



Working Paper No. 1

SUMMARY OF EXISTING CONDITIONS

Central Phoenix Transportation Framework Study



Bus Network



Freeway Network



Rail Network



Sustainability and Livability



Arterial Network



Commercial Vehicle Movements



Intelligent Transportation Systems



Bike and Pedestrian Movements

Prepared for



In Association With



and the following Project Partners

Arizona Department of Transportation (ADOT)

Federal Highway Administration (FHWA)

City of Avondale

City of Chandler

City of Glendale

City of Mesa

City of Peoria

City of Phoenix

City of Tempe

City of Scottsdale

Town of Guadalupe

Town of Paradise Valley

Gila River Indian Community

Salt River Pima-Maricopa Indian Community

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1.0 Introduction

This Working Paper has been prepared to establish a database of existing transportation, socioeconomic, and environmental information that will provide a foundation for future mobility analyses. The inventory of existing conditions presented herein will catalogue, review, and summarize the following:

- Relevant information, studies, reports, and data available through MAG, study partners, and key stakeholders;
- Pertinent information and data establishing the existing and projected future socioeconomic characteristics of the study area;
- An Environmental Overview presenting information and data relating to the cultural and physical (natural and manmade) characteristics of the study area;
- Available land use, development, and land ownership maps for the study area;
- Information and data relating to the existing multi-modal transportation system serving the study area, including: freeways, primary arterial streets, public transit, bicycle routes, pedestrian facilities and amenities, and rail freight and trucking operations;
- Identification of key public safety issues and concerns associated with travel and mobility within and through the study area;
- Information and data relating to the efficiency and effectiveness of the existing multi-modal transportation system, including identification of existing bottlenecks and zones of significant congestion, traffic operating characteristics, average travel speeds, safety “hot spots,” baseline Intelligent Transportation System (ITS) capabilities, and freight services and operations;
- Future Regional Transportation Plan improvements, assumed as committed, also are highlighted.



1.1 Purpose of Study

The Central Phoenix Transportation Framework Study is one study out of a series of Statewide Framework Studies being conducted in conjunction with the Building a Quality Arizona (BQAZ) process. BQAZ is sponsored by Arizona's Councils of Governments (COGs), metropolitan planning organizations (MPOs), the Governor's Office and various Legislative Committees. Two previous studies conducted by the Maricopa Association of Governments (MAG) set the precedent for the BQAZ framework study process: the Interstate 10 (I-10)/Hassayampa Valley Transportation Framework Study and the I-8 and I-10/Hidden Valley Transportation Framework Study. The Statewide Framework Studies focus on identifying transportation needs under Buildout conditions, which are expected to manifest in 40 to 60 years. The intent of these efforts is three-fold: (1) anticipate potential travel demand associated with intense population growth and economic activity; (2) identify multi-modal transportation systems necessary to accommodate forecast mobility needs; and (3) assure necessary rights-of-way are preserved to allow for the construction of a multi-modal transportation network capable of supporting such growth.

1.2 Study Area

The Phoenix metropolitan area is located in the south central portion of Arizona and includes all of Maricopa and Pinal Counties in Arizona. The most densely developed urbanized portion of the Phoenix metropolitan area largely is confined to Maricopa County. Figure 1-1 presents a map of the study area and shows its relationship to the Phoenix metropolitan area and the State. The study area encompasses approximately 620 square miles (388,000 acres) and focuses on the portions of the City of Phoenix and contiguous suburban

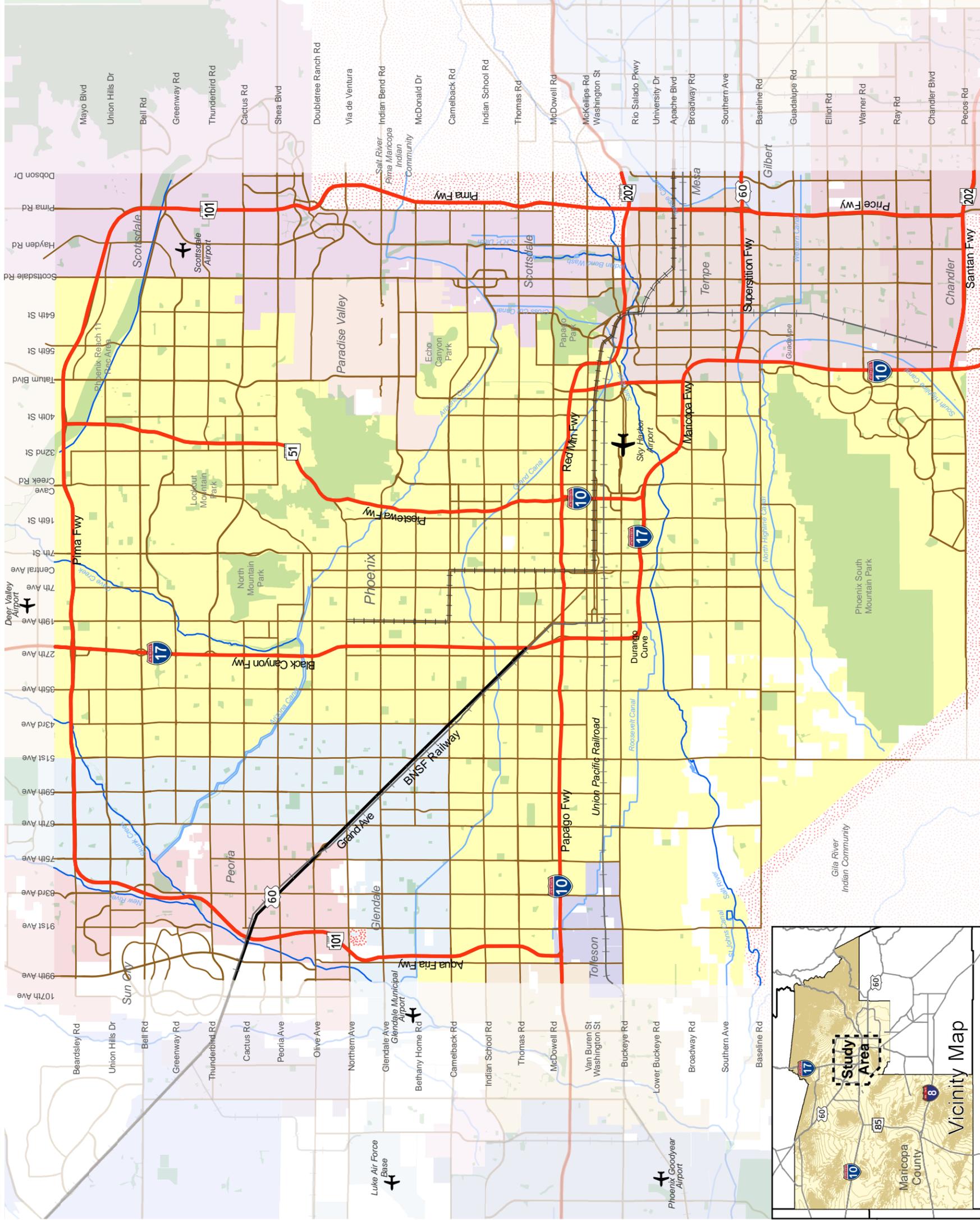


Figure 1-1
Study Area And
Location Map

Legend

- Freeway
- Highway
- Major Road
- Railroad
- Light Rail
- Park/Open Space Preserve
- River/Stream
- Canal
- Airport
- Indian Reservation
- Maricopa County



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

- Bus Network
- Freeway Network
- Rail Network
- Sustainability and Liability
- Aerial Network
- Commercial Vehicle Movements
- Intelligent Transportation Systems
- Bike and Pedestrian Movements

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communities within the Loop 101/Loop 202 corridors – the developed urban core of the Phoenix metropolitan area. For purposes of consistency and clarity of discussion, the following convention for referencing freeways within the study area has been adopted:

- Papago Freeway (Papago) – Interstate 10, SR-101 (Agua Fria Freeway) to Jct I-10/I-17 southwest of Sky Harbor International Airport;
- Maricopa Freeway (Maricopa) – I-17 (Black Canyon Freeway) at the Durango Curve to I-10 (Papago), then I-10 to SR-202 (Santan/South Mountain Freeway);
- Black Canyon Freeway – I-17 at the Durango Curve to SR-101 (Agua Fria/Pima Freeway);
- Piestewa Freeway – Jct I-10 (Papago)/SR-202 (Red Mountain Freeway) to SR-101 (Pima Freeway);
- Agua Fria Freeway – SR-101 from I-10 (Papago) to I-17 (Black Canyon);
- Pima Freeway – SR-101 from I-17 (Black Canyon) to SR-202 (Red Mountain);
- Price Freeway – SR-101 from SR-202 (Red Mountain) to SR-202 (Santan);
- Santan Freeway – SR-202 from SR-101 (Price) to I-17 (Maricopa);
- South Mountain Freeway (Future) – I-10 (Maricopa) to I-10 (Papago);
- Hohokam Expressway – SR-202 (Red Mountain) to I-10 (Maricopa).



1.3 Background

The Central Phoenix Transportation Framework Study (CPHX), while having the same focus as the previously completed framework studies, is examining the transportation system already serving a complex and intensely developed urban area rather than large areas of undeveloped land. The planning dialogue and evaluation for the prior studies concentrated on identifying the potential land use patterns at Buildout and how it can be supported with a multi-modal transportation system. In contrast, the CPHX study area is in an urban setting, with an established transportation system. In addition, communities are considered to be at or anticipating to be at Buildout within a shorter planning horizon. It is important to note that Buildout does not imply the end of development. "Buildout" refers to the general development of available land at some hypothetical foreseeable maximum at an unspecified future date. MAG has established assumptions for Buildout conditions based on information provided by its member jurisdictions. However, Buildout recognizes that significant, even insurmountable, constraints will exist for transportation facilities due to the inability to secure adequate rights-of-way.

Thus, this study focuses on the impacts of foreseeable infill development in Downtown core areas and urban activity centers located in Phoenix, Glendale, Peoria, Scottsdale, Tempe, Chandler, and smaller communities. In each community, infill development and increasing development densities must be considered in terms of potential impacts on local mobility, sub-regional travel between communities, even travel through the study area. Also, transit implications and the orientation of new development actions to alternative modes, such as pedestrian and bicycle must be considered. Equally important is the role of rail and freight services within the study area. Rail service represents a linear transportation feature that must be examined with respect to potential impediments to through traffic movements and, therefore, roadway capacity. Trucking activity at the interstate, intrastate, and local levels largely is integrated with non-truck traffic. Freight movements by truck are absolutely necessary to day-to-day economic activity. Therefore, the examination of means for efficient and expedited through movements of trucks and better accommodation of delivery/access at destinations in the study area will aid in creating a more effective and safe transportation system.

Developing a long-term perspective regarding the interaction of land use and all travel modes will aid in fostering a more efficient primary roadway system and stimulating mixed-use activity centers more apt to

support optimal mobility for area residents and businesses. Therefore, this study has been defined to anticipate new or expanded development patterns and determine how the transportation system can best respond to Buildout conditions. Centers of special interest include: the Scottsdale Airpark area, a rejuvenated McDowell Road Corridor, the Phoenix Villages, Westgate City Center and associated sports complex, Peoria Sports Complex and associated commercial and residential development, Chandler Fashion Center and associated commercial district, and Desert Ridge, and associated commercial and residential development. In addition, attention will be given to the potential impact of expanding Native American economic development efforts on the southern and eastern fringes of the study area.

Responsive, proactive planning activity, defines the essence of this study. Study activities involve examining all transportation resources and services to determine how they interact today. The understanding gained from this evaluation will be used to identify appropriate policy actions and project alternatives to improve the efficiency of their use and enhance mobility opportunities as the study area approaches Buildout conditions. Notwithstanding identification of immediate solutions to critical systemic needs (e.g., bottlenecks), responsive planning activity seeks to foresee the ultimate transportation needs and travel desires of the community and respond with realistic improvement options. Attention will be given to examining future social and economic trends to determine how transportation needs and desires are likely to change in the future. Innovative transportation solutions will be defined and evaluated that reasonably could be expected to accommodate those changes and improve travel opportunities and overall mobility.

Transportation system planning activities undertaken during this study seek to be responsive to social and economic needs of the study area by better integrating the various physical facilities and services of alternative modes. This will involve evaluating the different ways various modes operate, how they can interact, what the interface between modes looks like, and how efficient interfaces can be created. Key to this evaluation will be gaining an understanding as to how the various modal interactions can best serve not only the present or near-term transportation needs of the current community, but, also, the future "Buildout" community, which may evolve to an entirely different form.



1.4 Organization of Report

This Working Paper has been prepared to provide a sound basis for examining the current characteristics of the study area and how those characteristics relate to the transportation system and resident mobility, particularly with respect to Buildout. Defining Buildout requires an estimate of the future population levels the study area will support in 40 to 60 years, given an understanding of past and current trends. The same holds for employment: to assess the adequacy of the transportation to support economic activity and growth, the location and magnitude of employment and employment centers must be identified with some degree of reliability.

Several independent studies addressing various components of the study area's transportation system and future development currently are on-going or recently were completed. Findings and conclusions from these studies provide a foundation and a context for understanding mobility needs and developing a set of transportation system alternatives to accommodate those needs. Chapter Two of this Working Paper provides a summation of pertinent references used to aid the study process and facilitate integration of information from each of these studies into a cohesive vision for the future transportation network.

Chapter Three presents information and data relating to the socioeconomic characteristics of the study area. The discussion in this chapter includes an assessment of growth potential and expectations for future population and employment levels. It also addresses the issue of environmental justice, a concept that defines certain protections for the low-income, minority, and elderly population of the community with regard to the implementation of transportation improvement projects.

Chapter Four presents an environmental overview of the study area. This chapter highlights key environmental features that need to be considered when evaluating potential transportation improvements. Physical features include cultural and historical sites, major utilities, major drainage facilities, noise patterns, parks and trails, and hazardous materials sites. The natural environment of the study area is discussed in terms of geotechnical conditions, visual and aesthetic qualities, threatened and endangered species, water resources, and air quality.

Land use and development patterns give geographic definition to population and employment concentrations that need to be served by the transportation system. Chapter Five provides displays showing the distribution of land use types and land ownership. Major known planned/proposed developments are identified and significant economic development initiatives are discussed. The chapter ends with an assessment of expectations for the future urban development pattern in the study area.

Chapter Six addresses the various components that form the existing transportation system. An inventory of key highway and street systems is provided as well as concepts proffered for improvement. The public transit system is highlighted and plans for expansion discussed. Bikeways and pedestrian-friendly areas are identified as a means of integrating possible improvements with the major streets network. Goods movement also is addressed in terms of rail freight services and commercial trucking. Finally, key public safety issues and concerns associated with the current transportation system are highlighted.

Ultimately, all data and information in the previous chapters provides a basis for examining the efficiency and effectiveness of the existing transportation system. The assessment presented in Chapter Seven focuses on current areas of significant congestion, critical operating characteristics that reflect mobility, and progress in developing ITS components to improve operational performance of the transportation system. In addition, less recognizable aspects of the transportation system are discussed; specifically, the transportation system's critical role in goods movement and the need to have established, clearly defined emergency routes to expeditiously effect evacuations, as may be necessary.



2.0 Pertinent Community References

Numerous independent studies have been conducted that address various components of the transportation system and its components in the Central Phoenix study area. Some are in process, others have been completed in recent years, and still others are foundational studies from several years back that have guided the way to this point. Discussions, findings, and conclusions reported from these studies have relevance to this study in that they can provide system information and a context for proceeding with definition of an overall long-range framework for major transportation system improvements. Thus, an important aspect of this study will be integration of relevant information from each of these studies as may be appropriate and effective for developing a vision for the future transportation system. A summary of the findings and conclusions from these sources is provided in the first section of this chapter. Numerous other sources are listed for specific reference during the course of this study, as may be deemed necessary or appropriate in the context of identifying and evaluating potential improvement actions or projects.

2.1 Regionally Significant Transportation Planning Sources – A Review

Of the many many studies and reports pertinent to the study, a few stand out as being the more recent declarative position of the region’s leaders. These studies are summarized below.

2.1.1. Transportation – General: Phoenix Area Central Core Freeway Program Peer Review

ADOT, in a collaborative action with MAG, commissioned a Peer Review to evaluate design concepts and alternative approaches/solutions associated with the Proposition 400 freeway program. The results of this Peer Review provide sound guidance for examining the Central Phoenix transportation system and defining potential solutions to issues and concerns associated with long-term growth. The Peer Review panel introduced an integrative, systematic approach to transportation system evaluations that seeks to optimize multiple community goals, including economic development, livability, environmental protection, and equity. Two key planning paradigms were introduced: focus on the purpose of transportation, which is the efficient movement of people and goods (rather than the movement of vehicles); and maximize transportation network effectiveness through balanced utilization of all modes.

The panel noted that analyses and studies to achieve modal integration needed to focus on multiple modes and even multiple corridors: “Evaluation of and planning for individual modes in isolation from the operations, effects, and opportunities of other modes contradicted the objective of establishing an efficient and effective “transportation system.” The Peer Review panel recommended an integrated planning strategy that would promote collaborative and coordinated decision-making in the region. This recommendation is being implemented with this study.

2.1.2. Transit Framework Study

The Maricopa Association of Government’s (MAG) *Regional Transit Framework Study* (RTFS) was undertaken to identify actions that would attract new transit riders and improve transit service for existing customers. It is a component of the BQAZ planning process supported by the Arizona Department of Transportation (ADOT), and it will serve as an input into a comprehensive statewide multi-modal transportation planning framework. The RTFS involved review of previous studies, input from the community, Peer Review of transit services in the MAG region, and technical review of regional mobility needs and deficiencies. The process used during this study resulted in the identification of service deficiencies, notably: overcrowding in high-demand corridors, insufficient capacity in the planned system, inadequate infrastructure, insufficient and inconvenient service area coverage, service impacts due to congestion, and lack of adequate funding.



The RTFS assisted MAG in identifying four critical categories of regional transit needs: (1) new and expanded transit services, (2) new service corridors, (3) higher-speed travel opportunities, and (4) new revenue sources. To address these critical needs, three regional transit scenarios for improving transit service in the MAG region were developed for implementation through 2030. The scenarios build on transit enhancements that already have been identified in the MAG Regional Transportation Plan (RTP) and funded through Proposition 400 and local sources. The RTFS also set the stage for potential future services to serve the community beyond 2030.



2.1.3. Alternative Modes of Travel – Commuter Rail Strategic Plan

Recent studies indicated commuter rail service, operating on existing freight rail lines or within existing railroad corridors, could offer an alternative transportation mode to relieve congestion on the freeway system. Proposition 400 includes an allocation of sales tax revenues to study commuter rail options. The MAG *Commuter Rail Strategic Plan* (CRSP) established five sub-areas for which service concepts and timing for implementation have been identified. The focus of these sub-areas is Central Phoenix; therefore, each conjoins the major components of the central freeway system and intersects with the ring freeways. The CRSP incorporates a Vision Plan for commuter rail in the region. With completion of the subsequent *Commuter Rail System Study*, a “Get Started” scenario has been proposed for the Southeast Corridor – Central Phoenix to Queen Creek. Specific studies have been completed that evaluate in greater detail commuter rail possibilities in the Grand Avenue Corridor and the Yuma West Corridor.

2.1.4. Regional Transportation Plan

The RTP is a comprehensive, performance based, multi-modal 20-year regional plan covering the period through Fiscal Year (FY) 2031. The RTP is prepared, updated, and adopted by MAG, serving as the regional planning agency for the Maricopa County area. Key programming and funding elements of the RTP are coordinated among all the 25 incorporated cities and towns within Maricopa County that are member agencies of MAG. The full RTP is developed through a cooperative effort among government, business, and public interest groups. This regional effort includes an aggressive community outreach and public involvement program. The RTP covers all major modes of transportation from a regional perspective, including freeways/highways, streets, public mass transit, airports, bicycles and pedestrian facilities, goods movement, and special needs transportation. It also addresses key transportation-related development activities, such as transportation demand management (TDM), system management, safety, security, and air quality conformity analysis. The regular update process seeks to maintain the balance between program costs and reasonably available revenues, expected over the period of the RTP. Due to the current nationwide economic recession, the life cycle programming process the past several years, addressing the key transportation modes - freeways, arterials, and transit, has had to take into account major project cost increases, as well as falling revenue collections. As a result of significantly reduced revenue forecasts for all member agencies and federal and state programs, achieving a balance between costs and revenues has been particularly challenging. Consequently, caution must be exercised when reviewing the implications of current program and service cuts by MAG and study area communities relative to long-term (Buildout) growth and development in the study area.

2.2 Pertinent Information and Findings from Affected Communities

During conduct of the Central Phoenix Transportation Framework Study, several communities will be updating their General Plans, as required by state law once every ten years. In October 2009, the City of Phoenix kicked off Phase I of its General Plan update with public “Visioning Workshops.” As such, the General Plan provides a comprehensive direction for the growth, conservation, and redevelopment for all land use aspects of the City. The City is working closely with each of the 15 Village Planning Committees and residents to discuss and evaluate a host of community growth and development matters. Phase II of the General Plan update, “Policy Plan,” recently was initiated. The Plan will be presented to the public for

approval during the August 2011 election. Although the City of Phoenix accounts for the majority of the study area, adjoining municipalities also have General Plans, and many of those plans have recently been updated or are being updated. This study will be sensitive to the content, goals, and objectives of these plans. The City of Scottsdale has begun a similar process that will be running simultaneously with the framework process.



2.3 Potentially Relevant Studies and Reports

In preparation for this study, over 250 sources of potentially relevant information were identified. These sources are in the form of study results in published reports, policy and planning documents (such as General Plans) of various agencies and jurisdictions, concept documents, maps, and Web sites, where ongoing activities are reported. These sources offer potentially pertinent and valuable insight into the direction and focus of regional and local transportation planning activity and various portions of the study area as a whole, which represents the core of the Phoenix metropolitan area.

2.3.1. Key Reference Materials Pertinent to the Current Study

Maricopa Association of Governments (MAG)

Annual Report on Proposition 400. Current Year (2009).
Central Phoenix Peer Review Summary, Draft. March 5, 2009.
Commuter Rail Strategic Plan. MAG. March, 2008.
Commuter Rail System Study. MAG. 2010.
Complete Streets Plan. MAG. July 12, 2010.
FY 2008-FY 2012 Transportation Improvement Program (TIP).
Grand Avenue Commuter Rail Corridor Development Plan. MAG. 2010.
Intelligent Transportation Systems (ITS) Program.
ITS Strategic Plan Update, Final Report. MAG. April, 2001.
Pedestrian Plan 2000, Final Report, December, 1999.
Pedestrian Policies and Design Guidelines. MAG. April, 2005
Multi-Modal Transportation Performance Measurement. MAG Web site.
Non-Recurring Congestion Study. Ongoing since Feb 5, 2010; Scheduled Completion: August, 2011.
Regional Bikeway Master Plan and Bike Map. 2008.
Regional Bottleneck Study. MAG. 2002.
Regional Plan on Aging and Mobility. March, 2002.
Regional Transit Framework, Final Report. January 8, 2010.
Regional Transportation Plan, 2007 Update, Final Version. July, 2007.
Regional Travel Time and Speed Study, Final Report. 2007.
Socioeconomic Projections of Population, Housing, and Employment by Municipal Planning Area and Regional Analysis Zone. May, 2007.
Tentative Scenario for the MAG Regional Freeway & Highway Program. MAG Presentation. October 13, 2009.
Yuma-West Commuter Rail Corridor Development Plan. MAG. 2010.

Arizona Department of Transportation (ADOT)/bqAZ

Arizona Multimodal Freight Study. 2008.
Arizona's Wildlife Linkages Assessment. ADOT, et.al. 2006
Emergency Response and Recovery Plan. AZ Division of Emergency Management. December, 2003.
I-17/Black Canyon Freeway Corridor Improvement Study/EIS – South of Loop 101. ADOT Web Site. Ongoing.
Interstate 10 (I-10) Phoenix/Tucson Bypass Study. 2008.
South Mountain Transportation Corridor Study. ADOT Web Site. Ongoing.

City of Phoenix

City of Phoenix High Capacity Transit Corridor Study. IBI. June, 2009.

Green Rail Corridor Demonstration Project. City of Phoenix Web Site. Ongoing.

City of Scottsdale

2008 Scottsdale Transportation Master Plan. January 13, 2009.

Airpark Circulation Study, Raintree Drive Interchange Area. Ongoing.

City of Tempe

General Plan 2030 – Transportation Element. December 4, 2003.

Tempe Comprehensive Transportation Plan.

Gila River Indian Community

General Plan.

GRIC Borderlands Study. 1998.

GRIC Seven Districts Master Plan. Currently in process.

GRIC Small Area Transportation Study. 2010.

GRIC Transit Study. Currently underway.

Long-Range Transportation Plan Update. Ongoing.

Maricopa County

Maricopa County Regional Trail System Plan. August 16, 2004.

MCDOT TIP Ongoing Projects.

Valley Metro

I-10 West Alternatives Analysis/EIS).

2007 Origin and Destination Study.

Freeway BRT Operational Plan.

Regional Paratransit Study.

Salt River Pima Maricopa Indian Communit

2010 Long-Range Transportation Planning Study. Ongoing.



2.3.2. Potentially Relevant/Location-Specific Materials Pertinent to the Current Study

Maricopa Association of Governments (MAG)

Access Management Principles. MAG Web site.

East/West Mobility Study. MAG. February, 2002.

High Occupancy Vehicle Facilities Policy Guidelines for the MAG Freeway System. ADOT & MAG. December, 2002.

I-10 Integrated Corridor Management System. August 31, 2007.

Methodologies for Evaluating Congestion Mitigation and Air Quality Improvement Projects. April 16,

Regional ITS Communications Plan, TechMMO #4. August 2007.

Regional ITS Architecture Project. 2008.

Regional Community Network (RCN) Project Implementation.

Regional ITS Communications Network (RCN) Project Implementation.

Traffic Signal Optimization Program (TSOP).

Transportation Safety Planning Program.

Arizona Department of Transportation (ADOT)/bqAZ

AZ State Highway Access Management. ADOT. Draft 2008 - Ongoing.

Arizona State Rail Plan. bqAZ (ADOT). January, 2010.

Statewide Roadway Incident Management Plan. 2000.

Arizona Statewide Long-Range Transportation Plan (MoveAZ).

Arizona Tribal Strategic Partnering Team (ATSPT).

Pedestrian Safety Action Plan Study. 2009.

Maricopa County Department of Transportation (MCDOT)

*AZ Parkway, Series of studies and reports. MCDOT
MCDOT Transportation System Plan, February, 2008.*

City of Avondale

*Avondale Transportation Plan. October, 2006.
City Center Specific Plan. August 11, 2008.
Economic Development Strategic Plan. June, 2006.
Freeway Corridor Specific Plan. June, 1991.
General Plan 2002 and General Plan 2030 Update
North Avondale Specific Plan. June, 1992.
Tres Rios Greenway Specific Plan. April, 1997.*

City of Chandler

*Airpark Area Plan. November 5, 1998.
Chandler General Plan. June 26, 2008.
Chandler Redevelopment Element. July 13, 1995.
High-Capacity Transit Major Investment Study, Final Report. July, 2003.
Santan Freeway Corridor Area Plan. October 28, 1999.
South Arizona Avenue Corridor Area Plan. January 17, 2008.
South Arizona Avenue Design Guidelines. 2010.
Southeast Chandler Area Plan. September 19, 1999.
Transportation Master Plan Update, Final Report. April, 2010.*

City of Glendale

*City Center Master Plan. July 23, 2002.
Historic Preservation Plan and Ordinance. November 28, 2006.
Historic Preservation Plan. July 8, 2003.
Glendale 2025 – The Next Step (General Plan)
Glendale Transportation Master Plan.
North Valley Specific Area Plan. December 12, 1989.
West Glendale Avenue Design Plan, February 12, 1991.
Western Area General Plan Update. June 4, 2002.*

City of Peoria

*Peoria's Sustainability Action Plan (SAP). Peoria. 2009
Peoria Multimodal Transportation Plan. 2010.
Peoria Sports Complex District Urban Design Plan. 2009.*

City of Phoenix

*Downtown Phoenix Plan. Urban Form Project. July 2, 2008.
Street Classification System, General Policy Document and Technical Supplement and Map. July 8, 1992.*

City of Scottsdale

*Bicycle Element, Scottsdale Transportation Master Plan. January, 2008.
Downtown Plan. 2009
Greater Airpark Character Area Plan. Ongoing.
ITS Strategic Plan.
Scottsdale Design Standards and Policies Manual. 2009
Scottsdale General Plan 2011 Update – Future Focus. March, 2002.
Scottsdale Road Design Guidelines. 2008.*



City of Tempe

ASU Comprehensive Development Plan.
Broadway Road Streetscape Bike/Ped Improvement Project. In process.
Downtown Redevelopment Concept Plan.
Historic Preservation Plan.
Tempe Zoning & Development Code (includes TOD).
Tempe General Plan 2030. June 2009.
Tempe South Corridor Study. In process.

City of Tolleson

Tolleson General Plan. September 25, 2008.
Tolleson Towne Center. December 22, 2008.

Maricopa County

Comprehensive Plan 2020, Eye To The Future. October 20, 1997; Rnsd August 7, 2002.

Salt River Pima Maricopa Indian Community

General Plan and Land Use Map. December 13, 2006.

Valley Metro

2007 Service Efficiency and Effectiveness Report.
Park-and-Ride Re-Prioritization Study.
RTP 20-Year Program.



2.3.3. Known/Available Materials Pertinent to the Current Study

Maricopa Association of Governments (MAG)

A Resource for Policy Makers in the Maricopa Region. 2009.
Environmental Sensitive Development Areas (ESDA) Policies and Guidelines, MAG Desert Spaces. Regional Report. July, 2000.
Freeway Level-of-Service Study. 2006.
Grand Avenue Major Investment Study. Phase II. February, 2006.
Grand Avenue Northwest Corridor Study, SR-303L to SR-101L. January, 2003.
Growing Smarter Implementation Project, Final Report. 2002.
Growth Impacts and Challenges – AZ and the MAG Region. MAG. November, 2005.
High Capacity Transit Plan, Final Report. 2003.
Human Services Coordination Transportation Plan. 2007.
MAG and PAG 2008 External Travel Study. Final Report 2009.
Northwest Area Transportation Study (NWATS). September, 2003.
Park-and-Ride Study and Map. January, 2001.
Regional Concept of Transportation Operations, Final Report. November, 2003.
Regional Congestion Study. September 29, 2000.
Regional Off-Street System Plan (ROSS). 2000.
Southeast Maricopa/Northern Pinal Transportation Study. 2003.
Southwest Area Transportation Study (SWATS). September, 2003.
Strategic Transportation Safety Plan, Final. October 26, 2005.
Transportation Ambassador Program.
Transportation Data Management System.

Arizona Department of Transportation (ADOT)/bqAZ

Freeway Coordination Issues & Strategies for Transportation Planning. January 29, 2003.
High-Occupancy Toll (HOT) Facilities Policy Guidelines & Plan for the MAG Freeway System. June 2002.

Interstate 17 (I-17) Alternatives Study. 2007.
Statewide Bicycle and Pedestrian Plan. August, 2003.
Statewide Rail Framework Study. bq-AZ (ADOT).

City of Chandler

General Plan, 2008.
High-Capacity Transit Major Investment Study. Final Report. July, 2003.
Transportation Master Plan Update. Final Report. April, 2010.
South Arizona Avenue Corridor Area Plan. January 17, 2008.

City of Glendale

Glendale 2025, The Next Step – General Plan
North Valley Specific Area Plan. December 12, 1989.
Western Area Plan (Western Area General Plan Update). July 4, 2002.
West Glendale Avenue Design Plan. February 12, 1991.

City of Mesa

Citrus Sub-Area Plan. April 21, 2003
Desert Uplands Sub-Area Plan.
Economic Development Strategy. June 20, 2002.
Falcon Field Sub-Area Plan. April 2, 2007.
Gateway Strategic Development Plan. December 8, 2008.
Lehi Sub-Area Plan. January 23, 2006.
Mesa 2035 General Plan. A Shared Vision.
Mesa Grande Sub-Area Plan
Mesa Historic Preservation Plan. May 6, 2002.
Mesa Town Center Concept Plan. December 20, 1999.
Parks & Recreation Master Plan. August 5, 2002.
Transportation Master Plan. June 24, 2002.
West Main Strategic Plan. December 3, 2007.
West Main Street Area Plan, A Community's Vision. November 15, 2007.
Williams Gateway Sub-Area Plan.

City of Peoria

2008 Growth Trends Manual. Peoria. 2008
Bicycle Development Plan. June 2007.
City of Peoria 2010 General Plan.
Downtown Redevelopment Plan. Peoria.
Old Town Peoria Revitalization Plan. December 15, 2009.
Peoria Multimodal Transportation Plan. Currently underway.
Peoria Sports Complex District Urban Design Plan.

City of Phoenix

19th Avenue and Greenway Road Multiuse Pedestrian-Bikeway Bridge.
Arts, Culture and Small Business Overlay Expansion District. April 2, 2008.
Black Canyon/Maricopa Freeway Specific Plan. December, 1998.
Campo Bello Land Use Study.
Central City South Area Plan. June 2, 2004.
Central City Village Plan, January, 1998.
Citywide Retail Market Analysis.
Desert Ridge Specific Plan. July 1990.
Development Plans for the City of Phoenix Biomedical Campus.



Downtown Phoenix: A Strategic Vision and Blueprint for the Future. December 2004.
Freeway Mitigation and Enhancement Ideas. July, 1998.
Garfield Redevelopment Plan. March 17, 1999.
Greenway Road Land Use Study. April 26, 2010.
Happy Valley Road Land Use Study. December 10, 2008.
Light Rail Transit Station Area Planning Program.
Maricopa County Multi-Jurisdictional Hazard Mitigation Plan -2009. Jurisdictional Summary for the City of Phoenix.
Outer Loop Freeway Specific Plan – Agua Fria & Pima Freeways (Loop 101). February 15, 1995.
Peripheral Areas C and D, General Plan. October, 1987.
Phoenix General Plan 2002. December 5, 2001.
Phoenix Transit Plan 2000.
Rio Salado Beyond the Banks Area Plan. December 17, 2003.



Encanto Village

- *3rd Street Promenade Report*
- *7th Avenue Urban Main Street Overlay*
- *7th Avenue / 7th Street Reversible Lane Studies*
- *Black Canyon/Maricopa Freeway Specific Plan*
- *Canalscape Located at 7th Street and Canal*
- *Indian School, Phoenix Specific Plan*
- *Willo Neighborhood Conservation Plan*

Estrella Village

- *Estrella Village Plan*
- *Estrella Village Arterial Street Landscaping Program*

Laveen Village

- *Central Laveen Commercial District Pedestrian Mall Demonstration Project*
- *Laveen Southwest Growth Study*
- *Rural Street Design Policies (future)*

Maryvale Village

- *67th Avenue Streetscape*
- *Black Canyon/Maricopa Freeway Specific Plan*
- *Crickent Pavilion 79th Avenue and Encanto*
- *Maryvale Core Plan*
- *Safe Routes to School*

North Gateway Village

- *Carefree Highway Scenic Corridor Design Policies*
- *North Black Canyon Corridor Plan*
- *North Gateway Village Core Plan*
- *West quarter of the C & D plan*

North Mountain Village

- *Black Canyon/Maricopa Freeway Specific Plan*
- *Hatcher Road Overlay*
- *Royal Palm Special Planning District Plan*
- *Sunnyslope/ Arizona Canal Demonstration Area Master Plan*

Paradise Valley Village

- *Outer Loop Specific Plan*
- *Squaw Peak Parkway Specific Plan*

South Mountain Village

- *Baseline Area Master Plan*
- *Esteban Park Area Plan*
- *Rio Montana Area Plan*
- *Rio Salado Beyond the Banks Area Plan*
- *South Phoenix Village Redevelopment Area Plan*

Alhambra Village

- *44th Street Corridor Specific Plan*
- *Black Canyon/Maricopa Freeway Specific Plan*
- *Camelback East*
- *Camelback East Primary Core Pedestrian Corridor Study Final Draft Assessment and Recommendations*
- *Camelback East Primary Core Specific Plan, 2006 Update Executive Summary*
- *North Central Avenue Special Planning District*
- *Squaw Peak Parkway Specific Plan*
- *Windsor Square Neighborhood Conservation Plan*

Central City Village

- *2nd Avenue Streetscape: Connect ped to rail, bus, employment, and commercial.*
- *3rd and 5th Avenue through Willo Roundabout Improvements*
- *7th Street and Buckeye Road Redevelopment Plan*
- *Black Canyon/Maricopa Freeway Specific Plan*
- *Capitol District Development Guidelines*
- *Downtown Phoenix Plan*
- *Downtown Redevelopment and Improvement Plan*
- *Garfield/11th Street Streetscape: Connect ped to rail, bus, employment, and commercial.*
- *Garfield Redevelopment Plan*
- *Good Samaritan Area Redevelopment Plan*
- *Governmental Mall Redevelopment Plan*
- *Rio Salado Beyond the Banks Area Plan*
- *Roosevelt Neighborhood Special District Plan*
- *Roosevelt Row Streetscape: Connect ped to rail, bus, employment, and commercial.*
- *Story Neighborhood Conservation Plan*
- *Transit Oriented Development 1*
- *Transit Oriented Development 2*

Deer Valley Village

- *Black Canyon/Maricopa Freeway Specific Plan*
- *Deer Valley Airport Plan*
- *Deer Valley Core Specific Plan*
- *Outer Loop Freeway Specific Plan*

Desert View Village

- *Carefree Highway Scenic Corridor Design Policies*
- *Cave Creek Road Scenic Corridor (requirements came from the Peripheral C & D Plan)*
- *Desert Ridge Specific Plan*
- *North Land Use Plan*

City of Scottsdale

Arizona Canal Corridor Plan (2008)
Downtown Pedestrian Mobility Plan (2007)
Economic Vitality Strategic Plan. In process.



General Plan Community Mobility Element. 2001
Greater Airport Character Area Plan. Currently underway.
Scottsdale Rd Design Guidelines (2008)
Southern Scottsdale Character Area Plan. Ongoing.

City of Tempe

Downtown/Mill Avenue District Community Design Principles.
Hayden Ferry South Development Guidelines.
Mill + Lake District Placemaking Guidelines (Urban Open Space/PPS Plan).
Northwest Tempe Neighborhoods Strategic Plan.
Old Town Tempe-Mill Avenue Rehabilitation Feasibility Study.
Parks & Recreation Master Plan.
Public Art Master Plan.
Southeast Quadrant Plan.
Tempe Standard Details (supplement to MAG).
Tempe General Plan 2030
Tempe Zoning & Development Code (includes TOD)
Town Lake Project Specific Area Plan.

Gila River Indian Community

Pinal County Enterprise Zone Area 1
Western Maricopa Enterprise Zone

Maricopa County

Estrella Area Plan. January, 1992.
Laveen Area Plan. February, 1992.
MCDOT TIP Projects completed in FY 2009.
White Tanks/Grand Avenue Area Plan. December, 2000.

Town of Guadalupe

Guadalupe General Plan.

Town of Paradise Valley

Paradise Valley General Plan. March 2003.

2.3.4. Regional and Local Transit Studies

Valley Metro

CP/EV LRT EIS (Metro).
I-10 West Alternatives Analysis/EIS (Metro).
RPTA Comprehensive Arterial Bus Rapid Transit Planning Study. September, 2009.
2008 Ridership Satisfaction Survey-Phoenix Market.
2009 Ridership Satisfaction Survey-Phoenix Market.
Origin and Destination Study.
Papago Intermodal Transfer Station Feasibility Study.
Passenger and Operating Facility Characteristics.
Short-Range Transit Plan.
Ridership Reports.

City of Phoenix

2008 Ridership Satisfaction Survey-Phoenix Market (RPTA).
2009 Ridership Satisfaction Survey-Phoenix Market (RPTA).
2010 Origin and Destination Study (RPTA).



*Bus Stop Handbook: Street Improvements for Transit.
T2000 Plan.*
*COP High Capacity Transit Corridor Study (City of Phoenix).
Efficiency and Effectiveness Report (RPTA).*
Freeway BRT Operational Plan (RPTA).
Green Rail Corridor (City of Phoenix).
Origin and Destination Study (RPTA).
Park-and-Ride Re-Prioritization Study (RPTA).
Phoenix Bus Bay Priority Study Update.
Regional Paratransit Study (RPTA).
Ridership Reports (RPTA).
RTP 20-Year Program(RPTA).
Short-Range Transit Plan (RPTA).



2.3.5. Economic Development Reports & Information Items

2007-12 Phoenix Economic Development Plan. April, 2007.
Avondale Economic Development Plan. June 13, 2006.
City of Tolleson Economic Development. August, 2007.
Discovery Triangle, Overview. December, 2009.
Gila River Indian Community, Community Profiles. AZ Department of Commerce.
Light-Rail Transit, Phoenix, Arizona, Economic Development along the Planned Light-Rail Line. ULI. December, 2001.
Map_City of Peoria Major Developments. City of Peoria Community Development. March, 2008.
Map_City of Phoenix Employment Centers. Phoenix Community and Economic Development Department.
Map_City of Phoenix Enterprise Zone. Phoenix Economic Development Department.
Map_Development Areas (2007). MAG. March, 2009.
Northern Peoria Growth and Development Study. 2009.

3.0 Socioeconomic Characteristics

There are three primary socioeconomic characteristics evaluated at this level of regional transportation planning: population, employment, and the potentially-affected low-income population. This chapter identifies the size and distribution of these three socioeconomic groups within the study area. It also provides an estimate of the future size and distribution of the groups, based on projections developed by MAG for the region.¹

3.1 Existing Study Area Population and Employment

MAG population projections are based on Municipal Planning Area (MPAs) identified for each of the member communities. For this study, an estimate of the existing population in the study area has been based on these MPAs. Table 3.1 provides a mid-Census estimate of the Year 2005 population in the study area prepared by MAG as the base for its Regional Travel Demand Model dataset.

| Category | Central Phoenix Study Area | Maricopa County | Study Area Share of County |
|------------------|----------------------------|-----------------|----------------------------|
| Dwelling Units | 896,867 | 1,479,646 | 60.61% |
| Total Population | 2,277,174 | 3,680,743 | 61.87% |
| Total Employment | 1,333,198 | 1,747,610 | 76.29% |

Prepared by Wilson & Company, July, 2010.

Source: Socioeconomic Analysis Zone (TAZI03), Maricopa Association of Governments, 07/07/2010.

In 2005, the estimated population in the study area was just under 2.3 million persons. This population was distributed among 897,000 dwelling units. The 2005 employment in the study area was estimated at slightly more than 1.3 million jobs.

The largest community in terms of both population and employment is the City of Phoenix (Table 3.2). This, of course, is to be expected, as the City forms the central core of the study area. The City of Phoenix MPA accounts for 61.2 percent of the study area population and 58.4 percent of its employment. Of the second tier communities (i.e., those with a population exceeding 100,000), City of Glendale leads the way with more than 230,000 persons. Even so, the Cities of Scottsdale and Tempe lead this group in employment. The City of Tempe actually reports more employment than population within the study area. The City of Tolleson exhibits this same relationship, reporting almost twice as many jobs as population.



¹ Socioeconomic Projections of Population, Housing and Employment by Municipal Planning Area and Regional Analysis Zone, MAG, May, 2007.

Table 3.2
STUDY AREA POPULATION BY MUNICIPAL PLANNING AREA: YEAR 2005

| Municipal Planning Area | Dwelling Units | Total Population | Total Employment |
|-------------------------|----------------|------------------|------------------|
| City of Avondale | 2,041 | 6,139 | 2,372 |
| City of Chandler | 36,041 | 94,107 | 45,466 |
| Maricopa County | 20,668 | 25,530 | 8,951 |
| GRIC | 7 | 28 | 3,521 |
| City of Glendale | 83,612 | 230,141 | 74,684 |
| Town of Guadalupe | 1,229 | 5,555 | 1,033 |
| City of Mesa | 21,366 | 51,644 | 26,782 |
| Town of Paradise Valley | 6,045 | 14,136 | 5,770 |
| City of Peoria | 43,038 | 112,462 | 30,198 |
| City of Phoenix | 522,458 | 1,394,150 | 778,946 |
| SRPMIC | 1,681 | 2,909 | 5,454 |
| City of Scottsdale | 86,371 | 167,917 | 160,993 |
| City of Tempe | 70,331 | 165,968 | 176,688 |
| City of Tolleson | 1,979 | 6,488 | 12,340 |
| Grand Total | 896,867 | 2,277,174 | 1,333,198 |

Prepared by Wilson & Company, July, 2010.

Abbreviations:

- GRIC = Gila River Indian Community
- SRPMIC = Salt River Pima-Maricopa Indian Community

Source: Socioeconomic Analysis Zone (TAZI03), Maricopa Association of Governments, 07/07/2010.



3.1.1. General Distribution of Study Area Population

The study area generally is substantially developed with the population occupying the majority of the land. Figure 3-1 depicts the distribution of the population by Transportation Analysis Zone (TAZ). The map shows areas with as few as one person per acre and areas with more than 30 persons per acre. The map showing the distribution of population densities generally reveals lower densities – less than 10 persons per acre – predominantly in the northeastern and southwestern portions of the study area. The most densely populated sector of the study area – greater than 30 persons per acre – is located between I-10 (Papago Fwy) and US-60/Grand Avenue. Numerous pockets of high population densities are located in the central portion of the study area, between I-17 and SR-51 and in the central portion of the City of Tempe along the Apache Boulevard corridor. Knowledge of the distribution of the population is important to developing reliable travel demand models, as the models use the TAZ structure to forecast travel opportunities and travel desires.

3.1.2. Regionally Significant Population Concentrations

Whereas population distribution as shown in Figure 3-1 is important to transportation planning and forecasting of movements within a network of roadways, an understanding of population concentrations helps to focus attention on areas where travel demand is likely to be the highest. Figure 3-2 shows more clearly how the population of the study area is concentrated in four primary sectors:

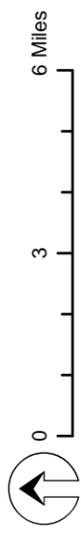
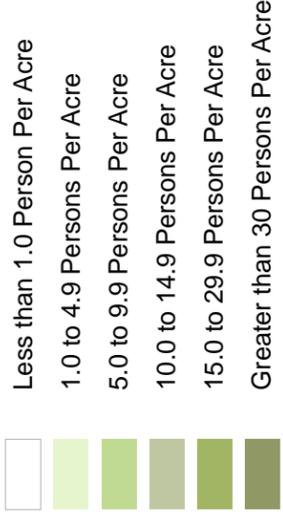
- An area of approximately 17 square miles between I-10 (Papago Fwy) and Camelback Road from east of 43rd Avenue to 91st Avenue in Phoenix;
- An area of approximately four square miles between Camelback Road and Glendale Avenue from 59th Avenue to west of 67th Avenue in Glendale;

Figure 3-1
Distribution of
Year 2005 Population



- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - ~ River/Stream
 - ~ Canal
 - ✈ Airport
 - City Boundary

Population Density by Traffic Analysis Zone (Year 2005)



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Socioeconomic Projections of Population, Housing and Employment by Municipal Planning Area and Regional Analysis Zone, Maricopa County, Arizona, Maricopa Association of Governments, May 2007.

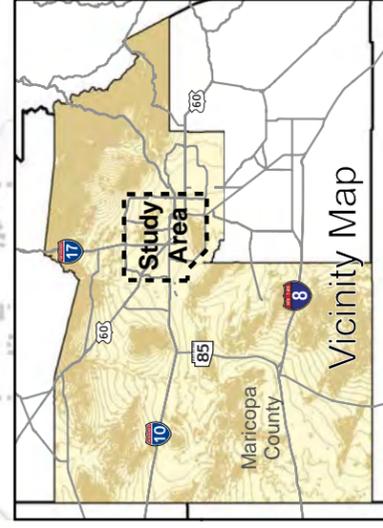
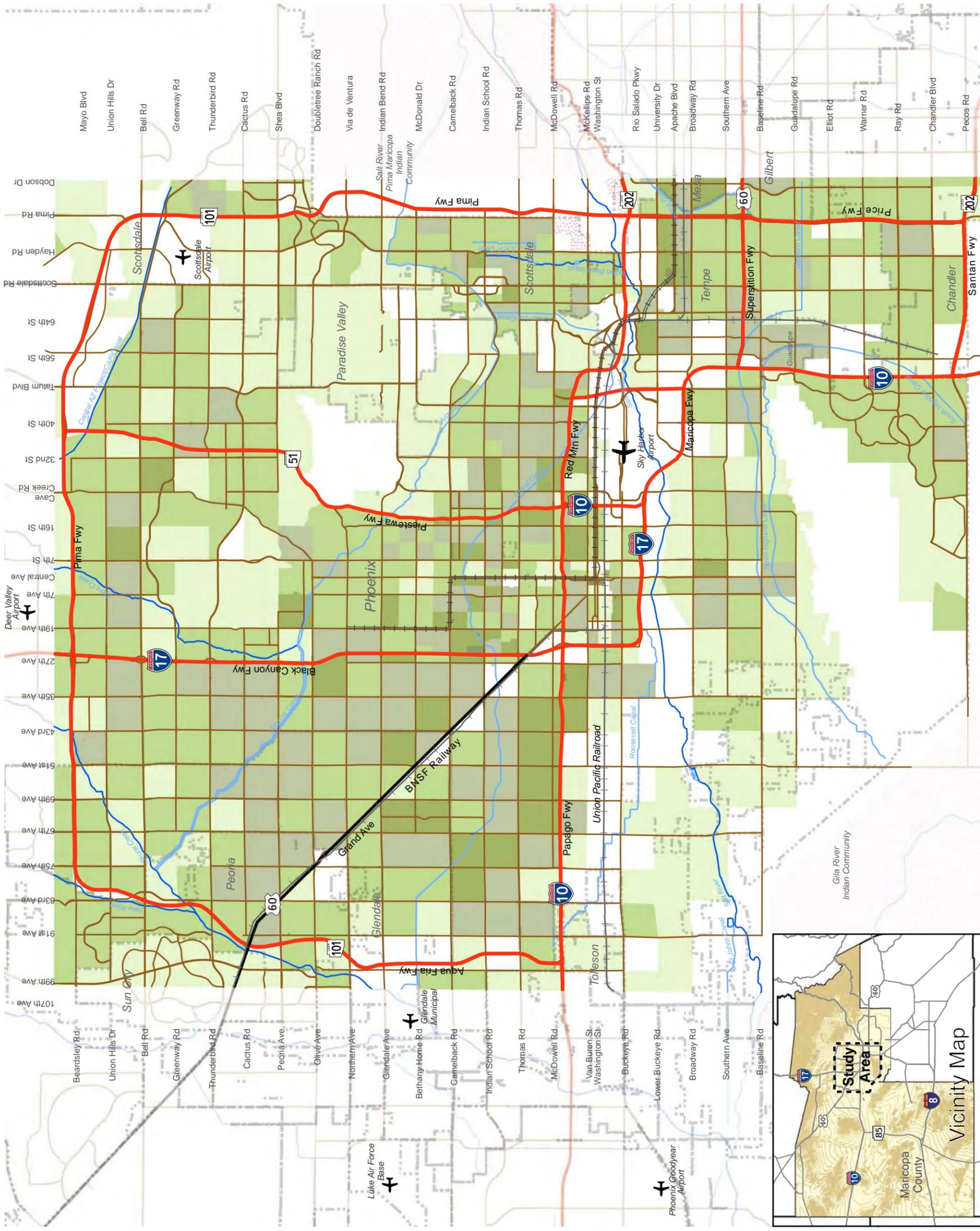
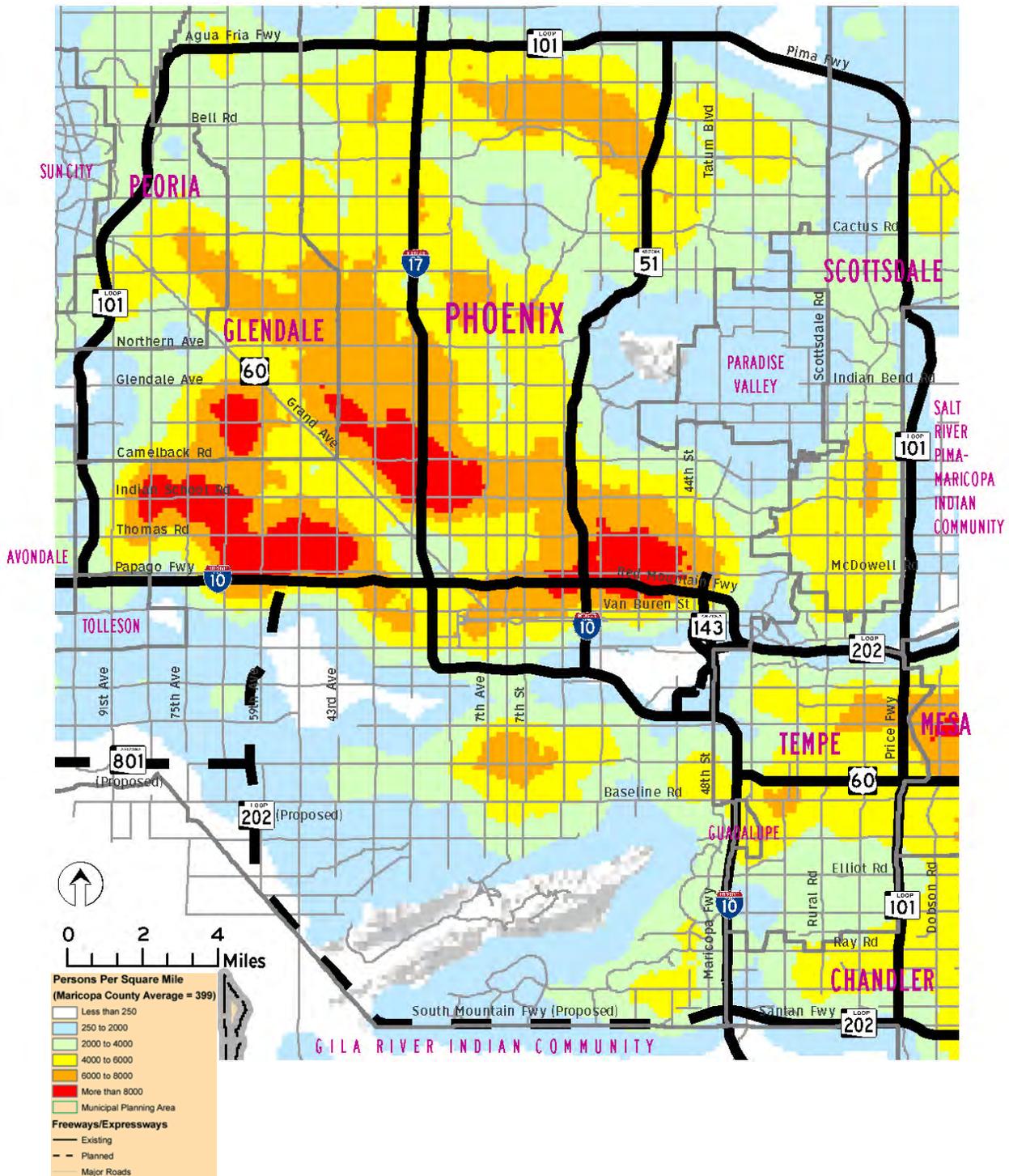


Figure 3-2
REGIONALLY SIGNIFICANT POPULATION CONCENTRATIONS



Source: Population Concentration 2005, *Socioeconomic Projections Documentation*, MAG, May, 2007.

- An area of approximately 10 square miles straddling I-17 from south of Indian School Road to Glendale Avenue in Phoenix; and
- An area of approximately of six square miles mostly north of Loop 202 (Red Mountain Fwy) and east of SR-51 in Phoenix.

The concentration of population in the areas identified above ranges from 6,000 persons per square mile to greater than 8,000 persons per square mile. The overall average for the study area is approximately 3,800 persons per square mile. In some respects, the concentration patterns of the population reflect the historic growth pattern of the Phoenix region, which in the early years had an orientation to US-60 originally comprised of Grand Avenue and Van Buren Street.

3.1.3. Employment

The pattern of employment in the study area generally does not reflect the population pattern. This is a natural pattern of urban development in that major concentrations of employment are not compatible with the places where people live.

General Employment Distribution

Figure 3-3 depicts employment density in the study area by TAZ. Comparing Figure 3-3 to Figure 3-1, it can be seen that the 1.3 million persons employed within the study area are more concentrated in certain areas, even pockets, than the residing population as a whole. The figure also reveals that employment is relatively uniformly distributed throughout the study area at a density 1.0 to 9.9 employees per acre. The greatest density of employment is present in the two core areas of the City of Phoenix, referred to as Downtown – between the railroad and I-10 (Papago Fwy), and Uptown – between McDowell and Camelback Roads. The density of employees in these areas reaches ranges from 24.9 to more than 100 employees per acre. The average density of jobs in the study area is approximately 3.35 employees per acre.

Regionally Significant Population Concentrations

The concentration of employees per square mile brings into focus a pattern that is almost opposite that of the population (Figure 3-4). In general, population is concentrated west of I-17, whereas are of high employment concentrations are east of I-17. But, again, the major concentration of employment is associated with the historic core of the study area – an area of approximately 15 square miles in central Phoenix. The 7th Avenue/7th Street corridor and the marginal areas to the west and east of this corridor support an employment density of 8,000 or more employees per square mile. An area with similar density extends from this core area, bulging into a two-square-mile area east of SR-51 between Indian School and Camelback Roads.

Four notable secondary areas of with high core concentration of 8,000 or more jobs per square mile are:

- East of I-17 between Northern Avenue and Cactus Road in Phoenix;
- The approximately four-square-mile area around Scottsdale Airport, known as Scottsdale Air Park in Scottsdale;
- The four-square-mile area of Downtown Scottsdale; and
- An industrial area occupying approximately six square miles southeast of Sky Harbor Airport, one-half of which is in Phoenix and one-half in Tempe.



Figure 3-3

Distribution of Year 2005 Employment



- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - River/Stream
 - Canal
 - Airport
 - City Boundary

Employment Density by Traffic Analysis Zone (Year 2005)

- Less Than 1.0 Employee Per Acre
- 1.0 to 9.9 Employees Per Acre
- 10.0 to 24.9 Employees Per Acre
- 24.9 to 49.9 Employees Per Acre
- 50.0 to 99.9 Employees Per Acre
- 100 or More Employees Per Acre



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Socioeconomic Projections of Population, Housing and Employment by Municipal Planning Area and Regional Analysis Zone, Maricopa County, Arizona, Maricopa Association of Governments, May 2007.

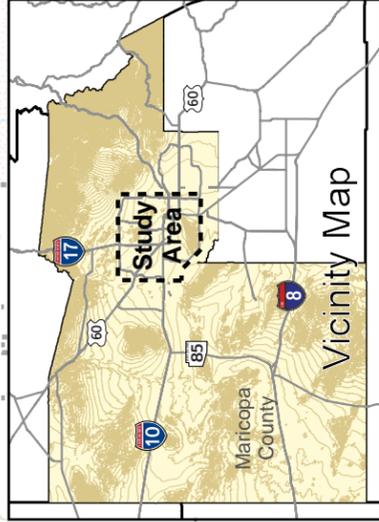
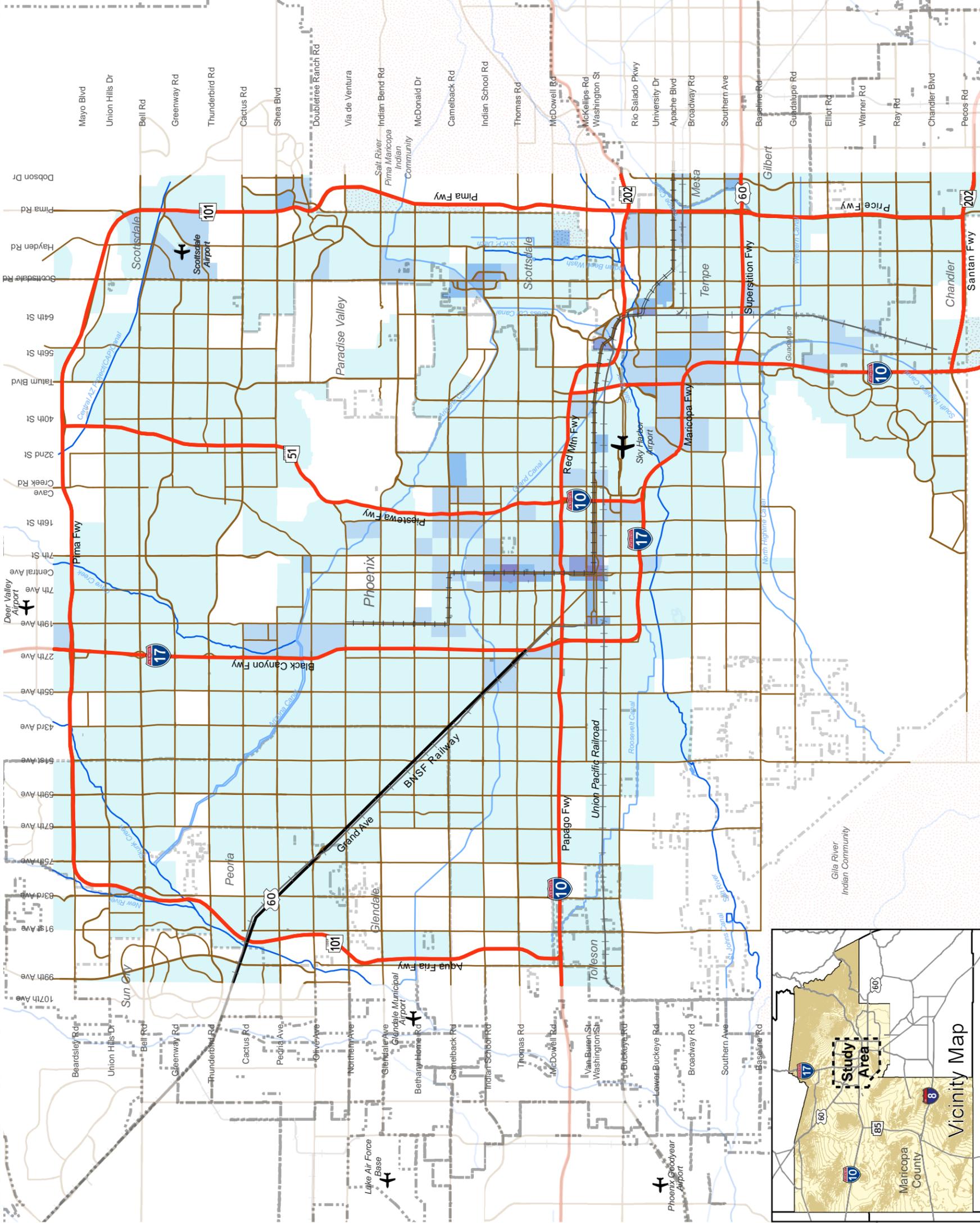
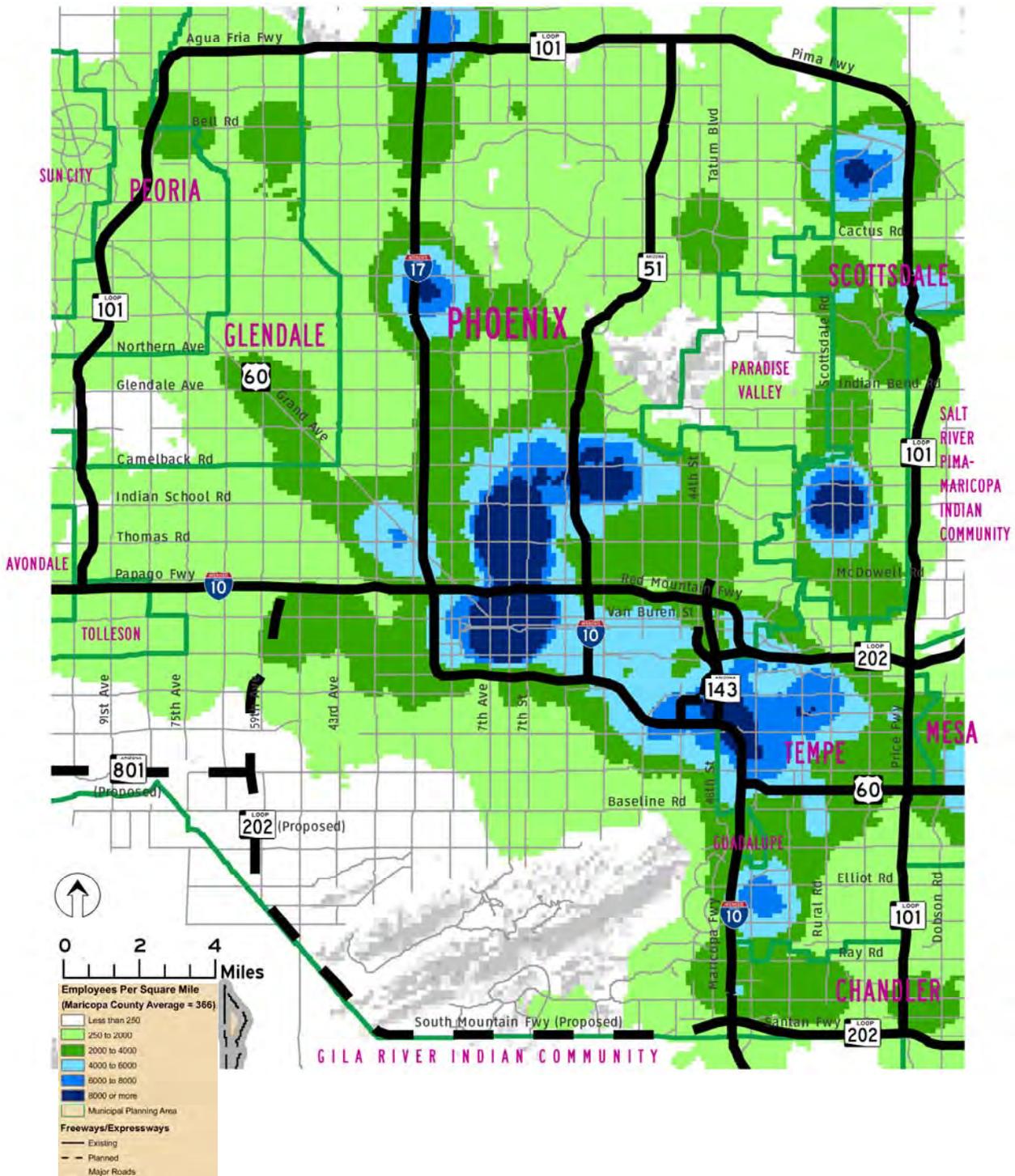


Figure 3-4
REGIONALLY SIGNIFICANT ECONOMIC CONCENTRATIONS



Source: Employment Concentration 2005, *Socioeconomic Projections Documentation*, MAG, May, 2007.

3.2 Future Expectations

MAG population and employment projections are based on the MPAs identified by the member communities. In this study, an estimate of the future (2035) population in the study area is based on these MPAs. Table 3.3 provides a comparison of the existing 2005 population and employment with the 2035 population and employment.

In 2005, the estimated population the study area was just under 2.3 million persons. Projections for 2035 indicate the population is expected to increase to more than 2.9 million persons, representing 28.1 percent growth during the 30-year period. During this same period, projections anticipate the number of dwelling units will increase by almost 29.7 percent. Study area employment is projected to increase more dramatically than that population. Employment in 2035 is projected to exceed two million jobs, representing a 51 percent increase over 2005.

Table 3.4 provides a summary of 2005 and 2035 population and employment data for MPAs in the study area compared with Maricopa County. In 2005, the study area population accounted for 61.9 percent of the County population and 60.6 percent of the dwelling units. MAG projections indicate the study area will comprise a smaller proportion of the County by 2035. The study area's share of total County population is projected to decrease to 44.6 percent, and its share of dwelling units is projected to decrease to 43.5 percent. The study area's share of County employment also is expected to decrease to 55.8 percent by 2035 from 76.3 percent in 2005.

These changes in the population and employment dynamics of the region reflect substantial growth projected for Maricopa County, in areas where new growth and development is less constrained by the established urban form. Thus, Table 3.4 shows the County population is projected to increase from 3.7 million in 2005 to more than 6.5 million in 2035, representing a 77.8 percent increase. This compares to population growth of only 28.1 percent in the study area between 2005 and 2035. The projected 80.9 percent increase in the number of dwelling units in the County as a whole surpasses the 29.7 percent projected to occur in the study area. Employment increases in the County are projected to eclipse the study area by a large margin. Whereas the study area accounted for 76.3 percent of County employment in 2005, projections indicate this share will decrease to 55.8 percent in 2035, with Countywide employment increasing 106 percent through 2035.

Today, the Cities of Glendale, Peoria, Scottsdale, and Tempe have populations exceeding 100,000 persons in the study area, and the dominant city is Phoenix with well over 1.3 million persons living within the study area. This relationship is expected to hold true in 2035. The City of Glendale is expected to experience between 2005 and 2035 a substantial increase in study area population (230,141 to 265,602), but an even greater increase in employment (74,684 to 126,411). Peoria also is expected to have high population growth, and its employment will nearly double (30,198 to 54,192) in the study area. Both Scottsdale and Tempe in 2035 will have more employment than population within the study area, meaning the two communities will continue to be significant job centers.

Distribution of Future Population

Figure 3-5 shows the forecast distribution of population in the study area for the year 2035. When compared to the existing distribution (Figure 3-1), it is readily apparent that the little change in the distribution of population within the study area is anticipated by the MAG projections. The principal areas of change are expected to take place on the periphery of the study area, particularly in the north Scottsdale outside Loop 101 (Pima Fwy), Peoria outside Loop 101 (Agua Fria Fwy), where some areas with densities exceeding 15 persons per acre are projected to develop. Comparison of the two figures also reveals significant growth in the southwest sector of the study area along Lower Buckeye Road and in the corridor defined by Broadway Road and Baseline Road. A major area of growth is anticipated also south of Baseline Road up against South Mountain and the Gila River Indian Community.



Table 3.3
STUDY AREA POPULATION BY MUNICIPAL PLANNING AREA: YEARS 2005 AND 2035

| Category | Year 2005 | | | Year 2035 | | | Percent Change 2005 - 2035 Percent Increase (Central Phoenix Study Area) | |
|------------------|----------------------------|-----------------|----------------------------|----------------------------|-----------------|----------------------------|---|-----------------|
| | Central Phoenix Study Area | Maricopa County | Study Area Share of County | Central Phoenix Study Area | Maricopa County | Study Area Share of County | Central Phoenix Study Area | Maricopa County |
| Dwelling Units | 896,867 | 1,479,646 | 60.61% | 1,163,523 | 2,676,262 | 43.48% | 29.73% | 80.87% |
| Total Population | 2,277,174 | 3,680,743 | 61.87% | 2,917,904 | 6,544,617 | 44.58% | 28.14% | 77.81% |
| Total Employment | 1,333,198 | 1,747,610 | 76.29% | 2,008,562 | 3,599,680 | 55.80% | 50.66% | 105.98% |

Prepared by Wilson & Company, July, 2010.

Source: Socioeconomic Analysis Zone (TAZI03), Maricopa Association of Governments, 07/07/2010.



Table 3.4
STUDY AREA POPULATION BY MUNICIPAL PLANNING AREA: YEARS 2005 AND 2035

| Municipal Planning Area | Year 2005 | | | Year 2035 | | |
|-------------------------|----------------|------------------|------------------|------------------|------------------|------------------|
| | Dwelling Units | Total Population | Total Employment | Dwelling Units | Total Population | Total Employment |
| City of Avondale | 2,041 | 6,139 | 2,372 | 2,721 | 7,451 | 16,866 |
| City of Chandler | 36,041 | 94,107 | 45,466 | 38,114 | 98,549 | 80,660 |
| Maricopa County | 20,668 | 25,530 | 8,951 | 20,674 | 25,923 | 8,853 |
| GRIC | 7 | 28 | 3,521 | 25 | 93 | 14,148 |
| City of Glendale | 83,612 | 230,141 | 74,684 | 97,456 | 265,602 | 126,411 |
| Town of Guadalupe | 1,229 | 5,555 | 1,033 | 1,329 | 5,983 | 1,478 |
| City of Mesa | 21,366 | 51,644 | 26,782 | 22,916 | 55,779 | 36,220 |
| Town of Paradise Valley | 6,045 | 14,136 | 5,770 | 6,659 | 15,357 | 9,379 |
| City of Peoria | 43,038 | 112,462 | 30,198 | 54,665 | 138,245 | 54,192 |
| City of Phoenix | 522,458 | 1,394,150 | 778,946 | 732,847 | 1,903,800 | 1,129,859 |
| SRPMIC | 1,681 | 2,909 | 5,454 | 1,910 | 3,426 | 54,111 |
| City of Scottsdale | 86,371 | 167,917 | 160,993 | 96,494 | 187,310 | 216,122 |
| City of Tempe | 70,331 | 165,968 | 176,688 | 84,607 | 200,195 | 237,364 |
| City of Tolleson | 1,979 | 6,488 | 12,340 | 3,106 | 10,191 | 22,899 |
| Grand Total | 896,867 | 2,277,174 | 1,333,198 | 1,163,523 | 2,917,904 | 2,008,562 |

Prepared by Wilson & Company, July, 2010.

Abbreviations:

GRIC = Gila River Indian Community

SRPMIC = Salt River Pima-Maricopa Indian Community

Source: Socioeconomic Analysis Zone (TAZI03), Maricopa Association of Governments, 07/07/2010.



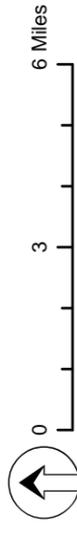
**Figure 3-5
Distribution of
Year 2035 Population**



- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - = Light Rail
 - ~ River/Stream
 - ~ Canal
 - ✈ Airport
 - City Boundary

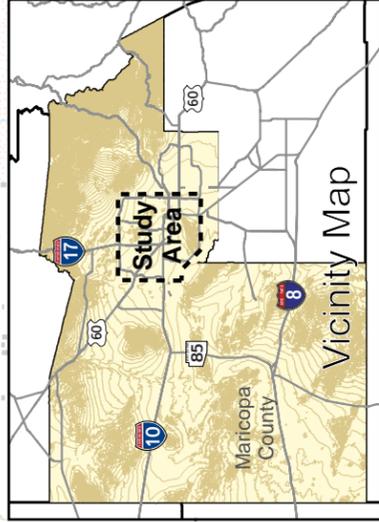
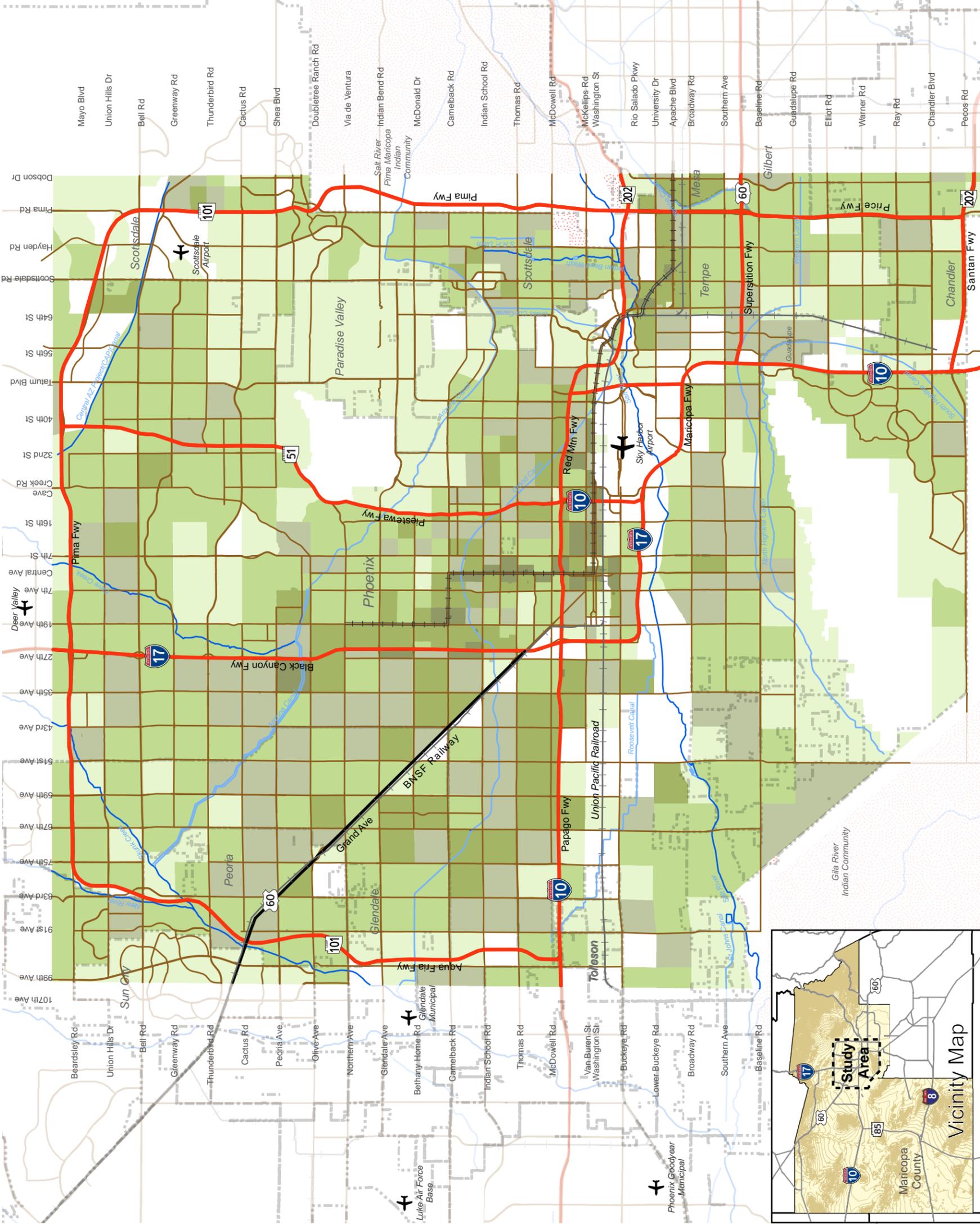
**Population Density by Traffic Analysis Zone
(Year 2035)**

- Less than 1.0 Person Per Acre
- 1.0 to 4.9 Persons Per Acre
- 5.0 to 9.9 Persons Per Acre
- 10.0 to 14.9 Persons Per Acre
- 15.0 to 29.9 Persons Per Acre
- Greater than 30 Persons Per Acre



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Source: MAG



Distribution of Future Employment

Figure 3-6 shows the forecast distribution of employment in the study area for the year 2035. When compared to the existing distribution (Figure 3-2), it is readily apparent that a notable change in the distribution of employment within the study area is anticipated by the MAG projections. MAG projections anticipate the light rail transit (LRT) line that traverses the central corridor of Phoenix and extends eastward through the Tempe downtown area to become a major attractor of employment. Particularly benefiting from the presence of the LRT is the Washington/Jefferson Streets corridor, especially north of Sky Harbor Airport. Other areas along the line expected experience employment growth include: Phoenix Downtown, Central Avenue/Uptown, Camelback Road, and 19th Avenue. The industrial area along the east side of I-17 between Peoria Avenue and Cactus Road is expected to benefit from the end of line access provided by the LRT line. Outside of Phoenix, significant employment growth is expected to occur around the Scottsdale Air Park, on the Salt River Pima-Maricopa Indian Community reservation within its Pima Road/Loop 101 (Pima Fwy) commercial district, downtown Scottsdale, downtown Tempe, and in conjunction with access to I-10 (Maricopa Fwy) in south Tempe and west Chandler.



3.3 Low-Income Population

In making determinations regarding potential impacts associated with transportation projects, it is important to give consideration to and identify low-income population concentrations. Impacts on individuals and families with low-incomes can be greater than for more affluent population groups, as the effects and costs of disruptions, even dislocations, are a greater proportion of household income. Therefore, mitigation and enhancement measures may need to be evaluated, if a proposed project potentially could result in disproportionately high and adverse effects on low-income population. Programs, policies, or benefits should be defined to ensure they prevent discriminatory effects including: discriminating against or excluding individuals or populations from participation; denying benefits of a proposed action/activity; or otherwise adversely affecting the human health or environment of these population groups.

In the case of transportation projects, impacts associated with improvements should not adversely impact such low-income groups in a disproportionate manner compared to the remainder of the community. Moreover, an array of alternatives should be developed that potentially would provide equitable transportation service to all groups. MAG has identified by TAZ the income levels of persons in the study area for the latest year a full census of the information was available – Year 2000 (Figure 3-7). TAZs with 25 percent or greater representation of persons in poverty, which in the Year 2000 was defined by the data shown in Table 3.5, largely are concentrated in the south central portion of the City of Phoenix. This area of Phoenix is generally bounded on the north by I-10 (Papago Fwy) and Loop 202 (Red Mountain Fwy), on the south by Baseline Road, on the east by SR-143, and on the west by 35th Avenue. The area of the City of Tempe east of Rural Road to Loop 101 (Price Fwy), the eastern portion of the Town of Guadalupe, and the US-60/Grand Avenue Corridor also stand out as having high numbers of persons below poverty levels. In addition, there are apparent in the study area several pockets of TAZs with 25 percent and greater presence of low-income persons. The two Native American communities on the eastern and southern periphery of the study area also fall into this category.

Low-income persons are particularly dependent on public transit services, as they are more likely to have no personal vehicle or unable to access such a vehicle for travel purposes. The Short-Range Transit Program for Fiscal Year 2009/10 – 2014/15, prepared by the Regional Public Transportation Authority (RPTA), reports a 2007 origin/destination survey revealed that 71% of the riders of the Valley Metro system were from

Figure 3-6

Distribution of Year 2035 Employment



- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - River/Stream
 - Canal
 - Airport
 - City Boundary

Employment Density by Traffic Analysis Zone (Year 2035)

- Less Than 1.0 Employee Per Acre
- 1.0 to 9.9 Employees Per Acre
- 10.0 to 24.9 Employees Per Acre
- 24.9 to 49.9 Employees Per Acre
- 50.0 to 99.9 Employees Per Acre
- 100 or More Employees Per Acre



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Extension of MAG 2007 Socioeconomic Projections to 2035 for Population, Housing and Employment by Municipal Planning Area and Regional Analysis Zone, Maricopa Association of Governments, January 2009.

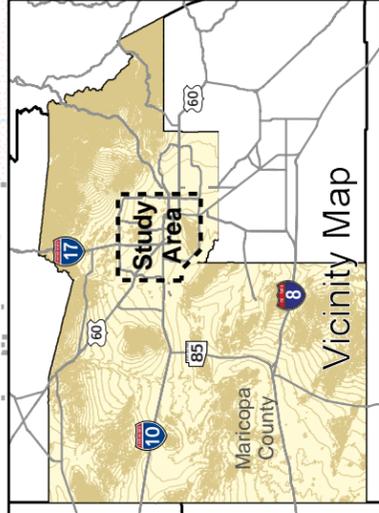
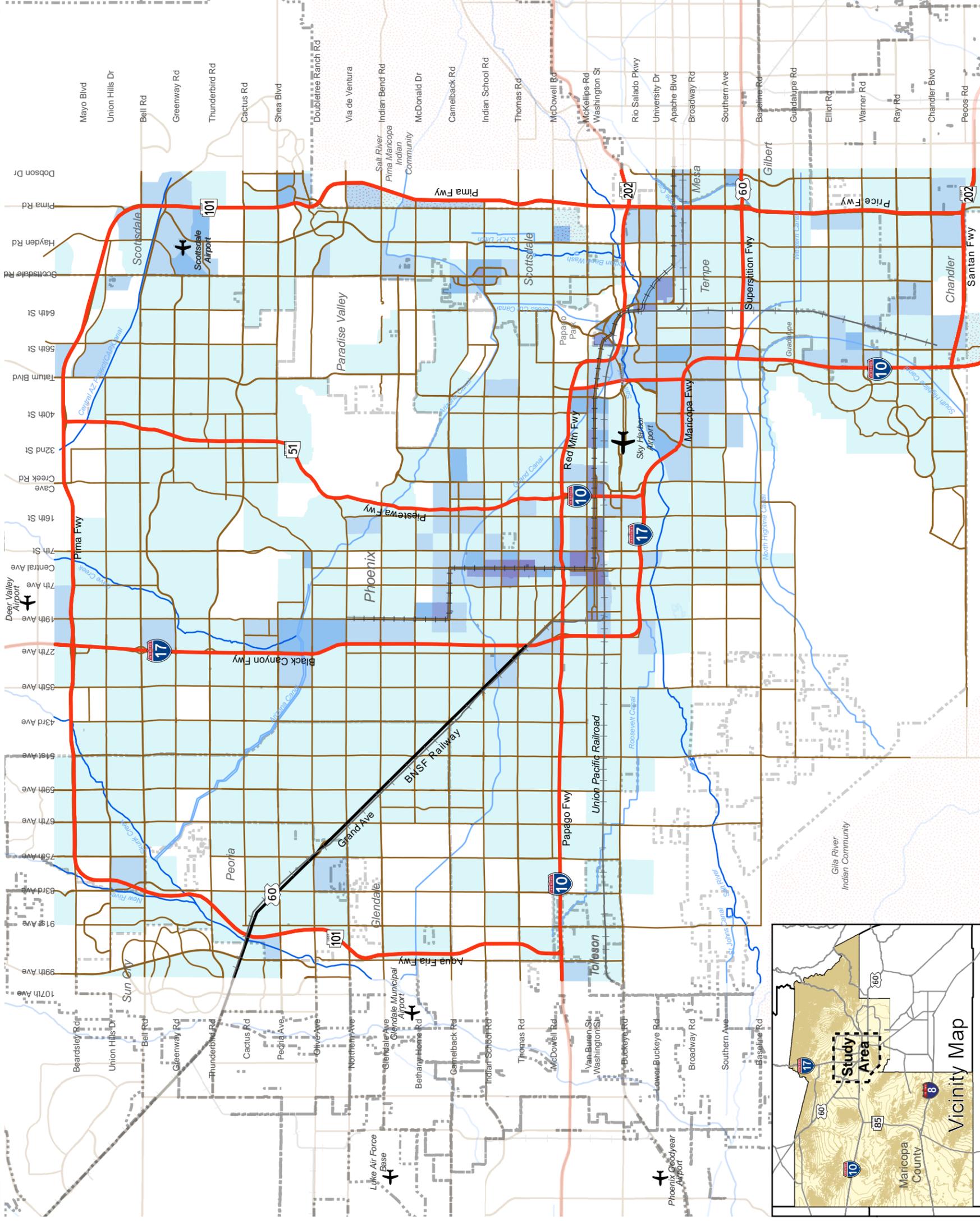




Figure 3-7 Location Of Low- Income Population

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - = Light Rail
 - ~ River/Stream
 - ~ Canal
 - ✈ Airport
 - City Boundary

Percentage of Persons in Poverty

- Less Than 10 Percent
- 10.0 to 24.9 Percent
- 25.0 Percent or Greater



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Source: 2000 Census

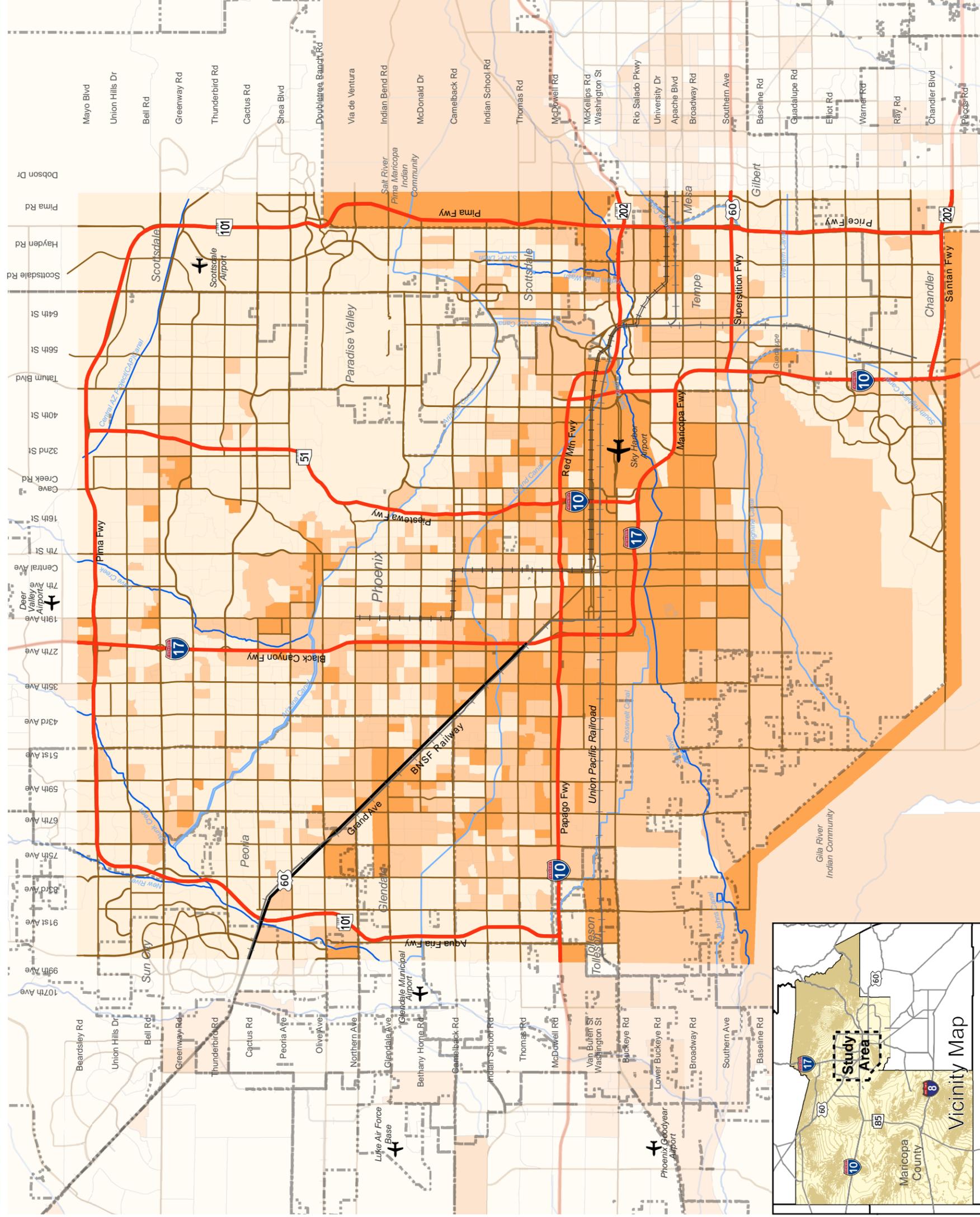


Table 3.5
POVERTY THRESHOLDS FOR 2000 BY SIZE OF FAMILY AND NUMBER OF RELATED CHILDREN UNDER 18 YEARS

| Size of Family Unit | Weighted Average Income Thresholds | Related Children under 18 Years | | | | | | | | |
|--|------------------------------------|---------------------------------|--------|--------|--------|--------|--------|--------|--------|---------------|
| | | None | One | Two | Three | Four | Five | Six | Seven | Eight or More |
| One person (unrelated individual)..... | 8,794 | | | | | | | | | |
| Under 65 years..... | 8,959 | 8,959 | | | | | | | | |
| 65 years and over..... | 8,259 | 8,259 | | | | | | | | |
| Two persons..... | 11,239 | | | | | | | | | |
| Householder under 65 years..... | 11,590 | 11,531 | 11,869 | | | | | | | |
| Householder 65 years and over..... | 10,419 | 10,409 | 11,824 | | | | | | | |
| Three persons..... | 13,738 | 13,470 | 13,861 | 13,874 | | | | | | |
| Four persons..... | 17,603 | 17,761 | 18,052 | 17,463 | 17,524 | | | | | |
| Five persons..... | 20,819 | 21,419 | 21,731 | 21,065 | 20,550 | 20,236 | | | | |
| Six persons..... | 23,528 | 24,636 | 24,734 | 24,224 | 23,736 | 23,009 | 22,579 | | | |
| Seven persons..... | 26,754 | 28,347 | 28,524 | 27,914 | 27,489 | 26,696 | 25,772 | 24,758 | | |
| Eight persons..... | 29,701 | 31,704 | 31,984 | 31,408 | 30,904 | 30,188 | 29,279 | 28,334 | 28,093 | |
| Nine persons or more..... | 35,060 | 38,138 | 38,322 | 37,813 | 37,385 | 36,682 | 35,716 | 34,841 | 34,625 | 33,291 |

Source: Extracted from U.S. Census Bureau Web site at <http://www.census.gov/hhes/www/poverty/data/threshld/thresh00.html>.

households with incomes of \$35,000 or less.² The survey also revealed that 51% of the riders resided in households with no available vehicle versus 6% of the general population of the RPTA service area. The low-income segment of the population tends to be “transit-dependent,” due to long-term conditions or situations impeding the use of a personal vehicle. Another type of rider is the persons affected by unusual (generally short-term) conditions or situations that require the use of public transit services. As reported in the Plan: “The highest concentrations of families living in poverty (>400 per square mile) are generally in three areas: 1) Vicinity of the I-10 freeway between about 67th Avenue and the SR-51 freeway; 2) Near the Loop 202 (Red Mountain Freeway) from approximately the SR-51 freeway to 48th Street; and 3) Vicinity of the I-17 freeway between about Thomas and Bethany Home Roads.”

² Short-Range Transit Program, FY 2009/10-2014/15, Regional Public Transportation Authority, October, 6, 2009, Version 2.0, pg. 18.



4.0 Environmental Overview

This chapter presents a general overview of the natural and physical/man-made environment. It focuses on identification of potential fatal flaws or impediments to implementation of roadway and transportation improvements. The information presented in this chapter is based on existing data sources from municipal, County, State, and Federal agencies, a “windshield” survey of the study area, and review of aerial photographic and mapping resources available on various Internet Web sites. Potential obstacles, issues, or concerns associated with development of transportation projects within the Study Corridor are identified. However, this overview does not meet the requirements of the National Environmental Policy Act of 1969 (NEPA), which would need to be met prior to implementation of any improvement projects supported with Federal funding.

The study area includes significant environmental features that need to be considered when defining transportation system improvements and new transportation system elements. The first section presents information relating to the physical environment of the study area. The second section provides information about the features, characteristics, and quality of the natural environment. For the general purposes of this overview, the study area is as defined in Chapter One, Introduction, and shown in Figure 1-1. This overview, consistent with the regional framework focus of the study, represents broad interpretations of the general setting and conditions in the study area with the intent of providing adequate knowledge for examining opportunities for transportation improvement projects, assessing the potential for significant environmental impacts, and identifying reasonable mitigation measures, as may be appropriate.



4.1 Physical Environment

The physical environment of the study area is defined by those features and characteristics that have been constructed or created through development activity within the urban environment. Specifically, this section addresses the following potentially sensitive environmental issues: historic and cultural resources; visual and aesthetic qualities and characteristics; major utility infrastructure, major drainage features; transportation-related noise issues and concerns; parks, trails, and major recreational resources; and potential issues and concerns associated with hazardous materials.

4.1.1. Historic and Cultural Resources

The inventory of historic and cultural resources was limited to identification of recognized historic districts, as a complete inventory of historic and cultural resources was beyond the regional scope and focus of this framework study.

Early History

The modern Phoenix metropolitan area has its roots in the ancient community of the Hohokam people, who inhabited much of the area between ca. AD 350 and AD 1500. Available water resources associated with the Verde River, Salt River, and Gila River supported intensive agriculture and a vast canal system that gave rise to the modern irrigation canals passing through the study area. Hohokam settlement was organized in part into irrigation communities in major drainages, so there would have been irrigation facilities, including canals, and other water control features. The Pueblo Grande ruins in east Phoenix provide evidence of the industrious, enterprising and imaginative society of the Hohokam. Numerous other cultural sites have been identified and evaluated in the study area, including encampments; year-round settlements with populations of more than 100, ball courts, central plazas, and platform mounds; hamlets and smaller year-round settlements; farmsteads (seasonal occupations of small social groups tied closely to larger settlements); and field houses (short-term agricultural sites consisting of a single structure). The locations of cultural sites are protected to prevent vandalism of these resources. Information on these locations is available to qualified specialists through the

Arizona State Museum and should be referenced when the specific location of transportation facility improvements or new facilities are identified for implementation.

Modern History

The modern history of the study area generally is considered to have begun in the 1860s, when a small colony of adventuresome entrepreneurs decided to take advantage of the flowing water of the Salt River approximately four miles east of modern-day downtown Phoenix. A townsite was selected in 1870, where the downtown is today. Other communities, rose up in the region with the City of Phoenix becoming the central core of what is today one of the largest metropolitan areas in the United States. Phoenix, itself, is the fifth largest city in the country. Since the earliest beginnings, continuous socioeconomic and development activity within the study area has resulted in hundreds of historic sites that have been identified for protection, due to their value to understanding and appreciating the flow of community and cultural growth through time. They include: farms; irrigation canals; dams; industrial sites, such as mines, and transportation-related sites (e.g., the existing railroads); commercial buildings, public buildings, neighborhoods, and private residences. The number of registered historic sites in the study area is likely in the hundreds, and many more sites are being evaluated for designation. Figure 4-1 shows the general locations of historic districts established in the study area. In addition to these districts there are numerous individual historic sites, and a comprehensive inventory should be conducted when a transportation project reaches the planning stage with the intent to implement, as mitigation actions may be necessary to protect these valuable community resources.



4.1.2. Visual and Aesthetic Characteristics

A detailed review of visual and aesthetic resources of the study area – a complex, urbanized setting with a substantial range of values and attractions – exceeds the scope and focus of this study. Nevertheless, a general overview of the study area setting and its principal characteristics is apropos. The study area is located in the northern reaches of the Sonoran Desert, one of the largest and hottest desert regions in North America that includes much of southwestern Arizona. Despite being a desert, the biseasonal rainfall pattern results in a rich variety of flora and fauna.

The topography is relatively flat or gently sloping, as the study area is located in a large basin or “valley” formed by several fault block mountain ranges (Figure 4-2). The uplifted mountains have resulted in the coalescing of numerous expansive alluvial fans, creating an alluvial plain, on which substantial urban development has taken place. The Salt River at approximately 1,000 feet above mean sea level (AMSL) generally is the lowest point in the study area and drains the majority of the alluvial plain. Elevations in the northern portion of the study area exceed 1,500 feet AMSL. Within this relatively flat landscape are numerous mountains that exceed 2,000 feet AMSL, with Camelback Mountain topping out above 2,700 feet AMSL.

The relatively flat terrain of the valley has given rise to development of a roadway network on a grid of wide arterials streets. However, the gentle slope of the valley and accessible mountains have given rise to a very visible cityscape and vice versa. Wide vistas and distant, as well as close-up, views of mountains generally are a notable aspect of traveling around the valley. In contrast, the wide arterial streets and local roadways offer opportunities for median and roadside landscaping, which became more extensive with the advent of drip irrigation practices.

An extensive variety of aesthetic qualities characterize the study area, including: low-density residential areas, high-density apartment and condominium communities, corner grocery/convenient stores, strip commercial developments, and high-rise office buildings, regional shopping malls, industrial office parks, heavy industrial/manufacturing area, small neighborhood parks, large regional parks and mountain preserves, overhead highways and tunnels, vacant lots and large undeveloped parcels, and airport and rail freight facilities. Among this admixture of development are several major watercourses and drainage features (discussed below),

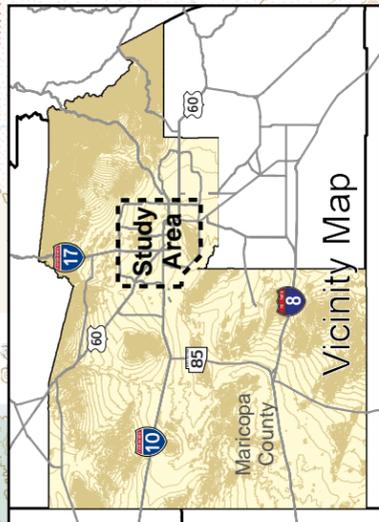
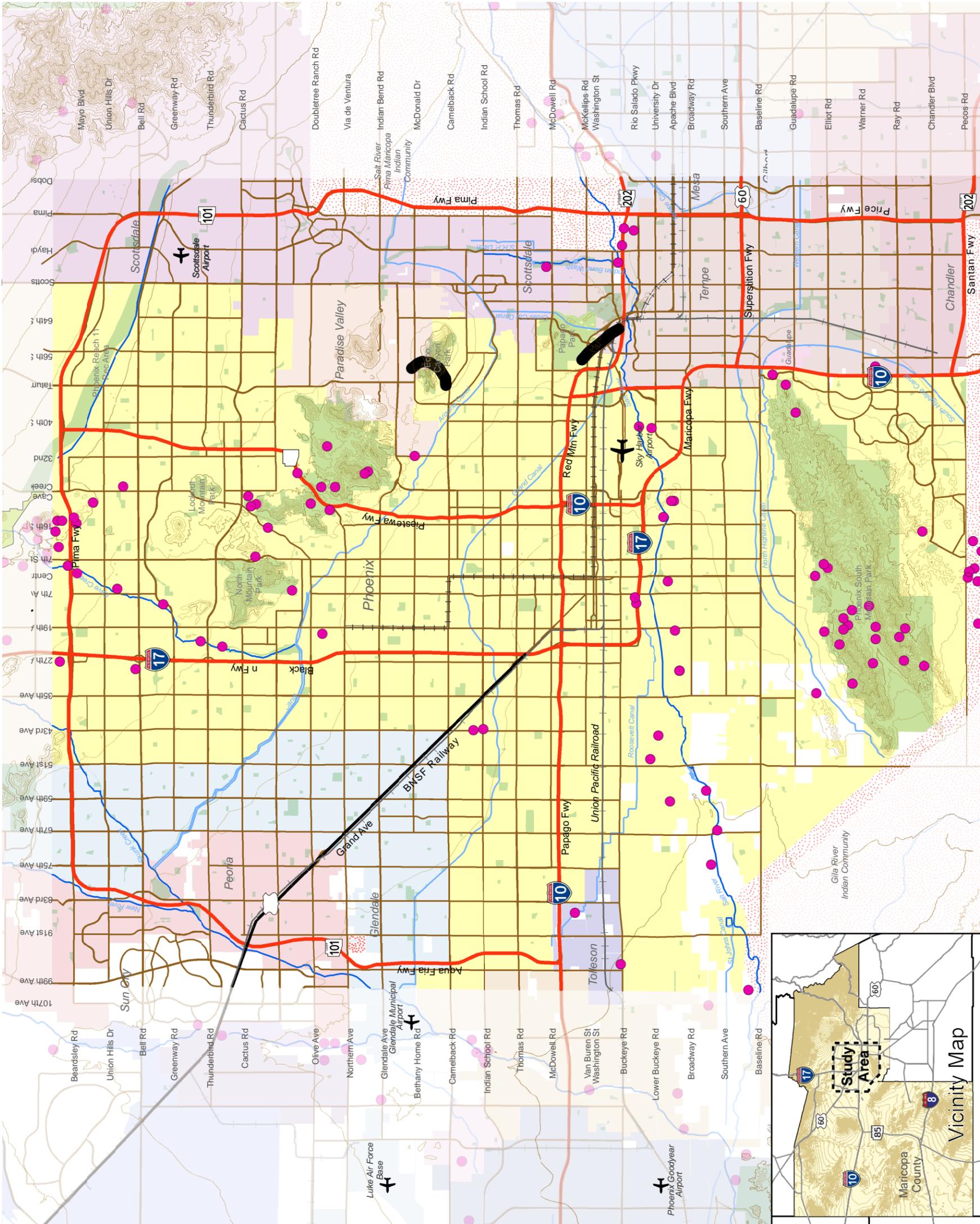


Figure 4-6 Physiographic, Geotechnical, and Other Features

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space Preserve
 - River/Stream
 - Canal
 - Airport
 - Fault
 - Mine
 - 100' Contour
 - Indian Reservation
 - Maricopa County



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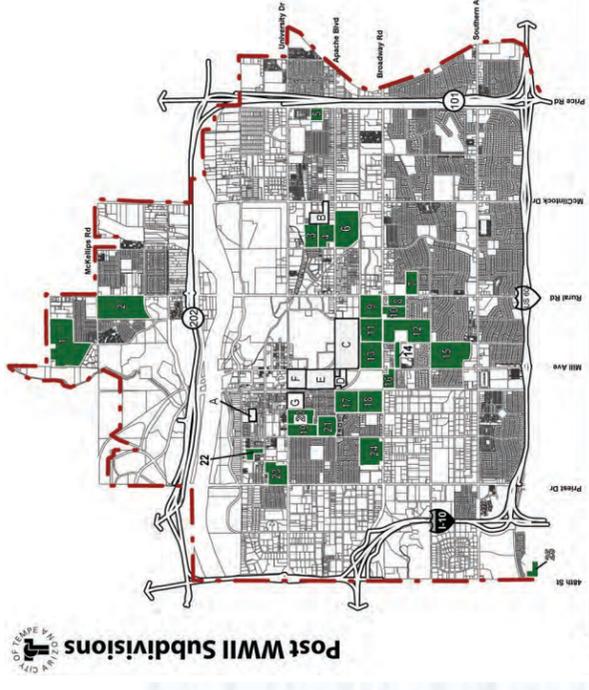
Source: Arizona Geodata Portal.



Figure 4-1

Study Area Historic Districts

TEMPE HISTORIC SUBDIVISIONS



Currently Eligible Historic Subdivisions

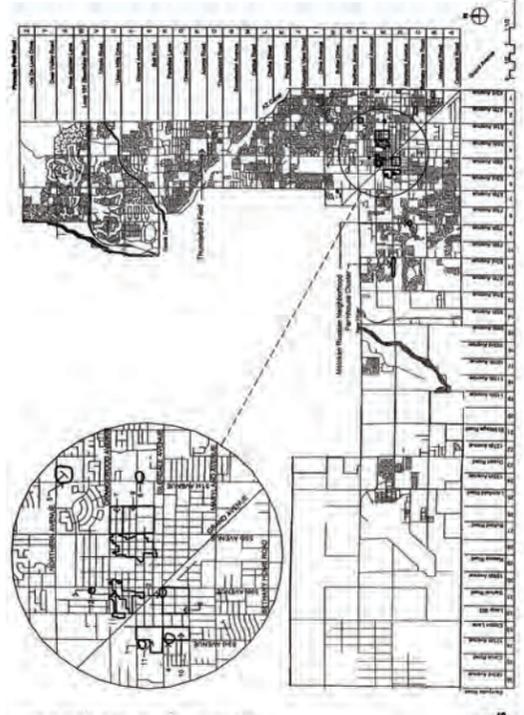
- A Roosevelt Addition 1946-1950
- B Borden Homes 1947-1957
- C University Park 1946-1948
- D College View 1946-1953
- E Park Tract 1930-1960
- F Sage Addition 1900-1954
- G Goodwin Homes 1949-1959

Potentially Eligible Historic Subdivisions

- 1 Pecos Parkway 1954-1960
- 2 Caveller Hills 1950-1960
- 3 Carlson Park 1957-1959
- 4 Tomlinson Estates 1950-1953
- 5 Hudson Park 1958-1959
- 6 Hudson Manor 1948-1955
- 7 Highgate Acres 1954-1959
- 8 Sunset Vista 1958-1960
- 9 University Heights 1954-1960
- 10 Broadmor Vista 1958-1960
- 11 University Terrace 1950-1955
- 12 Broadmor Manor 1955-1959

- 13 University Estates 1946-1950
- 14 Tempe Estates 1959-1960
- 15 Nu-Vista 1958-1960
- 16 Dale Palm Manor 1950-1959
- 17 Campus Homes 1952-1955
- 18 University Homes 1951-1960
- 19 Land Estates 1955-1959
- 20 Mitchell's Subdivisions 1950-1960
- 21 Tempe Terrace 1951-1960
- 22 Willaker Homes 1950-1955
- 23 D Bar L Ranchos 1950-1960
- 24 Paradise Manor 1955-1959
- 25 Tempe Heights 1956-1959

Post WWII Subdivisions



GLENDALE POTENTIALLY ELIGIBLE PROPERTIES

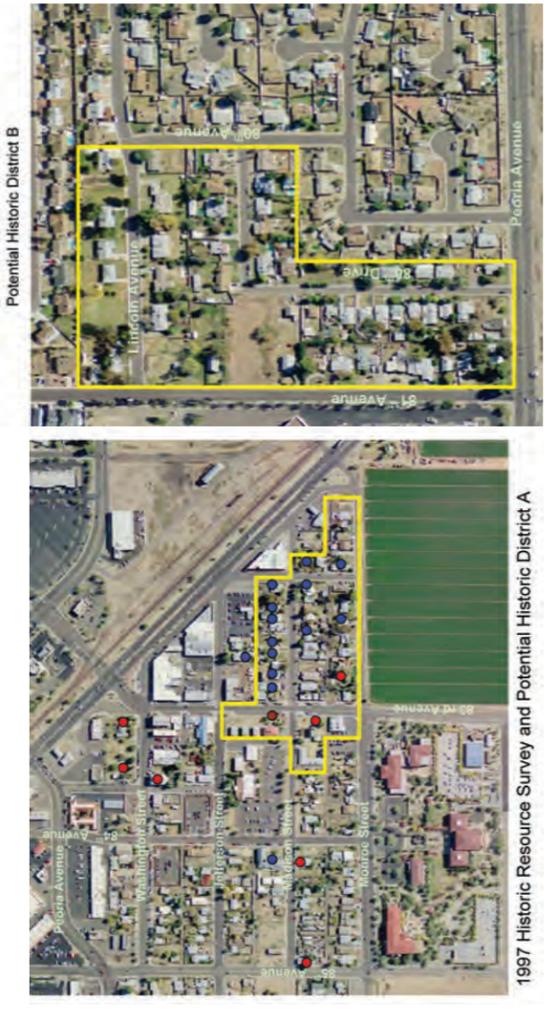
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| 81 | 91 |
| 82 | 92 |
| 83 | 93 |
| 84 | 94 |
| 85 | 95 |
| 86 | 96 |
| 87 | 97 |
| 88 | 98 |
| 89 | 99 |
| 90 | 100 |

NATIONAL REGISTER POTENTIALLY ELIGIBLE INDIVIDUAL PROPERTIES AND DISTRICTS

- 1. Alhambra
- 2. Ashland Place
- 3. Breewood
- 4. Cherry Vista
- 5. Country Club Park
- 6. Del Norte Place
- 7. East Place
- 8. East Evergreen
- 9. Encanto-Palmcroft
- 10. Encanto
- 11. East Evergreen
- 12. Encanto-Palmcroft
- 13. Encanto
- 14. Encanto
- 15. Encanto
- 16. F.O. Story
- 17. Garfield Park
- 18. La Hacienda
- 19. La Hacienda
- 20. Lehi Olive
- 21. Margaret Place
- 22. Woodland
- 23. North Encanto
- 24. North Encanto
- 25. North Encanto
- 26. Oakley
- 27. Phoenix Homesteads
- 28. Pierson Place
- 29. Roosevelt
- 30. Roosevelt Park
- 31. Villa Vista
- 32. Windsor Square
- 33. Woodland
- 34. North Encanto
- 35. Villa Park

Prepared by the City of Phoenix Historic Preservation Office - June 2007

PEORIA POTENTIAL HISTORIC DISTRICTS

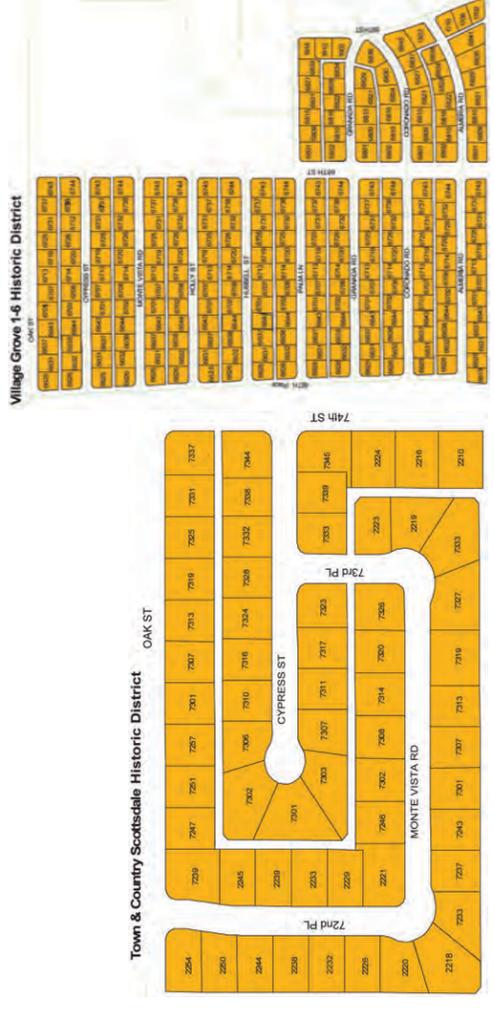


1997 Historic Resource Survey and Potential Historic District A

Potential Historic District C



SCOTTSDALE HISTORIC DISTRICTS



No Scale



Historic buildings provide a tangible link to our past. This link allows us to establish a sense of orientation about our place in time. We can learn from the past, and through preservation of historic buildings, can continue to benefit from the accomplishments of our ancestors.

From Historic Buildings: Issues in Preservation and Protection
Source: North Central Regional Center for Rural Development
Authors: Parrott, Kathleen; D.; Dellenbarger, Ann
Accessed through Michigan State University Extension at
<http://web1.msue.edu/imp/modid/33860122.html>

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Source: Extracted from Community documentation; posted on Internet Web sites.



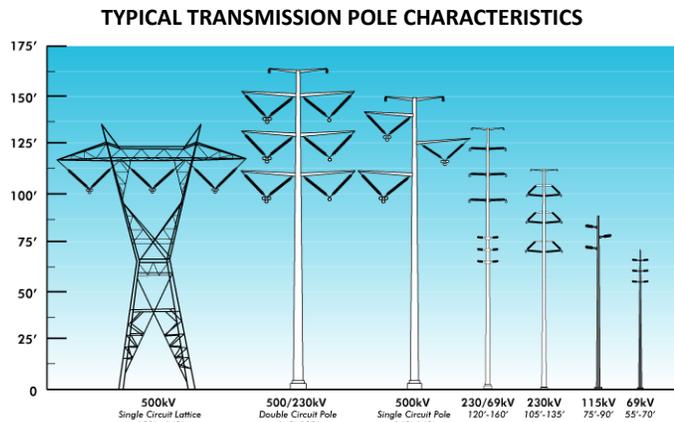
some of which have been integrated into the daily lifestyle of the community through uses, such as golf courses, that can withstand flowing water from the intermittent heavy rains. In addition, electrical service is provided throughout the study area (discussed below). This service is transmitted on a variety of poles ranging from under 75 feet in height to over 150 feet. A graphic depicting the different types of electrical utility poles is shown at right.



In the past, considerable development was planned and completed without very much guidance regarding the visual and aesthetic qualities of the development. Today, most communities have established plans or adopted guidelines to guide development actions, including the development of streets and roads (e.g., *Street Landscape Standards*, City of Phoenix, Developed 2006). These plans, guidelines, or standards will need to be identified and considered, as appropriate, with respect to any new transportation facilities or major changes to existing facilities. The references contained in Chapter Two include many of these plans and guidelines.

4.1.3. Geotechnical Conditions

Figure 4-2 also highlights significant geotechnical features, in addition to the several mountains. There are two known faults within the study area, which, as mentioned above, is largely developed on alluvial fans that are not earthquake prone features. One fault is located at the western end of Camelback Mountain, the most prominent topographic and geographic features in the study area.



Source: Salt River Project Public Involvement Web Site.

Echo Canyon is the surface manifestation of activity associated with this fault. The second fault is associated with the western flank of Papago Buttes, which is a series of low hills (the highest point being 1,745 feet AMSL) trending in a north by northwest direction north from Town Butte in Tempe (east of Mill Avenue) to Barnes Butte in Phoenix (north of McDowell Road).

Geotechnical activity within the study area has resulted in various mineral deposits that were exploited in the mid-1800s. Many of the mines were “placer” mines, where minerals that had accumulated in stream beds were washed out by panning, sluicing, hydraulic nozzles, or dredging. Placer mining sometimes involved a dry method that used pans and rockers. Remnants of old mining activities are especially apparent along Cave Creek in the north central portion of the study area and the Salt River, which runs from east to west across the southern portion of the study area. Mines in the vicinity of Piestewa Peak were particularly known for the extraction of mercury; rumors have it that miners would come down from the mountainside all lousy from inhaling the mercury dust. South Mountain was another area of frenetic mining of gold, silver, and other precious metals in the late 1800s.

4.1.4. Major Utilities

The study area is fully served by standard electrical and water utilities. Electrical services is provided by Arizona Public Service (APS) and Salt River Project (SRP). Major overhead, high-voltage transmission lines and underground or buried transmission lines traverse the study area along numerous alignments. These lines range from 69 kilovolt (kV) to 500 kV. In addition, there are power receiving regional and local substations located throughout the study area. Power line transmission corridors will need to be considered when choosing future roadway alignments, as they are expensive to build and difficult to move. However, many existing and future power line corridors already share right-of-way with major transportation and drainage routes. Neither APS or SRP have new power transmission projects proposed or planned at this time with in the study area.

Water and sewer service is ubiquitous within the study area, although there may be some small areas, particularly in the periphery of the southwestern portion of the study area, where such services have not reached. Implementation planning for transportation improvement projects will need to consult with local water and sewer agencies to determine whether impacts to these systems could occur. Avoidance and mitigation actions then could be taken, as appropriate to the project definition.



4.1.5. Major Drainage Facilities

The Flood Control District of Maricopa County (FCDMC or District) was officially organized August 3, 1959. Over the past 50 years, the FCDMC has constructed more than 140 structures, delineated 4,100 miles of floodplains, and identified flood mitigation solutions for over half of the 9,226 square miles of the County. The District provides flood control services to the public under four different flood hazard program areas: outreach, identification, regulation, and remediation. These programs link the District’s mission and implemented flood control solutions to its goal and mission to protect public safety in Maricopa County. The FCDMC mission is oriented to protective measures associated with three types of flooding: riverine flooding (which includes flash floods), alluvial fan flooding, and shallow flooding.

A significant activity of the FCDMC is planning to minimize the public cost of protecting citizens from the flooding, particularly flooding that results from the direct or cumulative effects of private and public development actions. Planning activities developed of Area Drainage Master Studies (ADMS) and Area Drainage Master Plans (ADMP); Watercourse Master Plans (WCMP); site specific plans (or Watercourse Master Plans); project pre-design studies; and the coordination of interagency cooperative projects and agreements. The District is engaged in preparation of an ADMP for the core of the study area and has completed ADMPs for large portions in the northwest, southwest, south, and east. It recently initiated preparation of an ADMP for the areas of Phoenix and Tempe south of the Salt River between I-10 (Maricopa Fwy) and Loop 101 (Price Fwy) south to us-60 (Superstition Fwy).

Substantial population growth and new development in Maricopa County in recent decades has occurred largely outside the urban center. Development actions have replaced agricultural and other undeveloped lands, particularly in the urban fringe areas. New development generally consists of low-density residential development followed by commercial development. This low-density development results in a steadily expanding urban area. FCDMC actions are oriented to protecting both existing urban areas, such as the study area, from flooding that can be caused by development in these fringe areas. The District also acts to prevent new development from being subject to flooding. This requires FCCMD to prioritize flood control projects and programs, and the 2009 Comprehensive Floodplain Management Plan and Program establishes the framework for District priorities.

Study area drainage is associated with three watersheds, as defined by FCDMC: Agua Fria Watershed; Cave Creek/Salt River Watershed; and Gila/Queen Creek Watershed. Each watershed has unique topographic, hydrologic, and socioeconomic characteristics, which influence flooding risk and affect the actions of the District to mitigate the risk. As part of its five-year flood hazard mitigation action plan, FCDMC has evaluated each watershed in the County, including the three named above that are pertinent to the study area. Figure 4-3 presents a graphic summary of the many drainage facilities design and installed by the District to control flooding in the study area. Information developed by the District for each of the three watersheds has been extracted from the 2009 Comprehensive Plan of the FCDMC and is presented in Appendix A.

4.1.6. Noise

Noise has an almost ubiquitous presence in a densely development urban environment, such as the Central Phoenix study area. As such, noise is an important environmental consideration for highway planners and designers. In order to minimize the potential impacts of transportation facilities, agencies responsible for the



Figure 4-3

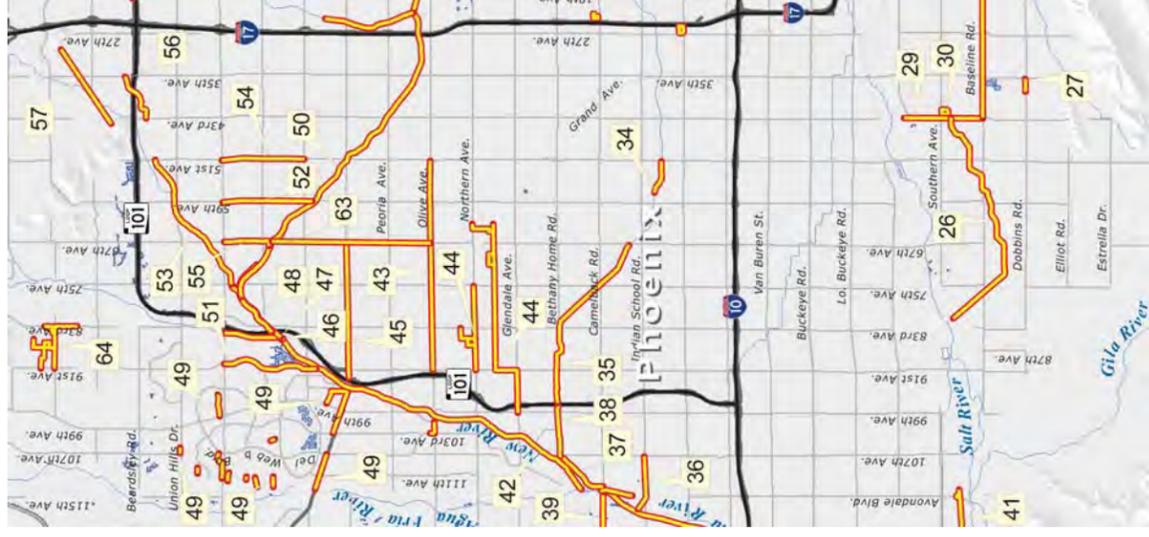
FCDMC Capital Projects through FY 2010 (Completed)

PROJECTS EAST OF I-17

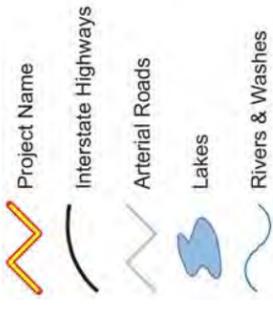


| Label | Project Name |
|-------|---|
| 3 | Adobe Dam |
| 9 | Beardsley Rd. Drainage System (7th Ave to 23rd Ave) |
| 10 | 7th Ave Storm Drain (Union Hills Dr to Cave Creek Wash) |
| 11 | Upper East Fork Cave Creek Drainage |
| 12 | Paradise Valley Detention Basin No. 4 |
| 13 | Greenway Parkway Channel (9th St to Cave Creek Rd) |
| 14 | City of Phoenix Dam No. 7 |
| 15 | Cave Creek Channelization |
| 16 | 9th Avenue Storm Drain (Peoria Avenue to ACDC) |
| 17 | 10th St Wash Basin No. 2 |
| 18 | 10th St Wash Improvements (Alice Ave to ACDC) |
| 19 | Dreamy Draw Dam |
| 20 | 10th St Wash Basin No. 1 |
| 21 | Arizona Canal Diversion Channel |
| 22 | 24th Avenue and Camelback Rd Basin |
| 23 | Tatum Wash Detention Basin |
| 24 | Cactus Rd Flood Control System |
| 25 | Doubltree Ranch Road System |
| 26 | Scottdale Rd Drainage (Thunderbird Rd to Doubletree Ranch Rd) |
| 27 | Indian Bend Wash |
| 28 | Camelback Side Drain Extension |
| 29 | 26th Avenue and Verde Lane Basin |
| 30 | Old Crosscut Canal |
| 31 | Osborn Rd. Storm Drain |
| 32 | Oak St. Drain (58th St to Indian Bend Wash) |
| 33 | Salt River Low Flow Ch. (9th Ave to I-10) (Phx Rio Salado) |
| 34 | 48th St Drain |
| 35 | 48th St Storm Drain |
| 36 | Salt River Channel (SR-143 to McClinton Cr) |
| 37 | Salt River Channel (McClinton Cr to Price Rd) |
| 38 | Salt River Channel (Price Rd to Mc Kellips Rd) |
| 39 | Alma School Drain |
| 40 | Price Road Drain |
| 41 | Guadalupe Drainage Improvement Project |
| 42 | Guadalupe FRS |
| 43 | Baseline Rd Storm Drain |
| 44 | ADOT Pit and Diversion Channel |
| 45 | Gila Drain Storm Drain |
| 46 | Central Chandler Area Drainage System |
| 48 | S.E. Valley Regional Drainage System |
| 49 | S.E. Phoenix Regional Drainage System |

PROJECTS WEST OF I-17



| Label | Project Name |
|-------|--|
| 26 | Laveen Area Conveyance Channel |
| 27 | 35th Avenue and Dobbins Road Basin and Storm Drain |
| 29 | 43rd Ave Storm Drain |
| 30 | 43rd Ave and Southern Ave Detention Basin |
| 34 | Maryvale Stadium West Inlet Channel |
| 35 | Bethany Home Outfall Channel (Phases IIA IIB & IIC) |
| 36 | Indian School Road Drain (10th Ave to Agua Fria River) |
| 37 | Camelback Ranch Levee |
| 38 | Bethany Home Outfall Channel (Phase I) |
| 39 | Colter Channel |
| 41 | Holly Acres Bank Stabilization |
| 42 | New River Channelization |
| 43 | Olive Ave. Storm Drain (1st Ave to 91st Ave) |
| 44 | Northern & Oranewood Storm Drain |
| 45 | Cactus Rd Storm Drain (6th Ave to SR-101) |
| 46 | 83rd Ave Grade Control Structure |
| 47 | Skunk Creek/ACDC Low Flow Channel |
| 48 | Skunk Creek Sports Complex Bank Protection |
| 49 | Sun City Drains |
| 50 | Arizona Canal Diversion Channel |
| 51 | 51st Ave & Bell Rd Drainage |
| 52 | 59th Ave Storm Drain (Bell Rd to ACDC) |
| 53 | Skunk Creek Channel Improvements (75th Ave to 51st Ave) |
| 54 | 51st Ave Storm Drain (Bell Rd. to Thunderbird Rd.) |
| 55 | 67th Ave Storm Drain (Bell to ACDC) |
| 56 | Scatter Wash Channel (43rd Ave. to 35th Ave.) |
| 57 | Adobe Dam |
| 63 | 67th Ave Storm Drain (Olive Ave. to ACDC) |
| 64 | 83rd Avenue and Pinnacle Peak Road Drainage Improvements Project |



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Source: Extracted from Map 2-2, West of I-17, and Map 2-3, East of I-17, in Completed Capital Projects through Fiscal Year 2010, *Comprehensive Floodplain Management Plan and Program Report*, Flood Control District of Maricopa County, 2009.

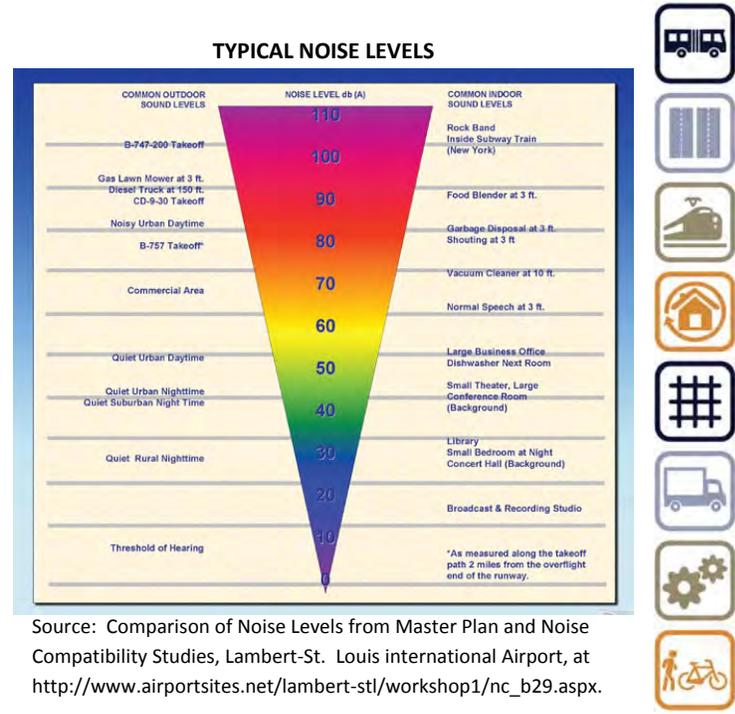
development and maintenance of these facilities measure different aspects of highway noise to determine or predict community impacts. Sound or noise levels are measured with meters generally applying a weighting (the 'A' scale) that mirrors human sensitivity to different frequencies. Typical noise levels experienced on a daily basis are shown in the graphic illustration at right.

MAG is the State-designated Metropolitan Planning Organization (MPO). In this capacity, MAG works with ADOT to implement State noise policy that was issued December 5, 2005, and the addendum approved by the Federal Highway Administration (FHWA), August 24, 2007. As directed by 23 CFR Part 772, the FHWA has developed specific noise abatement criteria (NAC) that are included in the ADOT noise abatement policy. NAC serve as the upper limit of acceptable traffic noise levels for various types of land use.

Table 4.1 identifies five NAC defined by FHWA relative to highway traffic and construction noise. Land uses in all activity categories are present in the study area. Category A potentially includes the several preserves that have been set aside by communities for which quiet and serenity are an important aspect of the environmental context. Category B, as indicated, focuses on general, daily activity areas of community residents (e.g., residential areas, parks, churches, etc.). Category C uses primarily are retail, commercial, and industrial properties, include such uses as recreational vehicle (RV) parking and storage areas. Vacant lots and undeveloped properties represent Category D uses within the study area. Category E focuses on the specific need to maintain a quiet environment around structures such that ongoing activities with the structure are not disrupted by unwelcome noise and the other forms of interference associated with noise – vibration.

ADOT policy sets guidelines to determine the need, feasibility, and reasonableness of noise-abatement measures for all roadway projects.³ This policy is based on currently accepted practices and procedures used by federal and state transportation agencies to assess highway-related noise impacts. For all construction projects, MAG is committed to ascertaining existing conditions, identifying potential noise receptors, and evaluating the nature of a project and its potential to affect prospective noise receptors. Measurements and assessment included attention to the following: (1) existing noise; (2) vehicle noise emissions; (3) noise barrier insertion loss; (4) construction equipment noise; (5) noise reduction due to buildings; and (6) occupational noise exposure.

ADOT policy indicates abatement measures must be considered, if anticipated sound levels are at or exceed the threshold criteria for land use categories identified in Table 4.1. For example, if noise levels at residential receptors are expected to equal, exceed, or approach 67 dBA L_{eq} (Exterior) for Category B land uses, then abatement measures must be investigated (*approach* is defined as 66 dBA L_{eq}). These levels typically are applied to exterior areas in which lower noise levels would be beneficial. If it is likely that predicted noise levels will approach or exceed the NAC, or cause a substantial increase over the existing traffic noise level



Source: Comparison of Noise Levels from Master Plan and Noise Compatibility Studies, Lambert-St. Louis international Airport, at http://www.airportsites.net/lambert-stl/workshop1/nc_b29.aspx.

³ Noise Abatement Policy, Arizona Department of Transportation (ADOT) Environmental & Enhancement Group, November 29, 2005.

Table 4.1
NOISE ABATEMENT CRITERIA

| Activity Category | Description | L _{eq} (h) | L ₁₀ (h) |
|-------------------|---|----------------------|----------------------|
| A | Lands on which serenity and quiet are of extraordinary significance and serve an important public need and on which the preservation of these qualities is essential, if the area is to continue to serve its intended purpose. | 57 dBA (Exterior) | 60 dBA (Exterior) |
| B | Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. | 67 dBA (Exterior) | 70 dBA (Exterior) |
| C | Developed lands, properties, or activities not included in Categories A or B. | 72 dBA (Exterior) | 75 dBA (Exterior) |
| D | Undeveloped lands. | -- | -- |
| E | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. | 52 dBA (Interior) | 55 dBA (Interior) |

Notes:

L_{eq} (h): L_{eq} is the equivalent, steady-state sound level that, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same period. L_{eq} (h) is the hourly value of L_{eq}.

L₁₀ (h): L₁₀ is the sound level that is exceeded 10 percent of the time (i.e., the 90th percentile) for the period under consideration. L₁₀ (h) is the hourly value of L₁₀.

dBA: dBA refers to the Hourly A-Weighted Sound Level in Decibels (acoustic). The A-weighting emphasizes certain frequencies to approximate how sound is perceived by human hearing.

Source: United States Code of Federal Regulations, Title 23: Highways, Part 772-Procedures For Abatement Of Highway Traffic Noise and Construction Noise (23 CFR §772.19).



(e.g., 15 dBA L_{eq}), the agency sponsoring the project must evaluate potentially affected properties for possible abatement solutions.

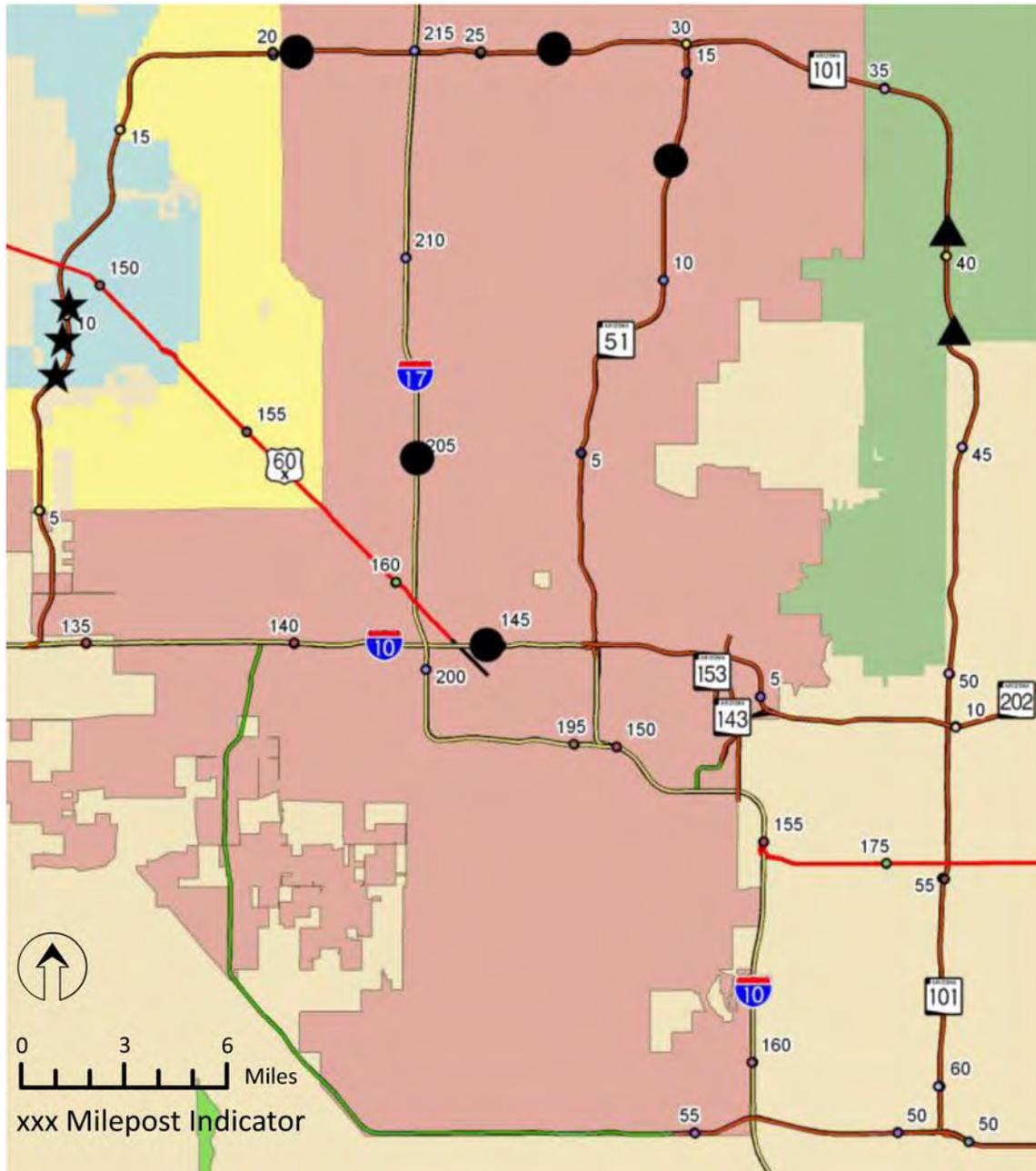
Noise-abatement measures are expected to be reasonable and feasible in terms of engineering considerations, cost, and benefit (e.g., can a barrier be constructed given the topography of the location; can substantial noise reduction be achieved given certain requirements for access, drainage, safety, or maintenance; are other noise sources present in the area). The reasonableness of proposed noise-abatement measure is discussed with affected property owner(s), and mutual agreement will be required prior to implementation of abatement measures.

A recent noise reduction study completed by MAG focused on possible noise reduction sites, prioritized recommended improvements, and established estimations of cost. Originally, 15 noise-sensitive locations were submitted by member governments for evaluation. Upon initial screening, 11 potential noise reduction locations were identified for further noise analysis. The FHWA approved Traffic Noise Model (TNM) 2.5 was used to predict traffic noise levels and conduct noise reduction analyses for the 11 locations. Ten of the 11 locations recommended for noise-abatement actions are located within the study area (Figure 4-4). These locations are identified in Table 4.2.

4.1.7. Parks and Trails

Each community in the study area has developed parks and other recreation facilities for use by its residents. Some of the parks are simply neighborhood-oriented open spaces, while others are vast regional preserves available to anyone in the region.

Figure 4-4
POTENTIAL NOISE REDUCTION LOCATIONS WITHIN THE STUDY AREA



POTENTIAL NOISE REDUCTION LOCATIONS

- City of Phoenix
- ▲ City of Scottsdale
- ★ City of Peoria

NOTE: Only sites within the Central Phoenix Framework Study Area are shown.

Source: Excerpt from Figure 1. Potential Noise Reduction Locations, *Noise Reduction Study Within Maricopa County*, Executive Summary, MAG Project No. : 888 MA 000 H7525 01L, June, 2008.

Table 4.2
LOCATIONS OF PROPOSED NOISE REDUCTION ACTION

| Municipality | Roadway Facility | Roadway Segment | Location of Noise Reduction Element |
|--------------------|--------------------------|---|-------------------------------------|
| City of Phoenix | I-17 | at Camelback Road | Southeast Corner |
| | I-10 (Papago Fwy) | 7 th Avenue to 15 th Avenue | North Side |
| | Loop 101 (Agua Fria Fwy) | at 51 st Avenue | Southeast Corner |
| | Loop 101 (Pima Fwy) | at 7 th Street | Northeast Corner |
| | SR-51 | at Greenway Parkway | Northwest Corner |
| City of Peoria | Loop 101 (Agua Fria Fwy) | Peoria Avenue to Grand Avenue | East Side |
| | | Olive Avenue to Peoria Avenue | West Side |
| | | Northern Avenue to Olive Avenue | West Side |
| City of Scottsdale | Loop 101 (Pima Fwy) | at 90 th Street | Northwest Corner |
| | | at Cactus Road | Northwest Corner |

Prepared by Wilson & Company, August, 2020.

Source: *Noise Reduction Study within Maricopa County*, Final Report, MAG, June, 2008.

Parks

There is some form of park or trail in almost every square mile of the study area (Figure 4-5). A brief summary of parks and recreation facilities in the communities of the study area is provided below.

City of Phoenix – The City has an extensive parks system that includes District Parks, Community Parks, Neighborhood Parks, Mini Parks, Desert Parks, as well as unnamed/undeveloped parks. In addition, the City identifies Special Areas (e.g., Arizona Horse Lover’s Park and Cricket Pavilion) and Mountain Preserves, which constitutes the largest parks system in the country, that provide a support recreation and lifestyle experiences beyond that available at traditional parks.

City of Peoria – Peoria has numerous neighborhood and community parks and recreation facilities, ranging from one to two acres in size to 52 acres. The most significant facility in the study area is the Peoria Sports Complex located in the southeast quadrant of Loop 101 (Agua Fria Fwy) and W. Bell Road. Built in 1994, this 142-acre facility is the first Major League Baseball Spring Training and player development facility in the country developed to be shared by two teams (see Study Area Spring Training below).

City of Scottsdale – The City has developed numerous Community Parks and Neighborhood Parks and provides special facilities for its residents (e.g., McCormick-Stillman Railroad Park). Plus, it has dedicated itself to establishment of the McDowell Sonoran Preserve, which is just outside the study area and attracts person from throughout the region.

City of Tempe – This City has does not differentiate among its many parks, which are located throughout the community. Tempe has several special facilities, such as the 2,000-acre Papago Park (contiguous with Phoenix Papago Park), and, particularly, sports-oriented facilities. But the City, since creation of Tempe Town Lake on the Salt River, has become a destination for water-oriented activities (e.g., P.F. Chang’s Rock ‘n’ Roll Arizona Marathon + Half Marathon). The two-mile long artificial lake is sustained with reclaimed water, recharge and recovery, and water exchanges.

City of Chandler – The portion of this City in the study area has thirteen developed parks of a neighborhood or community nature.

City of Tolleson – The City has two small neighborhood parks within the study area south of I-10 (Papago Fwy) between 86th and 55th Avenues. Its 10-acre Veterans Park, which features a shaded baseball facility and green design, is located in the southeast quadrant of 86th Avenue and Van Buren Street.



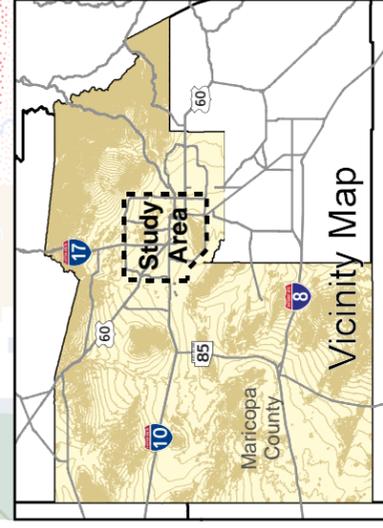
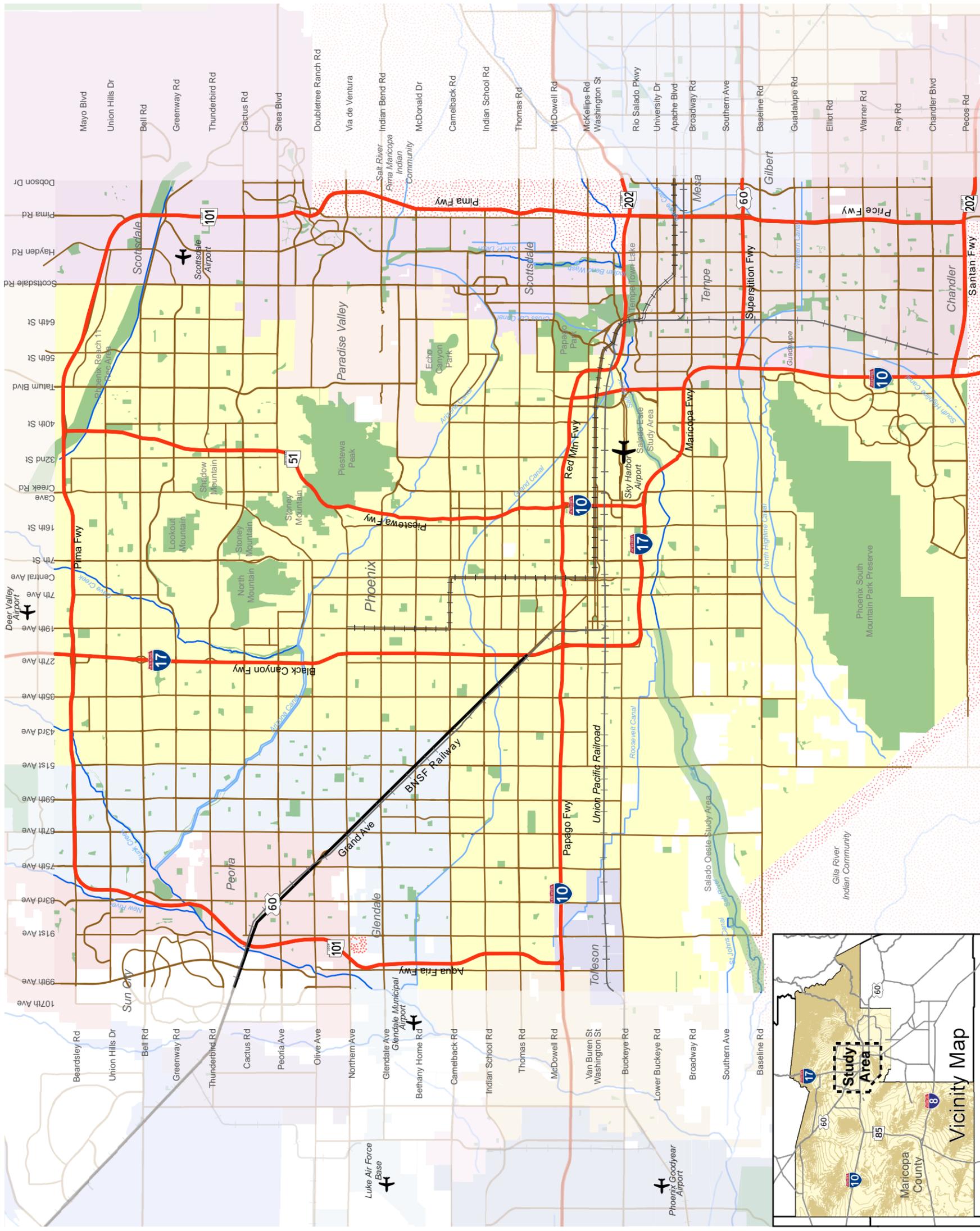


Figure 4-5 Study Area Parks, Open Spaces, and Preserves

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space/Preserve
 - River/Stream
 - Canal
 - Airport
 - Indian Reservation
 - Maricopa County



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Source: Arizona Geospatial Portal.

Town of Paradise Valley – This small community on the eastern edge of Phoenix has not neighborhood or community parks, but it does boast the presence of the Barry Goldwater Memorial Park located on the northeast corner of Lincoln Drive and Tatum Boulevard.

Trails

Due to the relatively mild climate regime within which the study area is located, mild weather conditions, particularly between September and May, offer excellent opportunities for outdoor activity. Walking, hiking, biking, and jogging, therefore, are very popular pastimes for residents throughout the study area. Figure 4-6 shows the general locale of various hiking trails in the study area. It is apparent from the figure that the trails are generally associated with the mountain preserves. Trails includes three trails on Camelback Mountain, eight associated with Piestewa Peak and nearby Dreamy Draw, four trails on Lookout Mountain.

Both the City of Phoenix and Scottsdale have extensive trail systems designed to provide opportunities to explore and experience natural features and amenities. The City of Tempe has developed trails associated with its major parks facilities, such as Tempe Town Lake, Papago Park, and Hayden Butte Preserve. And, the Cities of Peoria and Glendale have developed a trail along Skunk Creek, as a continuation of the Skunk Creek Trail in north Phoenix and connection to the Arizona Canal/Diversion Channel (ACDC) Trail that extends to the east through Phoenix, Scottsdale, to the Salt River at the eastern edge of the Salt River Pima-Maricopa Indian Community. Many miles of trails have been created in conjunction with the extensive canal system developed in the early- to mid-1900s as part of the Salt River Project.

In addition, the Department of the Interior (DOI) has identified the Central Arizona Project (CAP) canal as a National Recreation Trail. The CAP canal traverses the northeastern corner of the study area, crossing Loop 101 (Pima Fwy) just east of 32nd Street in Phoenix and continuing in a southeasterly direction, exiting the study area after crossing Loop 101 a second time parallel with Frank Lloyd Wright Boulevard. As part of the recreational planning for the CAP canal, the BOR has committed itself to maintaining a 20-foot wide recreation corridor on downstream side of the canal (generally the south or west side) to be developed as a permanent shared-use (trail/bikeway), non-motorized trail. As a designated National Trail, the trail qualifies as a Section 4(f) property, even though it still is under development.

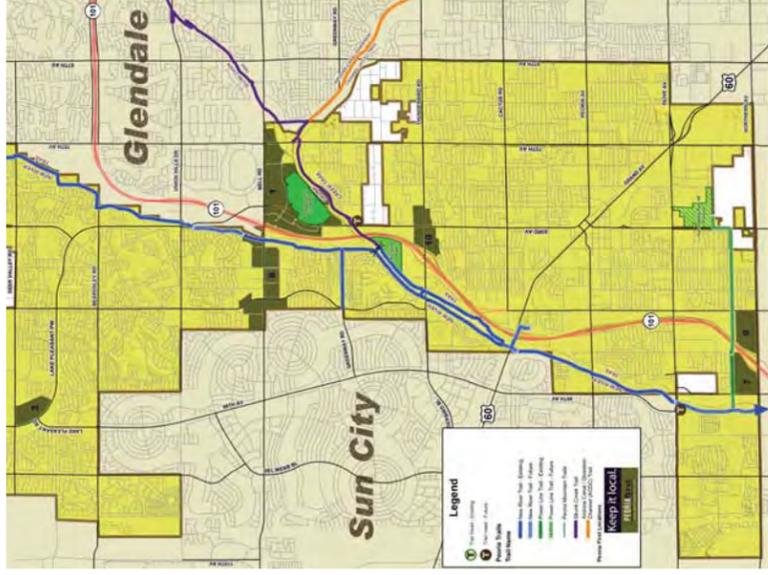
4.1.8. Hazardous Materials

Hazardous materials (HazMats) are regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). ADEQ implements CERCLA, commonly known as the “Superfund,” and its amendment, the Superfund Amendments and Reauthorization Act of 1986 (SARA). The inherent environmental concerns associated with HazMats and solid waste landfills require a preliminary investigation into the location of permitted and non-regulated HazMats sites and solid waste facilities within the study area.

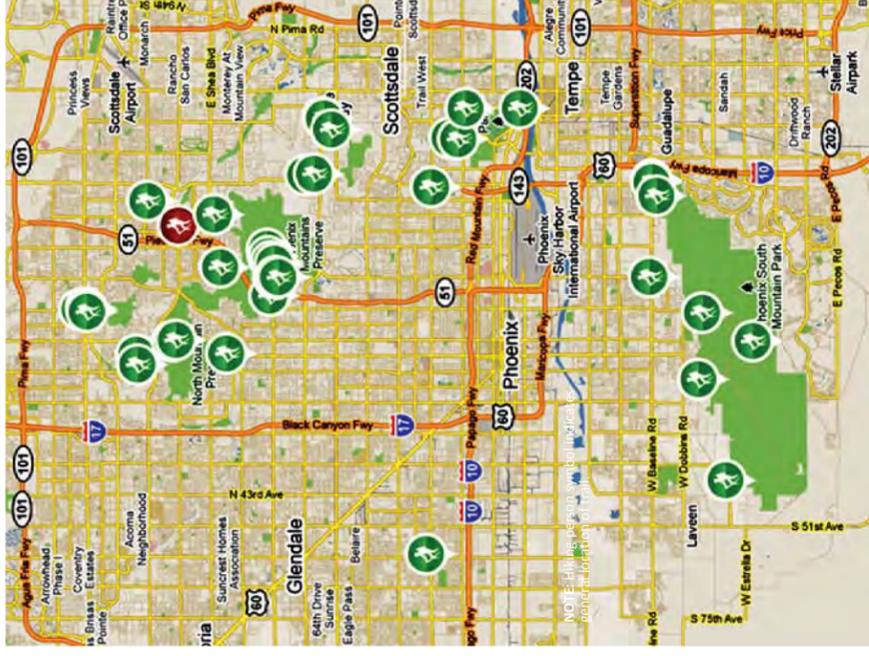
Proposed transportation improvement projects will be the subject of formal Preliminary Initial Site Assessment (PISA). Performing such a study, prior to implementing project-specific actions will provide information necessary to determine environmental conditions and reduce exposure from hazardous materials contamination of past uses of any property. This assessment will need to conform to policies and procedures established by federal, state, and local entities responsible for and having authority over the disposition of HazMats. The Arizona Department of Environmental Quality maintains information on significant HazMats sites, which will need to be reference with respect to any proposals for major transportation improvement projects. Appendix B provides mapping of significant HazMats sites within the study area. While surface improvements to existing facilities would need to considered local HazMats sites listed according to the regulatory sources cited above, major roadway construction projects requiring substantial subsurface excavation or drilling or setting of pylons will need to take into consideration the locations of the sites identified in Appendix B.



PEORIA TRAILS



CITY OF PHOENIX TRAIL LOCATIONS

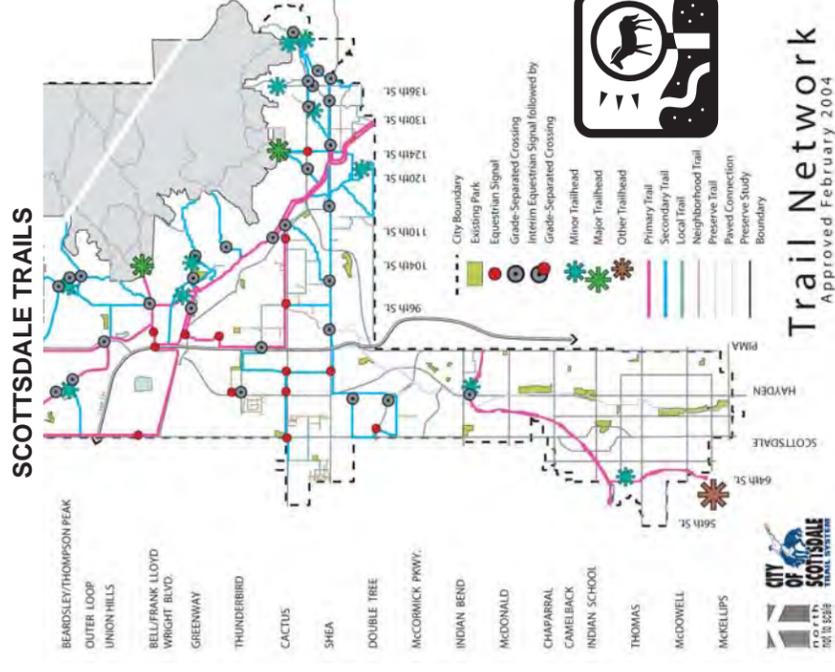


Source: Greater Phoenix Metropolitan Area Hiking at Trails.com

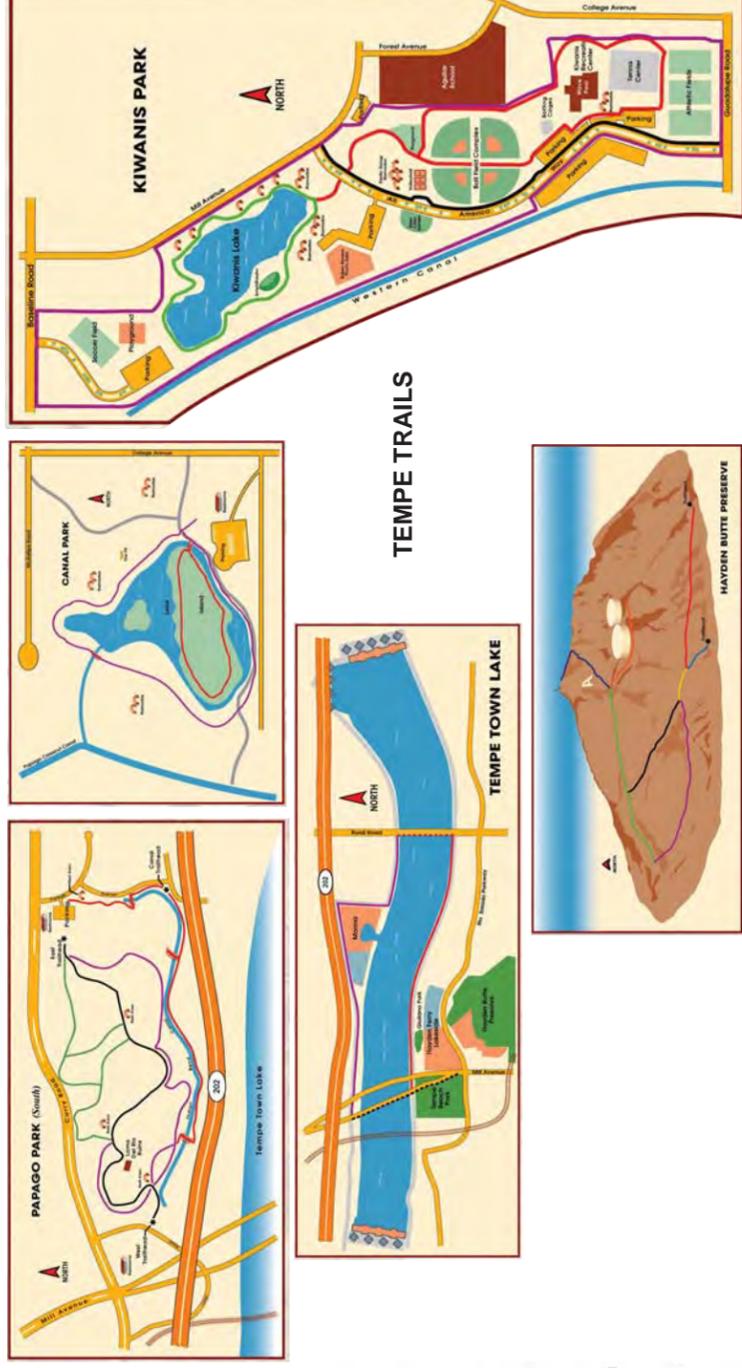


Figure 4-6

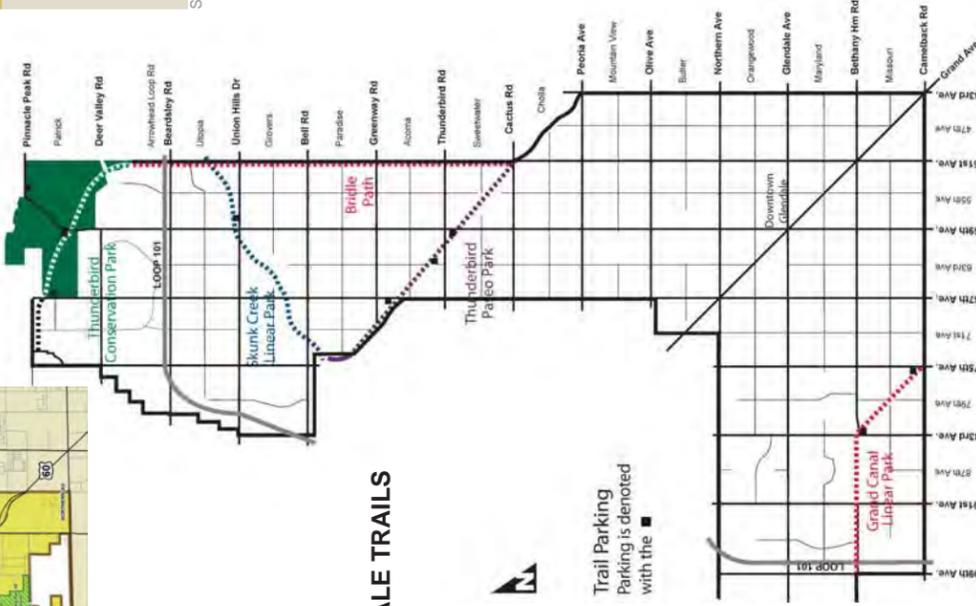
Study Area Trails



Trail Network
Approved February 2004



GLENDALE TRAILS



No Scale

While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Extracted from Community documentation posted on Internet Web sites, unless otherwise noted.

With respect to the transport of HazMats, such materials transported on Arizona highways include all and any allowed by U.S. Department of Transportation regulations. Prohibitions on the movement of HazMats apply to only three roadway segments in the State: all three are within the study area. ⁴

I-10 Deck Park Tunnel – HazMats are not allowed to be transported through the Deck Park Tunnel on I-10 (Papago Fwy) in Phoenix at any time. Vehicles transporting such materials must exit at 7th Street (westbound) or 7th Avenue (eastbound) and reenter the Interstate facility at 7th Avenue or 7th Street, respectively. As an alternative, the transporter can take I-17 to get to the east side of the tunnel.

Loop 202 Salt River Bridge – In Tempe, HazMats are prohibited from transport over the Loop 202 (Red Mountain Fwy) bridge across the Salt River. Vehicles transporting such materials must exit at McClintock Drive (westbound) or Dobson Road (westbound). Transporters may follow E. Rio Salado Parkway as a detour route that connects the McClintock and Dobson.

US-60 at Loop 101 (Agua Fria Fwy) – HazMats are not permitted on the ramp connecting eastbound US-60 to southbound Loop 101. A detour south on 99th Avenue to Peoria Avenue accommodates this prohibition.



4.2 Natural Environment

The environmental features discussed in this section are based on readily available information. This information was obtained from various sources such as public agencies, municipalities, and web pages and databases based on Geographic Information Systems (GIS). It has not been field-verified, although review of aerial imagery available on various Internet sites was conducted, as appropriate. On-site “ground truthing” and field investigation are recommended at the Corridor Improvement Study (CIS) and Design Concept Report (DCR) levels to verify the character and magnitude of these environmental considerations.

4.2.1. Threatened and Endangered Species

The Endangered Species Act, enacted in 1973, was passed out of concern about extinctions of "various species of fish, wildlife, and plants in the United States." It also reflected an understanding that many other species had become "so depleted in numbers that they are in danger of or threatened with extinction." An “endangered species” is one in danger of extinction in "all or a significant portion of its range." A “threatened species” is one likely to become endangered in the foreseeable future. The Act applies to significant actions of the federal government and requires an assessment of potential impacts to such species during planning for and implementation of projects approved or funded by the federal government. Species of Concern and Candidate species are not afforded protection under the Endangered Species Act and have no regulatory listing status. Generally, these categories are identified during listed species reviews, as these species have potential to become listed in the future.

Major transportation improvement projects, such as may be identified by this study, often rely on federal funding. Due to the heavily developed nature of the study area, the likelihood of the presence of threatened and endangered species is low. However, there are certain species that have adapted to the urban environment and move freely through natural areas that have been preserved, even created, within the overall development pattern. As such, these threatened and endangered species can be present and will need to be considered during implementation of any proposed transportation improvement projects.

⁴ The information cited below was provided to the South Mountain Citizens Advisory Team, June 26, 2008. Attendees at the meeting also were advised that ADOT is in the process of developing a statewide Hazardous Materials Routing Plan. This study will need to be coordinated with ADOT to assure proposed improvements are consistent with the goals and objectives and security issues associated with this plan.

A review of the U.S. Fish and Wildlife Service (FWS) and Arizona Game and Fish Department (AGFD) threatened and endangered species lists for Maricopa County was conducted to determine those species that potentially occur within the project study area. The only sensitive habitat known to exist within the study area is an area of small foothills generally bound by Cave Creek Road on the east, Union Hills Drive on the south, 12th Street on the west, and Deer Valley Road on the north. Significant urban development has occurred in this area, completely surrounding the hills. In addition, there is evidence from aerial imagery that the habitat has experienced substantial encroachment of human activity.

The many man-made lakes and natural drainage features of the study area provide resources that can support wildlife, including threatened and endangered species. For example, the Rio Salado projects of Phoenix and Tempe have established hospitable and supportive environmental conditions for several species of endangered wildlife, such as the black crowned night heron, Great Egrets, and American bald eagle. In fact, a large number of raptors, i.e., birds of prey, such as eagles, hawks, owls, falcons, are considered endangered and, therefore, protected. It is not uncommon to see these species in residence within the study area. Appendix C provides a listing of threatened and endangered species in Maricopa County produced by the US Fish and Wildlife Service (FWS) Arizona Ecological Services. The appendix also provides a listing of species identified for Maricopa County in the Heritage Data Management System (HDMS), which is maintained by the Arizona Game and Fish Department (AZGFD). There also is a listing of Special Status Species for the Lower Salt River Watershed



4.2.2. Wildlife Linkages

Expansive urban growth and human activity in residential neighborhood areas, commercial and industrial centers, even recreational venues has been supported by the construction of roads, railroad, fences, canals. Development of these artifacts of the human experience has presented challenges regarding the conservation of wildlife. They fragment, even destroy, wildlife habitat and potentially create barriers that can inhibit animal movements and migratory patterns, isolating wildlife populations. The Arizona Wildlife Linkages Assessment represents initial efforts to identify potential linkage zones that are important to Arizona’s wildlife and natural ecosystems. The document and map resulting from this assessment serves as an informational resource to planners and engineers, providing a basis for integrating the concept of wildlife linkage zones into projects to address wildlife connectivity at an early stage of the process.

Within the study area, there are two potential linkage zones. The CAP canal, in addition to being designated a National Recreation Trail, has been identified as a Potential Linkage Zone #152. Similarly, the Salt River through its entire length in the study area has been identified as Potential Linkage Zone #151. According to the Assessment, “potential linkage zones represent areas that are important to Arizona’s wildlife and natural ecosystems. If integrated into regional planning frameworks, these areas have the potential to be maintained or preserved during this time of prosperity, growth and development.” For each potential linkage zone, the Arizona Wildlife Linkages Workgroup (AWLW) defined existing conditions, including biotic communities, species, and land ownership, and detailing known and anticipated threats. Table 4.3 lists the species identified as being associated with Potential Linkage Zones #151 and #152.

As a whole, the study area may be considered to represent a “fracture zone.” These are areas that inhibit movements between “habitat blocks” – areas expected to remain hospitable to wildlife for a long time to come. Only South Mountain and the Salt River Pima-Maricopa Indian Reservation area have been identified as habitat blocks. In the case of the study area, extensive urban development actions have fractured or interrupted the natural wildlife habitat areas in central Arizona, limiting or preventing animal movements, or threatening to do so in the foreseeable future. Most fracture zones need significant restoration to function as reliable linkages. Resource agencies and conservation groups can, as appropriate, promote greater freedom for wildlife movement by protecting and enhancing washes, streams, and rivers, as well as improving culvert and bridge designs.

Table 4.3

SPECIES IDENTIFIED FOR WILDLIFE LINKAGES WITHIN THE STUDY AREA

| Linkage #151: Gila/Salt River Corridor, Granite Reef Dam to Gillespie Dam | Linkage #152: Central Arizona Project Canal |
|---|---|
| Arizona Chuckwalla <i>Sauromalus ater</i> | Arizona Chuckwalla <i>Sauromalus ater</i> |
| Bald Eagle <i>Haliaeetus leucocephalus</i> | Arizona Toad <i>Bufo microscaphus</i> |
| Black-bellied Whistling-duck <i>Dendrocygna autumnalis</i> | Bald Eagle <i>Haliaeetus leucocephalus</i> |
| Cactus Ferruginous Pygmy-owl <i>Glaucidium brasilianum cactorum</i> | Banded Gila Monster <i>Heloderma suspectum cinctum</i> |
| California Leaf-nosed Bat <i>Macrotus californicus</i> | Big Free-tailed Bat <i>Nyctinomops macrotus</i> |
| Desert Pupfish <i>Cyprinodon macularius</i> | Bighorn Sheep <i>Ovis canadensis</i> |
| Desert Sucker <i>Catostomus clarki</i> | Bobcat <i>Lynx rufus</i> |
| Least Bittern <i>Ixobrychus exilis</i> | Bonytail <i>Gila elegans</i> |
| Lowland Leopard Frog <i>Rana yavapaiensis</i> | Cactus Ferruginous Pygmy Owl <i>Glaucidium brasilianum cactorum</i> |
| Roundtail Chub <i>Gila robusta</i> | California Leaf-nosed Bat <i>Macrotus californicus</i> |
| Sonora Sucker <i>Catostomus insignis</i> | Cave Myotis <i>Myotis velifer</i> |
| Sonoran Desert Tortoise <i>Gopherus agassizii</i> | Clark's Grebe <i>Aechmophorus clarkii</i> |
| Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> | Desert Rosy Boa <i>Charina trivirgata gracia</i> |
| Western Burrowing Owl <i>Athene cunicularia hypugaea</i> | Desert Sucker <i>Catostomus clarki</i> |
| Western Yellow Bat <i>Lasiurus xanthinus</i> | Great Egret <i>Ardea alba</i> |
| Western Yellow-billed Cuckoo <i>Coccyzus americanus occidentalis</i> | Greater Western Mastiff Bat <i>Eumops perotis californicus</i> |
| Yuma Clapper Rail <i>Rallus longirostris yumanensis</i> | Javelina <i>Tayassu tajacu</i> |
| | Kit Fox <i>Vulpes macrotis</i> |
| | Least Bittern <i>Ixobrychus exilis</i> |
| | Longfin Dace <i>Agosia chrysogaster</i> |
| | Long-legged Myotis <i>Myotis volans</i> |
| | Maricopa Leaf-nosed Snake <i>Phyllorhynchus browni lucidus</i> |
| | Mountain Lion <i>Felis concolor</i> |
| | Mule Deer <i>Odocoileus hemionus</i> |
| | Pale Townsend's Big-eared Bat <i>Corynorhinus townsendii pallescens</i> |
| | Pocketed Free-tailed Bat <i>Nyctinomops femorosaccus</i> |
| | Razorback Sucker <i>Xyrauchen texanus</i> |
| | Roundtail Chub <i>Gila robusta</i> |
| | Sonora Sucker <i>Catostomus insignis</i> |
| | Sonoran Desert Tortoise <i>Gopherus agassizii</i> |
| | Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> |
| | Western Yellow-billed Cuckoo <i>Coccyzus americanus occidentalis</i> |
| | Yellow-nosed Cotton Rat <i>Sigmodon ochrognathus</i> |
| | Yuma Clapper Rail <i>Rallus longirostris yumanensis</i> |
| | Yuma Myotis <i>Myotis yumanensis</i> |



Prepared by Wilson & Company, July, 2010.

Source: Section VII Potential Linkage Zones, Arizona's Wildlife Linkages Assessment, Arizona Wildlife Linkages Workgroup, ADOT & AZGFD, et. al., December, 2006.

4.2.3. Water Resources and Water Quality



Water Quality

Urban development results in an artificial form of drainage and has largely disrupted the natural characteristics of water resources in the study area. Urban development is particularly critical to water quality. Stormwater that once soaked into the ground flows quickly into street gutters and drains from paved surfaces that cannot absorb the rains. Along the way, runoff picks up pollutants, such as pesticides, fertilizers, eroded soil, and oil and grease from motor vehicles. The pollutants are transferred over land or via specially design stormwater conveyance facilities and discharged, often untreated, directly into local water resource features, e.g., dry washes, creeks and rivers, and urban lakes. Pollution of water resources can lead to the destruction of fish, wildlife, and aquatic life habitats, a loss in aesthetic value and threats to public health.

As noted earlier with respect to drainage in the study area, there are three watersheds, as defined by FCDMC: Agua Fria Watershed; Cave Creek/Salt River Watershed; and Gila/Queen Creek Watershed. For purposes of evaluating and regulating water quality, the U.S. Environmental Protection Agency (USEPA) classifies the bulk of the study area as being in the Lower Salt River Watershed (ID# 15060106). An extensive record/inventory of water quality information by watershed station is available through the USEPA STORET site. The following water resources within the study area are identified as having impaired waters for listing cycles 2004, 2006, and 2008:

- Alvord Lake.
 - Location: Cesar Chavez Park, southwest corner of Baseline Road and 35th Avenue, Phoenix.
 - Impairment: Ammonia (un-ionized)
- Chaparral Park Lake.
 - Location: northeast corner of Chaparral Road and Hayden Road, Scottsdale.
 - Impairment: inadequate dissolved oxygen; E. Coli.
- Cortez Park Lake.
 - Location: northeast corner of Dunlap Avenue and 35th Avenue, Phoenix.
 - Impairment: inadequate dissolved oxygen; high PH.
- Salt River.
 - Location: from 23rd Avenue Waste Water Treatment Plan (WWTP) outfall to the Gila River, Phoenix.
 - Impairment: Chlordane, Toxaphene, DDT.

The current state of these resources is unknown, and it is unlikely that any proposed transportation improvements recommended from this study will directly affect or impact any of these sites. However, these sites highlight the difficulty of maintaining water quality in the urban environment.

Water Resources

The Salt River crosses the southern portion of the study area from a point proximate to the Loop 101 (Pima/Price Fwys)/Loop 202 (Red Mountain Fwy) interchange to a point near Baseline Road and 99th Avenue. It is the largest watercourse in the study area. The Salt River once was a major water resource for residents of the study area. The drainage basin has been tapped by hundreds of wells, as is obvious from the numerous symbols displayed in Figure 4-7. Since being dammed for water storage and irrigation purposes within the

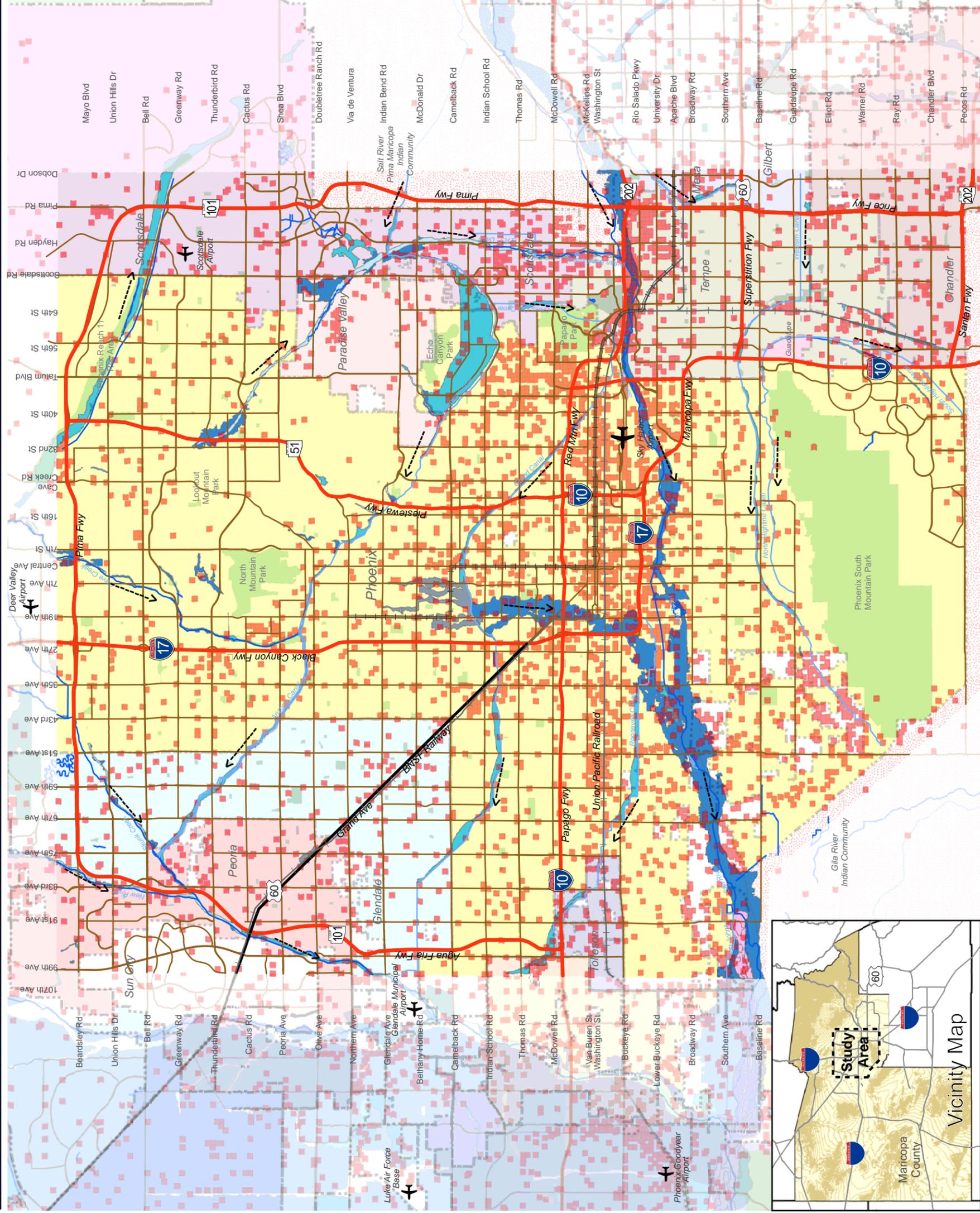


Figure 4-7

Principal Water Resources

Legend

- Freeway
- Highway
- Major Road
- Railroad
- Light Rail
- Park/Open Space Preserve
- River/Stream
- Canal
- Airport
- City Boundary
- Wells
- Riparian Areas
- 100 Year Floodplain/
Hazard Factors Are Not Determined
- 100 Year Floodplain/
Hazard Factors Are Determined
- 100 Year Floodplain/
Hazard Factors Are Determined
- 100 Year Floodplain
Depths Between 1 And 3 Feet
- Floodway
- Direction of Drainage or Flow



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framework of the Salt River Project (SRP) – first in 1909 with subsequent structures constructed through 1965 – the river only occasionally flows following major precipitation events.

Cave Creek flows generally in a southerly direction from a point near Loop 101 (Pima Fwy) at 7th Street to the east side of I-17 north of Olive Avenue. Cave Creek at one time flowed directly south to the Salt River. Flood control projects (see Section 4.1.5) have resulted in its diversion north of Olive Avenue to the northwest, where it joins Skunk Creek and another flood control structure to be diverted to the southwest to New River. Skunk Creek crosses the northwestern corner of the study area, joining the diverted Cave Creek west of 75th Avenue south of Bell Road in Peoria.

The Arizona Canal is a major water resource supporting socioeconomic activity in the study area, as is the entire system of SRP canals. The Arizona Canal, in particular led to the founding of Scottsdale, Glendale, and Peoria by transferring water for flood irrigation from the Salt River watershed. It is the northernmost canal in the SRP water distribution system, and it is coincident with diverted Cave Creek from west of I-17 to Skunk Creek.

Indian Bend Wash traverses the study area from north Phoenix through Scottsdale and north Tempe to the Salt River. It accommodates a 65-square-mile drainage area and provides 100-year flood protection. A greenbelt, located between McDonald Drive and McKellips Road, is a 4.5-mile-long grassy swale used for recreation and includes playgrounds and open space, golf courses, bicycle and hiking trails, and ball fields.

Although the project primarily was undertaken to mitigate the local flooding hazard, the design also serves as a key element of local groundwater recharge efforts.

The CAP Canal flows in a south by southeast direction across the northeastern corner of the study area, as described earlier. This canal is managed and operated by the Central Arizona Water Conservation District (CAWCD) and also referred to as the Hayden-Rhodes Aqueduct. Its elevation in the study area is approximately 1,500 feet. The north side of the canal has become a barrier to drainage from the north and northwest, which has created a small, linear park-like situation compatible with recreational activities and suitable for wildlife habitat.



4.2.4. Air Quality

Criteria Pollutants

The Maricopa County Air Quality Department's Air Monitoring Division, in cooperation with the USEPA and other governmental agencies, maintains and operates 23 air quality sites to measure pollutant levels. The sites provide an accurate and timely representation of the ambient air quality within the County:

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO₂)
- Ozone (O₃)
- Particulate Matter (PM₁₀ and PM_{2.5})
- Sulfur Dioxide (SO₂).

These “criteria” pollutants, as they are referred to, are defined in the Clean Air Act, as amended, which outlines the USEPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. Data from the County pollutant monitoring sites are used in a variety of different ways, including determining the County’s attainment status relative to standards established for these criteria, modeling to forecast the potential impacts of new sources, and providing real-time data to Air Quality Forecasters. According to the Department’s Web site:

The Department's Planning & Analysis Division is responsible for drafting and finalizing air pollution control rules and ordinances and for compiling emissions inventories. Rules and ordinances are created and revised to comply with the Clean Air Act and to implement control strategies for stationary sources in Maricopa County. Emissions inventories are a comprehensive listing, by source, of air pollutant emissions. Emissions inventories cover point sources (large industries), area sources (numerous small sources such as gas stations and consumer products usage), mobile sources (both on-road and off-road) and biogenic sources (gases released by plants and soil). The division also works with the Maricopa Association of Governments, the Arizona Department of Environmental Quality, and the Arizona Department of Transportation to develop State Implementation Plans (SIP), policies/guidelines and reports required to complete SIP analyses. A SIP is a cumulative record of all air pollution control strategies, state statutes, state and local rules and local ordinances implemented by governmental agencies within Arizona.



Nonattainment/Attainment Status

Currently, the County is in nonattainment status with respect to two of the five criteria pollutants cited above: PM10 and Ozone (1-hour) and is a maintenance area relative to CO.

PM10 – This pollutant is produced by many sources, including: exhaust from cars, trucks, buses and planes; industrial sources (e.g., power plants); fugitive dust resulting from construction, mining and agricultural activities; and direct fuel combustion associated with the operation of fireplaces and woodstoves. The definition of the PM10 criteria pollutant includes: dust, soot, and other tiny bits of solid materials released into the air.

Ozone – This pollutant is not directly released or emitted into the air: it is formed by the reaction of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) in the presence of heat and sunlight. VOCs are emitted from a variety of sources, including: motor vehicles, chemical plants, refineries, factories, consumer and commercial products, and other industrial sources. Nitrogen oxides are emitted from motor vehicles, power plants, and other sources of combustion.

Carbone Monoxide – The USEPA declared the County in 2005 had achieved attainment of the criteria for CO. This pollutant forms when the carbon in fossil fuels, such as oil and its derivative gasoline, does not completely burn. Vehicle exhaust contributes roughly 60 percent of all CO emissions nationwide and up to 95 percent in cities, according to the Air Quality Department's Web site. Other sources include fuel combustion in industrial processes and natural sources, such as wildfires.

It is apparent from the information presented above that the transportation sector of our communities is a primary contributor to the lack air quality, i.e., nonattainment of standards establish for criteria pollutants. This fact needs to be recognized, and the planning of transportation improvements must examine how changes will potentially affect the levels of those pollutants noted above that are in nonattainment status.

Mobile Source Air Toxics

Mobile source air toxics are a special class of compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. USEPA has produced a list of compounds identified in the exhaust or evaporative emissions from on-road and non-road equipment, relative to various fuels (e.g., ethanol, biodiesel, compressed natural gas). The number of such compounds exceeds 1,000. According to the USEPA Web site on this subject, the agency in February 2007 finalized a rule to reduce hazardous air pollutants from mobile sources. "The rule will limit the benzene content of gasoline and reduce toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and PM_{2.5}) by over 1 million tons."

Conformity

As explained at the U.S. Department of Transportation (USDOT) Web site addressing Transportation Conformity, “transportation conformity ("conformity") is a way to ensure that Federal funding and approval goes to those transportation activities that are consistent with air quality goals. Conformity applies to transportation plans, transportation improvement programs (TIPs), and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in areas that do not meet or previously have not met air quality standards for ozone, carbon monoxide, particulate matter, or nitrogen dioxide. These areas are known as "nonattainment areas" or "maintenance areas," respectively.”

MAG as the Metropolitan Planning Organization is responsible for regional transportation and air quality planning. USDOT, under stipulations specified in the 1990 Clean Air Act Amendments, “cannot fund, authorize, or approve Federal actions to support programs or projects which are not first found to conform to the Clean Air Act requirements. The FHWA [Federal Highway Administration] and the FTA [Federal Transit Administration] jointly make conformity determinations within air quality nonattainment and maintenance areas to ensure that Federal actions conform to the "purpose" of State Implementation Plans (SIPs). Therefore, MAG prepares a Conformity Analysis to demonstrate the criteria specified in the Federal transportation conformity rule for a conformity determination are satisfied by the Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP). MAG recently made a finding of conformity for the FY 2011-2015 MAG TIP and MAG RTP 2010 Update that the two plans support the SIP. The USDOT site explains: “A conformity determination demonstrates that the total emissions projected for a plan or program are within the emissions limits ("budgets") established by the air quality plan or State Implementation Plan (SIP), and that transportation control measures (TCMs) are implemented in a timely fashion.”





5.0 Land Use and Development

Because there is an integral a database for existing and future conditions for the study area at build out must be established. The Study Team reviewed previous transportation and land use studies including General Plans, comprehensive plans, framework studies, economic development plans, and major development plans to establish a land use inventory. Each study area jurisdictions' plans and planning efforts are at varying degrees of update, and they are developed at different timeframes. MAG has knit together all of the plans creating a realistic and acceptable baseline existing land use summary. MAG also has prepared a future land use summary, based on General Plans of communities within and contiguous to the study area boundary. These plans reflect nearer term planning horizons (e.g., 2020 and 2030). Working collaboratively with its planning partners, stakeholders, and the public, MAG also is in the process of development a Buildout land use pattern that represents an amalgamation of baseline existing land use, expectations for future development initiatives, and projections of future population and employment conditions.

5.1 Existing Land Use Pattern

The study area consists of approximately 620 square miles of dense urban development, which is depicted in Figure 5-1. The existing land use pattern is characterized by a mix of: low- to high-density residential areas, as well as scattered individual residences; small and large office/commercial centers, as well as scattered independent commercial sites; industrial corridors and local concentrations of industrial activity, as well as scattered independent industrial sites; scattered public/quasi-public institutions; a relatively large area devoted to agricultural pursuits; and scattered passive/active open space areas and facilities. There are certain patterns that stand out from within the overall pattern.

5.1.1 Residential Development

Generally, residential development west of I-17 has occurred at higher densities than east of I-17. And, residential density in the northern portion of the study area generally is higher than in the southern portion of the study area. The southwestern portion of the study area remains largely undeveloped and rural in character with the greatest representation of residential development directly south of the Phoenix downtown, which roughly is circumscribed by the I-10/I-17 loop. Low- to medium-density residential development dominates the northwestern quadrant of the study area, particularly north of the Arizona Canal. The low- to medium residential development pattern generally holds for the southeast corner of the study area, with the exception of high-density housing in the Ahwatukee neighborhood.

5.1.2 Commercial Development

Commercial development is widely scattered about the study area. Linear concentrations of commercial development occur along major arterial facilities. Commercial development also is the dominant land use within the major mixed-use activity centers in the study area. A summary of notable, major commercial development in the study area is presented in Table 5.1. There are six major corridors located with the study area that have a strong representation of commercial land uses. There are thirteen major shopping destinations located in the study area. Six of these destinations are considered to be regional shopping centers. However, all have some degree of attraction for residents well beyond the typical market area of a community shopping center or power center. There are nine major mixed-use activity centers, where a selection of housing, entertainment, commercial enterprises, sports venues, and other attractions are concentrated.

Figure 5-1

Existing Land Use

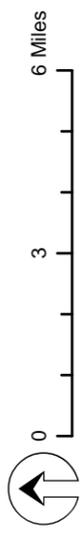
Legend

- Freeway
- Highway
- Major Road
- Railroad
- Light Rail
- Park/Open Space Preserve
- River/Stream
- Canal
- Airport
- City Boundary

- Bus Network
- Freeway Network
- Rail Network
- Sustainability and Liability
- Aerial Network
- Commercial Vehicle Movements
- Intelligent Transportation Systems
- Bike and Pedestrian Movements

Existing Land Use

- Active Open Space
- Agriculture
- Airport
- Business Park
- Cemetery
- Commercial (HD)
- Commercial (LD)
- Developing Employment
- Developing Residential
- Educational/Religious
- Golf Course
- Industrial
- Medical/Nursing Home
- Multi-Family
- Office
- Other Employment
- Undevelopable
- Public/Military
- Mixed Use
- Single-Family (LD)
- Single-Family (MD)
- Single-Family (HD)
- Motel/Hotel/Resort
- Transportation
- Vacant
- Water



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Composite mapping by MAG based on Member Agency land use information, 2006.

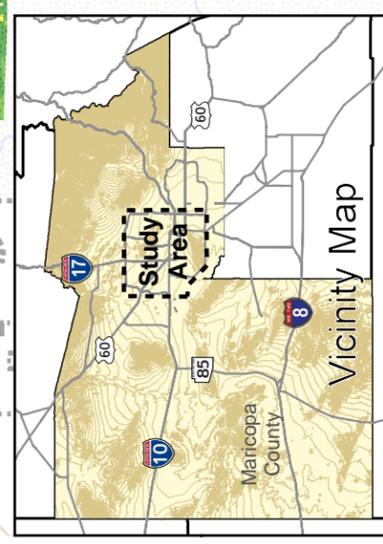
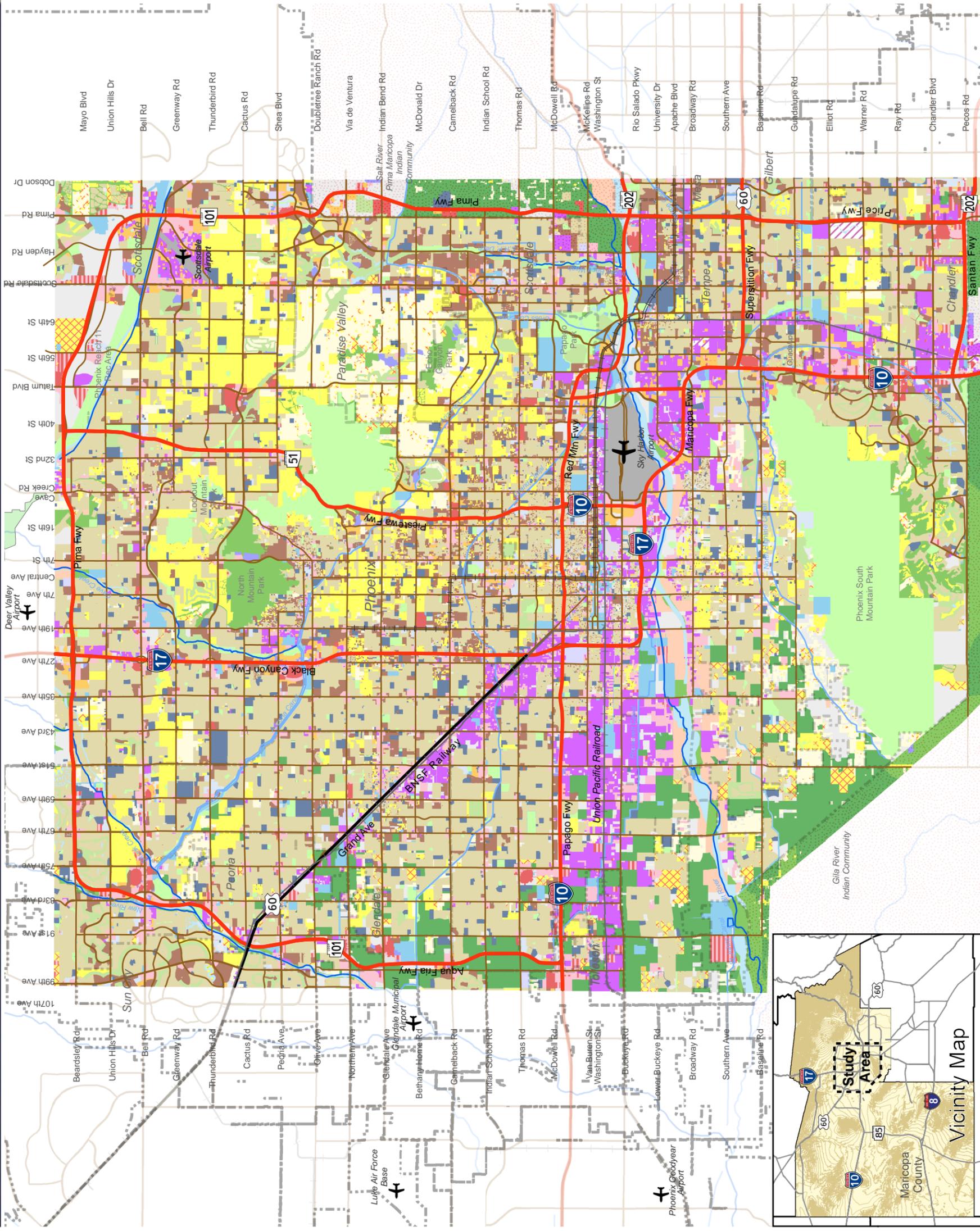


Table 5.1

LISTING OF MAJOR COMMERCIAL CONCENTRATIONS

| Commercial Concentration | General Location |
|---|--|
| Linear Commercial Corridors | |
| I-10 | Entire length through the study area |
| I-17 | Entire length through the study area |
| Loop 101 (Pima Fwy) | 90 th Street to McKellips Road |
| UPRR /US-60 (Grand Avenue) Corridor | Downtown Phoenix through Glendale and Peoria |
| Bell Road/Frank Lloyd Wright Boulevard Corridor | Peoria in the west to Scottsdale in the east |
| Camelback Road Corridor | I-17 in Phoenix to Hayden Road in Scottsdale |
| Scottsdale/Rural Roads | Scottsdale and Tempe |
| McDowell Road Corridor | Litchfield Park, Tolleson, Phoenix, and Scottsdale |
| Central Avenue | Broadway Road to Camelback Road |
| Baseline Road and Apache Boulevard | Phoenix and Tempe |
| Regional Commercial Shopping Centers | |
| Arrowhead Towne Center | Bell Road and N. 75 th Avenue just east of Loop 101 (Agua Fria Fwy) |
| Metro Center | I-17 at Peoria Avenue |
| Desert Ridge Marketplace | Loop 101 (Pima Fwy) at Tatum Boulevard |
| The Promenade | Frank Lloyd Wright and Scottsdale Road |
| Paradise Valley Mall | Cactus Road and Tatum Boulevard |
| Scottsdale Pavilions | Indian Bend Road – Loop 101 (Pima Fwy) and Pima Road |
| Scottsdale Fashion Square Mall | Camelback and Scottsdale Roads |
| Tempe Marketplace | Loop 101 (Price Fwy) and Loop 202 (Red Mountain Fwy) |
| Chandler Fashion Center Mall | Loop 101 (Price Fwy) at Chandler Boulevard |
| Arizona Mills Mall | I-10 and US-60 |
| Biltmore Fashion Park | Camelback Road and N. 24 th Street |
| Phoenix Spectrum Mall | Bethany Home Road at N. 19 th Avenue |
| Westridge Mall | Thomas Road and N. 75 th Avenue |
| Major Mixed-Use Activity Centers | |
| Peoria Downtown | Peoria Avenue at N. 83 rd Avenue |
| Peoria Sports Complex | Loop 101 (Agua Fria Fwy) at Bell Road |
| Downtown Scottsdale | Scottsdale Road – Chaparral and Thomas Roads |
| Downtown Tempe | Mill Avenue – Apache Boulevard and Salt River |
| Phoenix Gateway Center | N. 44 th Street – Loop 202 (Red Mountain Fwy) and Van Buren Street |
| Downtown Phoenix - CBD | Central Avenue – Roosevelt and Lincoln Streets |
| Phoenix Uptown | Central Avenue – McDowell and Camelback Roads |
| South Phoenix | Central Avenue and Broadway Road |
| Downtown Glendale | Glendale Avenue/59 th Avenue at US-60/Grand Avenue |
| Westgate City Center/Districts at Zanjero | Loop 101 (Agua Fria Fwy) – Bethany Home Road to Northern Avenue |
| Main Street | 99 th Avenue – Glendale Avenue to Bethany Home Road |

Prepared by Wilson & Company, July, 2010.



5.1.3. Industrial Development

Immediately noticeable in Figure 5-1 is the large representation of industrial land uses in the south central portion of the study area. This industrial concentration generally aligns with existing railroad facilities and I-10/I-17 corridor, extending from Tempe in the east to Tolleson in the west. Another significant swath of industrial land uses is readily apparent in the west central portion of the study area in relation to the BNSF and US-60/Grand Avenue transportation facilities. Smaller in scale but notable are six other areas of concentrated light industrial land uses: east of I-17, north and south of Peoria Avenue; east of I-17 north of Loop 101 (Pima Fwy), along the northern boundary of the study area; the Scottsdale Airport, between Scottsdale Road and Loop 101 (Pima Fwy) from Frank Lloyd Wright Boulevard to Thunderbird Road; west of Loop 101 between E. University Drive and E. Rio Salado Parkway; east and west of the railroad spur extending from W. Baseline Road to W. Knox Roads in Tempe; and east and west of the same rail spur from W. Galveston Street to W. Frye Road in Chandler.

5.1.4. Notable Regional Attractions/Destinations

In addition to the widespread, even ubiquitous presence of residential, commercial, and industrial land uses, there are numerous regional attractions in the study area. Table 5.2 provides a listing of these attractions, which draw large number of area residents on a daily or event-specific basis.

5.2 Land Ownership

Figure 5-2 shows the general pattern of land ownership in the study area. This figure reveals that land throughout the study area predominantly is privately owned. There are significant, large areas and a multitude of smaller areas in public ownership. The majority of the publically-owned land is devoted to streets and highways (not shown) and lands set aside and developed for parks and recreation. The Phoenix Parks and Recreation Department operates more than 200 parks throughout the City, including six desert-mountain Parks (Reserves), the largest being the 26-square-mile Phoenix South Mountain Preserve. The other communities making up the study area also have developed numerous neighborhood and community parks and recreational facilities, although the presence of these types of facilities is most apparent in the north and northwestern portion of the study area.

The northeastern corner of the study area remains relatively undeveloped, partly because of the large parcels of land still under the control of the Arizona State Land Department (ASLD). This land is held in trust and periodically auctioned to support educational programs of the State's school systems. The Salt River Pima Maricopa Indian Community occupies nine miles along the east-central boundary of the study area. Loop 101 (Pima Fwy) was constructed through the western edge of the Indian Community, which extends more than 12 miles to the east and is home to the new Talking Stick Casino Resort, which is just off the freeway. The Gila River Indian Community borders most of the southern boundary of the study area. A potential route for extension of Loop 202 (San Tan Fwy) to the west of I-10 follows Indian Community boundary or could be constructed within the community, as was the Loop 101 (Pima Fwy).

5.3 Major Planned/Proposed Developments

As can be seen in Figure 5-3, there is little active development within the study area. The great bulk of development is occurring in the western and southwestern sectors of the study area. The majority of this development is residential and commercial (retail and office) land uses. Active development also is occurring in the northeast corner of the study area in conjunction with access to the recently completed Loop 101 (Pima Fwy). New region-oriented commercial, other commercial/office, and residential (low- and high-density) land uses characterize this development area. Pockets of development also are related to freeways in southeast Phoenix, Tempe, Mesa, and Chandler. A good portion of this development is commercial in nature.



Table 5.2
LISTING OF MAJOR REGIONAL ATTRACTIONS

| Regional Attraction | General Description |
|--|--|
| Phoenix South Mountain Park Preserve | South Mountain is the world's largest desert municipal park occupying approximately 26 square miles in the southern portion of the study area. Features include a seven-mile paved road to lookouts at elevations of 2,300 and 2,600 feet. There are 58 miles of trails for hiking, climbing, horseback riding, and mountain biking. Reservable ramadas are a provided for gatherings. |
| Papago Park | The park today covers 1,200 acres and has numerous picnic sites with ramadas, tables, grills, water and electricity. The park also contains fishing lagoons and bike paths as well as a zoo, a botanical garden, fire museum and a golf course. |
| Sky Harbor International Airport | Phoenix Sky Harbor International Airport serves more than 100,000 passengers, with 1,500 flights per day. The airport is one of the ten busiest in the nation and among the top 20 busiest in the world with a \$90 million daily economic impact. |
| Cricket Wireless Pavilion | Cricket Wireless Pavilion is an outdoor amphitheater that seats approximately 8,000 under a Pavilion roof. About 12,000 more people can enjoy the concerts and shows on the spacious hillside behind the pavilion. |
| Jobing.com Arena and University of Phoenix Stadium | Constructed in conjunction with the Westgate City Center in Glendale, these two multi-use venues. The multi-use Arena primarily is a sports and entertainment venue located in that seats 17,125 for hockey and lacrosse. The 63,400-seat stadium (expandable to 72,200) opened on August 1, 2006 after three years of construction.] The facility sports a unique retractable roof roll-out/roll-in natural grass field. |
| Phoenix Deer Valley Municipal Airport | As a reliever airport, Deer Valley for Sky Harbor, is capable of accommodating all segments of civil aviation except commercial passenger service. It has two fixed-based operators (FBOs) and is home to more than 1,277 aircraft. It is the 14 th busiest of all U.S. airports and the busiest general aviation (GA) airport in the nation, accommodating 409,510 takeoffs and landings in 2009. |
| Turf Paradise Race Course | Turf Paradise opened for racing January 7, 1956, becoming the first organized professional sports franchise in Arizona. It supports one of the longest Thoroughbred racing season in the country with a seven-furlong infield turf course and a one mile and one-eighth chute. Turf Paradise stables 2,200 horses and races show in 2000 locations in 40 different countries. |
| Tournament Players Club of Scottsdale | The Tournament Players Club of Scottsdale, otherwise known as TPC of Scottsdale, is a PGA Tour facility located in north Scottsdale. The 2010 occasion of the tournament, referred to as the "Greatest Show On Grass," attracted over 425,000 persons in 2010 and paid the winner \$1,080,000. |
| WestWorld | WestWorld is a premier, nationally recognized, user-friendly equestrian center and special events facility occupying 300+ acres of land directly east of SR-101/Pima Freeway in Scottsdale. |
| Arizona State University (ASU) | ASU is a single, unified institution of higher learning, comprising four differentiated campuses. ASU employs a cadre of almost 13,000 faculty, administrators, and staff to serve more than 67,000 students in the Phoenix Metropolitan Area. Its largest campus, occupying approximately 1.2 square mile in downtown Tempe, accommodates the majority (51,000) of these students. The student/teacher population of this campus accounts for major commuting migrations from all sectors of the study area in the AM and PM hours during the academic year from September through May. |
| Rio Salado Park/Tempe Town Lake | This lake, completed in 1999, occupies the normally dry Salt River, through the use of inflatable rubber barriers in the riverbed. The 224 acres lake is nearly two miles long. The lake and Tempe Beach Park is now as stop on the annual P.F. Chang's Rock 'n' Roll Ironman Marathon tour and supports numerous other special events during the year, including the Tostitos Fiesta Bowl New Year's Eve Block Party, annual Fourth of July celebrations, and many other region-oriented activities. |
| Cactus League (Major League Baseball) | Fifteen major league baseball (MLB) teams conduct annual Spring Training at eleven stadiums in the Phoenix Metropolitan Area: seven of the stadiums lie within the study area. The Spring Training games attract over one million fans, many of whom travel to the Phoenix area from other parts of Arizona and other states. It is estimated that the annual month-long Spring Training adds over one-quarter of a million dollars to the local economy in addition to noticeable traffic increases. |

Prepared by Wilson & Company, December, 2010.

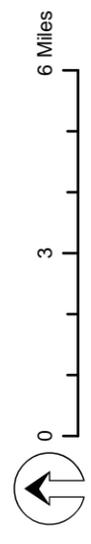




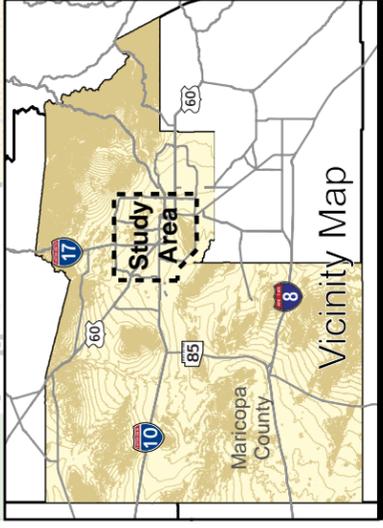
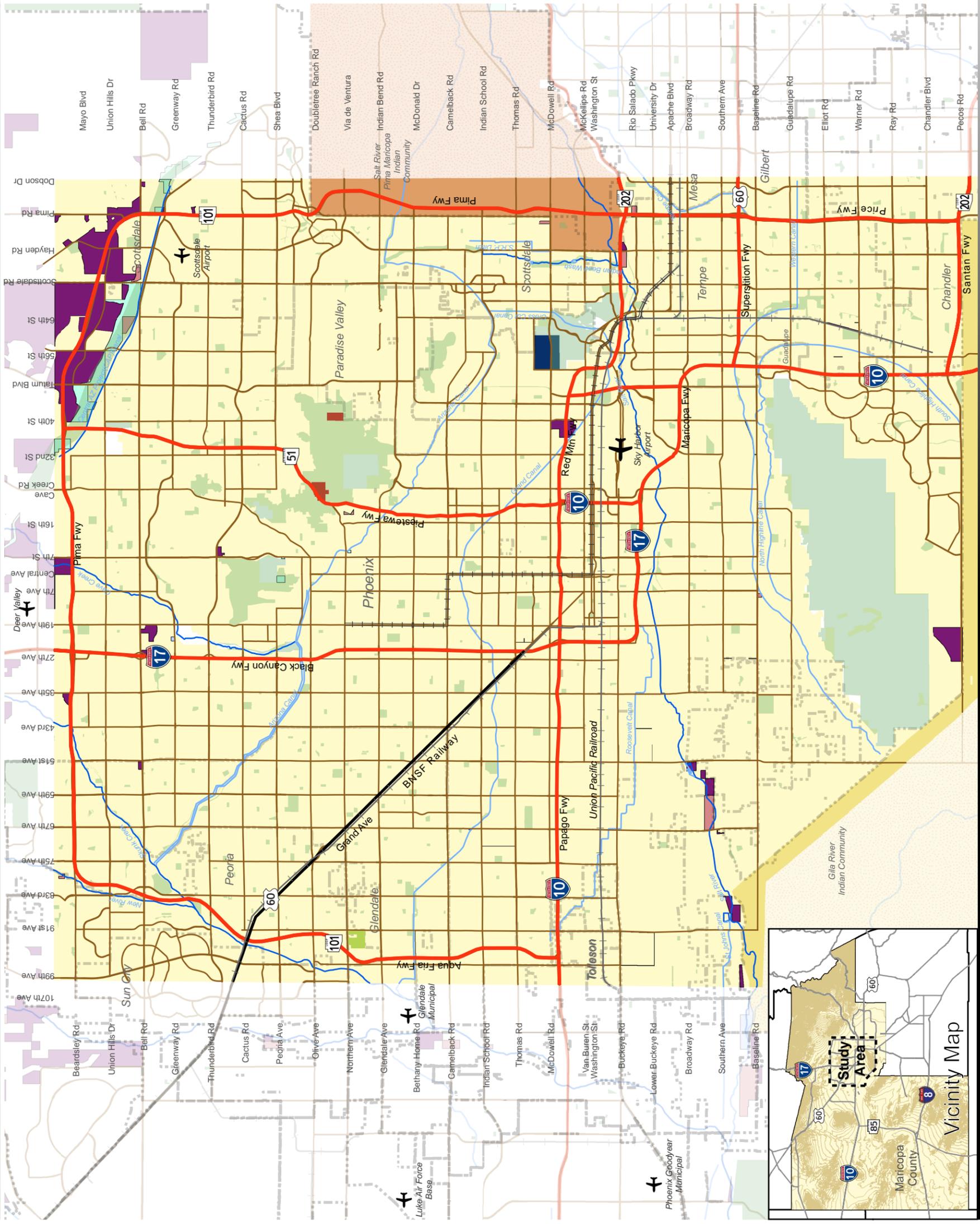
Figure 3-4

Land Ownership

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space Preserve
 - River/Stream
 - Canal
 - Airport
 - City Boundary
 - Bureau of Land Management
 - Bureau of Reclamation
 - Arizona Game & Fish Department
 - State Trust Land
 - Military Reservation
 - County Land
 - Salt River Indian Reservation
 - Gila River Indian Reservation
 - Tohono Oodham Nation
 - Private Land



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.



Source: Maricopa County Assessor GIS Portal.



Figure 5-3

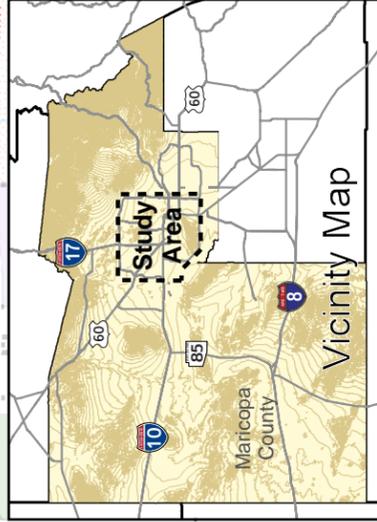
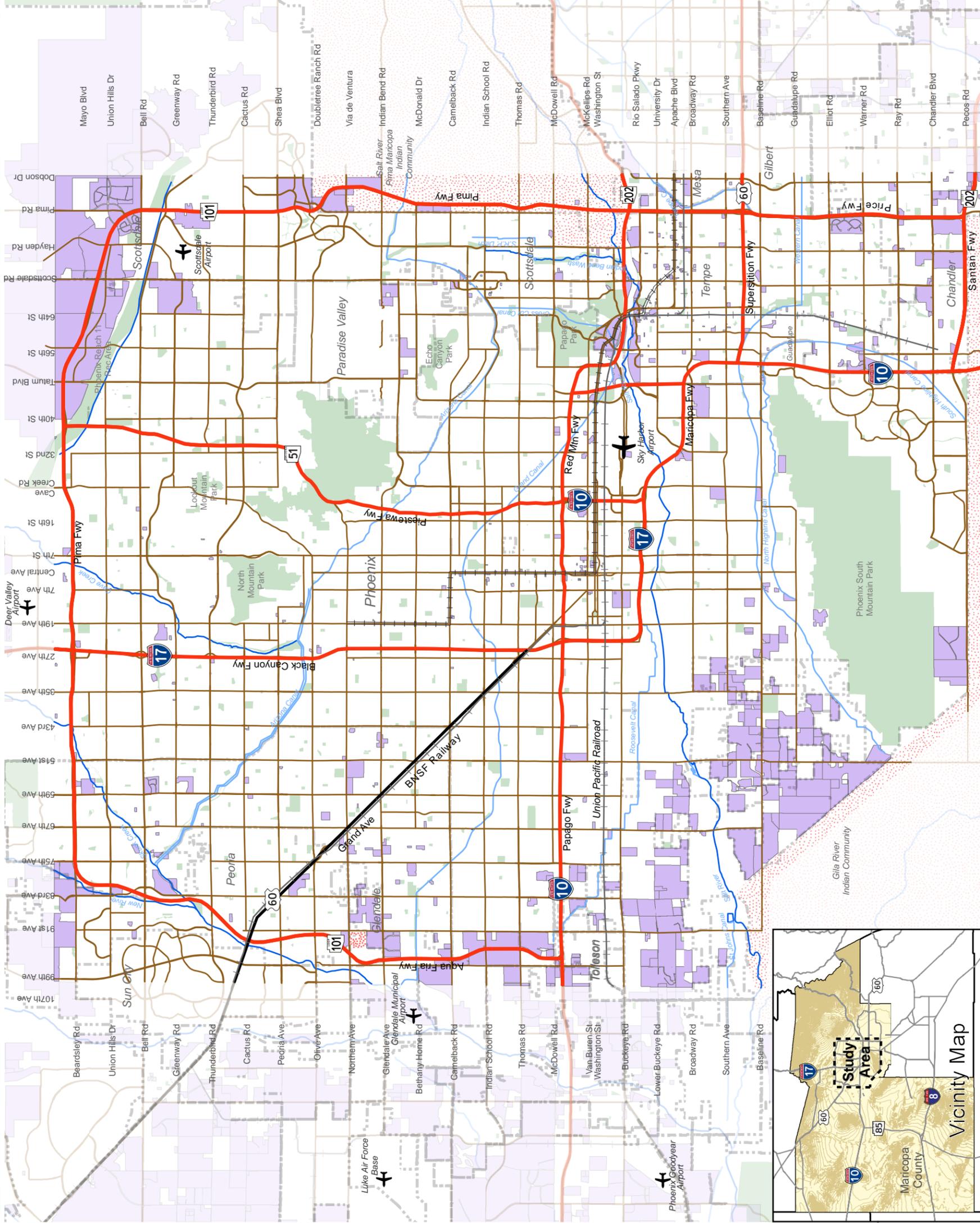
Development Areas

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space Preserve
 - River/Stream
 - Canal
 - Airport
 - City Boundary
 - Development Areas
 - Indian Reservation



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Source: MAG 2007 Development Area Data at G:\Dev\Maps\Development\65x11 dev_areas_031009.mxd



5.4 Educational Institutions

Both public and private educational institutions are located throughout the study area (Figure 5-4). These institutions include: colleges and universities, high schools, junior and middle schools, elementary schools.

5.4.1. Public Universities and Colleges

The primary institution of higher learning in the study area is Arizona State University (ASU). ASU has six campus locations, the largest of which occupies approximately one square mile located in downtown Tempe. In addition to this campus, ASU's Downtown (Phoenix) and West (Phoenix) campuses are designed for traditional classroom instruction. The University also operates and maintains SkySong, its Scottsdale Innovation Center, and ASU Research Park near Loop 101 (Price Fwy) in south Tempe, which is home to research and development companies as well as corporate and regional headquarters.

Maricopa County Community Colleges is a collection of 10 independent public colleges. This education consortium also includes two Skill Centers and numerous education centers. Seven of the 10 colleges are located within the study area.

5.4.2. Private Universities and Colleges

The study area also has numerous private colleges and universities, such as Argosy University, American Indian College, Western International University, University of Phoenix, and Thunderbird School of Global Management.



5.5 Major Regional Activity Centers

The study area, being a well developed urbanized metropolitan region includes numerous economic activity centers that are the focus of a significant amount of the commercial, service, and industrial enterprise. Figure 5-5 depicts four types of regional economic activity centers relative to their stage of growth and development. There are a few “built-out” areas that are not likely to see any new development in the next 30 to 50 years. These areas are established and have little, if any, room for expansion, although expansion upwards is not ruled out. The map depicts an extensive amount of the study area as being suitable for or expected to experience “expansion.” These areas are particularly oriented to major travel corridors or facilities, e.g., railroad service, interstates, and high-capacity highways.

Certain areas have been identified as having a high potential for “future growth.” These areas, too, generally have direct access to the study area’s major high-capacity highway facilities. There are areas in the southeastern portion of the study area where highway access does not exist; however, expectations for development of Loop 202 (South Mountain Fwy) and available land created conditions for future potential economic growth.

Three communities – Glendale, Scottsdale, and Tempe – have identified areas expected to experience revitalization. Glendale’s downtown area is the focus of intensive planning to create new opportunities for growth and revitalization along the Glendale Avenue corridor from 43rd Avenue to 67th Avenue. Scottsdale’s downtown also is the focus of intensive revitalization efforts. The City also has identified two other locations along its signature roadway – Scottsdale Road – where revitalization efforts are being pursued. In addition, the McDowell Road corridor from Pima Road to 64th Street has been the focus of significant attention, since the closing of Los Arcos Mall and the onset of closures among the many automobile dealerships. Tempe is focusing its revitalization effort on an approximately three-square-mile area in the northeastern corner of the City. Both Tempe and Mesa to the east have committed significant resources to revitalization of Apache Boulevard/Main Street, which, as the former US-60, once was the primary route through the region.



Figure 5-4

School Locations

Legend

- Freeway
- Highway
- Major Road
- Railroad
- Light Rail
- Park/Open Space/Preserve
- River/Stream
- Canal
- Airport
- Indian Reservation
- Maricopa County

Study Area Schools

- College/University/Post-Secondary
- High School
- Middle/Junior High School
- Elementary School
- Private/Charter/Other School

Note: This figure shows only those schools identified in readily available mapped sources and should not be considered a comprehensive mapping of area schools. In particular, numerous specialty colleges and technical schools dispersed throughout the study area are not included.



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Sources:

- Arizona GeoData Portal, Arizona Geographic Information Council (AGIC)
- MaricopaCommunityColleges@www.maricopa.edu/about
- ArizonaSchools@LocalSchoolDirectory.com
- PhoenixMapsOnline@http://maps.phoenix.gov/WebPMO/MapService/WebPMO.aspx
- Review of facility location utilizing available Internet mapping services, as necessary.

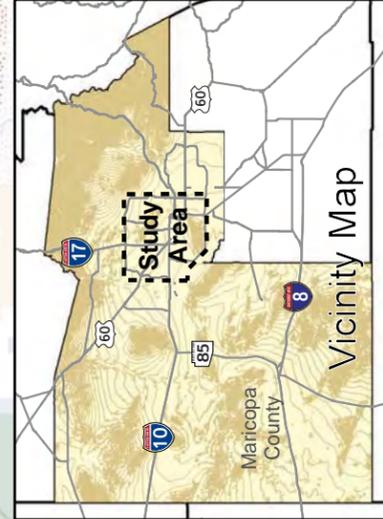
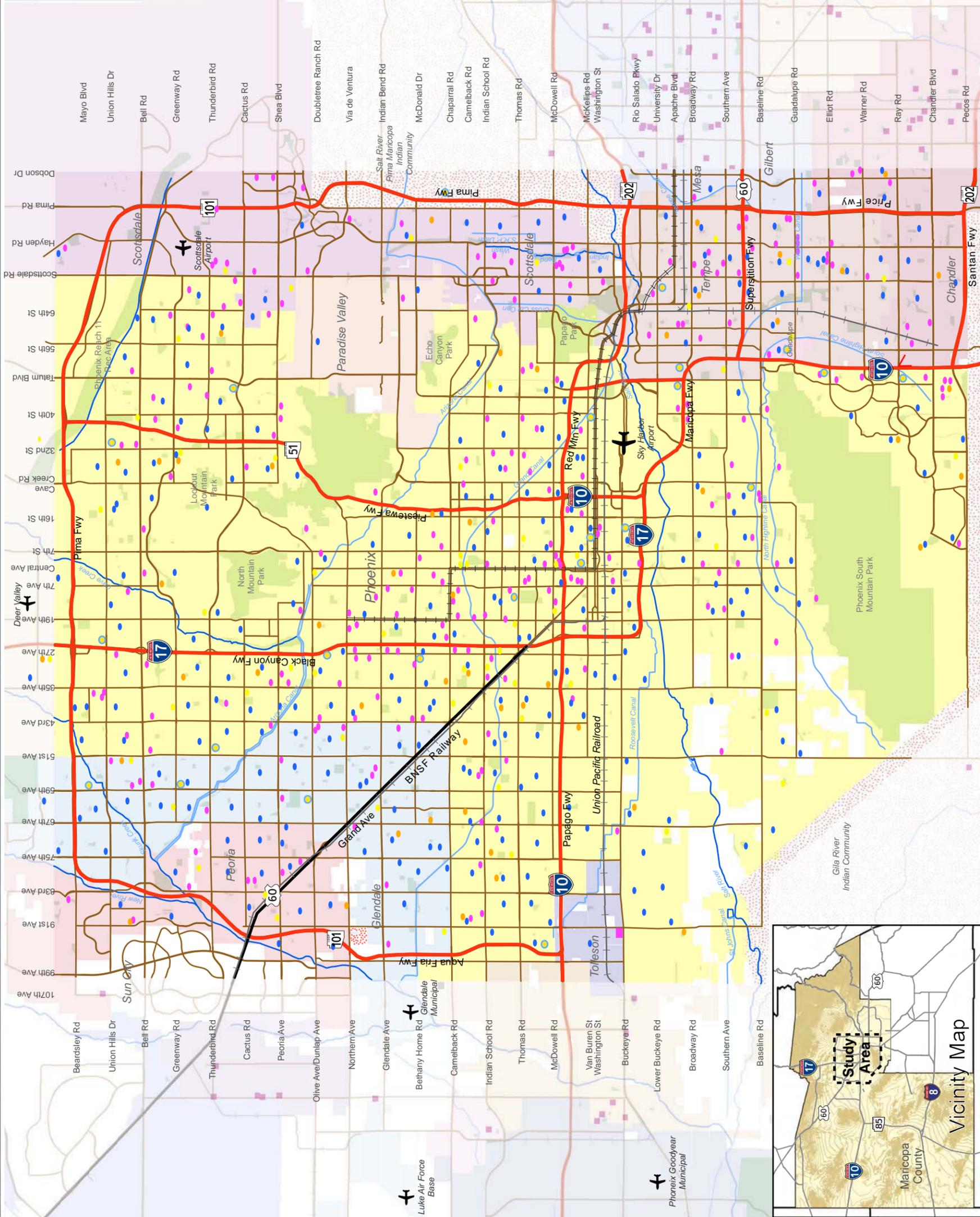




Figure 5-5
Regionally Significant Economic Activity Centers

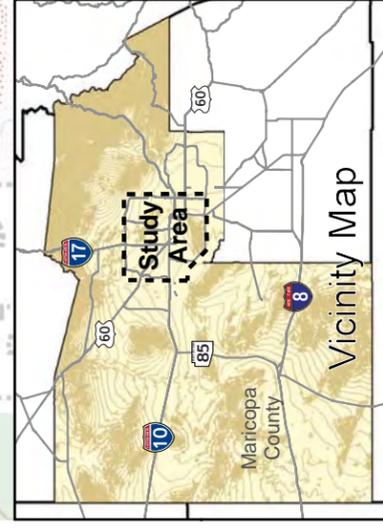
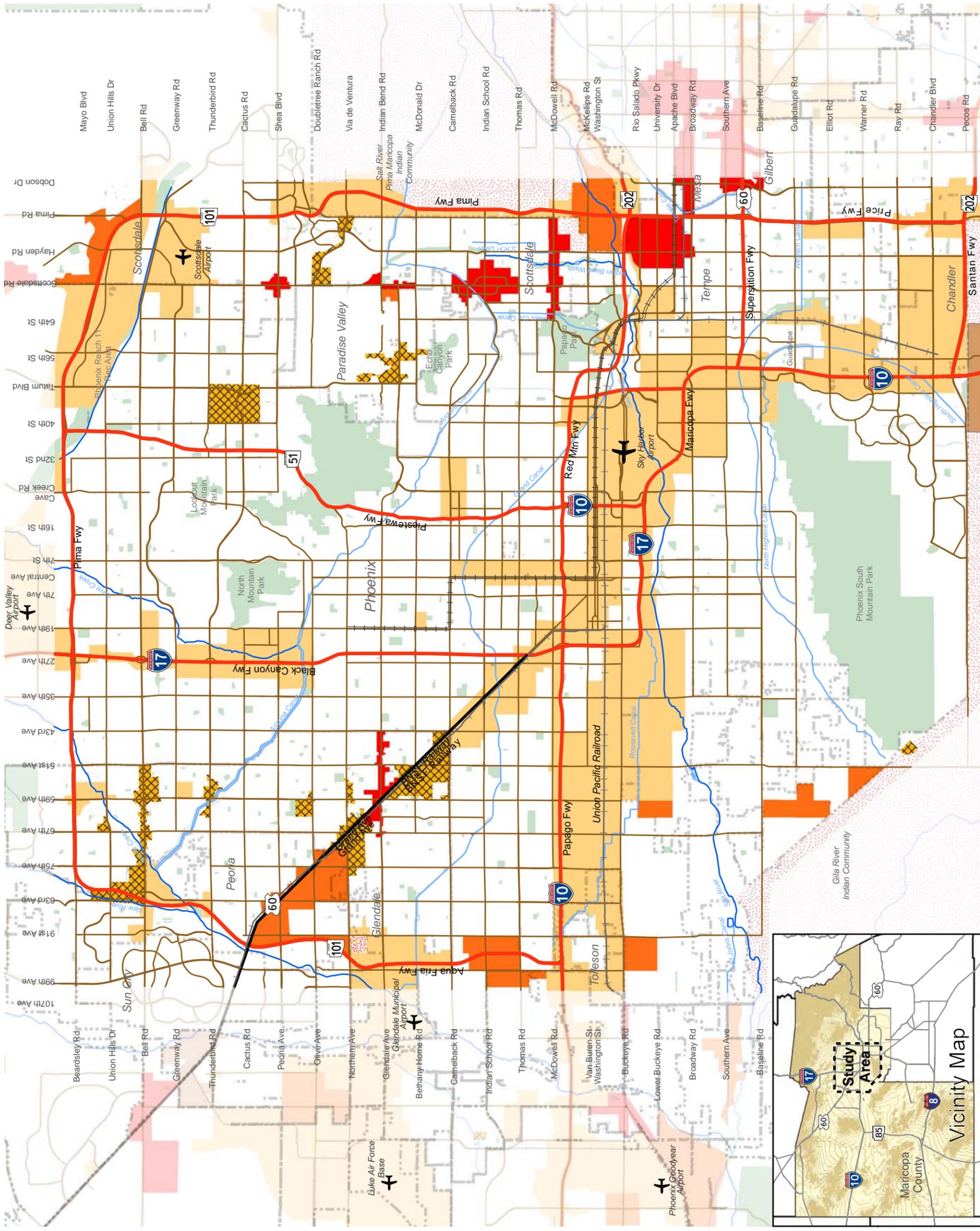
Legend

| | |
|--|--------------------------|
| | Freeway |
| | Highway |
| | Major Road |
| | Railroad |
| | Light Rail |
| | Park/Open Space/Preserve |
| | River/Stream |
| | Canal |
| | Airport |
| | City Boundary |
| | Built-Out Area |
| | Expansion Area |
| | Future Growth Potential |
| | Revitalization Area |
| | Indian Reservation |



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Source: MAG



5.6 Economic Development Initiatives

The Greater Phoenix Economic Council (GPEC) is the primary economic development apparatus for communities in the study area (except the Town of Paradise Valley). The GPEC is focused on business development and attraction of new business enterprise. This organization's core initiatives are to diversify the metropolitan economy, create quality jobs, and encourage innovation. Currently, the GPEC is engaged in direct-selling to competitor markets in pursuit of business development opportunities and synergistic partnerships. The GPEC is exploring international interest through foreign direct investment, with the understanding that such investment will lead to an infusion of capital and spur technology transformation in the region. The Council is working to capture the promise of renewable energy and solar, a fast-growth, global industry that recently gained federal-level support. In addition to the activities of the GPEC, each of the communities maintains its own individual efforts to stimulate economic development. Table 5.3 provides a listing of major industrial/commercial concentrations that are the focus of community development efforts.



5.6.1. City of Avondale

The City of Avondale Economic Development Strategic Plan identifies the I-10 corridor, which is defined by McDowell Road on the north and extends south of Van Buren Street on the south, as a "Primary Employment Corridor." This corridor is located directly east of the Loop 101 (Agua Fria Fwy) interchange. The plan anticipates a mix of high intensity commercial, office, and retail uses along I-10. Regional commercial, mixed-use, and business park/specialty support is the focus of development along McDowell Road and Van Buren Street. Also of relevance to this study is the Algodon Business Center, which is a one-half-mile square development expected to have a mix of office, business park/back office, and supportive commercial uses.

5.6.2. City of Chandler

The City of Chandler does not have a formal economic development plan, but has several economic development focus areas. The City has formally designated the Price Corridor (Loop 101 Freeway) as a focus for economic development. Development of three retail centers and two office centers is associated with this corridor. Chandler Fashion Center (noted above) is the locus for the Loop 101 (Price Fwy)/Chandler Road commercial node, which also includes Chandler Festival, Chandler Gateway, and Chandler Village Center. The City also is focused on development the I-10/Ray Road commercial node, which includes Casa Paloma, Chandler Pavilions, and Chandler Gateway Autopark. The City's Enterprise Zone incorporates the area around the Loop 101 (Price Fwy)/Loop 202 (San Tan Fwy) interchange. Businesses in the zone creating net new jobs can receive up to \$3,000 in State income tax credits for each job. In addition, small, minority-owned or woman-owned businesses can secure property tax reductions for certain investments.

5.6.3. City of Glendale

Like Chandler, the City of Glendale does not have a formal economic development plan, but has several economic development focus areas. Premier development projects include Main Street, which encompasses 283 acres adjacent to the recently completed Dodgers/White Sox Spring Training facility. This project will include a new USA Basketball Training Facility within a total development of 3.9 million square feet of space in five different commercial and residential components plus an 18-hole championship golf course. Improvements also are planned for the Glendale Municipal Airport directly west of the Main Street project. In addition, the City has initiated the Centerline project, which is focused on redevelopment of the Glendale Avenue corridor, from 43rd to 67th Avenues, between Ocotillo and Myrtle. The goals of this corridor redevelopment project, which passes through the City's historic downtown district, are to increase private business investment, stimulate job creation, and improve infrastructure. Numerous other smaller mixed-use and commercial centers are planned along both sides of Loop 101 (Agua Fria Fwy) from Northern Avenue to



Table 5.3
LISTING OF MAJOR INDUSTRIAL/COMMERCIAL CONCENTRATIONS

| Industrial/Commercial Concentration | General Location |
|--|---|
| Phoenix-Deer Valley Municipal Airport | Bounded by: W. Pinnacle Peak Road, N. 7 th Street, W. Rose Garden Lane, and I-17 |
| Scottsdale Airpark and Scottsdale Municipal Airport | Bounded by: Loop 101 (Pima Fwy), E. Thunderbird Road, N. Scottsdale Road, and E. Frank Lloyd Wright Boulevard |
| Peoria Industrial Center | Bounded by: W. Cholla Street, N. 19 th Avenue, W. Dunlap Avenue, and I-17 |
| Union Pacific Railroad/US-60 (Grand Avenue) Corridor | Bounded by: US-60/Grand Avenue/N. 19 th Avenue, W. Fillmore Street, and W. Maryland Avenue, and varying western limits (I-17, N. 27 th Avenue, N. 35 th Avenue, N. 47 th Avenue, N. 57 th Avenue |
| Tolleson/Avondale Industrial/Commercial Complex | Bounded by: W. McDowell Road, S. 83 rd Avenue, W. Buckeye Road, and S. 107 th Avenue |
| West Phoenix Railroad Industrial Complex | Bounded by: I-10 (Papago Fwy), I-17/S. 22 nd Avenue, Lower Buckeye Road, and S. 83 rd Avenue |
| South Phoenix Industrial Strip | Bounded by: I-17, I-10 (Maricopa Fwy), Salt River, and S. 22 nd Avenue |
| East Phoenix/Northwest Tempe Industrial Complex | Bounded by: E. Van Buren Street, N. Mill Avenue, E. Sky Harbor Boulevard/Loop 202 (Red Mountain Fwy), and S. 24 th Street |
| Southeast Phoenix/West Tempe Industrial Complex | Bounded by: Salt River, S. Priest Drive/S. Kyrene Road, W. Southern Avenue, and S. 32 nd Street |
| Northeast Tempe Industrial Complex | E. Rio Salado Parkway, Loop 101 (Price Fwy), E. University Drive, and S. Dorsey Lane |
| Arizona State University Research Park | Bounded by: E. Elliot Road, Loop 101 (Price Fwy), E. Warner Road, and S. Kenwood Lane |
| Kyrene Industrial Complex | Bounded by: S. Kyrene Corridor W. Baseline Road to W. Knox Road |
| Ahwatukee Industrial/Commercial Complex | Bounded by: W. Galveston Street/W. Laredo Street, N/S Kyrene Road, W. Germann Road, and I-10 (Maricopa Fwy) |

Prepared by Wilson & Company, July, 2010.

Camelback Road. The City's economic development Web page identifies 1.8 million square feet of known development projects and approximately 1,000 new hotel rooms, most of which are anticipated to occur along Loop 101 (Agua Fria Fwy).

5.6.4. City of Mesa

Key projects in the City of Mesa include the Fiesta District and Downtown Revitalization. The Fiesta District is located on the north side of US-60/Superstition Highway along W. Southern Avenue from the Tempe Canal to S. Extension Road. The City is anticipating \$400 million of private investment in the next five years within the boundaries of the Fiesta District, the City's premier commercial center. Council-approved Fiesta District Design Guidelines will be a tool to create a unified sense of place and destination for this area. Another major focus of economic development is Downtown Revitalization. The City is formulating a Central Main Street Plan to encourage economic development, establish form-based zoning, and initiate transit-oriented design to support business retention and expansion of the region's light rail transit (LRT) system along Main Street east of S. Sycamore.

5.6.5. City of Peoria

The City of Peoria has prepared a profile for economic development, which includes a major focus on five aspects of the community: the General Plan 2025; Old Town Peoria Revitalization; Peoria Sports Complex District Urban Design; Specific Area Plan for the Loop 303; and Northern Peoria Growth and Development. The Old Town Peoria Revitalization and Peoria Sports Complex District Urban Design plans directly impact

the study area. The former has the overarching purpose "...to establish the necessary framework and a multi-faceted approach to spur revitalization within the historic Old Town core and surrounding area." It includes a number of improvement actions, such as a Circulation Plan, a landscape and streetscape palette, creation of a special mixed-use district, and leveraging transit-oriented design (TOD) to emphasize multi-modal transportation opportunities. The latter, cited earlier in this report as a major mixed-use center, is the object of a multi-dimensional plan and implementation program. The focus area encompasses approximately 570 acres east of Loop 101 (Agua Fria Fwy) and south of Bell Road. The Preferred Urban Design Plan is comprised of four elements: New North Valley Town Center & Hotel District; Lifestyle and Entertainment Village; the East End and Artisan Village, and Skunk Creek Open Space Plan. All of these activities are guided by the Economic Development Implementation Strategy (EDIS), which sets forth the economic development plan of action for the City.



5.6.6. City of Phoenix

The City of Phoenix Economic Development Plan identifies five goals "to serve as a roadmap and catalyst, through collaboration and leadership, to grow and sustain a business environment focusing on knowledge-based businesses." In furtherance of this plan the City has defined five geographic-based incentive areas or zones to stimulate development.

- Enterprise Zone – Enterprise Zones are defined as part of a State program implemented to encourage creation of quality jobs and capital investment in distressed areas. The current program operates under 2006 legislation and is authorized until June 30, 2011. The elements of this economic stimulus associated with the enterprise zone program are the same for all zones, as described above for the City of Chandler. Within the City of Phoenix, there are two zones: City of Phoenix Enterprise Zones (COPEZ) and the Western Maricopa Enterprise Zone (WMEZ). The COPEZ covers approximately 200 square miles, including downtown, 1-17 Corridor, Deer Valley Airpark, Sky Harbor Airport area, the South Mountain area and Southwest Phoenix. The WMEZ covers 5,600 square miles and includes parts of Phoenix and 10 other political jurisdictions.
- Expansion Assistance and Development (EXPAND) – EXPAND is a financial assistance program supporting business loans that lead to job creation or preservation. Loan collateral support can be provide for land acquisition for commercial development, new construction, purchase or remodeling of an existing building, capital infusion, and other purposes.
- Phoenix New Markets Program – This program offers commercial real estate and small business loans to "Qualified Active Low-Income Community Businesses" that are located within or relocate to low-income areas of the City. The City has identified Census tracts that fall within the guidelines of this program to guide potential business activity to low-income areas. The bulk of these tracts are located in the central portion of the study area between Camelback and Baseline Roads, east of 83rd Avenue to 48th Street.
- Management Technical Assistance – This assistance to small businesses is focused on helping low- or moderate-income business owners. Assistance can be obtained if: (1) a job can be created for a low- to moderate-income individual within two years, (2) the business has fewer than five employees and the owner is low- to moderate-income, or (3) the business is located in a "poverty census tract." The bulk of the poverty census tracts are located south of I-10 between 35th Avenue and 40th Street. North of I-10, the poverty census tracts are somewhat scattered, with many situated in proximity to major travel corridors, such as US-60/Grand Avenue, I-17, I-10, and SR 51/Piestewa Freeway.
- Foreign-Trade Zone – Foreign-Trade Zones (FTZ) are secure areas considered to be outside the customs territory of the United States and under direct supervision of the U.S. Customs and Border Protection (CBP) Agency. Foreign and domestic merchandise may be moved into zones for storage,

exhibition, assembly, manufacturing, and processing without payment of duties, quota, and other import restrictions until the decision is made to enter the goods into the U.S. market. The City of Phoenix can sponsor a new FTZ application for sites within 60 miles, or within 90 minutes' driving time from the Phoenix Port of Entry, which is Phoenix Sky Harbor International Airport. The City currently has four sites in the study area that comprise FTZ No. 75, General-Purpose Zone: Phoenix Sky Harbor Center; CC&F South Valley Industrial Center at 7th Street and Ellwood Street; Riverside Industrial Center on West Buckeye Road; and Santa Fe Business Park located between 45th Avenue and 47th Avenue at Campbell Avenue. There also are nine sub-zones, four of these zones are in the study area:

- 75D - STMicroelectronics, Inc., Phoenix, Arizona
- 75F - PET'sMART, Phoenix, Arizona
- 75G - SUMCO Southwest, Phoenix, Arizona
- 75I - American Italian Pasta Co., Tolleson, Arizona.

The City also has specific development plans to foster balanced, integrated growth in the core area. The *Downtown Strategic Vision & Blueprint for the Future* contains over 40 strategic recommendations and identifies ten priority areas of focus. This plan provides a framework for the City to pursue the comprehensive revitalization of and support for continuing downtown vitality. Specific ongoing and contemplated projects are highlight below:

- The urban Biomedical campus, located downtown, is a 28-acre urban research park planned for six million square feet of biomedical-related research, laboratory, and academic facilities.
- Arizona State University (ASU) has partnered with the City of Phoenix to develop a Downtown campus, which is supported by a \$223 million commitment passed by Phoenix voters in a 2006 bond election. At Buildout, the new ASU campus is expected to serve 15,000 students, provide 4,000 student beds, and thousands more faculty and staff.
- Downtown Office and Commercial Space – Downtown Phoenix employment exceeds 55,000 employees in a 1.5 square mile area. In the past decade, downtown Phoenix has added almost four million square feet of office space.
- Transit-Oriented Design (TOD) – The new \$1.4 billion, 20-mile METRO light rail transit (LRT) system serves central Phoenix, Tempe, and west Mesa. The route connects many of the Valley's premier destinations, including: Downtown Phoenix, Central Avenue "Uptown" corridor, Phoenix Sky Harbor Airport, ASU and other universities and colleges, museums, medical and research centers, parks, historic neighborhoods, new mixed-urban living projects, and the region's largest employment centers. The City of Phoenix, Downtown Development Office is working to maximize the investment in LRT by promoting and attracting high-quality, mixed-use developments in proximity to light rail stations.
- Sports, Leisure, and Warehouse District – The Warehouse District, south of the commercial center of the City is composed of an eclectic group of restaurants, bars, warehouses, and residential uses. This District is an important complement to the two major sports venues located in the downtown: Chase Field and US Airways Center.
- Arts & Cultural Activities – The downtown area is home to numerous arts and cultural attractions that have a regional, even statewide, draw.

In support of economic development the City has broadly defined 13 Employment Centers, where commercial (retail, wholesale, and office) and industrial business enterprises are the dominant activity. All but one are



wholly or mostly with the boundaries of the study area. Each Employment Center has its own particular characteristics with regard to labor force accessibility and skill level, infrastructure, amenities, and recent development activity and, generally, is oriented to high-tech activities, service, manufacturing or distribution.

In addition, the City is partnering with the City of Tempe in defining a portion of the urban core as Discovery Triangle. After three years of planning, Discovery Triangle has been established as a 16,000 acre area anchored in downtown Phoenix on the west and the Arizona State University campus on the east. Phoenix's biomedical district and Sky Harbor Airport are important components of the triangle. The Discovery Triangle Development Corporation hopes to leverage through a cohesive plan the new LRT service and freeway connectivity in the area to foster a regional business, housing, and recreation hub. The Corporation will assist the cities and economic development groups to market the area and coordinate new projects as well as redevelopment efforts. Advocates for the project perceive it to be an important initiative to influence where people choose to live and work in the future, while encouraging redevelopment in the urban core instead on new growth in fringe areas.



5.6.7. City of Scottsdale

The City of Scottsdale currently uses its 2008 Economic Vitality Strategic Plan as a guide for economic development. This Plan states, in part, the economic development mission is to promote long-term prosperity, plan and manage growth in harmony with the city's unique heritage and desert surroundings, and strengthen the city's standing as a preeminent destination for tourism. "Quality of life shall be the city's paramount consideration." A key goal is to "position Scottsdale for short- and long-term economic prosperity by strengthening, expanding, and diversifying our economic resources." Focus areas for growth and development include: Scottsdale Airpark; Sky Song, a venture with ASU; and the McDowell Road corridor. The Strategic Plan states "Scottsdale is rapidly approaching the point of Buildout of the community based on undeveloped lands available. Key commercial cores, such as the Airpark, are about built out, and full residential Buildout is anticipated within the next decade. The last major commercial core yet to be developed is the State Trust Land adjacent to the 101 freeway between Scottsdale Road and Pima Road. As a result, the economic base that has been predicated on growth will have to change, and focus needs to shift from new development to redevelopment, reinvestment, and revitalization." The Plan also recognizes the role of regionalism in the City's economic future and states the need to take into account economic development strategies of the region (through the GPEC) and State and find ways to take advantage of those strategies.

5.6.8. City of Tempe

The City of Tempe Economic Development Department provides a wide range of services designed to support small businesses and large corporations alike. It facilitates meetings between companies and community leaders, helps to find tax-saving programs, and assists in choosing suitable business locations. The City has an aggressive development agenda, the flagship of which is the 220-acre Tempe Town Lake that has attracted significant upscale residential development, high-rise office buildings, and mixed-use projects. The City economic development initiatives currently are focused on pursuing and seeing development of \$2 billion in new projects, including:

- 3,000 New Condominiums Being Built
- 2 Million Sq. Ft. of new Retail Space
- 2 Million Sq. Ft. of new Class A Office Space
- Approximately 3,200 new Hotel Rooms
- 150,000 Sq. Ft. of Conference and Meeting Space.

In addition, the City is partnering with the City of Phoenix to pursue innovative redevelopment initiatives within the Discovery Triangle area (see description of this effort under City of Phoenix above).



5.6.9. City of Tolleson

Tolleson, the former “Vegetable Capital of the World,” has reinvented itself as a regional center for manufacturing, warehousing, and distribution activities. It has a strong vision supporting economic and community development with an emphasis on workforce recruitment and retention. The City has a one-stop-shop, time-tested over 25 years, for providing development services to prospective companies. A program of information actively promotes 18 potential development sites within the City.

5.6.10. Gila River Indian Community

The community’s Economic Development Department has the mission to generate economic wealth and create jobs by attracting economic development, supporting businesses, and fostering entrepreneurship programs. In pursuit of this mission, the Department evaluates leads and prospects for economic development both inside and outside the Community. It also assists tribal corporations, administers lending programs for tribal entrepreneurs, administers tourism support efforts, and identifies opportunities for tribal investments that would stimulate economic development.

The Community’s Office of Special Funding administers the Tobacco Tax and Health Care Fund and the State Shared Gaming Revenues. The passage of Proposition 202 by the voters of Arizona in November, 2002, allows an Indian tribe to make twelve percent (12%) of its total annual contribution in the following form: “Distributions to cities, towns, or counties for government services that benefit the general public, including public safety, mitigation of the impacts of gaming, or *promotion of commerce and economic development* (emphasis added).” The Gila River Indian Community (the “Community”) has decided to exercise its option to retain and administer the 12 percent of State-shared revenue itself. The Community’s Policy generally is to limit distributions to nearby cities, towns, and counties (i.e., Maricopa and Pinal Counties, Phoenix, Avondale, Coolidge, Casa Grande, Chandler, Gilbert, Queen Creek, Mesa, and Tempe). However, it has retained some flexibility to consider more distant, but special, situations.

5.6.11. Salt River Pima-Maricopa Indian Community

The Salt River Pima-Maricopa Indian Community has adopted a General Plan that “...serves as the basis for decisions regarding the Community's long-term physical development and the protection of the Community's natural and cultural resources. The Plan envisions a balance between economic development and foundational, long-established Community values. It established the Pima Corridor, the area between Pima Road and Loop 101 (Pima Freeway) from the Salt River to the northern boundary of the reservation (as well as some lands east of Loop 101), as a Commercial/Mixed Use area. Reflecting a blueprint for future development, the Pima Corridor has become the focus of significant commercial development in recent years, and a new 140-acre Spring Training Facility for two Major League Baseball (MLB) teams is under construction that will have an 11,000-seat ballpark and 12 practice fields. The General Plan seeks to guide land use and development while maintaining a framework of sustainability that supports conservation and preservation.

5.6.12. Town of Guadalupe

The Town of Guadalupe is a small, mostly Indian community, bounded by I-10 and Phoenix on the west; Baseline Road and Tempe on the north, and the Salt River Project (SRP) Highline Canal on the east. The Town’s Community Development Department focuses on organizing, coordinating, managing, and directing programs to support the Town’s development, revitalization, housing stock, and youth activities. It actively pursues identification of appropriate community development projects and prepares, submits, and administers major grant programs with federal, state, and local entities. Current activities are focused on street

improvements in the community and renovation of the Mercado, the primary commercial development at the center of the Town.





6.0 Existing Multi-Modal Transportation System

The Central Phoenix Framework Study focuses on the most densely developed portion of the Phoenix metropolitan area. As in all major metropolitan areas of the country, the study area supports area residents with a full range of transportation options provided by a combination of multiple travel modes. This section describes the various components of the existing multi-modal transportation system.

6.1 Roads and Streets

The roadways and street system is formed of major, high-capacity highways, major arterial roadways, and a variety of minor arterials, collectors, and local streets. As this is a framework study focused on establishing a network of higher order facilities to serve the entire region, the attention in this section is on the major, high-capacity highways, and major arterial roadways.

6.1.1. Major Regional, High-Capacity Facilities

Existing Facilities

Although freeways in and of themselves are singular facilities, the freeway system in the study area consists of two travel components: general purpose lanes and high-occupancy vehicle (HOV) lanes. The operational characteristics of these two components differs and, therefore, a discussion of both is presented.

General Purpose Lanes

The existing freeway/highway system of the study area, as of 2009, is shown in Figure 6-1. The system includes segments of two Interstate routes – I-10 and I-17 – State highways constructed to freeway design standards, and one US Highway – US-60/Grand Avenue (see discussion of Major Arterial Street System below). All the facilities forming the system are on the State Highway System, which includes facilities constructed, maintained and operated by ADOT. Table 6-1 lists the centerline mileage of this system in the study area by route. In all, there are 139 miles of freeway facilities serving the study area plus 11 miles on the four-to-six lane national highway, which is US-60. The maximum number of general travel lanes – 12 – occurs in two locations, both on I-10 (Maricopa Fwy): the I-10/I-17 merge (split) south of Sky Harbor Airport between 24th Street and University Drive and the Broadway Curve between SR-143 and US-60 (Superstition Fwy). Three locations have been constructed to 9-10 general travel lanes. The remainder of the freeway/highway system has been constructed to 5-8 general purpose travel lanes.

High-Occupancy Vehicle Lanes

High-Occupancy Vehicle (HOV) lanes have been added to many of the central freeway facilities. These lanes, shown in Figure 6-1, provide incentives to operate multiple occupancy vehicles during peak periods of travel, helping to reduce traffic in general purpose lanes. During off-peak periods, HOV lanes are operated as general purpose lanes, providing additional capacity to the facility. Currently, there are 101 miles of HOV lanes (one lane in each direction), representing slightly more than two-thirds of the freeway component is constructed with HOV lanes.

Planned Improvements

Improvements to the freeway/highway system will include the addition of general travel lanes, construction of new HOV lanes and ramps, projects to enhance capacity, and new traffic interchanges. The range of improvements planned in the study area is shown in Figure 6-2. Eventually, the full HOV system will be



Table 6.1
EXISTING STUDY AREA FREEWAY/HIGHWAY SYSTEM

| Route No. | Facility | Segment | Facility Centerline Mileage | HOV Lane Mileage* |
|--------------|--|---|--|-------------------|
| I-10 | Interstate 10 | Loop 101 (Agua Fria Fwy) to I-17 | 7 | 7 |
| | | I-17 to SR-51 | 5 | 5 |
| | | SR-51 to I-17 | 3 | 3 |
| | | I-17 to US -60 (Superstition Fwy) | 6 | 6 |
| | | US-60 (Superstition Fwy) to Loop 202 (Santan Fwy) | 6 | 5 |
| I-17 | Interstate 17 | I-10 (Maricopa Fwy) to I-10 (Papago Fwy) | 7 | -- |
| | | I-10 (Papago Fwy) to Loop 101 (Pima/Agua Fria Fwys) | 14 | 14* |
| US-60 | Grand Avenue | Loop 101 (Agua Fria Fwy) to Van Buren St | 11 | -- |
| | Superstition Fwy | I-10 to Loop 101 (Price Fwy) | 5 | 5 |
| SR-51 | Piestewa Fwy | Loop 202 (Red Mountain Fwy) to Loop 101 (Pima Fwy) | 16 | 16 |
| SR-101 | Agua Fria Fwy | I-10 to US-60/Grand Avenue | 10 | -- |
| | | US-60/Grand Avenue to I-17 | 12 | -- |
| | Pima Fwy | I-17 to SR-51 | 7 | -- |
| | | SR-51 to Loop 202 (Red Mountain Fwy) | 21 | 21 |
| | | Loop 202 (Red Mountain Fwy) to US-60 (Superstition Fwy) | 4 | 4 |
| Price Fwy | US -60 (Superstition Fwy) to Loop 202 (Santan Fwy) | 6 | 6 | |
| | Hohokam Expwy | I-10 to Loop 202 (Red Mountain Fwy) | 3 | -- |
| SR-143 | | Loop 202 (Red Mountain Fwy) to McDowell Rd | 1 | -- |
| | SR-202 | Red Mountain Fwy | I-10/SR-51 to Loop 101 (Pima/Price Fwys) | 9 |
| Santan Fwy | | I-10 (Maricopa Fwy) to Loop 101 (Price Fwy) | 4 | -- |
| Total | | | 150 | 101 |

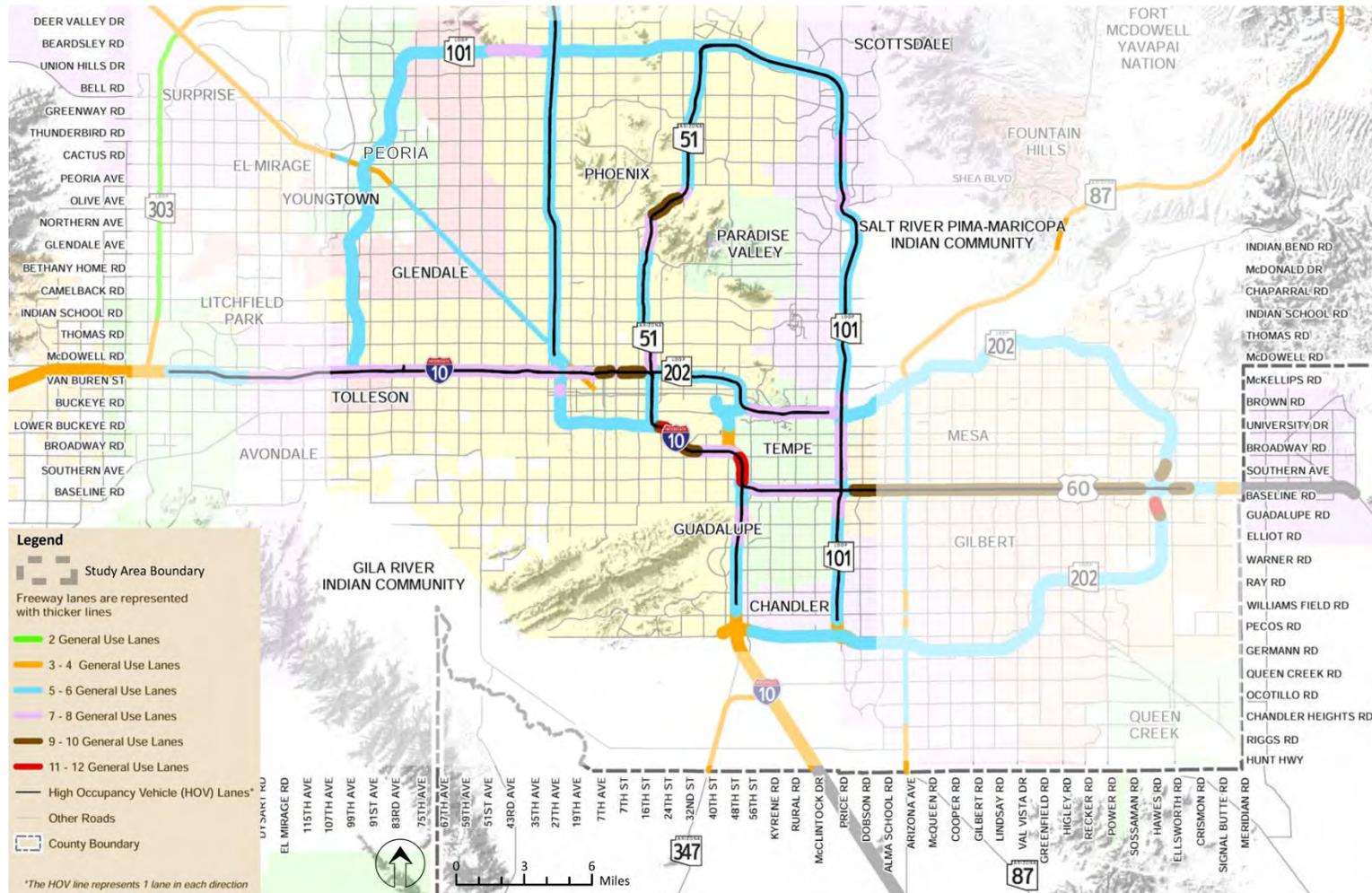
Prepared by Wilson & Company, August, 2010.

* HOV lane mileage represents one lane in each direction.

** Inbound lane terminates at Thomas Road.

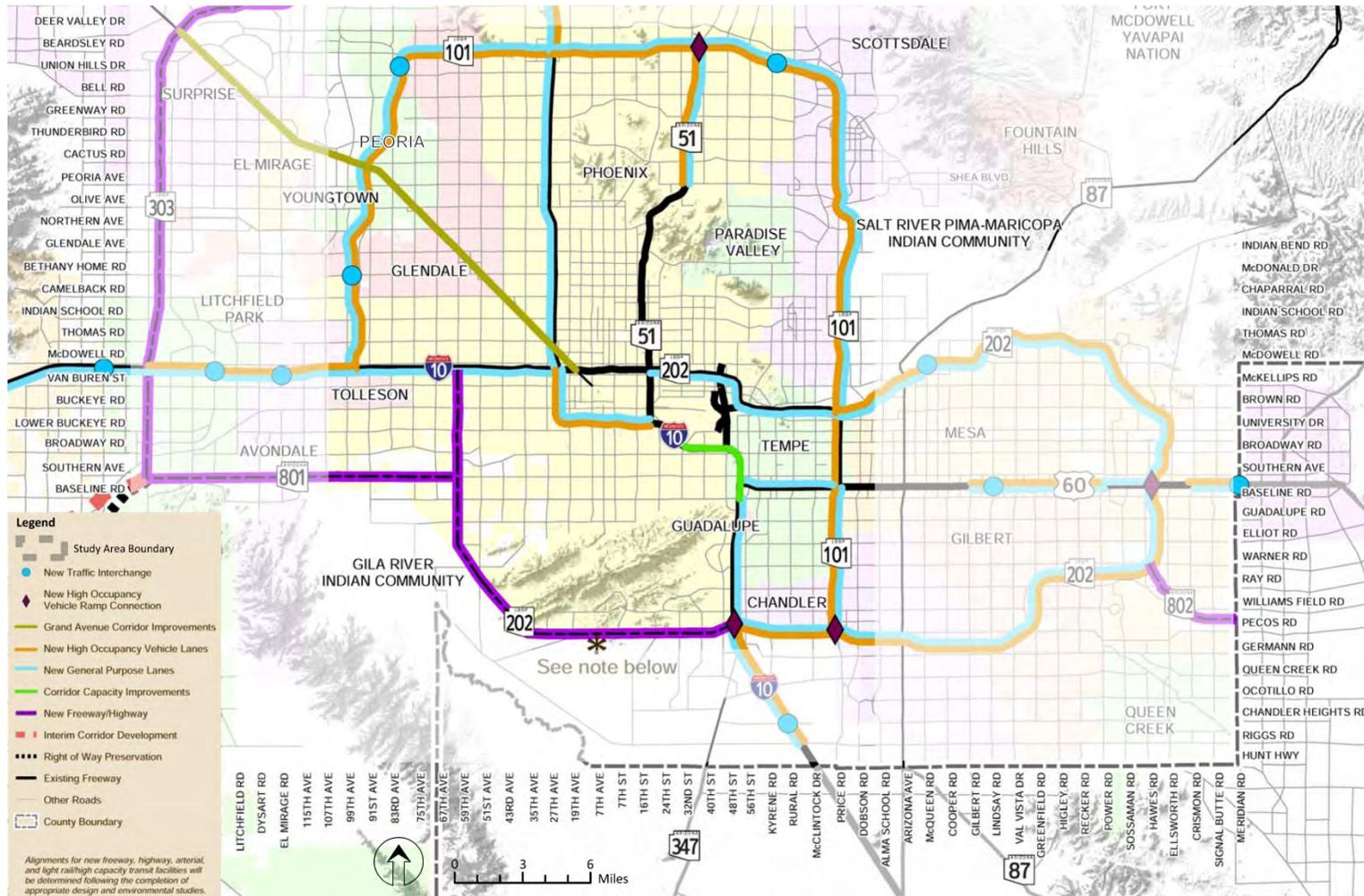
Source: Table 8-1, Freeway/Highway Mileages in the MAG Area, *Regional Transportation Plan, 2010 Update*, Maricopa Association of Governments (MAG), Draft - April, 2010.

Figure 6-1
REGIONAL FREEWAY/HIGHWAY SYSTEM



Source: Extracted from Figure 8-1, 2009 Freeway/Highway System Number of Lanes, *Regional Transportation Plan, 2010 Update*, Maricopa Association of Governments (MAG), Draft - February, 2010.

Figure 6-2
PLANNED STUDY AREA FREEWAY/HIGHWAY SYSTEM IMPROVEMENTS



Source: Extracted from Figure 8-3, Planned Freeway/Highway Improvements, *Regional Transportation Plan, 2010 Update*, Maricopa Association of Governments (MAG), Draft - February, 2010.

constructed as defined in the RTP Update. Therefore, recommendations formulated as part of this study need to compliment the full HOV system. One significant improvement is the planned extension of the Loop 202 (Santan Fwy) westward south of the South Mountain to connect with I-10 (Papago Fwy) in the vicinity of 59th Avenue (the final alignment of this proposed facility must await the completion of the ongoing planning and environmental review process). SR-801, expected to be a reliever for I-10 (Papago Fwy), also is depicted in Figure 6-2. Both of these facilities will be important to achieving a high level of service for the southwestern portion of the study area and removing traffic from segment of I-10 serving the central core. It should be noted that the three new interchanges shown in Figure 6-2 are either completed or underway.



6.1.2. Major Arterial Street System

The arterial street system complements the regional freeway/highway system by supporting travel by automobile, transit, bicycle, and pedestrian modes. The arterial street system primarily is comprised of roadways with four or more lanes generally established on a one-mile grid. This system of roadways is a critical sub-component of the regional transportation system, providing a high level of accessibility and mobility.

Existing Facilities

Figure 6-3 depicts principal characteristics of the current arterial street system, as of 2009. It is readily apparent from the figure that the bulk of streets in the study area north of I-10 (Papago Fwy) are five-lane facilities, which include a center left-turn lane. Most of the streets south of I-10 in Phoenix have four lanes or less with a large number having only two lanes. This pattern is consistent with the undeveloped character of the southwestern portion of the study area. Four-lane streets characterize the older sectors of the study area, including the central and downtown portions of Phoenix, Glendale, Peoria, Scottsdale, and Tempe.

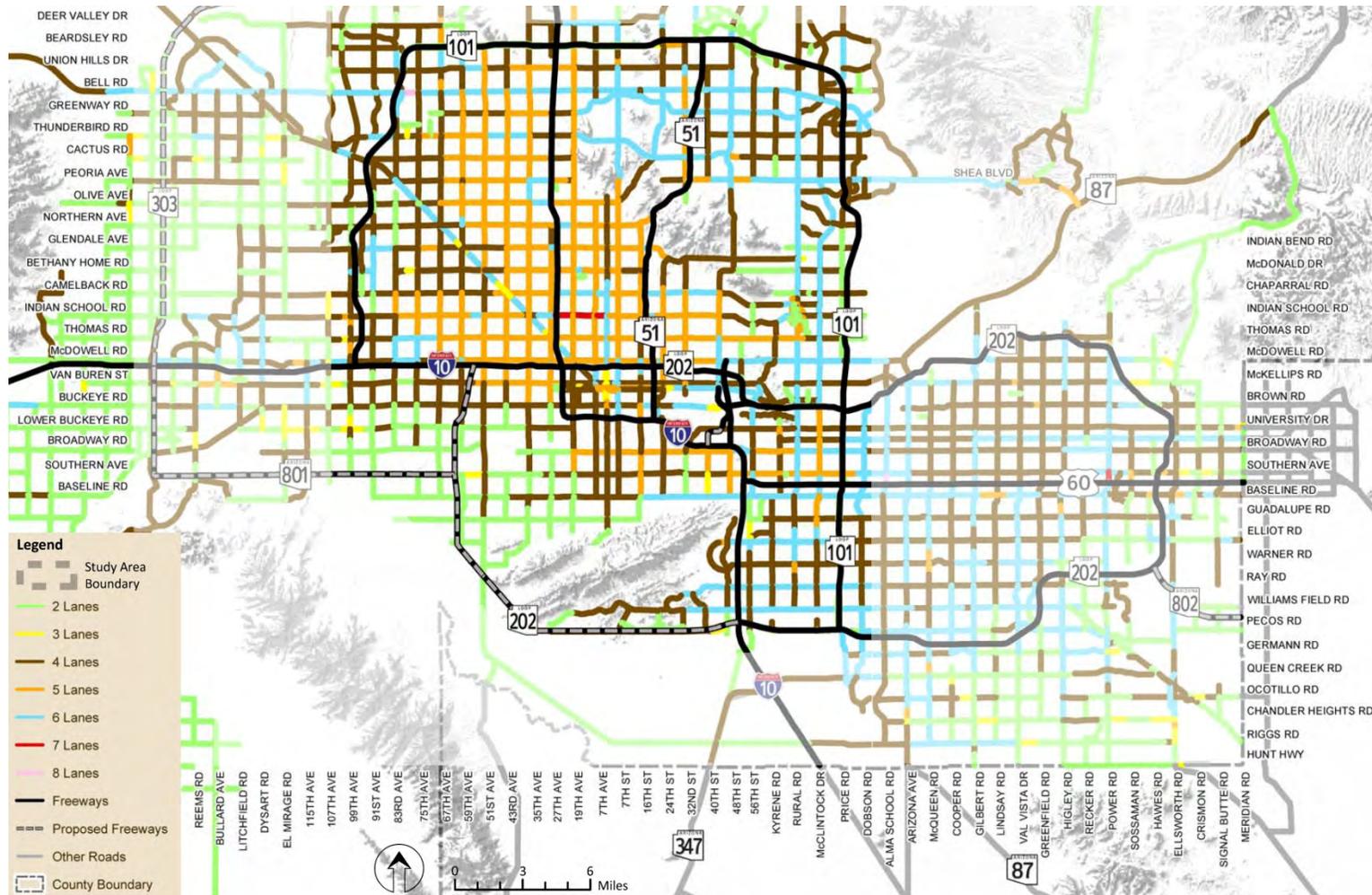
A significant number of streets in the northeastern portion of the study area are constructed to a six-lane cross-section. Bell Road, in particular, is a key east-west arterial with six lanes through the entire study area. Bell Road has become a major regional commercial corridor, linking Peoria, Glendale, Phoenix, and Scottsdale. Greenway Road and McDowell Road also provide intercommunity connectivity. Scottsdale/Rural Road, a major north-south arterial connecting Scottsdale and Tempe, is constructed to a six-lane cross-section through much of the study area. Baseline Road in the southeastern portion of the study area is an historically significant roadway that today is a six-lane, east-west facility, linking Phoenix, Tempe, and Mesa. To the south is Elliot Road, Ray Road, and Chandler Boulevard, all of which are six-lane facilities providing access to I-10 (Maricopa Fwy) and Loop 101 (Price Fwy) for portions of Tempe, Phoenix, and Chandler. Another street of historical significance to the western portion of the study area, US-60/Grand Avenue, is mostly a six-lane facility. Major improvement actions to grade separate six-legged intersections on this critical street for the western portion of the study area have enhanced travel and safety.

Planned Improvements

Planned improvements to the arterial street system are shown in Figure 6-4. Two improvements in the western portion of the study are intended to provide enhanced connectivity for Peoria (Beardsley Road/Loop 101 (Agua Fria Fwy) connection) and the communities of Surprise, El Mirage, Youngtown, Litchfield Park, and Glendale (Northern Parkway and El Mirage Road). In south Phoenix, the Avenida Rio Salado/Broadway Road project envisions a connector from the proposed Loop 202 (South Mountain Fwy) that essentially would be an extension of the proposed SR-801 to 7th Street and the South Phoenix activity center. As currently defined, the proposed corridor generally follows Broadway Road from 7th Street to 43rd Avenue, with an extension to the 67th Avenue in conjunction with the proposed SR-801/Loop 202 traffic interchange.

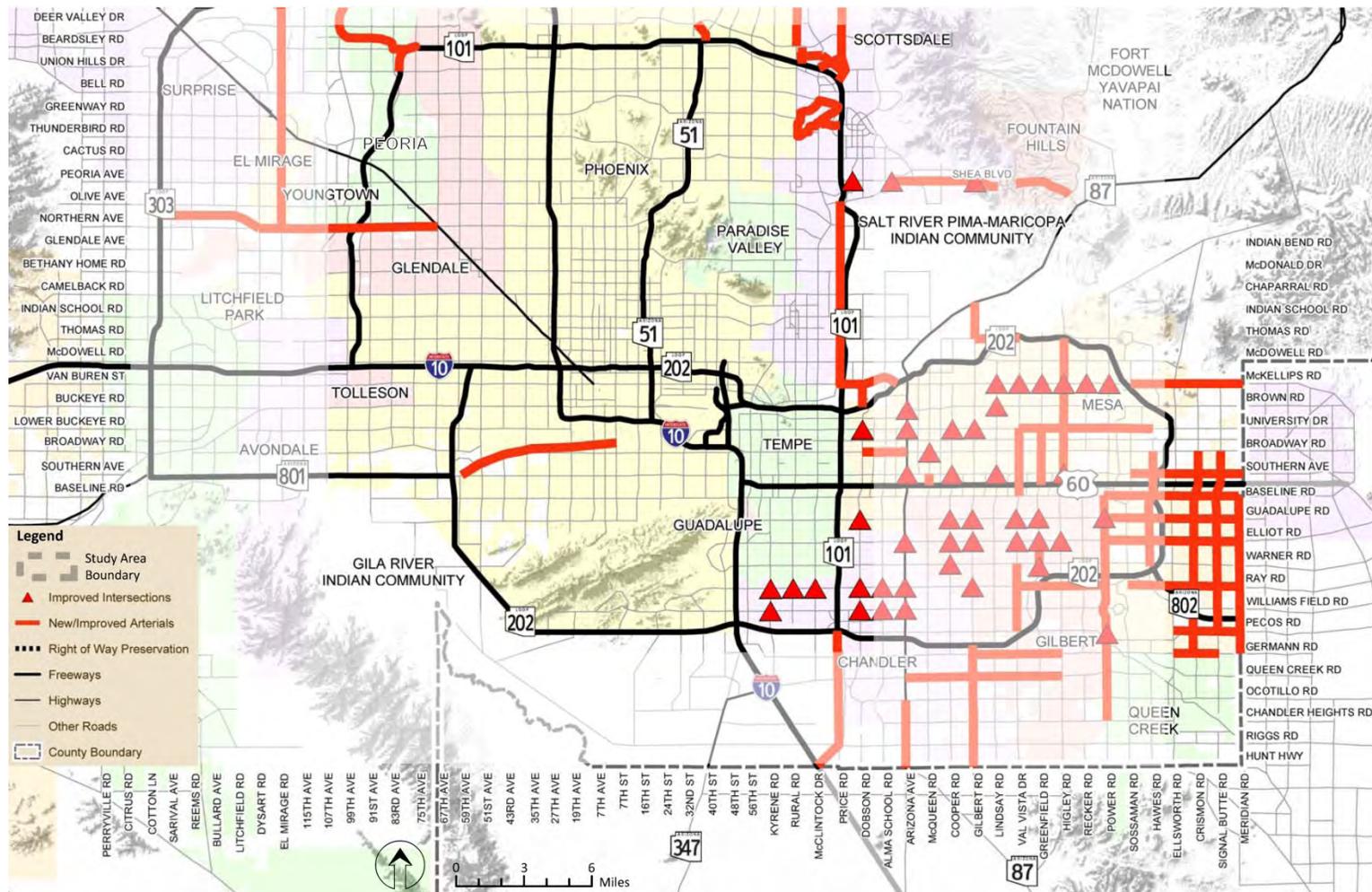
In Scottsdale, several major improvement actions are contemplated or underway. The area directly north of Loop 101 (Pima Freeway) is a growth spot for the City. To accommodate development demands a supportive arterial street system needs to be constructed. The City has been for some time evaluating alternative for

Figure 6-3
STUDY AREA ARTERIAL STREET SYSTEM



Source: Extracted from Figure 9-1, 2009 Arterial System Total Through Lanes, *Regional Transportation Plan, 2010 Update*, Maricopa Association of Governments (MAG), Draft - February, 2010.

Figure 6-4
PLANNED ARTERIAL STREET IMPROVEMENTS



Source: Extracted from Figure 9-3, Planned Arterial Street Improvements, *Regional Transportation Plan, 2010 Update*, Maricopa Association of Governments (MAG), Draft - February, 2010.

improving circulation in the Scottsdale Air Park area and is embarking on improvements to the Greenway-Hayden Loop and the Hayden Road/Thunderbird Road connection. In support of significant economic development activity on the Salt River Pima-Maricopa Indian Reservation, which includes the new dual-team Spring Training facility, Scottsdale is teaming with the Indian Community to develop Pima Road as a four-lane arterial. Pima Road will tie into McKellips Road and Dobson Road in Mesa, enhancing regional connectivity at Loop 202 (Red Mountain Fwy).

In addition to roadway improvements, numerous capacity enhancement projects are planned within the study area. Figure 6-4 shows several intersections in Tempe and Chandler planned for improvements. In this portion of the study area, it also is important to note the intention to extend Loop 101 (Price Fwy) south of Loop 202 (Santan Fwy) to connect with I-10 (Maricopa Fwy) at the County line.



6.2 Public Transit Services and Facilities

Public transportation in the study area includes several different modes of travel. Regularly scheduled, fixed-route bus service covers most of the study area. Transit services also include Express Bus, Light Rail Transit (LRT), and LINK service. In addition, there are several transit centers and a system of park-and-ride (P&R) lots. Public transit services are provided under the Valley Metro brand. Valley Metro was created when local governments joined to fund the Valleywide transit system. Elected officials from local governments comprise the Valley Metro Regional Public Transportation Authority (RPTA) Board of Directors.

6.2.1. Bus Service

Bus service is comprised of regularly scheduled local route service, express routes, local limited stop service, RAPID service, neighborhood circulators, rural connectors, and Valley Metro LINK service. Services pertinent to the study area are highlighted in the following subsections.

Existing Fixed-Route, Local Bus Service

Regularly scheduled bus service provided through Valley Metro as of publication of this report is comprised of local bus routes and several different types of specialized services, as listed below:

- 57 Regularly Scheduled Local Bus Routes
- 16 Shuttles and Circulator Routes (12 operating within the study area)

Substantial cuts have been made to bus services in recent months due to the current global economic downturn, which has forced significant budget cuts at all governmental levels. At the end of June, 2009, regularly scheduled local bus routes numbered 64, and there were 24 Express Routes and 18 Shuttles/Circulators. It is highly likely the service levels of June, 2009, will be reestablished over time and even increased. In fact, the regularly scheduled local bus route service ultimately is being configured into a “Super Grid” system that will offer consistent, high-level services in association with the region’s arterial street system (Figure 6-5). Table 6-2 presents a listing of the current routes.

Express Bus Service

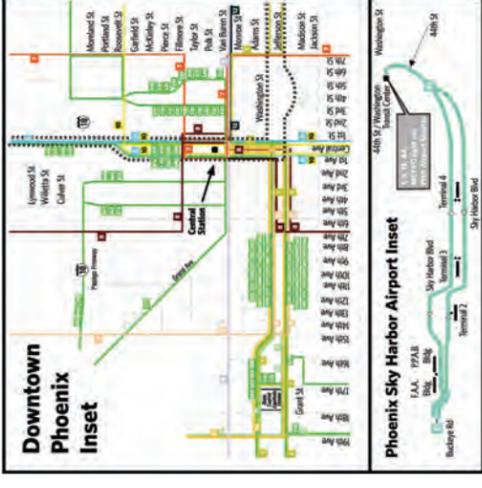
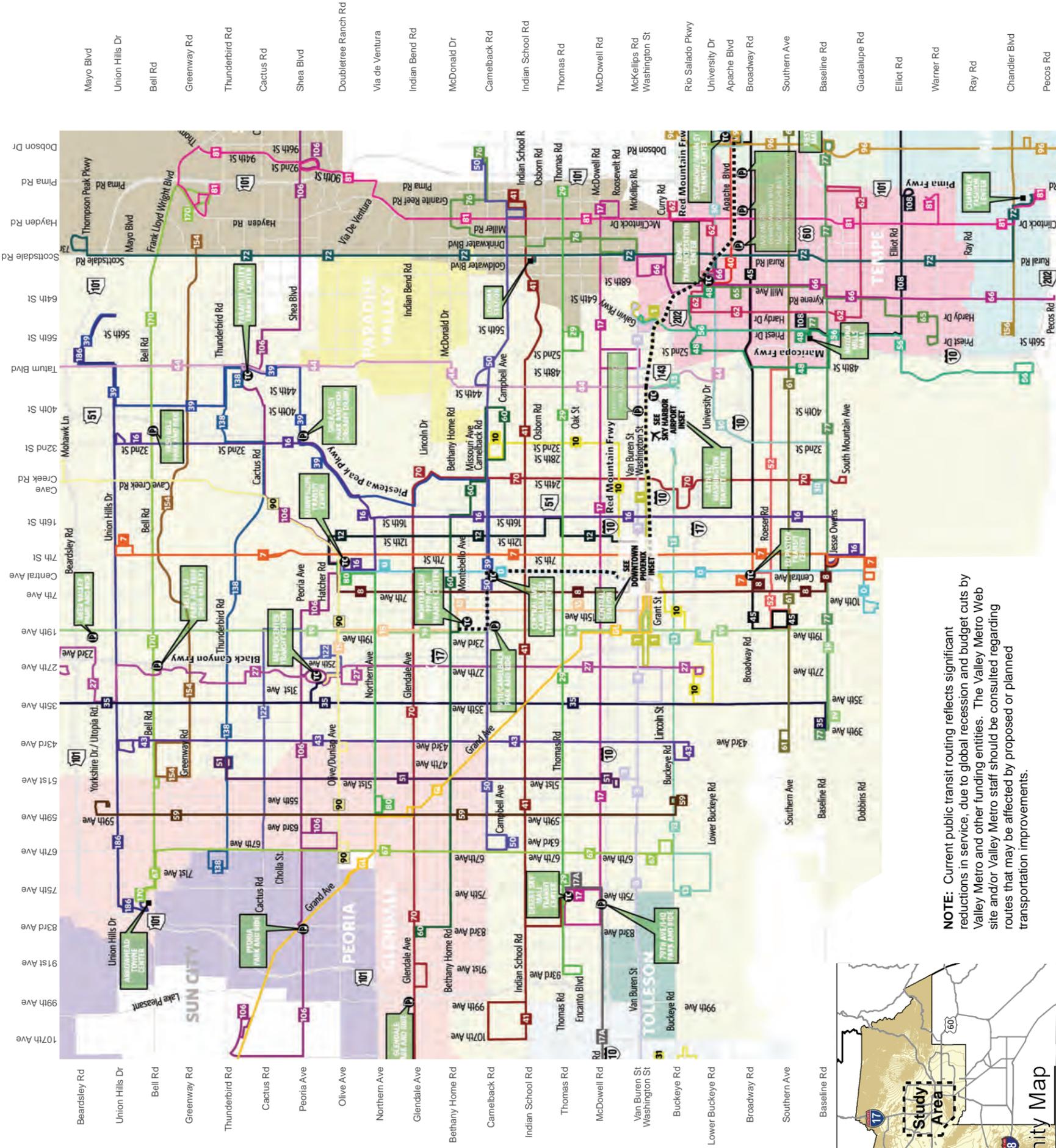
Valley Metro operates Express Bus service that accommodates morning and afternoon/evening commutes, primarily to Downtown Phoenix: one route connects Tempe to Scottsdale Air Park. The City of Phoenix operates the RAPID bus service, which, compared to the Express Routes, provides fewer stops (i.e., only at P&R facilities) and higher speeds. The City currently is considering restructuring this service. A special, “Limited Stop” service is provided along US-60/Grand Avenue, and a Rural Connector links Wickenburg to the Arrowhead Mall Transit Center. Express and special commuter bus services are listed in Table 6-3.



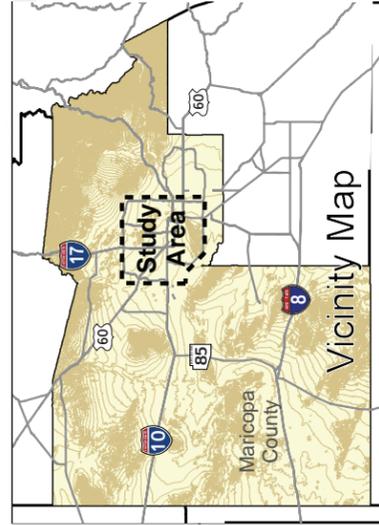
Figure 6-5

Local Bus, Light Rail, and LINK Routes

- Freeway
- Major Road
- Local Bus Route
- Light Rail Line
- Transit Center Location
- Park-and-Ride Location



NOTE: Current public transit routing reflects significant reductions in service, due to global recession and budget cuts by Valley Metro and other funding entities. The Valley Metro Web site and/or Valley Metro staff should be consulted regarding routes that may be affected by proposed or planned transportation improvements.



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Table 6.2
EXISTING VALLEY METRO LOCAL BUS ROUTES

| Route # | Identifier | Route # | Identifier |
|---------|-------------------|---------|--------------------------|
| 0 | Central | 60 | Bethany Home |
| 1 | Washington | 61 | Southern |
| 3 | Van Buren | 62 | Hardy |
| 7 | 7th Street | 65 | Mill/Kyrene |
| 8 | 7th Avenue | 66 | Mill/Kyrene |
| 10 | Roosevelt/Grant | 67 | 67th Avenue |
| 12 | 12th Street | 70 | Glendale/24th Street |
| 13 | Buckeye | 72 | Scottsdale/Rural |
| 15 | 15th Avenue | 76 | Miller |
| 16 | 16th Street | 77 | Baseline |
| 17 | McDowell | 80 | Northern |
| 17A | McDowell | 81 | Hayden/McClintock |
| 19 | 19th Avenue | 90 | Dunlap/Cave Creek |
| 27 | 27th Avenue | 96 | Dobson |
| 29 | Thomas Road | 104 | Alma School |
| 30 | University | 106 | Peoria/Shea |
| 35 | 35th Avenue | 108 | Elliot |
| 39 | 40th Street | 112 | Country Club/Arizona Ave |
| 40 | Apache/Main St | 120 | Mesa Drive |
| 41 | Indian School | 122 | Cactus |
| 43 | 43rd Avenue | 128 | Stapley |
| 44 | 44th Street/Tatum | 131 | START |
| 45 | Broadway | 136 | Gilbert Road |
| 48 | 48th Street | 138 | Thunderbird |
| 50 | Camelback | 154 | Greenway |
| 51 | 51st Avenue | 156 | Chandler Blvd |
| 52 | Roeser | 170 | Bell |
| 56 | Priest | 186 | Union Hills |
| 59 | 59th Avenue | | |

Prepared by Wilson & Company, August, 2010.

Source: Schedules & Maps, Express Service, Effective July 26, 2010, Valley Metro Web site.



Table 6.3
EXISTING STUDY AREA EXPRESS BUS SERVICES

| Route # | Identifier | Route # | Identifier |
|-------------------------------|---------------------------|---------|-----------------------------------|
| Express Routes | | | |
| 560 | Avondale Express | 581 | North Mountain Express |
| 542 | Chandler Express | 573 | Northwest Valley-Downtown Express |
| 541 | Chandler Express | 575 | Northwest Valley-Downtown Express |
| 540 | Chandler Express | 535 | Red Mountain-Downtown Express |
| 590 | Deer Valley Express | 510 | Scottsdale Express |
| 570 | Glendale Express | 512 | Scottsdale Express |
| 562 | Goodyear-Downtown Express | 511 | Tempe/Scottsdale Airpark |
| 532 | Mesa Express | 571 | Surprise Express |
| 533 | Mesa Express | 521 | Tempe Express |
| 531 | Mesa/Gilbert Express | 520 | Tempe Express |
| 582 | North Mountain Express | -- | Grand Avenue Limited |
| RAPID Routes | | | |
| -- | I-10 East RAPID | -- | I-10 West RAPID |
| -- | I-17 RAPID | -- | SR-51 RAPID |
| Special Service Routes | | | |
| -- | Grand Avenue Limited | 660 | Wickenburg Connector |

Prepared by Wilson & Company, December, 2010.

Source: Schedules & Maps, Express Service, Effective July 26, 2010, Valley Metro Web site.



Existing Metro Rail Service

Light rail transit (LRT) service, referred to as "METRO Rail," currently is a 20-mile operating system that begins at 19th Avenue and Montebello Avenue in central Phoenix and passes through the study area to the Sycamore Station in west Mesa (Figure 6-6). It serves the Central Avenue corridor of Phoenix, the Phoenix Downtown and Arizona State University (ASU) Downtown Campus, offers access to Phoenix Sky Harbor International Airport via an automated Sky Train (under construction), and passes through Downtown Tempe and the ASU Tempe Campus before proceeding to west Mesa. LRT service began public operation on December 27, 2008, and ridership has surpassed the initially forecasts of approximately 26,000 boardings a day.

Existing Park-and-Ride Lots and Transit Centers

The public transit system in the study area is supported by a system of P&R lots and transit centers (Figure 6-7). This system supports services provided by both Valley Metro Bus and METRO Rail. Overall, distributed throughout the study area, there are 37 P&R lots, as listed in Table 6.4, and 10 transit centers, as listed in Table 6.5.

The majority of the P&R lots are situated in close proximity to a major highway or thoroughfare. Those at freeway locations are particularly situated to support the Express Bus and RAPID services. Eight P&R facilities have been developed specifically to serve the METRO Rail service. These lots are located adjacent to the LRT line and offer a total of 3,513 parking spaces. All P&R lots are available to travelers free of charge, and all are monitored by security cameras, security officers, and municipal police officers.

Transit centers are specifically designed to serve multiple transit services, including regularly scheduled local bus routes, Express Bus, RAPID, and METRO LRT. These facilities offer a range of services and amenities that may include: shade trees, play areas, public restrooms, drinking fountains, fare sales, transit information, evaporative cooling, bike and day lockers, telephones, and limited parking.

Figure 6-6

METRO Light Rail Existing and Planned Routes

Legend

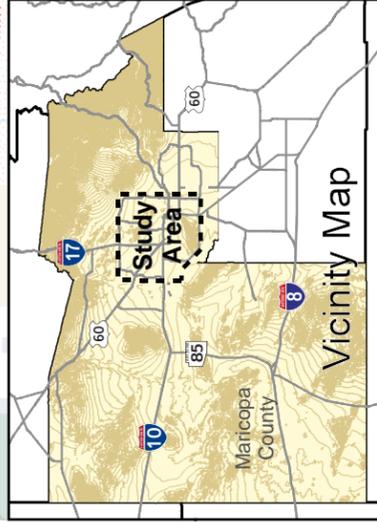
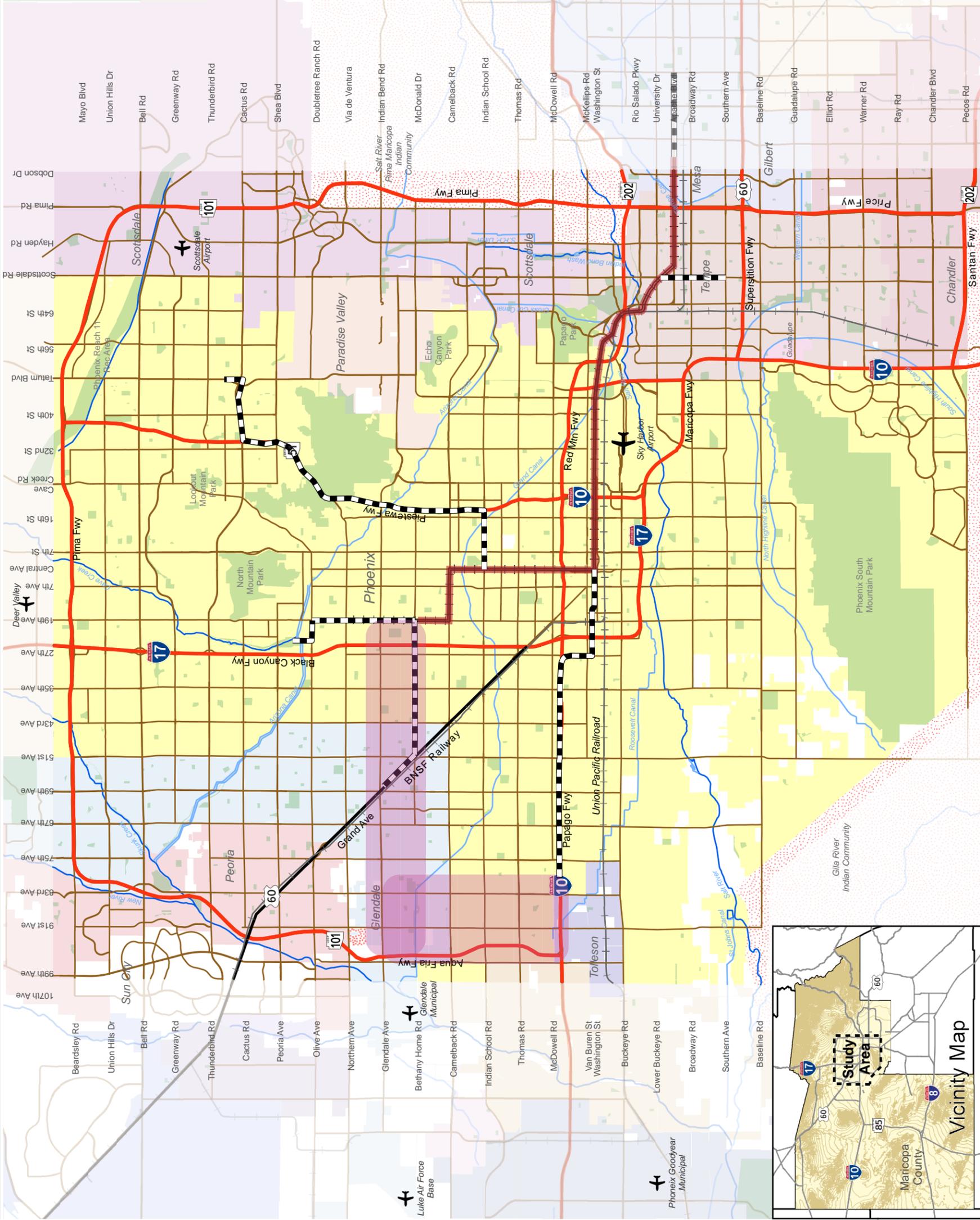
- Freeway
- Highway
- Major Road
- Railroad
- Existing METRO Light Rail Route
- Planned METRO Light Rail Extensions
- Ongoing LRT Route Planning
- Park/Open Space Preserve
- River/Stream
- Canal
- Airport
- Indian Reservation
- Maricopa County

NOTE: Route system reflects planned Light Rail Transit (LRT)/High-Capacity Transit scheme identified in Figure 10-5 of the 2007 Update Regional Transportation Plan, prepared by MAG, July 2007, and Figure 8-3 of the MAG 2007 Annual Report on Proposition 400. Refer to Draft Regional Transportation Plan, 2010 Update, for current anticipated phasing of extensions. The Valley Metro Web site and/or Valley Metro staff should be consulted regarding LRT routes that may be affected by proposed or planned transportation improvements.



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Figure 10-5, 2007 Update Regional Transportation Plan, MAG, July 2007, G:\Dev\Maps\RTP\2007_Plan_Update\10-5_High_Cap_Corridors.mxd.



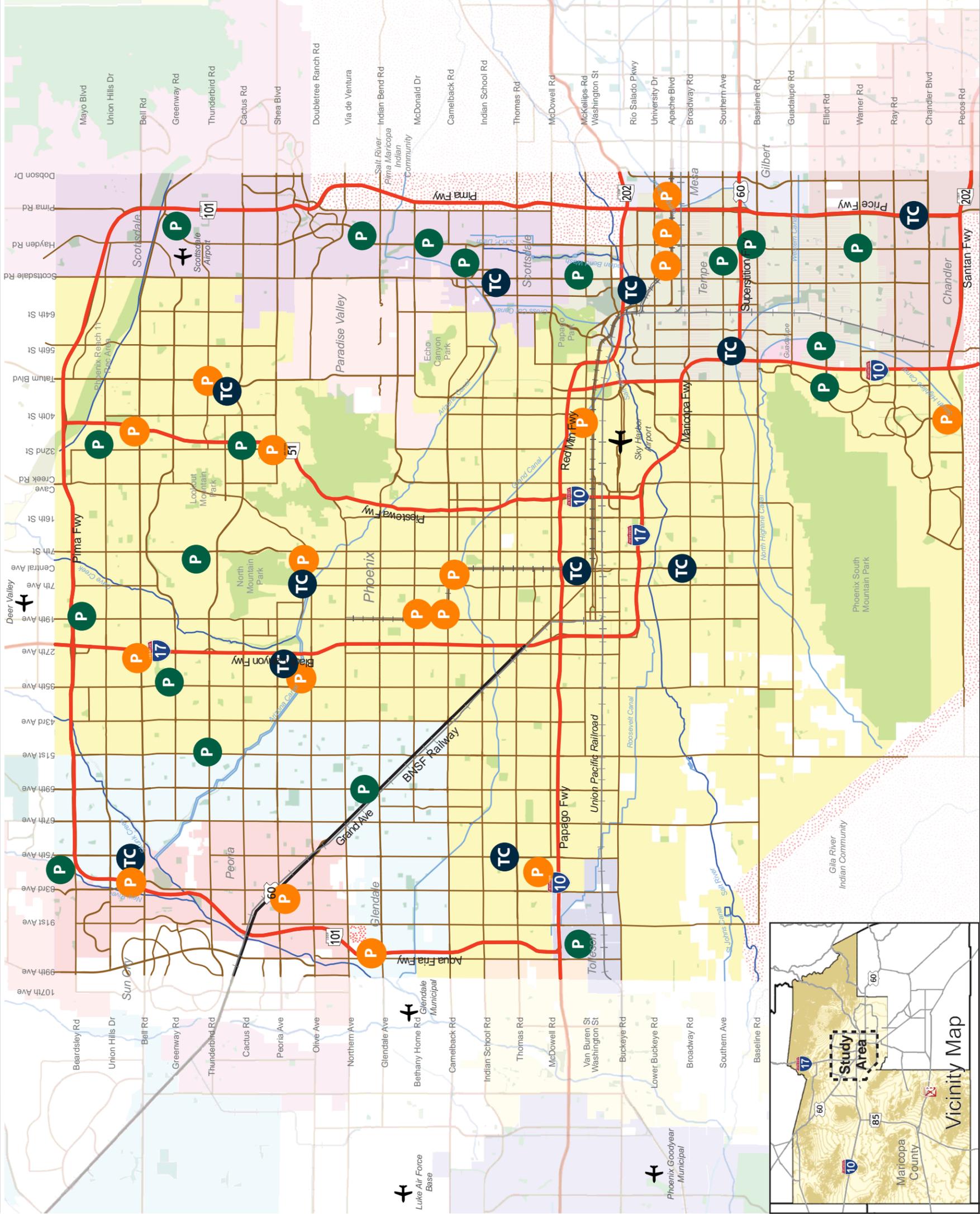


Figure 6-7

Park-and-Ride Lots and Transit Centers

Legend

- Freeway
- Highway
- Major Road
- Railroad
- Light Rail
- Park/Open Space Preserve
- River/Stream
- Canal
- Airport
- Indian Reservation
- Maricopa County

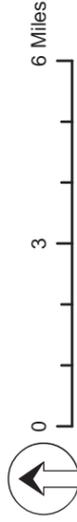
Valley Metro Transit Facilities

- Transit Centers
- Park-and-Ride Lot

Private Facilities

- Park-and-Ride Lot

NOTE: Private facilities generally consist of spaces in parking lots offered for public use by private property owners (including municipalities), often at commercial or institutional locations.



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Source: Park and Rides and Transit Centers at How To Ride, Valley Metro Web Site, www.valleymetro.org, 2010.

Table 6.4
STUDY AREA PARK-AND-RIDE LOTS

| City | Facility/Lot | Location | Routes Served |
|---|--|--|---|
| Glendale | City Lot | 59 th Ave. and Myrtle Ave., NE & SW corners | 59, 570, Grand Ave. Limited, Glendale Urban Shuttle (GUS) |
| | The Community Church of Joy | 75 th Ave. and Rose Garden Ln., SW corner | 573, 575, 576 |
| | <u>Glendale P&R</u> | 99 th Ave. and Glendale Ave., NE corner | 70, 573 388 |
| | Shopping Center | Thunderbird Rd. and 51 st Ave., NW corner | 51, 138, 581 |
| Mesa | <u>Sycamore/Main St. Transit Ctr* (802)</u> | Main St. and Sycamore, NW corner | 30, 40, 45, 96, 104, LINK, METRO LRT |
| Peoria | <u>Peoria P&R East</u> | Jefferson St. and 84 th Ave., NE corner | Grand Ave. Limited |
| | <u>19th Ave/Camelback P&R (410)</u> | 19 th Ave. and Camelback Rd., SE corner | 19, 50, METRO LRT |
| | <u>38th St/Washington P&R (189)</u> | Washington St. and 38 th St., NW corner | 1, 32, METRO LRT |
| | <u>40th St. & Pecos P&R (562)</u> | Pecos Rd. & 40 th St., NW corner | RAPID I-10 East, ALEX |
| | <u>79th Ave. & I-10 P&R (607)</u> | I-10 and 79 th Ave., NE corner | 17, 17A, 560, RAPID I-10 West |
| | <u>Bell/I-17 Park-and-Ride (350)</u> | I-17 and Bell Rd., SW corner | 27, 170, 582, 590, RAPID I-17 |
| | <u>Bell/SR-51 P&R (377)</u> | SR-51 and Bell Rd., SW corner | 170, RAPID SR-51 |
| | Cactus Square Shopping Ctr | 32 nd St. and Cactus Rd., SE corner | 32, 106, 138 |
| | <u>Central Ave/Camelback Transit Ctr (135)</u> | Camelback Rd. and Central Ave., SW corner | 0, 39, 50, 512, 570, 582, 590, METRO LRT |
| | CityNorth Shopping Ctr | 53 rd St. and Park Place North, NE corner | RAPID SR-51, DART |
| | Deer Valley Community Center | 19 th Ave. and Utopia Dr., NW corner | 19, RAPID I-17 |
| | Greenway Village Square | 35 th Ave. and Greenway Rd., SE corner | 35 |
| | <u>Metrocenter Transit Ctr</u> | West of 29 th Ave. on Metro Pkwy. West | 15, 27, 35, 90, 106, 122, 581, 582, RAPID I-17 |
| | <u>Montebello/19th Ave. Transit Ctr (794)</u> | Montebello Ave. and 19 th Ave., SE corner | 15, 19, 60, 576, METRO LRT |
| | Mountain View Lutheran Church | 48 th St. and Cheyenne St., SW corner | 56, 540, ALEX |
| | Paradise Valley Community College | 32 nd St. and Union Hills Dr. | 32, 186 |
| <u>Paradise Valley Mall Transit Ctr</u> | Paradise Village Pkwy. and Tatum Blvd. | 39, 44, 106, 138, RAPID SR-51 | |
| Safeway Shopping Ctr | 7 th St. and Thunderbird Rd., NW corner | 7, 138 | |
| <u>Shea & SR-51 P&R</u> | SR-51 and Shea Blvd., SW corner | 32, 512, RAPID SR-51 | |
| <u>Sunnyslope Transit Ctr</u> | 3 rd St., half block south of Dunlap Ave. | 0, 8, 12, 16, 80, 90, 106, SMART | |
| Scottsdale | Chaparral Park | Hayden Rd. and Jackrabbit Rd., NE corner | 81, 510 |
| | Costco (Hayden Rd.) | Butherus Dr. and 83 rd Pl., NE corner | 81, 170 |
| | Miller Plaza | Montecito Ave. and Miller Rd., NW corner | 50, 76, 510 |
| | Trinity Church | Hayden Rd. and McCormick Pkwy., SE corner | 81, 510 |
| Tempe | Cobblestone Village | Warner Rd. and McClintock Dr., SE corner | 81, 540 |
| | Costco | Priest Dr. and Elliot Rd., SE corner | 56, 108 |
| | <u>Dorsey Ln/Apache Blvd P&R (190)</u> | Apache Blvd. and Dorsey Ln., NE corner | 40, METRO LRT |
| | <u>Loop 101 (Price Fwy)/Apache Blvd P&R (693)</u> | Apache Blvd. and Loop 101 (Price Fwy), SE corner | 40, 511, METRO LRT |
| | <u>McClintock Dr/Apache Blvd P&R (300)</u> | Apache Blvd. and McClintock Dr., SE corner | 40, 81, METRO LRT |
| | Grace Community Church | Southern Ave. and Dorsey Ln., NW corner | 61, 520 |
| | Shopping Center | McKellips Rd. and Scottsdale Rd., SE corner | 72, 532 |
| Target Shopping Center | McClintock Dr. and Baseline Rd., NE corner | 77, 81, 521 | |

Prepared by Wilson & Company, August, 2010.

() Numbers in parentheses identifies spaces at location, as provided at source.

Underlined Facility/Lot name identifies facilities developed with Federal funding; others constitute contributed space on private property.

Source: Valley Metro Web Site, October, 2009, Valley Metro Bus at http://www.valleymetro.org/bus/park_and_rides/ and Valley Metro Rail at http://www.valleymetro.org/metro_light_rail/how_to_ride/lr_park_and_ride/.



Table 6.5
TRANSIT CENTERS

| |
|--|
| <u>Central Station - Phoenix</u> 302 N. Central Ave. |
| <u>Desert Sky Transit Center - Phoenix</u> 7611 W. Thomas Rd. |
| <u>Chandler Fashion Center - Chandler</u> 3111 W. Chandler Blvd. |
| <u>Ed Pastor Transit Center at South Mountain Village - Phoenix</u> 10 W. Broadway Road |
| <u>Metrocenter Transit Center - Phoenix</u> 9415 N. Metro Parkway |
| <u>Paradise Valley Mall Transit Center - Phoenix</u> 4623 E. Paradise Village Parkway North |
| <u>Sunnyslope Transit Center - Phoenix</u> 8927 N. 3rd St. |
| <u>Loloma Station - Scottsdale</u> 7084 E. 2nd St. |
| <u>Tempe Transportation Center</u> 200 E. Fifth St. |
| <u>Arizona Mills Mall - Tempe</u> 5000 Arizona Mills Circle |

Prepared by Wilson & Company, August, 2010.

Source: Valley Metro Transit Centers, Valley Metro Bus at http://www.valleymetro.org/bus/transit_centers/.



Critical Aspects of Current Public Transit Service in the Study Area

A summary of the important issues, concerns, and opportunities related to existing operations and service is provided in the following paragraphs.

City of Phoenix Public Transit Department

Years 2007/2008 were high points in travel demand, and may be suitable for purpose of defining and understanding base conditions. Vehicle miles of travel (VMT) and transit ridership have fallen in the last couple of years, as the economy has faltered. Route modifications undertaken in response to the global economic downturn should be viewed as temporary, and long-term service goals remain in place. Therefore, Phoenix’s Long-Range Transportation Plan should be considered a reasonable source for evaluating transit service.

City of Tempe

Ridership peaks on routes serving Tempe are becoming less pronounced, as ridership is high throughout the day. The Rural Road corridor records the heaviest transit use. This corridor would be the best candidate for bus priority treatments and service improvements. Routes serving Broadway Road, Southern Avenue, University Drive, and McClintock Drive would also be suitable candidates for upgraded transit service.

Valley Metro Rail

Ridership on the Central Phoenix/East Valley (CP/EV) LRT line already is close to meeting the 20-year horizon levels with respect to ridership. Ridership on the system currently is 35 percent higher than the initial forecast cited above. METRO Rail reports that twenty percent of current ridership is related to students,

faculty, and visitors at the ASU Downtown and Tempe Campuses. As a response to the economic downturn and budget cuts at the State and local levels, a fare increase went into effect in 2009, and service frequency has been reduced. The ultimate effect of these two changes will not be known for several months.

The first phase of a Northwest Extension has been initiated with right-of-way acquisition and utility relocations. This extension will take the system up to Dunlap Avenue from Montebello (just south of Bethany Home Road), a distance of three miles. In addition to the Northwest Extension, which is planned for a total of five miles, five other extensions are being planned. Therefore, as is the case with bus service, the limitations imposed on METRO Rail service are not expected to remain in place over the long-term.

Valley Metro

There is an existing regional bus stop database; however, maintenance of this database by the individual jurisdictions purchasing or providing service is inconsistent. Valley Metro is pursuing efforts to bring greater coordination to this data gathering/reporting process, as the accuracy and reliability of the data base affects the automated trip planning system. In addition, P&R lots currently are not considered by the trip planner.

Valley Metro also notes that freeway-oriented Bus Rapid Transit (BRT) – RAPID – and Express Bus services would benefit from direct access ramps and similar features that would expedite bus operations, wherever feasible. Weaving in and out of the HOV lanes has a negative effect on service times and safety and creates disruptions to traffic flow. Valley Metro anticipates the lanes would be usable by both buses, HOVs, and single-occupant vehicles (SOVs). The agency also has reviewed the potential use of measures to give transit priority, particularly at intersections, such as transit signal priority (TSP), queue jumping/bypass lanes (see below), curb extensions, and station spacing.

Valley Metro has indicated that more P&R lots would be desirable. Planners consider the lack of lots a limiting factor with respect to transit usage. Structured parking integrated with condominiums, as at McClintock Drive and Apache Boulevard in Tempe, is an example of mixed-use development that would aid in attracting riders. However, structured parking likely would need private sector involvement.

The regional transit agency also has expressed interest in the use of “queue jumps” with farside bus stops, referred to in this context as Bus-and-Turn or BAT lanes (sometimes called Business Access and Transit lanes). A queue jump is a type of roadway geometry and signal operation typically implemented in relation to BRT systems. The queue jump consists of an additional travel lane (usually the curbside) on the approach to a signalized intersection, which is installed to favor progression of transit vehicles through the intersection. Some variants of the queue jump may permit bicyclists, mopeds, and/or motorcycles. The intent of the added travel lane is to allow transit vehicles to cut to the front of the other vehicles waiting at the intersection – the queue. A queue jump lane generally includes a signal phase specifically for transit vehicles, reducing delay and improving operational efficiency of the transit system. A dedicated signal and phase reduces the need for a designated receiving lane on the opposite side of the intersection. Thus, transit vehicles get a "head-start" over other queued vehicles and enter into the regular travel lanes immediately beyond the signal without being required to merge. The additional phasing of the signal, however, reduces green time for the general traffic queue, and additional of the queue jump lanes widens the roadway, possibly requiring additional right-of-way and increasing the distance pedestrians must travel to cross the road.

6.2.2. Special Transportation Opportunities

Within the study area, there are other transportation and mobility opportunities that have been devised to address specific demands or needs of the traveling public. Car pools and van pools specifically address the commute-to-work trips and are considered a major player in the effort to reduce congestion and pollution by removing vehicles from the road, especially during the morning and afternoon/evening peak periods. Dial-a-Ride systems provide special access/mobility options for those without vehicles or who are significantly



disadvantaged and unable to provide for their own transportation. The principal characteristics of these special transportation opportunities are outlined in the following subsections.



Car Pool/Van Pool

Car Pool

Car pools involve two or more persons sharing a motor vehicle to save time and money. In the study area, carpoolers (and motorcycles) get to use available HOV lanes, which are focused on reducing commute times and congestion in the general travel lanes. Carpoolers also save gas money and vehicle wear and tear, stress of travel is reduced. Valley Metro maintains a Web site and phone number for people to query potential partnerships with others to car pool.

Van Pool

Vanpools are comprised of commuters sharing the monthly rental fee and gasoline cost associated with the use of a Valley Metro clearly marked, multi-passenger (6 to 15 persons) van. Fuel, insurance, and vehicle maintenance costs are included in the monthly fare. Some employers may offer company-owned vans as an alternative mode incentive to employees. Routes traveled by van pool vehicles generally are oriented to collecting employees with a common destination, such as an economic activity center (e.g., downtown Scottsdale) or the same corporation (e.g., Intel Chandler and Ocotillo campus). Like the car pool program, Valley Metro maintains a Web site and phone number for people to query opportunities for vanpooling to their place or work. Vanpool members are also eligible for special commuter tax benefits. According to the Valley Metro Van Pool Web site, “the Federal Government has enacted tax laws that benefit commuters who travel to work in government-owned vanpools. Employees are eligible for employer subsidies or they may set aside up to \$115 a month of their pre-tax income towards commuting costs. Employers who subsidize their employees’ commute may receive equivalent deductions free of additional payroll and federal income taxes.”

Dial-A-Ride

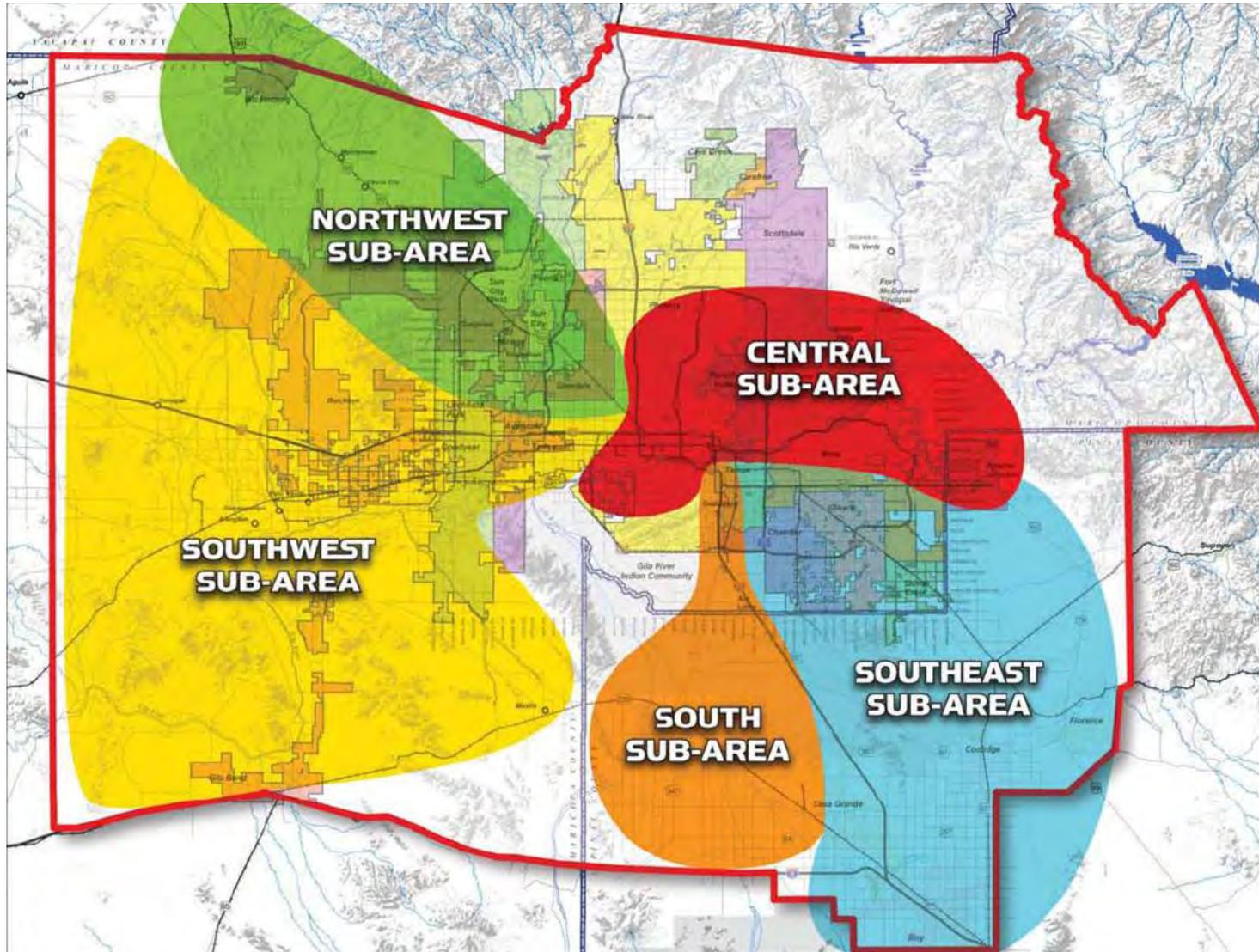
Dial-a-Ride is a shared-ride service provided by a number of different types of agencies, depending on the city or town where the service exists. For instance, there can be Dial-a-Ride service for seniors, persons with disabilities, or the general public. The vehicles are not route oriented, and drivers may pick-up or drop-off people at multiple, predetermined locations during the course of the trip. In most cases, travel on the Dial-a-Ride system can be accomplished without transferring to another vehicle, unless a person’s trip extends beyond the service area of the system. Valley Metro facilitates transfers between Dial-a-Ride systems and between the Dial-a-Ride systems and regularly scheduled, fixed-route bus service. Dial-a-Ride services are provided by Phoenix, Peoria, Glendale, Scottsdale, Tempe, Chandler, Mesa, Paradise Valley, and Tolleson.

6.2.3. Planned Commuter Rail Service

In May of 2007, MAG initiated a Commuter Rail Strategic Planning Study. This study, completed in March, 2008, addressed regional fixed rail transit opportunities in Maricopa County and northern Pinal County.⁵ The *Commuter Rail Strategic Plan* reflects the latest thinking for development of high-capacity transit services for the Phoenix metropolitan area. The overall goal is to gain adoption of study findings and recommendations by a “large and diverse group of stakeholders.” The study identified five sub-areas being studied to determine the feasibility for commuter rail service (Figure 6-8). All five sub-areas intersect with the Central Phoenix Framework Study Area.

⁵ *Commuter Rail Strategic Plan*, Maricopa Association of Governments (MAG), March, 2008.

Figure 6-8
MAG COMMUTER RAIL SUB-AREA DEFINITIONS



Source: *Commuter Rail Strategic Plan*, Maricopa Association of Governments (MAG), March, 2008.

In a follow-on Commuter Rail System Study, MAG sought to define an optimized network of rail service corridors and identify the key elements needed to implement the system. The vision defined by this study is a commuter rail system radiating from downtown Phoenix serving each of the five sub-areas (Figure 6-9). This study evaluated each of the corridors relative to: ridership, travel time savings, cost-effectiveness, and implementation and constructability. This evaluation resulted in the Phoenix Subdivision (Southeast) being considered the top candidate for implementation as a “stand alone” project. The Grand Avenue and Tempe/Chandler corridors were considered “middle tier” alternatives, with the Yuma Corridor receiving the lowest appraisal. When interlining was considered the top two corridors were the Phoenix Subdivision (SE) and Grand Avenue.

6.3 Regional Bikeway System

MAG has developed a *Regional Bikeway Master Plan* as a guide for the expansion and interconnection of the Phoenix metropolitan Region’s bicycle facility network. The plan was developed against the backdrop of emerging National and Regional trends that have given focused attention to community-oriented mobility concepts, such as “smart growth,” “active transportation,” “complete streets,” “traffic calming,” and “bicycling encouragement” programs and events. Many elements of these trends already have been initiated in communities making up the study area and integrated with overall community master planning.

The Regional Bikeway Master Plan incorporates several distinct objectives aimed at establishing a more integrated and user friendly bikeway system. The Plan’s structure is designed to aid communities in the MAG Region in developing an interconnected bikeway system and addresses both on-street and off-street facilities. The Plan demonstrates the importance of developing a viable system to support relatively short bicycle trips, creating useful linkages between neighborhoods. Another important aspect of the Plan is to provide design guidelines for improvements to enhance the satisfaction level and safety of the bicycle-riding experience and remove barriers to regional and local bicycle travel.

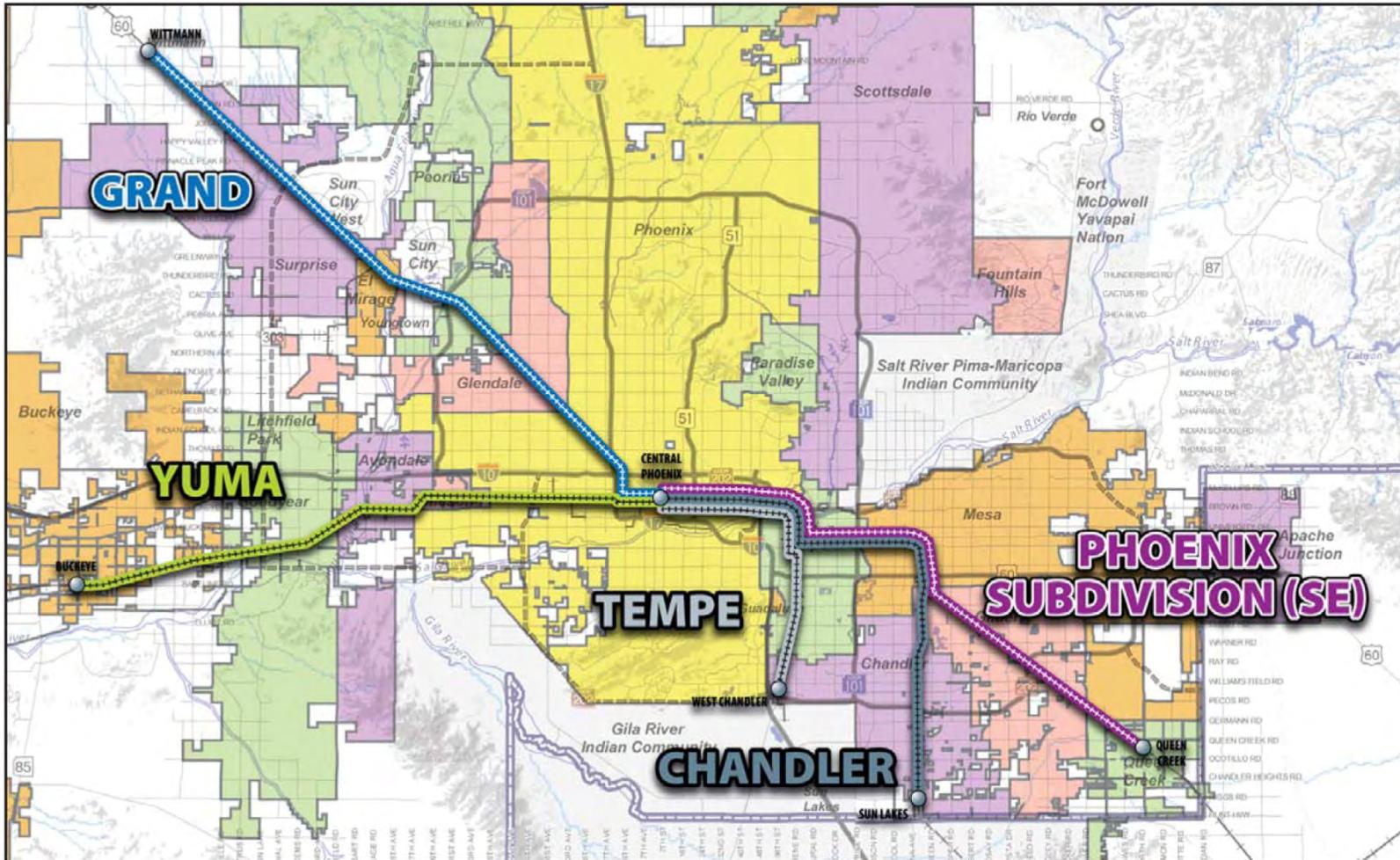
The *Regional Bikeway Master Plan* recognizes that “bicycling conditions in the MAG Region have improved dramatically in the past decade.” This is evidenced by the comprehensive incorporation of bicycle facilities into new master-planned communities and development of bicycle lanes on existing streets. Significantly, most MAG member agencies now have adopted bicycle lanes as a specific required component of standard street cross-sections. In many instances, on-street and off-street bicycle facilities are seamlessly integrated providing direct and safer linkages to schools, parks, employment centers, and shopping areas.

Nevertheless, in many already developed areas of the Valley, which characterizes the study area, bicycle travel remains challenging, even dangerous. Specifically, traffic levels, proximity to traffic, and safety aspects along arterial roadways are intimidating factors for people wanting to access community opportunities by bicycle. It is clear that many aspects of the bicycling experience must be addressed to truly make bicycling an easy and integral part of everyday life. Needs relating to the eventual improvement of bicycling for pleasure and for purpose (e.g., journey to work) range from a paved pathway with appropriate guide posts and safety features to a policy that encourages more bicycle-friendly parking regulations to programmatic actions that focus on the education of motorists concerning the legal rights and obligations of vehicular operations and bicycle riders.

The mission statement of the Plan states: “Provide an interconnected Regional system of bikeways that contributes to a vibrant, healthy, livable community.” This mission statement provides a basis for a set of five regional goals adopted to provide guidance to decisionmakers in addressing issues, concerns, and opportunities regarding bicycle travel:

- Access, including an accessible and visible bicycle system and adoption of the “complete streets” concept, which integrates all modes of travel;
- Safety/Health/Education, including safety and security during travel, reduction of barriers to healthful physical activity, and educational and enforcement programs to enhance safety and system usage;

Figure 6-9
POTENTIAL COMMUTER RAIL CORRIDORS



Source: *Commuter Rail System Study*. Final Report, Maricopa Association of Governments (MAG), May, 2010.

- Connectivity, including integration of on-street and off-street paths/trails and connections with community destinations and transit services;
- User-Friendliness, including path/trail maintenance, signage, and design aspects and amenities along the way as well as at destinations (e.g., bicycle parking/lockers, drinking water, toilets, showers); and
- Implementation, including adopting integrated transportation plans, institutionalizing bicycle-friendly policies, and ensuring adequate resources for maintenance.



The result of the MAG planning activity is a Regional Bikeway System Map that establishes five types of bicycle paths/trails throughout the MAG Region. Figure 6-10 displays the portion of the system within the study area. The figure shows that large portion of the study area is served by bicycle facilities. The area most lacking of such facilities is the southwestern portion of the study area, south and west of I-10 (Papago Fwy) and I-10 (Maricopa Fwy), respectively. Two other areas are notable for a low number of bicycle facilities. The first area is located in the triangle formed by Loop 101 (Agua Fria Fwy), US-60/Grand Avenue, and I-10 (Papago Fwy). The second area is between Loop 101 (Pima Fwy) and Bell Road between I-17 and the eastern edge of the study area. The common characteristic of all these areas is the lack of or a low level of development. The area comprised of Paradise Valley and west Scottsdale also has few bicycle facilities, but this largely is due to the very low density of development.

6.4 Pedestrians Facilities, Amenities, & Multi-Use Paths

Pedestrian Plan 2000 was developed by MAG in September, 1999. This Plan reflected the intent of MAG and member agencies to encourage development of pedestrian facilities and the integration of such facilities in the planning and design of all types of public infrastructure and private development. The MAG Design Assistance Program initiated prior to development of this Plan is the tool by which the organization implements concepts embodied in the Plan. *Pedestrian Policies and Design Guidelines*, published in April, 2005, is the primary source of information and design assistance to support walking as an alternative transportation mode. Through application of the policies and design guidance in this document, jurisdictions, neighborhoods, land planners, and other entities are able to better recognize opportunities to enhance the built environment for pedestrians.

The Guidelines aid in creating better pedestrian areas as part of new development and redeveloping pedestrian areas in developed environments. The Guidelines identify a number of features by which pedestrian facility designs can be improved to make all facilities safe and comfortable:

| | |
|--|--|
| <ul style="list-style-type: none"> • Walkway Width • Walkway Separation from Traffic • Intersections • Adjacent Roadway Width • Traffic Calming Techniques • Walkway Character | <ul style="list-style-type: none"> • Walkway Furnishings • Walkway Shade • Parking • Lighting • Signs • Bicycle and Transit Access |
|--|--|

Guidance provide in this publication is intended to make all pedestrian areas and facilities safe, comfortable, and a destination for the people who use them. Each of these purposes is described in the following subsections transcribed from the Guidelines:

- Safety: Most importantly, a transportation facility, which includes pedestrian walkways, paths, and trails, i.e., pedestrianway or pedway, must be safe and provide basic security for the user. Minimum levels of safety should be met in all circumstances, including: provision of a defined, exclusive walkway



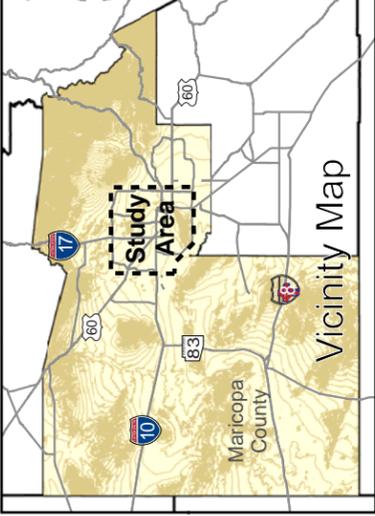
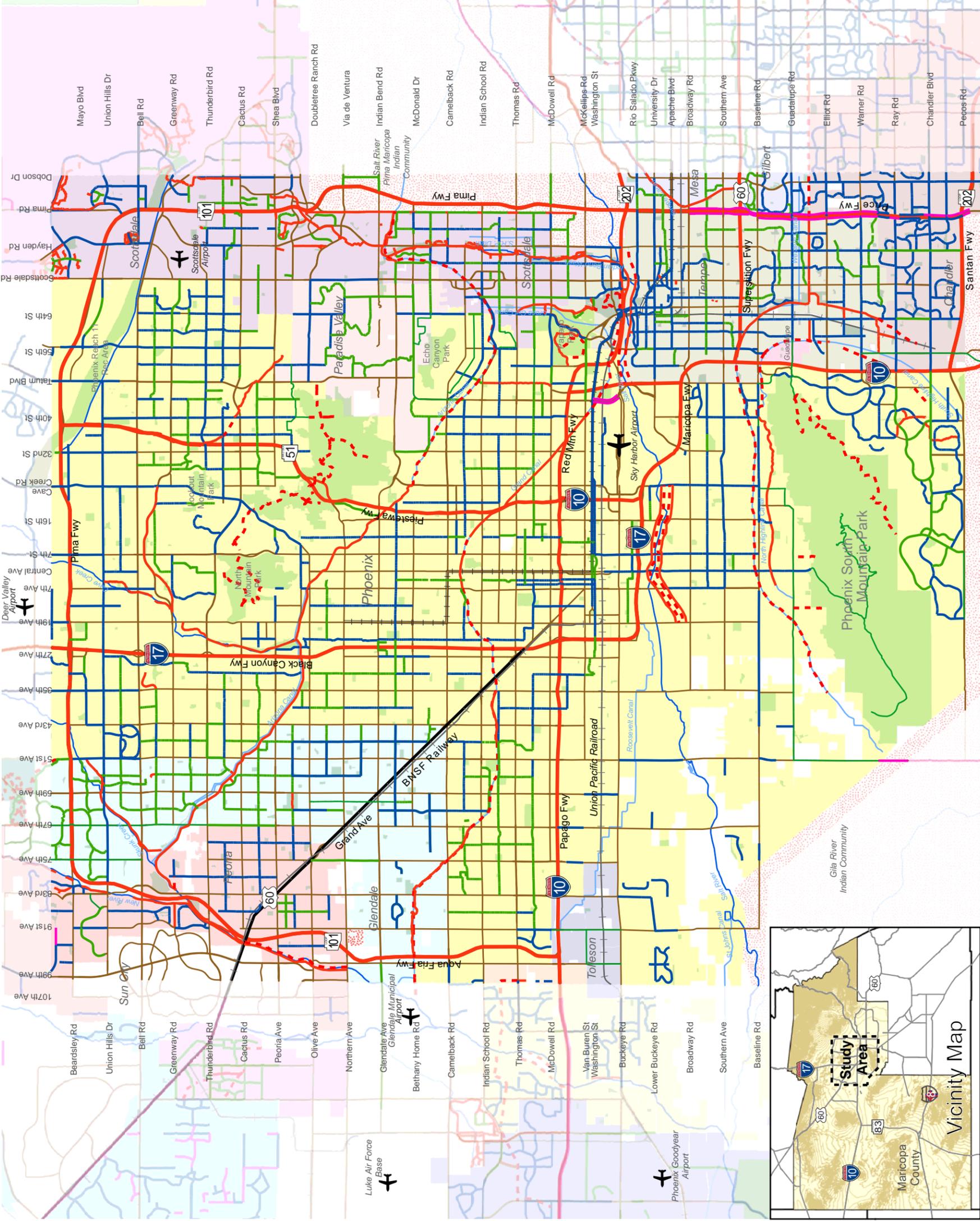
Figure 6-10
Regional Bikeway System

- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space/Preserve
 - River/Stream
 - Canal
 - Airport
 - Indian Reservation
 - Maricopa County

- Bikeway/Path Type**
- Unpaved Trail
 - Paved Multi-Use Path
 - Bike Lane
 - Bike Route
 - Paved Shoulder



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.



Source: MAG Bike Map, June 23, 2008.

for pedestrian use that is a minimum of six-feet wide; a solid, dependable and walkable surface that is clear of impediments; ramps, where needed; physical and/or horizontal separation from vehicular traffic (including bicycles); and well lighted, particularly at roadway crossings. New projects and retrofit or renovation projects must be built to satisfy American with Disabilities Accessibility Guidelines (ADAAG).

- **Comfortable:** Physical design options and amenities should be considered and incorporated, whenever space and funding resources will permit, to make a pedestrian area or pedway comfortable and encourage more walking. The following features should be evaluated: wider walkways (7 to 12 feet or more); physical and/or horizontal separation of the pedestrianway from traffic; reduction in the number of driveway crossings; provision of places to sit; the addition of traffic calming features; and, in the study area in particular, shade elements.
- **Destination:** Pedestrian areas and pedways can be made destinations through extensive use of amenities beyond those noted above. A destination is a locality, place, or site which is the end point and principal purpose of travel. Specialty paving, themed signs and site furnishings, and decorative lighting fixtures can set the stage for establishing an active street or group of streets that are a destination with various attractions, such as street vendors, musicians, food, even people-watching.

Finally, *Pedestrian Policies and Design Guidelines* recognizes and explicitly incorporates the principles of universal design. Universal design is an approach to developing facilities that maximizes ease of use by the greatest number of people. Thus, universal design emphasizes the value of creating facilities and spaces within facilities that are suitable for a person’s entire lifespan and range of abilities. Ultimately, it recognizes that all users benefit when a facility can be easily used by people with a wide range of abilities and disabilities.



6.5 Goods Movement Systems

The efficient flow of goods through and within the study area is essential for the economic well-being of the community. Performance of the goods movement system, which includes trucks and trains, has direct implications for the productivity of the community, costs of goods and services, and competitiveness of commercial enterprises. Goods movement must be integrated with land use and zoning decisions at the regional and local levels to create more effective connections between the origin and destination of goods. Restrictions relating to operating times and routes, as they may be necessary or desirable, must recognize the logistical needs of businesses and consumers, opportunities to support economic development, and compatibility of goods movements with community quality of life.

6.5.1. Trucking Operations

Facility characteristics and capacity also must be considered with respect to the need to move goods throughout the central area. Generally, this is accomplished with trucks of all sorts and sizes. The distribution of goods is heavily dependent on trucking operations. Therefore, safe and effective access by trucks to all sectors is of paramount importance to the dynamics of the community. In some cases, where there are high concentrations of loading or unloading, special truck-only facilities may be worthy of consideration. Also, added consideration could be given to accommodating truck parking, particularly for package carriers, in the central business district (CBD) during the day. Removing trucks from general traffic patterns frees capacity and improves system efficiency. The potential to reduce the admixture of trucks and automobiles, therefore, represents a significant opportunity for improving the transportation system.

Existing Truck Volumes on Study Area Roadways

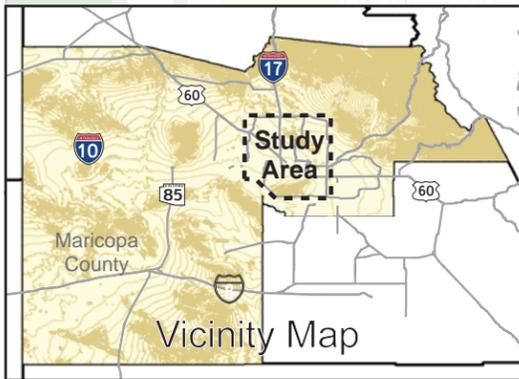
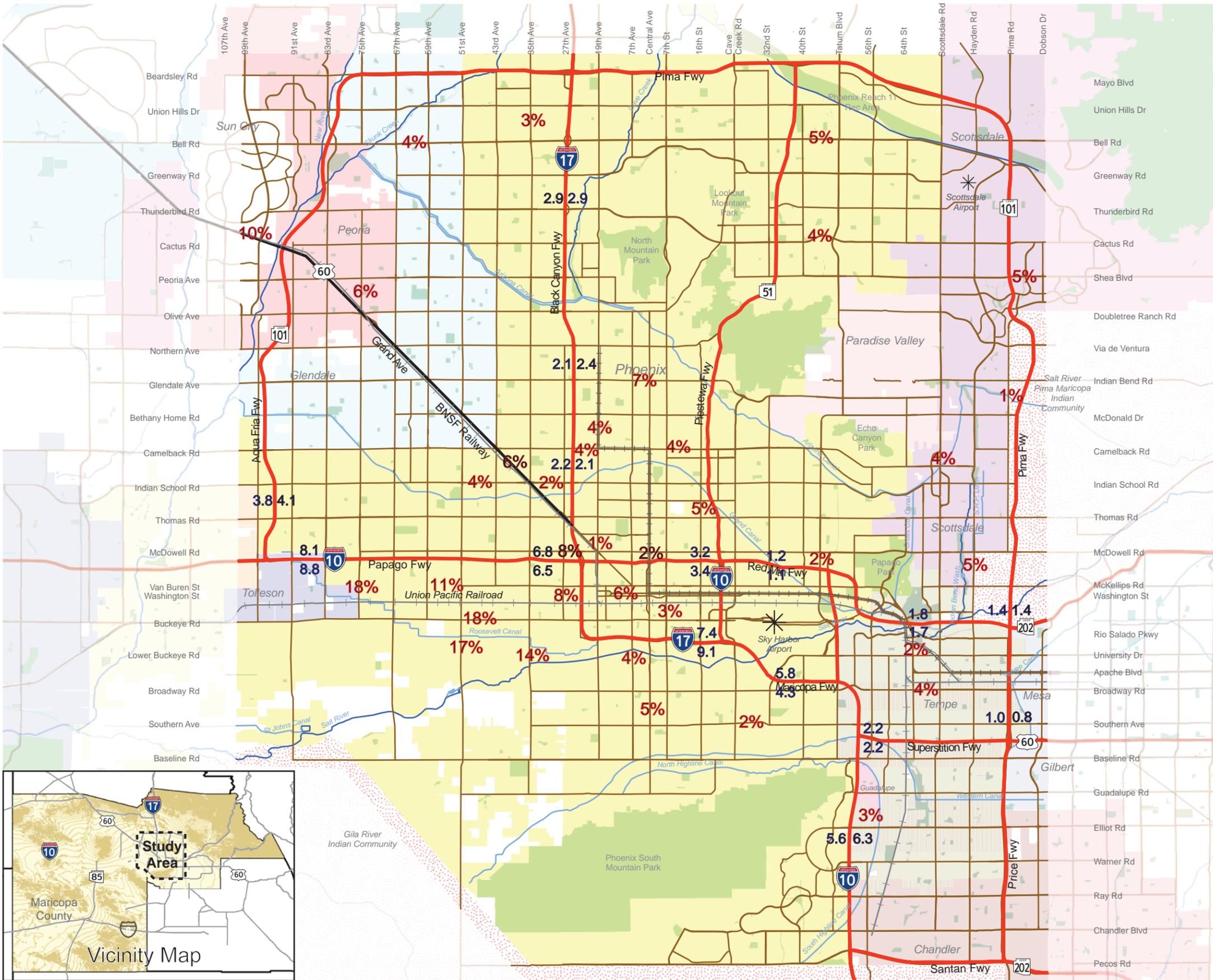
Figure 6-11 shows the share of total traffic volume on study area freeways and arterials attributed to truck traffic. This figure clearly shows the heaviest burden of truck traffic on freeways is associated with eastbound

Figure 6-11

Percent Truck Traffic: Freeways and Arterials

Legend

-  Freeway
-  Highway
-  Major Road
-  Railroad
-  Light Rail
-  Park/Open Space Preserve
-  River/Stream
-  Canal
-  Airport
- X.X** Percent Trucks - Freeways
Daily Truck Volume as a Percentage of Daily Total Volume (Both Directions)
Source: MAG 1998 Congestion Study
- X%** Percent Trucks - Arterial Streets
Weekday Medium & Heavy Truck Volume as a Percentage of Total Traffic Volume
Source: MAG 2003 Arterial Traffic Volume Survey



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Source: Identified in Legend.

movements on I-10 (Papago Fwy) west of I-17 and I-17 between I-10 (Papago Fwy) and I-10 (Maricopa Fwy). At the I-17/I-10 (Maricopa Fwy) merge, 9.1 percent of the daily total volume of traffic is truck traffic. Truck traffic on these same segments also are heavy in the westbound direction, but trucks represent a slightly less share of total traffic volume. Truck traffic on I-10 (Maricopa Fwy) is notably lighter (4 to 6%), indicating that a significantly larger number of activities relying on trucking and trucking operations are located in the western portion of the study area.

Figure 6-11 also shows the percentage of medium and heavy trucks operating on arterials during the weekday. These values support the conclusion that activities relying on trucking and trucking operations are located in the western portion of the study area with a corridor essentially defined by I-10 (Papago Fwy) and the Union Pacific Railroad (UPRR) Yuma West Line. Truck traffic accounts for 18 percent of the total daily traffic volume on 75th Avenue south of I-10 (Papago Fwy) and on Buckeye Road east of 51st Avenue. Eight percent of total weekday traffic on McDowell Road west of I-17 and on 27th Avenue north of the UPRR line is truck traffic. Except for US-60/Grand Avenue west of Loop 101 (Agua Fria Fwy), which has a 10 percent share of trucks to total traffic, traffic levels on the remainder of study area arterials include six percent or less trucks.



Major Trucking/Warehouse Facilities

Information on the major trucking/warehouse facilities presented herein is based on findings from the 2004 MAG *Regional Freight Assessment* (MAG, 2004). The results of this assessment indicate there are approximately 40 freight terminals and warehouse facilities in the study area. Several are located along the Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UPRR) lines and near Sky Harbor International Airport. The majority of these facilities are in the City of Phoenix and the City of Tempe. Approximately 74 percent of all trucking terminal operations located in the MAG Region are located in the City of Phoenix.

Freight terminals facilitate the handling and transferring of freight by trucks and freight carrying vehicles (e.g., piggyback and flat cars used by railroads). They also may incorporate staff and facilities for vehicle maintenance services. Warehouse facilities serve as a transfer point, where products are received, processed, and then distributed to customers. There are approximately 10 intermodal facilities in the study area. Intermodal facilities transfer goods from one mode to another (e.g., rail-to-truck). The majority of intermodal movements of freight within the MAG region and the study area consist of a combination of rail and truck.

6.5.2. Rail Freight Facilities

Two railroads operate rail freight services within the study area: the BNSF and the UPRR. The BNSF operates over approximately 15 miles of track within the study area; approximately 13.5 miles of trackage parallels US-60/Grand Avenue between Loop 101 (Agua Fria Fwy) and McDowell Road. The line turns south at McDowell Road, following 19th Avenue to the UPRR line located between Jackson and Buchanan Streets. The segment of the UPRR primary line within the study area – the Yuma West line – extends from 99th Avenue in Tolleson to Loop 101 (Price Fwy) in east Tempe. It follows a route south of and parallel to Washington Street to the Salt River, where it crosses, heading south through Tempe to 13th Street, where it turns to the east to follow a route one-half mile south of Apache Boulevard out of the study area. The railroad also operates a Tempe Branch, which extends south from the Yuma West Line at 13th Street, exiting the study area at 56th Street and Loop 202 (Santan Fwy).

Demand for rail freight transportation has been rising steadily and rail traffic is expected to increase dramatically in the foreseeable future. The UPRR and the BNSF, which serve the study area, were engaged in facility and service expansions immediately prior to the current recession. Delays to railroad operations represent an economic cost and a social welfare cost, as “time is money” and idling vehicles express more pollutants than those operating at an efficient operating speed. Regarding pollution, locations where frequent idling occurs may create higher concentration of pollutants affecting the nearby population. Therefore,

expansion plans and improvements in operating efficiency need to be integrated with other modal improvements. In some cases, it may be advisable to grade separate a roadway from rail freight activity to permit through operations. Grade separation, however, will be difficult and expensive to accomplish in the built environment of the study area. Therefore, other avenues for reducing impacts of rail freight operations need to be investigated.



6.6 Key Public Safety Issues and Concerns

6.6.1. Traffic Incident Management

Traffic Incident Management (TIM) is a planned and coordinated process involving multiple public agencies and private sector partners to detect, respond to, and remove interruptions to traffic flow and restore traffic capacity as safely and quickly as possible. The process requires integrated interagency communications, on-scene traffic incident management operations teams, and regional and statewide programs and institutional protocols to expedite coordination and expeditious activation of necessary resources. Thus, traffic incident management involves extensive planning and coordination among the following entities:

- Law Enforcement Agencies
- Fire and Rescue Organizations
- Emergency Medical Services
- Transportation Agencies
- Public Safety Communications Services
- Emergency Management Agencies
- Towing and Recovery Organizations
- Hazardous Materials Contractors
- Traffic Information Media.

Effective management of incidents occurring on freeways and key arterial facilities is a key element to providing transportation system reliability. ADOT and the Arizona Department of Public Safety (DPS) along with other transportation partners and stakeholders developed and adopted a *Statewide Incident Management Plan* in 2000 (2000 Plan). Implementation of this plan has led to significant improvements in management of incidents. Incident Management has grown in national importance with the formation of the National Traffic Incident Management Coalition (NTIMC), which is an assembly of organizations representing the public safety, transportation, and towing and recovery communities. The NTIMC has been effective in developing recommended practices for integrated communications, improved responder safety, and quick clearance of incident components. These state-of-the-art techniques will be reviewed and compared to the 2000 Plan and other local practices to identify opportunities for improvement.

6.6.2. Highway Safety

The Safe, Accountable, Flexible, Efficient Transportation Equity Act, A Legacy for Users (SAFETEA-LU), 23 U.S.C. § 148, established the Highway Safety Improvement Program (HSIP) as a core federal program. This program is specifically focused on achieving a significant reduction in traffic fatalities and serious injuries on all public roads. Starting in FY 2006, states with Strategic Highway Safety Plans (SHSP) that meet the requirements of 23 USC 148 may obligate HSIP funds for all eligible purposes. The SHSP is developed by the State DOT in a cooperative process with local, state, Federal, and private sector safety stakeholders. An SHSP

is a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads. According to the FHWA Web site:

The SHSP is a data-driven, four to five year comprehensive plan that establishes statewide goals, objectives, and key emphasis areas and integrates the four E's - engineering, education, enforcement and emergency medical services (EMS). The purpose of an SHSP is to identify the State's key safety needs and guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads. The SHSP allows all highway safety programs in the State to work together in an effort to align and leverage its resources. It also positions the State and its safety partners to collectively address the State's safety challenges on all public roads.

The Federal Highway Administration (FHWA) division offices located in each state manages program implementation, review states' annual highway improvement program reports, and provides oversight of program funding. Funds may be used for projects on any public road or publicly-owned bicycle and pedestrian pathway or trail. Each State must have an SHSP to be eligible to use up to 10 percent of its HSIP funds for other safety projects under 23 USC (including education, enforcement and emergency medical services). It must also certify that it has met its railway-highway crossing and infrastructure safety needs. The Arizona SHSP was published in August, 2007, as a derivative of an earlier Arizona Transportation Safety Plan prepared by the Governor's Traffic Safety Advisory Council (GTSAC).

At the local level, the MAG Transportation Safety Committee (TSC), which has responsibilities relating to the study area, consists of representatives from FHWA, Arizona Governor's Office of Highway Safety, ADOT, Arizona Department of Public Safety, AAA Arizona, American Association of Retired Persons (AARP), RPTA, ASU, and 17 local agencies. This group provides oversight of the MAG Transportation Safety Planning Program. The primary goal of MAG's Transportation Safety Planning Program is to help identify both current and potential future transportation safety issues, concerns, and needs in the region, and determine ways to address them through the regional transportation planning process. A Strategic Transportation Safety Plan was published October, 2005. Some of the safety priorities identified in the MAG Strategic Transportation Safety Plan are: developing a road safety information management system; promoting road safety audits; improving roads for older road users; achieving better public awareness of road safety issues; reducing red light running; reducing bicycle and pedestrian crashes; and improving safety in access routes to schools.



7.0 Efficiency and Effectiveness of Existing Multi-Modal Transportation System

Measuring the efficiency and effectiveness of an existing multi-modal transportation system is challenging. Efficiency measures the utilization of a product or resource, it is the degree to which something is done well without wasted expense or energy. Effectiveness, on the other hand, measures the ability of the product or resource to accomplish a desired purpose or goal. Thus, to evaluate multi-modal transportation systems, general parameters referred to as level of service (LOS) indicators have been identified that reflect the speed, convenience, comfort, safety, security, and other factors associated with transportation facilities and services as experienced by users. Information in this chapter has been compiled to provide a basic understanding of the operating characteristics of the existing multi-modal transportation system in these terms.

7.1 Evaluation of Transportation System Performance

There are broad factors of performance that provide a reasonable estimate and understanding of the efficiency and effectiveness of a multi-modal transportation system. For instance, accessibility or mobility measures the degree to which the system provides opportunities for area residents and visitors to reach desired destinations, such as the workplace, shopping, or an entertainment venue. VMT and vehicle hours of travel (VHT) provide an understanding of the amount of time involved in reaching destinations and can be used to measure the degree to which the transportation system is being utilized. From another perspective, congestion reflects full utilization, even overuse, of a system and measures that compare system capacity to system use have been devised to evaluate this condition. This section provides foundational information associated with evaluating the existing multi-modal transportation system serving the study area and presents potential evaluation criteria that may be applied to understand its strengths and weaknesses as well as assess the potential contribution of possible improvements.

7.1.1. Methodology

Generally accepted level of service standards have been developed for various modes by three different organizations. The Florida Department of Transportation (FDOT) published the *Quality/Level of Service Handbook* in 2002. This publication provides the most comprehensive information on multi-modal LOS standards and is widely use by transportation planners and engineers. The Transportation Research Board (TRB) published in 2000 a *Highway Capacity Manual* (HCM 2000), which provides planners and engineers with guidance for designing roadway facilities based on expected traffic volumes. HCM 2000 also includes LOS ratings for walking and cycling. A third publication, *Transit Capacity and Quality of Service Manual*, 2nd Edition, contains background, statistics, and graphics on the various types of public transportation and provides a framework for measuring transit availability and quality of service from the passenger point of view. This publication was produced in 2003 under the auspices of the Transit Cooperative Research Program with support from the Federal Transit Administration (FTA) and distributed through the TRB.

7.1.2. Evaluation Criteria

Transportation planning in many communities tends to evaluate transportation system performance or level of service largely from the viewpoint of motor vehicle traffic: speed of travel and delay are two very important measures. Thus, LOS ratings for other modes often are ignored. This tends to favor highway/roadway expansion over other types of transportation improvements, contributing to the automobile dependency of most sprawling urban areas.

Multi-modal LOS indicators have been developed and are useful in guiding planning decisions, which aids in giving credence to modes that may be more efficient or more effective and frames issues of prioritization with



greater understanding of the interaction and nuances of each mode.⁶ The use of LOS ratings for other modes supports a reversal of priorities from the allocation of resources to increase automobile traffic volume and speed to other modes that could offer better use of space, energy, and other community resources. Thus, emphasis is given to integrating modes and expanding modal options to satisfy travel demand with greater flexibility and connectivity. Specifically, evaluation criteria are associated with:

- Pedestrians
- Bicycles
- Public Transportation (Bus, LRT, Shuttles)
- Service and Freight Vehicles (Trucks, Trains)
- Taxis (and other forms of passenger movement, such as Jitneys, Pedicabs)
- Multiple-Occupancy Vehicles
- Single-Occupancy Vehicles (SOVs).

Developing a set of multi-modal level of service standards or evaluation criteria generally will follow the steps outlined below:

- Define quantifiable indicators: This involves identifying a reasonable set of indicators, suitable for quantification, that reflect various types of user impacts, such as speed, convenience, comfort and safety;
- Determine quantification methods: This is usually done by experts, based on surveys to help determine user needs and preferences. For example, speed may be measured in average kilometers-per-hour, crowding in people per square meter, and security in assaults per million passenger trips.
- Collect Data. This may involve using existing data (such as vehicle traffic speeds), collecting new data (such as transit station crowding), or special user surveys to rate the quality of certain facilities and services.
- Integrate Results into an Index: Individual indicators can be combined into an index. For example, several indicators reflecting various impacts (speed, convenience, comfort, etc.) can be averaged and converted from a numerical value into a letter grade. Some indicators may be considered more important than others and so should receive more weight.
- Incorporate Results into the Planning Process: Use Level-of-Service indicators to identify problems, evaluate potential improvements, compare different systems and jurisdictions, and track trends.

The development and use of multi-modal level-of-service indicators is consistent with current trends toward more comprehensive and balanced transportation planning that considers diverse modes and impacts. Such indicators can help respond to users' preferences and expand the range of solutions that can be considered in transport planning.



⁶ This discussion relies on extensive use of the Online Transportation Demand Management Encyclopedia (also referred to as Mobility Management), which has been created and is maintained by the Victoria Transport Policy Institute to “help improve understanding of TDM.”

7.2 Current Areas of Significant Congestion

Growth and development in the region have led to increasing traffic volumes and congestion on the existing freeway and arterial roadway network, particularly in the study area – the central portion of the region. This section provides information about existing travel delays on freeways, HOV lanes, and arterial roads within the study area. Existing bottlenecks were identified utilizing available data and findings from various recently completed studies, including the *2007 MAG Regional Travel Time and Speed Study* (Jacobs Carter Burgess, 2007), the *2009 MAG Performance Measurement Framework and Congestion Management Update Study: Phase II – Performance Measures Report* (PBS&J, 2009), and the *Measuring MAG Regional Traffic Mobility 2007* draft report (MAG, 2007). This section also identifies improvements that have been implemented since these studies were completed, such as the completion of the METRO Light Rail in late 2008, which were undertaken to improve mobility and congestion in the study area.



7.2.1. Freeway Segments

The existing freeway system in the study area includes: I-10, I-17, Loop 101, Loop 202, US-60, SR-51, and SR-143. Operations data were compiled from the studies mentioned above to assess the existing congestion in the study area. The data include: volumes, speeds, travel time, and loss of productivity for the general purpose (i.e., through) lanes and HOV lanes on these freeways. No new data was collected for this study.

Existing Traffic Volumes

The *Performance Measures Report* (PBS&J, 2009) contains special graphics depicting the state of freeway operations in the core portion of the study area (Figure 7-1). Available 2007 data indicate annual average daily traffic (AADT) volumes on the general purpose lanes of I-10 (Papago and Maricopa Fwys) exceed 75,000 vehicles per day (vpd) in both directions, except for the westbound segment of the Maricopa Freeway between Chandler Boulevard and US-60 (Superstition Fwy). Volumes exceeding 75,000 vpd also are present on southbound Loop 101 (Price Fwy) southbound between Loop 202 (Red Mountain Fwy) and Guadalupe Road and in both directions on US-60 (Superstition Fwy) east of Loop 101 (Price Fwy).

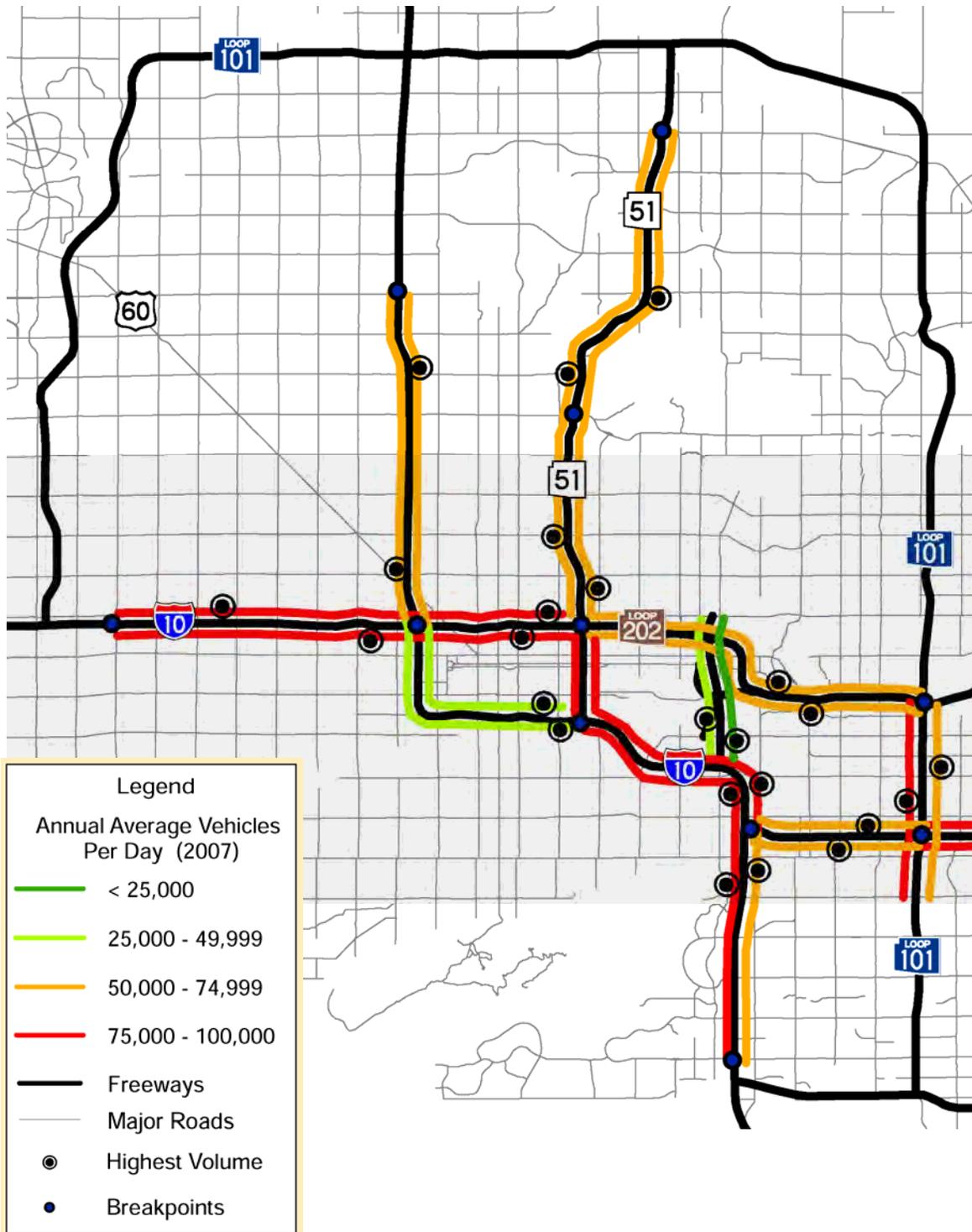
AADT volumes between 50,000 and 75,000 vpd in both directions are present on: I-17 (north of I-10); SR-51; Loop 202 (Red Mountain Fwy) between SR-51 and Loop 101; and US-60 (Superstition Fwy) between I-10 (Maricopa Fwy) and Loop 101 (Price Fwy). This same level of traffic is present on Loop 101 (Price Fwy) northbound between Guadalupe Road and Loop 202 (Red Mountain Fwy). AADT volumes of less than 50,000 vpd in both directions are reported for I-17 (south of I-10) and SR-143.

Figure 7-2 shows the operating conditions of the freeway HOV lanes in the study area’s core. AADT volumes on the eastbound HOV lane of I-10 from the I-10/I-17 “Stack” to US-60 exceeds 17,000 vpd, and the westbound HOV lane in this same segment carries between 13,000 and 17,000 vpd. The HOV lanes west of I-17 on I-10 (Papago Fwy) are operating at the same level – 13,000 and 17,000 vpd. AADT volumes on the eastbound HOV lane on Loop 202, both HOV lanes on I-17, US-60 (Superstition Fwy), and I-10 (Maricopa Fwy) south of US-60 are between 10,000 and 13,000 vpd. HOV lanes on SR-51 and the westbound HOV lane on Loop 202 (Red Mountain Fwy) were recorded as having AADT volumes less than 10,000 vpd.

Based on a comparison of 2006 and 2007 data, traffic volumes typically increased on the general purpose lanes of all seven freeways within the study area, except on I-17, US-60 (Superstition Fwy) and portions of I-10 and SR-143. Segments of I-10 and SR-143 where the volumes decreased are noted below:

- I-10 (Papago Fwy) eastbound from 81st Avenue to I-17
- I-10 (Papago Fwy) westbound from SR-51 to I-17

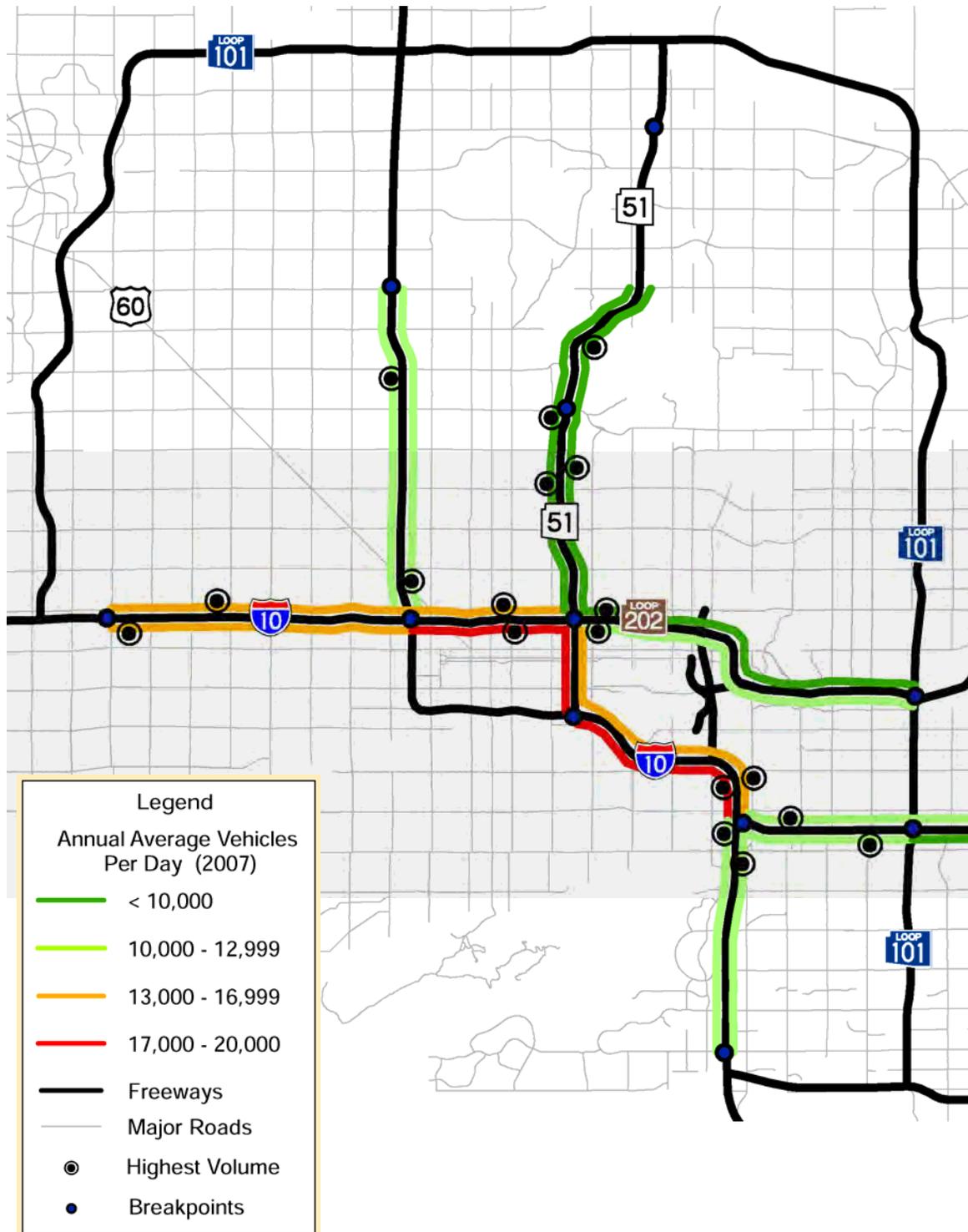
Figure 7-1
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES: FREEWAY GENERAL PURPOSE LANES



Source: Figure 2.4, Performance Measures Study, MAG, PBS&J, 2009.



Figure 7-2
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES: FREEWAY HIGH-OCCUPANCY VEHICLE LANES



Source: Figure 2.5, Performance Measures Study, MAG. PBS&J, 2009.



- I-10 (Maricopa Fwy) eastbound from US-60 (Superstition Fwy) to Chandler Blvd
- I-10 (Maricopa Fwy) westbound from Chandler Blvd to SR-51
- SR-143 northbound from I-10 (Maricopa Fwy) to Loop 202 (Red Mountain Fwy).

The comparison of 2006 and 2007 data indicates AADT volumes on HOV lanes also increased, except on US-60 (Superstition Fwy) and portions of I-10, I-17, and SR-51. Segments of I-10, I-17, and SR-51 where the volumes decreased are noted below:

- I-10 (Papago Fwy) westbound from SR-51 to I-17
- I-10 (Maricopa Fwy) eastbound from US-60 (Superstition Fwy) to Chandler Blvd
- I-17 northbound from I-10 (Papago Fwy) to Peoria Avenue
- SR-51 northbound from I-10 (Papago Fwy)/Loop 202 (Red Mountain Fwy) to Glendale Avenue.

Congestion on General Purpose Lanes

Posted speeds on study area freeways range from 55 to 65 mph. The 2007 Study defines congestion on the freeway system as occurring when speeds drop below 45 mph. Based on 2007 data, congestion occurring on general purpose lanes during the AM peak period (6:30 to 8:30) primarily is associated with traffic inbound to the central portion of the study area. However, there are segments on Loop 101 where traffic flow may have an orientation to locations on the periphery of the study area (e.g., Scottsdale Air Park). Figure 7-3 shows the principal areas of congestion during the AM peak period, as identified by data developed during the 2007 *LAG Regional Travel Time and Speed Study*.

Conditions of congestion are more widespread during the PM peak period (4:00 to 6:00) and especially severe on the I-10 portion of the Inner Loop. Figure 7-4 shows the principal areas of congestion during the PM peak period, as identified by data developed during the 2007 *LAG Regional Travel Time and Speed Study*. It is interesting to note from observations reported on Figures 7-3 and 7-4 that there was no congestion evident on Loop 101 (Agua Fria Fwy) in 2007 between I-10 and Union Hills Drive.

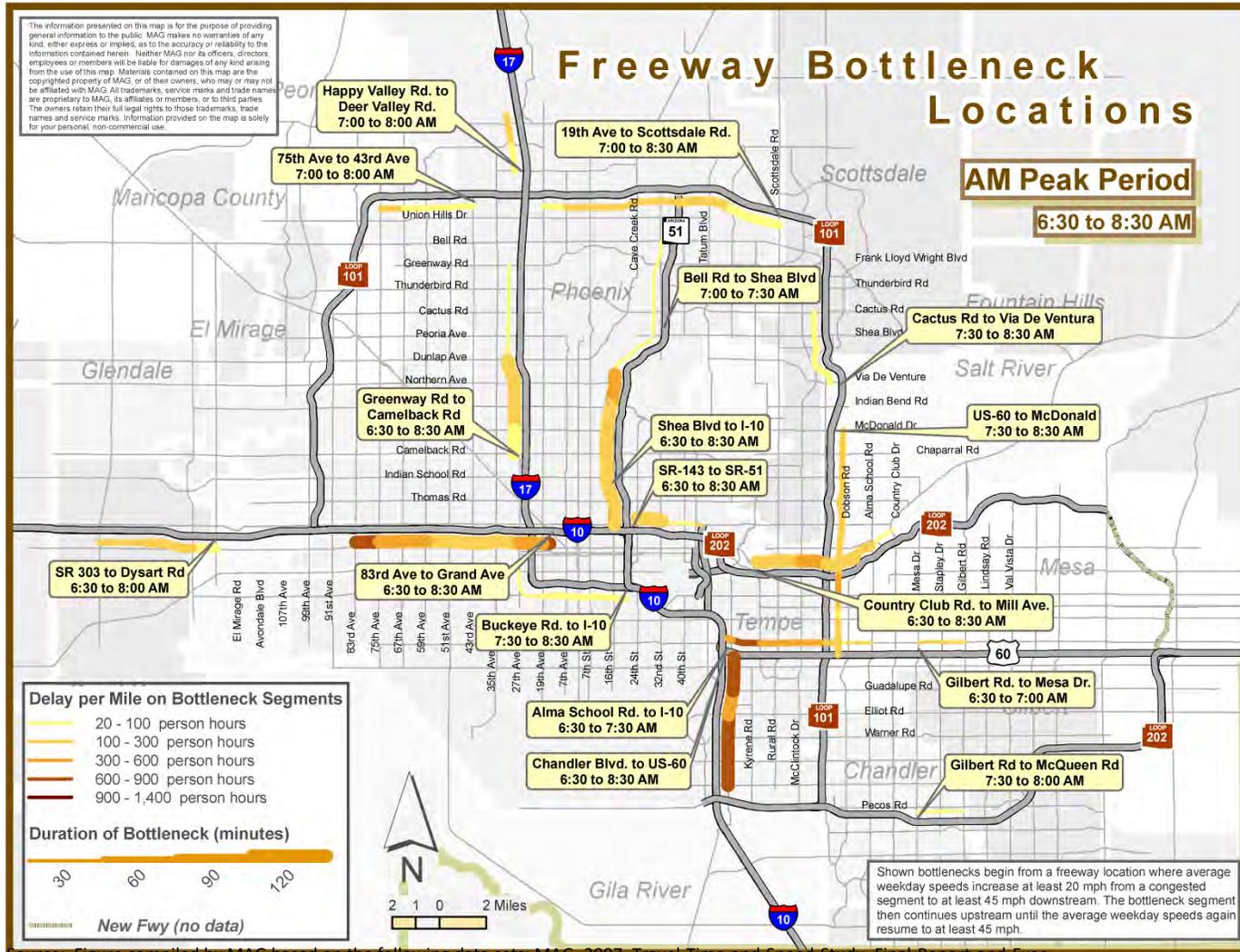
Congestion on HOV lanes

The 2007 Study defines congestion on HOV lanes as occurring when average speeds drop below 50 mph. The region’s HOV system exhibits congestion on I-10 with respect to inbound traffic in the AM peak period and outbound traffic in the PM peak period. Segments of the Loop 202 (Red Mountain Fwy) HOV lanes are congested in the PM peak period. A summary of findings regarding HOV lane congestion is presented below:

- HOV lane segments congested during the AM peak period include:
 - I-10 (Papago Fwy) eastbound from 83rd Avenue to 7th Avenue
 - I-10 (Maricopa Fwy) westbound from Ray Road to US-60, and
 - US-60 (Superstition Fwy) westbound from Loop 101 (Price Fwy) to I-10 (Maricopa Fwy).
- HOV lane segments congested during the PM peak period include:
 - I-10 (Papago/Maricopa Fwy) eastbound from Buckeye Road to US-60 (Superstition Fwy), and
 - Loop 202 (Red Mountain Fwy) eastbound from SR-143 to Loop 101 (Pima/Price Fwys).
 - I-10 (Papago Fwy) westbound from Buckeye Road to 43rd Avenue.



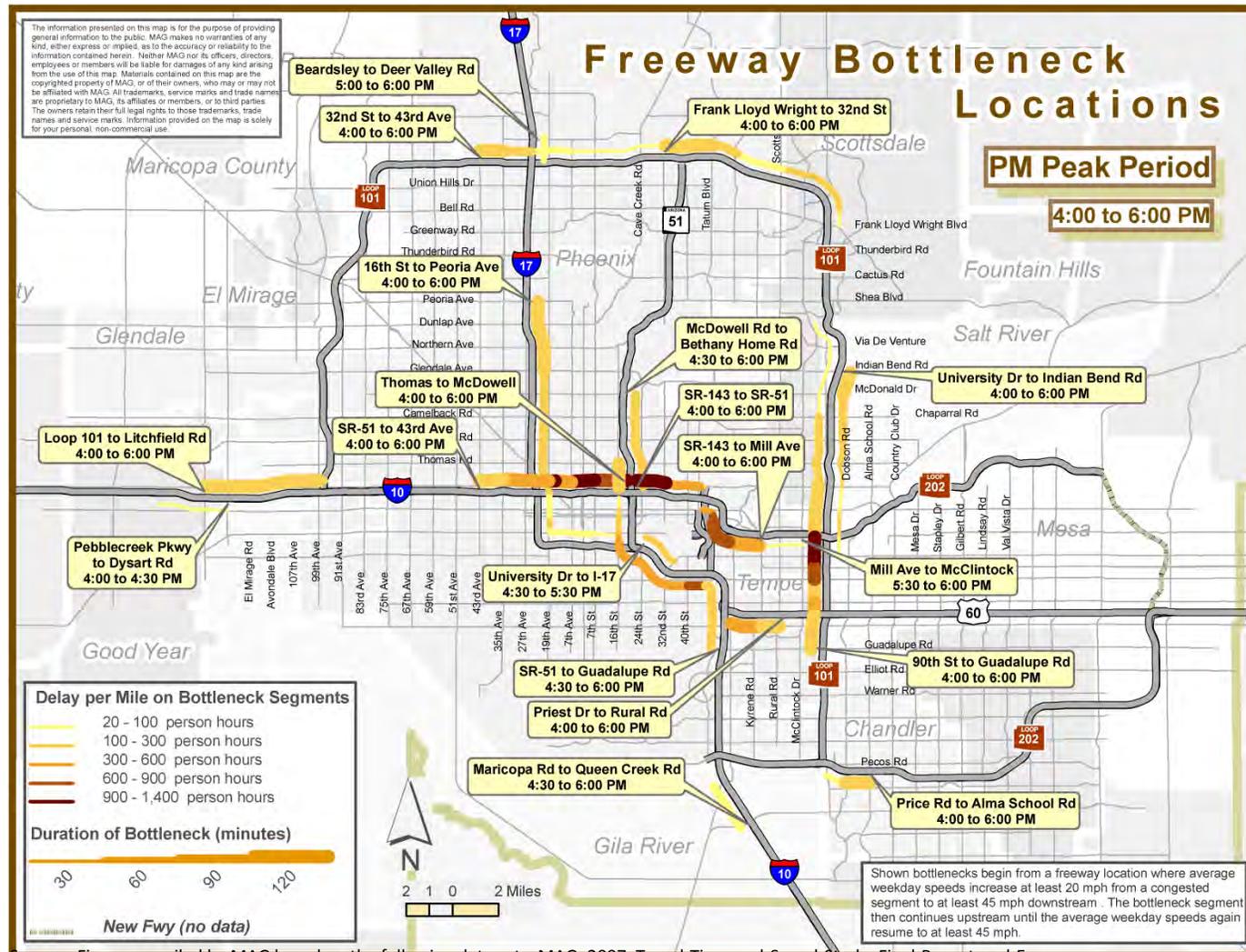
Figure 7-3
CRITICAL BOTTLENECK LOCATIONS: AM PEAK PERIOD



Source: Figure compiled by MAG based on the following data sets: MAG_2007_Travel-Time-and-Speed-Study_Final-Report-and-Exec-Summ80658.pdf; MAG_2007_Travel-Time-and-Speed-Study_Appendix-A57981.pdf; and MAG_2007_Travel-Time-and-Speed-Study_Appendix-B_Data-Directory15972.pdf.



Figure 7-4
CRITICAL BOTTLENECK LOCATIONS: PM PEAK PERIOD



Source: Figure compiled by MAG based on the following data sets: MAG_2007_Travel-Time-and-Speed-Study_Final-Report-and-Exec-Summ80658.pdf; MAG_2007_Travel-Time-and-Speed-Study_Appendix-A57981.pdf; and MAG_2007_Travel-Time-and-Speed-Study_Appendix-B_Data-Directory15972.pdf.



Speed trends on the HOV lanes are very similar to the general purpose lanes, with slightly higher speeds on the HOV lanes during the peak periods. However, on the segment of I-10 (Papago Fwy) between 83rd Avenue and SR-51, speeds in the HOV lanes are comparable to the general purpose lanes, indicating saturation of the roadway's capacity. Travel time benefits gained through use of HOV lanes are higher during the AM peak period, because there is greater congestion and, therefore, delay during the PM peak period.



Freeway Performance

A performance assessment of the MAG region's surface transportation system was completed September, 2009. The framework for this assessment was developed to illustrate the most important characteristics associated with operation of the surface transportation system. Point-to-point travel times were examined to gain an understanding of the support the system provides to typical commuting trips. Table 7.1 provides information about seven routes selected as representative of commute trips in the MAG region, and Figure 7.5 shows the general location of each commute route. All except the trip from central Mesa fully occur within the CPHX study area.

Table 7.1
AVERAGE TRAVEL TIMES FOR TYPICAL COMMUTES

| Corridor ID | Selected Commute Route | | Direction of Travel | Time Period | Average Travel Time (Minutes) | Approximate Distance (Miles) |
|-------------|--|---|--------------------------|-------------|-------------------------------|------------------------------|
| | From | To | | | | |
| O-D1 | I-10 (Papago Fwy) at 83 rd Ave | Loop 101 (Pima Fwy) via Loop 202 (Red Mountain Fwy) | Eastbound | Midday | 22 | 21 |
| O-D2 | US-60 at Val Vista Dr | SR-143 at Sky Harbor Blvd | Westbound/ Northbound | AM Peak | 22 | 16 |
| O-D3 | Loop 101 (Price Fwy) at US-60 (Superstition Fwy) | I-10 (Papago Fwy) at 7 th St | Westbound/ Northbound | PM Peak | 19 | 14 |
| O-D4 | Loop 101 at Guadalupe Rd | I-17 at Dunlap Ave | Westbound/ Northbound | AM Peak | 32 | 25 |
| O-D5 | I-17 at 19 th Ave | I-10 (Maricopa Fwy) at Elliot Rd | Eastbound | PM Peak | 23 | 11 |
| O-D6 | I-10 (Maricopa Fwy) at Warner Rd | SR-143 at University Dr | Northbound | AM Peak | 12 | 7 |
| O-D7 | I-10 (Papago Fwy) at 83 rd Ave | SR-51 at Bell Road | Eastbound/ Northbound | PM Peak | 25 | 25 |

Prepared by Wilson & Company, October, 2010.

Source Table 2.8, Average Travel Time Results for Typical Commutes, Phase II - Performance Measures Report, *Performance Measurement Framework and Congestion Management Update Study*, Maricopa Association of Governments, September, 2009. Approximate distance determined by Wilson & Company; other modifications made for the sake of clarity.

Completed and Underway Freeway Improvement Projects

Major improvement projects have been completed or are underway to relieve congestion on study area freeway facilities, since the studies referenced above were conducted. Table 7.2 provides a summary of specific improvement projects relative to the areas of congestion referenced in Figures 7-3 and 7-4. Improvement project information was derived from the "Valley Freeways" Web site maintained by ADOT and reflects current (2010) conditions.

In addition to the improvement projects on area freeways, work has been initiated to widen US-60/Grand Avenue, a significant regional highway serving the northwestern portion of the study area. US-60/Grand

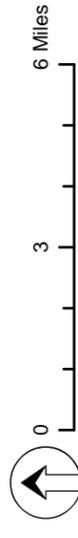
Figure 7-5
Average Travel Times
for Typical Commutes



- Legend**
- Freeway
 - Highway
 - Major Road
 - Railroad
 - Light Rail
 - Park/Open Space/Preserve
 - River/Stream
 - Canal
 - Airport
 - City Boundary
 - Indian Reservation
 - Maricopa County

Origin to Destination Travel Times (2007)

- Commute Route**
- Origin
 - Destination
- Times by Route**
- O-D 1 (22 minutes)
 - O-D 2 (22 minutes)
 - O-D 3 (19 minutes)
 - O-D 4 (32 minutes)
 - O-D 5 (23 minutes)
 - O-D 6 (12 minutes)
 - O-D 7 (25 minutes)



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: Performance Measures Study, MAG, Derived from ADOT Freeway Management System Archived Data for Years 2006 and 2007.

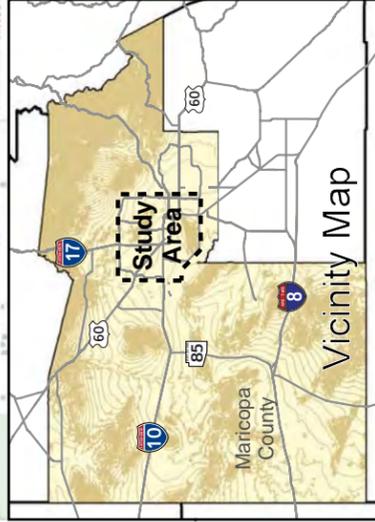
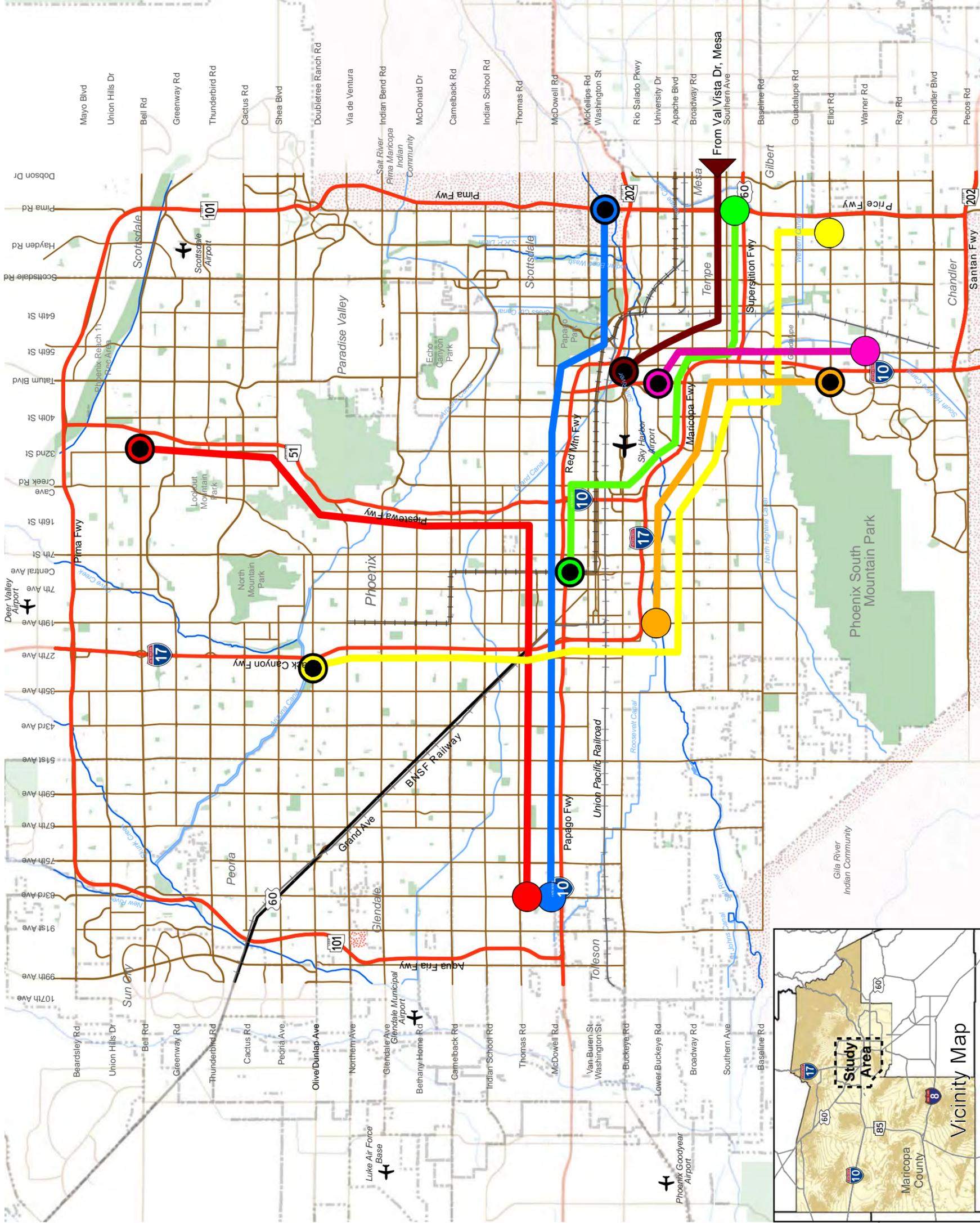


Table 7.2
CONGESTED FREEWAY SEGMENTS RELATIVE TO COMPLETED AND UNDERWAY IMPROVEMENT PROJECTS

| Facility | Congested Segment | Time Period | Direction of Travel | Completed and Underway Improvements (2010) |
|---|---|-------------|---------------------|--|
| I-10 General Purpose Lanes | | | | <ul style="list-style-type: none"> An auxiliary ramp for US-60 (Superstition Fwy) westbound traffic to I-10 (Maricopa Fwy) westbound was opened to traffic August, 2008. Two general purpose lanes added in each direction in the median of I-10 (Papago Fwy) between Loop 101 (Agua Fria Fwy) and Sarival Avenue – completed in early 2010. |
| Papago Fwy | 83 rd Ave to US-60/Grand Ave | AM | Eastbound | |
| Papago Fwy to Maricopa Fwy | SR-51 to Guadalupe Rd | PM | Eastbound | |
| Maricopa Fwy to Papago Fwy | University Dr to I-17 Split | PM | Westbound | |
| Papago Fwy | SR-51 to 43 rd Ave | PM | Westbound | |
| Maricopa Fwy | Chandler Blvd to US-60 (Superstition Fwy) | AM | Westbound | |
| I-10 HOV Lanes | | | | <ul style="list-style-type: none"> One HOV lane added in the median of I-10 (Papago Fwy) between Loop 101 (Agua Fria Fwy) and Sarival Avenue – completed in early 2010. |
| Papago Fwy | 83 rd Ave to 7th Ave | AM | Eastbound | |
| Papago Fwy to Maricopa Fwy | Buckeye Road to US-60 (Superstition Fwy) | PM | Eastbound | |
| Maricopa Fwy | Ray Rd to US-60 (Superstition Fwy) | AM | Westbound | |
| Papago Fwy | Buckeye Rd to 43rd Ave | PM | Westbound | |
| I-17 (Black Canyon Fwy) General Purpose Lanes | | | | <ul style="list-style-type: none"> One general purpose lane and one HOV lane added in each direction between Loop 101 (Agua Fria/Pima Fwys) and SR-74/Carefree Hwy – completed in late 2009. (Although this improvement is outside the study area, it directly affects traffic flow into and out of the study area.) |
| | Greenway Rd to Camelback Rd | AM | Southbound | |
| | Buckeye Rd to I-10 (Papago/Maricopa Fwys) | AM | Southbound | |
| | 16 th St to Peoria Ave | PM | Northbound | |
| US-60 (Superstition Fwy) General Purpose Lanes | | | | <ul style="list-style-type: none"> An auxiliary ramp to carry US-60 westbound traffic to I-10 westbound was opened August, 2008. One general purpose lane added in each direction along US-60 between I-10 (Maricopa Fwy) and Loop 101 (Price Fwy) – completed in May 2010. |
| | Alma School Rd to I-10 (Maricopa Fwy) | AM | Westbound | |
| | Priest Dr to Rural Rd | PM | Eastbound | |
| US-60 (Superstition Fwy) HOV Lanes | | | | <ul style="list-style-type: none"> One HOV lane added in each direction between Val Vista Drive and Power Road – completed in June 2007. |
| | Loop 101 (Price Fwy) to I-10 (Maricopa Fwy) | AM | Westbound | |
| Loop 202 (Red Mountain Fwy) | | | | <ul style="list-style-type: none"> Overpass structures at Washington Avenue and Mill Avenue widened – completed in early 2009. One general purpose lane added in the eastbound direction between SR-51 and Scottsdale Rd - completed in 2010. Two general purpose lanes added from Scottsdale Rd to Loop 101/Loop 202 TI - completed in 2010. Two general purpose lanes added in the westbound direction from the Loop 101/Loop 202 TI to McClintock Dr - completed in 2010. One general purpose lane added in the westbound direction between McClintock Dr and Scottsdale Rd - completed in 2010. |
| | Country Club Rd to Mill Ave | AM | Eastbound | |
| | SR-143 to SR-51 | AM | Eastbound | |
| | SR-143 to Mill Ave | PM | Eastbound | |
| | Mill Ave to McClintock Dr | PM | Eastbound | |
| | SR-143 to SR-51 | PM | Westbound | |

continued



Table 7.2 (continued)
CONGESTED FREEWAY SEGMENTS RELATIVE TO COMPLETED AND UNDERWAY IMPROVEMENT PROJECTS

| Facility | Congested Segment | Time Period | Direction of Travel | Completed and Underway Improvements (2010) |
|---|--|-------------|---------------------|--|
| Loop 202 (Red Mtn Fwy) HOV Lanes | | | | <ul style="list-style-type: none"> One HOV lane added in each direction between Loop 101/Loop 202 TI and Gilbert Road – completed July 2010. |
| | SR-143 to Loop 101 (Pima/Price Fwy) | PM | Eastbound | |
| Loop 101 General Purpose Lanes | | | | <ul style="list-style-type: none"> A new traffic interchange at Bethany Home Road and Loop 101 (Agua Fria) – completed in August 2007. A new traffic interchange was constructed at 64th Street and Loop 101 (Pima Freeway) – completed in October 2008. This interchange is not open to traffic because of other pending local street improvements. Improvements to the Thunderbird Road and Loop 101 (Agua Fria) interchange – completed in late 2009. One HOV lane added in each direction between Loop 202 and Princess Drive – completed in November 2009. One HOV lane added in each direction from Princess Drive to Tatum Boulevard, including direct HOV ramps at the SR-51 interchange – completed in August 2009. One HOV lane added in each direction on Loop 101 (Price) between Loop 202 (Red Mountain) and Loop 202 (Santan Fwy) – completed November 2009. Work is underway to extend Beardsley Rd and provide ramp connections to Loop 101 via 75th Ave interchange and Union Hill Dr interchange; project includes expansion of the Union Hills TI – anticipated completion is late-2010 to mid-2011. |
| Agua Fria Fwy | 75 th Ave to 43 rd Ave | AM | Southbound | |
| Pima Fwy | 19 th Ave to Scottsdale Rd | AM | Southbound | |
| Pima Fwy | Cactus Rd to Via de Ventura | AM | Southbound | |
| Pima Fwy to Price Fwy | 90 th St to Guadalupe Rd | PM | Southbound | |
| Price Fwy to Pima Fwy | University Dr to Indian Bend Rd | PM | Northbound | |
| Pima Fwy | Frank Lloyd Wright Blvd to 32 nd St | PM | Northbound | |
| Price Fwy to Pima Fwy | US-60 (Superstition Fwy) to McDonald Dr | AM | Northbound | |
| Pima Fwy to Agua Fria Fwy | 32 nd St to 43 rd Ave | PM | Westbound | |
| SR-51 (Piestewa Fwy) General Purpose Lanes | | | | <ul style="list-style-type: none"> One HOV lane added in each direction between Shea Boulevard and Loop 101 (Pima Fwy) – completed in January 2009. This project included ramps at the system interchange between SR-51 and Loop 101 providing direct HOV connectors to and from the east. |
| | Bell Road to I-10 (Papago Fwy) | AM | Southbound | |
| | Thomas Rd to McDowell Rd | PM | Southbound | |
| | McDowell Rd to Bethany Home Rd | PM | Northbound | |
| SR-143 | | | | <ul style="list-style-type: none"> No improvements to this facility have been completed since the 2007 data was collected. |
| | Loop 202 (Red Mtn Fwy) to I-10 (Maricopa Fwy) | PM | Southbound | |

Prepared by Wilson & Company and CH2M Hill, August, 2010.

Source: 2007 MAG Regional Travel Time and Speed Study, Jacobs Carter Burgess, 2007; and "Valley Freeways," ADOT Web site.



Avenue is being widened between 99th Avenue and 83rd Avenue, adding one general purpose lane in each direction to create a continuous six-lane arterial roadway. This improvement project is expected to be fully completed late-2010 to early-2011. The six-lane cross-section of US-60/Grand Avenues will be extended to the Loop 303 (Estrella Freeway) by the end of 2011. Other major improvements to this facility are planned within the study area in the future, including projects to improve traffic flow and additional grade separations.



7.2.2. Arterial Segments

The arterial street system consists of the major roadways within the study area. The arterial system of interest for this study does not include minor arterials, collectors, or local streets. Data were compiled from the 2007 MAG Regional Travel Time and Speed Study (Jacobs Carter Burgess, 2007) to assess existing congestion in the study area. These data include traffic volumes, operating speeds, and intersection delay values for major roadways in the study area. No new data were collected for this study.

Existing Traffic Volumes

MAG conducted traffic counts in 2006 and 2007 at over 700 locations in the region and collected additional available counts from local jurisdictions. More than one-half of the highest traffic volumes reported for arterials in the study area are located near the freeways. The locations named below have a reported AADT exceeding 45,000 vpd.

| | | |
|---|--|---------------------------------------|
| Chandler Blvd at I-10 (Maricopa Fwy) | 7 th St at I-10 (Papago Fwy) | Bell Rd at Loop 101 (Agua Fria Fwy) |
| Baseline Rd East of 24 th St | Indian School Rd at SR-51 and I-17 | Tatum Blvd at Loop 101 (Pima Fwy) |
| Baseline Rd West of 40 th St | 7 th St north of Indian School Rd | Shea Blvd at SR-51 |
| Baseline Rd at I-10 (Maricopa Fwy) | Camelback Rd West of 32 nd St | Scottsdale Rd at South of Greenway Rd |
| Rural Rd at US-60 (Superstition Fwy) | Camelback Rd West of 40 th St | Shea Blvd East of Scottsdale Rd |
| 59 th Ave at I-10 (Papago Fwy) | Lincoln Dr at SR-51 | Scottsdale Rd at McCormick Pkwy |
| 51 st Ave at I-10 (Papago Fwy) | Glendale Rd East of 7 th St | Scottsdale Rd South of Lincoln Dr |
| 43 rd Ave at I-10 (Papago Fwy) | Olive Ave at I-17 | Scottsdale Rd North of McDowell Rd |
| | Thunderbird Rd at 35 th Ave | |

Some of the lowest traffic volumes occur on roadway segments in the southwestern and western portion of the study area. Notable among these are: Baseline Road between 99th and 59th Avenues, Broadway Road between 99th to 51st Avenues, Lower Buckeye Road between 99th to 16th Avenues, Van Buren Street between 99th and 67th Avenues, 91st Avenue between Thomas Road and Northern Avenue and south of I-10 (Papago Fwy), 83rd Avenue between Northern and Peoria Avenues, 56th Street between Thomas and Camelback Roads, and 64th Street between Northern Avenue and Bell Road. These segments have reported AADT of less than 13,000 vpd.

Arterial Congestion

Based on the 2009 MAG Performance Measurement Framework and Congestion Management Update Study: Phase II – Performance Measures Report (PBS&J, 2009), an arterial segment is considered congested, if the average speed on a segment is 75 percent or less than the posted speed. Percent of posted speed data was compiled from the 2007 MAG Regional Travel Time and Speed Study (Jacobs Carter Burgess, 2007) for the arterial corridors within the study area. In general, the average speed data show slower average speeds occur during the PM peak period. Therefore, it can be concluded that congestion during the PM peak period can be considered worse than the AM peak period.

Figures 7-6 and 7-7 show the average arterial travel speed as a percent of posted speed. During the AM and PM peak periods, several arterial segments in Phoenix, Tempe, and Scottsdale are experiencing average travel

Figure 7-6
 AVERAGE ARTERIAL TRAVEL SPEED AS A PERCENT OF POSTED SPEED – AM PEAK PERIOD

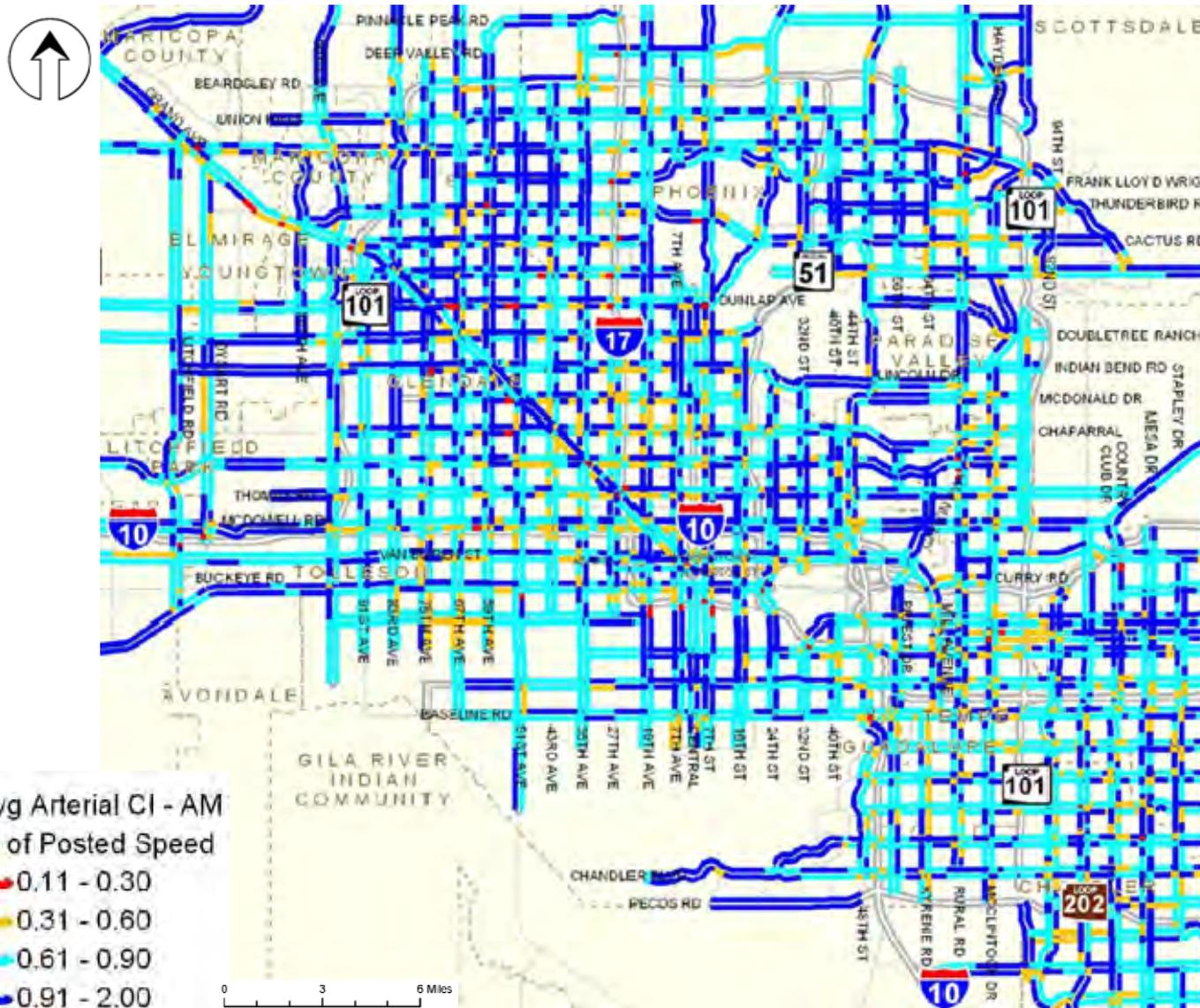
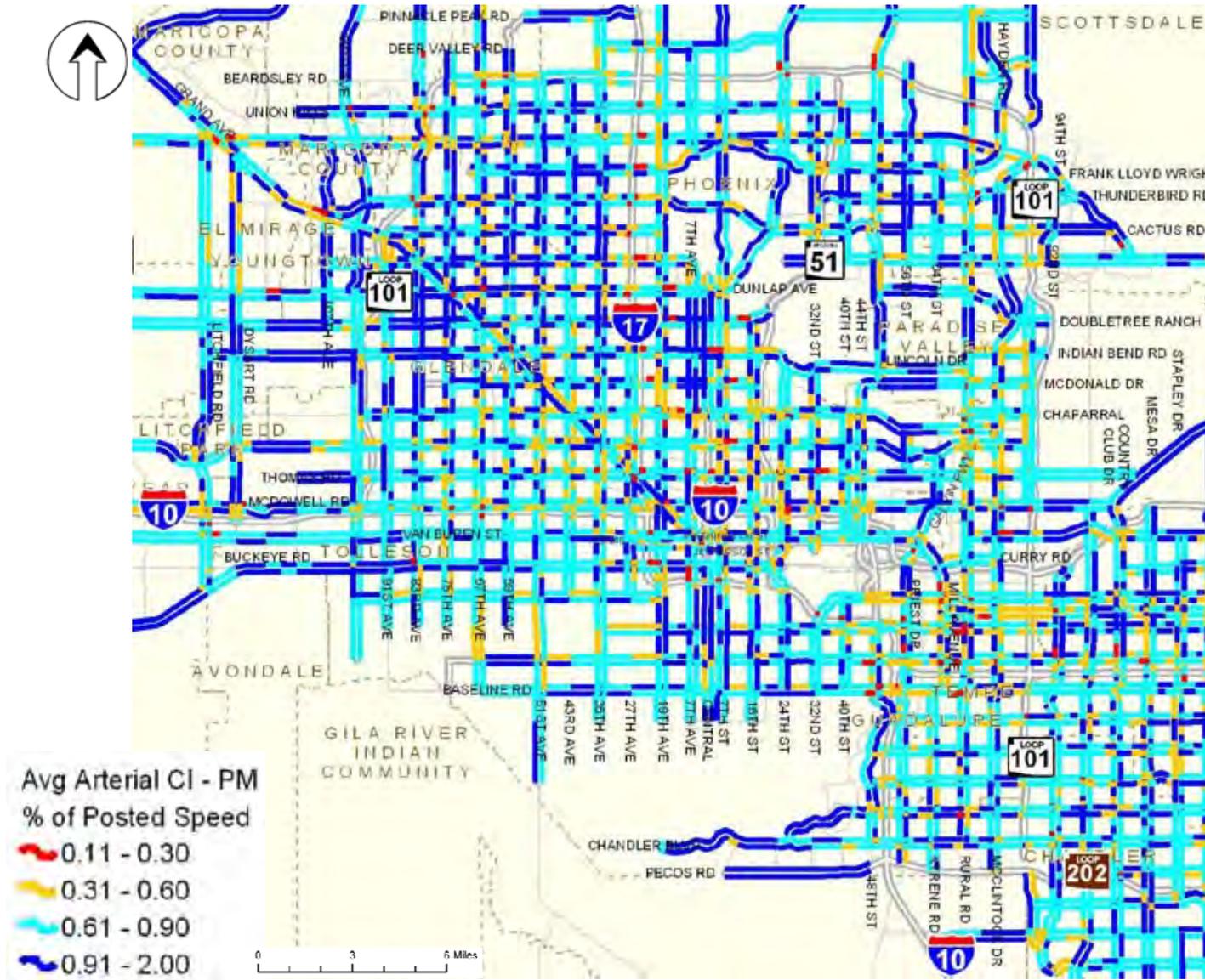


Figure 7-7
 AVERAGE ARTERIAL TRAVEL SPEED AS A PERCENT OF POSTED SPEED – PM PEAK PERIOD



Source: Extracted from Figure 36, Percent of Posted Speed Arterial – PM, 2007 Regional Travel Speed Study, MAG, April 18, 2008.



speeds less than 60 percent of the posted speed. This includes arterials such as Indian School Road, McDowell Road, and Glendale Avenue, which run parallel to I-10 (Papago Fwy), and 19th Avenue, 7th Avenue, 7th Street, 16th Street, and McClintock Drive, which run parallel to I-17, SR-51, and Loop 101 (Pima Freeway).

The 2007 MAG Regional Travel Time and Speed Study evaluated average speeds and other factors to determine the level of service (LOS) for major intersections. The LOS results determined from this study show traffic movements at several intersections in the study area experience considerable delay during the PM peak period. Near downtown Phoenix and Tempe, several intersections along 51st Avenue, 7th Street, Southern Avenue, Scottsdale Road/Rural Road, and 48th Street are operating at LOS E and F. Intersections currently operating at LOS F include the following:

| Intersections Operating at LOS F during the AM Peak Period | | |
|---|---|-------------------------------------|
| Buckeye Road/51 st Avenue | Camelback Road/51 st Avenue | |
| Intersections Operating at LOS F during the PM Peak Period | | |
| Southern Avenue/51 st Avenue | Baseline Road/48 th Street | Cactus Road/Scottsdale Road |
| McDowell Road/7 th Street | Southern Avenue/48 th Street | Thunderbird Road/Scottsdale Road |
| Jefferson Street/7 th Street | Southern Avenue/Mill Avenue | Thomas Road/16 th Street |
| Indian School Road/7 th Street | Southern Avenue/Rural Road | |

With the exception of the Thomas Road/16th Street intersection, inefficiently operating intersections are associated with five arterial corridors in Phoenix, Tempe, and Scottsdale. Specifically, these corridors are 51st Avenue, 7th Street, 48th Street, Southern Avenue, and Scottsdale Road. The more critical travel period for the 51st Avenue corridor appears to be during the AM peak period: two intersections - Buckeye Road/51st Avenue and Camelback Road/51st Avenue – were identified as experiencing significant delay. It is noteworthy that the 48th Street and Southern Avenue corridors form an axis, and there is a strong likelihood that these two arterials are serving as a bypass to the Broadway Curve on I-10 (Maricopa Fwy).

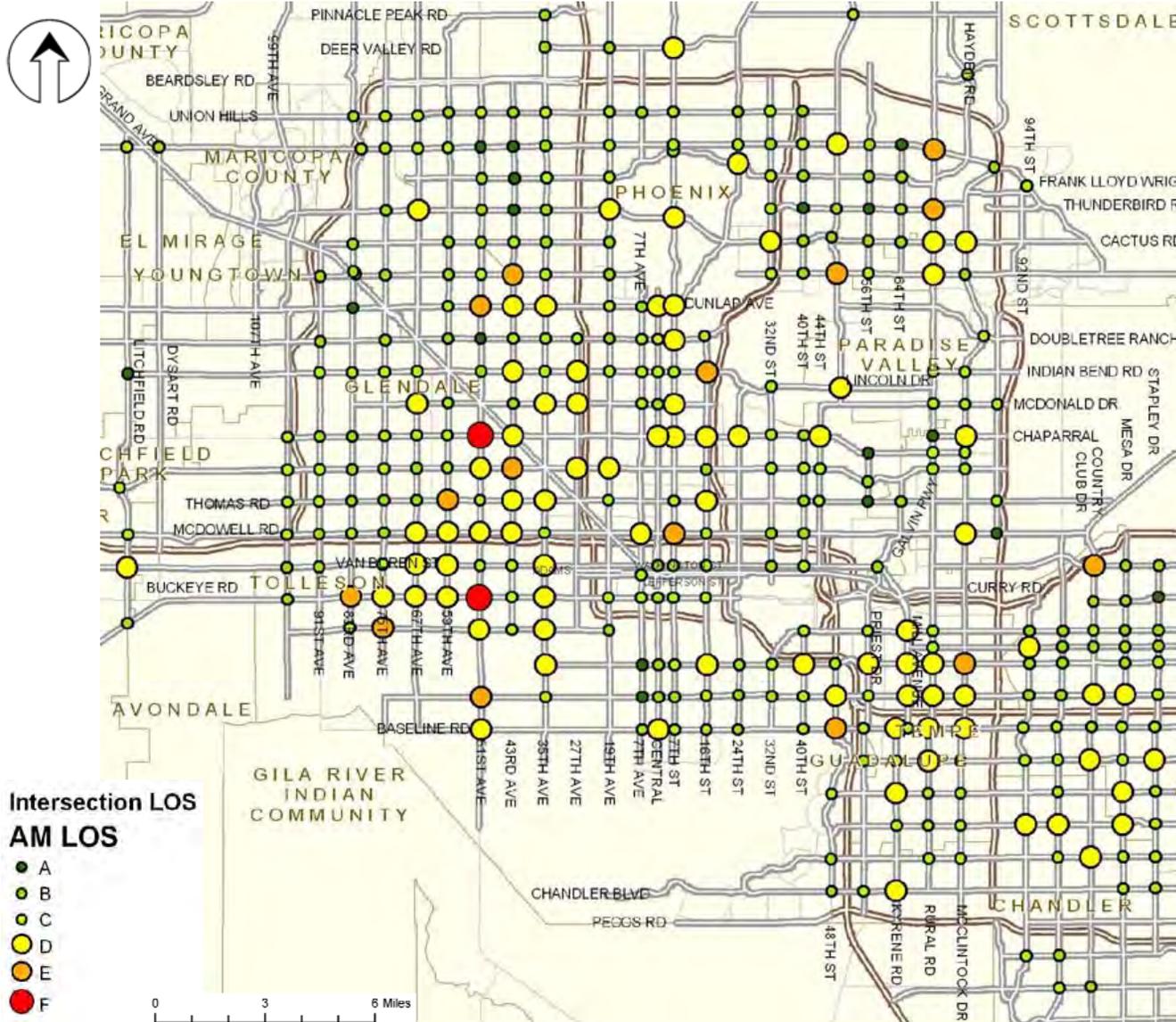
Figure 7-8 and 7-9 are excerpts from maps prepared by MAG to show the location of intersections operating at LOS D, E, and F in the study area during the AM and PM peak periods. Based on historical data from 2002, the speed drop on the arterial system for 2007 in both the AM and PM peak periods was minimal (approximately three percent). Preliminary reports, based on data from the ADOT Highway Performance Monitoring System, indicate freeway-based travel slightly decreased between 2006 and 2007 and fell even more between 2007 and 2008. This is most likely resulted from two critical conditions for travelers: (1) spiking gasoline prices, which began in the summer of 2005 and reached their peak in the summer of 2008 and (2) the national/worldwide economic recession (PBS&J, 2009). Therefore, congestion levels may be lower today than in 2007 when the data was collected. However, it is the general consensus among Valley planners and decisionmakers that economic recovery is underway and continued regional growth ultimately will return travel conditions to the pre-2006/2007 levels with traffic growth continuing into the future.

7.3 Locations with Significant Crash History

Information regarding the location, frequency, and type/severity of crashes provides a basis for identifying inefficient facilities or improperly design facilities. This section presents an inventory and analysis of crash data for the study area.



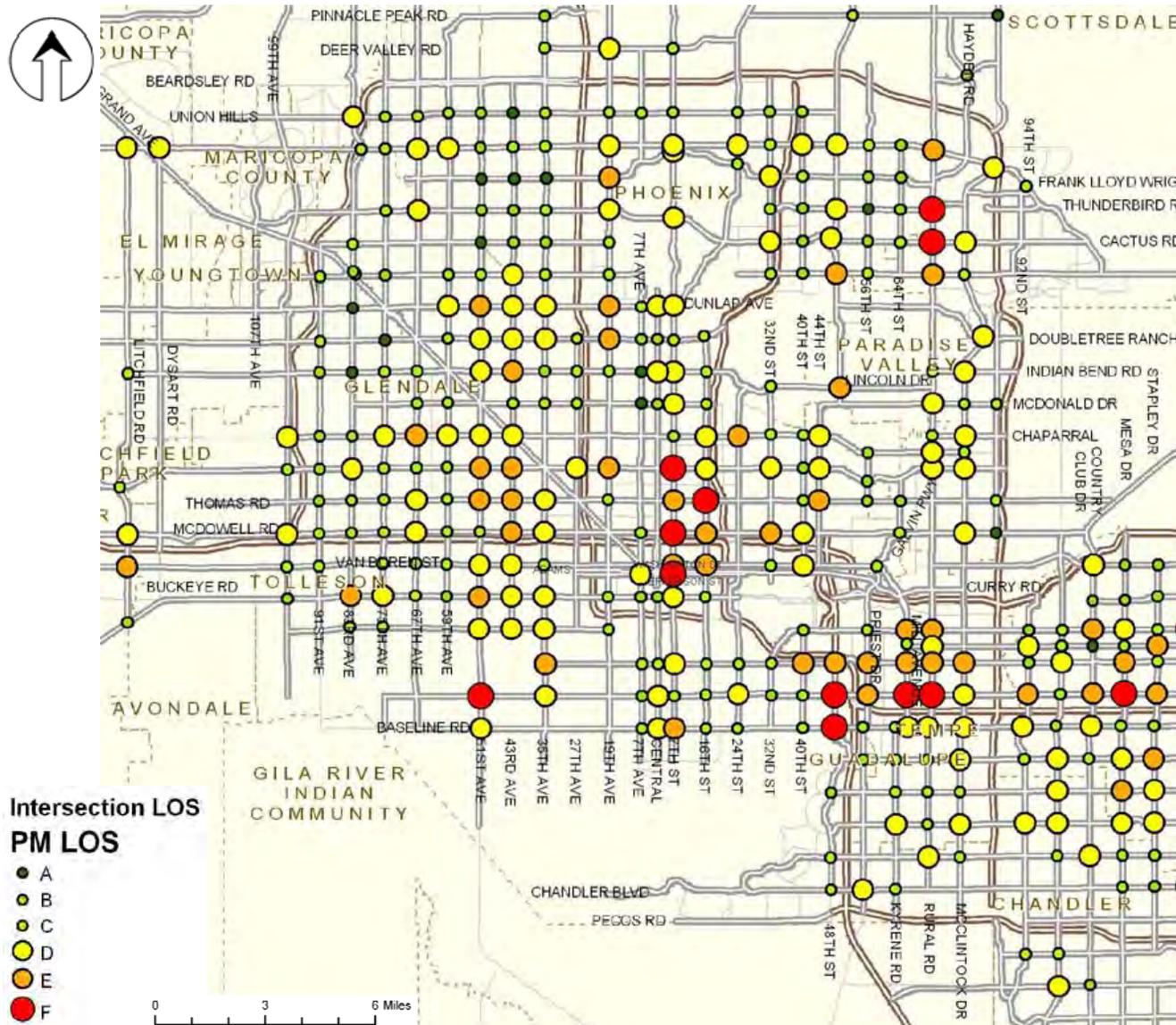
Figure 7-8
INTERSECTION LEVEL OF SERVICE – AM PEAK PERIOD



Source: Extracted from Figure 53, Intersection LOS – AM, 2007 Regional Travel Speed Study, MAG, April 18, 2008.



Figure 7-9
INTERSECTION LEVEL OF SERVICE – AM PEAK PERIOD



Intersection LOS
PM LOS

- A
- B
- C
- D
- E
- F

0 3 6 Miles



7.3.1. Sources of Data

Data on the locations of a high number of crashes and the severity of crashes were collected from three sources: the *Arizona 2009 Five Percent Report* (ADOT, 2009), *Performance Measurement Framework and Congestion Management Update Study: Phase II – Performance Measures Report* (PBS&J, 2009); and publications derived from activities of the MAG Transportation Safety Committee.

Arizona 2009 Five Percent Report

The *2009 Five Percent Report* identifies locations throughout the state with the most severe safety needs. This assessment is based on an analysis of fatal and injury crashes in the last three years (2006-2008). The top five percent locations were identified based on the following criteria:

- Location should have at least one fatal crash within 3-year period;
- Location should have at least one crash every year for 3-year period; and
- The number of fatal or incapacitating injury crashes is equal to or greater than two for 3-year period.

There were 244 lane-departure crash locations and 392 intersection-related crash locations satisfying the criteria cited above. The top five percent of those locations included 12 lane-departure locations and 20 intersection-related locations. Almost one-half of these crash locations are located within the limits of this study, as shown in Tables 7.3 and 7.4. The analysis is primarily based on frequency of crashes and does not account for exposure factors, e.g., driver impairment, roadway design, vehicle design, *et cetera*.

Performance Measures Report

As part of the performance measures update, an analysis of crash history in the MAG region was conducted. By screening 2006, 2007, and 2008 data available through the Automated Life Insurance Sales System (ALISS), the top 100 crash locations were identified and mapped (Figure 7-10). This analysis and mapping effort is enlightening with respect to the distribution and magnitude of high-frequency crash locations. It also reveals certain corridors of travel that have a propensity for a high number of crashes: Thomas Road between 35th Avenue and 75th Avenue and 35th Avenue from Camelback Road to Union Hills Drive are two prime examples.

7.3.2. MAG Transportation Safety Committee Crash Evaluations

The same crash data were evaluated somewhat differently by MAG (PBS&J, 2009) to identify the locations with the most significant crash history. Based on the MAG Transportation Safety Committee’s recommendation, a weighting scheme was used to compute the crash “severity” score at all intersections in the MAG Region. The weighting scheme used to calculate each intersection’s crash severity score was based on the following criteria:

- For each fatal crash, add 1,450 points;
- For each incapacitating crash, add 100 points;
- For each non-incapacitating crash, add 20 points;
- For each crash possibly resulting in an injury, add 11 points;
- For each property damage only (PDO) crash, add 1 point; and
- For each crash with unknown characteristics, add 1 point.



Table 7.3
TOP FIVE PERCENT OF STATEWIDE CRASHES FROM 2006- 2009, LANE DEPARTURES LOCATED WITHIN STUDY LIMITS

| Roadway Segment | Milepost | Direction of Travel | Type of Injury | | | | | |
|--|----------------------|---------------------|----------------|-----------------------|---------------------------|-----------------|-----------|---------|
| | | | Fatal | Incapacitating injury | Non-Incapacitating injury | Possible injury | No Injury | Unknown |
| SR-101 (Agua Fria Fwy), – Glendale Avenue to Northern | MP 7.0 to MP 7.9 | Northbound | 2 | 5 | 12 | 3 | 41 | 2 |
| Interstate 10 (Papago Fwy) – 3 rd Street HOV Ramp to 7 th Street | MP 145.0 to MP 145.9 | Eastbound | 2 | 4 | 9 | 23 | 110 | 5 |
| Interstate 10 (Papago Fwy) – 24 th Street to Buckeye Road | MP 149.0 to MP 149.9 | Westbound | 1 | 5 | 10 | 11 | 50 | 30 |
| Interstate 10 (Papago Fwy) – Washington/Jefferson Streets to Loop 202 (Red Mountain Fwy) and SR-51 Ramps | MP 147.0 to MP 147.9 | Westbound | 1 | 4 | 12 | 12 | 81 | 2 |
| Interstate 17 – Grant Street to 19 th Avenue | MP 198.0 to MP 198.9 | Northbound | 2 | 3 | 10 | 6 | 22 | 3 |

Source: Arizona 2009 Five Percent Report, Arizona Department of Transportation (ADOT), 2009.

Prepared by CH2M Hill, August, 2010.



Table 7.4
TOP FIVE PERCENT OF STATEWIDE CRASHES FROM 2006-2009, INTERSECTION-RELATED LOCATIONS WITHIN STUDY LIMITS

| Year | Annual Total | Angle | Single Vehicle | Rear End | Left Turn | Other | Fatal | Incapacitating | Non-Incapacitating | Possible | None |
|---|--------------|-------|----------------|----------|-----------|-------|-------|----------------|--------------------|----------|-------|
| Dunlap Avenue and 35th Ave (176 Collisions) | | | | | | | | | | | |
| | | | | | | 6 | 0 | 5 | 11 | 13 | 35 |
| 2008 | 54 | 3 | 1 | 21 | 25 | 4 | 1 | 1 | 5 | 12 | 35 |
| Average | 58.67 | 7.00 | 1.00 | 22.00 | 24.33 | 4.33 | 0.33 | 3.00 | 8.00 | 13.67 | 33.67 |
| Van Buren Street and 51st Avenue (85 Collisions) | | | | | | | | | | | |
| 2006 | 25 | 5 | 0 | 6 | 10 | 4 | 0 | 2 | 3 | 6 | 14 |
| 2007 | 34 | 5 | 0 | 13 | 9 | 7 | 1 | 3 | 2 | 6 | 22 |
| 2008 | 26 | 6 | 0 | 4 | 6 | 10 | 0 | 3 | 4 | 4 | 15 |
| Average | 28.33 | 5.33 | 0.00 | 7.67 | 8.33 | 7.00 | 0.33 | 2.67 | 3.00 | 5.33 | 17.00 |
| Union Hills Drive and 7th Street (84 Collisions) | | | | | | | | | | | |
| 2006 | 35 | 7 | 2 | 4 | 17 | 5 | 1 | 7 | 7 | 8 | 12 |
| 2007 | 18 | 3 | 0 | 4 | 10 | 1 | 0 | 0 | 4 | 4 | 10 |
| 2008 | 31 | 9 | 0 | 5 | 14 | 3 | 1 | 1 | 5 | 11 | 13 |
| Average | 28.00 | 6.33 | 0.67 | 4.33 | 13.67 | 3.00 | 0.67 | 2.67 | 5.33 | 7.67 | 11.67 |
| Hayden Road and Thomas Road (50 Collisions) | | | | | | | | | | | |
| 2006* | 50 | 7 | -- | 28 | 8 | 7 | -- | -- | -- | -- | -- |
| Indian School Road and 27th Avenue (153 Collisions) | | | | | | | | | | | |
| 2006 | 60 | 8 | 1 | 14 | 21 | 16 | 0 | 3 | 10 | 16 | 31 |
| 2007 | 51 | 13 | 1 | 19 | 10 | 8 | 1 | 2 | 6 | 8 | 34 |
| 2008 | 42 | 5 | 1 | 13 | 14 | 9 | 0 | 2 | 5 | 4 | 31 |
| Average | 51 | 8.67 | 1 | 15.33 | 15 | 11 | 0.33 | 2.33 | 7 | 9.33 | 32 |
| Camelback Road and 27th Avenue (146 Collisions) | | | | | | | | | | | |
| 2006 | 55 | 20 | 1 | 15 | 10 | 9 | 1 | 2 | 8 | 8 | 36 |
| 2007 | 50 | 10 | 0 | 17 | 17 | 6 | 0 | 4 | 10 | 6 | 30 |
| 2008 | 41 | 3 | 2 | 19 | 11 | 6 | 0 | 0 | 6 | 0 | 35 |
| Average | 48.67 | 11.00 | 1.00 | 17.00 | 12.67 | 7.00 | 0.33 | 2.00 | 8.00 | 4.67 | 33.67 |
| Bell Road and Cave Creek Road (143 Collisions) | | | | | | | | | | | |
| 2006 | 52 | 9 | 1 | 18 | 11 | 13 | 0 | 4 | 5 | 6 | 37 |
| 2007 | 48 | 8 | 2 | 20 | 10 | 8 | 1 | 0 | 7 | 3 | 37 |
| 2008 | 43 | 8 | 1 | 9 | 14 | 11 | 0 | 3 | 7 | 10 | 23 |
| Average | 47.67 | 8.33 | 1.33 | 15.67 | 11.67 | 10.67 | 0.33 | 2.33 | 6.33 | 6.33 | 32.33 |

continued



Table 7.4 (continued)

TOP FIVE PERCENT OF STATEWIDE CRASHES FROM 2006-2009, INTERSECTION-RELATED LOCATIONS WITHIN STUDY LIMITS

| Year | Annual Total | Angle | Single Vehicle | Rear End | Left Turn | Other | Fatal | Incapacitating | Non-Incapacitating | Possible | None |
|--|--------------|-------|----------------|----------|-----------|-------|-------|----------------|--------------------|----------|-------|
| Van Buren Street and 16th Street (95 Collisions) | | | | | | | | | | | |
| 2006 | 40 | 9 | 1 | 15 | 6 | 9 | 1 | 3 | 3 | 10 | 23 |
| 2007 | 35 | 8 | 1 | 10 | 6 | 10 | 0 | 3 | 4 | 4 | 24 |
| 2008 | 20 | 3 | 0 | 11 | 3 | 3 | 0 | 1 | 1 | 4 | 14 |
| Average | 31.67 | 6.67 | 0.67 | 12.00 | 5.00 | 7.33 | 0.33 | 2.33 | 2.67 | 6.00 | 20.33 |
| Bell Road & 16th Street (59 Collisions) | | | | | | | | | | | |
| 2006 | 26 | 7 | 3 | 4 | 9 | 3 | 1 | 1 | 6 | 5 | 13 |
| 2007 | 14 | 3 | 2 | 4 | 3 | 2 | 0 | 2 | 4 | 2 | 6 |
| 2008 | 19 | 3 | 2 | 4 | 6 | 4 | 0 | 4 | 1 | 1 | 13 |
| Average | 19.67 | 4.33 | 2.33 | 4.00 | 6.00 | 3.00 | 0.33 | 2.33 | 3.67 | 2.67 | 10.67 |
| Cactus Avenue and 43rd Avenue (80 Collisions) | | | | | | | | | | | |
| 2006 | 31 | 3 | 0 | 15 | 12 | 1 | 0 | 3 | 4 | 10 | 14 |
| 2007 | 24 | 8 | 0 | 8 | 5 | 3 | 0 | 1 | 6 | 8 | 9 |
| 2008 | 25 | 4 | 0 | 6 | 13 | 2 | 1 | 2 | 5 | 7 | 10 |
| Average | 26.67 | 5.00 | 0.00 | 9.67 | 10.00 | 2.00 | 0.33 | 2.00 | 5.00 | 8.33 | 11.00 |

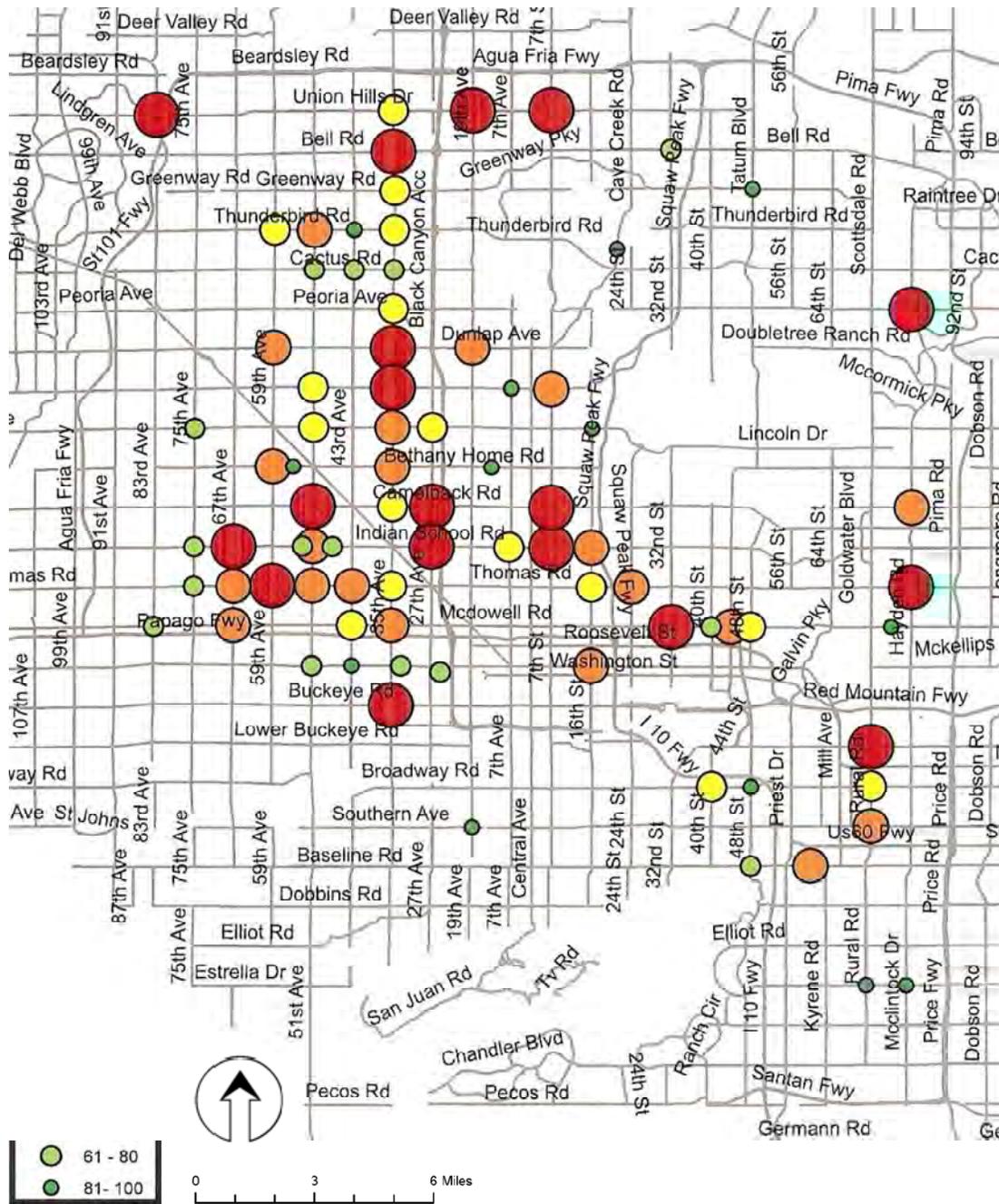
Prepared by CH2M Hill and Wilson & Company, August, 2010.

* Full data for the three-year period were not reported for this intersection. The intersection was one of the top 20 high-collision locations identified from information included in the City of Scottsdale 2006 Traffic Volume and Collision Rate Data Report

Source: Arizona 2009 Five Percent Report, Arizona Department of Revenue, August 31, 2009.



Figure 7-10
LOCATIONS OF HIGH-FREQUENCY CRASH LOCATIONS



Source: Extracted from MAG Network Screening Methodology – Top 100 Intersection Crash Locations Using 2006, 2007, 2008 ALISS Data.



The 25 top-ranked intersections experiencing the highest crash severity scores were identified and became the focus of attention. Twenty of the locations exhibiting the highest crash severity scores are located within the limits of this study. These locations are identified in Table 7.5, which includes the results of the MAG rating process, and highlighted in Figure 7-11.



7.4 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) facilitate better use of all available modes of surface transportation and allows the traveling public to make informed decisions regarding mode of choice and route. Such systems are deployed to enhance mobility and maximize the efficiency of the transportation network. They encompass a broad range of wireless and wireline communications-based information and electronics technologies installed to aid in the improvement of transportation safety and mobility. This section discusses the status of ITS relative to the regional transportation system, identifies the baseline capabilities extant today within the study area, and examines the current level of regional coordination and interface among supporting jurisdictions and agencies.

7.4.1. Background

The Regional Community Network (RCN) Program, the development of which is overseen by ADOT, refers to numerous projects and stakeholders involved in creating an integrated fiber and communications infrastructure in the Phoenix metropolitan area to support coordinated use of ITS technologies. The RCN Program has been in existence since 2001, when the initial RCN Feasibility Study was developed. Projects are developed as part of the RCN Program on a continuing basis. The MAG RCN concept was adopted in 2004. Future projects foreseen as part of the RCN Program will include additional fiber and conduit infrastructure design/construction projects, operations and maintenance of the network, procurement of additional active electronics equipment, and potential studies regarding use of the network. The ultimate RCN infrastructure to be developed in two phases will provide connectivity among all Valley communities within three sub-rings linked to a Core Ring (Figure 7-12). Development of the RCN

7.4.2. Intelligent Transportation System Technologies

Available ITS technologies and management techniques have been demonstrated to increase the effective capacity of the surface transportation infrastructure. Various combinations of technological devices and management techniques are part of the ITS toolbox, and all are designed to foster safer, more efficient, and more secure movements of people, goods, and services. ITS utilizes remote sensor technology (e.g., traffic count equipment, cameras, etc.), computerized databases, and real-time communication applications to monitor and influence the operational conditions of surface transportation systems. Continual review of real-time information by trained technicians is employed to inform users of travel conditions and provide guidance regarding available optional routes. Improvements to the efficiency and effectiveness of the surface transportation system, in turn, enhance social and economic productivity.

The ITS management infrastructure extends over a wide spectrum of purposes and activities directed toward managing facility operations and informing the traveling public. The accompanying graphic (Figure 7-13) developed by the U.S. Department of Transportation (USDOT) Research and Innovative Technology Administration (RITA), displays the wide range of techniques developed to aid local transportation officials. Each area of the ITS infrastructure provides varying degrees of control and influence over the operational characteristics of the surface transportation system, including both the physical travel facilities and services and the vehicles operationally associated with these facilities and services. Thus, ITS, as an integrated field and transportation management endeavor, focuses on:

Table 7.5
ARTERIAL INTERSECTIONS WITH THE HIGHEST CRASH SEVERITY SCORES IN THE MAG REGION (2007)



| Regional Rank | Jurisdictions ^a | Intersection | | Type of Crash | | | | | | Severity |
|-----------------|----------------------------|------------------------------|--------------------|---------------|----|----|---|---|---------|----------|
| | | | | O | C | B | A | K | Unknown | |
| 1 ^b | Mesa | Broadway Road | Val Vista Drive | 40 | 9 | 10 | 1 | 3 | 0 | 4,785 |
| 2 ^b | Chandler | Arizona Avenue | Ray Road | 58 | 23 | 15 | 4 | 2 | 0 | 3,900 |
| 3 | Phoenix | 67th Avenue | Indian School Road | 99 | 25 | 21 | 2 | 2 | 0 | 3,882 |
| 4 | Scottsdale | Camelback Road | Hayden Road | 42 | 9 | 15 | 5 | 2 | 0 | 3,837 |
| 5 | Phoenix | 19th Avenue | Union Hills Drive | 38 | 17 | 21 | 2 | 2 | 0 | 3,737 |
| 6 | Phoenix | 35 th Avenue | Cactus Road | 40 | 25 | 13 | 2 | 2 | 0 | 3,663 |
| 7 | Phoenix | 35th Avenue | Bell Road | 44 | 29 | 15 | 1 | 2 | 0 | 3,649 |
| 8 | Scottsdale | Hayden Road | Shea Boulevard | 44 | 19 | 17 | 1 | 2 | 0 | 3,584 |
| 9 | Peoria | 83rd Avenue | Union Hills Drive | 57 | 17 | 3 | 2 | 2 | 1 | 3,397 |
| 10 | Scottsdale | Chaparral Road | Hayden Road | 37 | 9 | 8 | 2 | 2 | 1 | 3,393 |
| 11 | Phoenix | 23rd Avenue | Bethany Home Road | 26 | 10 | 3 | 3 | 2 | 0 | 3,391 |
| 12 | Phoenix | 43 rd Avenue | Union Hills Drive | 16 | 10 | 8 | 2 | 2 | 0 | 3,381 |
| 13 | Phoenix | Central Avenue | Osborn Road | 22 | 8 | 2 | 3 | 2 | 0 | 3,346 |
| 14 ^b | Maricopa County/ Avondale | Avondale Boulevard | MC-85 | 28 | 5 | 4 | 2 | 2 | 0 | 3,261 |
| 15 | Scottsdale | Frank Lloyd Wright Boulevard | Scottsdale Road | 45 | 13 | 4 | 0 | 2 | 0 | 3,162 |
| 16 ^b | Maricopa County/ Goodyear | Estrella Pkwy | MC-85 | 11 | 6 | 4 | 1 | 2 | 1 | 3,155 |
| 17 | Phoenix | 33rd Avenue | Van Buren Street | 19 | 5 | 3 | 1 | 2 | 1 | 3,133 |
| 18 | Phoenix | 16 th Street | Oak Street | 13 | 7 | 2 | 1 | 2 | 1 | 3,128 |
| 19 | Phoenix | Cave Creek Road | Sharon Drive | 3 | 2 | 4 | 1 | 2 | 0 | 3,104 |
| 20 | Phoenix | 7 th Street | Northern Avenue | 58 | 23 | 22 | 9 | 1 | 1 | 3,091 |
| 21 | Glendale | 55th Avenue | Bethany Home Road | 14 | 9 | 4 | 0 | 2 | 0 | 3,089 |
| 22 ^b | Phoenix | 27 th Avenue | Indian School Road | 75 | 36 | 24 | 7 | 1 | 0 | 3,083 |
| 23 ^c | Mesa | Brown Road | Recker Road | 23 | 8 | 3 | 0 | 2 | 2 | 3,069 |
| 24 | Phoenix | Cave Creek Road | Sweetwater Avenue | 13 | 5 | 5 | 0 | 2 | 0 | 3,066 |
| 25 | Maricopa County/Phoenix | 51st Avenue | Estrella Drive | 6 | 0 | 2 | 1 | 2 | 0 | 3,046 |

Prepared by CH2M Hill, July, 2010.

Abbreviations: O = Property Damage Only; C = Injury; B = Non-Incapacitating; A = Incapacitating; K = Fatality

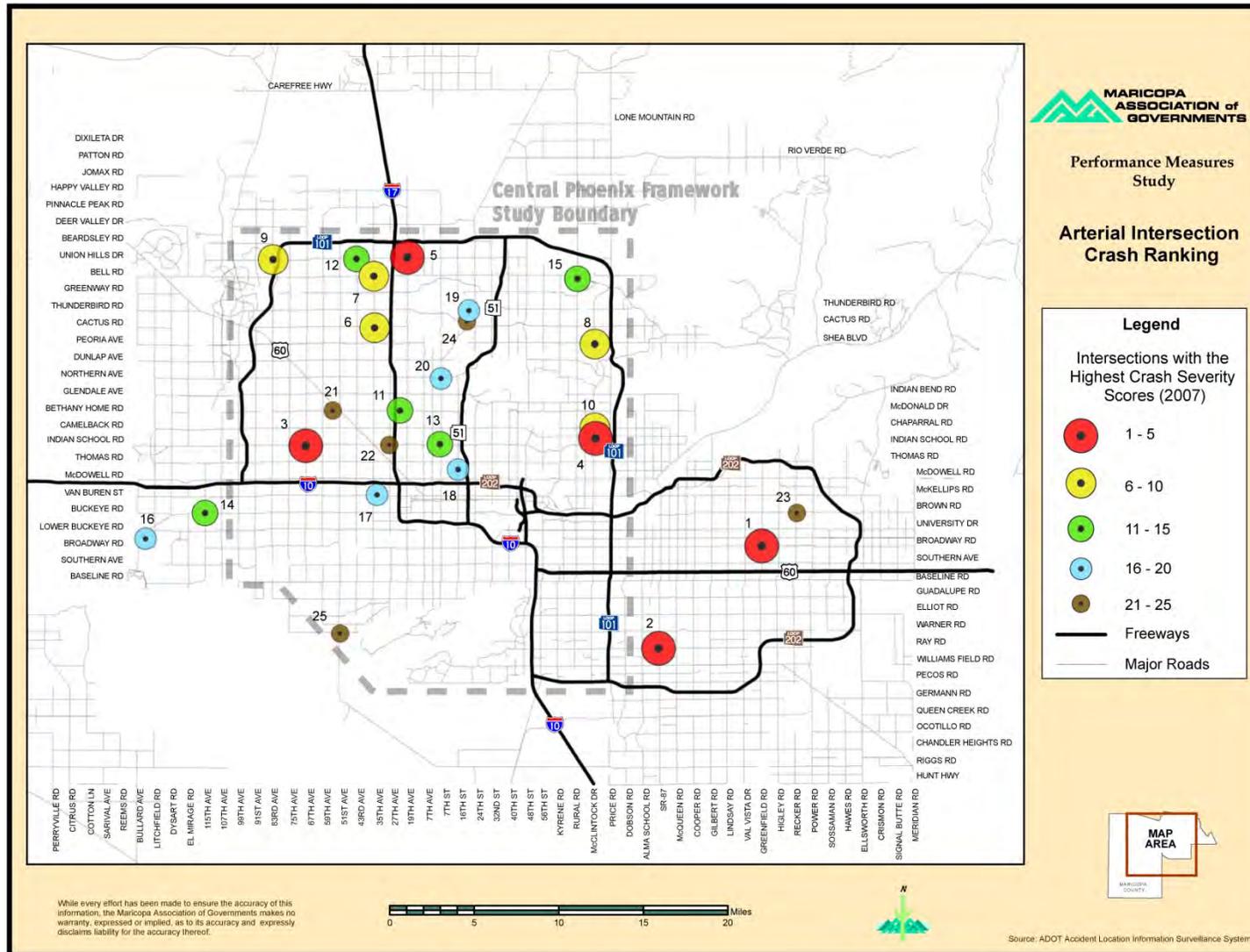
^a The cities listed in the "Jurisdiction(s)" column are responsible for maintaining the intersections listed in the columns to their immediate right. In cases where Maricopa County is listed next to a local jurisdiction (see rows 14, 16, and 25), the intersection resides within the local jurisdiction, but is maintained by the County.

^b Located outside the limits of the Central Phoenix Transportation Framework Study.

^c Also reported in the *Arizona 2009 Five Percent Report* (ADOT, 2009).

Source: *Performance Measurement Framework and Congestion Management Update Study: Phase II – Performance Measures Report*, PBS&J, 2009.

Figure 7-11
ARTERIAL INTERSECTIONS WITH THE HIGHEST CRASH SEVERITY SCORES IN THE MAG REGION

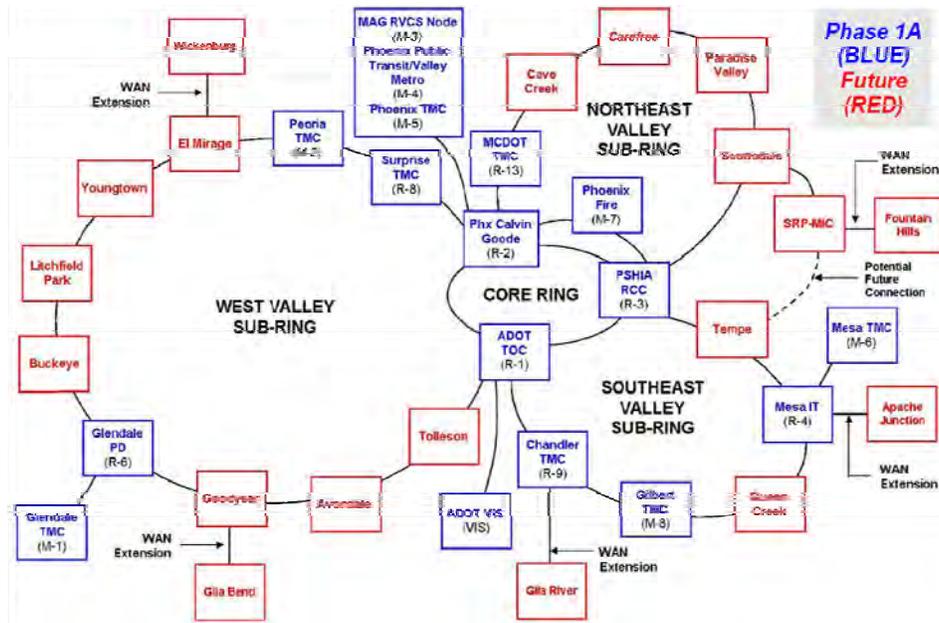


Source: Figure 3.8, Performance Measurement Framework and Congestion Management Update Study, Phase II, Performance Measures Report, MAG, September, 2009.



Figure 7-12

REGIONAL COMMUNITY NETWORK STRUCTURE

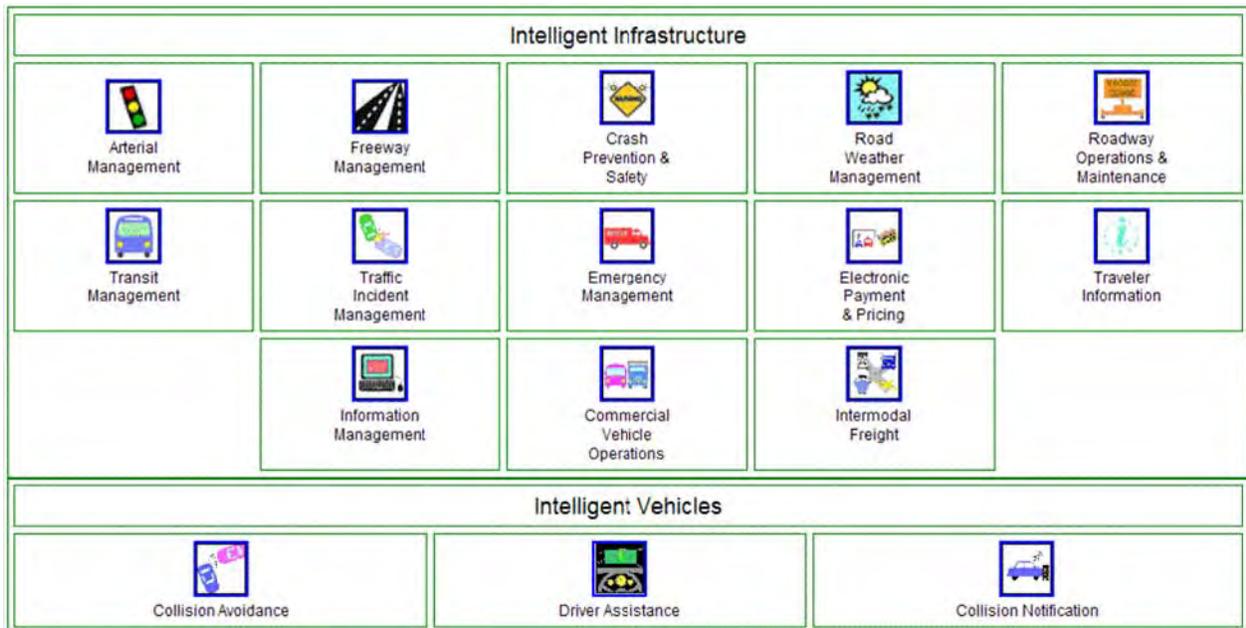


Source: Regional Community Network (RCN) Newsletter, ADOT, Fall, 2008.



Figure 7-13

INTELLIGENT TRANSPORTATION SYSTEMS APPLICATIONS OVERVIEW



Source: Intelligent Transportation Systems, Application Overview, Research and Innovative Technology Administration (RITA), U.S. Department of Transportation (US DOT) at <http://www.itsoverview.its.dot.gov/>

- Improving facility capacities through active monitoring and management of operating conditions;
- Enhancing operational efficiency of the highway, public transportation, and rail passenger infrastructure;
- Reducing congestion through timely response to ordinary and extraordinary events adversely affecting system operations;
- Maintaining safer and more convenient travel opportunities; and
- Increasing the efficiency and security of freight movements.



In turn, capital construction projects and costs can be reduced, as the need for additional physical facilities is reduced.

The agencies and jurisdictions of the Phoenix metropolitan area have been leaders in the planning, design, and deployment of Intelligent Transportation Systems (ITS). Regional efforts to deploy ITS are represented well in the recent MAG Regional ITS Architecture, which establishes the framework for arterial, freeway, and transit system surveillance and management capabilities at the local and regional level. The regional architecture, along with ITS planning efforts by all study area jurisdictions and multi-agency efforts focused on the urban freeway system, provide a solid basis upon which to assess the applicability and effectiveness of ITS solutions relative to potential transportation system improvements in the study area. Signal control, detection, tracking, surveillance, and information systems already deployed serve as a baseline for the physical or operational extension and expansion of ITS-based mobility and management solutions. Planning for deployment of future ITS applications will be best served by matching crucial corridor issues with existing capabilities and real-world implementation experience.

7.4.3. Status of Implementation

The AZTech partnership was created in 1996 to bring together decisionmakers and practitioners in the Phoenix metropolitan area to coordinate traffic operations across the region. The goals of this partnership are to integrate the existing ITS infrastructure of multiple entities into a regional system, establish a regional integrated traveler information system, and expand the transportation management system. AZTech members include ADOT, MAG, Valley Metro, Maricopa County, cities and towns, and private partners. All ITS applications are owned and operated by the individual AZTech members, but they are also referred to as the regional AZTech system.

AZTech has developed regional operational center-to-center (C2C) guidelines that provide procedures and standards for public agencies to use for interagency sharing of ITS devices to improve regional traffic management. The AZTech system ultimately will provide interconnection and communication along corridors that cross multiple jurisdictions. Some AZTech members already have fully connected and integrated Traffic Management Centers (TMC), while others, such as the City of Tolleson, and Towns of Guadalupe and Paradise Valley, do not have a TMC. The TMCs allow the agencies to manage their ITS devices, including traffic signals, cameras, detectors, and message signs, from a central location. It also allows them to coordinate with the other agencies, although not all information is visible and, therefore, shared between the TMCs. Signal timing information and camera images generally are only shared for signals at jurisdictional boundaries. The Phoenix metropolitan area has approximately 140 cameras on freeways, 250 on arterials, and 320 intersections with vehicle image detectors.

ADOT is responsible for operating and maintaining the entire freeway network and has a freeway management system (FMS) operating on over 100 miles of freeways in the Phoenix metropolitan area. The agency has plans to add FMS capabilities to another 130 miles in the next 20 years: plans call for FMS to be added to approximately 40 miles in the near-term. As of 2009, FMS projects are under construction on Loop 101 (Pima Fwy), between I-17 and SR-51 and between Princess Road and Loop 202 (Red Mountain Fwy). FMS projects

are programmed for: I-17 between Peoria Avenue and Happy Valley Road, SR-51 between Bell Road and Loop 101 (Pima Fwy), and Loop 202 (Red Mountain Fwy) between I-10 and Dobson Road. Additional FMS projects are under design for portions of Loop 101 and Loop 202. Figure 7-14 shows the location and status of FMS projects in the study area.

Surveys were distributed to all the MAG member agencies as part of the 2010 MAG Regional ITS Architecture update to help build an inventory of the existing and future planned ITS infrastructure and communications in the region. The survey results, summarized in Table 7.6, provide information on the number and location of devices and the types of information sharing by AZTech members.

In addition to the existing infrastructure, there are several supporting ITS improvement projects planned and programmed that will directly affect the study area. For example, ADOT is incorporating central control of ramp metering into their Traffic Operations Center (TOC) and is proposing to build a joint TOC with City of Peoria. Also, ADOT is pursuing upgrades to the FMS that will permit real-time, traffic-adaptive ramp metering. Adaptive ramp metering forecasts traffic conditions at predetermined problem points (typically bottlenecks) and adjusts metering rates based on forecasts.

Programmed ITS projects are identified in the current MAG Transportation Improvement Program (TIP), which serves as a five-year regional guide for the preservation, management, and expansion of public transportation services, including: highways, arterial streets, transit, demand management, and alternative mode improvements in Maricopa County. Table 7.7 lists ITS projects for the agencies and jurisdictions within the study area. There are additional infrastructure projects adding ITS and communications to different agencies' transportation networks that are not included in the MAG TIP, but were identified in the surveys completed by each agency for the MAG Regional ITS Architecture project. Some of these projects include coordination between multiple agencies for operations of ITS devices along corridors that cross into multiple jurisdictions. All projects are bringing the region closer to the overall goal of providing an integrated traffic management system across the region.

Proposition 400 was passed in 2004, providing for continuation of the half-cent sales tax for transportation in Maricopa County. Proposition 400 funds can only be applied to projects consistent with the MAG Regional Transportation Plan (RTP). According to the MAG 2009 *Annual Report on the Status or the Implementation of Proposition 400* (MAG, 2009), an estimated \$29 million (2009 \$'s) in reimbursements from regional funds will be made for ITS projects between Fiscal Years (FY) 2010 and 2014. The local matching requirement in the RTP is 30 percent for major street projects, including ITS elements. The process for identifying and recommending arterial ITS projects for funding is overseen by the MAG ITS Committee.

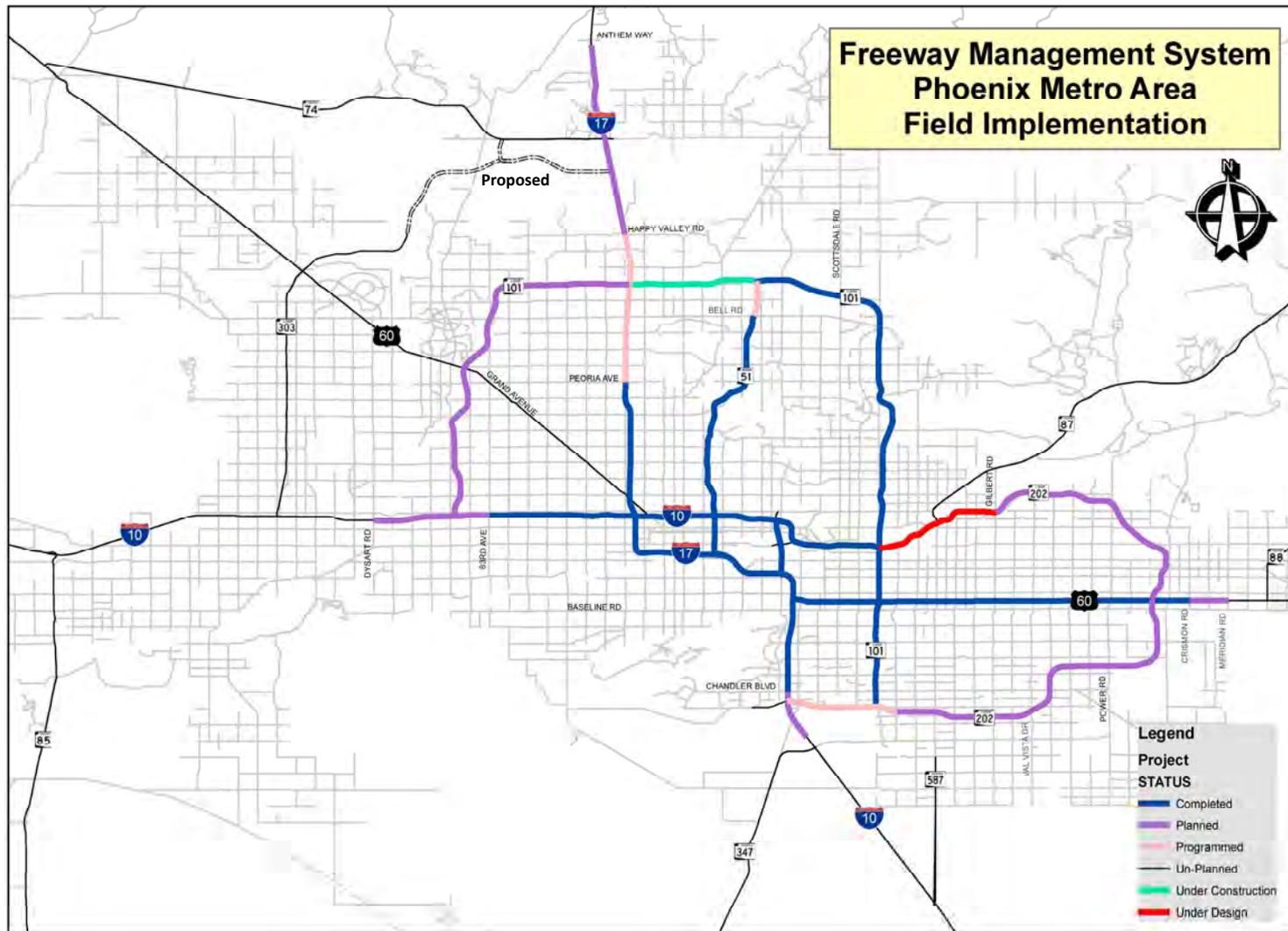
7.4.4. Regional Interface

The purpose of the AZTech C2C System is to provide common communications protocols, and the associated software interfaces to permit information exchange among the different agencies in the region. Only agencies and jurisdictions operating a specific traffic signal system currently are using the C2C system, but other traffic signal systems will be included in the system in the near future. Table 7.8 summarizes existing agency agreements that will help provide the regional interface among the jurisdictions. Other potential agreement types that could further expand the interface include:

- Data sharing and usage
- Shared video monitoring
- Mutual aid agreements
- Joint operations/shared control agreements
- Emergency coordination agreements
- Fiber sharing agreements.



Figure 7-14
FREEWAY MANAGEMENT SYSTEM PROJECT STATUS: PHOENIX METROPOLITAN AREA



Source: FMS-PhxMetro-030110.pdf at Documents, Transportation Technology Group, <http://www.azdot.gov/Highways/TTG/TTG-Docs.asp>. Update October, 2010, by MAG.

Table 7.6

SUMMARY OF EXISTING INTELLIGENT TRANSPORTATION SYSTEMS (ITS) INVENTORY BY AGENCY

| Agency | Centers | Devices | | | | | | Communications | | |
|--|--------------------------------|----------|----------------|-----------------|-----------------------|----------|-----------------|----------------|----------|--------------|
| | TMC/TOC | CCTV | DMS | Traffic Signals | Traffic Signal System | VID | Other Detection | Fiber | Wireless | Leased Lines |
| ADOT | Existing | Existing | Existing | Existing | -- | -- | Existing | Existing | -- | -- |
| MCDOT | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing |
| City of Avondale | Existing | Existing | Planned | Existing | Existing | Existing | Existing | Existing | Existing | -- |
| City of Chandler | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | -- |
| City of Glendale | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | -- |
| City of Mesa | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing |
| City of Peoria | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Planned | Existing | -- |
| City of Phoenix | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | -- |
| City of Scottsdale | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing | Existing |
| City of Tempe | Existing | Existing | Planned | Existing | Existing | Existing | Existing | Existing | Existing | -- |
| City of Tolleson | No ITS applications installed. | | | | | | | | | |
| Town of Guadalupe | No ITS applications installed. | | | | | | | | | |
| Town of Paradise Valley | No ITS applications installed. | | | | | | | | | |
| Salt River Pima-Maricopa Indian Community* | No ITS applications installed. | | | | | | | | | |
| Gila River Indian Community* | No ITS applications installed. | | | | | | | | | |

Prepared by CH2M Hill and Wilson & Company, August, 2010.

TMC/TOC = Traffic Management Center/Traffic Operations Center
 CCTV = Closed-Circuit Television
 DMS = Dynamic Message Sign
 VID = Vehicle Image Detection Existing - Existing Capability

Existing Capability – Could be expanded in the future

Planned – Currently programmed or planned for the future

* Not included in the source document. Identified here, as these two communities are part of the Central Phoenix Transportation Framework Study.

Source: Table 7 – Summary ITS Inventory by Agency (Freeway/Arterial), *MAG Regional ITS Architecture*, Final Report (091980011-15), Kimley-Horn and Associates, Inc., 2010.



Table 7.7
INTELLIGENT TRANSPORTATION SYSTEM (ITS) PROJECTS PROGRAMMED FOR THE STUDY AREA: 2008 - 2014

| Agency / Jurisdiction | Program Year | Project Description |
|-----------------------|--------------|---|
| ADOT | 2008 | Loop 202: Loop 101 to Gilbert Road – Design FMS |
| | 2008 | Loop 101: I-17 to SR-51 – Design and construct FMS |
| | 2009 | Loop 202: Loop 101 to Gilbert Road – Construct FMS |
| | 2009 | Loop 101: SR-51 Princess Drive – Design and construct FMS |
| | 2011 | I-17: Loop 101 to SR-74 – Design FMS, SR-51: Bell Road to Loop 101 – Design FMS, Loop 101: I-17 to SR-51 – Design FMS, I-17: Arizona Canal to Loop 101 – Design FMS, Loop 101: SR-51 to Princess Drive – Design FMS, Loop 202: Dobson Rd to I-10 – Design FMS |
| | 2012 | I-17: Arizona Canal to Happy Valley Road – Construct FMS |
| | 2012 | MAG Regionwide – FMS projects (2012) |
| MAG | 2009 | Regionwide – Traffic signal optimization program |
| | 2010 | Regionwide – Traffic signal optimization program |
| | 2012 | Regionwide – Traffic signal optimization program |
| MCDOT | 2008 | Regionwide – System enhancements to expand arterial traveler information systems, including 511 and az511.gov |
| | 2009 | Glendale, Peoria and Scottsdale City Limits – Establish REACT arterial incident response teams in Glendale, Peoria, and Scottsdale |
| | 2009 | Bell Rd: Loop 303 to Loop 101 – Construct ITS improvements |
| | 2010 | 99 th Avenue: Olive Avenue to Bell Road – Install conduit and fiber optic cable to connect existing and planned ITS field devices |
| | 2010 | MCDOT Traffic Management Center – Design and construct TMC upgrade |
| | 2011 | Bell Road: Loop 303 to 75 th Avenue – Construct dynamic message signs and fiber optic cable and conduit |
| | 2011 | Five different locations – Upgrade traffic signals, including CCTV facilities |
| | 2012 | Regionwide – Upgrade regional archived data server (RADS) equipment |
| | 2012 | Olive Avenue: Litchfield Road to Loop 101 – Construct and install new conduit and fiber optic cable to connect existing and planned ITS field devices |
| | 2013 | Develop and implement arterial ATIS enhancements, building on the previous Phase I efforts, 511 enhancements, and other key projects |
| | 2013 | Develop a multi-agency operations plan that will support coordinated arterial operations, freeway/arterial coordination, incident management and traveler information |
| | 2013 | Install arterial DMS and associated conduit, pull boxes, fiber optic cable, communication equipment, and electrical service equipment – joint project with Avondale and Goodyear |
| City of Avondale | 2013 | McDowell Rd from 99th Ave to Avondale Blvd plus 99th Ave from McDowell Rd north to the first signalized shopping center location – Furnish and install 2 1/8 miles of fiber optic cable, conduit, and innerduct, and associated equipment at nine traffic signals and one CCTV camera |
| City of Chandler | 2008 | Citywide – Install Chandler Fire/Police Department signal system integration and variable message signs |
| | 2009 | Chandler Blvd: Delaware Street to Gilbert Road – Install fiber optic cable traffic signal interconnection |
| | 2010 | Buffalo Street at Colorado Street – Upgrade, retrofit, and integrate TMC equipment |
| | 2011 | Arizona Ave: Pecos Road to Riggs Road – Install fiber optic cable for interconnecting traffic signals (4 out of 5 miles) |

continued





Table 7.7 (continued)

INTELLIGENT TRANSPORTATION SYSTEM (ITS) PROJECTS PROGRAMMED FOR THE STUDY AREA: 2008 - 2014

| Agency / Jurisdiction | Program Year | Project Description |
|-----------------------|--------------|---|
| City of Glendale | 2008 | Various locations – Install CCTV cameras |
| | 2009 | Olive Ave: 67 th Ave to 59 th Ave – ITS fiber and one CCTV camera – Glendale and Peoria Joint Project |
| | 2012 | Various locations – Deployment of ITS |
| | 2013 | Variable message signs; ITS conduit and fiber |
| City of Mesa | 2008 | Mesa St: Mesa Dr to Mill Ave – Construct non-intrusive detection systems, cameras, dynamic message signs and one mile of fiber optic cable |
| | 2008 | Loop 202 – Design and install fiber optic cable and end devices and complete connections at network hubs |
| | 2008 | ITS Signal Conversions – Phase 3 – Expand fiber optic network and link 11 traffic signals to the Mesa TMC |
| | 2009 | Country Club Dr: 8 th Ave to Baseline Rd (including US-60 TI) – Install real-time adaptive signal system |
| | 2009 | Various locations – Upgrade TMC equipment and purchase central components, field cameras and VMS |
| | 2009 | Along sections of Broadway, Dobson, Alma School and Baseline Rds – Establish fiber optic link on Broadway Rd and connect to west ITS loop |
| | 2010 | Baseline Rd, Southern Ave, Dobson and Alma School Rds – Establish fiber optic link with arterial streets near US-60 |
| | 2011 | Various locations – Install fiber optic communications and upgrade traffic signal controllers |
| | 2012 | ITS Signal Conversions – Phase 5 – Improve existing fiber optic communications systems and install communications network and ITS devices |
| | 2013 | Ten intersections with highest crash rates within Mesa – Implement video and acoustic sensors with communications facilitated using existing traffic controller cabinets |
| | 2013 | West side mid-city, West city limits to Country Club, University to Broadway – Upgrade central traffic control system software to accommodate a lite version of adaptive control |
| City of Peoria | 2008 | Traffic Management Center – Construct TMC |
| | 2009 | Citywide – Connect existing traffic signals to the central system using a hybrid wireless-fiber system (35 additional signals will be connected with this project) |
| | 2011 | Various locations – Design and construct extension to fiber optic backbone and install CCTV cameras |
| | 2013 | Installation of conduit, pull boxes, fiber, and CCTV cameras to connect signals to Central, and monitor traffic and provide real-time traffic management on this segment of 83 rd Avenue |
| City of Phoenix | 2008 | Downtown Phoenix – Design parking management system (Phase 3) |
| | 2008 | Various locations – Construct Phoenix regional ITS fiber optic backbone, Phase B |
| | 2009 | Various locations – Construct regional ITS fiber optic backbone, Phase B-1 |
| | 2010 | Various locations – Construct regional ITS fiber optic backbone, Phase B-2 |
| | 2011 | Various locations – Construct regional ITS telecommunications expansion |

continued

Table 7.7 (continued)

INTELLIGENT TRANSPORTATION SYSTEM (ITS) PROJECTS PROGRAMMED FOR THE STUDY AREA: 2008 - 2014

| Agency / Jurisdiction | Program Year | Project Description |
|--|--------------|---|
| City of Scottsdale | 2008 | Scottsdale Road: Loop 101 (Pima Freeway) to Indian School Road – Construct smart corridor traffic control system |
| | 2008 | Area enclosed by McKellips Road to Indian School Road and 64 th Street to Pima Road – Replace traffic signals controllers and cabinets |
| | 2009 | Scottsdale Road: Frank Lloyd Wright Boulevard to Thompson Peak Parkway – Construct smart corridor traffic control system |
| | 2009 | South Scottsdale – Controller and cabinet replacement |
| | 2010 | McDowell Road: Scottsdale Road to Pima Road – Construct smart corridor traffic control system |
| | 2011 | Scottsdale and Hayden Roads: Shea Boulevard to McDowell Road – Install detection equipment, variable message signs and software |
| | 2012 | Area enclosing Shea Boulevard to Carefree Highway and 56 th to 136 th Streets – Install dynamic message signs |
| | 2012 | South Scottsdale – Replace traffic signal controllers and cabinets |
| | 2013 | Establish last-mile connections from city fiber network |
| City of Tempe | 2008 | Citywide – Engineering services for ITS network components |
| | 2009 | Citywide – Purchase and install malfunction management units in all traffic control cabinets |
| | 2009 | Citywide – Develop ITS and communications strategic plan |
| | 2010 | Citywide – Install video detection system |
| | 2011 | Various locations – Install fiber optic connection between ADOT FMS backbone and signal cabinets at 22 interchanges |
| | 2011 | Various locations – Install wireless communications and CCTV monitoring at 26 intersections |
| | 2012 | Citywide – Design and construct fiber optic cable installations |
| | 2012 | Light Rail Transit Corridor in Tempe – Install CCTV monitoring stations |
| | 2013 | Procure and install traffic control cabinets and hardware – Phases 1 of 3 |
| Town of Guadalupe* | 2008 | 8413 S Avenida Del Yaqui – Install emergency signal device at fire station |
| Paradise Valley* | 2009 | Various locations (12 intersections) – Install video detection systems |
| Salt River Pima-Maricopa Indian Community* | | No ITS applications programmed. |
| Gila River Indian Community* | | No ITS applications programmed. |



Prepared by CH@M Hill and Wilson & Company, August, 2010.

* Not included in the source document. Identified here, as these communities are part of the Central Phoenix Transportation Framework Study.

Source: Table 8 – MAG TIP (2008-2014) Programmed ITS Projects, *MAG Regional ITS Architecture Final Report*, Kimley-Horn and Associates Inc., 2010.

Table 7.8

SUMMARY OF EXISTING AGENCY AGREEMENTS

| Agreement Name | Agencies Involved | Summary |
|--|--|---|
| Regional Concept of Transportation Operations MOU (October 22, 2003) | MAG, ADOT, MCDOT, Phoenix Transit, and Cities | Participants agree to cooperate to develop and implement regional priority functions for arterial and freeway multi-modal transportation issues. Signed by MAG; ADOT; MCDOT; cities. |
| MOU AZTech ITS Model Deployment (1996) | ADOT, MCDOT, MAG Member Agencies | Provided a framework and guidelines to promote coordinated decision making and information sharing in planning, design, development, and evaluation of AZTech Model Deployment. |
| AZTech MDI IGA's (1998) | ADOT, MCDOT, RPTA, City of Phoenix, Phoenix Public Transit, City of Glendale | Facilitated integration of existing multi-modal ITS infrastructure into a regional system. The agreements identified funding arrangements, acceptance of equipment, and maintenance and operations obligations of each of the partners. |
| AZTech Phase 1, 2, and 3 Private Partnerships (1998 – 2001) | AZTech, and private partners (integration, traveler information providers [web, PDA, kiosk and in vehicle] and transit AVL partners) | Formalized the agreement between MCDOT and private agencies for data sharing and dissemination to the public. |
| AZTech SMART Corridor Phase 2 (2002) and Phase 3 (2006) IGA's | MCDOT and eight Local Jurisdictions (Cities of Phoenix and Glendale, among others) | Cooperative arrangement between MCDOT and eight local jurisdictions to plan and implement an integrated SMART Corridor program. |
| Emergency Traffic Management Mutual Aid (REACT) MOU and IGAs | MCDOT, MCSO, City of Glendale, City of Avondale, City of Goodyear (in progress) | Agreements to provide emergency traffic management support for arterial closures/incidents. |
| Radio Interoperability for Public Safety and Transportation (December 6, 2004) | ADOT, MCDOT, DPS | Agreement between ADOT, MCDOT, and Arizona DPS to install automatic vehicle location on response vehicles. |
| AZTech Connectivity IGA (June 24, 2004) | ADOT, MCDOT | Agreement between ADOT and MCDOT to connect transportation and public safety agencies to the AZTech transportation operations telecommunications network in the Phoenix metro area. |
| AZTech Center-to-Center Stakeholder Agreement (January 2006) | AZTech Partner Agencies | Agreement of the AZTech stakeholders to develop and implement the C2C System. |
| Fiber Optic Backbone (April 3, 2006) | ADOT, City of Phoenix | Agreement between the City of Phoenix and ADOT to design and construct a fiber optic backbone, to designate fibers for each party, and for joint use of conduit. |
| Automatic Aid Agreement for Fire Protection and Emergency Services | Phoenix Fire Department, 18 Local Fire Departments | Automatic aid agreement, including centralized dispatch at Phoenix Fire and dispatch of closest vehicle to incident for fire agencies. |
| Intergovernmental Cooperative Purchasing Agreements | ADOT, MCDOT | MCDOT and ADOT established standard procurement specifications for signal system, wireless communications, and ITS equipment. |
| Agreements with Local Media (Established 2002-2004) | ADOT, Channel 3, Channel 5, Channel 10, Channel 12, Channel 15, Telemundo, Total Traffic | Agreements provide media access to ADOT CCTV freeway images for broadcasts. |
| Phoenix Downtown Traffic Management System Intergovernmental Agreement Amendment One | ADOT, City of Phoenix | City of Phoenix pay all costs associated with the DTMS project, and ADOT granted the City use of State highway right-of-way. |

continued



Table 7.8 (continued)

SUMMARY OF EXISTING AGENCY AGREEMENTS

| Agreement Name | Agencies Involved | Summary |
|---|---|--|
| Transit Services in Avondale (2004) and Glendale (2000) | City of Phoenix Transit, Local Cities | Agreement between the City of Phoenix Transit and other cities to provide fixed-route and dial-a-ride transit services. |
| Sky Harbor Rental Car Center ATIS Displays Agreement | MCDOT, City of Phoenix | MCDOT and City of Phoenix established an agreement for physical ATIS displays in the Rental Car Center and connection to the central communications room |
| Bell Road Operations Plan for Shared Use of Devices | MCDOT, City of Surprise, City of Peoria | Documented roles, responsibilities, permission levels, and shared operations between jurisdictions for devices along Bell Road between MCDOT, Surprise, and Peoria |
| REACT MOU with Agencies | MCDOT, City of Peoria (future), City of Glendale (future) | This agreement is being developed to provide consistency in REACT services and define the roles and responsibilities of the MCDOT versus the local REACT teams. |

Prepared by CH2M Hill and Wilson & Company, August, 2010.



Abbreviations:

- MOU = Memorandum of Understanding
- MAG = Maricopa Association of Governments
- ADOT = Arizona Department of Transportation
- MCDOT = Maricopa County Department of Transportation
- ITS = Intelligent Transportation Systems
- MDI = Model Development Initiative
- IGA = Intergovernmental Agreement
- RPTA = Regional Public Transportation Authority (Valley Metro)
- PDA = Personal Digital Assistant
- SMART Corridor = a corridor in which all transportation facilities are used at their maximum efficiency during both an incident and normal periods of congestion
- REACT = Regional Emergency Action Coordination Team
- MCSO = Maricopa County Sheriff's Office
- DPS = Arizona Department of Public Service
- C2C = Center-to-Center
- CCTV = Closed-Circuit Television
- DTMS = Downtown Traffic Management System
- ATIS = Advanced Traveler Information System

Source: Table 8 – MAG TIP (2008-2014) Programmed ITS Projects, MAG Regional ITS Architecture Final Report, Kimley-Horn and Associates Inc., 2010.



7.5 Goods Movement

Goods and freight movement by truck within the study area primarily is focused on the freeways and major highways serving the community. It is important to ensure full access to all parts of the community for delivery of goods and freight. Local trucking is an important part of the community’s freight system and, thus, an important part of the local economy. In fact, “the total resource costs of urban goods movement are comparable to those of urban person movement.... In other words, about half of total urban transportation costs, in economic terms, are related to freight.”⁷ Still, it also is important that through truck movements be limited to a select number of routes. In the end, restricting the movement of goods and freight to major roadways and incorporating necessary capacity and design parameters to accommodate fleet characteristics is essential to maintaining the safety and security of the community. Nearly all vehicle movements in major urban areas are tied both directly and indirectly to truck movements. This section provides information on existing, established truck routes, trucking operations and facilities, and restrictions imposed on truck movements.

7.5.1. Major Trucking Operations and Facilities

Goods and freight movement in the MAG Region is accomplished primarily using four different modes: truck, rail, air, and pipelines. Based on 2001 data, trucking is responsible for transporting approximately 86 percent of goods to, from, within, and throughout the MAG Region (*Regional Freight Assessment*, MAG, 2004). Trucks transport raw materials and processed goods for manufacturing, distribute goods to warehouses and retail locations, and deliver goods to businesses and consumers. According to the *Arizona Multimodal Freight Analysis Study* (ADOT, 2007), in 2005, 12 percent of Arizona truck trips were inbound from other states and 10 percent were outbound. Through trips represented 55 percent of the Arizona’s truck traffic and internal (both origin and destination within Arizona) truck flows accounted for 23 percent.

Based on the freight throughput analysis for the MAG Region in the *Performance Measurement Framework and Congestion Management Update Study: Phase II – Performance Measures Report* (PBS&J, 2009), I-10 (Papago Fwy) between I-17 and SR-51 has the highest average truck volumes per day. SR-143 between I-10 (Maricopa Fwy) and Loop 202 (Red Mountain Fwy), which principally serves passenger access to Sky Harbor International Airport, has the lowest. This section provides information about existing designated truck routes and operating restrictions.

Designated Truck Routes

The freeway system serves as the main truck routes within and through the study area. However, the major arterial grid system provides additional routes for trucks to move freight to, from, within, and throughout the study area and greater metropolitan region. Some jurisdictions within the study area have designated truck routes within city/town limits. However, most jurisdictions do not have designated truck routes, opting instead to establish restrictions as determined necessary by local conditions. A summary of the designated truck routes established by three jurisdictions is provided below. Information on designated truck routes presented herein is based on available data on city Web sites and information provided by the different jurisdictions.

City of Phoenix

According to the City of Phoenix Code (Sections 36-82 through 36-96), all arterial streets in the City of Phoenix are designated truck routes with the exception of Central Avenue and 1st Avenue within Zone I (area

⁷ Ogden, Kenneth Wade, “Urban Goods Movement and Its Relation to Planning” in *Proceedings of the Urban Goods and Freight Forecasting Conference* (Washington, D.C.: FHWA and TMIP, forthcoming, 1998, 2-1 to 2-14) in Casa Grande SATS Final Report, 07-02-07, pg. 38.

bounded by, but not including, Roosevelt Street on the north, Madison Street on the south, and 7th Street and 7th Avenue on the east and west, respectively (Figure 7-15). However, peak-period truck restrictions apply in certain areas (see Truck Operating Restrictions below). No time restrictions apply on “through” truck routes, which include the following:

- Freeways within the city limits, including: I-10 (except through the Deck Park Tunnel), I-17, SR-51, Loop 101 (Agua Fria/Pima Fwys) and Loop 202 (Red Mountain Fwy)
- US-60/Grand Avenue between the northwest city limit and I-17
- Buckeye Road between the west city limit and 19th Avenue
- 19th Avenue between I-17 and Lincoln Street
- Lincoln Street between 19th Avenue and 7th Street
- 7th Street between Lincoln Street and I-17.

City of Scottsdale

Based on the City of Scottsdale Code of Ordinances (Section 17-1004), the following roadways are designated truck routes (Figure 7-16):

- Camelback Road, 64th Street to Scottsdale Road
- Frank Lloyd Wright Boulevard, Scottsdale Road to Pima Road
- Hayden Road, McKellips Road to Frank Lloyd Wright Boulevard
- Indian Bend Road, Scottsdale Road to Pima Road
- Indian School Road, 60th Street to Pima Road
- McKellips Road, Scottsdale Road to Granite Reef Road
- McDowell Road, 64th Street to Pima Road
- Pima Road, McDowell Road to Stage Coach Pass Road
- Scottsdale Road, Roosevelt Street to Carefree Highway
- Shea Boulevard, 64th Street to east city limits
- Thomas Road, 56th Street to Pima Road.

City of Peoria

All highways in the National Highway System (NHS) within the city limits are designated truck routes, which includes US-60/Grand Avenue, Loop 101 (Agua Fria Fwy) and Loop 303/Estrella Freeway (future). Based on the City of Peoria Code (Sections 14-66 through 14-74), the following additional roadways are designated truck routes (Figure 7-17):

- Northern Avenue from approximately 115th Avenue, east to 71st Avenue
- Olive Avenue from approximately 115th Avenue, east to 67th Avenue
- Peoria Avenue from the interchange with Loop 101 (Agua Fria Fwy) east to 83rd Avenue
- Cactus Road from 91st Avenue east to 67th Avenue
- Thunderbird Road from 91st Avenue east to 67th Avenue



Figure 7-15
TRUCK ROUTE MAP: CITY OF PHOENIX

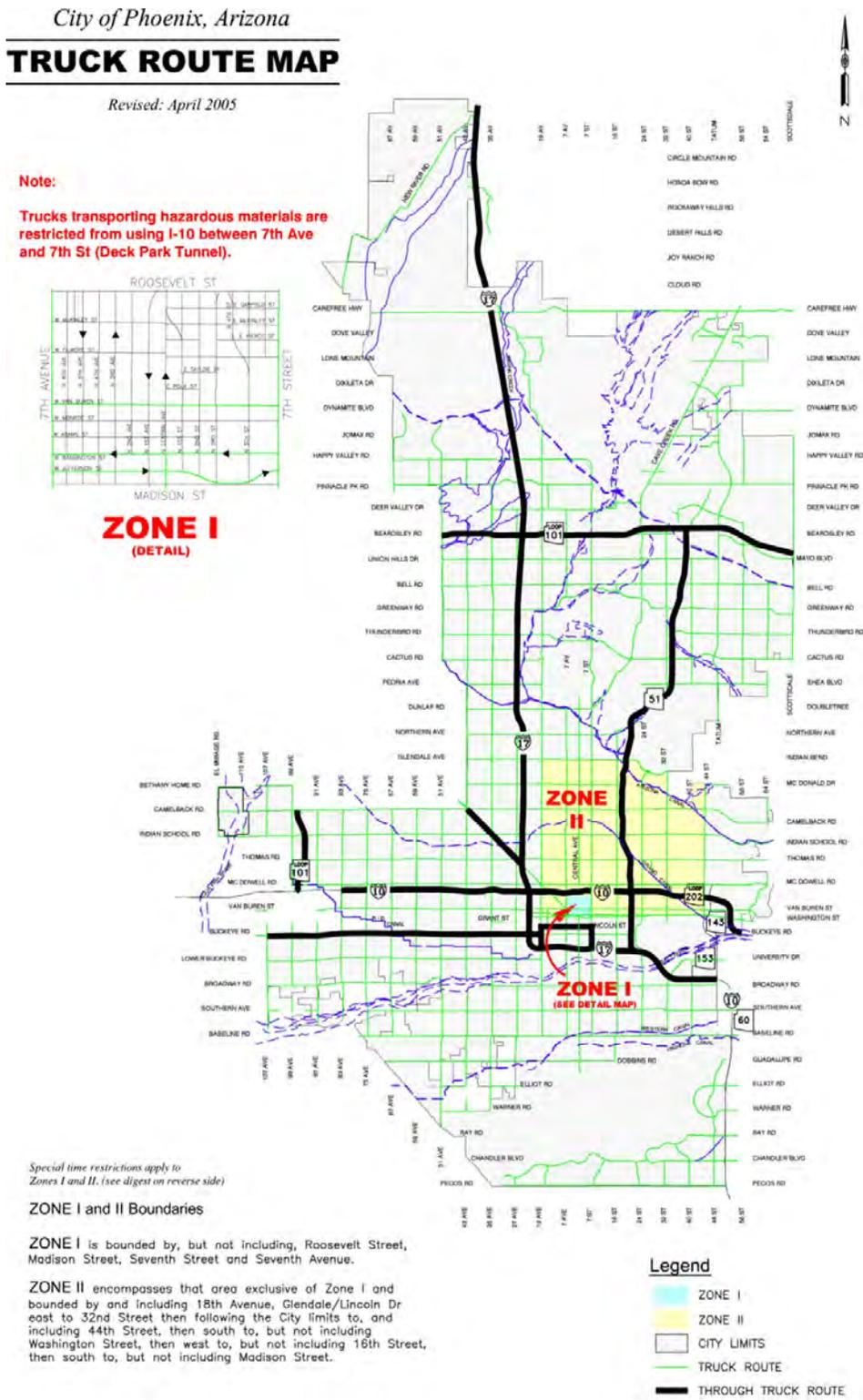


Figure 7-16
CURRENT TRUCK ROUTES: CITY OF SCOTTSDALE

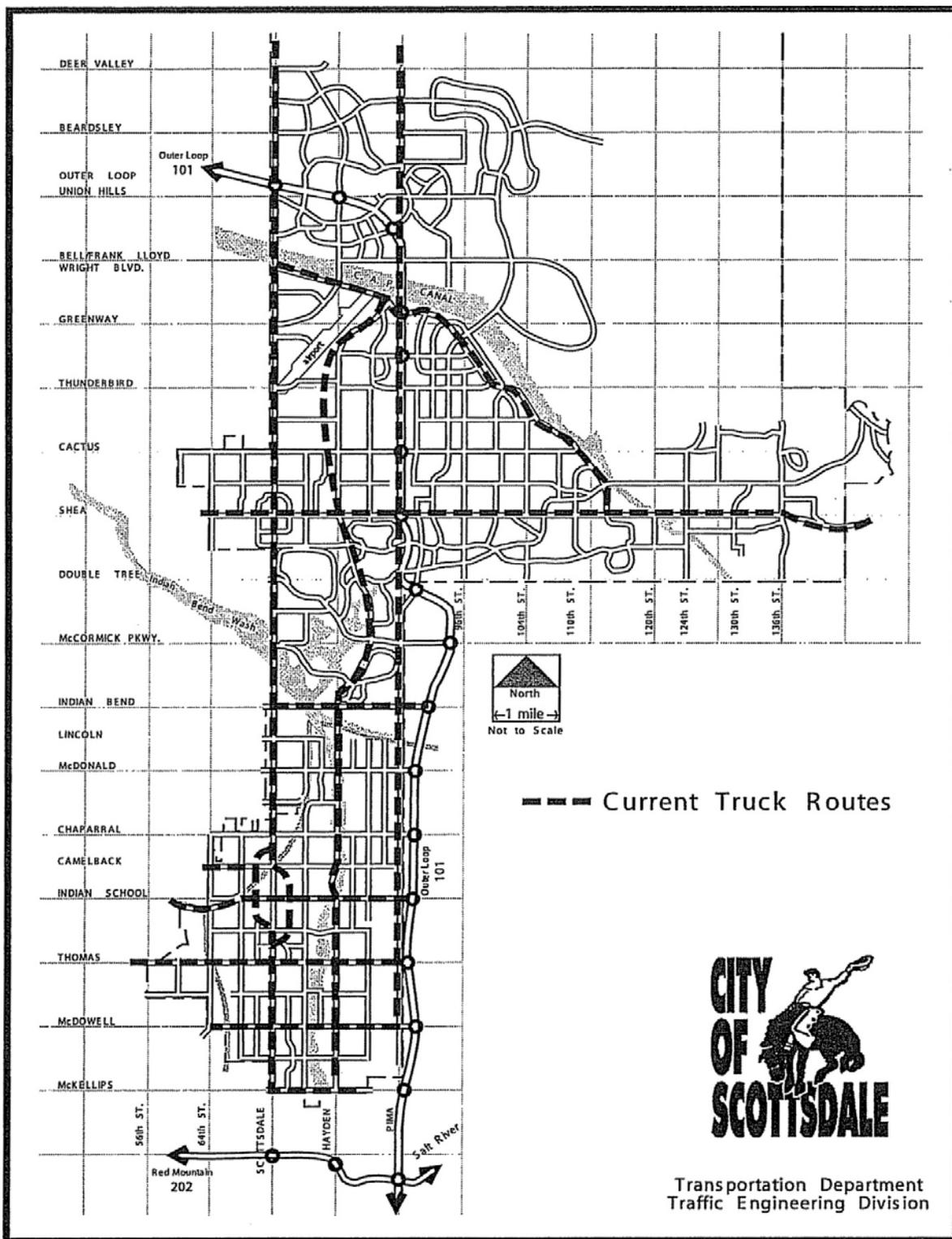
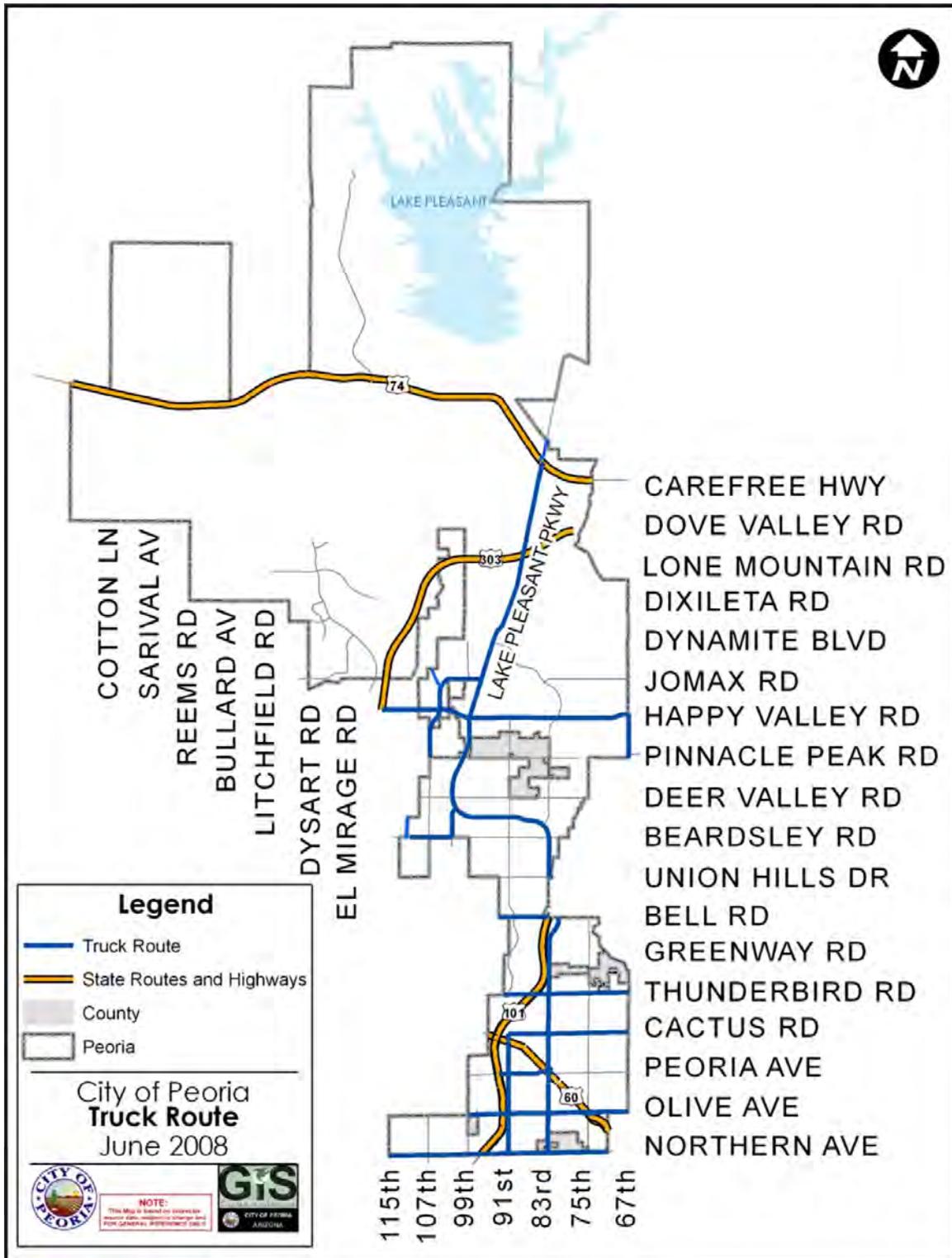


Figure 7-17
TRUCK ROUTES: CITY OF PEORIA



- Bell Road from approximately 93rd Avenue east to 83rd Avenue
- Beardsley Road from Lake Pleasant Road west to the city limit
- Happy Valley Parkway from approximately 109th Avenue to Lake Pleasant Parkway; Happy Valley Road from Lake Pleasant Parkway to 67th Avenue
- Jomax Road west of Lake Pleasant Parkway to the 107th Avenue
- 112th Avenue from Rose Garden Lane to Beardsley Road
- 107th Avenue north from Pinnacle Peak Road to Jomax Road, which also is known as Tierra Del Rio Boulevard
- Lake Pleasant Road from Beardsley Road north to Lake Pleasant Parkway
- 91st Avenue from Northern Avenue north to Loop 101 (Agua Fria Fwy)
- 83rd Avenue from Northern Avenue north to Cotton Crossing, following Cotton Crossing north to Peoria Avenue, north from Peoria Avenue to Bell Road, then north from Union Hills Drive to Lake Pleasant Parkway
- New River Road from SR-74/Carefree Highway north to the city limit.



City of Tempe

Section 19-164 of the Tempe City Code states that “The city traffic engineer is authorized to determine and designate parts of streets or specific lanes as truck routes, with council approval, and when so designated all such trucks shall use routes to the closest point of the destination.” There currently are no designated truck routes in the city.

Truck Operating Restrictions

In lieu of developing and publishing an official truck route map, many agencies and jurisdictions opt to impose restrictions on truck movements, such as: local delivery only no trucks exceeding x pounds. Information on truck operating restrictions summarized below is based on available data on city Web sites and information provided by the different agencies.

Arizona Department of Transportation (ADOT)

Trucks carrying hazardous materials are restricted from using I-10 through the Deck Park Tunnel (between 7th Avenue and 7th Street). This traffic is diverted from every approach to the tunnel. This same restriction applies to the Loop 202 (Red Mountain Fwy) bridge structure crossing the Salt River between McClintock Drive and the Loop 101/Loop 202 interchange.

City of Chandler

Based on discussions with the City Transportation Engineer, the City of Chandler has no restrictions on any roadways for weight or cargo.

City of Glendale

Based on discussions with the City Transportation Department, there are no restrictions on arterial streets within the city. However, trucks are not allowed to operate on residential or collector streets.

City of Peoria

Based on Section 14-76 of the Peoria City Code, certain roadways that are designated truck routes may have restricted hours of operation. The city posts notices on these routes, prohibiting truck operation between 9:00 p.m. and 5:00 a.m. to help reduce noise and vibration through residential areas. Vehicles or loads in excess of the size and weight limitations set forth by Arizona Revised Statutes (A.R.S.) Title 28, Chapter 3, Article 18, are not permitted on streets within the City of Peoria without a special permit.

City of Phoenix

Consistent with ADOT restrictions, trucks carrying hazardous materials are restricted from using I-10 through the Deck Park Tunnel (between 7th Avenue and 7th Street). This traffic is diverted from every approach to the tunnel. A special permit, issued by the Police Department, is required to operate on city streets any vehicle or load that exceeds the size and weight limitations set by A.R.S. Title 28, Chapter 3, Article 18. Conditional restrictions on the oversize/overweight vehicle are included with the permit.

There are peak-period truck restrictions within two zones (refer to Figure 7-13). Zone I is the area bounded by, but not including, Roosevelt Street on the north, Madison Street on the south, and 7th Street and 7th Avenue on the east and west, respectively. Zone II is the area bounded by and including 18th Avenue, Glendale Avenue/Lincoln Drive east to 32nd Street, then following the city limits to, and including, 44th Street, then south to, but not including, Washington Street, then west to, but not including, 16th Street, then south to, but not including, Madison Street. The following restrictions apply in these zones:

- Trucks may not operate in Zone I between 4:00 p.m. and 6:00 p.m. and are only allowed in the zone between 7:00 a.m. and 10:00 p.m. to pick up/deliver a shipment to a single address.
- Trucks may not enter Zone II between 7:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m.

Additional haul restrictions in the Phoenix city code do not allow construction materials to be spilled or tracked onto the city streets or sidewalks. Also, large hauls (exceeding 10,000 cubic yards or lasting longer than 20 days) require a haul permit and a haul plan approved by the Street Transportation Department.

City of Scottsdale

Based on City of Scottsdale Code of Ordinances (Section 17-1004), commercial vehicles exceeding 10,000 pounds are not allowed to operate on city streets, except for the purpose of picking up or delivering of materials. Per Section 17-302, a permit from the city is required to operate on streets within the City of Scottsdale any vehicle or load that exceeds the size and weight limitations set by A.R.S. Title 28, Chapter 3, Article 18. The following restrictions apply:

- No oversize/overweight vehicles or loads may operate on a public roadway from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday.
- No oversize/overweight vehicles or loads may be driven through the downtown area as a through route, except when necessary to deliver or pick up a vehicle or load on private property or a job site within that area. The downtown area is bounded by Chaparral Road on the north, Osborn Road on the south, Civic Center Boulevard on the east, and Goldwater Boulevard on the west.

City of Tempe

A special permit, issued by the City of Tempe Traffic Engineer, is required to operate on city streets any vehicle or load that exceeds the size and weight limitations set by A.R.S. Title 28, Chapter 3, Article 18. Restrictions on the oversize/overweight vehicle permit state that vehicles:



- Will not operate on any roadway under construction
- Will not operate on Mill Avenue between University and Rio Salado
- Cannot travel on city streets between 6:00 a.m. to 8:30 a.m. and 4:00 p.m. to 7:00 p.m., Monday through Friday.



City of Tolleson

Trucks are not allowed on Van Buren Street through the City of Tolleson. There are no other truck restrictions in the city.

Town of Guadalupe

Based on discussion with the Public Works Town Manager, trucks are not allowed on town streets except for local deliveries.

Town of Paradise Valley

Based on discussions with the Town Engineer, there is a 10,000-pound weight restriction within the town.

7.5.2. Rail Freight Operations and Facilities

As noted earlier, there are two railroad companies operating rail freight services within the study area: BNSF and UPRR. This section offers additional information concerning these operations.

BNSF Railway

The BNSF Railway Company right-of-way in the study area generally runs parallel with US-60/Grand Avenue and is referred to as the Phoenix Subdivision. Right-of-way varies from 75 feet to 200 feet in width, with 200 feet being predominant. Maximum operating speed is limited to 49 mph for all trains, both freight and passenger (although there is no passenger service provide at this time). Approximately 10 to 12 through trains and local trains currently are operated per day over the line.

The BNSF owns, maintains, and operates four facilities within the study area:

Phoenix Yard: this facility is the southernmost point of service for BNSF in the Phoenix metropolitan area. It is situated between 9th Avenue and 15th Avenue on the south side of Harrison Street. An additional staging area is located west of 15th Avenue, extending to 18th Avenue. A wye at the yard facilitates service south along 11th Street to the industrial area of South Phoenix located south of I-17

Mobest Yard: This facility is located near the intersection of McDowell Road and Grand Avenue in Phoenix. It serves as BNSF’s primary yard along the Phoenix Subdivision. The yard was built in 1895 and is 3,000 feet long. BNSF Railway Company’s fueling and sanding facility, turntable, locomotive inspection and repair pits, freight car inspection and repair, and crew facilities are all located within Mobest Yard.

Desert Lift Intermodal Facility: This facility is located near the intersection of Camelback Road and Grand Avenue. It is used to transfer sealed containers between trains and trucks. According to the “State of Arizona 2007 Railroad Inventory and Assessment” this facility has a capacity of between 100,000 and 250,000 lifts per year.

Alhambra Yard: This facility is located near Indian School Road and Grand Avenue. The yard is used to store empty cars and for staging of loaded cars for local customers. Some classification work (switching) is also done at the yard.

Glendale North/South Yards: These yards are located between Glendale Avenue and Bethany Home Road. The yards are used for staging loaded and empty cars for local customers. BNSF would like to connect the two yards in order to provide longer yard tracks.

A new spur is being constructed at 83rd Avenue in Peoria in conjunction with development of a new Wal-Mart store.

Union Pacific Railroad Company

The UPRR, under the direction of its parent company, Union Pacific Corporation, links 23 states in the western two-thirds of the country. The railroad company serves many of the fastest-growing U.S. population centers, including the Phoenix metropolitan area. UPRR’s diversified rail freight operations provide transportation support for several major industries, including: agricultural products, automotive, chemicals, energy, and industrial products. It also operates intermodal facilities. The railroad offers competitive routes from all major West Coast and Gulf Coast ports to eastern gateways. UPRR also connects with Canada's rail systems and is the only railroad serving all six major gateways to Mexico.

UPRR rail operations within the study area occur along the Phoenix Subdivision, which was built in 1887. The portion of the Phoenix Subdivision within the Yuma West Corridor currently averages approximately three local/switching trains a day. UPRR is continuing to make improvements along its line and has completed the construction of Campo Yard in 2002, added three additional tracks and a trans-load track to the Phoenix Yard in 2004, and expanded the Phoenix auto facility in 2005.

The Yuma Line, running west from Phoenix, is the former railroad link between Phoenix, Yuma, and Los Angeles. It has not seen regular passenger or freight service since 1996. Union Pacific (and predecessor Southern Pacific) chose to downgrade most of this line to “storage” in order to save on maintenance costs. Currently this line sees only a few "local" freight trains daily between downtown Phoenix and Buckeye, since its downgrading from an Amtrak passenger main in 1996. Nevertheless, it is still in relatively good shape and has been evaluated as a potential route for future commuter rail service.

The UPRR owns, maintains, and operates four facilities within the study area:

Campo Yard: This facility is located between 43rd Avenue and 35th Avenue in Phoenix and holds 12 sets of tracks. It is located in the middle of the South Phoenix industrial area and has spurs extending both north and south to serve industrial customers.

Union Station: This facility is located near the intersection of 4th Avenue and Harrison Street in Downtown Phoenix. It served as the main station for Amtrak passenger service until 1996, when such service was discontinued.

Phoenix Harrison Street Yard: This facility is located between 7th Street and 16th Street in Downtown Phoenix, east of Union Station. It is the largest of the UPRR facilities in the study area with over 20 sets of tracks. Rail spurs facilitate service to customers located in the industrial district to the south. An intermodal facility and an automobile trans-load facility are located on the south side of the Harrison Street Yard.



APPENDICES





APPENDIX A
Information on Study Area Watersheds and Drainage Projects

[Excerpts from 2009 Comprehensive Floodplain Management Plan and Program, Flood Control District of Maricopa County]

APPENDIX B
Major Study Area Superfund Program Sites





APPENDIX C

Threatened, Endangered, and Sensitive Species of Flora and Fauna

