

Developed by LKC Consulting Services, Inc. for the Regional Public Transportation Authority (RPTA, also known as Valley Metro), in cooperation with the Maricopa Association of Governments. Developed with funding assistance from the Federal Transit Administration, United States Department of Transportation.

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the views of the RPTA. This study was accepted by the RPTA Board on July 10, 2003.

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### Agency Advisors Group

- Valley Metro / RPTA
- Maricopa Association of Governments (MAG)
- Maricopa County
- Arizona Department of Transportation
- City of Phoenix
- City of Tempe
- City of Mesa
- City of Scottsdale
- City of Chandler
- City of Glendale
- City of Avondale
- Salt River Pima-Maricopa Indian Community

### Other Stakeholders

- Town of Gilbert
- Town of Buckeye
- City of Peoria
- City of Goodyear
- City of Surprise
- City of Queen Creek
- Gila River Indian Community
- Valley Metro Operations Staff (VMOS)
- Dial-a-Ride / ADA / Seniors Advisors
- Rideshare / TDM Staff
- Vanpool Staff
- MAG and Valley METRO Public Forums

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## **SECTION ONE: INTRODUCTION**

This report documents the process and findings that went into the creation of the Regional Transit System Study. The findings included in this report include materials presented at Agency Advisors Group (AAG) meetings through May 2003.

### **STUDY PURPOSE AND BACKGROUND**

By 2025, there will be over five million people living in the greater Phoenix metropolitan area. Traffic congestion is projected to increase despite substantial transportation investments. Bus service provides over 18 million miles of transit service annually, but significant expansion is needed to meet user needs.

The Regional Transit System Study (RTS) develops a fiscally constrained regional multi-modal transit plan for Maricopa County that could be implemented over the next 20 years. The study evaluates all modes of public transit other than fixed guideway / high capacity transit to determine how best to meet current and future transportation needs.

#### **Background**

The RTS is a component of the Regional Transportation Plan (RTP) currently being developed by the Maricopa County Association of Governments (MAG). MAG is a regional agency made up of the Valley communities working together to ensure a better quality of life. MAG is the designated Metropolitan Planning Organization (MPO) for the Phoenix metropolitan area. MAG is made up of the 24 incorporated cities and towns in Maricopa and Pinal Counties, the Gila and Salt River Pima-Maricopa Indian Communities, and Maricopa County.

The RTP project is the largest planning initiative in Phoenix in four decades. The last such exercise set the blueprint for the regional freeway network now nearing completion. The new RTP will address the sustained growth that is expected over the next four to five decades. It will provide a new policy framework to guide regional transportation investments and establish measures of performance to better monitor and improve the transportation system in the future. Using this information, the RTP will also identify and prioritize specific transportation projects needed to keep up with the increasing travel demands in the region. The short-term recommendations of the RTP will form the basis for the five-year transportation improvement program.

Studies underway as part of the RTP include:

- Northwest Area Transportation Study
- Southeast Maricopa / Northern Pinal County Area Transportation Study
- Southwest Area Transportation Study
- East-West Mobility Study
- Freeway Bottleneck Study
- High Capacity Transit Plan
- Regional Transit System Study
- Central / East Valley (CP/EV) Light Rail Transit Project

In addition, MAG has worked with the study teams to develop new demographic projections through the year 2040.

Development of the RTP is in two phases. Phase I was completed in spring 2002. Phase I focused on defining policies and goals and analyzing different regional growth scenarios. Phase II is currently underway. Phase II will identify specific projects to meet regional goals developed in Phase I. Different investment alternatives will be evaluated and ranked using results from Phase I. Projects will include all forms of transportation, including roadways, transit, bicycle and pedestrian projects and will include funding from Federal, State and Local sources. The result will be a new multi-modal transportation plan to meet future travel needs.

The CP/EV Light Rail Project, the RTS, and the High Capacity studies compose the transit portions of the RTP. The High Capacity study will evaluate potential light rail (LRT), commuter rail (CRT), or bus rapid transit (BRT) corridors in the Phoenix area. The RTS study looks at all other forms of transit service. The RTS and high capacity studies both assume the minimum operating segment (MOS) for the CP/EV LRT project as a given in their baselines.

### **Study Purpose**

The RTS has developed guidance in the implementation of future bus and dial-a-ride services. The study analyzed existing transit networks for bus and dial-a-ride services. Using growth projections for ten-year intervals from 2000 to 2040, existing transit networks were compared with future needs for transit service to identify gaps between current levels of service and future demand for services.

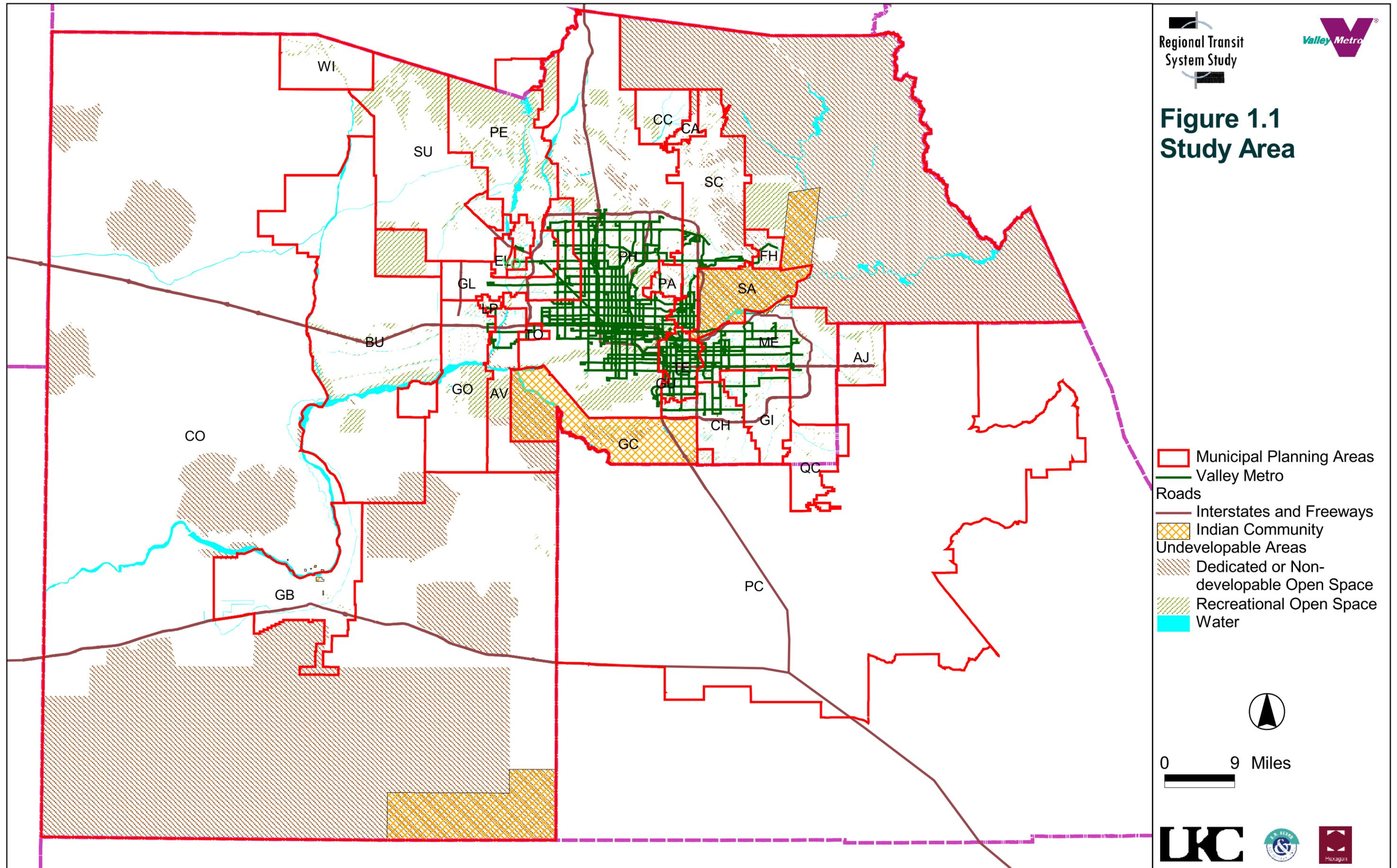
This information was used to identify new transit projects that could be implemented over the next twenty to thirty years. Key regional issues, such as providing coordinated public transportation in a large service area and funding for a rapidly expanding transit network, were also addressed.

## **STUDY AREA**

The study area for this project includes all of Maricopa County and the northern portion of Pinal County. More than half the state's population resides in Maricopa County. From 1990 to 2000, the population of Maricopa County grew by 45 percent, from 2.1 million in 1990 to 3.1 million in 2000. According to Arizona state population projections, in 25 years, there will be over 5 million people living in the region. The metropolitan area is the state's major center of political and economic activity. Maricopa County measures 9,222 square miles.

The study area is shown in **Figure 1.1**.

# Figure 1.1 Study Area



The study area is divided into 29 Municipal Planning Areas (MPAs). The 29 MPAs collectively make up the entire study area, which includes portions of northern Pinal County. Although MPAs are named for the cities or towns they contain, the MPA boundaries are not the same as municipal boundaries, and MPAs may contain significant unincorporated land or pieces of more than one incorporated place. As a result, the populations and areas cited in this report for MPAs do not match those for the incorporated places by themselves. The population and area of each City and MPA in the study area is shown in **Table 1.1**.

**Table 1.1**  
**2000 Population and Area, MPA Versus Place**

MPA / Place	Population		Area (Square Mile)	
	Place	MPA	Place	MPA
Apache Junction	31,814	40,462	34.2	46.0
Avondale	35,883	37,827	41.3	94.0
Buckeye	8,497	16,663	145.8	670.0
Carefree	2,927	2,967	8.9	12.0
Cave Creek	3,728	3,855	28.2	43.0
Chandler	176,581	185,309	58.0	75.0
El Mirage	7,609	8,723	9.7	10.0
Fountain Hills	20,235	20,497	18.2	18.0
Gila Bend	1,980	2,264	22.8	177.0
Gila River Indian Community	2,699	2,699	150.0	150.0
Gilbert	109,697	119,159	43.2	73.0
Glendale	218,812	230,286	55.8	92.0
Goodyear	18,911	21,246	116.5	151.0
Guadalupe	5,228	5,227	0.8	1.0
Litchfield Park	3,810	3,831	3.1	4.0
Mesa	396,375	441,846	125.2	170.0
Paradise Valley	13,664	14,071	15.5	16.0
Peoria	108,364	114,143	141.7	220.0
Phoenix	1,321,045	1,350,472	475.1	651.0
Queen Creek	4,316	8,947	25.8	63.0
Salt River Pima-Maricopa Indian Community	6,405	6,451	Not available	82.0
Scottsdale	202,705	204,317	184.4	184.0
Surprise	30,848	37,746	69.5	286.0
Tempe	158,625	158,865	40.2	40.0
Tolleson	4,974	4,998	5.6	6.0
Wickenburg	5,082	7,419	11.5	76.0
Youngtown	3,010	3,013	1.3	2.0
Maricopa County MPA	Not available	82,641	Not available	1,218.0
Pinal County MPA	Not available	108,348	Not available	1,864.0

Source: MAG, 2000 US Census

**Table 1.2** shows the composition of each MPA. The table shows the incorporated communities and census designated places (CDP) in each MPA and the portion of each MPA that is made up of those places.

**Table 1.2  
2000 Composition of MPAs**

MPA	Place (City, Town, CDP)	Place Area as % of MPA	Place Pop as % of MPA
Apache Junction	Apache Junction	71%	79%
Avondale	Avondale	44%	95%
Buckeye	Buckeye	25%	52%
Carefree	Carefree	74%	99%
Cave Creek	Cave Creek	66%	97%
	New River (partial)	15%	n/a
Chandler	Chandler	81%	95%
	Sun Lakes (partial)	2%	6%
El Mirage	El Mirage	95%	87%
Fountain Hills	Fountain Hills	98%	99%
Gila Bend	Gila Bend	13%	87%
Gila River Indian Community	Gila River Indian Community (Maricopa County Portion)	100%	100%
Gilbert	Gilbert	59%	92%
Glendale	Glendale	60%	95%
Goodyear	Goodyear	77%	89%
Guadalupe	Guadalupe	96%	100%
Litchfield Park	Litchfield Park	72%	99%
Mesa	Mesa	73%	90%
Paradise Valley	Paradise Valley	96%	97%
Peoria	Peoria	64%	95%
Phoenix	Phoenix	73%	98%
	New River (partial)	10%	n/a
	Black Canyon City	0%	0%
Queen Creek	Queen Creek	41%	48%
Salt River Pima-Maricopa Indian Community	Salt River Pima-Maricopa Indian Community	100%	100%
Scottsdale	Scottsdale	100%	99%
Surprise	Surprise	24%	82%
Tempe	Tempe	99%	100%
Tolleson	Tolleson	93%	100%
Wickenburg	Wickenburg	15%	69%
Youngtown	Youngtown	69%	100%
Maricopa County MPA	Sun City	0.2%	46%
	Sun City West	0.2%	32%
	Rio Verde	0.1%	2%
	Fort McDowell Reservation		1%
	Sun Lakes (partial)		0.1%

MPA	Place (City, Town, CDP)	Place Area as % of MPA	Place Pop as % of MPA
Pinal County MPA	Casa Grande	3%	23%
	Florence	0.4%	16%
	Eloy	2%	10%
	Gila River Indian Community (Pinal County Portion)		8%
	Coolidge	0.3%	7%
	Gold Camp	1%	6%
	Superior	0.1%	3%
	Sacaton	0%	1%
	Maricopa	0.2%	1%
	Queen Valley	1%	1%
	Maricopa (Ak Chin) Indian Community		1%
	Ak-Chin Village	1%	1%
	Santan	0%	1%
	Stanfield	0.2%	1%
	Blackwater	0%	0%

*Source: MAG, 2000 US Census*

The MPAs are composed of smaller Districts that are used by MAG in measuring trip patterns (patterns are aggregated into district-to-district trips). The urbanized portion of the region has a total of 67 districts.

Districts themselves are split into transportation analysis zones (TAZ). There are a total of 1,941 TAZ in the study area. The size of TAZ varies, from very small in built-up areas to several square miles in undeveloped areas. All demographic data provided by MAG can be broken down to the TAZ level, so the TAZ forms the basic unit of analysis for this study.

## **GOALS AND OBJECTIVES**

As part of the RTS, the project team worked with an Agency Advisors Group (AAG) that consisted of representatives of the Regional Public Transportation Authority (RPTA), MAG, the Arizona Department of Transportation (ADOT), Maricopa County, the Salt River Pima-Maricopa Indian Community, and the Cities of Phoenix, Tempe, Mesa, Scottsdale, Chandler, Glendale, Gilbert and Avondale. In May 2002, the AAG developed the following goals to guide the RTS project:

- 1) Provide transit to encourage mobility and independence for all residents of Maricopa County.
- 2) Encourage the use of transit as an alternative to personal auto travel to reduce commute trips and vehicle miles traveled
- 3) Ensure that transit services meet the goals of the Americans with Disabilities Act (ADA) for persons with disabilities
- 4) Provide transit access and passenger facilities for major activity centers, employment, education, shopping, medical services, and airports to sustain and encourage economic success for residents and businesses
- 5) Plan efficient and effective transit to meet community needs and to ensure value. Offer innovation in transit service planning to optimize limited resources.
- 6) Develop intermodal transfer centers to increase choices and provide convenient transfers for transit users.
- 7) Provide higher capacity transit in corridors where demand warrants to reduce traffic congestion and to improve air quality.
- 8) Support city comprehensive plans to encourage transit-oriented development.
- 9) Communicate the benefits of transit as an alternative to the automobile to encourage transit riders through effective marketing and customer information. Develop communication tools to encourage transit use by children.
- 10) Use innovations in technology such as smart fare media and trip planning software to provide more flexible and convenient transit services.

## **LITERATURE REVIEW**

As part of this study, a literature review was conducted of prior and on-going transportation studies. The literature review included:

- The High Capacity Transit Plan
- Sub-Regional Transportation Studies (Southeast, Southwest, Northwest)
- East / West Mobility Study
- Freeway Bottleneck Study
- ADOT / MAG HOV and Value Lanes Study
- RPTA Facilities Master Plan
- Valley Metro Annual Short Range Transit Report
- Transit Plans and General Plans produced by local jurisdictions

Findings from the literature review were discussed with representatives of most communities in the Phoenix area at the time of the first round of stakeholder meetings in the fall of 2002. Stakeholder groups included representatives of the following:

- Valley Metro / RPTA
- Valley Metro Operators Staff
- Dial-a-Ride / ADA / Senior Advisors
- Rideshare, TDM and Vanpool Staff
- MAG
- ADOT
- Maricopa County
- City of Phoenix
- City of Tempe
- City of Mesa
- City of Scottsdale
- City of Glendale
- City of Chandler
- City of Avondale
- Town of Gilbert
- Town of Buckeye
- City of Peoria
- City of Goodyear
- City of Surprise
- Gila Bend Indian Community
- Salt River Pima-Maricopa Indian Community
- MAG and Valley Metro public forums

The literature review was used for the following purposes:

- To establish an accurate baseline for existing (2002) service
- To identify projects that had already been committed
- To identify planned or proposed projects

Where possible, those proposed projects that were consistent with the 2030 RTS were incorporated into the 2030 plan and interim networks.

A full bibliography of literature used in this report is included as **Appendix A**.

## **DOCUMENT ORGANIZATION**

This report includes documentation of the findings and methodologies used to create the Regional Transportation Plan for 2030 and interim plans. This report is divided into the following sections:

- Section One: Introduction
  - Study Purpose and Background
  - Study Area
  - Literature Review
  - Document Organization
- Section Two: Study Area Characteristics
  - Demographic Characteristics
  - Transit Need
- Section Three: Existing Transit Service
  - Valley Metro Organization
  - Service Characteristics
- Section Four: Peer Review
- Section Five: Regional Transit System Plan
  - Components of the Regional Transit System Plan
  - 2030 Transit Plan
  - Interim Networks
- Section Six: Costs and Funding
  - Operating and Capital Costs
  - Funding Sources

## SECTION TWO: STUDY AREA CHARACTERISTICS

The purpose of this section is to present existing and estimate future conditions in the study area. Existing conditions provide the baseline upon which proposed new transit services are based. The future demographic data described in this section is used in the RTS to determine the future need for transit service.

This section is divided into two subsections:

- Demographic Characteristics
- Transit Need

As noted in the previous section, the Study Area is made up of all of Maricopa County, including the urbanized Phoenix area, and the northern part of Pinal County.

### DEMOGRAPHIC CHARACTERISTICS

The study area is characterized by great contrasts between the Phoenix urbanized area and rural areas. The Phoenix urbanized area is characterized by urban population densities and rapid growth in population and employment. The area is served by a dense network of transportation facilities including highways, roads, and transit service. Rural portions of the study area are characterized by extremely low population densities, and much of the study area has no roads and / or is off-limits to the general public, with extremely rugged terrain. What both the urbanized and non-urbanized areas have in common is rapid population growth.

The following demographic factors were evaluated for the study area:

- Population / Population Density
- Employment / Employment Density
- Income / Low-Income Households
- Senior Population
- Population with Disabilities

The primary data source for demographic data is the MAG Draft 2 TripGen files. TripGen files were provided by MAG at the TAZ level. LKC has aggregated data to the MPA level where appropriate. 2000 U.S. Census data was also used. To use Census data, data at the Census Block Group level was aggregated to match MAG TAZ.

Note that subsequent to the analysis performed as part of this study, MAG released revised Draft 3 demographic projections. Regionally, the population and employment of the area do not change significantly between the two drafts (by less than one percent for each). However, the Draft 3 data have some larger differences at the MPA or TAZ level. Per the scope of work for this project and discussions with the AAG, Draft 2 data are used in this study.

## **Population**

The population of the study area is overwhelmingly concentrated in the Phoenix urbanized area and the adjacent Avondale small urban area. **Table 2.1** shows the population and population density for MPAs within the study area according to the MAG Draft 2 projections.

**Table 2.1**  
**2000 Population and Population Density by MPA**

<b>MPA</b>	<b>2000 Population</b>	<b>Area (sq. mi.)</b>	<b>Pop / Sq. Mi.</b>
Apache Junction	40,462	46	879.6
Avondale	39,266	94	417.7
Buckeye	16,430	670	24.5
Carefree	3,760	12	313.3
Cave Creek	4,098	43	95.3
Chandler	193,951	75	2,586.0
El Mirage	9,806	10	980.6
Fountain Hills	22,387	18	1,243.7
Gila Bend	2,435	177	13.8
Gila River Indian Community	3,542	150	23.6
Gilbert	121,961	73	1,670.7
Glendale	239,357	92	2,601.7
Goodyear	20,364	151	134.9
Guadalupe	5,825	1	5,825.0
Litchfield Park	4,513	4	1,128.3
Mesa	514,814	170	3,028.3
Paradise Valley	17,758	16	1,109.9
Peoria	121,097	220	550.4
Phoenix	1,423,062	651	2,186.0
Queen Creek	9,300	63	147.6
Salt River Pima-Maricopa Indian Community	8,142	82	99.3
Scottsdale	233,276	184	1,267.8
Surprise	46,029	286	160.9
Tempe	172,820	40	4,320.5
Tolleson	5,363	6	893.8
Wickenburg	8,843	76	116.4
Youngtown	3,384	2	1,692.0
Maricopa County MPA	90,631	1,218	74.4
Pinal County MPA	97,148	1,864	52.1
<b>TOTAL</b>	<b>3,479,824</b>	<b>6,494</b>	<b>535.9</b>

Source: MAG Draft 2 Projections

Population is expected to grow rapidly in nearly all MPAs over the next 30 years. Population projections were provided by MAG, as the Draft 2 TripGen projections. **Table 2.2** shows the projected population in 2010, 2020 and 2030 for each MPA, and the growth rate from 2000 to 2030.

**Table 2.2**  
**Population Growth by MPA, 2000-2030**

MPA	Population				Growth, 2000-2030
	2000	2010	2020	2030	
Apache Junction	40,462	45,830	51,274	56,685	40%
Avondale	39,266	72,743	105,309	116,296	196%
Buckeye	16,430	76,185	166,635	490,629	2886%
Carefree	3,760	5,096	6,022	6,243	66%
Cave Creek	4,098	5,489	6,186	13,581	231%
Chandler	193,951	270,393	296,127	299,487	54%
El Mirage	9,806	36,114	46,297	52,971	440%
Fountain Hills	22,387	27,287	33,826	34,662	55%
Gila Bend	2,435	3,053	6,222	18,281	651%
Gila River Indian Community	3,542	4,159	5,249	6,309	78%
Gilbert	121,961	183,276	280,847	291,540	139%
Glendale	239,357	304,581	318,811	321,838	34%
Goodyear	20,364	65,765	162,148	334,855	1544%
Guadalupe	5,825	5,894	5,948	6,001	3%
Litchfield Park	4,513	9,574	15,026	15,582	245%
Mesa	514,814	618,768	710,954	748,305	45%
Paradise Valley	17,758	19,398	20,373	20,922	18%
Peoria	121,097	173,528	259,437	359,920	197%
Phoenix	1,423,062	1,779,857	2,098,839	2,261,677	59%
Queen Creek	9,300	19,789	76,379	94,391	915%
Salt River Pima- Maricopa Indian Community	8,142	9,279	9,513	9,693	19%
Scottsdale	233,276	295,846	333,665	343,881	47%
Surprise	46,029	129,291	222,073	358,756	679%
Tempe	172,820	190,677	198,245	201,227	16%
Tolleson	5,363	6,635	6,749	6,800	27%
Wickenburg	8,843	9,332	11,722	20,753	135%
Youngtown	3,384	6,013	6,861	7,674	127%
Maricopa County MPA	90,631	98,681	125,024	181,059	100%
Pinal County MPA	97,148	177,493	255,890	331,514	241%
<b>TOTAL</b>	<b>3,479,824</b>	<b>4,650,026</b>	<b>5,841,651</b>	<b>7,011,532</b>	<b>101%</b>

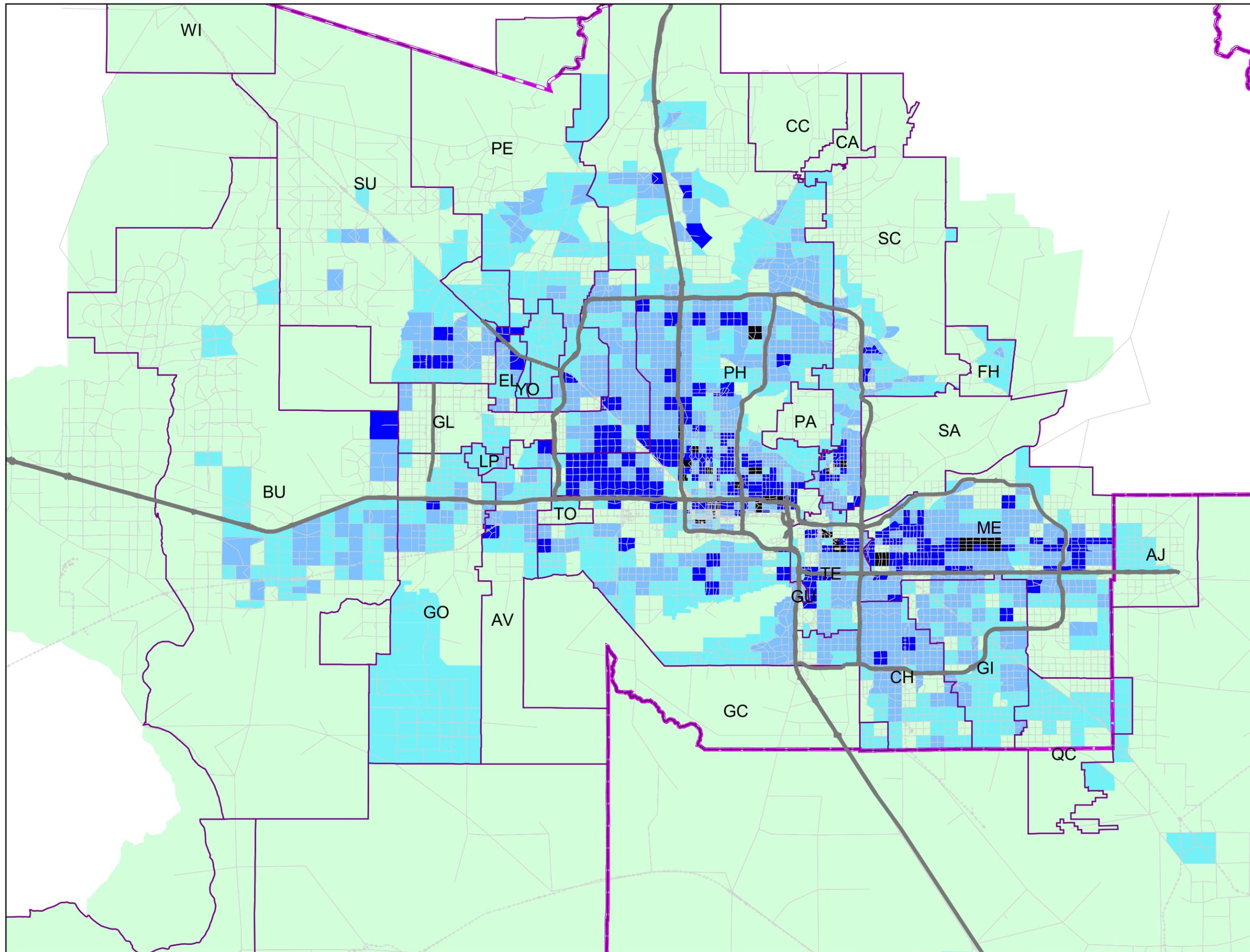
Source: MAG Draft 2 Projections

Because the year 2030 was used to develop the future Regional Transit System Plan (see Section 5), 2030 demographic projections were the most important in determining future demand for transit. **Figure 2.1** shows the projected 2030 population density for the study area.

# Figure 2.1 2030 Population Density

Source: DRAFT2 TripGen files  
(MAG unofficial projections)

- Interstates & Freeways
  - MPA Boundaries
  - County Boundaries
  - Rails (2000)
  - Planned Road Network
- Population Density
- 0 - 1,800 Ppl/SqMi
  - 1,800 - 4,500
  - 4,500 - 8,000
  - 8,000 - 15,000
  - 15,000 - 35,000



0 6 Miles



## **Employment**

The Phoenix urbanized area is also overwhelmingly the largest employment center in the study area. Like population, employment is spread around the urbanized region and is not highly concentrated in any one location.

**Table 2.3** shows the total employment and employment density for each MPA in 2000. Employment is based on the MAG Draft 2 projections.

**Table 2.3**  
**2000 Employment and Employment Density by MPA**

MPA	2000 Employment	Employment / Square Mi.	No. Employed / 100 Population
Apache Junction	10,146	220.6	25.1
Avondale	9,041	96.2	23.0
Buckeye	7,088	10.6	43.1
Carefree	1,546	128.8	41.1
Cave Creek	813	18.9	19.8
Chandler	72,972	973.0	37.6
El Mirage	1,885	188.5	19.2
Fountain Hills	4,285	238.1	19.1
Gila Bend	1,191	6.7	48.9
Gila River Indian Community	3,677	24.5	103.8
Gilbert	34,996	479.4	28.7
Glendale	84,542	918.9	35.3
Goodyear	13,895	92.0	68.2
Guadalupe	585	585.0	10.0
Litchfield Park	1,178	294.5	26.1
Mesa	172,008	1,011.8	33.4
Paradise Valley	5,358	334.9	30.2
Peoria	28,359	128.9	23.4
Phoenix	741,315	1,138.7	52.1
Queen Creek	1,665	26.4	17.9
Salt River Pima-Maricopa Indian Community	7,289	88.9	89.5
Scottsdale	152,116	826.7	65.2
Surprise	8,999	31.5	19.6
Tempe	160,134	4,003.4	92.7
Tolleson	12,777	2,129.5	238.2
Wickenburg	4,052	53.3	45.8
Youngtown	1,224	612.0	36.2
Maricopa County MPA	29,695	24.4	32.8
Pinal County MPA	29,195	15.7	30.1
<b>TOTAL</b>	<b>1,602,026</b>	<b>246.7</b>	<b>46.0</b>

Source: MAG Draft 2 Projections

From 2000 to 2030, employment is projected to grow rapidly, especially in outlying areas. Employment within the study area will actually grow faster than population, which suggests that commuters will be traveling from outside of the study area to work within the study area.

**Table 2.4** shows the growth in employment from 2000-2030.

**Table 2.4  
Employment Growth by MPA, 2000-2030**

MPA	Employment				Growth, 2000-2030
	2000	2010	2020	2030	
Apache Junction	10,146	14,103	19,151	23,984	136%
Avondale	9,041	29,388	54,644	64,229	610%
Buckeye	7,088	27,598	74,949	201,881	2748%
Carefree	1,546	2,846	3,451	3,383	119%
Cave Creek	813	1,977	2,316	3,881	377%
Chandler	72,972	117,468	143,028	154,741	112%
El Mirage	1,885	7,651	17,701	24,904	1221%
Fountain Hills	4,285	7,981	9,556	9,237	116%
Gila Bend	1,191	1,947	4,424	12,165	921%
Gila River Indian Community	3,677	4,991	7,312	9,446	157%
Gilbert	34,996	70,355	124,073	143,428	310%
Glendale	84,542	130,215	160,344	192,053	127%
Goodyear	13,895	43,806	115,434	185,722	1237%
Guadalupe	585	1,726	1,740	1,892	223%
Litchfield Park	1,178	3,791	5,059	4,703	299%
Mesa	172,008	242,555	308,124	333,849	94%
Paradise Valley	5,358	5,612	5,967	6,009	12%
Peoria	28,359	53,134	98,114	153,098	440%
Phoenix	741,315	891,844	1,083,429	1,253,336	69%
Queen Creek	1,665	6,294	29,317	37,310	2141%
Salt River Pima- Maricopa Indian Community	7,289	7,813	9,485	20,599	183%
Scottsdale	152,116	184,104	215,506	222,512	46%
Surprise	8,999	29,444	55,310	123,181	1269%
Tempe	160,134	183,195	211,234	214,979	34%
Tolleson	12,777	16,521	24,753	31,973	150%
Wickenburg	4,052	4,993	6,304	12,214	201%
Youngtown	1,224	1,726	1,655	1,713	40%
Maricopa County MPA	29,695	31,357	41,798	57,256	93%
Pinal County MPA	29,195	44,942	63,520	82,238	182%
<b>TOTAL</b>	<b>1,602,026</b>	<b>2,169,377</b>	<b>2,897,698</b>	<b>3,585,916</b>	<b>124%</b>

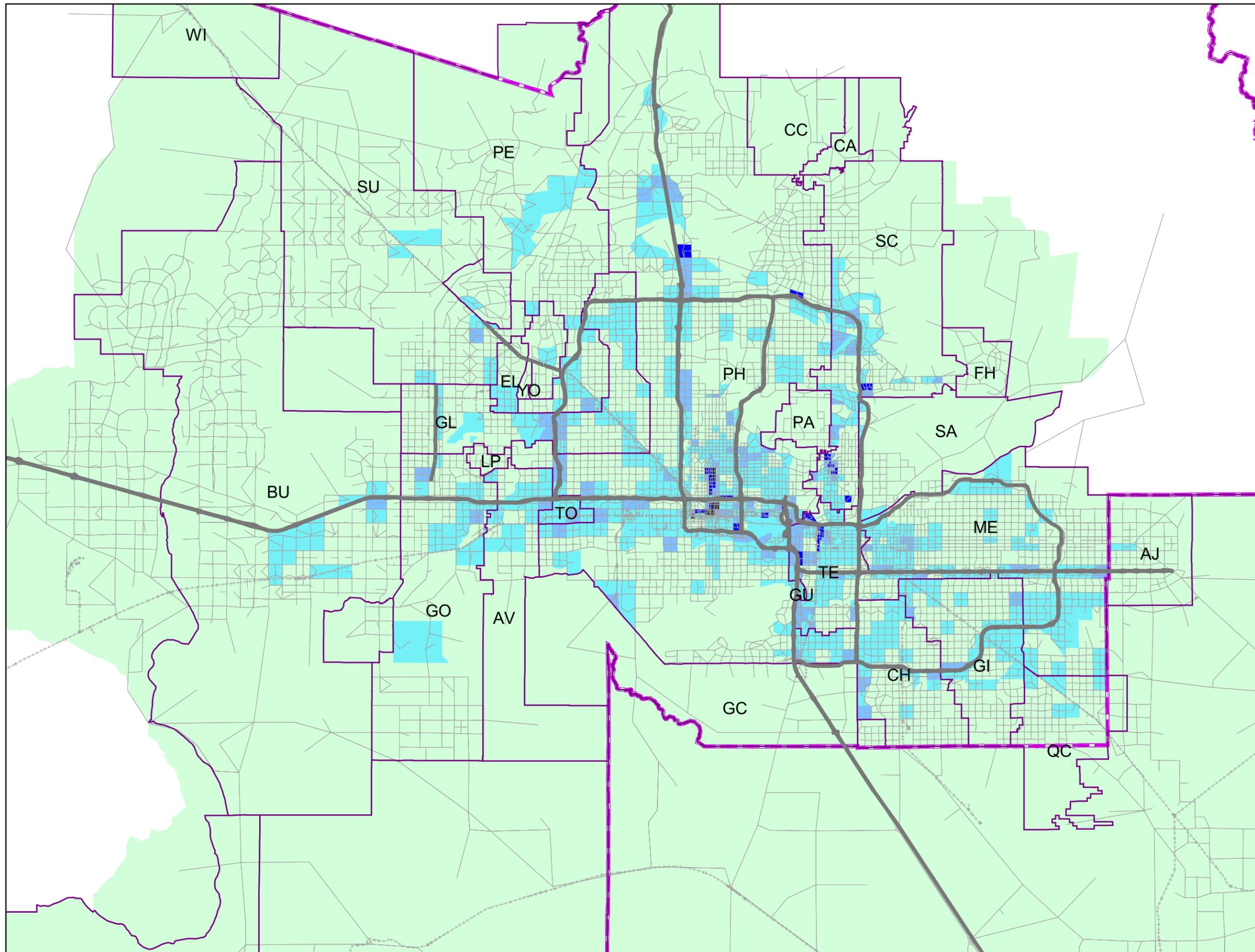
Source: MAG Draft 2 Projections

Because the year 2030 was used to develop the future Regional Transit System Plan, 2030 demographic projections were the most important in determining future demand for transit. **Figure 2.2** shows the projected 2030 employment density for the study area.

# Figure 2.2 2030 Employment Density

Source: DRAFT2 TripGen files  
(MAG unofficial projections)

- Interstates & Freeways
  - MPA Boundaries
  - County Boundaries
  - Rails (2000)
  - Planned Road Network
- Employment Density
- 0 - 2,000 jobs/sq mi
  - 2,000 - 8,000
  - 8,000 - 20,000
  - 20,000 - 50,000
  - 50,000+



0 6 Miles



## **Low-Income Households**

A third demographic characteristic that MAG projects in the Draft 2 TripGen file is the number of low-income households in each MPA. Low-income households are always defined by MAG as those in the bottom quintile of all households in the entire study area according to household income. Therefore, region-wide, 20 percent of households are always low income in the Draft 2 projections.

Thus, MPAs with more than 20 percent low-income households have a disproportionate share of low income households in the area, while those communities with less than 20 percent low income households may be more affluent than the region as a whole.

**Table 2.5** shows the number of low-income households in each MPA in 2000 according to the MAG Draft 2 projections.

**Table 2.5**  
**2000 Low Income Households by MPA**

MPA	Total Households	Low Income Households	% Low Income
Apache Junction	17,370	3,474	20%
Avondale	11,192	2,910	26%
Buckeye	4,755	1,569	33%
Carefree	1,400	322	23%
Cave Creek	1,595	303	19%
Chandler	67,391	7,413	11%
El Mirage	2,406	1,203	50%
Fountain Hills	8,613	689	8%
Gila Bend	770	154	20%
Gila River Indian Community	627	370	59%
Gilbert	39,617	2,377	6%
Glendale	78,450	15,690	20%
Goodyear	6,838	1,094	16%
Guadalupe	1,106	564	51%
Litchfield Park	1,460	73	5%
Mesa	166,943	35,058	21%
Paradise Valley	5,550	222	4%
Peoria	41,154	5,350	13%
Phoenix	476,796	114,431	24%
Queen Creek	2,581	542	21%
Salt River Pima-Maricopa Indian Community	1,960	980	50%
Scottsdale	92,920	9,292	10%
Surprise	14,695	3,086	21%
Tempe	64,195	12,839	20%
Tolleson	1,432	487	34%
Wickenburg	3,361	1,277	38%
Youngtown	1,639	967	59%
Maricopa County MPA	47,532	9,031	19%
Pinal County MPA	32,280	6,456	20%
<b>TOTAL</b>	<b>1,196,625</b>	<b>238,223</b>	<b>20%</b>

Source: MAG Draft 2 Projections

Because the number of low income households is always set at 20 percent of all regional households, the total number of low income households in the region grows at roughly the same rate as the population as a whole (with any variance explained by the difference in the growth rate of the population versus that of the number of households). However, the distribution of low income households varies over time. **Table 2.6** shows the number and percent of low income households in each MPA over time between 2000 and 2030.

**Table 2.6**  
**Growth in Low Income Households, 2000-2030**

MPA	Low Income Households								Growth, 2000-2030
	2000		2010		2020		2030		
	Total	%	Total	%	Total	%	Total	%	
Apache Junction	3,474	20%	5,396	26%	7,346	30%	10,026	36%	189%
Avondale	2,910	26%	6,709	32%	9,858	32%	10,634	31%	265%
Buckeye	1,569	33%	9,756	40%	18,365	34%	45,929	29%	2827%
Carefree	322	23%	350	18%	376	16%	381	16%	18%
Cave Creek	303	19%	430	20%	503	20%	868	16%	186%
Chandler	7,413	11%	10,891	12%	12,099	12%	12,047	12%	63%
El Mirage	1,203	50%	4,722	48%	5,726	50%	5,879	49%	389%
Fountain Hills	689	8%	846	8%	1,078	8%	1,091	8%	58%
Gila Bend	154	20%	248	26%	818	41%	1,875	31%	1118%
Gila River Indian Community	370	59%	449	60%	620	63%	767	63%	107%
Gilbert	2,377	6%	3,961	7%	7,848	9%	8,045	9%	238%
Glendale	15,690	20%	18,928	19%	19,843	19%	19,954	19%	27%
Goodyear	1,094	16%	3,765	16%	12,341	22%	27,896	24%	2450%
Guadalupe	564	51%	677	52%	677	52%	677	52%	20%
Litchfield Park	73	5%	163	5%	257	5%	262	4%	259%
Mesa	35,058	21%	41,176	21%	44,249	21%	44,493	20%	27%
Paradise Valley	222	4%	236	4%	241	4%	242	4%	9%
Peoria	5,350	13%	7,574	13%	10,157	12%	12,114	10%	126%
Phoenix	114,431	24%	143,325	24%	166,213	24%	173,239	23%	51%
Queen Creek	542	21%	1,133	20%	4,598	21%	5,014	18%	825%
Salt River Pima-Maricopa Indian Community	980	50%	1,094	48%	1,132	49%	1,135	49%	16%

MPA	Low Income Households								Growth, 2000-2030
	2000		2010		2020		2030		
	Total	%	Total	%	Total	%	Total	%	
Scottsdale	9,292	10%	10,168	9%	10,742	9%	10,775	9%	16%
Surprise	3,086	21%	7,721	17%	17,398	22%	26,275	21%	751%
Tempe	12,839	20%	13,705	21%	14,107	21%	14,214	21%	11%
Tolleson	487	34%	631	35%	642	35%	644	35%	32%
Wickenburg	1,277	38%	1,329	38%	1,748	40%	2,871	34%	125%
Youngtown	967	59%	1,510	60%	1,664	60%	1,675	60%	73%
Maricopa County MPA	9,031	19%	9,275	19%	11,149	19%	14,087	18%	56%
Pinal County MPA	6,456	20%	12,662	20%	18,813	20%	24,661	20%	282%
<b>TOTAL</b>	<b>238,223</b>	<b>20%</b>	<b>318,830</b>	<b>20%</b>	<b>400,608</b>	<b>20%</b>	<b>477,770</b>	<b>20%</b>	<b>101%</b>

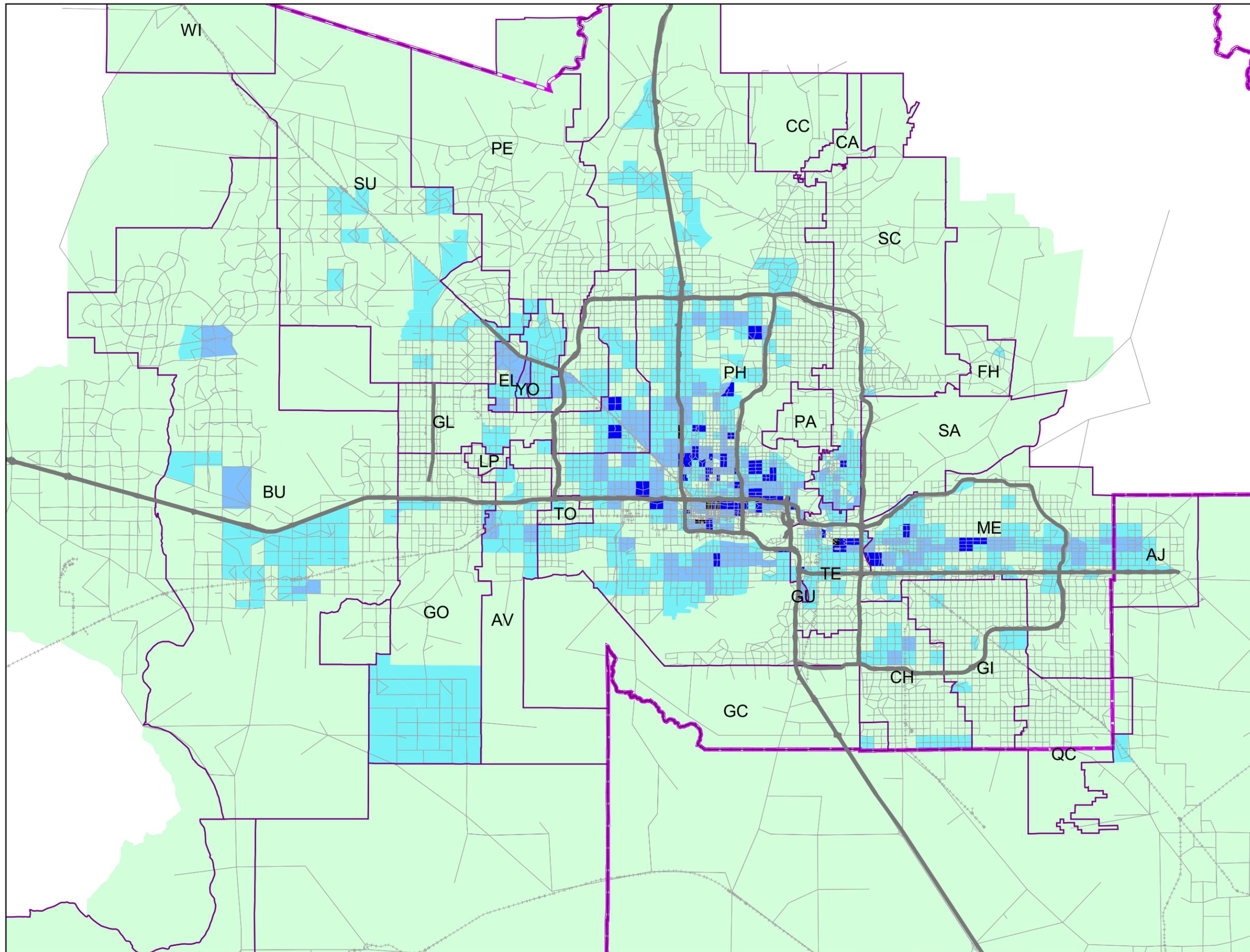
Source: MAG Draft 2 Projections

Because the year 2030 was used to develop the future Regional Transit System Plan, 2030 demographic projections were the most important in determining future demand for transit. **Figure 2.3** shows the total projected low income households per MPA in 2030.

# Figure 2.3 2030 Low Income Household Density

Source: DRAFT2 TripGen files  
(MAG unofficial projections)

- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Rails (2000)
- Planned Road Network
- Low Income Households
- 0 - 250 Households/SqMi
- 250 - 750
- 750 - 1,500
- 1,500 - 35,00
- 3,500 - 5,700



0 6 Miles



## **Senior Population**

The Phoenix area is an area with a large and rapidly growing population of seniors, defined here as the population with more than 65 years of age. The senior population has specific transportation needs that may be different from those of the population as a whole. Therefore, it is important to understand the size of the senior population and where it is located. The senior population of each MPA was determined using 2000 U.S. Census data. **Table 2.7** presents the population, senior population, and percent senior population for each MPA.

**Table 2.7**  
**2000 Senior Population by MPA**

MPA	Total Population	Senior Population	% Senior
Apache Junction	40,462	9,882	24%
Avondale	39,266	2,325	6%
Buckeye	16,430	1,132	7%
Carefree	3,760	891	24%
Cave Creek	4,098	494	12%
Chandler	193,951	12,893	7%
El Mirage	9,806	1,139	12%
Fountain Hills	22,387	3,977	18%
Gila Bend	2,435	160	7%
Gila River Indian Community	3,542	141	4%
Gilbert	121,961	4,289	4%
Glendale	239,357	16,480	7%
Goodyear	20,364	2,153	11%
Guadalupe	5,825	323	6%
Litchfield Park	4,513	535	12%
Mesa	514,814	66,347	13%
Paradise Valley	17,758	2,361	13%
Peoria	121,097	18,810	16%
Phoenix	1,423,062	110,096	8%
Queen Creek	9,300	256	3%
Salt River Pima-Maricopa Indian Community	8,142	1,384	17%
Scottsdale	233,276	32,066	14%
Surprise	46,029	8,050	17%
Tempe	172,820	11,413	7%
Tolleson	5,363	514	10%
Wickenburg	8,843	1,215	14%
Youngtown	3,384	1,624	48%
Maricopa County MPA	90,631	57,766	64%
Pinal County MPA	97,148	13,021	13%
<b>TOTAL</b>	<b>3,479,824</b>	<b>381,737</b>	<b>11%</b>

Source: 2000 US Census, MAG Draft 2 Projections

The very high percentage of seniors in the Maricopa County MPA probably reflects the presence of the age-restricted Sun City communities that make up more than half of the County MPA population.

MAG does not project future senior population. Change in the senior population is very difficult to predict. Many seniors are working later in life, which maintains travel patterns that are similar to those of non-seniors. Some areas attract seniors, while others

attract young families and have small senior populations; Phoenix has both types of areas. Finally, trends change in terms of whether a population ages in place or migrates during different phases of their adult lives.

Although the population of the country as a whole is aging as the “Baby Boomer” cohort ages, some sub-populations have higher than average birth rates, which can balance the growth in the senior population. These contrasting population trends could occur within the same community or within different communities within the same metropolitan area.

For the purposes of this study, it is assumed that the percent senior in each community will remain constant.

### **Population with Disabilities**

Like the senior population, the population with disabilities has specific transportation needs. The population with disabilities here reflects those people aged 16-64 who self-reported themselves as having disabilities in the 2000 U.S. Census.

**Table 2.8** shows the total population, population with a self-reported disability, and percent of the population with a self-reported disability in 2000.

**Table 2.8**  
**2000 Population with Disability by MPA**

MPA	Total Population	Population w/Disability	% w/Disability
Apache Junction	40,462	9,416	23%
Avondale	39,266	7,104	18%
Buckeye	16,430	3,234	20%
Carefree	3,760	271	7%
Cave Creek	4,098	573	14%
Chandler	193,951	25,211	13%
El Mirage	9,806	2,427	25%
Fountain Hills	22,387	2,828	13%
Gila Bend	2,435	364	15%
Gila River Indian Community	3,542	778	22%
Gilbert	121,961	14,007	11%
Glendale	239,357	48,479	20%
Goodyear	20,364	3,620	18%
Guadalupe	5,825	1,265	22%
Litchfield Park	4,513	140	3%
Mesa	514,814	76,301	15%
Paradise Valley	17,758	625	4%
Peoria	121,097	19,047	16%
Phoenix	1,423,062	293,556	21%
Queen Creek	9,300	862	9%
Salt River Pima-Maricopa Indian Community	8,142	2,283	28%
Scottsdale	233,276	25,884	11%
Surprise	46,029	6,568	14%
Tempe	172,820	27,937	16%
Tolleson	5,363	1,139	21%
Wickenburg	8,843	1,356	15%
Youngtown	3,384	832	25%
Maricopa County MPA	90,631	9,642	11%
Pinal County MPA	97,148	23,669	24%
<b>TOTAL</b>	<b>3,479,824</b>	<b>609,418</b>	<b>18%</b>

Source: 2000 US Census, MAG Draft 2 Projections

MAG does not project future population with disabilities.

## TRANSIT NEED

Transit need refers to the likelihood of an area to generate transit ridership. The more likely an area is to demand transit service or the more service an area is likely to consume, the higher its transit need. Transit need is also sometimes referred to as transit demand or transit dependence. Transit need is projected onto the geographic area of the study area in two ways:

- Transit Need Index (TNI)
- Trip Patterns

### Transit Need Index (TNI)

The TNI is a method used to graphically display the relative ability of an area to generate or attract transit ridership. The TNI aggregates demographic characteristics of an area that have a statistical relationship with either transit supply or transit use.

In the case of this study, transit need is expressed in terms of demand for **revenue miles of local transit service per square mile**. Measuring transit need in terms of revenue miles provides a method to compare the relative transit need of any two TAZ or MPA or any other geographic units using the same units of measurement. The revenue miles demanded do not imply any specific type of local transit service; service to a given area could be fixed route line-haul routes, circulators, or demand-response.

The TNI does not predict where patrons will want to go. Although it predicts how likely an area is to generate or attract ridership, the transit need index does not match that trip attractor or generator to any other transit attractor or generator. That analysis is included in the Trip Patterns analysis presented later in this section.

The process of measuring revenue miles per square mile of transit demand requires the following steps:

1. Establish Baseline
2. Identify future socio-economic projections
3. Define transit need

#### *1) Establish Baseline*

A ratio must be set to determine the relationship of transit demand to transit supply. The easiest way to set the ratio is to choose an area where the level of transit service is appropriate for the level of transit need. In the case of this study, that area was defined as the area of Phoenix served by Valley Metro fixed route service and the entire area of Tempe. This area represents a fully built-out transit network; has an existing dedicated funding source for transit; and appears to be a realistic goal of transit levels of service for the region.

The level of supply in the chosen area must be compared to demand. Because this analysis required future projections, only those socio-economic data for which MAG projections were available were used as components in the TNI. The three demographic factors used are:

- Population
- Employment
- Low Income Households

Baseline (year 2000) data for population, employment and low income households at the MPA level are presented in **Tables 2.1, 2.3** and **2.5**. Baseline transit supply is based on the July 2002 service offered by Valley Metro, which is described in detail in Section Three.

Weightings were applied to population, employment and low income households to force a better mathematical fit between the Phoenix and Tempe actual supply and the demand. The best fit was for the following weightings:

- Population: 11 percent (1 in 9) of variance is due to population
- Employment: 23 percent (2 in 9) of variance is due to employment
- Low-Income Households: 66 percent (6 in 9) of variance is due to employment

What this means is that each low income household is six times more likely to demand a revenue mile of transit than one person and three times more likely than one job (or to put it another way, for every one mile an individual demands, a low-income household demands six miles).

Applying these assumptions allows the creation of a ratio of  $x$  units of transit service for every  $y$  units of transit need, where every unit of service is a certain number of revenue miles and every unit of need is an aggregate of population, employment and low income households.

## *2) Identify Future Socio-Economic Projections*

As noted above, the source for projected demographic data was the MAG Draft 2 TripGen projections that provide the projected population, employment, and number of low income households for every TAZ in the study area. Projected population, employment, and low-income households aggregated by MPA for 2010, 2020, and 2030 are shown above in **Tables 2.2, 2.4** and **2.6**.

## *3) Define Transit Need*

Once the ratio of transit supply to demand is determined (*Step One*) and the future demographic projections are obtained (*Step Two*), applying the ratio to the future demographics provides the projected future transit need (as expressed in revenue miles of service per square mile of area).

**Table 2.9** shows the total revenue miles and revenue miles per square mile of transit need for each MPA in the study area using 2030 projected demographic data.

**Table 2.9**  
**2030 Transit Need by MPA**

MPA	Daily Revenue Miles	Area	Revenue Mi / Square Mi
Apache Junction	2,317	46	50.4
Avondale	4,367	94	46.5
Buckeye	16,510	670	24.6
Carefree	217	12	18.1
Cave Creek	374	43	8.7
Chandler	9,668	75	128.9
El Mirage	1,949	10	194.9
Fountain Hills	843	18	46.8
Gila Bend	763	177	4.3
Gila River Indian Community	425	150	2.8
Gilbert	8,899	73	121.9
Glendale	11,716	92	127.3
Goodyear	12,371	151	81.9
Guadalupe	195	1	195.0
Litchfield Park	376	4	94.0
Mesa	23,818	170	140.1
Paradise Valley	487	16	30.4
Peoria	10,472	220	47.6
Phoenix	82,271	651	126.4
Queen Creek	2,816	63	44.7
Salt River Pima-Maricopa Indian Community	826	82	10.1
Scottsdale	12,147	184	66.0
Surprise	10,760	286	37.6
Tempe	10,218	40	255.5
Tolleson	1,075	6	179.2
Wickenburg	882	76	11.6
Youngtown	295	2	147.5
Maricopa County MPA	5,356	1,218	4.4
Pinal County MPA	9,059	1,864	4.9
<b>TOTAL</b>	<b>241,472</b>	<b>6,494</b>	<b>37.2</b>

Source: LKC

Note that the data in **Table 2.9** does not reflect the type of service offered, but rather reflects the fact that *all* areas have a need for transit of some kind. Tempe, for example, demands 4 percent of the total miles of regional transit, but only accounts for 0.6 percent

of the total area. Maricopa County, on the other hand, only demands 2 percent of the transit miles but accounts for 19 percent of the total area.

The density of transit demand is shown graphically for the year 2030 in **Figure 2.4**.

# Figure 2.4 2030 Transit Need (Desired Supply) Density

Source: LKC Consulting Services, Inc., based on DRAFT2 TripGen demographics (MAG unofficial data)

- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Rails (2000)
- Planned Road Network

- Transit Need
- 0 - 100 Rev Mi/Sq Mi
  - 100 - 200
  - 200 - 400
  - 400 - 700
  - 700 - 4,500



0 6 Miles



## Trip Patterns

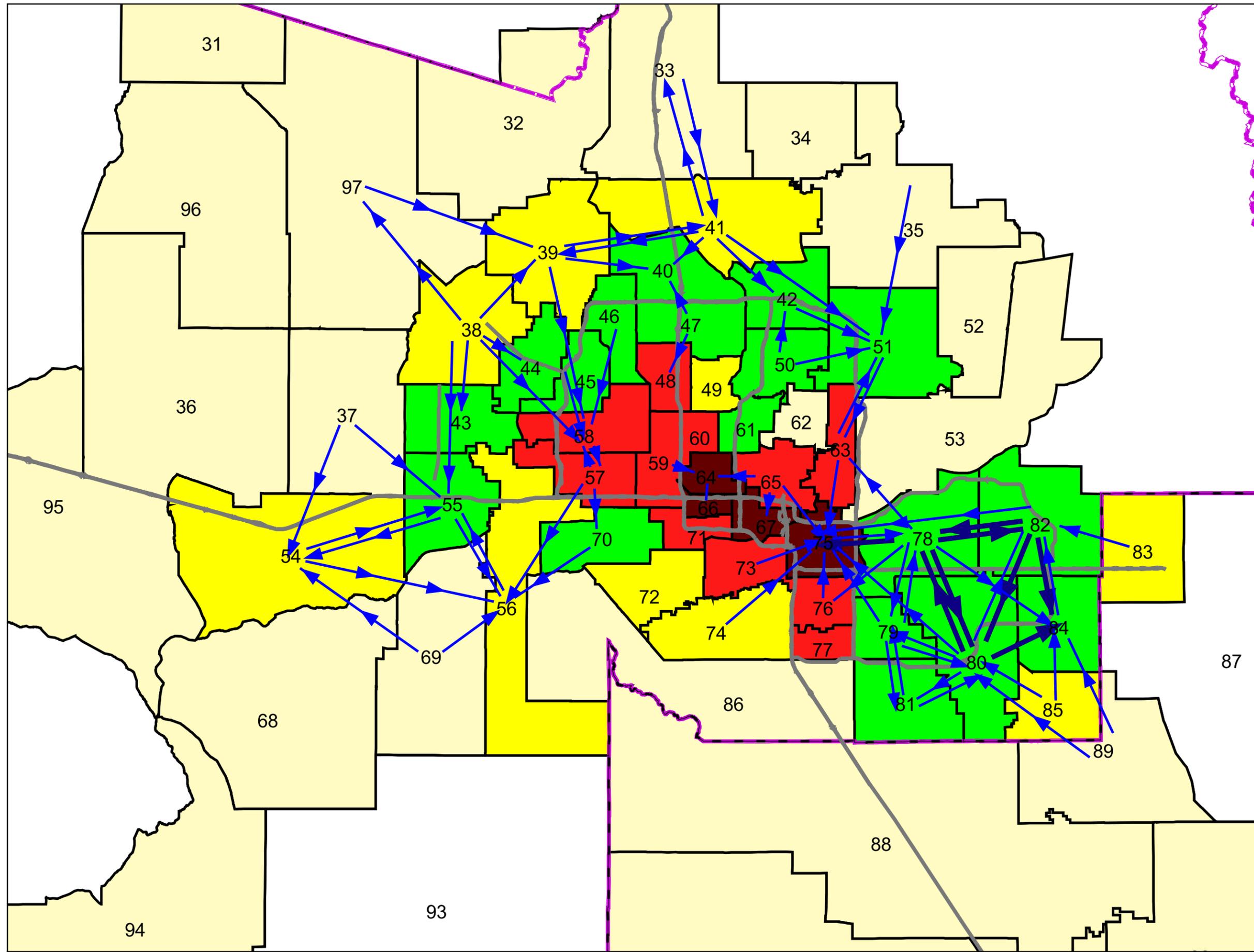
Another method of measuring transit need is to examine travel patterns. Existing and projected travel patterns show the pairs of origins and destinations commuters will likely want to travel between. To serve work trips, transit should provide as direct and quick a service as possible between these origins and destinations.

Projected home based work and full-time student trip tables for all TAZ within the study area were provided by MAG for the target years 2000, 2010, 2020 and 2030. The 2030 travel patterns were used to develop regional transit services (see Section Five). The 2030 work trip patterns are shown in **Figure 2.5**. **Figure 2.5** displays significant inter-district trips (those with more than 7,000 one-way trips) with arrows. Intradistrict trips are shown by the color-coding of the districts.

**Table 2.5** shows that there are significant non-downtown travel patterns. These patterns appear to be most significant in the Southeast Valley (roughly Mesa, Tempe, Chandler and Gilbert), along the east side of Loop 101, and along the west side of Loop 101. Downtown is not the largest recipient of trips from any one TAZ, but remains the single largest trip destination in the region, pulling trips from all over the region.

## Figure 2.5 2030 Work Trip Patterns & Destinations

District-to-district home-based work & home-based university trips from 2030 MAG model (based on unofficial DRAFT2)



**Inter-District Trips**

- 7,000 - 17,000
- 17,000 - 88,000

**Interstates & Freeways**

**County Boundaries**

**Trips Arriving in District**

- 0.01 - 0.71 Trips/Acre
- 0.71 - 1.9
- 1.9 - 4.7
- 4.7 - 12.5
- 12.5 - 38.7

0 6 Miles

**LUC**

A listing of major trip origins and destinations for each district is included in **Appendix B** of this report.

### **SECTION THREE: EXISTING TRANSIT SERVICE**

The purpose of this section is to document the existing transit service in the study area. Existing transit service is the baseline from which the Regional Transit System Plan will develop new services. This section is divided into the following subsections:

- Valley Metro Organization
  - Component Agencies
  - Capital Facilities
- Service Characteristics
  - Fixed Route Service
  - Paratransit service
  - Vanpool Service
  - Rural Service

#### **VALLEY METRO ORGANIZATION**

Six agencies, operating as Valley Metro, provide fixed-route public transit in metropolitan Phoenix. Valley Metro provides a single, publicly recognizable transit identity for the cooperative network of independent transit agencies. Valley Metro provides public information such as advertising, newsletters, and schedules, and presents transit in the Phoenix area as a seamless service across municipal boundaries.

The six independent transit agencies that comprise Valley Metro are the Cities of Phoenix, Glendale, Mesa, Scottsdale, and Tempe and the Regional Public Transportation Authority (RPTA). Each agency has its own service area, service levels, and funding sources. While all work together under the Valley Metro banner, each has its own agenda and constraints. All five transit agencies comprising Valley Metro contract their service to private providers.

Traditionally, the lack of a reliable source of local revenue has limited Valley Metro's service levels. While capital expenses are heavily subsidized by Federal sources, operating funds are largely locally funded. However, Valley Metro agencies have begun securing local funding. As of 2003, Phoenix, Glendale, Mesa and Tempe have local sales taxes dedicated in part to transit.

#### **Component Agencies**

Valley Metro is made up of the following five transit agencies:

- City of Phoenix
- City of Glendale
- City of Mesa
- City of Scottsdale
- Tempe in Motion (City of Tempe)
- Regional Public Transportation Authority (RPTA)

Each is described below.

#### City of Phoenix, City of Glendale

The City of Phoenix owns and funds the fixed-route transit system in Phoenix. A subsidiary of ATC/VanCom, ATC/Phoenix, provides the majority of service. Laidlaw Arnett Transportation and MV Transportation provide some transit services under contract to the City of Phoenix. Phoenix has the largest transit agency in the metropolitan area. The service area encompasses all of Phoenix and the adjacent city of Glendale, with some routes extending into other adjacent cities.

Phoenix funds its service through a \$0.004 sales tax collected within the City of Phoenix. A portion of the tax funds bus service, with the rest funding construction and (eventually) operation of a light rail (LRT) system. The City of Glendale funds its portion of the service through a \$0.005 sales tax collected in the City of Glendale. The Glendale tax funds bus service, a portion of LRT construction and operation, and some roadway improvements. Both Glendale and Phoenix also support transit service from their general funds. The City of Glendale also operates its own circulator buses.

As of spring 2003, PTS operated 341 vehicles for fixed-route service from two operating facilities in Phoenix and five outstation locations. Laidlaw operated 59 vehicles from a facility in Glendale, Arnett operated nine vehicles from a facility in Phoenix, and MV Transportation provides some Dial-a-Ride service and the ALEX Circulator service.

MV Transportation also operates demand-response service operating within the city of Phoenix under the name "Dial-a-Ride." Glendale operates its own Dial-a-Ride service within the City of Glendale.

#### City of Mesa

The City of Mesa provides fixed-route transit service funded through a portion of a dedicated "quality of life" sales tax. The RPTA owns Mesa's fleet. ATC/Mesa operates the buses, and a city-owned fleet maintenance facility provides the maintenance. Mesa is currently constructing a new transit operating facility, scheduled to open in Spring 2003.

ATC/Mesa operated 46 buses in spring 2003. Mesa also funds a portion of the East Valley Dial-a-Ride system.

#### City of Scottsdale

The City of Scottsdale provides some limited funding for fixed-route transit services out of its general fund. ATC/RPTA and ATC/Tempe provide the service under contract and operates from the same facility as the Tempe and RPTA transit service. A separate private provider also operates a circulator service in downtown Scottsdale. Scottsdale also funds a portion of the East Valley Dial-a-Ride system.

### City of Tempe

The City of Tempe provides fixed-route transit service through a contract with ATC/Tempe. Service is funded through a dedicated local sales tax of \$0.005 collected within the city limits of Tempe. The sales tax also funds a portion of the LRT project. ATC/Tempe operates both a downtown circulator service and fixed-route services. ATC/Tempe operates from a leased facility in west Tempe, but Tempe is considering constructing a new facility.

As of spring 2003, ATC/Tempe operated 92 buses for fixed route service, plus three electric buses for neighborhood circulator service. Tempe also funds a portion of the East Valley Dial-a-Ride system.

### RPTA

The RPTA provides regionally oriented transit service in the Phoenix area. The majority of the RPTA's fixed-route service is in the form of express or park and ride routes. However, some local service is also provided. The RPTA is funded via a portion of a dedicated regional mobility tax. ATC/RPTA provides transit services under contract to the RPTA. In some cases, other transit agencies operate RPTA-owned vehicles. The ATC/RPTA vehicles operate out of an operating facility in Phoenix.

As of spring 2003, ATC/RPTA operated 80 vehicles, including those used in Scottsdale service.

### **Capital Facilities**

A number of capital facilities for transit have been constructed around the Phoenix area. Although these facilities are constructed by individual agencies, most are used by more than one agency, so they are described together in this section.

### Operating and Maintenance Facilities

Fixed route vehicles are maintained and dispatched from several locations throughout the valley. Facilities within the region vary in capability and function from providing light maintenance and dispatch to full maintenance and operations. There are only three comprehensive maintenance facilities. These are described in greater detail below. In addition, several privately owned leased facilities provide support for fixed route services. Although they are privately owned, these facilities receive indirect support from public funds through operating costs paid to the private contractors. The existing transit fleet maintenance needs exceed the existing capacity of the facilities.

The largest and most comprehensive facility in the region is the South Division Maintenance Facility, owned by the City of Phoenix and operated by ATC/Phoenix. Built in 1982 for heavy and light maintenance, the South Division facility includes a

paint and body shop, unit rebuild shop, air conditioning shop, brake shop, steam cleaning bays, and fully stocked parts room. It also houses fueling and cleaning stations, as well as a modern fare collection and data booth that is capable of probing vehicle fare boxes through infrared technology. Dispatch operations provide radio support for the regional transit fleet. Administrative functions include human resources, operator training, and other miscellaneous functions.

The City of Phoenix owns a second maintenance facility, the North Division Maintenance Facility, constructed in 1981. This facility provides light maintenance and operator dispatch functions, vehicle fueling and washing and fare collection.

The third maintenance facility, the East Mesa Service Center (EMSC), is owned by the City of Mesa. EMSC provides heavy maintenance for transit vehicles, although EMSC is not strictly dedicated to maintenance of transit vehicles (City vehicles are also maintained at the facility). The EMSC joint-use facility provides heavy maintenance, compressed natural gas and diesel fueling, and automated bus washing.

Mesa is currently constructing a new operating and maintenance facility to which it will relocate operation and vehicle storage some time in 2003.

Beyond these facilities, several leased facilities are also used for fixed-route vehicles. These include:

- A small Arnett facility used to maintain Arnett's downtown shuttle vehicles
- The RPTA facility in Phoenix, which maintains vehicles used by the RPTA
- The Tempe facility in Tempe
- The Laidlaw facility in Glendale
- MV Transportation facility in Phoenix

The Facilities Master Plan report (July 2001) proposed replacing leased facilities and increasing regional capacity by constructing new East Valley and West Valley facilities. In addition, the report recommended a Phase II to Mesa's new facility to double the capacity and the construction of a new dedicated heavy maintenance facility to relieve crowding at South Division. As of spring 2003, work has begun on locating sites for the East and West Valley facilities.

### Passenger Facilities

Valley Metro operates two types of passenger facilities - transit centers and park & ride lots.

#### *Transit Centers*

Transit centers are developed to facilitate convenient passenger transfers between buses and other modes of transportation or between multiple bus routes. There are ten transit centers in Maricopa County. Two of the facilities (Central and Loloma Stations) provide

a suite of services including public transit information, the sale of fare media, and other relevant customer services. The amenities and services available at each transfer facility vary. **Table 3.1** summarizes this inventory.

**Table 3.1**  
**Valley Metro Transit Centers, 2003**

Facility	Location	Routes	Parking Spaces
Arizona Mills	Arizona Mills Mall, Tempe	56, 77, 92, 108	0
Central Station	Central / Van Buren, Phoenix	B, R, 0, 3, 7, 8, 10, 12, 15, 27, 500, 501, 502, 510, 512, 520, 521, 531, 532, 533, 540, 541, 560, 561, 570, 582, 590, 592	0
College Avenue Bus Stops	College / University, Tempe	Y, 30, 44, 56, 62, 65, 66, 72, 76, 81, 92, FLASH	0
Desert Sky	Desert Sky Mall, Phoenix	G, 17, 41, 131, 560, 561	94
Ed Pastor	S. Central / Broadway, Phoenix	B, 7, 8, 45, 52, 61	0
Loloma Station	Marshall / 2 <sup>nd</sup> Street, Scottsdale	41, 66, 72, 76	0
MetroCenter	MetroCenter Mall, Phoenix	R, 27, 35, 90, 106, 122, 580, 581, 582	115
Paradise Valley	Paradise Valley Mall, Phoenix	B, 44, 106, 138, 501	100
Sunnyslope	3 <sup>rd</sup> St. / Dunlap, Phoenix	0, 8, 12, 16, 80, 90, 106	45
Superstition Springs	Superstition Springs Mall, Mesa	30, 45, 61, 108, 533	50

Source: Valley Metro

Three other locations, Arrowhead Town Center mall in Glendale, Chandler Fashion Square Mall in Chandler and the Mesa Senior Center in Mesa provide an informal transit center function but have no passenger facilities beyond those of a standard bus stop.

#### *Park & Ride Lots*

Valley Metro's Annual Short Range Transit Report indicates that there are 51 park-and-ride facilities in the region, providing 2,482 automobile spaces. Of these facilities, only three are Regional Park & Ride lots (Dreamy Draw Park-and-Ride, 79<sup>th</sup> Avenue, Deer Valle Park-and-Ride) while a fourth, smaller lot (Sunnyslope Transit Center) is also

publicly owned and operated. Three other park and ride lots are located on leased property adjacent to transit centers (Paradise Valley, MetroCenter, and Desert Sky Mall Transit Centers). The remaining 44 park-and-ride facilities are joint-use in which informal agreements with private property owners are established for shared parking arrangements.

**Table 3.2  
Regional Park & Ride Lots, 2002**

Facility	Location	Routes	Parking Spaces
Deer Valley	W. Bell / I-17, Phoenix	27, 170, 580, 582, 590, 591	500
Dreamy Draw	E. Shea / N. 30 <sup>th</sup> St., Phoenix	B, 500, 501, 502, 512, 592	330
79 <sup>th</sup> Avenue	W. I-10 / 79 <sup>th</sup> Ave., Phoenix	17, 560, 561	618

Source: Valley Metro

#### HOV / Diamond Lanes

The Arizona Department of Transportation (ADOT) operates a network of high occupancy vehicle (HOV) lanes throughout the Phoenix region. All of the HOV lanes are configured as peak period carpool lanes, non-barrier separated, in the inside lane in each direction.

A total of 43 centerline miles (86 one-way lane miles) of HOV lanes currently exist on freeways in the Phoenix metropolitan area. These are summarized on **Table 3.3**.

**Table 3.3  
HOV / Diamond Lanes, 2002**

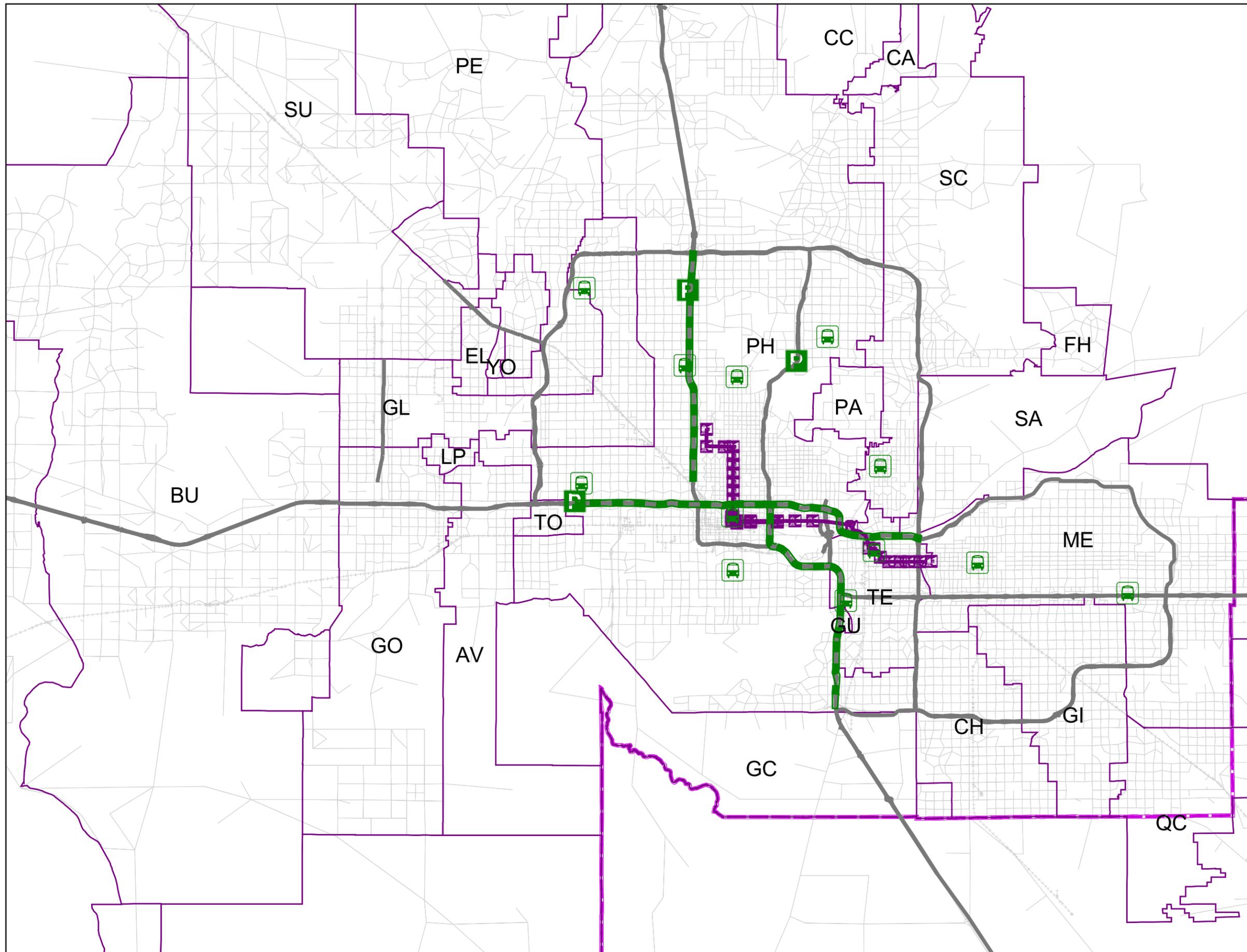
Facility	Bounds	Length (mi)	Features
Black Canyon Fwy	Thomas-Loop 101	12.9	
Maricopa Fwy	Downtown- Chandler Blvd.	15.8	Direct HOV connector to EB Loop 202 & EB US60; direct ramp to 3 <sup>rd</sup> St.
Papago Fwy	Downtown-79 <sup>th</sup> Ave. P&R	9.1	Direct ramp to 79 <sup>th</sup> Ave. P&R & 3 <sup>rd</sup> Ave.
Red Mountain Fwy	I-10 to Loop 101	9.6	Direct connector to WB I-10
Superstition Fwy	I-10 to Val Vista	12.4	Direct connector to WB I-10

Source: LKC

Although expansion of Phoenix's HOV lane network is assumed in this study, development of an HOV network is outside of the scope of the RTS and is addressed in a separate study, the "High Occupancy Lanes and Value Lanes Study" (August 2002).

The capital facilities described in **Tables 3.1, 3.2 and 3.3** are shown in **Figure 3.1**.

**Figure 3.1  
Existing Valley Metro Capital Facilities**



- Transit Centers
  - Existing
- Park & Rides
  - Existing
- HOV lanes
  - Existing
- C/EV LRT line (MOS)
- LRT stations (MOS)
- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Rails (2000)
- Planned Road Network



0 5 Miles



## SERVICE CHARACTERISTICS

### Fixed Route Services

Fixed route bus service is the primary mode of public transportation in the Phoenix Metropolitan Area. Valley Metro, the regional transit identity, provides coordinating functions for the region's fixed route bus network. Currently all local and regional fixed route service is provided through a limited number of private sector contracts administered by the cities of Glendale, Mesa, Phoenix, Scottsdale, Tempe, and the RPTA.

As of July 2002, the regional fixed route bus system was comprised of 57 local routes, 21 express routes, and four circulator routes. Routes vary in frequency and hours of operation. However, most local routes operate from 6:00 a.m. to 8:00 p.m. on weekdays, with a typical frequency of 30 minutes during peak travel hours (frequencies range from 5 to 90 minutes). Saturday bus service is characterized by limited hours of operation and reduced frequency, while Sunday service is limited to a few routes that primarily operate in Phoenix, Glendale, Scottsdale and Tempe. Since the Phoenix Metropolitan Area's street infrastructure is laid out in a grid pattern with arterials at one-mile intervals, most routes are aligned to provide a grid network of service, with routes typically spaced at one-mile intervals.

According to the Performance Management and Analysis System (PMAS) report for fiscal year 2001, Valley Metro recorded approximately 42 million passenger boardings, 40 million of which were on the fixed route network.

Despite the modest improvement in transit service over the past 12 years, ridership has more than doubled. This phenomenon may be attributable in part to the rapid population growth in the Valley as well as the increase in transit services available.

Fixed route service is not distributed evenly around the Valley. Areas with dedicated sales taxes (Phoenix, Glendale, Tempe, and to a lesser extent Mesa) have the highest levels of service, while many outlying areas have no fixed route service at all.

**Table 3.4** shows the population per fixed route vehicle for cities with transit service in 2000. Note that the data on the table precedes the implementation of the Phoenix and Glendale transit sales taxes.

**Table 3.4**  
**Population per Fixed Route Vehicle, 2000**

Service Area	2000 Population	2000 Fixed Route Fleet	Population / Vehicle	Difference from Average
All Valley Metro	2,870,875	630	4,557	Average
Phoenix & Glendale	1,539,857	409	3,765	-792
Mesa	396,375	46	8,617	4,060
Scottsdale	202,705	28	7,239	2,683
Tempe	158,625	95	1,670	-2,887
Other Valley Metro*	573,313	52	11,025	6,468

\* - Includes Avondale, Chandler, El Mirage, Fountain Hills, Gilbert, Goodyear, Guadalupe, Paradise Valley, Peoria, Sun City, Surprise, Tolleson, and Youngtown

Source: Valley Metro, 2000 U.S. Census, LKC

**Table 3.4** shows that those communities with dedicated sales taxes (Phoenix, Glendale, Tempe) have much smaller ratios of population per vehicle, which implies higher levels of service.

**Table 3.5** summarizes basic service statistics for the region's fixed routes for Fiscal Year 2002.

**Table 3.5**  
**Service Statistics for Fixed Route Service, FY2002**

Days of Service	7 Days (Phx, Tempe, Glendale, Scottsdale) 6 Days (Mesa, Scottsdale)
Hours of Service	Roughly 4 am - Midnight
Annual Vehicle Miles*	27,900,000
Annual Vehicle Hours*	2,100,000
Annual Revenue Miles	24,100,000
Annual Revenue Hours	1,700,000
Annual Passenger Boardings	45,200,000
Boardings / Revenue Mile	1.88
Boardings / Revenue Hour	26.57
Gross Operating Cost	\$109,800,000
Fare Recovery (dollars)	\$24,400,000
Fare Recovery (percent)	23%
Net Operating Cost	\$85,400,000
Net Cost / Revenue Mile	\$3.54
Net Cost / Revenue Hour	\$50.12
Net Cost / Passenger	\$1.89
Percent On-Time*	92%

*Source: Valley Metro PMAS Statistics for Fixed Route and Circulator services*

*\* - Fixed route service only (no data reported for circulator service)*

### Paratransit Service

Paratransit service in the study area is provided primarily by Dial-a-Ride (DAR). Like Valley Metro, “Dial-a-Ride” is actually a shared identity used by a number of service providers, most of whom only operate within their own cities. If a person wants to travel to a neighboring city or service area, transfers are made at identified locations along or near municipal boundaries. Most Dial-a-Ride transfers occur at fast food restaurants, grocery stores, group caregiver centers, and hospitals. Unfortunately, many transfers occur within a short distance of the final destination – frustrating riders and adding costs to services.

The notable exception is the East Valley Dial-a-Ride system (EVDAR) that provides service in Mesa, Scottsdale, Tempe, Chandler, and Gilbert.

Dial-a-Ride is the most expensive form of public transportation provided in the Valley, with passenger fares covering approximately 7 percent of the operating cost of the service. The average operating subsidy continues to increase from \$5.95 in 1992 to \$12.58 in 1997 to \$16.73 in 2001 (source: PMAS).

As with fixed route service, Dial-a-Ride capacity is not spread evenly across the study area. **Table 3.6** compares the 2000 population of each service area against the number of

vehicles available in that service area. The disparity between available vehicles to population between these service areas and the region as a whole is presented in the far right column of this table, Difference from Average. Note that the fleet sizes are from 2000 and precede the implementation of dedicated transit funding.

**Table 3.6**  
**Population per Dial-a-Ride Vehicle, 2000**

Service Area	2000 Population	2000 Fixed Route Fleet	Population / Vehicle	Difference from Average
All Providers	3,072,149	247	12,438	-
East Valley*	1,059,210	64	16,550	4,112
Phoenix	1,321,045	70	18,872	6,434
West Valley**	429,656	43	9,992	(2,446)
Maricopa County***	262,238	70	3,746	(8,692)

\* - Includes providers in Chandler, Gilbert, Guadalupe, Mesa, Scottsdale, and Tempe

\*\* - Includes providers in El Mirage, Glendale, Peoria, Sun Cities, and Surprise

\*\*\* - Includes all unincorporated Maricopa County

Source: Valley Metro, LKC

**Table 3.7** summarizes basic service statistics for the region's demand response service for fiscal year 2002.

**Table 3.7**  
**Service Statistics for Dial-a-Ride Service, FY2002**

Days of Service	7 Days (EVDAR, SCAT) Weekdays (all others)
Hours of Service	Varies
Annual Vehicle Miles	8,300,000
Annual Vehicle Hours	654,000
Annual Revenue Miles	7,000,000
Annual Revenue Hours	509,000
Annual Passenger Boardings	1,000,000
Boardings / Revenue Mile	0.15
Boardings / Revenue Hour	2.01
Gross Operating Cost	\$21,500,000
Fare Recovery (dollars)	\$1,300,000
Fare Recovery (percent)	6%
Net Operating Cost	\$20,200,000
Net Cost / Revenue Mile	\$2.88
Net Cost / Revenue Hour	\$39.73
Net Cost / Passenger	\$19.76
Percent On-Time	88%

Source: Valley Metro PMAS

The eligible population for each service provider varies. **Table 3.8** presents eligibility by provider. Some Dial-a-Ride trips are to ADA-certified persons, and satisfy the requirements under ADA to provide curb-to-curb service for the population with disabilities. In other communities, there is no existing local fixed route service, so there is no requirement to certify riders for ADA eligibility.

**Table 3.8**  
**Dial-a-Ride Eligibility**

Agency	Eligible Population
Avondale	START ADA Service
East Valley Dial-a-Ride (EVDAR)	Seniors, persons with disabilities
El Mirage	General Public
Glendale	General public, seniors, persons with disabilities
Goodyear	START ADA Service
Guadalupe	Seniors, persons with disabilities
Litchfield Park	START ADA Service
Maricopa County STS	Seniors, persons with disabilities, low income households
Paradise Valley	Persons with disabilities
Peoria	General public, seniors, persons with disabilities
Phoenix (Dial-a-Ride)	Seniors, persons with disabilities
Phoenix (Reserve-a-Ride)	Seniors, persons with disabilities (to Senior Centers and other designated only)
Sun Cities Area Transportation (SCAT)	General Public, persons with disabilities
Surprise	General Public
Tolleson	START ADA Service

*Source: Valley Metro*

**Table 3.9** presents the trip characteristics for each of the Dial-a-Ride providers in 2001.

**Table 3.9**  
**Trip Characteristics for Dial-a-Ride Operators, FY2001**

Agency	2001 Trips				Revenue Hours		Revenue Miles	
	Total	DAR	ADA	%ADA	Total	Per Trip	Total	Per Trip
Phoenix Dial-a-Ride	238,000	118,000	120,210	51%	192,000	0.8	2,906,000	12.2
Phoenix Reserve-a-Ride	204,000	204,000		0%	51,000	0.3	574,000	2.8
East Valley Dial-a-Ride	267,000	202,000	64,625	24%	116,000	0.4	1,425,000	5.3
Maricopa County STS	142,000	142,000		0%	46,000	0.3	727,000	5.1
Sun Cities Area Transportation (SCAT)	61,000	61,000	26	0%	19,000	0.3	204,000	3.3
Glendale	67,000	52,000	14,758	22%	21,000	0.3	248,000	3.7
Peoria	34,000	33,000	950	3%	8,000	0.2	156,000	4.6
Surprise	6,000	6,000		0%	3,000	0.5	33,000	5.5
Guadalupe	5,000	5,000		0%		0.0	10,000	2.0
El Mirage	2,000	2,000		0%	2,000	1.0	10,000	5.0
Total	1,026,000	825,000	200,569	20%	458,000	0.4	6,293,000	6.1
Total Phx+EVDAR+Glendale+Peoria	810,000	609,000	200,543	25%	388,000	0.5	5,309,000	6.6

Source: Valley Metro

## **Vanpool Service**

Vanpools are in essence a personalized express service for commuters. The Vanpool program is managed by RTPA through its complementary rideshare program. Vanpooling consists of a group of seven to 15 employees who share a ride to work and divide the expenses of operating the vanpool equally. Vans are purchased by RTPA using federal assistance. The driver of the vanpool receives a free ride to and from work each day and is allowed limited free personal use of the van every month.

In 1987, the RTPA initiated a “third-party” vanpool program and hired a vendor to provide vans and fleet services. The benefit of using a third-party system is that companies can establish vanpools for their employees with a minimal investment and without any liability exposure to the company and the RTPA is able to maximize funding and staff resources. During FY 2000-2001, the Valley Metro Vanpool Program grew by 26 vanpools (46 new pools, 20 terminated), or 15 percent. During 2001-2002, the vanpool program grew by 10 new vanpools for a total of 237 vans. Ridership increased by 4.5 percent to over 917,000 passenger trips in 2001-2002.

## **Rural Service**

The Maricopa County Special Transportation Services (MCSTS) provides demand-response internal circulation on selected days, as well as inter-city service designed to meet employment-related needs. MCSTS is funded through a variety of sources, including support from several of the rural communities it services. Currently, these services are provided for elderly, low-income, and disabled individuals only. MCSTS also provides a local circulator route for TANF participants throughout much of the rural community. Several rural communities augment the MCSTS services by funding limited demand-response transit services.

## SECTION FOUR: PEER REVIEW

As part of the development of the Regional Transit System Plan (RTS), peer systems were analyzed. The analysis of peer systems was to accomplish two goals:

- To learn how other agencies addressed regional transit service; and
- To develop reasonable unit costs for transit services and capital investment

Although a wide range of peers was originally considered, through consultation with the AAG, the set of peers was reduced to five metropolitan areas:

- Dallas-Fort Worth, Texas
- Houston-Galveston, Texas
- Portland-Vancouver, Oregon-Washington
- San Diego, California
- Seattle-Tacoma, Washington

Existing service in the Phoenix area was also used as a baseline for developing new services. Elements from each of the peers that were incorporated into the 2030 RTS are noted below. The 2030 RTS is described in detail in Section Five.

A full review of peer system operating data is included in **Appendix C** of this report.

### Dallas DART

DART's paratransit eligibility program was used as a model for a future eligibility program for Dial-a-Ride's paratransit service. DART has an extensive eligibility program that includes bringing potential patrons to a centralized facility to meet with physicians and case workers. Although the effort of becoming certified and the strict eligibility standards may discourage some potential patrons from using DART's system, DART's ridership characteristics suggest that eligible users make more annual trips than passengers make on Dial-a-Ride in Phoenix. This may be due to a better overall level of service.

By switching to an eligibility process like that used by DART, Valley Metro should be able to slow down the growth in demand for dial-a-ride service by strictly controlling who can access the service. At local discretion, Dial-a-Ride service for seniors could be continued. At the same time, Valley Metro should attempt to improve the quality of service, mainly by coordinating trips between jurisdictions to reduce the need to transfer.

To reflect a shift to DART's eligibility process, the 2030 ridership rate (in terms of trips per eligible rider) for Valley Metro is set equal to that of DART's service in Plano, Texas. Plano shares many characteristics with the Phoenix area, including decentralized employment, a large senior population, and rapid growth.

## Houston METRO

The Metropolitan Transit Authority of Harris County (METRO) provides an extensive network of Park & Ride routes. METRO's Park & Ride service was used as the basis for the expressway regional connections service designed as part of the 2030 RTS. METRO's Park & Ride route network provides trips to downtown Houston and selected other major activity centers. In Downtown Houston, the Park & Ride service has helped achieve a greater than 30 percent mode split for transit. Houston's Park & Ride routes do not provide any local service other than within the activity centers that they serve. Buses operate at high frequencies during peak hours, and operate all day and in both directions. Access to Park & Ride service at its origins is either via private automobile or other bus routes.

The proposed expressway regional connections service in Phoenix would operate similarly. Routes would no longer provide local services, as most Valley Metro express routes do now. Instead, they would connect park & ride lots with downtown Phoenix, downtown Tempe, and the Scottsdale Airpark area. Shorter and faster trips would allow higher frequencies of service using the same numbers of vehicles. In most cases service would be all-day and in both directions.

The Houston area's commuter vanpool program (administered by the Houston-Galveston Area Council, the MPO) was also used as a model for a reasonable future level of service for Valley Metro's vanpool program. By 2015, Valley Metro's vanpool per capita rate should grow to the same rate as Houston's (assuming the RTS).

## San Diego Metropolitan Transit Development Board

San Diego's Short Range Transit Plan (2002-2006) uses market segmentation to define different types of transit demand. Service concepts are then matched to the type of demand, and all of the services together make up that city's regional transit plan.

A similar approach was used to develop the different categories of service used in the 2030 RTS. Different markets were identified (local access, long distance commuter, rural service, etc.) and a suite of services was developed to match each type of demand.

The RTS also borrows the concept of local routes of regional significance. San Diego has developed criteria to rate local routes that are of regional significance. A similar set of criteria was drafted for the RTS to define those routes that are of regional importance and should be implemented regardless of local levels of participation in the RTS.

## Seattle – Sound Transit, King County Metro

Sound Transit is the regional transit provider in the Puget Sound region of Washington State. Like the Phoenix area, the Puget Sound region is characterized by multiple activity centers and multidirectional commuter patterns. In the case of the Sound Transit network, express service was instituted to connect the major activity centers as nodes in a

network. Local service and circulators connected trip origins and destinations to the major transit nodes.

A similar network is proposed for the Phoenix area in the 2030 RTS. The regional transit services – expressway and arterial connections – are designed to provide high-speed connections between transit nodes and activity centers. Each activity center is served by local fixed route transit routes and each MPO has a circulator “budget” of revenue hours with which to design circulator service.

## **SECTION FIVE: REGIONAL TRANSIT SYSTEM PLAN**

The purpose of Section Five is to present the Regional Transit System Study's Regional Transit System (RTS) for 2030. This section also presents the methodology by which the RTS was developed, and summarizes interim 2010 and 2020 transit networks.

The RTS was developed to provide a reasonable and realistic level of service given anticipated transit needs in the Phoenix area through 2030. However, the RTS is not a cost-constrained transit alternative. Information on the costs of providing the service in the RTS network and on methods of funding that service are presented in Section Six.

Materials in Section Five were originally presented (in a different format) to members of the AAG and to stakeholder groups in the "Regional Transit System Study: Study Documentation" in December 2002 (updated July 2003).

This section is organized into the following subsections:

- Components of the Regional Transit System
- Development of the 2030 Regional Transit System
- Interim Transit Systems
  - Capital Project Implementation Schedule
  - 2010 Regional Transit Systems
  - 2020 Regional Transit Systems

### **COMPONENTS OF THE REGIONAL TRANSIT SYSTEM**

The Regional Transit System (RTS) is designed to serve all needs for transit service in the Valley. Therefore, it contains a number of different service types designed to serve different markets. For example, express bus service provides high speed work trips to commuters working in downtown Phoenix, and paratransit service provides curbside service to persons with disabilities who may not be able access traditional fixed route service.

The methodology to develop each type of service is presented in the next subsection. This subsection defines the service concept of each category of service.

The following are the components of the RTS:

- Local Transit Service
  - Fixed route local service
  - Circulator / shuttle service
- Rural / Non-Fixed Route Service

- Regional Transit Service
  - Regional local routes
  - Arterial Regional Service
  - Expressway Regional Service
  - Commuter Vanpool Service
  
- Paratransit
  - ADA-Paratransit
  - Senior Paratransit
  
- Transit Demand Management (TDM)
  
- Capital Projects

Each is described below. Note that the RTS does not include planning for High Capacity Transit modes, such as light rail or commuter rail.

### **Local Transit Service**

Local transit service provides the backbone of the RTS plan and makes up the bulk of the revenue hours and miles of service and of the cost of providing the service. Local transit service consists of two categories of fixed route transit:

- Local fixed route, which operates along set routes and follows set schedules. Local fixed routes operate primarily on arterial streets. Examples include Valley Metro's Red, Green, Blue and Yellow routes.
- Circulator / shuttle routes, which provide service within neighborhoods and activity centers and typically operate short routes at high frequencies. Neighborhood circulators may travel on local streets. Examples include Valley Metro's FLASH, DASH or ALEX routes.

Local transit service serves all trip purposes, including work, shopping, and educational trips. The service design emphasis is on service area coverage, so that the maximum possible population can access the bus network. Service levels on particular routes are dictated by the demand for transit along those routes. Local service routes typically operate all day, seven days a week, in some cases with higher levels of service during peak hours. Unlike regional services, which are oriented around peak periods of demand, local transit service provides access to transit for people who work or otherwise need to travel at all hours.

Because local routes make multiple stops and travel in mixed traffic, operating speeds can be slow, and riders may choose to use regional transit services for longer trips.

## **Rural / Non-Fixed Route Service**

Rural Connections service is a catch-all category that includes all transit services operating outside of the urbanized area of Phoenix. For the purposes of the service type, the urbanized area is that part of Phoenix that is served by local fixed route service. Rural Connections could include long distance shuttles connecting remote communities with urban transit nodes, circulator services within remote towns such as Gila Bend or Casa Grande, or curbside demand-response service in low-density areas in the urban fringe. In all cases, the focus of service is on connecting rural communities with the urban fixed route network.

## **Regional Transit Service**

Regional transit services are designed to provide higher speed services for longer trips. Routes are also designed to connect together distant activity centers, transportation nodes, or residential areas. Regional transit service consists of four categories of service:

- Regional local routes, which are local transit routes considered to be regionally significant. By funding these service *regionally*, a backbone of connecting service is assured regardless of local funding levels.
- Arterial regional routes, which operate as overlays on corridors served by local fixed route service, but provide higher speed services by operating with limited stops and in some cases possibly with other enhancements, such as queue-jumper or signal priority systems. Arterial regional routes operate during peak and off-peak periods.
- Expressway regional routes, which use existing and proposed high occupancy vehicle (HOV) facilities to connect remote park & ride lots with major activity centers, primarily downtown Phoenix and downtown Tempe; may only operate during peak periods. In some cases provide suburb-to-suburb connections using loop expressways and intermediate stops, such as along the Pima, Price and Agua Fria Expressways, or at a LRT station.
- Commuter vanpools, which allow groups of employees to self-organize and lease a vehicle from Valley Metro to use to operate a carpool service.

Regional transit services are focused on trips to major activity centers, with the bulk of service occurring during peak periods, primarily work and school trips. The emphasis of service is on long-distance trips, and where possible uses existing capital infrastructure such as HOV lanes and park & ride lots. Off-peak work trips are addressed through expansion of hours in the local transit network.

## **Paratransit**

Paratransit includes all modes of transit service generally intended to serve only seniors and persons with disabilities. Paratransit service is demand-response and provides curbside pick-ups and drop-offs. In some cases, paratransit service may connect with fixed route service at transit centers or other nodes.

Paratransit consists of two categories of service:

- ADA-paratransit service is required by the Americans with Disabilities Act (ADA) for all areas within  $\frac{3}{4}$  mile of a fixed route for all ADA-certified patrons
- Senior paratransit service is an optional service provided for the senior population or the population with disabilities that does not meet ADA criteria

Paratransit can also include client transportation services such as the existing Reserve-a-Ride service, which provides trips in Phoenix to Senior Centers; or other programs such as taxi vouchers or volunteer driver programs.

### **Transit Demand Management**

Transit Demand Management (TDM) addresses the demand side of travel behavior. Strategies to manage travel demand attempt to reduce the demand for drive-alone (single occupant) travel on roadways by offering alternatives to driving alone. Local transit, commuter transit service, rail transit, ridesharing, and cycling are all examples of alternate modes. Fewer vehicles on roadways during peak hours allow traffic to move more efficiently.

TDM strategies included in the RTS are low-cost projects and programs that encourage alternative travel modes to driving alone. More expensive projects (i.e., transit service, HOV lanes) are described elsewhere. Examples of TDM strategies include organizing carpools, encouraging flexible time or staggered work hours, encouraging telecommuting, and encouraging transit-oriented development.

### **DEVELOPMENT OF THE 2030 RTS**

The 2030 RTS includes each of the above components. Each was developed using its own methodology. The 2030 RTS is based on the transit needs (as defined in Section Two) for the region for the year 2030.

### **Local Transit**

The development of the local transit network is based on the concept of *transit need*, as defined in Section 2 of this report. The transit need index (TNI) was used to define the amount of local transit service needed (in terms of revenue miles) by each TAZ within the study area. Transit need is converted into either local transit service or rural connections service (see the next subsection) by the process described below.

Miles of transit demanded by each TAZ are shown in **Figure 2.4**. Miles demanded by each MPA are shown in **Table 2.9**.

The TNI is converted into a local transit network via the following steps:

1. Develop a potential route network
2. Solve for optimal service levels
3. Clean up optimized network
4. Assign circulators and shuttles

Each step is described in detail below.

*1) Develop a potential route network*

The output of the TNI process described in Section Two is the number of revenue miles of service demanded by each TAZ. The purpose of Step One is to convert that output into fixed route service. Steps One and Two also determine the extent of the fixed route service area.

To develop the local route network, service levels must be applied to a potential route network. A potential route network is created in the ArcView Geographic Information Systems (GIS) software by drawing a route on any street that could potentially carry fixed route transit service. The most recent street network available for this process was supplied by MAG. The road network is complete within the central part of the study area, but does not include a complete road grid in outlying areas, especially in the Northwest and Southwest Valley. In areas where there is not a complete road network, the grid of local service could not be extended.

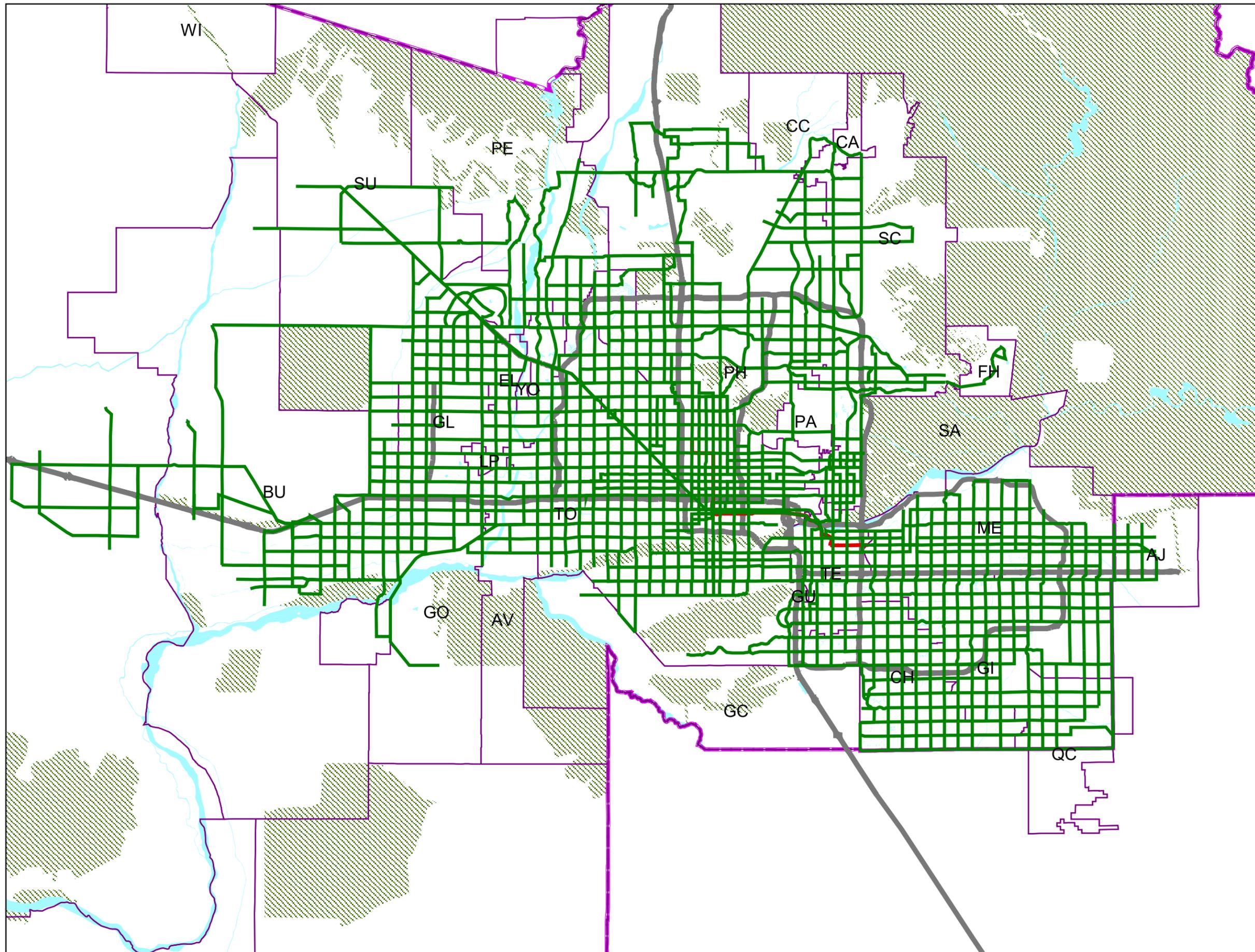
To the greatest extent possible, transit plans developed by area cities were used to identify potential routes. Stakeholder interviews were also used to identify potential routes and to develop routes in areas with no street networks in the road layer supplied by MAG.

The potential route network largely follows the existing Valley Metro route network design of operating fixed route service along the arterial grid network. Additional routes were drawn on streets outside of the one-mile grid of arterials where demand appeared to warrant denser service and where the street network allowed.

The potential routes are broken into segments at major transit nodes or where they cross political boundaries. The resulting potential network covers a very large area, and includes service in areas where realistically, service would not be offered in the year 2030. Step Two in the process will assign service levels to the routes and identify those that should be dropped from the network.

**Figure 5.1** shows the potential route network.

### Figure 5.1 Potential Route Network



- Potential Local Routes
- C/EV LRT line (MOS)
- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Undevelopable Space
- Water



0 6 Miles



## 2) Solve for optimal service levels

The next step is to use the TNI to assign service levels to the route segments in the potential route network. A “solver” algorithm in Microsoft Excel is used to assign different frequencies of service to each segment for each of the potential routes. The solver tries different combinations of service levels, with the goal of minimizing the square of the difference between the number of revenue miles of service demanded by a TAZ and the number of revenue miles operating in a TAZ.

Each potential route is buffered to assign a portion of the service along a route to both the TAZ that the route touches and those TAZ within a quarter-mile of the route. The amount of service assigned to a given TAZ is proportional to the percentage of the buffered area that lies within the TAZ. Thus, some TAZ could be assigned revenue miles of service even if no routes actually pass through those TAZ.

At the end of the solving process, every segment in the potential route network has been assigned a number of average daily trips that ranges from zero to 200 daily trips (the solver caps the maximum number of trips at 200). Average daily revenue miles in each TAZ equals (route miles within the TAZ x number of daily trips). The service level assignments represent the best possible match of service levels to demand given the limitations placed on the solver algorithm. The next step will be to clean up the network so it more closely resembles an actual transit network.

## 3) Clean optimized network

Once service levels have been assigned to the potential network, the network must be cleaned. Otherwise, there are routes with unrealistically high (more than 155 trips per average day, or more than 176 trips per average weekday) or low (less than 20 trips per day) levels of service. Also, because routes are broken into segments, frequencies are inconsistent across routes.

The first step in the process is to break all the route frequencies into categories. The solver algorithm assigns a range of frequencies. By assigning these frequencies into categories, it is easier to convert them into standard service levels. **Table 5.1** shows the categories of service used in this process.

Note that there are an infinite number of ways the total trips could be broken up; the frequencies presented in **Table 5.1** are intended only as examples to give an idea of what service levels are like.

**Table 5.1**  
**Example Service Level Categories for Local Transit Service**

Weekday Service				Total Trips				
Span of Service	Peak Headway	Base Headway	Late Night Headway	Weekday	Saturday	Sunday	Weekly	Average Daily
5:00 a.m. - 7:00 p.m.	60	60	No Service	26	17	13	160	23
5:30 a.m. - 9:30 p.m.	60	60	60	32	21	16	197	28
5:00 a.m. - 10:15 p.m.	30	40	40	58	39	29	356	51
5:00 a.m. - 10:30 p.m.	30	30	30	70	47	35	432	62
5:00 a.m. - Midnight	15	20	30	120	80	60	740	106
5:00 a.m. - Midnight	12	20	30	132	88	66	814	116
5:00 a.m. - Midnight	10	15	15	176	117	88	1,085	155

Source: LKC

One of the purposes of the clean-up process is to eliminate potential routes for which the demand does not warrant fixed route service. All segments where the demand for service resulted in an assignment of fewer than 22 weekday trips (roughly 1 trip per hour in each direction) were eliminated from the network unless those segments were necessary to connect segments with higher demand.

In addition to breaking frequencies up into categories, the network cleanup also requires setting consistent levels of service across segments of each route. Although a route does not necessarily travel its entire length at the same level of service, it is also unlikely that a route would operate under different parameters in each of several jurisdictions.

The final local route network is shown in **Figure 5.2**. Because routes overlap on many street segments, **Figure 5.2** does not reflect the frequencies assigned to each route. Route frequencies for all local routes in each MPA are shown in **Appendix D**.

Note that **Figure 5.2** only shows local fixed routes. **Figure 5.2** does not show any regional routes, rural routes or circulators.

Those TAZ that fixed routes pass through or those with a portion within one-quarter mile of a fixed route constitute the fixed route service area. This area corresponds roughly with the projected urbanized area of Phoenix in 2030. The area outside of the fixed route service area is defined here as the rural area. The process of developing transit services for the rural area is described later in this section.

# Figure 5.2 2030 Local Service Network

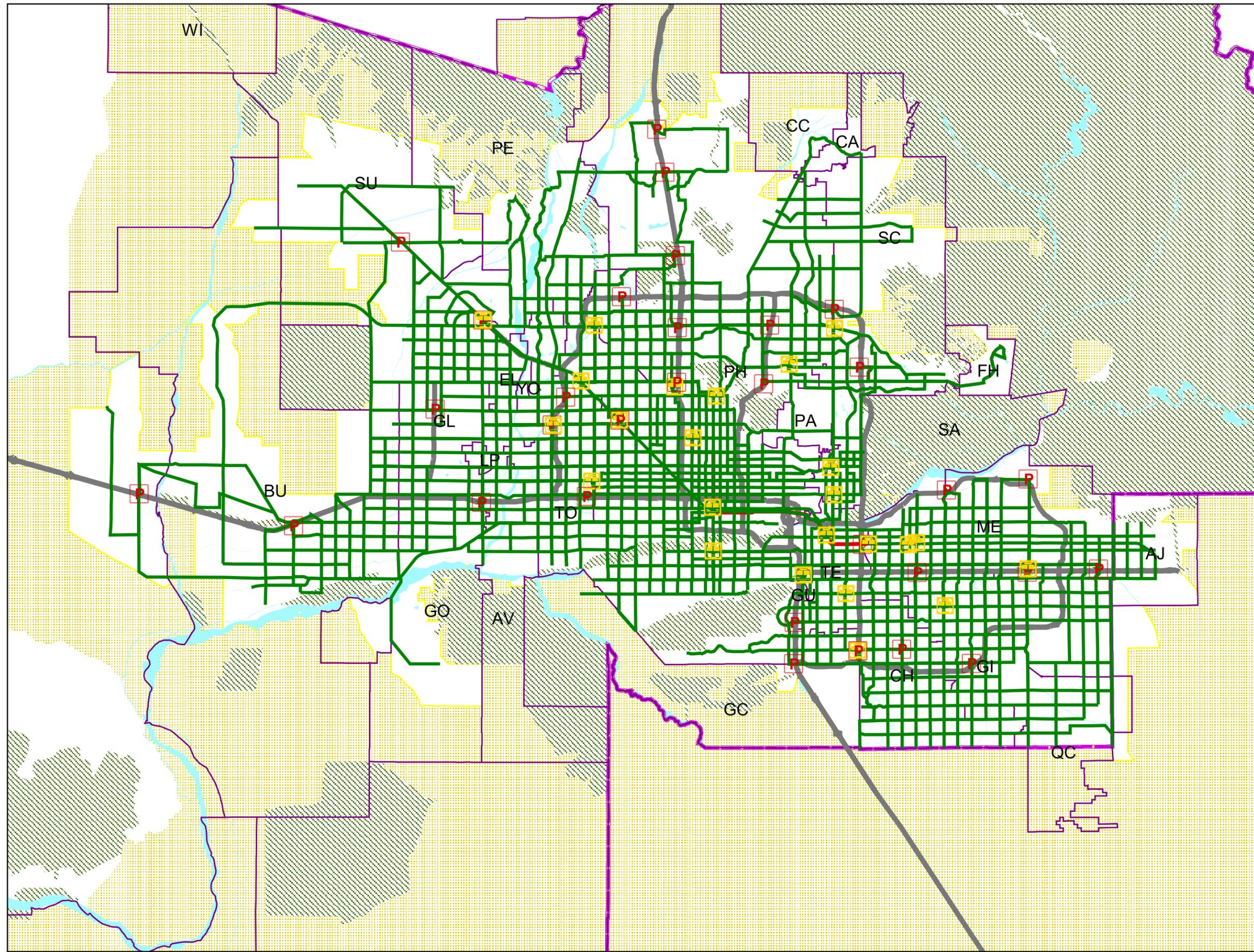
Local fixed routes plus rural/transit access areas

Passenger Facilities

- Park & Ride
- Transit Center

- Local Fixed Routes
- C/EV LRT line (MOS)
- Interstates & Freeways
- MPA Boundaries
- County Boundaries

- Undevelopable Space
- Water
- Urban (FR) vs Rural service
- Rural/transit access area
- Urban/fixed route area



0 6 Miles

#### 4) Develop Circulator and Shuttle Service

Once the route clean up process is completed, the revenue miles of service assigned to each TAZ or each MPA can be recalculated using the new, cleaned up route network (using the formula Daily Revenue Miles per Route = Pattern Miles x Number of Daily Trips). **Table 5.2** shows the results of this calculation.

In many cases, the revenue miles assigned to each MPA do not match the revenue miles needed. Some variation is a consequence of the process. However, in the majority of cases, the revenue miles assigned fall short of the miles required. This could reflect any of three factors:

- Many MPAs have small areas of extremely high transit need that the widely spaced (one-mile interval) network of the local route grid cannot reach
- Some MPAs have areas of such high need that 176 weekday trips is not sufficient to serve them
- Some MPAs have high need areas where there is no street network to support fixed route transit operations
- Some miles are required in areas outside of the fixed route service area

All revenue miles of service beyond those required for the fixed route network are included in **Table 5.2** under one of two categories:

- Circulator Miles
- Other Miles, which account for miles demanded by areas outside of the fixed route service area (which will be served by rural transit services, see below)

Areas where demand exceeds possible supply may be better served by circulator service. Examples include services in major activity centers like downtown Phoenix or Tempe (DASH and FLASH service) or services in neighborhoods with high transit need but street networks that are not conducive to internal service (ALEX).

Even areas that do not receive an allotment of circulator miles under this methodology may benefit from some type of neighborhood or circulator service. In those communities, resources dedicated here to the fixed route grid may instead be invested in circulator-type routes, or those communities may be willing and able to invest beyond the levels required for the 2030 plan to operate additional service.

To account for circulator services that use demand response or flexible route service, revenue miles for circulators can be converted to revenue hours using a factor of 12.2 miles per hour (which is roughly the Valley Metro average speed for local service).

**Table 5.2**  
**2030 Local Transit Service Need and Allocation,**  
**Service in Miles per Average Day**

MPA	Total Need (Rev. Mi.)	Urban Revenue Miles		Other Miles
		Fixed Route	Circulator	
Apache Junction	2,317	1,777	359	180
Avondale	4,367	3,930	257	180
Buckeye	16,510	15,625	0	1,929
Carefree	217	239	0	0
Cave Creek	374	256	0	157
Chandler	9,668	9,104	565	0
El Mirage	1,949	1,897	51	0
Fountain Hills	843	612	128	102
Gila Bend	763	0	0	763
Gila River Indian Community	425	343	0	211
Gilbert	8,899	8,943	0	0
Glendale	11,716	12,637	0	0
Goodyear	12,371	6,515	2,400	3,456
Guadalupe	195	237	0	0
Litchfield Park	376	444	0	0
Mesa	23,818	20,255	3,387	177
Paradise Valley	487	666	0	0
Peoria	10,472	8,905	1,123	444
Phoenix	82,271	71,916	8,986	1,369
Queen Creek	2,816	2,074	507	235
Salt River Pima-Maricopa Indian Community	826	397	95	334
Scottsdale	12,147	8,640	2,677	829
Surprise	10,760	11,676	0	819
Tempe	10,218	8,868	1,350	0
Tolleson	1,075	1,176	0	0
Wickenburg	882	0	0	882
Youngtown	295	156	140	0
Maricopa County MPA	5,356	4,290	0	1,811
Pinal County MPA	9,059	180	17	8,862
<b>TOTAL</b>	<b>241,471</b>	<b>201,758</b>	<b>22,044</b>	<b>22,740</b>

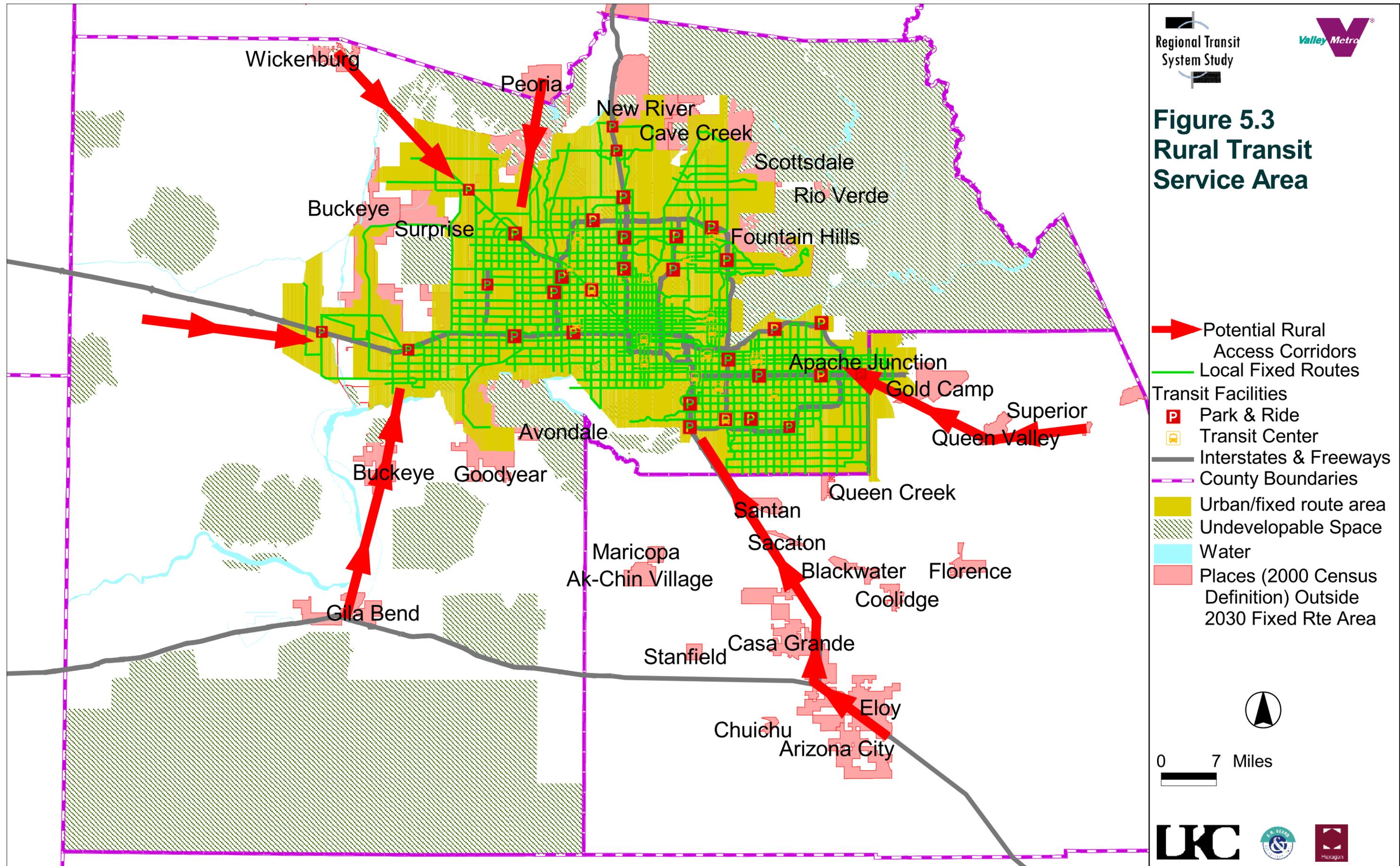
Source: LKC

## **Rural / Non-Fixed Route Transit**

As noted above, areas outside of the fixed route service area are defined as the “rural” area. These areas may in fact be built up, suburban areas. The definition of rural is intended only to signify that they are beyond the service area for fixed route transit.

**Figure 5.3** shows the fixed route service area of the study area. **Figure 5.3** also shows significant travel patterns from remote rural locations.

**Figure 5.3  
Rural Transit Service Area**



- Potential Rural Access Corridors
- Local Fixed Routes
- Transit Facilities**
- Park & Ride
- Transit Center
- Interstates & Freeways
- County Boundaries
- Urban/fixed route area
- Undevelopable Space
- Water
- Places (2000 Census Definition) Outside 2030 Fixed Rte Area



0 7 Miles



**Table 5.3** shows the portion of each MPA that is categorized as rural in this methodology.

**Table 5.3  
Urban and Rural Population of MPAs, 2030**

MPA	Population (2030)	Rural Pop. (2030)	% Rural
Apache Junction	56,685	4,501	8%
Avondale	116,296	7,982	7%
Buckeye	490,629	67,939	14%
Carefree	6,243	0	0%
Cave Creek	13,581	6,521	48%
Chandler	299,487	0	0%
El Mirage	52,971	0	0%
Fountain Hills	34,662	5,493	16%
Gila Bend	18,281	18,281	100%
Gila River Indian Community	6,309	5,026	80%
Gilbert	291,540	0	0%
Glendale	321,838	0	0%
Goodyear	334,855	119,732	36%
Guadalupe	6,001	0	0%
Litchfield Park	15,582	0	0%
Mesa	748,305	0	0%
Paradise Valley	20,922	8,410	40%
Peoria	359,920	13,651	4%
Phoenix	2,261,677	47,193	2%
Queen Creek	94,391	10,684	11%
Salt River Pima-Maricopa Indian Community	9,693	6,134	63%
Scottsdale	343,881	33,091	10%
Surprise	358,756	22,732	6%
Tempe	201,227	0	0%
Tolleson	6,800	0	0%
Wickenburg	20,753	20,753	100%
Youngtown	7,674	0	0%
Maricopa County MPA	181,059	53,193	29%
Pinal County MPA	331,514	323,253	98%
<b>Total</b>	<b>7,011,532</b>	<b>774,569</b>	<b>11%</b>

Source: MAG, LKC

Rural services can vary widely depending on the needs of the area in which rural service operates. Examples of rural services include:

- Demand response service connecting the suburban fringe of northern Pinal County with transit centers in Mesa or Chandler

- Town circulators in remote communities like Casa Grande, Wickenburg, or Gila Bend
- Express routes connecting remote communities like Gila Bend with Phoenix
- Shuttles between remote residential areas in Indian Communities and employment centers on the outskirts of the Indian Communities
- Demand response lifeline service in rural areas connecting rural residents with Phoenix's fixed route network

The revenue miles (or hours) allocated for these services in each MPA are provided in **Table 5.2**. MPAs with zero hours in the "Other" column have no rural areas (though they might serve as destinations for trips from rural areas).

### **Regional Transit Services**

As noted above, Regional Transit Service is a category that encompasses four very different types of service, each of which was developed using a different methodology:

- Regional local service
- Expressway Regional Connections
- Arterial Regional Connections
- Commuter Vanpool Service

### Regional Local Routes

Regional local routes are a subset of the local fixed routes as developed for the 2030 local service network. Regional local routes are local routes that provide a regional transit function. To be considered a regionally significant route, a local route must satisfy one or more of the following criteria:

- Must be a major trunk line route
- Must have high ridership
- Must connect major activity centers and / or transportation hubs
- Must operate in a major transportation corridor
- Must serve a large area and / or multiple jurisdictions

To develop a potential list of regional routes, a set of criteria were developed that allow all local routes to be ranked in order of how regional they are. Based on the availability of funding, routes at the top of the list could potentially be funded regionally instead of locally.

The ranking process requires the following steps:

1. Each eligible local route is ranked from 1st (best) to 63<sup>rd</sup> (worst) in each of the evaluation criteria presented in **Table 5.4**.

2. Each of the evaluation criteria is weighted based on local priorities; if the highest priority for regional service is to serve multiple jurisdictions, criteria 1 would be weighted more heavily than the others
3. Each route's ranking in each criterion is multiplied by the weighting for that criterion, which results in a weighted total number for each route. That weighted total is the Regionality Index value for the route.
4. Sorting the routes by their Regionality Index value ranks them from most to least regional.

Measures of regionality and their evaluation criteria are shown in **Table 5.4**. **Table 5.4** also shows the top performer in each category among existing (Summer 2002) routes.

**Table 5.4**  
**Regionality Criteria**

Measure of Regionality	Evaluation Criteria	Top Performer
Serves multiple jurisdictions	% of pattern miles in jurisdiction other than largest	108 Elliot
Has long trip length	Total pattern miles	Blue Line
Provides high level of service	Trip per week	Red Line
Has high ridership	Weekday passenger boardings	Green Line
Is productive	Weekday boardings / revenue mile	0 Central Avenue
Provides transfer opportunities	Number of stops served by 2+ other routes	Red Line
Provides intermodal connections	Number of intermodal nodes served	Red Line
Serves major activity centers	Number of high-employment TAZ served	Red Line
Provides high level of service	Span in hours of weekday service	10 Roosevelt / Grant

Source: LKC

A set of weightings was suggested by the AAG committee at the April 2003 meeting. An additional criteria was added at the May 2003 meeting. **Table 5.5** shows the suggested weightings that were recommended.

**Table 5.5**  
**Recommended Weightings, Regionality Index Criteria**

Evaluation Criteria	Weighting
% of pattern miles in jurisdiction other than largest	3
Total pattern miles	3
Trip per week	1
Weekday passenger boardings	2
Weekday boardings / revenue mile	3
Number of stops served by 2+ other routes	1
Number of intermodal nodes served	1
Number of high employment TAZ served	1
Span in hours of weekday service	1

*Source: May 2003 AAG Meeting*

Ranked local routes in the existing (2002) and proposed (2030) route networks are shown in **Appendix E** of this report.

#### Expressway Regional Connections Service

Expressway regional connections services are designed to replace the existing Valley Metro express routes (500-number routes) and the proposed Phoenix Bus Rapid Transit service. Expressway regional connections routes operate as park & ride routes. They connect directly from remote park & ride lots to major activity centers utilizing expressways and (where available) HOV / diamond lanes. The only local service they provide is to circulate around their activity center destinations.

In some cases, expressway regional connections routes operate all day from remote park & ride lots to downtown Phoenix. In other cases, during off-peak hours routes stop at an interim location and passengers must transfer to complete their trip downtown. In all cases, if a transfer must occur, it is to either another express route or to light rail.

Development of expressway regional connections services required two steps:

- Identify major activity centers
- Identify existing and proposed infrastructure

#### *Identify Major Activity Centers*

Ideally, all major activity centers would have express service. In reality, however, limited funding availability limits implementation of such services to locations where they can be relatively productive. Productivity in this case is a function of the following:

- Amount of employment (or number of full-time students) at the destination
- Parking capacity in park & ride lots served by the route

- Presence of expressways and HOV treatments for vehicles to use
- Limited parking at the destination

The major activity centers with large enough employment and limited parking are downtown Phoenix and downtown Tempe, the two largest activity centers in the Valley. After consultation with stakeholders, a third activity center, the Scottsdale Airpark, was added to the list.

Downtown Phoenix and Tempe are both compact activity centers where limited local service can effectively distribute employees. Both also have limited parking and essentially no free parking, which will further encourage transit use. Both are served by several expressways and HOV facilities, which will improve transit travel times and can make bus service more competitive with single occupancy vehicles.

#### *Identify Existing and Planned Infrastructure*

As noted above, commuter transit services rely upon the existence of expressway facilities for longer trips. HOV facilities can make such service competitive with single-occupancy vehicles by allowing buses to bypass congestion on expressways. Finally, there must be sufficient parking capacity at the origins of commuter routes to allow any commuters in the route's catchment area to access transit.

To maximize the cost effectiveness of the regional transit services, existing or planned facilities were included in the network wherever possible. Therefore, from downtown Phoenix or downtown Tempe, express routes were assumed on all connecting expressways, with more extensive service on those corridors with HOV lanes and multiple park & ride lots. Existing Park & Ride lots and HOV lanes are shown in **Table 3.2** and **3.3**. Planned facilities are listed in **Table 5.16**, later in this report section.

During peak hours, non-stop service is provided to downtown Phoenix from all corridors. During off peak hours, non-stop or one-transfer commuter service is provided to downtown Phoenix from all corridors. Where one-transfer service is operated, service on either side of the transfer is either via express route or the CP/EV LRT line.

During peak hours, non-stop service is provided to downtown Tempe from corridors with projected high travel patterns to downtown Tempe (see **Figure 2.5**). During off peak hours, service is either non-stop or one-transfer service. Where one-transfer service is operated, service on either side of the transfer is either via express route or LRT transit.

The Scottsdale Airpark area is an emerging activity center. Although the size and density of activity do not equal that of downtown Phoenix or Tempe, the Airpark area experiences many of the same traffic problems and there is a high demand for transit service to this area. Peak period express service is provided along the two most significant commuter travel corridors to the Airpark area, the North and East Loop 101 (Pima and Agua Fria Expressways).

**Table 5.6** details the expressway regional connections routes.

**Table 5.6**  
**Expressway Regional Connection Routes, 2030**

Freeway Corridor	Route Name	Primary Destination	Time Period	Transit Nodes
Black Canyon Fwy	Deer Valley Express	Downtown Phoenix	Peak	Deer Valley P&R, MetroCenter
	North Glendale Express	Downtown Phoenix	Peak	Arrowhead TC, North Glendale P&R, MetroCenter
	North I-17 Express	Downtown Phoenix	Peak	Carefree P&R, Happy Valley P&R, MetroCenter
	Anthem Express	Downtown Phoenix	Peak	Anthem P&R, MetroCenter
	Black Canyon Connector	MetroCenter (downtown via LRT)	Off-Peak	Happy Valley P&R, Carefree P&R, Deer Valley P&R, MetroCenter
East Loop 101 (Pima Fwy, Price Fwy)	Pima Express	Downtown Phoenix	Peak	Airpark P&R, Airpark TC, Scottsdale P&R
	East Loop 101 Connector	Downtown Phoenix or Tempe via LRT, Airpark	All Day	Chandler TC-P&R, Ahwatukee P&R, Tempe P&R-LRT, Airpark TC, Airpark P&R
Grand Avenue (US60 West)	Grand Avenue Limited	Downtown Phoenix	All Day; Saturdays	Grand/Jomax P&R, Surprise P&R, Peoria TC, Glendale TC/P&R
Maricopa Fwy	Ahwatukee Express	Downtown Phoenix	Peak	Desert Foothills P&R, Ahwatukee P&R
	Ahwatukee Connector	Downtown Tempe (Phx via LRT)	All Day	Desert Foothills P&R, Ahwatukee P&R, Arizona Mills TC, Tempe TC-LRT
North Loop 101 (Pima Fwy, Agua Fria Fwy)	North Loop 101 Connector	Airpark	Peak	Surprise P&R, Arrowhead TC, North Glendale P&R, Airpark P&R, Airpark TC, Scottsdale P&R
Papago Fwy	Desert Sky Express	Downtown Phoenix	All Day	Desert Sky TC, 79 <sup>th</sup> Ave P&R
	Avondale Express	Downtown Phoenix	Peak	Avondale P&R

Freeway Corridor	Route Name	Primary Destination	Time Period	Transit Nodes
	Buckeye Express	Downtown Phoenix	Peak	East Buckeye P&R, West Buckeye P&R
	Loop 303 Express	Downtown Phoenix	Peak	Surprise P&R, 303/Northern P&R, Avondale P&R
	Peoria Express	Downtown Phoenix	Peak	Peoria P&R, Peoria TC, 101/Glendale TC-P&R
	Papago Connector	Downtown Phoenix via Desert Sky Express	All Day	East Buckeye P&R, West Buckeye P&R, Avondale P&R, Desert Sky TC
Red Mountain Fwy	Red Mountain Express	Downtown Phoenix	Peak	202/Power P&R, 202/Gilbert P&R
	Red Mountain Connector	Downtown Tempe (Phx via LRT)	All Day	202/Power P&R, 202/Gilbert P&R, Tempe P&R-LRT, Tempe TC-LRT
Santan Fwy	Santan Express	Downtown Phoenix	Peak	Gilbert P&R, Chandler TC-P&R
Squaw Peak Pkwy	Squaw Peak Express	Downtown Phoenix	All Day	SR51/Bell P&R, Dreamy Draw P&R
Superstition Fwy	Apache Junction Express	Downtown Phoenix	Peak	Apache Junction P&R, Superstition Springs TC
	Superstition Springs Express	Downtown Phoenix	Peak	Superstition Springs P&R, Superstition Springs TC, Mesa P&R
	Superstition Connector	Downtown Tempe (Phx via LRT)	All Day	Superstition Springs P&R, Superstition Springs TC, Mesa P&R, Tempe P&R-LRT, Tempe TC-LRT
West Loop 101 (Agua Fria Fwy)	West Loop 101 Connector	Downtown Phx (via Desert Sky Express)	All Day	Arrowhead TC, Peoria TC, Peoria P&R, 101/Glendale TC-P&R, Desert Sky TC, 79 <sup>th</sup> Ave P&R

Source: LKC

Note that the 2-direction service on the Expressway Regional Connection Routes help connect to activity centers that they don't serve, also. For example, someone traveling from Chandler to the Mayo Clinic in Scottsdale could use the East Loop 101 Connector route to travel from Chandler to the Scottsdale P&R, then take the local route on Shea Blvd. to the Mayo Clinic.

Expressway Regional Connection Routes in each MPA are shown in **Appendix D** of this report.

### Arterial Regional Connections Service

Arterial regional service is designed to serve two key markets for transit service:

- Commuters to activity centers that are smaller than those served by expressway regional connections service
- Long distance trips along major arterials

Potential corridors for arterial regional service were identified by evaluating which transit corridors had high ridership and by evaluating the travel pattern data shown in **Figure 2.5**. Arterial regional services operate as three different types of routes:

- *Limiteds*, which provide limited stop service along major arterial roads. Limiteds overlay local service, but only stop at roughly one-mile intervals (typically at transfer points or activity centers).
- *Shuttles*, which operate from terminal LRT stops and connect the CP/EV LRT line with more distant activity centers. Shuttles operate on the same schedules as the LRT line and only stop approximately every one mile.
- *Connectors*, which provide limited stop circulator service connecting transit hubs and activity centers within a specific area.

In some cases, buses could be equipped with signal priority equipment. Arterial regional routes typically operate all day, and some routes also have weekend service. Local service on corridors served by arterial regional routes may be reduced to prevent competing services on the same street.

Arterial regional routes are shown in **Table 5.7**.

**Table 5.7**  
**Arterial Regional Connection Routes, 2030**

<b>Route Name</b>	<b>Primary Street(s)</b>	<b>Major Destinations</b>
35 <sup>th</sup> Avenue Limited	35 <sup>th</sup> Ave. between Dobbins & Happy Valley P&R	MetroCenter, Deer Valley P&R, Happy Valley P&R
Litchfield Road Limited	Litchfield Rd. between I-10 & Grand Ave.	Avondale P&R, Surprise P&R
59 <sup>th</sup> Avenue Limited	59 <sup>th</sup> Ave. between I-10 & Loop 101 North	79 <sup>th</sup> Ave. P&R, Desert Sky TC, Glendale TC-P&R, North Glendale P&R
Scottsdale / Rural Limited	Scottsdale / Rural between Loop 202 and Loop 101 North	Chandler TC-P&R, South Tempe TC, Tempe TC-LRT, Los Arcos, Loloma Station, Airpark TC, Airpark P&R
Arizona Avenue Limited	Arizona Ave. / Country Club from downtown Mesa to southern Chandler	Chandler CBD P&R, Mesa P&R, Mesa Town Center TC
Gilbert Road Limited	Gilbert Rd. between Gilbert P&R & Loop 202	Gilbert P&R, Gilbert TC, 202/Gilbert P&R
Power Road Limited	Power Rd. between Williams Gateway & Loop 202	Williams Gateway, Superstition Springs TC / P&R, 202/Power P&R
Chandler Boulevard Limited	Chandler Blvd. between Maricopa Fwy & Williams Gateway	Ahwatukee P&R, Chandler TC/P&R, Chandler CBD P&R, Gilbert P&R, Williams Gateway
Baseline / Southern Limited	Baseline & Southern between 59th Ave. & Superstition Springs Mall	Ed Pastor TC, Arizona Mills TC, Superstition Springs TC/P&R
Camelback Road Limited	Camelback Rd. between Loop 101 West and Loop 101 East	101/Glendale TC-P&R, LRT at Central Ave., Camelback Corridor, Loloma Station, Scottsdale Community College
Bell Road Limited	Bell Rd. between Grand Ave. & Scottsdale Airpark	Surprise P&R, Arrowhead TC, Deer Valley P&R, SR51/Bell P&R, Airpark TC, Scottsdale P&R
MetroCenter Shuttle	Extension from LRT Terminus to MetroCenter TC	Phoenix Spectrum Mall-LRT, MetroCenter

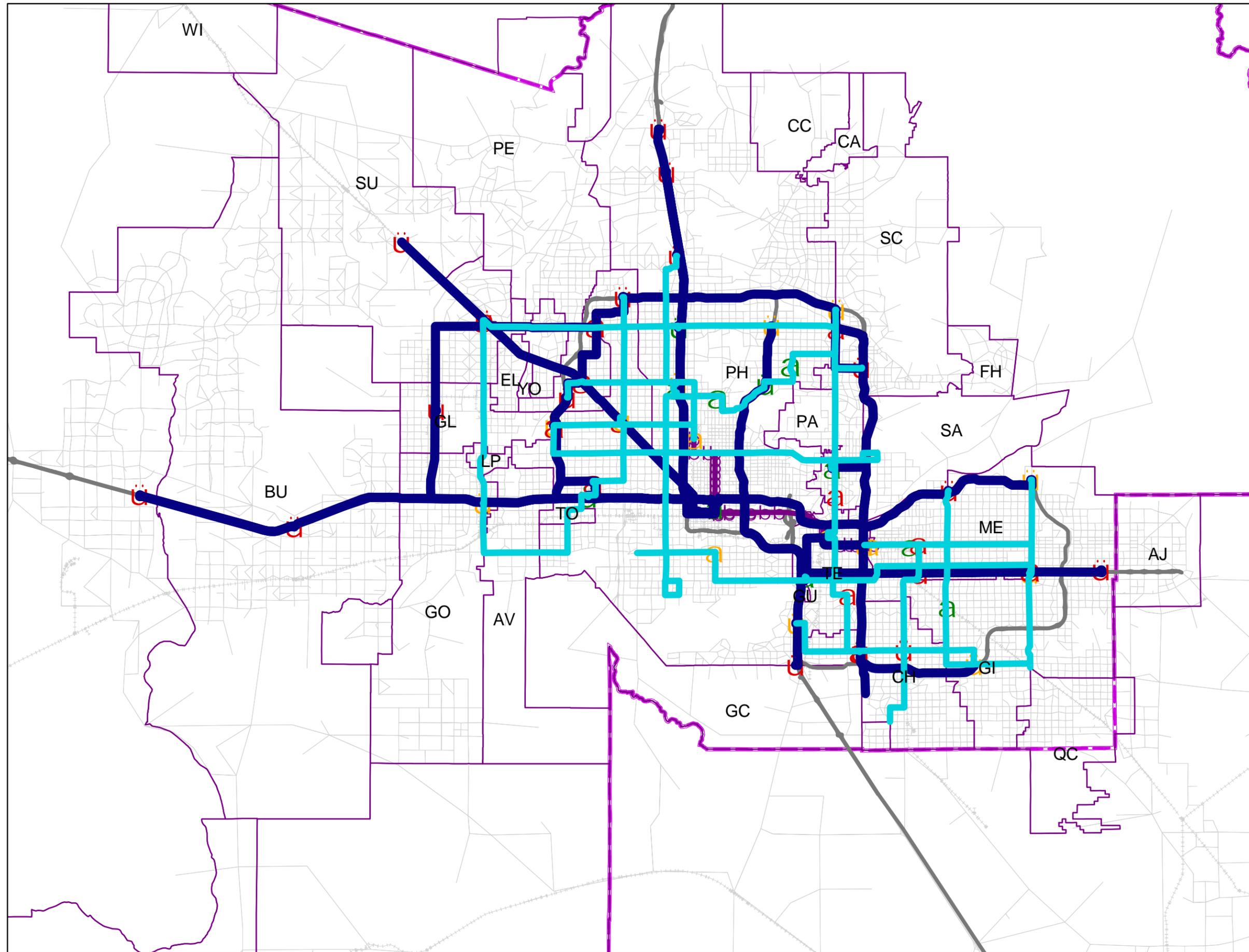
Route Name	Primary Street(s)	Major Destinations
Main Street Shuttle	Extension from LRT Terminus to Superstition Springs via Main & Power	Tempe P&R-LRT, EVIT, Mesa Town Center TC, Superstition Springs TC/P&R
Glendale Boulevard Shuttle	Extension from LRT Terminus to Loop 101 West via Glendale Blvd.	Phoenix Spectrum Mall-LRT, Glendale TC/P&R, 101/Glendale TC-P&R
Mid-North Connector	Various streets connecting Peoria, MetroCenter, Paradise Valley and the Airpark area	Peoria P&R, Peoria TC, MetroCenter, Sunnyslope TC, Dreamy Draw P&R, Paradise Valley TC, Airpark TC, Airpark P&R
Southwest Connector	Via Broadway between Avondale P&R and 79 <sup>th</sup> Ave. P&R	Avondale P&R, 79 <sup>th</sup> Ave. P&R, Desert Sky TC

Source: LKC

Arterial Regional Connection routes by MPA are shown in **Appendix D** of this report. Expressway and Arterial Regional Connection routes are shown in **Figure 5.4**.

# Figure 5.4 2030 Regional Transit Routes

LKC-Proposed Regional Routes (with transit capital facilities).



- Arterial Regional Routes
- Expressway Regional Routes

### Passenger Facilities Park & Rides

- Existing
- Planned
- Proposed

### Transit Centers

- Existing
- Planned
- Proposed

- C/EV LRT line (MOS)
- LRT stations (MOS)
- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Rails (2000)
- Planned Road Network



0 6 Miles



### Commuter Vanpool Service

The final category of regional transit service is the regional vanpool. Vanpools can provide transit service to small activity centers, single-site large employers, or activity centers where trip origins are scattered.

To estimate the demand for vanpool service in 2030, peer vanpool programs were evaluated to determine the ratio of vanpools per capita. Examples included:

- Phoenix’s existing program (low demand estimate): 0.6 vanpools per 10,000 residents
- Houston’s program (moderate demand estimate): 1.3 vanpools per 10,000 residents
- Seattle’s program (high demand estimate): 4.5 vanpools per 10,000 residents

Based on these ratios, **Table 5.8** shows the total demand for vanpools by 2030.

**Table 5.8**  
**Demand for Vanpools, 2030**

Ratio	Population (2030)*	Total Vanpools	Employment (2030)**	Jobs / Vanpool
0.6 / 10,000	6,649,000	400	3,358,000	8,400
1.3 / 10,000		860		3,900
4.5 / 10,000		2,990		1,100

\*- MAG Estimate for Study Area, includes all categories except transient, correction & seasonal

\*\* - MAG Estimate for Study Area, includes all categories except construction, work at home

Source: MAG, LKC, Peer Research

Based on discussions with Valley Metro, it was determined that the moderate estimate (1.3 vanpools per 10,000 residents) was the most realistic scenario for future growth of the vanpool program.

Given the ratios of jobs per vanpools shown in **Table 5.8**, **Table 5.9** shows the number of vanpools that could potentially be generated by a set of Phoenix-area activity centers in 2030. Based on **Table 5.9**, the majority of vanpools would be demanded not in the major activity centers (which have higher levels of bus service) but rather in more dispersed locations, where bus service may not be as comprehensive.

**Table 5.9**  
**Vanpools Demanded at Selected Major Activity Centers, 2030**

<b>Employment Center</b>	<b>Employment (2030)*</b>	<b>Total Vanpools</b>	<b>% of Total</b>
All Employment	3,358,000	860	100%
Downtown Tempe / ASU	128,000	33	4%
Downtown Phoenix / Capitol Complex	106,000	27	3%
Deer Valley / USAA	83,000	21	2%
New Cardinal Stadium / West 101	81,000	21	2%
North Central Avenue	78,000	20	2%
Scottsdale Airpark	73,000	19	2%
Williams Gateway	61,000	16	2%
Camelback Corridor	57,000	15	2%
MetroCenter / North I-17	45,000	12	1%
Price Fwy / South Chandler	41,000	11	1%
<b>Total</b>	<b>753,000</b>	<b>195</b>	<b>21%</b>

\* - Employment includes all categories except construction, work at home  
Source: MAG Employment Estimates, LKC

### **Paratransit**

Unlike local, regional and rural service, paratransit service is generally not available to the general public. Rather, service is reserved for eligible patrons only. Some existing paratransit service are an exception to this (see **Table 3.8**). For the purposes of the 2030 RTS Plan, however, eligibility is assumed to be restricted to the senior population or the population with disabilities. As a result, the demand for transit service is based on the size of the eligible population and the trip making characteristics of that population.

Trips made on paratransit services are unpredictable because vehicles do not follow set schedules and routes. Instead, trips can vary from day to day. As a result, the amount of capacity needed depends on the types of trips that are taken.

For both ADA-Paratransit and Senior-Paratransit, the same methodology was used to estimate the future demand for paratransit service. The methodology uses the following steps:

- Set Assumptions
- Estimate Demographics
- Estimate Future Demand

### *Set Assumptions*

There are three basic assumptions used in the development of 2030 paratransit services:

- 1) Paratransit service is assumed to be two-tiered.

Each service provider must separate services into ADA trips (which are required in any area with fixed route transit service) and non-ADA trips. Senior transportation is typically non-ADA, although some seniors may also qualify for ADA service.

Each provider must develop its own ADA certification procedures. This methodology assumes the entire study area is provided with ADA service. This methodology also assumes that all jurisdictions provide Senior Paratransit Service.

- 2) Trip rates will resemble Dallas Area Rapid Transit (DART)

A second assumption has to do with the number of annual trips per eligible paratransit user. Valley Metro's service currently has barriers to use such as limited service area and the requirement of extensive transfers for longer trips. On the other hand, the regional Valley Metro certification process is not as extensive or strict as that of many other communities, and eligibility includes a broad population, often including those who would not qualify under a strict interpretation of ADA.

Instead of using Valley Metro's practices, those of DART were used, specifically those in place in the City of Plano, a community that resembles the Phoenix area (see Section 4). DART has a more extensive paratransit system with a higher quality of service than Valley Metro, so overall use rates are higher. On the other hand, Valley Metro practices only minimal ADA certification.

Dallas DART (Plano) recorded 141.3 annual trips per passenger in 2001.

- 3) Future trip characteristics continue to resemble 2002 trip characteristics

The following assumptions were developed based on 2001 operating data for all existing Valley Metro paratransit service providers:

- Ridership rate per MPA = (2001 annual trips / trips per rider) / total MPA population
- Vehicle hours per trip = 2001 total vehicle hours / 2001 total trips
- Vehicle miles per trip = 2001 total vehicle miles / 2001 total trips
- Revenue miles per trip = Vehicle hours per trip x 1.19
- Revenue hours per trip = Vehicle hours per trip x 1.23

It is assumed in this methodology that the trip characteristics will remain the same in 2030.

**Table 3.9** shows the 2001 service statistics by provider and MPA.

#### *Estimate Demographics*

The next step requires estimating the future demographics that influence paratransit use - the size of the senior population and the size of the population with disabilities. MAG does not estimate the growth of either population. Therefore, this methodology assumes the same portion of the population is over 65 years of age and the same portion of the population has a disability as in the 2000 U.S. Census.

The portions of each MPA's population that is over 65 or that has a disability are shown in **Tables 2.7** and **2.8**.

#### *Estimate Future Demand*

Based on the assumptions above, the following calculations are used to estimate the demand for paratransit in 2030:

- Total riders (2030) = Ridership rate per MPA (2001) x Eligible population per MPA (2030)
- Total trips (2030) = Total riders (2030) x trips per rider (DART-Plano 2001)
- Total Revenue Miles (2030) = Total trips (2030) x revenue miles per trip (2001)
- Total Revenue Hours (2030) = Total trips (2030) x revenue hours per trip (2001)

Total demand for service for ADA Paratransit service in 2030 is shown in **Table 5.10**. Total demand for service for Senior Paratransit service in 2030 is shown in **Table 5.11**.

**Table 5.10**  
**Estimated Demand for ADA Paratransit, 2030**

MPA	2030 Estimates				
	Population	ADA Riders	ADA Trips	Annual Rev Hours	Annual Rev Miles
Apache Junction	56,685	105	14,800	6,600	91,000
Avondale	116,296	108	15,300	6,800	94,000
Buckeye	490,629	505	71,400	31,800	439,000
Carefree	6,243	7	1,100	500	6,000
Cave Creek	13,581	14	1,900	900	12,000
Chandler	299,487	228	32,200	14,400	198,000
El Mirage	52,971	75	10,500	4,700	65,000
Fountain Hills	34,662	41	5,800	2,600	35,000
Gila Bend	18,281	15	2,200	1,000	13,000
Gila River Indian Community	6,309	6	900	400	6,000
Gilbert	291,540	170	24,000	10,700	147,000
Glendale	321,838	339	47,800	21,300	294,000
Goodyear	334,855	368	52,000	23,200	320,000
Guadalupe	6,001	6	900	400	6,000
Litchfield Park	15,582	9	1,300	600	8,000
Mesa	748,305	804	113,600	50,600	698,000
Paradise Valley	20,922	14	1,900	900	12,000
Peoria	359,920	436	61,600	27,500	379,000
Phoenix	2,261,677	2,486	351,300	156,600	2,159,000
Queen Creek	94,391	44	6,200	2,800	38,000
Salt River Pima-Maricopa Indian Community	9,693	17	2,400	1,100	15,000
Scottsdale	343,881	331	46,800	20,900	288,000
Surprise	358,756	442	62,400	27,800	384,000
Tempe	201,227	178	25,100	11,200	154,000
Tolleson	6,800	8	1,100	500	7,000
Wickenburg	20,753	23	3,300	1,500	20,000
Youngtown	7,674	22	3,100	1,400	19,000
Maricopa County MPA	181,059	522	73,700	32,900	453,000
Pinal County MPA	331,514	485	68,600	30,600	421,000
<b>Total</b>	<b>7,011,532</b>	<b>7,807</b>	<b>1,103,200</b>	<b>492,200</b>	<b>6,781,000</b>

Source: MAG, LKC

**Table 5.11**  
**Estimated Demand for Senior Paratransit, 2030**

MPA	2030 Estimates					
	Pop.	%Senior	Senior Riders	Annual Trips	Annual Rev Hr	Annual Rev Mi
Apache Junction	56,685	24%	195	22,000	9,800	135,000
Avondale	116,296	6%	97	11,000	4,900	67,000
Buckeye	490,629	7%	475	53,000	23,800	329,000
Carefree	6,243	24%	21	2,000	1,000	14,000
Cave Creek	13,581	12%	23	3,000	1,200	16,000
Chandler	299,487	7%	280	32,000	14,000	194,000
El Mirage	52,971	12%	86	10,000	4,300	60,000
Fountain Hills	34,662	18%	87	10,000	4,300	60,000
Gila Bend	18,281	7%	17	2,000	800	12,000
Gila R. Indian Community	6,309	4%	4	0	200	2,000
Gilbert	291,540	4%	144	16,000	7,200	100,000
Glendale	321,838	7%	311	35,000	15,600	216,000
Goodyear	334,855	11%	498	56,000	25,000	344,000
Guadalupe	6,001	6%	5	1,000	200	3,000
Litchfield Park	15,582	12%	26	3,000	1,300	18,000
Mesa	748,305	13%	1,355	153,000	68,000	938,000
Paradise Valley	20,922	13%	39	4,000	2,000	27,000
Peoria	359,920	16%	786	88,000	39,400	544,000
Phoenix	2,261,677	8%	2,459	277,000	123,400	1,702,000
Queen Creek	94,391	3%	37	4,000	1,800	25,000
Salt R. Pima-Maricopa Indian Community	9,693	17%	23	3,000	1,200	16,000
Scottsdale	343,881	14%	664	75,000	33,300	460,000
Surprise	358,756	17%	882	99,000	44,300	610,000
Tempe	201,227	7%	187	21,000	9,400	129,000
Tolleson	6,800	10%	9	1,000	500	6,000
Wickenburg	20,753	14%	40	5,000	2,000	28,000
Youngtown	7,674	48%	52	6,000	2,600	36,000
Maricopa County MPA	181,059	64%	1,622	183,000	81,400	1,122,000
Pinal County MPA	331,514	13%	624	70,000	31,300	432,000
<b>Total</b>	<b>7,011,532</b>	<b>11%</b>	<b>11,046</b>	<b>1,245,000</b>	<b>554,200</b>	<b>7,645,000</b>

Source: MAG, LKC

## Transit Demand Management (TDM)

A variety of relatively low cost programs can be provided under the category of TDM. Examples of programs are shown in **Table 5.12**.

**Table 5.12**  
**Potential TSM Programs**

Area of Focus	Strategies
Mode	Carpools, vanpools, transit, bike, walk
Time	Flextime, staggered work hours, compressed work weeks, time-of-day pricing
Single Occupancy Vehicles	HOV Lanes, preferential parking for carpools / vanpools
Frequency	Telecommuting, linking of trips, frequent rider programs, car sharing or short-term auto rental, guaranteed ride home
Regulation	Employer trip reduction ordinances, development of regional impact fees, minimum and maximum parking ordinances
Trip Length	Transit oriented development, bicycle and pedestrian facilities, access management, telecommuting
Route	Value pricing / congestion pricing, intelligent transportation systems
Cost	Commuter choice tax benefits, parking pricing, value pricing / congestion pricing, high occupancy toll (HOT) lanes

*Source: Bay Area Commuter Services*

Although TDM programs are inexpensive relative to the cost of constructing roadways or operating transit services, they still require regular annual funding. To fund TDM programs in the 2030 network, the annual cost is assumed to equal one percent of the cost of transit operations, which roughly corresponds to existing levels of funding.

## Capital Projects

The transit services described above require an accompanying network of capital facilities and fleets of vehicles. Capital facilities include:

- Operating and maintenance facilities
- Passenger infrastructure
- Passenger facilities

HOV lanes and other roadway facilities are not included in this study; proposed future HOV networks were presented in the “High Occupancy Lanes and Value Lanes Study

(August 2002). Fixed guideway modes are also not included, and are being studied under the separate High Capacity Transit study.

Vehicles

With the exception of TDM programs, all of the transit services in the 2030 RTS will require a range of transit vehicles. Although in reality a large transit system uses a wide range of different types of vehicles, for the purposes of this study, vehicles are limited to four general types:

- Commuter Transit Buses (used for expressway regional connections service)
- Transit Buses (used for local fixed route, local circulator, regional fixed route, and arterial regional transit service)
- Cut-Aways (used for rural service and paratransit)
- Commuter Vans (used for vanpool service)

Total fleet required for transit service was estimated by the following method:

- For services that are measured in revenue miles (local fixed route, regional local, expressway regional and arterial regional service), fleet (2030) = 2030 revenue miles of service / annual revenue miles per vehicle
- For services that are measured in terms of revenue hours (local circulator, vanpool, rural service, and paratransit), fleet (2030) = 2030 revenue hours of service / annual revenue hours per vehicle

Annual revenue miles and hours per vehicle are shown in **Table 5.13**.

**Table 5.13**  
**Annual Revenue Miles or Hours per Vehicle and Service Type**

Service Type	Vehicle Type	Annual Revenue Hours / Vehicle	Annual Revenue Miles / Vehicle
Local Fixed Route	Transit Bus	3,700	45,000
Local Circulator	Transit Bus	3,700	45,000
Rural	Cut-Away	1,900	45,000
Regional Local	Transit Bus	3,700	45,000
Expressway Regional	Commuter Bus	2,600	45,000
Arterial Regional	Transit Bus	1,800	45,000
Vanpool	Van	400	15,000
ADA Paratransit	Cut-Away	3,500	45,000
Senior Paratransit	Cut-Away	3,500	45,000

Source: LKC

Based on the ratios shown in **Table 5.13** and the levels of service above, **Table 5.14** shows the total fleet required for each category of service in 2030.

**Table 5.14**  
**Total Transit Fleet, 2030**

<b>Service / Vehicle Type</b>	<b>Units of Service</b>	<b>Peak Fleet</b>	<b>20% Spares</b>	<b>Total Fleet</b>
Local Fixed Route	73,642,000	1,636	327	1,964
Circulators	8,046,000	1,788	358	2,146
Non-Fixed Route Service (Incl Rural)	346,000	185	37	221
Regional Fixed Route	0	0	0	0
Arterial Regional Route	6,812,000	151	30	182
Expressway Regional Route	7,251,000	161	32	193
Vanpool	365,000	929	186	1,115
ADA Paratransit	492,000	141	28	169
Senior Paratransit	554,000	159	32	191
Commuter Bus		161	32	193
Transit Bus		3,576	715	4,291
Cut-Away		484	97	581
Van		929	186	1,115
<b>Total</b>		<b>5,151</b>	<b>1,030</b>	<b>6,181</b>

Source: LKC

The 20 percent spare ratio is an industry standard rate, and is supported by an analysis of peer systems (see **Appendix C**).

#### Operating and Maintenance Facilities

Operating and maintenance facilities are needed to provide capacity to park, fuel, and clean buses. They provide driver locker rooms and lounges, reporting areas, and office space, as well as dispatch and office space for supervisors. Operating and maintenance facilities also provide capacity to provide on-going preventive maintenance and a variety of repair work (depending on the design of the facility).

As noted in Section Three, there are currently two purpose-built, publicly owned maintenance facilities serving Valley Metro, Phoenix's North and South Division. Mesa's new facility should come on-line in 2003. Other service providers operate from a variety of leased facilities that are in varying condition.

The Facilities Master Plan (2001) recommends that Valley Metro move from leased to publicly owned facilities. The Master Plan also recommends that Valley Metro construct

two new operating facilities, expand the Mesa facility, and build a new dedicated heavy maintenance facility by 2020.

By the year 2030, with more than 2,800 buses, 500 cut-away vehicles, and 1,000 commuter vans, Valley Metro will need several additional facilities. **Table 5.15** shows the operating and maintenance facilities that are on-line in the 2030 transit plan.

**Table 5.15**  
**Operating and Maintenance Facilities, 2030**

Facility	Date Opened	Capacity	Status
Phoenix-North Division	1979	190	Existing
Phoenix-South Division	1991	275	Existing
New Mesa Facility (Phase I)	2003	100	Under construction
New Mesa Facility (Phase II)	2008	100	Planned
New West Valley	Planned 2007	275	Anticipate 2007
New East Valley	Planned 2009	275	Anticipate 2008
New Facility	Proposed	275	Anticipate 2009
New Facility	Proposed	275	Anticipate 2012
New Facility	Proposed	275	Anticipate 2015
New Facility	Proposed	275	Anticipate 2018
New Cut-Away Facility	Proposed	250	Anticipate 2006
New Cut-Away Facility	Proposed	250	Anticipate 2015
New Van Facility	Proposed	1,000	Anticipated 2006
New Heavy Maintenance	Planned 2008	1,200	Anticipate 2008

Source: Valley Metro, LKC

The schedule for operating and maintenance facilities is designed to fit within a reasonable implementation and budget schedule, but does not meet the demand posed by the rapid expansion of Valley Metro's fleet proposed in the RTS. As a result, crush capacity conditions will continue intermittently at Valley Metro facilities.

### Passenger Infrastructure

Passenger infrastructure consists of two types of investment:

- Bus pull-outs that allow buses to pull out of the flow of traffic when stopping at major bus stops
- Passenger Shelters that have covered waiting areas for passengers and can include a combination of benches, trash cans, paved waiting area, maps, and other information

The assumption of the 2030 plan is that bus pull outs and shelters are only to be placed at major passenger transfer points. Accordingly, each is assumed to be spaced at one-mile intervals in each direction along all local routes.

## Passenger Facilities

There are two types of passenger facilities in the 2030 plan:

- Park & Ride Lots
- Transit Centers

### *Park & Ride Lots*

Park & ride lots consist of large parking areas and passenger waiting areas, plus associated bus and automobile circulatory areas. In some cases, park & ride lots may include direct ramps or other special treatments to make it easier for buses to move between the lots and diamond-lanes on nearby expressways.

Park & Ride lots are divided into two categories:

- Planned park & ride Lots, including those facilities that are either in the transportation improvement plan (TIP), the MAG Park & Ride Study short-term projects list, or the transit plans published by any of the cities in the study area
- Proposed park & ride Lots, including all other park & ride facilities in the 2030 RTS

All planned park & ride lots are to be constructed by 2007. All proposed lots are constructed after 2007, with construction spaced evenly over the remaining 23 years to 2030.

Wherever possible, existing plans were used to locate park & ride lots, including the MAG Park & Ride Study and city transportation plans. Locations were also confirmed through conversations with representatives of cities within the study area. Note that locations given in this report are approximate and do not imply that property is available at the specific intersections cited.

T-Ramps, wishbone ramps, or other special freeway treatments are beyond the scope of this report.

**Table 5.16** shows the existing, planned and proposed park & ride lots in the 2030 plan. Existing, planned and proposed passenger facilities are shown in **Figure 5.5**.

**Table 5.16**  
**Existing, Planned and Proposed Park & Ride Lots, 2030 Plan**

Facility	Location	MPA	Source	Opening Year	# Spaces
Existing Park & Ride Lots					
79 <sup>th</sup> Avenue P&R	79 <sup>th</sup> Ave. / Papago Fwy	Phoenix	Existing	1996	618
Deer Valley P&R	Bell Rd. / Black Canyon Fwy	Phoenix	Existing	2000	500
Dreamy Draw P&R	Squaw Pk Pkwy / Shea Rd.	Phoenix	Existing	1998	330
Planned P&R Lots					
101 / Glendale P&R	Agua Fria Fwy / Glendale Blvd. (at new stadium)	Glendale	TIP	2007	505
202 / Power P&R	Power Rd. / Red Mtn. Fwy	Mesa	TIP	2006	433
Ahwatukee P&R	Warner Rd. / Maricopa Fwy	Phoenix	TIP	2004	377
Avondale-Goodyear P&R	Papago Fwy near Litchfield Rd.	Goodyear	TIP	2006	369
Gilbert P&R	Gilbert Rd. / Page Rd.	Gilbert	TIP	2004	250
Glendale P&R	Grand Ave. / Myrtle	Glendale	TIP	2005	613
MetroCenter P&R	Dunlap / 29 <sup>th</sup> Ave.	Phoenix	TIP, Phx BRT Plan	2005	283
Scottsdale Airpark P&R	Scottsdale Rd. / Pima Fwy	Scottsdale	TIP	2006	500
SR51 / Bell Rd. P&R	Bell Rd. / Squaw Pk Pkwy	Phoenix	TIP	2004	600
Superstition Springs P&R	Superstition Fwy / Power Rd.	Mesa	TIP	2002	800
Tempe P&R / LRT	Apache / Price Fwy	Tempe	CP/EV LRT Plan	2006	400
Proposed Park & Ride Lots					
202 / Gilbert P&R	Gilbert Rd. / Red Mtn. Fwy	Mesa	Mesa 2025 Plan	2014	250
303 / Northern P&R	Northern Ave. / Loop 303	Glendale	LKC	2022	250
Anthem P&R	Anthem Access Rd. / Black Canyon Fwy	Phoenix	LKC	2020	250

Facility	Location	MPA	Source	Opening Year	# Spaces
Apache Junction P&R	Signal Butte / Superstition Fwy	Mesa	LKC	2021	250
Carefree Hwy P&R	Carefree Hwy / Black Canyon Fwy	Phoenix	LKC	2013	500
Chandler P&R	Chandler Blvd. / Price Fwy	Chandler	City of Chandler	2006	398
Chandler Town Center P&R	Arizona Ave. / Chandler Blvd.	Chandler	City of Chandler	2019	250
Desert Foothills P&R	Pecos / 40 <sup>th</sup> Street	Phoenix	Phx BRT Plan	2003	421
East Buckeye P&R	Papago Fwy near Miller	Buckeye	LKC	2023	500
Grand Ave. / Jomax P&R	Grand Ave. / Jomax	Surprise	LKC	2025	250
Happy Valley P&R	Happy Valley Rd. / Black Canyon Fwy	Phoenix	MAG P&R Study	2018	535
Mesa P&R	Superstition Fwy / Mesa Dr.	Mesa	MAG P&R Study	2010	600
North Glendale P&R	59 <sup>th</sup> Ave. / Agua Fria Fwy	Glendale	MAG P&R Study	2004	800
Peoria P&R	Olive Ave. / Agua Fria Fwy	Peoria	MAG P&R Study	2017	442
Scottsdale P&R	Cactus Rd. / Pima Fwy	Scottsdale	MAG P&R Study	2005	390
Surprise P&R	Grand Ave. / Bell Rd.	Surprise	MAG P&R Study	2016	500
West Buckeye P&R	Papago Fwy near 339 <sup>th</sup> Ave.	Maricopa County	LKC	2024	500

Source: LKC, MAG TIP, MAG P&R Study

### *Transit Centers*

Transit centers are located at major transfer locations where multiple routes come together or multiple modes are served, or they can be attached to major activity centers. Like park & ride lots, transit centers are categorized as existing, planned, or proposed. Note that some of the proposed facilities are actually improvements at locations where there is a current transfer location, but limited facilities (i.e., Superstition Springs, Desert Sky, etc.).

**Table 5.17** shows the transit centers that are included in the 2030 Plan. Existing, planned and proposed passenger facilities are shown in **Figure 5.5**.

**Table 5.17**  
**Existing, Planned and Proposed Transit Centers, 2030 Plan**

Facility	Location	MPA	Source	Opening Year	Size
Existing Transit Centers					
Central Station	Central Ave. / Van Buren	Phoenix	Existing	1987	MAC*
Loloma Station	2 <sup>nd</sup> Street / Goldwater	Scottsdale	Existing	1997	6-Bay
Mesa Senior Center	Center St. / 1 <sup>st</sup> St.	Mesa	Existing	N/A	No amenities
MetroCenter	Dunlap / 29 <sup>th</sup> Ave.	Phoenix	Existing	1983	4-Bay w/parking
Sunnyslope TC	3 <sup>rd</sup> Street / Dunlap	Phoenix	Existing	1989	6-Bay w/parking
Arizona Mills TC	Priest / Baseline	Tempe	Existing	1998	4-Bay
Paradise Valley TC	Tatum / Cactus	Phoenix	Existing	1990	4-Bay
Arrowhead Town Center	Bell Rd. / 75 <sup>th</sup> Ave.	Glendale	Existing	N/A	No amenities
Desert Sky TC	Thomas / 75 <sup>th</sup> Ave.	Phoenix	Existing	1989	4-Bay
Superstition Springs TC	Power Rd. / Superstition Fwy	Mesa	Existing	N/A	No amenities
Chandler TC	Chandler Blvd. / Price Fwy	Chandler	Existing	2003	No amenities
Planned Transit Centers					
EVIT TC-LRT	Main St. / Longmore	Mesa	CP/EV LRT	2006	4-Bay+LRT Station
Pastor TC	S. Central Ave. / Broadway	Phoenix	Under construction	2003	MAC*
Phoenix Spectrum Mall TC-LRT	Bethany Home / 19 <sup>th</sup> Ave.	Phoenix	CP/EV LRT	2006	4-Bay+LRT Station
Tempe TC-LRT	Downtown Tempe (TBD)	Tempe	CP/EV LRT	2006	MAC*+LRT
Proposed Transit Centers					
Upgrades at Desert Sky	75 <sup>th</sup> Ave. / Thomas	Phoenix	LKC	2008	4-Bay

Facility	Location	MPA	Source	Opening Year	Size
Upgrades at Superstition Springs	Power Rd. / Superstition Fwy	Mesa	LKC	2010	4-Bay
Upgrades at Arrowhead Town Center	Bell Rd. / 75 <sup>th</sup> Ave.	Glendale	LKC	2012	4-Bay
Upgrades at Chandler TC	Chandler Blvd. / Price Fwy	Chandler	City of Chandler	2006	6-Bay
Gilbert Town Center TC	Gilbert Rd. / Elliot Rd.	Gilbert	City of Gilbert	2022	4-Bay
Mesa Town Center TC	Mesa Rd. / Main St.	Mesa	Originally expansion LRT	2020	4-Bay
Scottsdale Airpark TC	Scottsdale Rd. / Bell Rd.	Scottsdale	LKC	2024	4-Bay
South Tempe TC	Guadalupe / McClintock (Local TBD)	Tempe	City of Tempe	2018	4-Bay
101 / Glendale TC	Glendale Blvd. / Agua Fria Fwy (near stadium)	Glendale	City of Glendale	2016	4-Bay
Glendale TC	Grand Ave. / Myrtle	Glendale	City of Glendale	2014	6-Bay
Peoria TC	Grand Ave. / Peoria	Peoria	LKC	2026	4-Bay w/parking
Surprise TC	Grand Ave. / Bell Rd.	Surprise	LKC	2028	4-Bay

Source: LKC, MAG TIP, MAG P&R Study

# Figure 5.5 2030 Existing, Planned & Proposed Passenger Facilities

Transit Facilities Existing, Planned (with funding), and Proposed, either by LKC or by other studies

### Transit Centers

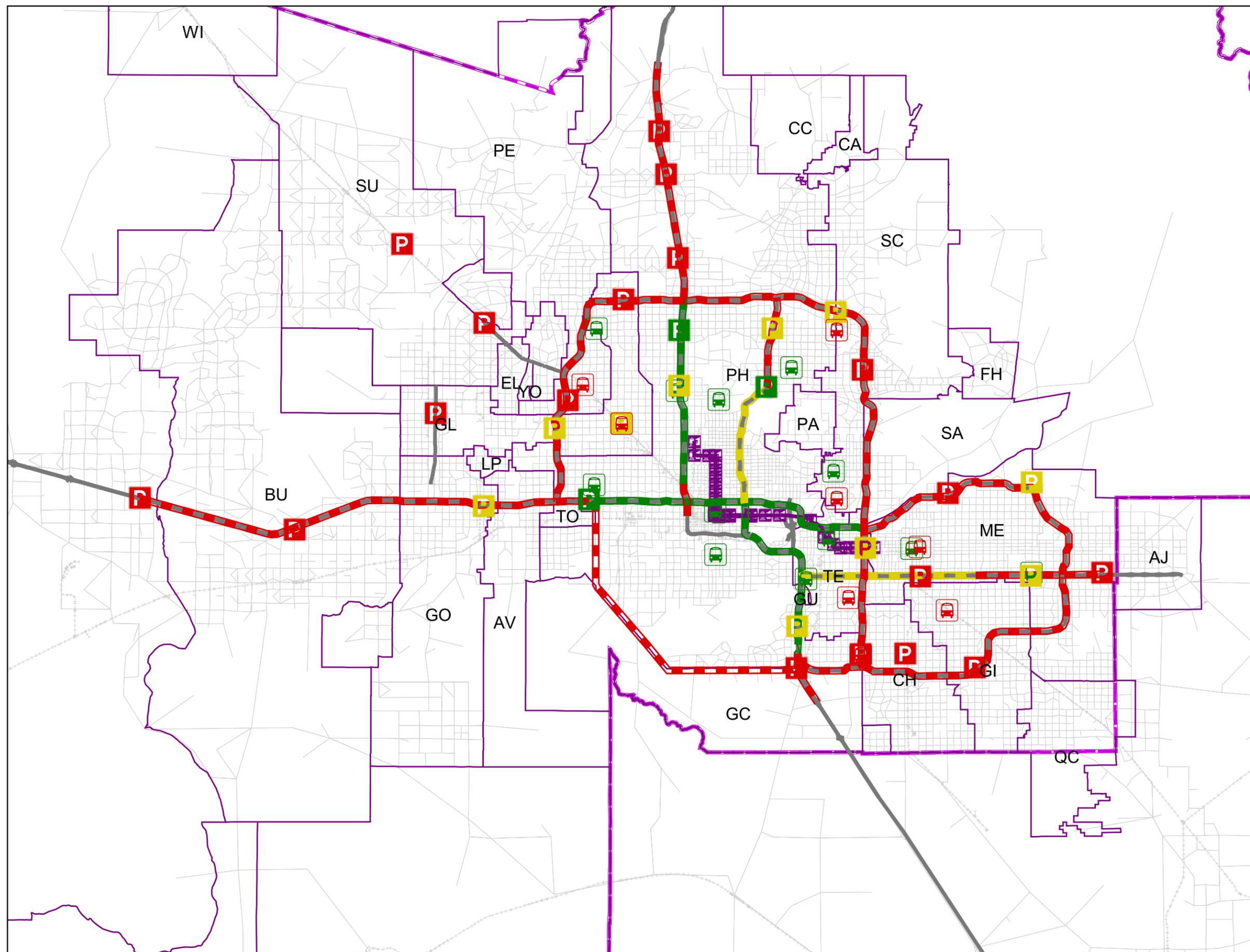
- Proposed
  - Existing
- ### Park & Rides
- Proposed
  - Planned
  - Existing

### HOV lanes

- Proposed
- Planned
- Existing
- C/EV LRT line (MOS)
- LRT stations (MOS)
- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Rails (2000)
- Planned Road Network



0 6 Miles



## INTERRIM TRANSIT PLANS

In addition to the 2030 Regional Transit System Plan documented above, LKC also created two interim transit plans, one each for 2010 and 2020. The interim plans assume service increases by building towards the 2030 plan as demand warrants and funding becomes available.

### Local Transit Service and Rural Connections Service

Local transit service in the 2020 RTS is assumed to be proportional to demand as defined for the 2030 RTS, and was created following the same methodology. Because the network is smaller than in the 2030 RTS, the rural area is larger. Revenue miles of service assigned to local fixed route, local circulator, and rural service are shown in **Table 5.18**. The local fixed route service network is shown in **Figure 5.6** and the urban / rural boundary is shown in **Figure 5.7**.

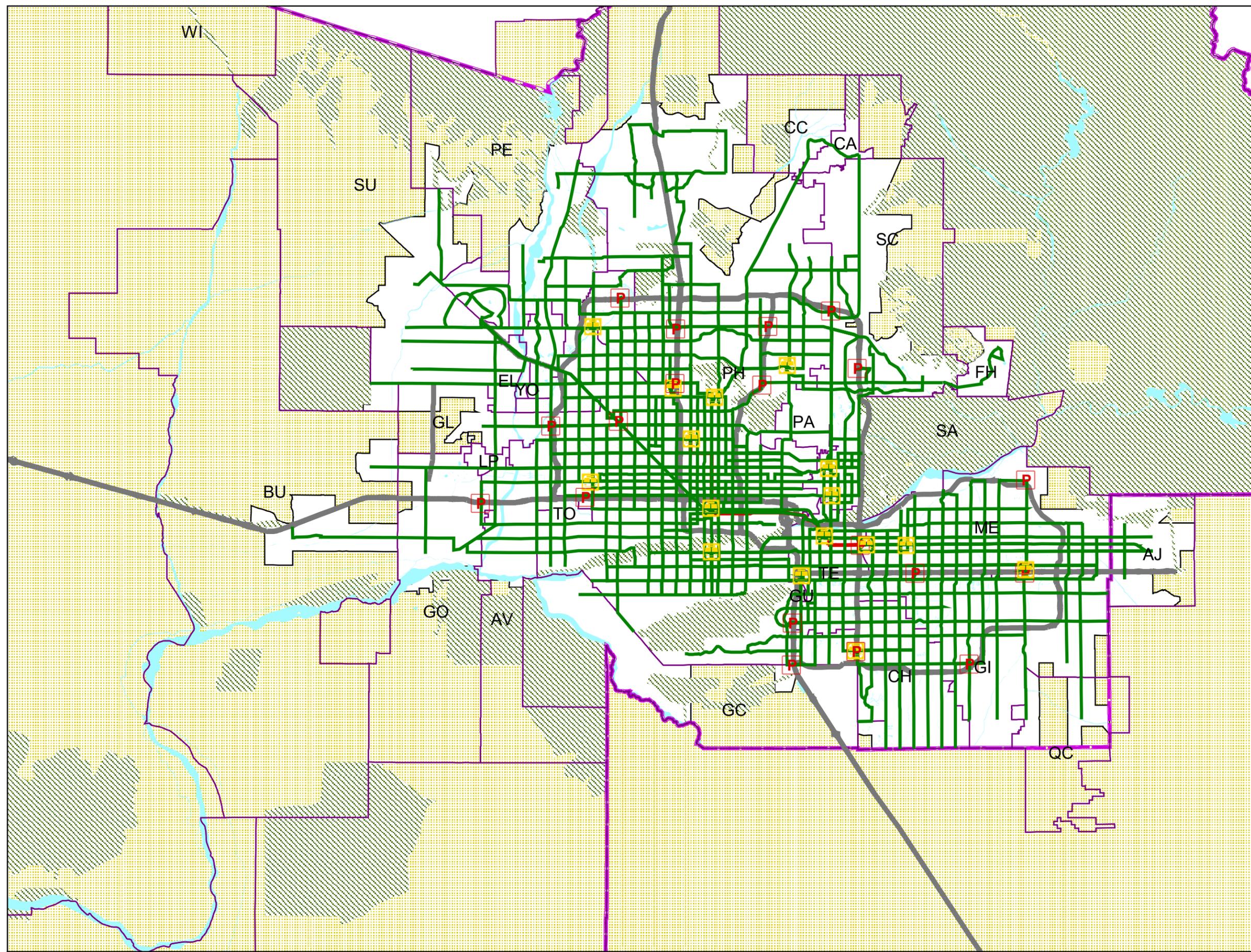
Baseline (2002) transit service is not sufficient to meet the demand for service outside of Phoenix and Tempe. Therefore, the ratio of service to demand is not the same in 2002 as it is in the 2020 and 2030 RTS networks. Service is assumed to “catch up” by 2015. Therefore, in creating the 2010 network, the ratio of transit supply to demand falls somewhere on a growth curve between 2002 and 2015.

Revenue miles of service assigned to local fixed route, local circulator, and rural service in the 2010 RTS are shown in **Table 5.19**. The local fixed route service network is shown in **Figure 5.6** and the urban / rural boundary is shown in **Figure 5.7**.

# Figure 5.6a 2010 Local Service Network

Local fixed routes plus rural/transit access areas

- Passenger Facilities
- Park & Ride
  - Transit Center
  - Local Fixed Routes
  - C/EV LRT line (MOS)
  - Interstates & Freeways
  - MPA Boundaries
  - County Boundaries
  - Undevelopable Space
  - Water
  - Urban (FR) vs Rural service
  - Rural/transit access area
  - Urban/fixed route area

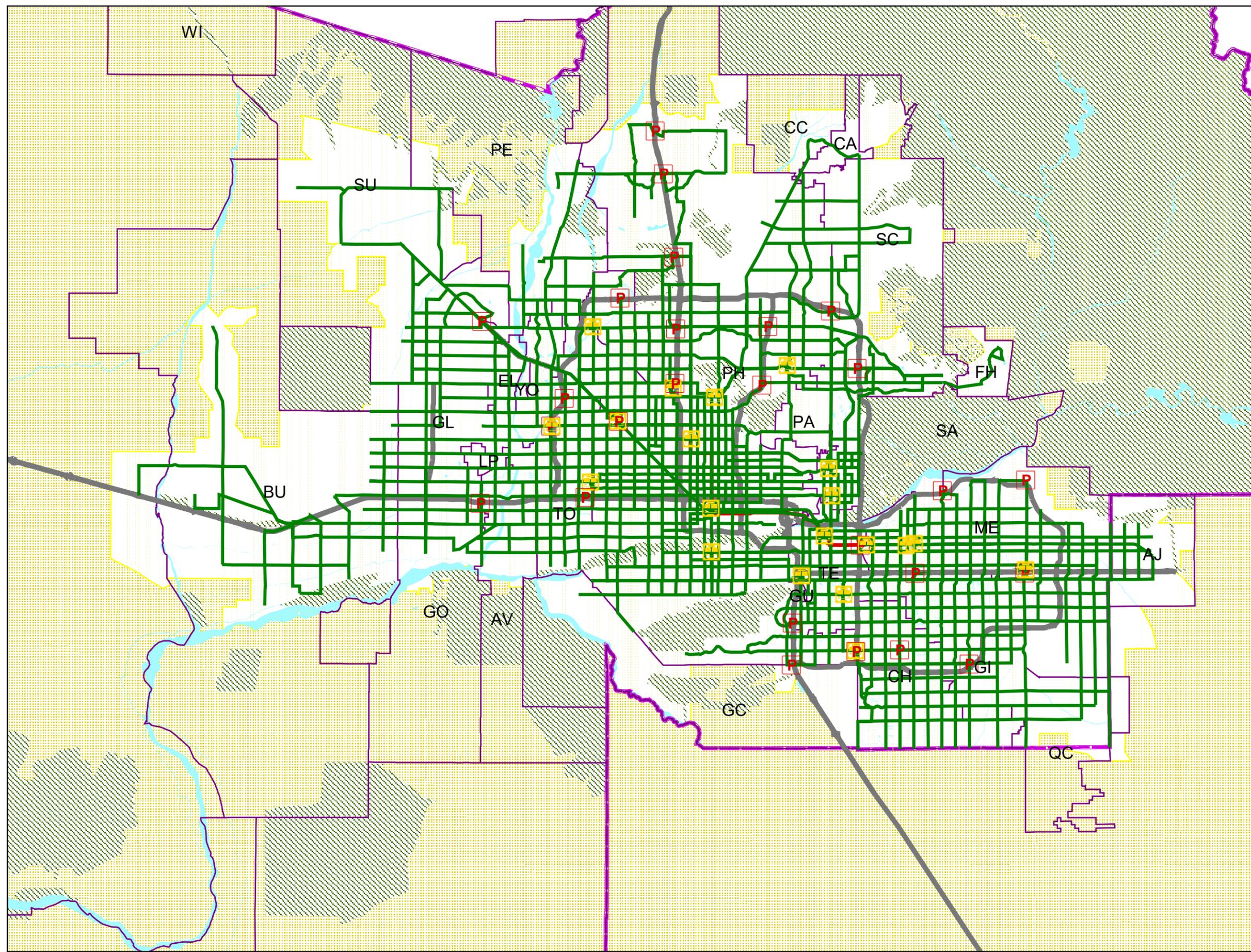


0 6 Miles

# Figure 5.6b 2020 Local Service Network

Local fixed routes plus rural/transit access areas

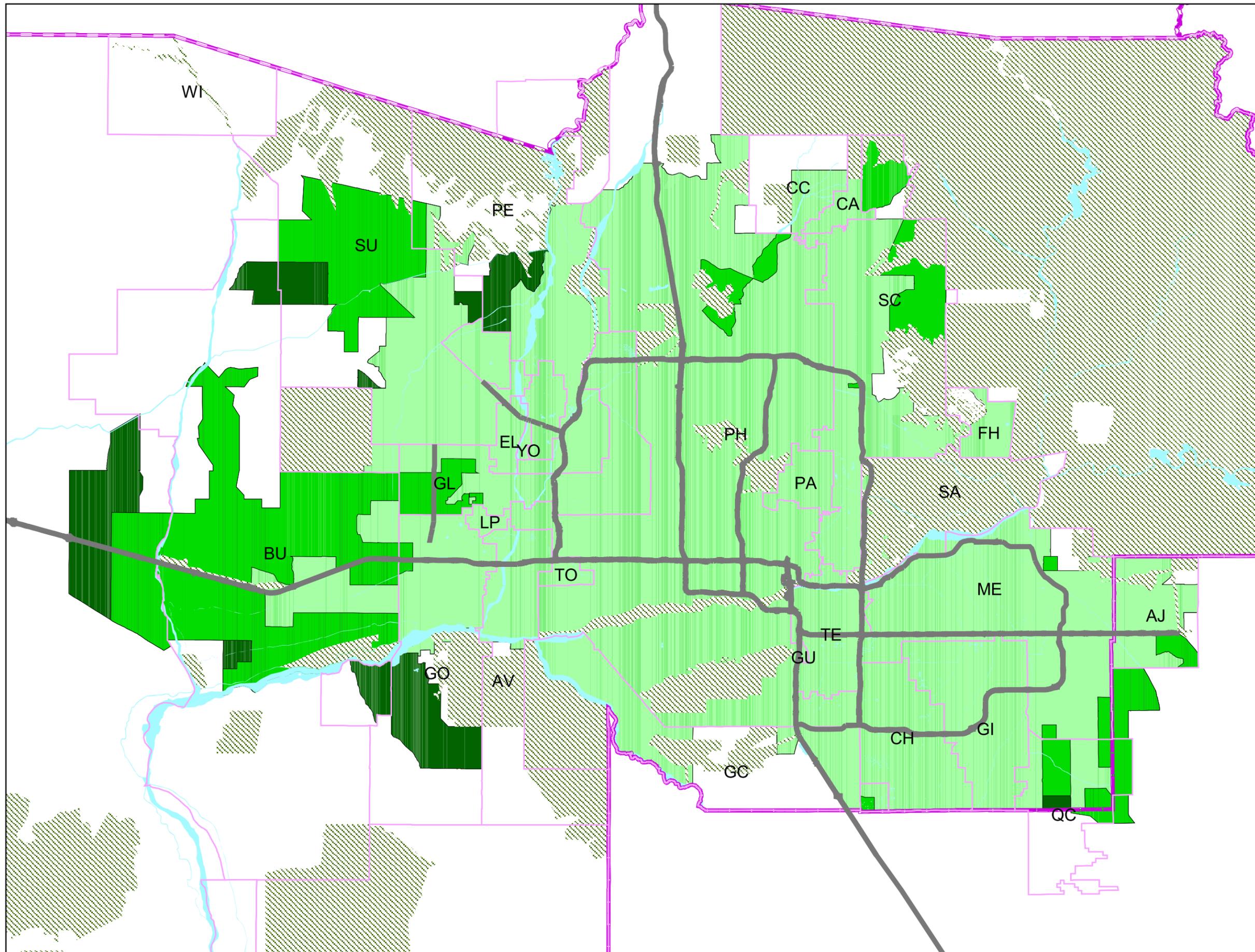
- Passenger Facilities
- Park & Ride
  - Transit Center
  - Local Fixed Routes
  - C/EV LRT line (MOS)
  - Interstates & Freeways
  - MPA Boundaries
  - County Boundaries
  - Undevelopable Space
  - Water
  - Urban (FR) vs Rural service
  - Rural/transit access area
  - Urban/fixed route area



0 6 Miles

# Figure 5.7 Urban/Rural Boundary, 2010-2030

Urban area is equivalent to fixed-route service area



- Interstates & Freeways
- MPA Boundaries
- County Boundaries
- Undevelopable Space
- Water
- Urban Area
  - 2010
  - 2020
  - 2030

0 6 Miles

**Table 5.18**  
**2020 Local Transit Service Need and Allocation,**  
**Service in Miles per Average Day**

MPA	Total Need (Rev. Mi.)	Urban Revenue Miles		Rural Miles
		Fixed Route	Circulator	
Apache Junction	1,879	1,510	235	135
Avondale	3,871	3,986	0	190
Buckeye	6,021	5,834	0	344
Carefree	215	234	0	0
Cave Creek	195	248	0	16
Chandler	9,286	10,615	0	0
El Mirage	1,634	1,670	0	0
Fountain Hills	839	702	32	105
Gila Bend	283	0	0	283
Gila River Indian Community	337	644	0	18
Gilbert	8,172	8,667	0	0
Glendale	10,746	12,175	0	0
Goodyear	6,633	4,249	0	2,496
Guadalupe	190	307	0	0
Litchfield Park	378	321	57	0
Mesa	22,531	20,712	1,704	114
Paradise Valley	478	982	0	0
Peoria	7,311	6,507	466	338
Phoenix	74,490	72,435	1,391	665
Queen Creek	2,298	1,270	854	175
Salt River Pima-Maricopa Indian Community	501	489	0	207
Scottsdale	11,799	11,138	268	392
Surprise	6,148	7,581	0	412
Tempe	10,059	10,130	0	0
Tolleson	865	905	0	0
Wickenburg	494	0	0	494
Youngtown	282	121	161	0
Maricopa County MPA	3,882	2,995	0	1,015
Pinal County MPA	6,975	282	0	6,825
<b>TOTAL</b>	<b>198,791</b>	<b>186,710</b>	<b>5,168</b>	<b>14,224</b>

Source: LKC

**Table 5.19**  
**2010 Local Transit Service Need and Allocation,**  
**Service in Miles per Average Day**

MPA	Total Need (Rev. Mi.)	Urban Revenue Miles		Rural Miles
		Fixed Route	Circulator	
Apache Junction	1,039	508	431	100
Avondale	1,991	1,226	696	68
Buckeye	2,675	300	655	1,719
Carefree	122	103	19	0
Cave Creek	112	108	0	9
Chandler	5,781	6,232	0	0
El Mirage	847	504	343	0
Fountain Hills	468	440	0	50
Gila Bend	124	0	0	124
Gila River Indian Community	179	371	0	11
Gilbert	4,244	4,333	0	0
Glendale	7,841	7,720	0	191
Goodyear	2,830	903	888	1,038
Guadalupe	208	218	0	0
Litchfield Park	204	113	90	0
Mesa	15,048	15,312	0	178
Paradise Valley	441	639	0	0
Peoria	3,858	3,321	398	139
Phoenix	59,892	56,864	2,582	446
Queen Creek	877	158	187	533
Salt River Pima-Maricopa Indian Community	383	414	0	122
Scottsdale	8,599	7,681	541	377
Surprise	2,907	1,687	692	527
Tempe	10,004	8,858	1,146	0
Tolleson	486	342	143	0
Wickenburg	271	0	0	271
Youngtown	176	52	124	0
Maricopa County MPA	2,181	1,466	179	536
Pinal County MPA	3,633	56	0	3,633
<b>TOTAL</b>	<b>137,421</b>	<b>119,930</b>	<b>9,116</b>	<b>10,072</b>

Source: LKC

## **Regional Transit Services**

Regional transit services must also be cut back from their 2030 levels to account for the reduced level of transit need and transportation infrastructure in the 2010 and 2020 RTS.

### Regional Local Routes

The methodology used to identify regional local routes in the 2030 RTS should still be valid under the 2010 or 2020 RTS. How much local service is eligible for regionalization is to be determined.

### Expressway Regional Routes

As noted above, one of the primary considerations for locating an expressway regional route is parking capacity at the route origin. Accordingly, the schedule for implementation for expressway regional service is set to match the implementation plan for park & ride lots. As a park & ride lot comes on-line, the corresponding expressway regional route(s) serving that lot also begin service.

The year of implementation of Park & Ride lots is shown in **Table 5.16**.

**Table 5.20** shows the implementation schedule for expressway regional routes.

**Table 5.20  
Implementation Schedule for Expressway Regional Routes**

Transit Network	Route	Park & Rides Served	Year of Implementation
2010, 2020 and 2030	Deer Valley Express	Deer Valley	2003
	Ahwatukee Express	Desert Foothills	2003
	Desert Sky Express	79th Avenue	2003
	Superstition Springs Express	Superstition Springs, Mesa	2003
	North Glendale Express	North Glendale	2004
	Santan Express	Gilbert, Chandler	2004
	Squaw Peak Express	SR51/Bell, Dreamy Draw	2004
	Grand Avenue Limited (to Glendale)	Glendale	2005
	Pima Express (to Scottsdale P&R)	Scottsdale	2005
	Avondale Express	Avondale-Goodyear	2006
	East Loop 101 Connector	Chandler, Ahwatukee, Tempe, Scottsdale Airpark	2006
	North Loop 101 Connector (North Glendale P&R to Scottsdale P&R)	North Glendale, Scottsdale Airpark, Scottsdale	2006
	Papago Connector (from Avondale P&R)	Avondale-Goodyear	2006
	Pima Express (to Scottsdale Airpark P&R)	Scottsdale Airpark, Scottsdale	2006
	Red Mountain Connector	202 / Power, 202 / Gilbert, Tempe	2006
	Red Mountain Express	202 / Power, 202 / Gilbert	2006
	Superstition Connector	Superstition Springs, Mesa, Tempe	2006
	Peoria Express (from 101/Glendale P&R)	101 / Glendale	2007
	West Loop 101 Connector (from 101 / Glendale P&R)	101 / Glendale, 79th Avenue	2007
	Ahwatukee Connector (to Desert Foothills P&R)	Desert Foothills, Ahwatukee	2008
Ahwatukee Express (to Desert Foothills P&R)	Ahwatukee, Desert Foothills	2008	
2020 and 2030	Black Canyon Connector	Happy Valley, Carefree, Deer Valley	2013

Transit Network	Route	Park & Rides Served	Year of Implementation
	North I-17 Express	Carefree, Happy Valley	2013
	Grand Avenue Limited (to Surprise)	Glendale, Surprise	2016
	Loop 303 Express	Surprise, 303 / Northern, Avondale-Goodyear	2016
	North Loop 101 Connector (Surprise P&R-Scottsdale P&R)	Surprise, North Glendale, Scottsdale Airpark, Scottsdale	2016
	Peoria Express (from Peoria P&R)	Peoria, 101/Glendale	2017
	West Loop 101 Connector (from Peoria P&R)	Peoria, 101/Glendale, 79th Avenue	2017
	Anthem Express	Anthem	2020
2030 Only	Apache Junction Express	Apache Junction	2021
	Buckeye Express (to East Buckeye P&R)	East Buckeye	2023
	Papago Connector (from East Buckeye P&R)	East Buckeye, Avondale-Goodyear, 79th Avenue	2023
	Buckeye Express (to West Buckeye P&R)	East Buckeye, West Buckeye	2024
	Papago Connector (from West Buckeye P&R)	W Buckeye, E Buckeye, Avondale-Goodyear, 79th Avenue	2024
	Grand Avenue Limited (to Jomax)	Grand / Jomax, Surprise, Glendale	2025

Source: LKC

### Arterial Regional Routes

Like expressway regional routes, the arterial regional routes are implemented over time between 2002 and 2030. Unlike the expressway routes, however, arterial route service is not keyed to specific capital projects, with the exception of the three LRT shuttle routes, which would be implemented in 2006 upon the opening of the CP/EV LRT project.

Instead, implementation of arterial regional service is spread evenly over the 28-year period from 2002 to 2030, with those routes that serve already-developed areas or existing high need corridors being implemented first and those serving developing areas implemented in the later years of the program.

**Table 5.21** shows the implementation schedule for arterial regional routes.

**Table 5.21**  
**Implementation Schedule for Arterial Regional Connections Routes**

Transit Network	Arterial Regional Route	Implementation Year
2010, 2020 and 2030	Camelback Road Limited	2004
	Glendale Avenue Shuttle	2006
	Main Street Shuttle	2006
	MetroCenter Shuttle	2006
	Scottsdale / Rural Limited	2008
	Baseline-Southern Limited	2010
2020 and 2030	59th Avenue Limited	2012
	Bell Road Limited	2014
	Chandler Boulevard Limited	2016
	35th Avenue Limited	2018
	Arizona Avenue Limited	2020
2030	Power Road Limited	2022
	Gilbert Road Limited	2024
	Mid-North Connector	2026
	Litchfield Road Limited	2028
	Southwest Connector	2030

Source: LKC

### Commuter Vanpool Service

As noted above, the demand for commuter vanpool service is directly proportional to the service area population. In the fully built-out 2030 RTS network, the ratio of vanpools to population is 1.3 vanpools per 10,000 population.

As with local service, the 2020 vanpool service assumes that the service offered meets the anticipated demand, so the ratio would be applicable. However, in the case of the 2010 network, the vanpool service would still be developing and growing from its current level of 0.6 vanpools per 10,000 population.

**Table 5.22** shows the number of vanpools and vanpool per capita rates for the existing, 2010, 2020 and 2030 regional transit systems.

**Table 5.22**  
**Vanpool Service: 2002, 2010, 2020 and 2030**

Year	Population	Vanpool / 10,000 Population	Total Vanpools
Existing (2002)	3,479,824	0.6	223
2010	4,650,026	1.1	505
2020	5,841,651	1.3	759
2030	7,011,532	1.3	911

*Source: LKC*

### **Paratransit Service**

As noted above, the demand for paratransit service is a function of the eligible population and trip characteristics in the service area for which paratransit service is offered. Paratransit service for the interim 2010 and 2020 networks assumes the same trip pattern and user characteristics as in the 2030 network described above. Therefore, changes in the demand for service in 2010 and 2020 are a function in the changes to the overall population of each MPA.

**Tables 5.23** and **5.24** show the proposed ADA-paratransit and senior paratransit service levels for 2010. **Tables 5.25** and **5.26** show the proposed ADA-paratransit and senior paratransit service levels for 2020.

**Table 5.23**  
**Estimated Demand for ADA Paratransit, 2010**

MPA	2010 Estimates				
	Population	ADA Riders	ADA Trips	Annual Rev Hours	Annual Rev Miles
Apache Junction	45,830	105	14,800	6,600	91,000
Avondale	72,743	108	15,300	6,800	94,000
Buckeye	76,185	505	71,400	31,800	439,000
Carefree	5,096	7	1,100	500	6,000
Cave Creek	5,489	14	1,900	900	12,000
Chandler	270,393	228	32,200	14,400	198,000
El Mirage	36,114	75	10,500	4,700	65,000
Fountain Hills	27,287	41	5,800	2,600	35,000
Gila Bend	3,053	15	2,200	1,000	13,000
Gila River Indian Community	4,159	6	900	400	6,000
Gilbert	183,276	170	24,000	10,700	147,000
Glendale	304,581	339	47,800	21,300	294,000
Goodyear	65,765	368	52,000	23,200	320,000
Guadalupe	5,894	6	900	400	6,000
Litchfield Park	9,574	9	1,300	600	8,000
Mesa	618,768	804	113,600	50,600	698,000
Paradise Valley	19,398	14	1,900	900	12,000
Peoria	173,528	436	61,600	27,500	379,000
Phoenix	1,779,857	2,486	351,300	156,600	2,159,000
Queen Creek	19,789	44	6,200	2,800	38,000
Salt River Pima-Maricopa Indian Community	9,279	17	2,400	1,100	15,000
Scottsdale	295,846	331	46,800	20,900	288,000
Surprise	129,291	442	62,400	27,800	384,000
Tempe	190,677	178	25,100	11,200	154,000
Tolleson	6,635	8	1,100	500	7,000
Wickenburg	9,332	23	3,300	1,500	20,000
Youngtown	6,013	22	3,100	1,400	19,000
Maricopa County MPA	98,681	522	73,700	32,900	453,000
Pinal County MPA	177,493	485	68,600	30,600	421,000
<b>TOTAL</b>	<b>4,650,026</b>	<b>7,807</b>	<b>1,103,200</b>	<b>492,200</b>	<b>6,781,000</b>

Source: MAG, LKC

**Table 5.24  
Estimated Demand for Senior Paratransit, 2010**

MPA	2010 Estimates					
	Pop.	%Senior	Senior Riders	Annual Trips	Annual Rev Hr	Annual Rev Mi
Apache Junction	45,830	24%	157	18,000	7,900	109,000
Avondale	72,743	6%	61	7,000	3,000	42,000
Buckeye	76,185	7%	74	8,000	3,700	51,000
Carefree	5,096	24%	17	2,000	900	12,000
Cave Creek	5,489	12%	9	1,000	500	6,000
Chandler	270,393	7%	253	28,000	12,700	175,000
El Mirage	36,114	12%	59	7,000	3,000	41,000
Fountain Hills	27,287	18%	68	8,000	3,400	47,000
Gila Bend	3,053	7%	3	0	100	2,000
Gila R. Indian Community	4,159	4%	2	0	100	2,000
Gilbert	183,276	4%	91	10,000	4,500	63,000
Glendale	304,581	7%	295	33,000	14,800	204,000
Goodyear	65,765	11%	98	11,000	4,900	68,000
Guadalupe	5,894	6%	5	1,000	200	3,000
Litchfield Park	9,574	12%	16	2,000	800	11,000
Mesa	618,768	13%	1,121	126,000	56,300	776,000
Paradise Valley	19,398	13%	36	4,000	1,800	25,000
Peoria	173,528	16%	379	43,000	19,000	262,000
Phoenix	1,779,857	8%	1,935	218,000	97,100	1,339,000
Queen Creek	19,789	3%	8	1,000	400	5,000
Salt R. Pima-Maricopa Indian Community	9,279	17%	22	2,000	1,100	15,000
Scottsdale	295,846	14%	571	64,000	28,700	396,000
Surprise	129,291	17%	318	36,000	16,000	220,000
Tempe	190,677	7%	177	20,000	8,900	122,000
Tolleson	6,635	10%	9	1,000	400	6,000
Wickenburg	9,332	14%	18	2,000	900	12,000
Youngtown	6,013	48%	41	5,000	2,000	28,000
Maricopa County MPA	98,681	64%	884	100,000	44,400	612,000
Pinal County MPA	177,493	13%	334	38,000	16,800	231,000
<b>TOTAL</b>	<b>4,650,026</b>	<b>11%</b>	<b>7,059</b>	<b>796,000</b>	<b>354,300</b>	<b>4,885,000</b>

Source: MAG, LKC

**Table 5.25  
Estimated Demand for ADA Paratransit, 2020**

MPA	2020 Estimates				
	Population	ADA Riders	ADA Trips	Annual Rev Hours	Annual Rev Miles
Apache Junction	51,274	105	14,800	6,600	91,000
Avondale	105,309	108	15,300	6,800	94,000
Buckeye	166,635	505	71,400	31,800	439,000
Carefree	6,022	7	1,100	500	6,000
Cave Creek	6,186	14	1,900	900	12,000
Chandler	296,127	228	32,200	14,400	198,000
El Mirage	46,297	75	10,500	4,700	65,000
Fountain Hills	33,826	41	5,800	2,600	35,000
Gila Bend	6,222	15	2,200	1,000	13,000
Gila River Indian Community	5,249	6	900	400	6,000
Gilbert	280,847	170	24,000	10,700	147,000
Glendale	318,811	339	47,800	21,300	294,000
Goodyear	162,148	368	52,000	23,200	320,000
Guadalupe	5,948	6	900	400	6,000
Litchfield Park	15,026	9	1,300	600	8,000
Mesa	710,954	804	113,600	50,600	698,000
Paradise Valley	20,373	14	1,900	900	12,000
Peoria	259,437	436	61,600	27,500	379,000
Phoenix	2,098,839	2,486	351,300	156,600	2,159,000
Queen Creek	76,379	44	6,200	2,800	38,000
Salt River Pima-Maricopa Indian Community	9,513	17	2,400	1,100	15,000
Scottsdale	333,665	331	46,800	20,900	288,000
Surprise	222,073	442	62,400	27,800	384,000
Tempe	198,245	178	25,100	11,200	154,000
Tolleson	6,749	8	1,100	500	7,000
Wickenburg	11,722	23	3,300	1,500	20,000
Youngtown	6,861	22	3,100	1,400	19,000
Maricopa County MPA	125,024	522	73,700	32,900	453,000
Pinal County MPA	255,890	485	68,600	30,600	421,000
<b>TOTAL</b>	<b>5,841,651</b>	<b>7,807</b>	<b>1,103,200</b>	<b>492,200</b>	<b>6,781,000</b>

Source: MAG, LKC

**Table 5.26**  
**Estimated Demand for Senior Paratransit, 2020**

MPA	2020 Estimates					
	Pop.	%Senior	Senior Riders	Annual Trips	Annual Rev Hr	Annual Rev Mi
Apache Junction	51,274	24%	176	20,000	8,800	122,000
Avondale	105,309	6%	88	10,000	4,400	61,000
Buckeye	166,635	7%	161	18,000	8,100	112,000
Carefree	6,022	24%	20	2,000	1,000	14,000
Cave Creek	6,186	12%	10	1,000	500	7,000
Chandler	296,127	7%	277	31,000	13,900	191,000
El Mirage	46,297	12%	76	9,000	3,800	52,000
Fountain Hills	33,826	18%	84	10,000	4,200	58,000
Gila Bend	6,222	7%	6	1,000	300	4,000
Gila R. Indian Community	5,249	4%	3	0	100	2,000
Gilbert	280,847	4%	139	16,000	7,000	96,000
Glendale	318,811	7%	308	35,000	15,500	213,000
Goodyear	162,148	11%	241	27,000	12,100	167,000
Guadalupe	5,948	6%	5	1,000	200	3,000
Litchfield Park	15,026	12%	25	3,000	1,300	17,000
Mesa	710,954	13%	1,288	145,000	64,600	891,000
Paradise Valley	20,373	13%	38	4,000	1,900	26,000
Peoria	259,437	16%	566	64,000	28,400	392,000
Phoenix	2,098,839	8%	2,282	257,000	114,600	1,579,000
Queen Creek	76,379	3%	30	3,000	1,500	20,000
Salt R. Pima-Maricopa Indian Community	9,513	17%	23	3,000	1,100	16,000
Scottsdale	333,665	14%	645	73,000	32,400	446,000
Surprise	222,073	17%	546	61,000	27,400	378,000
Tempe	198,245	7%	184	21,000	9,200	127,000
Tolleson	6,749	10%	9	1,000	500	6,000
Wickenburg	11,722	14%	23	3,000	1,100	16,000
Youngtown	6,861	48%	46	5,000	2,300	32,000
Maricopa County MPA	125,024	64%	1,120	126,000	56,200	775,000
Pinal County MPA	255,890	13%	482	54,000	24,200	334,000
<b>TOTAL</b>	<b>5,841,651</b>	<b>11%</b>	<b>8,899</b>	<b>1,004,000</b>	<b>446,600</b>	<b>6,157,000</b>

Source: MAG, LKC

## Capital Program

In addition to reducing the levels of service from the 2030 RTS to fit demand in 2010 and 2020, the capital program in both years is also reduced. This reflects both a reduced need for vehicles to provide the reduced level of service; and an earlier point in the facilities expansion program.

### Vehicles

The fleet required for 2010 and 2020 are shown in **Table 5.27** and **5.28**. As with the 2030 RTS, the number of vehicles required each year is a function of the number of units of service required divided by the annual number of units per vehicle, as shown in **Table 5.13**.

**Table 5.27**  
**Total Transit Fleet, 2010**

Service / Vehicle Type	Units of Service	Peak Fleet	20% Spares	Total Fleet
Local Fixed Route	43,775,000	973	195	1,167
Circulators	3,327,000	902	180	1,082
Non-Fixed Route Service (Incl Rural)	159,000	85	17	102
Regional Fixed Route	0	0	0	0
Arterial Regional Route	3,434,000	76	15	92
Expressway Regional Route	4,580,000	102	20	122
Vanpool	202,000	514	103	617
ADA Paratransit	325,000	93	19	112
Senior Paratransit	366,000	105	21	126
Commuter Bus		102	20	122
Transit Bus		1,951	390	2,341
Cut-Away		283	57	339
Van		514	103	617
<b>Total</b>		<b>2,850</b>	<b>570</b>	<b>3,420</b>

Source: LKC

**Table 5.28  
Total Transit Fleet, 2020**

Service / Vehicle Type	Units of Service	Peak Fleet	20% Spares	Total Fleet
Local Fixed Route	68,149,000	1,514	303	1,817
Circulators	1,886,000	511	102	614
Non-Fixed Route Service (Incl Rural)	229,000	122	24	147
Regional Fixed Route	0	0	0	0
Arterial Regional Route	5,444,000	121	24	145
Expressway Regional Route	6,007,000	133	27	160
Vanpool	304,000	774	155	929
ADA Paratransit	410,000	118	24	141
Senior Paratransit	461,000	132	26	159
Commuter Bus		133	27	160
Transit Bus		2,147	429	2,576
Cut-Away		372	74	446
Van		774	155	929
<b>Total</b>		<b>3,426</b>	<b>685</b>	<b>4,111</b>

Source: LKC

### Passenger Facilities

Year of implementation for each type of facility is included in the subsections on facilities, above. **Table 5.30** summarizes the tables by providing a year-by-year description of each year's new capital facilities. Note that facilities may take several years to implement, and the date in **Table 5.30** reflects the final year of implementation (when the new facility opens).

**Table 5.30  
 Implementation Schedule, New Facilities**

Network	Year of Implementation	Facility	Type
2010, 2020, 2030	Existing	North Division	Maintenance
	Existing	South Division	Maintenance
	Existing	79th Avenue Park & Ride	P&R
	Existing	Deer Valley Park & Ride	P&R
	Existing	Dreamy Draw Park & Ride	P&R
	Existing	Arizona Mills Transit Center	TC
	Existing	Central Station	TC
	Existing	Desert Sky Transit Center	TC
	Existing	Loloma Station	TC
	Existing	MetroCenter Transit Center	TC
	Existing	Paradise Valley Transit Center	TC
	Existing	Sunnyslope Transit Center	TC
	Existing	Superstition Springs Transit Center	TC
	Existing	Ed Pastor Transit Center	TC
	2003	Desert Foothills Park & Ride	P&R
	2003	Superstition Springs Park & Ride	P&R
	2003	New Mesa Maintenance (Phase1)	Maintenance
	2004	Ahwatukee Park & Ride	P&R
	2004	Gilbert Park & Ride	P&R
	2004	North Glendale Park & Ride	P&R
	2004	SR51 / Bell Road Park & Ride	P&R
	2005	Glendale Park & Ride	P&R
	2005	MetroCenter Park & Ride	P&R
	2005	Scottsdale P&R	P&R
	2006	New Dial-a-Ride Facility	Maintenance
	2006	New West Valley Maintenance	Maintenance
	2006	New Vanpool Maintenance	Maintenance
	2006	202 / Power Park & Ride	P&R
	2006	Avondale-Goodyear Park & Ride	P&R
	2006	Chandler Park & Ride	P&R
	2006	Scottsdale Airpark P&R	P&R
	2006	Tempe P&R / LRT	P&R
	2006	Chandler Transit Center	TC
2006	EVIT	TC	
2006	Phoenix Spectrum Mall	TC	
2006	Tempe TC / LRT	TC	
2007	New East Valley Maintenance	Maintenance	
2007	101 / Glendale Park & Ride	P&R	
2008	New Heavy Maintenance	Maintenance	

Network	Year of Implementation	Facility	Type
	2008	New Mesa Maintenance (Phase2)	Maintenance
	2008	Upgrades at Desert Sky TC	TC
	2009	New Maintenance Facility	Maintenance
	2010	Mesa Park & Ride	P&R
	2010	Upgrades at Arrowhead TC	TC
2020, 2030	2012	New Maintenance Facility	Maintenance
	2012	Upgrades at Superstition Springs	TC
	2013	Carefree Hwy Park & Ride	P&R
	2014	202 / Gilbert Park & Ride	P&R
	2014	Glendale Transit Center	TC
	2015	New Dial-a-Ride Facility	Maintenance
	2015	New Maintenance Facility	Maintenance
	2016	Surprise Park & Ride	P&R
	2016	101 / Glendale Transit Center	TC
	2017	Peoria Park & Ride	P&R
	2018	New Maintenance Facility	Maintenance
	2018	Happy Valley Park & Ride	P&R
	2018	South Tempe Transit Center	TC
	2019	Chandler Town Center Park & Ride	P&R
	2020	Anthem Park & Ride	P&R
2020	Mesa Town Center Transit Center	TC	
2030 Only	2021	Apache Junction Park & Ride	P&R
	2022	303 / Northern Park & Ride	P&R
	2022	Gilbert Town Center Transit Center	TC
	2023	East Buckeye P&R	P&R
	2024	West Buckeye P&R	P&R
	2024	Scottsdale Airpark Transit Center	TC
	2025	New Heavy Maintenance	Maintenance
	2025	Grand Avenue / Jomax Park & Ride	P&R
	2026	New Dial-a-Ride Facility	Maintenance
	2026	Peoria Transit Center	TC
	2028	Surprise Transit Center	TC
2030	New Maintenance Facility	Maintenance	
Beyond 2030	2035	New Maintenance Facility	Maintenance
	2040	New Maintenance Facility	Maintenance

Source: Valley Metro, LKC

Financial estimates for the 2010 and 2020 networks will be presented in Section 6.

## SECTION SIX: COSTS AND FUNDING

The purpose of Section Six is to present the methodology used to develop operating and capital costs for the 2030 Regional Transit System Plan (RTS) and the interim plans presented in Section Five. This section also presents estimated funding available by source.

This section is divided into the following subsections:

- Costs
  - Operating Costs
  - Capital Costs
- Funding
  - Federal Funding
  - State Funding
  - Local Funding
- Net Costs for Service Plan

Findings presented in Section Six were presented (in a different format) to the AAG in March 2003. Note that costs do not include high capacity modes.

### COSTS

Costs for transit service are divided into operating costs and capital costs, each of which is described below. More detailed cost tables are included in **Appendix F** of this report.

#### Operating Costs

This study estimates operating costs for transit service by using the methodology described in Section Five to develop the number of units (measured in terms of revenue hours or revenue miles) of service needed and then multiplying them by unit costs.

Unit costs for operating and capital costs were developed based on a review of existing Valley Metro costs and of costs for peer systems (see Section 4). All costs were reviewed by the AAG prior to the March 2003 meeting.

Unit costs for operating costs are presented in **Table 6.1**. Operating costs include:

- Employee salary and benefits
- Fuel for vehicles
- Maintenance for vehicles, including preventive maintenance and major repair work
- Planning
- Administration

**Table 6.1**  
**Operating Unit Costs (\$2002)**

Service Type	Cost / Revenue Mile	Cost / Revenue Hour
Local Fixed Route		
Local Circulator	\$6.73	\$86.70
Regional Local Route		
Arterial Regional Route	\$5.58	\$94.99
Expressway Regional Route	\$4.76	\$107.48
Commuter Van	N/A	\$27.99
ADA Paratransit	N/A	\$43.83
Senior Paratransit		
Rural	N/A	\$64.77

Source: RTS Study Documentation

Two additional operating cost items do not include unit costs:

- TDM / Rideshare programs – budget is equal to 1 percent of annual operating costs
- Contingency – budget is equal to \$3 million per year

Revenue hours and miles were developed for each category of service for the years 2010, 2020 and 2030 (see Section Five). Baseline (2002) revenue hours and miles of service were based on existing service. Interval years assumed that service levels would be “caught up” with demand by 2015. Thus, levels of service in 2020 and 2030 are proportional to demand (as defined in Section Five). An interim level of supply was set for 2015. Transit supply in 2010 was estimated based on straight line growth from existing (2002) service levels to 2015 estimated levels.

For other years, assume a straight line of growth in service from 2002 to 2010, 2010 to 2015, 2015 to 2020, and 2020 to 2030.

Annual revenue miles and hours of service for each service type in the years 2002, 2010, 2020 and 2030 are shown in Section Five. **Table 6.2** provides “snapshot” costs for those key years. **Table 6.3** provides total operating costs for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.2**  
**Annual Operating Costs in Key Years, 2002-2030 (\$2002 in 000s)**

<b>Service</b>	<b>2002</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>
Local Fixed Route	\$181,100	\$294,600	\$458,600	\$495,600
Local Circulator	\$2,900	\$23,600	\$13,400	\$57,200
<b>Total Local Service</b>	<b>\$184,000</b>	<b>\$318,200</b>	<b>\$472,000</b>	<b>\$552,800</b>
Rural / Non-Fixed Route	\$0	\$10,300	\$14,900	\$22,400
Regional Local Routes	\$0	\$0	\$0	\$0
Expwy Regional Service	\$0	\$21,800	\$28,600	\$34,500
Arterial Regional Service	\$0	\$19,200	\$30,400	\$38,000
<b>Total Regional Service</b>	<b>\$0</b>	<b>\$41,000</b>	<b>\$59,000</b>	<b>\$72,500</b>
Vanpool Service	\$2,500	\$5,700	\$8,500	\$10,200
ADA-Paratransit	\$11,200	\$14,300	\$18,000	\$21,600
Senior-Paratransit	\$12,700	\$16,000	\$20,200	\$24,300
<b>Total Paratransit</b>	<b>\$23,900</b>	<b>\$30,300</b>	<b>\$38,200</b>	<b>\$45,900</b>
TDM / Rideshare	\$2,100	\$4,100	\$5,900	\$7,000
Contingency	\$3,000	\$3,000	\$3,000	\$3,000
<b>Total Operating Costs</b>	<b>\$213,400</b>	<b>\$408,500</b>	<b>\$595,600</b>	<b>\$706,800</b>

Source: LKC

**Table 6.3**  
**Cumulative Operating Costs, 2002-2030 (\$2002 in 000s)**

<b>Service</b>	<b>2002-2010</b>	<b>2011-2020</b>	<b>2021-2030</b>	<b>2002-2030</b>	<b>2006-2025</b>
Local Fixed Route	\$2,140,700	\$3,848,300	\$4,789,700	\$10,778,700	\$7,528,100
Local Circulator	\$119,500	\$180,100	\$374,800	\$674,500	\$405,100
<b>Total Local Service</b>	<b>\$2,260,200</b>	<b>\$4,028,400</b>	<b>\$5,164,500</b>	<b>\$11,453,200</b>	<b>\$7,933,200</b>
Rural / Non-Fixed Route	\$45,100	\$126,200	\$193,800	\$365,100	\$250,700
Regional Local Routes	\$0	\$0	\$0	\$0	\$0
Expwy Regional Service	\$132,900	\$251,800	\$326,000	\$710,700	\$512,100
Arterial Regional Service	\$74,800	\$250,900	\$342,600	\$668,200	\$479,900
<b>Total Regional Service</b>	<b>\$207,700</b>	<b>\$502,700</b>	<b>\$668,600</b>	<b>\$1,378,900</b>	<b>\$992,000</b>
Commuter Vanpool Service	\$36,700	\$75,000	\$94,400	\$206,100	\$144,400
ADA-Paratransit	\$114,700	\$163,100	\$199,500	\$477,400	\$325,900
Senior-Paratransit	\$129,200	\$183,600	\$224,600	\$537,300	\$366,800
<b>Total Paratransit</b>	<b>\$243,900</b>	<b>\$346,700</b>	<b>\$424,100</b>	<b>\$1,014,700</b>	<b>\$692,700</b>
TDM / Rideshare	\$27,900	\$50,800	\$65,500	\$144,200	\$100,100
Contingency	\$27,000	\$30,000	\$30,000	\$87,000	\$60,000
<b>Total Operating Costs</b>	<b>\$2,848,500</b>	<b>\$5,159,800</b>	<b>\$6,640,900</b>	<b>\$14,649,200</b>	<b>\$10,173,100</b>

Source: LKC

Annual costs for each year are shown in **Appendix F**.

### Capital Costs

Capital unit costs are provided in **Table 6.4**. All capital costs are based on the unit capital costs developed as part of the Regional Transit System Study and presented to the AAG and stakeholder groups in December 2002. Capital costs include contingency (10 percent), project and construction management, and administration. Vehicle costs include technology-related purchases (estimated at \$17,000 per vehicle; source: William Franklin / PTS).

**Table 6.4**  
**Capital Cost Unit Costs (\$2002)**

Item	Units	Cost / Unit
<u>Passenger Infrastructure</u>		
Shelters (one / mile each way)	One-way route miles	\$12,500
Bus pull-outs (one / mile each way)	One-way route miles	\$50,000
<u>Transit Centers (includes land)</u>		
4-Bay Transit Center	Facility	\$1,600,000
6-Bay Transit Center	Facility	\$2,300,000
Major Activity Transit Center	Facility	\$6,500,000
Park & Ride Lots (includes land)	Parking space	\$15,000
<u>Maintenance Facility (includes land)</u>		
Bus maintenance	Bus	\$160,000
Cut-away maintenance	Cut-Away	\$37,000
Vanpool maintenance	Van	\$6,000
Heavy maintenance facility	Facility	\$33,800,000
<u>Transit Vehicles</u>		
Commuter Bus (45')	Vehicle	\$450,000
Transit Bus (40')	Vehicle	\$350,000
Cut-Away (rural, paratransit)	Vehicle	\$60,000
Van	Vehicle	\$30,000

Source: RTS Study Documentation

Each category of capital cost is described in more detail below.

#### Passenger Infrastructure

Passenger shelters and bus pull-outs are spaced on average one / mile (each) in each direction on streets that have bus service.

This methodology assumes streets already served by fixed route service have infrastructure in place. Passenger infrastructure costs are only applied to “new” streets as new pattern miles of service are added. Additional pattern miles are calculated by

multiplying the additional revenue miles each year by the existing ratio of revenue miles / pattern miles.

### Passenger Facilities

All passenger facilities are assumed to take 3 years for construction, with the construction cost split 20 percent in year one, 50 percent in year two, and 30 percent in year three.

All passenger facilities are assumed to have a 25-year lifespan. After 25 years, the facilities must be replaced for the same capital cost as construction, minus land costs. For transit centers, replacement equals 75 percent of original cost; for Park & Ride lots, replacement equals 50 percent of original cost.

### *Transit Centers*

Proposed transit centers (including those associated with LRT) are assumed to be completed by the end of fiscal year 2006. After 2006, all transit centers proposed in the 2030 plan are assumed to be in place by 2029, with implementation spread evenly over the 23-year period. Note that construction includes upgrades at the Desert Sky, Arrowhead Town Center, and Superstition Springs facilities.

### *Park & Ride Lots*

All Park & Ride lots proposed in the 2030 plan are assumed to be in place by 2025. Facilities included in the MAG Park & Ride Study short range plan or that are in the Transportation Improvement Plan (TIP) are constructed first and are all in place by 2007. Size of facilities is based on the full-size recommendations in the MAG Park & Ride study (where available) or else were based on assumptions for demand at facilities based on LKC's assessment.

### Maintenance Facilities

Because the growth in fleet size is so rapid in the early years of the plan, it will be impossible to construct facilities quickly enough to keep up with demand. Therefore, crush conditions will probably continue to exist at Valley Metro facilities in the near future.

New bus operating facilities are assumed to come on-line in the following order:

- 2004: Renovations at existing Phoenix-North (200 buses)
- 2003: Phase I, new Mesa facility (100 buses)
- 2006: New West Valley facility (275 buses)
- 2007: New East Valley facility (275 buses)
- 2008: Expansion at new Mesa facility (100 buses)
- 2009: New operating facility (275 buses)
- 2012: New operating facility (275 buses)

- 2015: New operating facility (275 buses)
- 2018: New operating facility (275 buses)
- 2026: New operating facility (275 buses)
- 2029: New operating facility (275 buses)
- 2035: New operating facility (275 buses)

Paratransit operating facilities are also planned to be added onto the new bus facilities scheduled for completion in 2006, 2015 and 2026. A van maintenance facility is scheduled to come on-line as part of the facility to be completed in 2006. Finally, new heavy maintenance facilities are scheduled to come on-line in 2008 and 2025.

All maintenance facilities are assumed to take three years for construction, with the construction cost split 20 percent in year one, 50 percent in year two, and 30 percent in year three.

All maintenance facilities are assumed to have a 25-year lifespan. After 25 years, the facilities must be replaced for the same capital cost as construction, minus land costs (75 percent of original cost).

### Vehicles

The number of vehicles required depends on the type of service. Vehicles required are based on the following assumptions:

- 45,000 revenue miles per vehicle per year (bus, cut-away)
- 392 revenue hours per vehicle per year for vanpools
- Average speed to convert between revenue miles and revenue hours

Fleet requirements were generated using the existing (2002) fleet as a baseline, and adding vehicles as required by growing service levels. Using the revenue hours and miles required in each year, revenue miles or hours of service divided by revenue miles or hours per vehicle equals vehicles required. A 20 percent spare ratio was applied to all fleets (which is comparable to peer systems, see Section Four).

Vehicles have the following lifespans:

- Bus = 12 years
- Cut-Away = 5 years
- Vanpool = 3 years

Buses used in express service may have longer lifespans. Vehicles are assumed to be replaced with the same type vehicle at the end of their lifespan. Both expansion buses and existing buses are assumed to be replaced according to this schedule.

Summary: Capital Costs

Annual capital projects in the years 2002, 2010, 2020 and 2030 are shown in Section Five. **Table 6.5** provides “snapshot” costs for those key years. **Table 6.6** provides total capital costs for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.5**  
**Annual Capital Costs in Key Years, 2002-2030 (\$2002 in 000s)**

Service	2002	2010	2020	2030
Commuter Bus	\$0	\$0	\$3,600	\$0
Transit Bus	\$0	\$103,600	\$53,600	\$39,900
Cut-Away	\$0	\$2,900	\$800	\$700
Van	\$0	\$1,300	\$1,800	\$1,100
<b>Total Vehicles</b>	<b>\$0</b>	<b>\$107,800</b>	<b>\$59,800</b>	<b>\$41,700</b>
Heavy Maintenance	\$0	\$0	\$0	\$0
Bus Operating Facility	\$12,600	\$8,800	\$0	\$36,300
Cut-Away Maintenance Facility	\$0	\$0	\$0	\$0
Van Maintenance Facility	\$0	\$0	\$0	\$0
<b>Total Maintenance Capacity</b>	<b>\$12,600</b>	<b>\$8,800</b>	<b>\$0</b>	<b>\$36,300</b>
Passenger Shelters	\$200	-\$100	\$400	\$100
Bus Pull-Outs	\$1,000	-\$400	\$1,600	\$300
<b>Total Passenger Infrastructure</b>	<b>\$1,200</b>	<b>-\$500</b>	<b>\$2,000</b>	<b>\$400</b>
Park & Ride Lots	\$12,800	\$2,700	\$3,800	\$13,100
Transit Centers	\$1,700	\$1,800	\$1,800	\$4,500
<b>Total Passenger Facilities</b>	<b>\$14,500</b>	<b>\$4,500</b>	<b>\$5,600</b>	<b>\$17,600</b>
<b>Total Capital Cost</b>	<b>\$28,300</b>	<b>\$120,600</b>	<b>\$67,400</b>	<b>\$96,000</b>

Source: LKC

**Table 6.6**  
**Cumulative Capital Costs, 2002-2030 (\$2002 in 000s)**

Service	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
Commuter Bus	\$55,400	\$72,500	\$29,700	\$157,500	\$116,600
Transit Bus	\$389,200	\$443,500	\$363,700	\$1,196,300	\$888,700
Cut-Away	\$10,200	\$18,200	\$7,300	\$35,700	\$29,900
Van	\$10,200	\$23,500	\$16,100	\$49,700	\$39,000
<b>Total Vehicles</b>	<b>\$465,000</b>	<b>\$557,700</b>	<b>\$416,800</b>	<b>\$1,439,200</b>	<b>\$1,074,200</b>
Heavy Maintenance	\$33,800	\$0	\$33,800	\$67,600	\$67,600
Bus Operating Facility	\$192,400	\$153,200	\$108,500	\$454,100	\$270,400
Cut-Away Maintenance Facility	\$9,300	\$9,300	\$9,300	\$27,800	\$18,500
Van Maintenance Facility	\$6,000	\$0	\$0	\$6,000	\$1,800
<b>Total Maintenance Capacity</b>	<b>\$241,500</b>	<b>\$162,500</b>	<b>\$151,600</b>	<b>\$555,500</b>	<b>\$358,300</b>
Passenger Shelters	\$1,800	(\$400)	\$3,600	\$5,100	\$2,400
Bus Pull-Outs	\$7,300	(\$1,600)	\$14,600	\$20,200	\$9,800
<b>Total Passenger Infrastructure</b>	<b>\$9,100</b>	<b>(\$2,000)</b>	<b>\$18,200</b>	<b>\$25,300</b>	<b>\$12,200</b>
Park & Ride Lots	\$106,500	\$48,900	\$74,000	\$229,300	\$103,700
Transit Centers	\$20,500	\$17,000	\$19,200	\$56,700	\$35,400
<b>Total Passenger Facilities</b>	<b>\$127,000</b>	<b>\$65,900</b>	<b>\$93,200</b>	<b>\$286,000</b>	<b>\$139,100</b>
<b>Total Capital Cost</b>	<b>\$842,600</b>	<b>\$784,100</b>	<b>\$679,800</b>	<b>\$2,306,000</b>	<b>\$1,583,800</b>

Source: LKC

Annual costs for each year are shown in **Appendix F**.

### Total Annual Cost of Service

**Table 6.7** shows the total annual cost for service for 2002, 2010, 2020 and 2030. **Table 6.8** shows the total annual costs for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.7**  
**Annual Operating and Capital Costs in Key Years, 2002-2030 (\$2002, in 000s)**

Cost Type	2002	2010	2020	2030
Operating Cost	\$213,400	\$408,500	\$595,600	\$706,800
Capital Cost	\$28,300	\$120,600	\$67,400	\$96,000
Total Cost	\$241,700	\$529,100	\$663,000	\$802,800

Source: LKC

**Table 6.8**  
**Cumulative Operating and Capital Costs, 2002-2030 (\$2002, in 000s)**

Cost	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
Operating	\$2,848,500	\$5,159,800	\$6,640,900	\$14,649,200	\$10,173,100
Capital	\$842,600	\$784,100	\$679,800	\$2,306,000	\$1,583,800
Total	\$3,691,100	\$5,943,900	\$7,320,700	\$16,955,200	\$11,756,900

Source: LKC

Annual total costs for each year are shown in **Appendix F**.

### REVENUE

The costs for services described before are funded through three primary categories of revenue:

- Federal revenue sources
- State revenue sources
- Local revenue sources

A methodology was developed to estimate future funding from each source. The methodology for each source is described below. For detailed, year-to-year revenue estimates, please see **Appendix F**.

## **Federal Revenue Sources**

### Section 5303 Planning

Section 5303 funding is reserved for use in major planning efforts. Currently, MAG receives approximately \$700,000-\$800,000, of which \$225,000 goes to the RPTA. Cities and agencies can request larger apportionments to support major efforts. This methodology assumes the total amount available will grow in proportion to revenue miles of transit service.

### Section 5307 Formula for Capital (includes Maintenance)

Section 5307 funds are apportioned by formula. Funds are intended primarily for capital expenses, but can also be used for maintenance. The baseline (2002) FTA 5307 apportionment was calculated using the 2002 FTA apportionment coefficients for:

- Population
- Population Density
- Revenue Miles of fixed route bus service

The 2002 FTA 5307 apportionment using these factors for the Phoenix urbanized area is about \$26,000,000. Starting in 2003, the Avondale small urban area (which also includes portions of Goodyear and Glendale) also generated 5307 money. From 2003, Avondale generated \$777,000 in 5307 funding. Starting with the release of new census data in 2013, Avondale's population will be included in the population for the Phoenix urbanized area.

Section 5307 funding is recalculated for each decennial Census based on population, density and miles of fixed route service. The base level then stays constant for ten years, with increases due to changes in the total funding available at the Federal level (to account for inflation).

100 percent of the Phoenix and Avondale apportionments is reserved for use in the bus network through 2006. Beginning with the initiation of LRT service in 2007, any additional 5307 funding above 2006 levels is split between bus and LRT in proportion to revenue miles of service (i.e., if bus revenue miles account for 90 percent of total revenue miles, 5307 apportionment for bus would equal the 2006 level+0.90 x the increase since 2006).

Section 5307 dollars are assumed to be split 20 percent for operations and maintenance and 80 percent for capital projects. One hundred percent of the funding reserved for capital expense will be used to fund the bus expansion and replacement program to the maximum required in a given year (assuming 5307 dollars fund 80 percent of the bus costs). The federal share of any bus purchases not funded through 5307 will be funded via Section 5309.

Estimates included in this study do not include rail or bus incentive program funds and do not include funding to support high capacity transit beyond the minimum operable segment of the LRT line.

#### Section 5309 Discretionary Capital

Section 5309 funding is discretionary, meaning funds are applied for to fund specific projects. As such, the amount of funding will vary widely from year to year. Section 5309 funds are assumed to be sufficient to pay for the following projects in each year of the RTS:

- Funds 50 percent of capital costs for maintenance facilities
- Funds 50 percent of capital costs for passenger facilities
- Funds 80 percent of vehicle purchases *beyond those funded through 5307*

Section 5309 funds used to pay for any high capacity projects are not included in this study.

#### Section 5310 Elderly and Persons with Disabilities

The Section 5310 program is a federal grant program administered by the Arizona Department of Transportation (ADOT) to provide assistance to local agencies, which serve persons with special needs. This assistance is provided primarily in the form of new vehicles and related equipment which meet the transportation requirements of seniors and persons with disabilities. This assistance is provided through private non-profit corporations (PNPs), public agencies, and Native American Community agencies. Funding is awarded instead of allocated, so the actual amount available varies each year. For 2002, the Section 5310 funding totaled \$526,000. For 2003, funding was expected to be approximately \$700,000. After 2003, funding is expected to grow at a rate of approximately 5 percent per year (source: Greg Kiely / ADOT).

#### Section 5311 Rural

Section 5311 funding is reserved for capital and operating expenses associated with rural transportation services. Section 5311 funding is by formula based on the rural population of an area. For the purposes of this study, funding is assumed to equal \$2.45 per rural person per year. The rural population is considered to be anyone in the study area outside of the fixed route service area (see Section Five).

Access to funding may be limited by a fare recovery standard of 17 percent. Local funding is used to make up the difference between actual fare recovery (which is typically below 10 percent) and the minimum standard. When local funding is not available to make up the difference, there will be less Federal matching money.

### Congestion Mitigation and Air Quality (CMAQ)

CMAQ funding is distributed to MPOs on a formula basis, depending on population and air quality. MPOs have the option of distributing money for projects on a discretionary basis. Projects funded through CMAQ are not necessarily transit projects.

For 2002, regional CMAQ funding was about \$30 million. Of that, half (\$15 million) was used for transit-related projects. For the purposes of RTS, it is assumed that funding would remain at \$15 million per year through 2005. Thereafter, the amount will increase by 2 percent per year.

### Surface Transportation Program (STP) Funding

STP funding is generally reserved for use on capital projects. Current funding level at \$3 million annually, and this study assumes current funding holds through 2030.

### Total Federal Funding

**Table 6.9** shows the total annual federal funding estimated for 2002, 2010, 2020 and 2030. **Table 6.10** shows the total annual federal funding for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.9**  
**Annual Federal Funding in Key Years, 2002-2030 (\$2002, in 000s)**

Source	2002	2010	2020	2030
5303	\$225	\$612	\$855	\$1,070
5307 Capital	\$21,422	\$18,870	\$26,910	\$35,188
5307 Operating	\$5,355	\$4,718	\$6,728	\$8,797
Total 5307	\$26,777	\$23,588	\$33,638	\$43,985
5309	\$13,562	\$73,959	\$23,660	\$26,956
5310	\$526	\$700	\$700	\$700
5311	\$608	\$871	\$1,132	\$1,901
CMAQ	\$15,000	\$15,000	\$15,000	\$15,000
STP	\$3,000	\$3,000	\$3,000	\$3,000
CDBG	\$0	\$0	\$0	\$0
<b>Total Federal</b>	<b>\$86,475</b>	<b>\$141,317</b>	<b>\$111,624</b>	<b>\$136,598</b>

Source: LKC

**Table 6.10**  
**Cumulative Federal Funding, 2002-2030 (\$2002, in 000s)**

Cost	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
5303	\$3,867	\$7,501	\$9,783	\$21,151	\$14,773
5307 Capital	\$182,937	\$248,384	\$333,706	\$765,027	\$503,809
5307 Op'n	\$45,734	\$62,096	\$83,426	\$191,257	\$125,952
Total 5307	\$228,671	\$310,480	\$417,132	\$956,283	\$629,761
5309	\$394,609	\$311,939	\$142,107	\$848,655	\$609,598
5310	\$6,126	\$7,000	\$7,000	\$20,126	\$14,000
5311	\$6,654	\$10,146	\$15,552	\$32,352	\$20,986
CMAQ	\$135,000	\$150,000	\$150,000	\$435,000	\$300,000
STP	\$27,000	\$30,000	\$30,000	\$87,000	\$60,000
CDBG	\$0	\$0	\$0	\$0	\$0
<b>Total Fed</b>	<b>\$1,030,599</b>	<b>\$1,137,545</b>	<b>\$1,188,706</b>	<b>\$3,356,851</b>	<b>\$2,278,878</b>

Source: LKC

Annual total costs for each year are shown in **Appendix F**.

### State Funding Sources

There is only one state funding source for the transit service. Some state funding for transit is available through the Local Transportation Assistance Fund (LTAF, referred to as LTAF1). The LTAF1 program is funded through state lottery programs. LTAF1 provided \$9.7 million for transit projects in the Phoenix area in fiscal year 2001. LTAF1 funding is assumed to remain constant for the life of the RTS.

**Table 6.11** shows the LTAF1 funding estimated for 2002, 2010, 2020 and 2030. **Table 6.12** shows the total LTAF1 funding for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.11**  
**Annual State Funding in Key Years, 2002-2030 (\$2002, in 000s)**

Source	2002	2010	2020	2030
LTAF1	\$9,700	\$8,252	\$6,743	\$5,509

Source: LKC

**Table 6.12**  
**Cumulative State Funding, 2002-2030 (\$2002, in 000s)**

Cost	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
LTAF1	\$80,632	\$73,970	\$60,439	\$215,041	\$148,695

Source: LKC

## Local Funding Sources

The bulk of transit funding in the Phoenix area is and will continue to be local funding.

### Dedicated Sales Tax

In the communities that use them, the single largest source of transit funding is dedicated sales taxes. This funding plan assumes all sales tax rates will be renewed at the same rate indefinitely and that there will be no new communities with dedicated sales taxes for transit. The following cities have a dedicated transportation sales tax:

- Phoenix (\$0.004)
- Glendale (\$0.005)
- Tempe (\$0.005)
- Mesa (portion of “Quality of Life” sales tax)

Not all sales taxes are available to fund transit service, and funds reserved for transit are not always available for non-high capacity transit. Each city’s sales tax program is described below.

#### *Phoenix*

Phoenix began to collect a \$0.004 sales tax in 2000. Funds collected are reserved for the following programs:

- Bus Service (58 percent)
  - Local bus service (52 percent)
  - BRT (corresponds to the expressway regional service in the RTS) (4 percent)
  - Limited stop service (1 percent)
  - Neighborhood circulator (1 percent)
- Paratransit (Dial-a-Ride) (6 percent)
- Light Rail (34 percent)
- Support Services (2 percent)

Thus, 66 percent of all funding is available for non-HCT projects. In addition, 55 percent of all funding is reserved for capital expenses, while 45 percent is reserved for operating expenses.

Baseline (2002) funding is was reported as \$87.9 million and 2003 funding is expected to be \$87 million. Total annual funding is assumed to grow by 1.5% from 2003 to 2004 and 5.25% thereafter (not including inflation) (source: Jeff Dolfini / Phoenix).

### *Glendale*

Glendale began to collect a \$0.005 sales tax in 2002. Funds collected are reserved for the following programs:

- Fixed route bus (34 percent)
- Paratransit (Dial-a-Ride) (8 percent)
- Light Rail (17 percent)
- Transit Education (TDM) (6 percent)
- Street Improvements (35 percent)

Thus 48 percent of the tax income is available for transit services described in the RTS. Funds are divided 38 percent capital, 62 percent operating.

The fiscal projections presented as the mid-range in the 2003 Go Glendale Annual Report were used to estimate sales tax income through Fiscal Year 2027. For fiscal year 2002 (in which the tax was only collected for 6 months) \$7.7 million was collected via the tax. For 2003, tax income was expected to increase to \$16.5 million. Thereafter, the increase in tax revenue varies by year. After 2027, the tax revenue is expected to increase at the same rate as population increase within the Glendale MPA.

### *Mesa*

Unlike the other sales tax cities, Mesa's sales tax is not dedicated to transportation use. Since 1998, Mesa has collected a "Quality of Life" tax that funds a number of projects in Mesa. Included in these projects are some limited transit projects. Mesa's sales taxes are used to fund operating and capital costs for bus through 2008. After 2008, sales tax proceeds can only be used for operating costs for bus service (local share for LRT will be from the Mesa General fund).

Mesa's sales tax revenue is assumed to grow at the same rate as the population from 2002 to 2007. From 2007 to 2008, the rate drops as a result of phasing out use of the tax for capital expenses.

### *Tempe*

Tempe began to collect a \$0.005 sales tax for transit in 1996. Tempe's sales tax funds are used on an as-needed basis and are not reserved for specific projects. For Fiscal Year 2002, Tempe received \$25.2 million via its transit sales tax. Revenue is expected to grow to \$28.6 million by 2006, and by 2.2 percent per year thereafter (not including inflation). A portion of the Tempe sales tax income is set aside for expensed related to the light rail program.

## General Fund

Many of the communities in the Phoenix area fund transit service out of their general funds. As of April 2003, the following cities had reported their general fund contributions for transit for fiscal year 2002:

- Avondale: \$130,000 (source: Cindy Blackmore / Avondale)
- Buckeye: \$12,261 (source: Joe Blanton / Buckeye)
- Cave Creek: \$0 (source: Usama Abujbarah / Cave Creek)
- Chandler: \$265,000 (source: Mike Normand / Chandler)
- Fountain Hills: \$2,701 (source: Julie Ghetti / FH)
- Gilbert: \$1,325,000 (source: Brian Townsend / Gilbert)
- Glendale: \$900,000 (source: Diane Adams / Glendale)
- Litchfield Park: \$32,000 (source: Horatio Skeete / LP)
- Mesa: \$1,054,000 (source: Donald Miller / Mesa)
- Peoria: \$0 (source: Randy Roberts / Peoria)
- Phoenix: \$27,840,000 (2003), \$26,089,000 (2004), \$29,000,000 (after 2006) (source: Darrel Dennis, Jeff Dolfini / Phoenix)
- Scottsdale: \$2,400,000 (source: Michelle Korf / Scottsdale)
- Surprise: \$0 (source: Daniel Lundberg)
- Tempe: \$0 (source: Carlos deLeon / Tempe)

Unless otherwise noted, general fund contributions are assumed to remain constant (not including inflation) over the life of the RTS.

## Farebox Income

Income generated through passenger fares can be an important source of revenues. Farebox recovery rates were included in the preliminary cost and revenue model presented to the AAG in January 2003. At that time, farebox recovery rates were set at:

- Fixed route (local, circulator, regional fixed route): 20 percent
- Non-fixed route / rural: 10 percent
- Regional service (arterial & expressway): 35 percent
- Vanpool: 100 percent
- Paratransit: 5 percent

By comparison, the Fiscal Year 2002 Performance Management and Analysis System (PMAS) shows the following fare recovery:

- Fixed route (all): 28 percent
- Demand Response: 7 percent
- Vanpool: 100 percent

The lower recovery rates for fixed route service proposed for the RTS are due to two factors:

- Regional services, with a higher recovery rate, were broken out into their own category
- Local service is being offered in less productive areas and at less productive times, resulting in ridership growth being slower than growth in revenue miles of service offered

Note that the proposed farebox recovery rates assume fares remain the same relative to inflation.

#### Arizona State University (ASU) Fee

ASU pays Tempe an annual fee to subsidize the cost of providing FLASH circulator routes in the university area. In 2002, the subsidy equaled \$342,000. The amount of the subsidy was taken from the Central Phoenix / East Valley Light Rail Transit Project Section 5309 Supplemental Report on New Starts and assumes a growth rate of 2.5 percent per year.

#### Advertising

Different cities and transit operators in the Valley Metro system may have different policies for allowing advertising. As of April 2003, advertising revenue was allowable only for Phoenix. In fiscal year 2002 and 2003, Phoenix had the following advertising revenue:

- Bus advertising (2002)- \$1,140,000
- Bus advertising (2003)- \$811,000
- Shelter advertising (2002)- \$337,000
- Shelter advertising (2003)- \$463,000

Beyond 2003, advertising revenue should grow in proportion to the increase in revenue miles of service for local and circulator service.

#### Total Federal Funding

**Table 6.13** shows the total annual local funding estimated for 2002, 2010, 2020 and 2030. **Table 6.14** shows the total local funding for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.13**  
**Annual Local Funding in Key Years, 2002-2030 (\$2002, in 000s)\***

Source	2002	2010	2020	2030
Phoenix Sales Tax	\$87,918	\$120,038	\$200,235	\$334,010
Glendale Sales Tax	\$7,700	\$21,333	\$23,702	\$25,717
Mesa QOL Tax	\$5,402	\$3,851	\$4,424	\$4,657
Tempe Sales Tax	\$15,138	\$18,830	\$25,833	\$35,686
<b>Total Sales Tax</b>	<b>\$116,158</b>	<b>\$164,052</b>	<b>\$254,194</b>	<b>\$400,070</b>
General Fund	\$34,465	\$35,122	\$35,122	\$35,122
Farebox	\$40,498	\$86,193	\$126,946	\$150,679
ASU Fee	\$342	\$417	\$533	\$683
Advertising	\$1,477	\$2,291	\$3,018	\$3,658
<b>Total Local</b>	<b>\$192,941</b>	<b>\$288,074</b>	<b>\$419,814</b>	<b>\$590,212</b>

\* - Does not include RARF  
Source: LKC

**Table 6.14**  
**Cumulative Local Funding, 2002-2030 (\$2002, in 000s)\***

Cost	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
Phoenix Sales Tax	\$899,390	\$1,607,754	\$2,681,888	\$5,189,032	\$3,321,319
Glendale Sales Tax	\$160,292	\$226,112	\$250,858	\$637,262	\$449,030
Mesa QOL Tax	\$37,646	\$41,663	\$45,523	\$124,833	\$82,741
Tempe Sales Tax	\$145,496	\$218,256	\$302,924	\$666,677	\$442,670
<b>Total Sales Tax</b>	<b>\$1,242,824</b>	<b>\$2,093,785</b>	<b>\$3,281,194</b>	<b>\$6,617,803</b>	<b>\$4,295,760</b>
General Fund	\$305,546	\$351,217	\$351,217	\$1,007,979	\$699,523
Farebox	\$578,133	\$1,086,578	\$1,401,875	\$3,066,586	\$2,137,975
ASU Fee	\$3,404	\$4,785	\$6,125	\$14,315	\$9,643
Advertising	\$16,060	\$27,036	\$33,854	\$76,949	\$53,387
<b>Total Local</b>	<b>\$2,145,966</b>	<b>\$3,563,402</b>	<b>\$5,074,264</b>	<b>\$10,783,633</b>	<b>\$7,196,289</b>

\* - Does not include RARF  
Source: LKC

Annual total costs for each year are shown in **Appendix F**.

## Total Annual Revenues

**Table 6.15** shows the total estimated revenue for 2002, 2010, 2020 and 2030. **Table 6.16** shows the total estimated revenue for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025. Neither table includes RARF funding.

**Table 6.15**  
**Annual Estimated Revenue in Key Years, 2002-2030 (\$2002, in 000s)**

Funding Source	2002	2010	2020	2030
Federal	\$86,500	\$141,300	\$111,600	\$136,600
State	\$9,700	\$8,300	\$6,700	\$5,500
Local*	\$192,900	\$288,100	\$419,800	\$590,200
Total	\$289,100	\$437,700	\$538,100	\$732,300

\* - Does not include RARF

Source: LKC

**Table 6.16**  
**Cumulative Revenues, 2002-2030 (\$2002, in 000s)**

Funding Source	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
Federal	\$1,030,600	\$1,137,500	\$1,188,700	\$3,356,900	\$2,388,800
State	\$80,600	\$74,000	\$60,400	\$215,000	\$157,800
Local	\$2,146,000	\$3,563,400	\$5,074,300	\$10,783,600	\$7,419,400
Total	\$3,257,200	\$4,774,900	\$6,323,400	\$14,355,500	\$9,966,000

\* Does not include RARF

Source: LKC

Annual total costs for each year are shown in **Appendix F**.

## Net Costs per Year

**Table 6.17** shows the total estimated shortfall in funding for service for 2002, 2010, 2020 and 2030. **Table 6.18** shows the total estimated shortfall for service for the intervals 2002-2010, 2011-2020, 2021-2030, and 2006-2025.

**Table 6.17**  
**Annual Funding Surplus and (Deficit) in Key Years, 2002-2030 (\$2002, in 000s)**

Year →	2002	2010	2020	2030
Cost	\$259,200	\$534,200	\$641,400	\$783,100
Revenue*	\$289,100	\$437,700	\$538,100	\$732,300
Surplus or (Deficit)	\$29,900	(\$96,500)	(\$103,300)	(\$50,800)

\* - Does not include RARF

Source: LKC

**Table 6.18**  
**Annual Funding Surplus or (Deficit), 2002-2030 (\$2002, in 000s)**

Year →	2002-2010	2011-2020	2021-2030	2002-2030	2006-2025
Cost	\$3,842,400	\$6,294,200	\$7,325,800	\$17,462,200	\$12,186,200
Revenue*	\$3,257,198	\$4,774,917	\$6,323,410	\$14,355,525	\$9,965,954
Surplus or (Deficit)	-\$585,202	-\$1,519,283	-\$1,002,390	-\$3,106,675	-\$2,220,246

\* Does not include RARF

Source: LKC

## CONCLUSIONS

As can be seen from Table 6.18, over the twenty year period that corresponds to the proposed RARF extension, providing a reasonable level of transit service to the Phoenix area will cost in excess of \$2 billion above existing funding levels. In fact, the funding shortfall is understated as Table 6.18 assumes all local funding is available equally to all cities, when in fact local sales taxes are reserved for expenditure within the cities of their collection. Thus, while communities like Phoenix and Tempe who have sales taxes may be able to meet most or all of their individual transit needs through 2025, communities with no local sales taxes may have little or no ability to meet their own needs with existing funding.

Even with the existence of a regional funding source such as the RARF tax, it is unlikely that enough funding will be generated regionally to pay for all the services set out in the 2030 RTS plan. Therefore, those communities for whom local transit service is important will likely need to seriously consider emulating Glendale and enacting their own dedicated local transit funding, presumably through a sales tax or additional set-asides from their general funds.

## **APPENDICES**