MAG Regional Transit Framework

Final Report

January 5, 2010

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REGIONAL TRANSIT FRAMEWORK
FINAL REPORT

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1.0 REGIONAL TRANSIT FRAMEWORK SUMMARY

The Maricopa Association of Government's (MAG) Regional Transit Framework (RTF) is one of several studies that are occurring throughout the State of Arizona to identify future transportation needs. The framework studies are part of the Building a Quality Arizona (BqAZ) planning process, which will serve as input into a comprehensive statewide multi-modal transportation planning framework. Since the initiation of the study in February 2008, the MAG Regional Transit Framework has sought to understand the region's transit needs and deficiencies with the goal of identifying high-leverage transit investments that can attract a significant number of new passengers while improving transit service for existing patrons.

Understanding of the region's transit needs and deficiencies was accomplished through a process that included a review of previous studies; input from the community; an evaluation of the MAG region by external transit peers; and a technical review of regional mobility needs and deficiencies. This chapter provides a summary of the results from the planning process and study conclusions.

1.1 *Review of Previous Studies*

The initial step of the planning process was a technical review of previous and ongoing studies and plans related to transportation and transit in the MAG region. More than 20 documents organized into 6 categories were reviewed to identify their results and conclusions as well as to understand past and current visions for public transit in the region. The categories of documents reviewed include:

- MAG Regional Transportation Plan (includes related studies)
- MAG Area Transportation Framework Studies
- Other Regional Transportation Plans and Studies (includes park-and-ride and bus stop studies, etc.)
- Corridor Studies and Plans
- Local Transit Plans
- Regional Transit Reporting and Surveys

Full documentation of the study review is provided in the *MAG RTF Review & Peer Cities Report*.

1.2 *Public Involvement*

Beginning in February 2008, MAG, Valley Metro Rail Inc. (METRO), and Valley Metro started a comprehensive public outreach process geared toward transit riders and non-transit riders. The goal of this program was to reach a broad range of citizens to obtain feedback on Maricopa County's current transit system and what type of regional transit services the community would like to see through the year 2030 and beyond. Through focus groups, a regional telephone survey, and public open house meetings/presentations, information for the following categories was collected:

- Quality and convenience of existing transit services
- Transit needs and deficiencies
- Connections to activity centers
- Regional origins and destinations
- Transit service modes

Focus Group Quote

"We should be moving ahead a lot faster and it should be more user friendly and we should be doing better than we are now." (Rider, 35+)

1.3 *Peer Region Analysis & Evaluation*

The peer region analysis and evaluation took place in two parts; an analysis of how the MAG regional transit system compares to transit systems in similar regions, and an evaluation of the MAG regional transit system by peers from participating transit planning and operating agencies. The following regions were selected for the peer analysis and evaluation:

1. Atlanta, Georgia (Metropolitan Atlanta Rapid Transit Authority – MARTA)
2. Dallas, Texas (Dallas Area Rapid Transit – DART)
3. Denver, Colorado (Regional Transportation District – RTD)
4. Salt Lake City, Utah (Utah Transit Authority – UTA)
5. San Diego, California (San Diego Association of Governments – SANDAG)
6. Seattle, Washington (Sound Transit)

The primary purpose of including peer regions in this study was to offer a broad perspective on transit service in the MAG region. Peers were selected based on factors such as geographical location, population and population growth trends, age of the existing transit system, land use patterns and plans for system expansion.

The peer region analysis compared population and transit data from the MAG region with data from peer agencies. The MAG region had a slightly higher population density than most of the peer regions (except Salt Lake City), but fell short on funding for transit and the types of transit services provided. The average population per square mile among peer regions in 2006 was 2,932 compared to 4,040 in Phoenix. The average operating expenditure per capita among peer regions was $129.87, compared to $71.10 in Phoenix. Of all the peer regions, Phoenix and Atlanta were the only cities without commuter rail.

Participants from the peer regions evaluated transit in the MAG region and provided a summary report containing observations and recommendations. The Peer Regions Evaluation Summary Report provides a discussion of the benefits of a market-based approach to service, management of multiple transit agencies and providers, and suggestions for paratransit, HOV lanes, and other topics. Key findings of the evaluation are included in Chapter 2.2 of this report.

1.4 *Planning Analysis*

Three regional transit mobility scenarios were formed through input from a technical process based on the identification and evaluation of regional transit deficiencies and needs. The process was comprised of multiple steps including:

- Soliciting stakeholder and focus groups to determine regional transit deficiencies and needs;
- Evaluating existing and planned transit services and capital investments;
- Identifying geographical sub-areas with deficiencies;
- Identifying and analyzing key transit corridors;
- Evaluating and prioritizing transit services; and
- Modeling travel demand.

Eleven regional transit deficiencies were identified during the planning process. The need to address these deficiencies guided decisions throughout the study, as corridors and modes of service were identified and refined. The regional transit deficiencies are identified in **Figure 1**. Additional details regarding the analysis are provided in Chapter 3 of this report and in *MAG RTF Working Paper #3: Existing Transit Services and Deficiencies* and *MAG RTF Working Paper #4: Regional Transit Problem Definition.*

Figure 1: Regional Transit Deficiencies

- **Transit demand exceeding capacity**
- **Limited service expansion**
- **Vehicle and facility shortages**
- **Lack of safe and convenient services**
- **Insufficient project eligibility for discretionary funds**
- **Unserved developed areas**
- **Unserved future growth areas**
- **More broadly dispersed employment**
- **Congested roadways**
- **New transit investments require funding**
- **Economic competitiveness**

Source: MAG/consultant project team

1.5 *Transit Modes*

For this study, six transit modes were identified as service options to meet future regional transit needs. Local transit services are not specifically identified in this study, but such needs are recognized and addressed through local funding allowances. Each mode has unique operating characteristics that apply to different purposes and market types. The transit mode types were assigned to types of corridors depending upon the physical characteristics of the corridor, ease of access for passengers, and typical trip length. **Table 1** provides a comparison of the six transit modes considered. Chapter 5 defines each mode in more detail.

Table 1: Regional Transit Service Modes

Service Mode	Purpose / Market Type	Common Vehicle Type	Corridor Characteristics	Passenger Access
Regional Connector	Regional Access	Fixed route bus	Rural roadways and arterial streets	Selected locations
Supergrid	Regional and local access	Fixed route bus	Arterial Streets	Approximately every quarter-mile
Arterial BRT	Enhanced-speed, high-demand local or regional access	Fixed route bus	Arterial Streets	Approximately every mile
Express Bus	Enhanced-speed, moderate-volume commuter or regional access	Fixed route bus	Mostly freeway	Mainly at park-and-ride facilities and a minimal number of non-parking locations
HCT Peak Period	Higher-speed, high demand regional access	Fixed route bus or rail vehicle	Dedicated guideway	Mainly at park-and-ride facilities and a minimal number of non-parking locations
HCT All day	Higher-speed, high demand regional access	Fixed route bus or rail vehicle	Dedicated guideway	Approximately every half mile to one mile

Source: MAG/consultant project team

1.6 *Regional Transit Framework Scenarios*

Three regional transit scenarios for year 2030 were developed to provide options for improving transit service in the MAG region. Each scenario is based on a level of financial investment and a transit service approach. The scenarios build off of the planned transit investments identified in the 2007 RTP update. Despite lower projected revenues for Proposition 400 transit improvements, the scenarios assume that all projects will be implemented. **Table 2** provides an outline of the Framework scenarios; a complete description is in Chapter 7.

Table 2: Framework Scenario Outline

	Basic Mobility Scenario (I)	Enhanced Mobility Scenario (II)	Transit Choice Scenario (III)
Expansion of ADA Paratransit Service	X	X	X
Regional Paratransit System		X	X
Local Transit Service Improvements		X	X
Expanded Supergrid	X	X	X
Expanded Arterial BRT	X	X	X
Expanded Regional Connector		X	X
Expanded Express Bus	X	X	X
New High-Capacity Transit Peak Period		X	X
New High-Capacity Transit All Day		X	X
Assumed Additional Regional Transit Revenues (2015-2026)*	$0	$4.69 Billion	$12.22 Billion
Assumed Additional Regional Transit Revenues (2027-2030)*	$2.05 Billion	$6.36 Billion	$9.24 Billion
Total Assumed Revenue	$2.05 Billion	$11.05 Billion	$21.46 Billion

Source: HDR Engineering, Inc.
* All local and regional transit funding sources are assumed to remain in place or be extended through 2026. Revenue requirements identified in this report are for the new transit operations and capital investments identified herein. Existing and planned services through FY 2026 are assumed to be supported by existing revenue sources.

1.7 *Sustainable Transit and Development*

Consideration of how the MAG region is developing with respect to the investment in transit service is vital to shaping the region's future and building on the current transit system. Transit oriented development (TOD) helps provide tools to integrate transit into successful regional development. Chapter 9 provides a description of several key elements of TOD, including:

- Transit-supportive land use;
- Policy programs supporting transit;
- Activity centers; and
- Parking and transit access.

1.8 *Future Planning Needs*

Additional studies and planning efforts will be needed as the regional transit system continues to develop. These may include added analysis of the region, as well as the availability of additional funding mechanisms and other transit-related studies. A list of recommended future planning needs are provided in **Table 3** and further addressed in Chapter 10.

Table 3: Recommended Future Planning Actions

Action or Study	Description
Establish a Regional Transit Foundation	Conduct a study to establish a regional transit vision and priorities for planning, programming and operating regional transit services and infrastructure investments. This effort would serve as the basis for transforming the current regional transit system from a collection of services and programs to a market based, regional transit system that more efficiently addresses the needs of regional mobility.
Regional Transit Implementation Plan	Develop a detailed regional transit service implementation plan, based on a transit mobility scenario identified in this report or a combination of the mobility scenarios.
Regional Transit Revenue Opportunities	Conduct a comprehensive analysis of potential revenue sources.
Multimodal Transit Connection Study	Identify potential service and infrastructure needs necessary to support intercity transit service connections.
Regional Park-and-Ride Opportunities Study	Identify potential site locations for future park-and-ride facilities identified in the Regional Transit Framework. The study would also assist in refining capital and operations costs.
Regional Operations and Maintenance Facilities Study	Assess existing and future needs and opportunities for regional operations and maintenance facilities. The study would include facilities to support all modes of public transit in the region and would identify potential opportunities for combining modes at facilities to take advantage of economies of scale.
Corridor Studies	Conduct detailed corridor studies for high-capacity transit alternatives identified in this Framework or in other studies. The studies would identify local feasibility of corridor investments.
Alternative Land Use Scenarios/Transit Oriented Development	Conduct a study to evaluate the impacts of alternative land use scenarios along designated regional transit corridors.

Source: MAG/consultant project team

2.0 PUBLIC INVOLVEMENT

The public involvement program of the Regional Transit Framework was initiated in February 2008. Outreach was geared toward capturing input from a broad range of stakeholders through several outreach methods, including focus groups, telephone surveys, and public meetings and presentations. This chapter provides information on the public outreach and summarizes the input received.

2.1 *Focus Groups*

Two demographically balanced focus groups consisting of 40 total participants were held with local transit riders and non-transit riders to identify attitudes toward transit in the region. Discussion topics included why people use or do not use transit and how transit service investments should be implemented in the future.

Transit riders and non-transit riders had similar thoughts and perceptions of today's transit system and future needs. Community input gathered through the focus group process included:

Perceptions

- Key words to describe initial impressions of the public transit system in the MAG region were "slow," "old," and "prehistoric."
- In comparison, transit systems used by participants when visiting or living in other areas were described as "seamless" or "painless." The systems were easy to use and allow the rider to get "anywhere," at "any time."
- Most transit riders and non-riders are excited and optimistic about light rail service in the region.

Traveling Behavior & Transit Experience

- Non-riders report traveling from 5 miles to nearly 100 miles daily. However, the common theme was that driving offers them the freedom to go where they want, when they want in a way that the current transit system simply cannot match.
- While many transit riders indicated that they use public transit because it is the only option available to them, several choose to use the system because they are able to accomplish what they need to and they enjoy the transit experience.
- The bus schedule and existing routes have a direct impact on rider destinations, as well as the extent to which people use the system.

Barriers and Motivations for Transit Usage

- The burden of planning trips and dealing with substantial wait times is a major hindrance to bus usage among non-riders.
- Riders were most likely to focus on limitations related to operational issues such as the hours the buses are available, lack of frequency, and inadequate routes.
- To encourage transit use, current riders want more buses, more routes, greater frequency, and longer service hours.
- Non-riders are unlikely to consider public transit a viable alternative until the system can offer them a benefit in convenience, speed, and time.

Focus Group Quote

"A lot of times it's inconvenient, because you can't make the connection or you have to wait a long time for the other bus." (Rider, 35+)

Future of Public Transit

- An ideal regional transit system would include more buses, more routes, greater reliability and frequency, and better connectivity with other transportation options.
- Many participants expressed interest in creating more direct/non-stop options to specific high-traffic areas and incorporating smaller circulator buses for the areas between them.

- Recommendations for likely destinations from riders included college campuses, malls, schools, parks, and shopping areas. Non-riders were more likely to suggest destinations such as the airport, downtown in general, work and sporting events.

Transportation Funding

Each focus group ended with each participant being asked to choose between three different future transit service funding scenarios:

- Scenario I: A basic plan that builds on the current transit levels. This plan keeps public costs low while providing service to new areas.
- Scenario II: An intermediate plan that includes the basic improvements from Scenario 1. It also increases bus service and adds additional rail service as well as improved travel in the most heavily used corridors.
- Scenario III: In addition to the improvements from Scenarios 1 and 2, this plan offers new options to those areas with busy and congested roadways. Scenario 3 provides a more comprehensive transit system.

The responses to the question were split between a desire for future funding of Scenario 2 and Scenario 3. All participants agreed that an improved public transportation system is critical for the region in the future. Almost half of the participants indicated that Scenario 2 was a viable choice for them, primarily because they felt it was the scenario most likely to be implemented and/or supported by the public. Those who selected Scenario 3, whether transit riders or non-riders, thought that the region is already behind in developing public transit, and that we must do whatever we can to "catch up" to the region's needs instead of just applying "band-aids."

Focus Group Quote

"Scenario 1 and 2 are essentially the same thing. You're putting a band-aid on it and saying at a less cost we could do this, but it doesn't really solve the problems we've got today, and certainly in 5 or 10 years when more people want to use transit and the systems aren't there to accommodate them isn't going to solve them then." (Rider, 35+)

In addition to the focus groups consisting of transit riders and non-riders, three focus groups were held with the organization *Arizona Bridge to Independent Living* (ABIL). ABIL's mission is "to empower people with disabilities to live independent lifestyles". Thirteen total attendees provided feedback on their transit usage, the current transit system, and enhancements for the future. Comments received through the ABIL focus groups were similar to those of the transit riders and non-riders, but there was more focus on providing improved paratransit services for persons with disabilities.

2.2 *Telephone Surveys*

WestGroup Research of Phoenix was commissioned to conduct a telephone survey of residents in Maricopa County who do not currently use transit regularly. The purpose of the survey was to assess attitudes toward public transit and identify factors that might influence transit usage in the future. Key findings from the survey of 400 participants include:

Perceptions

- Approximately four in five non-riders (78%) have used public transit in other cities. These people primarily cite speed and convenience as the appealing aspects of those systems. It takes them wherever they want to go (26%), without much of a wait (25%) and overall is convenient (24%) and fast (20%).
- Only about one-third of all non-riders with an opinion rate the public transit system in Maricopa County highly: 31% give it a 4 or 5 rating, where "5" means excellent and "1" poor. Two in five (39%) non-riders give the transit system low ratings (17% rate it 1 and 22% rate it 2). Not

enough routes is the main reason why non-riders who have used transit in other cities rate public transit worse in the MAG region (44%). They also mention that transit in Maricopa County is not frequent enough (21%) and that it takes too long to get to their destination (16%).

- Non-riders paint a picture of an ideal transit system that is comprehensive and convenient. Specifically, non-riders think it should include light rail service (16%), expansion of transit service region-wide (16%), frequent service (14%), more light rail than already planned (14%) and an expansion of bus service (11%).

Reactions to Transit Options and Elements

- Four in five non-riders (80%) indicate that local buses are important to the Maricopa County transit system (57% rated it 5 and 22% rated it 4). Express buses and commuter trains also receive high importance ratings (76% and 74%). Nearly two-thirds (64%) feel that light rail service is important in Maricopa County.
- Direct routes, speed and frequency of service are the top three elements that will affect whether a non-rider uses public transit in the future.

Conclusions

1. Non-transit riders in Maricopa County clearly feel that the current transit system is inadequate, in and of itself, but also in comparison to transit systems in other cities. The key issues appear to be speed and convenience. Other systems allow residents and visitors to use transit without wasting excessive time, and serve more areas with greater speed and frequency. In addition to the perceived lack of services in the county, there appears to be an increased desire for improved transit services because of the increase in the price of gasoline (survey was conducted in summer 2008, gas prices were approximately $4.00/gallon).
2. The ideal transit system would not only offer the speed and convenience of other systems, but also include several elements working together (i.e., buses, light rail, commuter rail) to provide transit service throughout the county.
3. Interestingly, while non-riders indicate that local and express bus service are important components of the local transit system, they are more likely to use other components (light rail and commuter rail) from the suburbs to the central city. This is consistent with other studies: non-riders understand the necessity of local bus service, but they are more attracted to the more "glitzy" or "upscale" light rail and commuter trains.
4. Finally, non-riders understand that a financial investment needs to be made to expand the public transit system in Maricopa County. Most also appear to believe that the investment must go beyond basic improvements to include system expansion and new services. This is consistent with the focus group findings. Residents understand the need for expansion, but are cautious about the level of financial investment that they are willing to support until they have seen the benefits of improved service to the community.

2.3 *Public Meetings & Presentations*

Twelve public meetings and one webinar was held throughout the planning process between June 2008 and June 2009 at key project milestones. Opportunities were provided for the public to speak one-on-one with project staff. Large maps, display boards and fact sheets were provided so that meeting attendees could visually identify areas they were most concerned about and where they would like to see transit service improved. Additional input was collected on comment forms. Key messages received through the public meeting process were similar to the input received through focus groups and the telephone survey, including:

- Bus service frequency and hours of operation are too limited;
- Light rail and express bus service needs to be expanded to more areas; and
- The region needs more park-and-ride lots with more buses to reduce overcrowding.

3.0 PEER REGIONS REVIEW AND EVALUATION

The study team conducted a quantitative review and evaluation of six peer regions, while a panel of transit professionals from these regions provided a more qualitative evaluation of transit in the MAG region. The peer region review and evaluation revealed that the MAG region is significantly behind its peers in the level of service provided, funding, and other factors. Chapters 3.1 and 3.2 summarize the quantitative comparison between the MAG region and its peers as well as the evaluation by peer professionals. The *MAG RTF Peer Region Evaluation Report* has the full review and evaluation results.

3.1 *Review of Peer Regions*

Six peer regions were reviewed to identify how the MAG region's transit system compares to transit systems in similar regions. Elements such as existing transit service, population density, funding, major ballot initiatives, fares, transit patronage, operating expenses, and future transit service were reviewed. The peer regions chosen for this evaluation are:

1. Atlanta, Georgia (Metropolitan Atlanta Rapid Transit Authority – MARTA)
2. Dallas, Texas (Dallas Area Rapid Transit – DART)
3. Denver, Colorado (Regional Transportation District – RTD)
4. Salt Lake City, Utah (Utah Transit Authority – UTA)
5. San Diego, California (San Diego Association of Governments – SANDAG)
6. Seattle, Washington (Sound Transit)

Table 4 compares Urbanized Area (UZA) densities for Phoenix and the six peer regions, and lists the modes operated in each region. UZAs were used instead of Metropolitan Statistical Areas to calculate densities in each region because the majority of transit modes operate in urban areas rather than the entire county, which usually has a mix of urban and rural areas. The Salt Lake City UZA had the highest density per square mile, followed by Phoenix and Denver. All three of these regions had approximately 4,000 persons per square mile in 2006. Atlanta had the lowest density, with approximately 2,000 persons per square mile.

Table 4: Comparison of UZA Densities for Peer Regions

Region	State	2006 Urbanized Area (UZA) Population[1,2]	2000 UZA Land Area (sq mi)[1]	Density per Square Mile of UZA	Regional Modes Operated
MAG	AZ	3,228,000	799	4,040	• Arterial Bus Rapid Transit (December 2008) • Demand Response • Freeway Bus Rapid Transit (RAPID service) • Light Rail Transit (December 2008) • Local/Express Bus • Vanpool
Atlanta	GA	4,051,000	1,963	2,064	• Demand Response • Heavy Rail Transit • Local/Express Bus • Vanpool
Dallas	TX	4,809,000	1,529	3,145	• Demand Response • Light Rail Transit • Local/Express Bus • Vanpool • Commuter Rail
Denver	CO	2,316,000	585	3,959	• Demand Response • Local/Express Bus • Vanpool • Light Rail Transit • Commuter Rail (under construction)

Region	State	2006 Urbanized Area (UZA) Population[1,2]	2000 UZA Land Area (sq mi)[1]	Density per Square Mile of UZA	Regional Modes Operated
Salt Lake City	UT	945,000	231	4,091	• Demand Response • Light Rail Transit • Local/Express Bus • Vanpool • Commuter Rail
San Diego	CA	2,722,000	782	3,481	• Demand Response • Light Rail Transit • Local/Express Bus • Vanpool • Commuter Rail
Seattle[3]	WA	2,875,000	954	3,014	• Demand Response • Light Rail Transit • Local/Express Bus • Vanpool • Commuter Rail • Ferryboat • Monorail

[1]Source: U.S. Census Bureau – "American FactFinder: 2006 Community Survey Population." 2006. http://factfinder.census.gov
[2]Note: Data for Dallas is 2006 data, while Denton is 2000 data.
[3]Note: Data for ferryboat services are omitted because the data is not applicable for comparison to other peer regions. Calculation for determining Seattle's density includes large uninhabited bodies of water.

Table 5 identifies the 2006 annual ridership (unlinked trips) in the MAG region and each peer region. Annual trips per person for the "Bus/Rail" or "Bus" mode range from 17.73 (Dallas) to 48.19 (Seattle). The Dallas and MAG regions have the fewest passenger trips per population, while the remaining regions have more than 30 trips per person. Annual trips per person for other modes (demand response, vanpool) range from 0.35 (Atlanta) to 2.12 (Seattle). The Seattle and Salt Lake City regions have the highest demand response and vanpool ridership per person.

Table 4 also includes the total operating expenditures (total and per person) for each UZA. These expenditures range from $71.09 per capita in the MAG region to a high of $259.58 per capita in the Seattle area, which also has the highest total reported ridership.

Passenger boardings and operating expenditures by urbanized area vary greatly, with Phoenix ranking near the bottom of both categories. Only the Dallas region has fewer transit trips per person (18.20 boardings per person versus 19.93). Comparing operating expenditures per capita, Phoenix expends the least money on transit operations.

Table 5: 2006 Ridership and Operating Expenses by UZA Population

Region	State	UZA Population[1,3]	Transit Agencies in UZA[2]	Mode[4]	2006 Ridership (NTD 2006 Reporting-Annual Unlinked Trips)[2]	Ridership per UZA Population	Operating Expenditures[5] Total and per UZA Population
MAG	AZ	3,228,000	- Valley Metro - Phoenix Public Transit - Glendale Transit - Tempe In Motion - Phoenix-VPSI, Inc. - SCAT - MCHSD - Peoria Transit - Surprise Dial-A-Ride	Bus	62,270,000	19.29	$229,487,781 $71.09/capita
				Demand Response/ Vanpool	2,061,000	0.64	
				Total	64,331,000	19.93	
Atlanta	GA	4,051,000	- MARTA	Bus/Rail	147,128,000	36.32	$349,054,540

Region	State	UZA Population[1,3]	Transit Agencies in UZA[2]	Mode[4]	2006 Ridership (NTD 2006 Reporting-Annual Unlinked Trips)[2]	Ridership per UZA Population	Operating Expenditures[5] Total and per UZA Population
			- GRTA - Marietta-VPSI, Inc. - CCT - City of Canton Transit - Gwinnett County Board of Commissioners - Douglas County Rideshare	Demand Response/ Vanpool	1,415,000	0.35	$86.17/capita
				Total	148,543,000	36.67	
Dallas	TX	4,809,000	- DART - The T - Handitran Special Transit Division - Dallas-VPSI, Inc. - ATC - Grand Connection - MTED - DCTA	Bus/Rail	85,265,000	17.73	$420,706,983 $87.48/capita
				Demand Response/ Vanpool	2,242,000	0.47	
				Total	87,507,000	18.20	
Denver	CO	2,316,000	- Regional Transportation District-Denver	Bus/Rail	85,301,000	36.83	$320,088,805 $138.21/capita
				Demand Response/ Vanpool	1,271,000	0.55	
				Total	86,572,000	37.38	
Salt Lake City	UT	945,000	- UTA	Bus/Rail	36,802,000	38.94	$136,824,235 $144.79/capita
				Demand Response/ Vanpool	1,793,000	1.90	
				Total	38,595,000	40.84	
San Diego	CA	2,722,000	- SDMTS - SANDAG - NCTD - NCT - CVT	Bus/Rail	93,721,000	34.43	$264,244,089 $97.08/capita
				Demand Response/ Vanpool	2,375,000	0.87	
				Total	96,096,000	35.30	
Seattle[6]	WA	2,875,000	- King County Metro - Sound Transit - Pierce Transit - Community Transit - Everett Transit - Senior Services - Seattle Center Monorail Transit (City of Seattle) - Washington State Ferries - Pierce County Ferry	Bus/Rail	138,539,000	48.19	$746,301,825 $259.58/capita
				Demand Response/ Vanpool	6,099,000	2.12	
				Total	144,638,000	50.31	

[1]Source: U.S. Census Bureau – "American FactFinder: 2006 Community Survey Population." 2006. http://factfinder.census.gov
[2]Source: Federal Transit Administration – "National Transit Database: 2006 Transit Profiles." 2006.
[3]Note: Data for Dallas is 2006 data, while Denton is 2000 data.
[4]Note: Under Mode, "Other" equals the sum of Demand Response and Vanpool ridership.
[5]Note: Operating Expenses reported as a total of all major transit agencies in the UZA and based on "National Transit Database: 2006 Transit Profiles." 2006. Operating expenses include the following categories: Salary, Wages, and Benefits; Materials and Supplies; Purchased Transportation; and Other Operating Expenses.
[6]Note: Data for ferryboat services are omitted because the data is not applicable for comparison to other peer regions. Calculation for determining Seattle's density includes large uninhabited bodies of water.

Table 6 provides a comparison of revenue miles per capita with transit trips per capita by region. Based on the (aggregate) average revenue miles per capita, Phoenix, Atlanta, and Dallas all fall below the average of 18.6; but of these regions, Atlanta has more than the average trips per capita. As shown in **Table 5**, these regions also spend the least per capita for transit operations.

Table 6: Revenue Miles/Capita & Ridership/Capita by Peer Region

Region	State	Regional Modes Operated	2006 Urbanized Area (UZA) Population[1,3]	2006 Annual Revenue Miles[2]	Revenue Miles per Capita	2006 Annual Ridership[2]	Ridership per Capita
MAG	AZ	• Bus • Demand Response • Vanpool	3,228,000	40,444,000	12.53	64,331,000	19.93
Atlanta	GA	• Bus • Heavy Rail • Demand Response • Vanpool	4,051,000	60,437,000	14.92	148,543,000	36.67
Dallas	TX	• Bus • Light Rail • Commuter Rail • Demand Response • Vanpool	4,809,000	55,611,000	11.56	87,507,000	18.20
Denver	CO	• Bus • Light Rail • Demand Response • Vanpool	2,316,000	54,028,000	23.33	86,572,000	37.38
Salt Lake City	UT	• Bus • Light Rail • Demand Response • Vanpool	945,000	30,188,000	31.94	38,595,000	40.84
San Diego	CA	• Bus • Demand Response • Commuter Rail • Vanpool • Light Rail	2,722,000	54,385,000	19.98	96,096,000	35.30
Seattle[4]	WA	• Bus • Demand Response • Vanpool • Monorail • Ferryboat • Commuter Rail • Light Rail	2,875,000	93,522,000	32.53	144,638,000	50.31
Average			2,992,286	55,516,428	21.00	95,183,143	34.10

[1]Source: U.S. Census Bureau – "American FactFinder: 2006 Community Survey Population." 2006. http://factfinder.census.gov
[2]Source: Federal Transit Administration – "National Transit Database: 2006 Transit Profiles." 2006.
[3]Note: Data for Dallas is 2006 data, while Denton is 2000 data.
[4]Note: Data for ferryboat services are omitted because the data is not applicable for comparison to other peer regions. Calculation for determining Seattle's density includes large uninhabited bodies of water.

The number of transit vehicles operated in a region is an indicator of the overall level of investment, while the number of transit guideway miles serves as an indicator of a region's capital investment. **Table 7** shows the number of vehicles available for maximum service by mode (2006), and **Table 8** shows the fixed guideway directional miles by mode (2006).

Table 7: 2006 Vehicles Available for Maximum Service by Mode

Region	Bus	Trolleybus	Light Rail	Heavy Rail	Commuter Rail	Monorail	Total
MAG[1]	762	0	0	0	0	0	762
Atlanta	855	0	0	276	0	0	1,131
Dallas	941	0	107	0	53	0	1,101
Denver	1,179	0	83	0	0	0	1,262
Salt Lake City[2]	517	0	53	0	11	0	581
San Diego	756	0	102	0	35	0	893

Region	Bus	Trolleybus	Light Rail	Heavy Rail	Commuter Rail	Monorail	Total
Seattle[3]	1,875	161	3	0	69	8	2,116
Average	984	23	50	39	24	1	1,121

Source: Federal Transit Administration – "National Transit Database: 2006 Transit Profiles." 2006.
[1]Light Rail in the MAG region is scheduled to commence in December 2008.
[2]Commuter Rail service in Salt Lake City Region commenced operations in April 2008.
[3]Note: Data for ferryboat services are omitted because the data is not applicable for comparison to other peer regions. Calculation for determining Seattle's density includes large uninhabited bodies of water.

Table 8: 2006 Fixed Guideway Directional Miles by Mode

Region	Bus	Trolleybus	Light Rail	Heavy Rail	Commuter Rail	Monorail	Total	Total Fixed Guideway Miles Per 100,000 People
MAG[1]	170.9	0.0	0.0	0.0	0.0	0.0	170.9	5.29
Atlanta	114.6	0.0	0.0	96.1	0.0	0.0	210.7	5.20
Dallas	75.0	0.0	87.7	0.0	69.5	0.0	232.2	4.83
Denver	50.7	0.0	70.0	0.0	0.0	0.0	120.7	5.21
Salt Lake City[2]	46.0	0.0	37.3	0.0	44.0	0.0	127.3	13.47
San Diego	16.6	0.0	108.4	0.0	82.2	0.0	207.2	7.61
Seattle[3]	602.4	116.0	3.6	0.0	146.9	1.8	870.7	30.29
Average	153.7	16.6	43.9	13.7	28.0	0.3	277.1	10.27

Source: Federal Transit Administration – "National Transit Database: 2006 Transit Profiles." 2006.
[1]Light Rail in the MAG region is scheduled to commence in December 2008
[2]Commuter Rail service in Salt Lake City Region commenced operations in April 2008
[3]Note: Data for ferryboat services are omitted because the data is not applicable for comparison to other peer regions. Calculation for determining Seattle's density includes large uninhabited bodies of water.

In reviewing how peer regions fund transit services, several common revenue sources were identified. Local or regional sales taxes are a primary source in many regions. Other revenue sources include motor vehicle sales taxes, motor vehicle excise taxes, and rental car taxes. Four of the six peer regions have local or regional dedicated transit sales tax rates that are higher percentages than what is currently collected in any local jurisdiction in the MAG region. **Table 9** compares regional funding sources.

Table 9: Peer Region Major Sources of Regional Funding

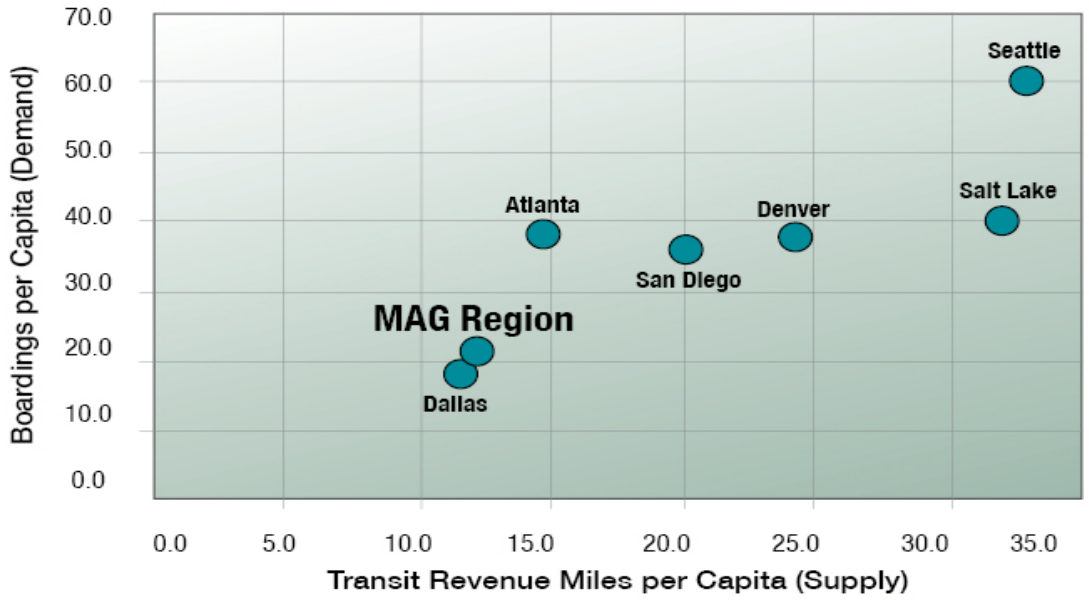
Region	State	Major Source of Regional Funding (excluding fare revenue)
MAG	AZ	Regional Sales Tax (approximately 0.17% percent for transit split between bus and HCT) Local Sales Tax-City of Phoenix (0.40%) Local Sales Tax-City of Tempe (0.50%) Local Sales Tax-Glendale, Peoria and Scottsdale (varies)
Atlanta	GA	Local Sales Tax - (1.00%)
Dallas[1]	TX	Regional Sales Tax - (1.00%)
Denver	CO	Local Sales Tax - (1.00%)
Salt Lake City	UT	Sales Tax - (0.25%) MVST- (0.30%) Rental Car Tax - (0.80%)
San Diego	CA	State Sales Tax - (0.25%) Local Sales Tax - (0.167%)

Region	State	Major Source of Regional Funding (excluding fare revenue)
Seattle[2]	WA	Local Sales Tax-King County - (0.80%) Regional Sales Tax - (0.40%) MVET Tax-Regional - (0.30%)

MVST=Motor Vehicle Sales Tax
MVET = Motor Vehicle Excise Tax
[1] Excludes Fort Worth
[2] In November 2008 Seattle region residents approved an additional 0.5 percent local (regional) sales tax for expanded regional transit services.

The supply of transit service in the peer regions ranges from approximately 30.2 million annual revenue miles in Salt Lake City to 93.5 million in Seattle. The amount of transit service consumed (demand) ranges from 38.6 million annual boardings in Salt Lake City to 144.6 million in Seattle. In general, the peer regions that generate the greatest ridership per capita provide higher levels of service than the other peers. **Figure 2** shows the relationship of revenue miles supplied per capita and ridership per capita.

Figure 2: Comparison of Transit Supply and Demand by UZA



Source: Federal Transit Administration – "National Transit Database: 2006 Transit Profiles." 2006.

3.2 *Peer Panelists' Evaluation of the MAG region's Transit System*

The Peer Region Evaluation was conducted in 2008 by transit executives and management staff affiliated with transit planning and operating agencies in the six peer regions. The evaluation process was conducted through telephone conferences and an independent review of documents that provided the panelists with information on the existing transit system, funding initiatives, ridership, and planned expansion in the MAG region. The evaluation consisted of peer region discussions and recommendations on the following topics:

- Regional transit funding;
- Transit service levels;

- Light rail service;
- Paratransit service; and
- High occupancy vehicle (HOV) lanes.

The evaluation provided an important dimension to the MAG RTF because the panel had the advantages of a broad perspective and drawing from lessons learned in their own regions. The information gathered from the evaluation was incorporated into the framework conclusions.

"Our vision is very aggressive... [the vision] in the next 30 years is to have most of the population in the Wasatch Front within one mile of a major transit station. "

Mike Allegra
Utah Transit Authority

The panelists noted similarities between the MAG regional transit funding process and their own experiences with multiple jurisdictions, planning organizations, and regional service providers. Panelists agreed that it is important to maintain good relationships between organizations to facilitate funding discussions. The group recommended that a Metropolitan Planning Organization (MPO) should prioritize transit service and facility funding. In addition, the panelists suggested that policy boards, with transit-savvy members, are important for setting regional funding priorities.

Panelists recommended a market-based approach to transit service levels by targeting transit service to areas of demand, choice riders, and higher population and employment densities. To successfully develop a market-based approach, panelists recommended strengthening the relationship between land use and transit ridership and implementing local policies that support transit use. Participants cautioned that a market-based approach must be re-evaluated and adjusted routinely according to service standards, policies and performance-based criteria. Peer regions such as Denver have had success in adopting a market-based approach to transit service levels through consolidating local services to support regional transportation goals, which results in more efficiency.

"By having decision making focused in one area, [SDMTS] was able to make huge strides in productivity, ridership, and effectiveness of the whole system."

Paul Jablonski, CEO
San Diego Metropolitan Transit System

The panel's discussion focused on the MAG region's lack of a comprehensive transit service plan to integrate bus with the region's light rail starter line. One of the most important aspects of adding a new high-capacity transit service to an existing system is the ability to connect multiple modes. According to the panel, the ability to provide timed transfers through the coordination of headways to ensure convenience and regional connectivity is an important characteristic of an efficient system. Transit modes need to be planned in an integrated fashion to maintain ridership. The restructuring process also includes the ability to reduce duplication of service, as well as to provide support from existing routes for the new high-capacity option. The region's ability to restructure and sometimes eliminate existing routes to complement the high-capacity service will contribute to the development of an efficient and effective system.

The evaluation resulted in several additional recommendations to MAG concerning regional paratransit service and HOV lane operations. Drawing from lessons learned from their own experiences with multiple paratransit service providers, panel members recommended that MAG implement a centralized reservation system. Suggested HOV lane operational improvements included converting HOV lanes to High Occupancy Toll (HOT) lanes, increasing minimum HOV lane vehicle occupancy from two to three people, and applying techniques such as variable passenger fares for transit services operating in HOV lanes with congestion pricing.

Comments and recommendations provided by the panelists helped MAG identify the region's transit deficiencies and formulate conclusions of the study. Full results of the peer region evaluation are identified in the *MAG RTF Peer Region Evaluation Report.*

4.0 ANALYSIS OF REGIONAL TRANSIT DEFICIENCIES AND NEEDS

The primary goal of the MAG RTF is to identify future regional investments capable of increasing the transit market share in high-demand corridors by addressing regional transportation needs. The success of this market-based approach depends on determining the factors that affect mode choice, and on a thorough understanding of the relationships between transit, land use, local plans and policies, and other transportation planning efforts. The study is intended to identify a set of improvements designed to (1) capture new transit riders, and (2) improve transit service for existing customers.

Through stakeholder input and a technical analysis of socioeconomic, regional travel demand, and transit performance data, regional transit needs and deficiencies were identified. This chapter summarizes the conclusions drawn from the analysis of needs and deficiencies. Additional details of the analysis are identified in *MAG RTF Working Paper #3: Existing Transit Services and Deficiencies* and in *Working Paper #4: Regional Transit Problem Definition*.

4.1 Basic Deficiencies

4.1.1 Service Area Coverage

Overlaying the RTP transit service map on a 2009 road map of the region clearly reveals large gaps in transit service coverage. These gaps become larger and more prevalent as one moves outward from the current regional core. Population projections indicate that growth will increasingly occur in areas outside the SR 101 and SR 202 freeways; areas that currently have little or no existing or funded public transportation services. The funded RTP transit service will allow modest expansion of the area served by transit, but will pay for limited improvements to operating hours or service frequencies.

Transit service to newly developing employment centers is also important. Employment locations will become more widely dispersed throughout much of Maricopa County by 2030. Using public transit to connect residents with newly developing activity and employment centers could provide benefits that include reduced requirements for parking, reduced congestion, and may encourage regional economic competitiveness through a more comprehensive transportation system. Some employers have shown interest in locating work sites in areas that have strong public transportation services. Quentin D. Dastugue of the Intermodal Transportation Council of the New Orleans Regional Chamber of Commerce states that "Capital investment historically creates jobs in any industry, but it's even more pronounced in public transportation because of the vast number of businesses directly impacted. Movement of a company's number one assets, its employees, is as critical of an investment as dollars spent on marketing to your customers." (National Business Coalition for Rapid Transit. “The Economic Importance of Public Transit”. November 3, 2003).

MAG projects that population will both continue to grow toward the edges of the region and increase around many currently developed areas. Countywide population density is projected to increase from 457 persons per square mile in 2010 to 665 in 2030, indicating substantial infill development as well as expansion of the urbanized area. A similar pattern will apply to employment growth, but employment is not projected to spread as far or as fast as population in the undeveloped parts of the region. This growth pattern will tend to increase the geographic imbalance between jobs and people.

Population and employment growth will occur in areas that do not currently have funded transit service improvements. **Figures 3** and **4** illustrate projected change in population and employment from 2005 to 2030. They also depict the year 2030 funded transit network. These maps show at a glance that RTP-funded growth of the transit system to 2030 will not even come close to keeping up with rapidly increasing population and employment on the urban fringes. This observation was also corroborated by the peer review panel’s findings.

While travel demand between the central area of the region and suburban areas will remain strong between now and 2030, new regional travel demand patterns (e.g., between large suburban activity centers) will emerge. Travel demand is expected to grow the greatest in the following areas:

- West of SR 303 along the I-10 corridor beyond the White Tank Mountains as far as Buckeye
- Between SR 303, SR 101 (Agua Fria Freeway), I-10 and Bell Road
- Southeast corner of the county (to East Valley locations)

Figures 5 and **6** illustrate the estimated daily travel demand by Transit Influence Zone (TIZ), demand is measured in person trips, whether originating or terminating in the zone. Again, much of the 2030 travel demand will occur outside the transit service areas shown in the RTP.

4.1.2 Passenger Convenience (Including Speed, Frequency and Hours of Service)

Passenger convenience is a major type of regional transit deficiency. Choice riders will not generally use an inconvenient system. To many participants in the Framework Study focus groups and telephone survey, inconvenience is defined as excessive travel times and long waits in the heat, limited coverage and hours of service. Deficiencies in passenger convenience can also include missing or inconsistent safety elements, such as lighting and crosswalks at transit stops. Amenities such as shaded passenger waiting areas, seating, sidewalks and trash cans are not available at many transit stops. Some elements, such as real-time vehicle arrival information and bicycle parking, are available at few locations. Newer services such as the Central Phoenix/East Valley LRT and Phoenix RAPID have been designed for greater convenience, and as a result have attracted many choice riders. They offer:

- Attractive and comfortable waiting areas with seating and other passenger amenities, including real-time travel information and art at some locations.
- Frequent service: 10- to 20-minute frequencies on light rail; up to 24 trips per four-hour peak period on RAPID.
- Generous hours of operation: at least 19 hours a day on LRT.
- Higher travel speeds: freeway/HOV lane operation on RAPID; exclusive guideway, signal priority, limited stops and off-line fare collection on LRT.
- Light rail and other fixed-guideway operations have been shown to potentially attract passengers through a combination of actual and user perceived benefits. Data from the 2009 METRO LRT On-Board Survey indicated that rail passengers have potentially different motives than bus passengers. For example, 35% of those surveyed never used transit the year before and 49% surveyed used METRO after 4pm compared to only 23% of bus riders.

Overcrowding is an issue on some routes, including express services that lack the passenger turnover of local routes. Congestion on roadways is also a passenger convenience issue, as increased traffic results in delays for transit riders along with everyone else. Freeway congestion is a particular problem on HOV lanes that the express buses use. Decreased satisfaction may result in reduced ridership and fewer choice riders. Funds to add vehicles or trips during peak hours are scarce.

Publicly-owned park-and-ride facilities offer amenities such as security, water fountains, shaded waiting areas and covered parking. Recently, two park-and-ride lots serving the Phoenix RAPID freeway BRT were filled to over 90 percent of capacity during nine of the ten months monitored. There are also concerns that the demand for parking at LRT stations will eventually exceed the supply. Again, the RTP offers only limited funds for park-and-ride expansion where the need is greatest.

Demand response service has different providers in different cities, which results in non-uniform fares, varying hours of operation and inconsistent eligibility requirements. The non-uniformity of the service between jurisdictions results in confusion and time-consuming transfers for riders. Even passengers who

are eligible for ADA-mandated service may have to transfer between vehicles at municipal boundaries, although they pay only a single fare when they begin the first leg of their trip.

4.1.3 Funding Limitations

These deficiencies are ultimately traceable to a lack of sufficient capital and operating funds to meet the transit needs of the MAG region. Proposition 400 provides funding through the RTP for a minimal expansion of the regional transit service area and basic service levels for most routes. In general, Supergrid routes (i.e., regional fixed route bus service operating on arterial streets) have service every 30 minutes all day, except where cities provide funding for greater frequencies. Some Supergrid routes will have 15-minute service during peak periods for only three to four hours a day. Other local bus routes, however, will continue to operate with low frequencies (more than 30 minutes between buses), limited hours of operation and no Sunday service, unless additional local or regional funding can be found. Only one of the five arterial BRT routes is funded sufficiently to provide more than 48 trips per weekday.

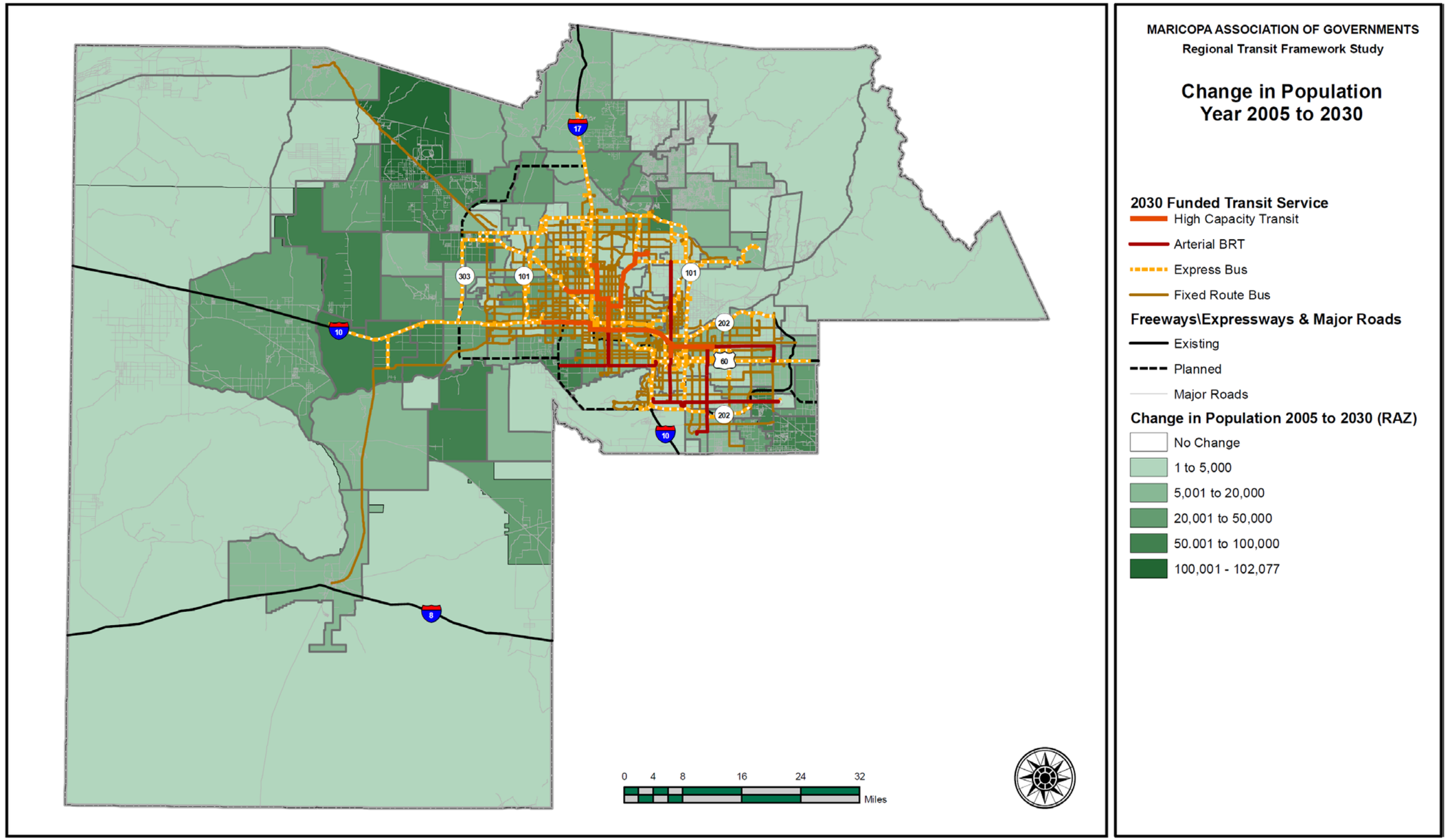
Many local bus routes are funded by individual jurisdictions (cities and towns). This hinders the development of inter-jurisdictional bus routes because of unbalanced funding: some cities have a dedicated transit funding source and some do not. This imbalance of funds limits the ability of transit riders to travel seamlessly or even make efficient connections from one part of the metropolitan area to another.

Some RTP-funded transit services are insufficient to qualify for special discretionary federal funding opportunities. For example, only one of the five programmed arterial BRT routes will meet provide enough service to qualify for Very Small Starts funding. Access to new revenue opportunities and sources may be reduced in the future by the lack of sufficient financial resources to match grants available under other federal transit programs. Discretionary funding is awarded by the U.S. Secretary of Transportation (not by formula based on the population or other characteristics of the region). Very Small Starts is a capital investment grant program of the Federal Transit Administration (FTA) for bus and rail projects that meet specified criteria, such as: transit stations, signal priority, service operating at least every 10 to 15 minutes for 14 or more hours a day, existing daily corridor ridership exceeding 3,000, and a total cost of less than $50 million.

Capital improvements funded by Proposition 400 will not meet the full demand for planned transit service expansion. Some elements of the capital program, including operations and maintenance facilities, will be inadequate to serve programmed future transit operations. Some park-and-ride lots are already exceeding capacity and regional funding levels for proposed lots may not be adequate in the future. The RTP funds minimal expansion of the regional paratransit fleet and no expansion of the regional fixed route fleet for routes not already included in the RTP. Local or other revenue sources will be needed to pay for vehicles to serve any new, non-RTP funded routes.

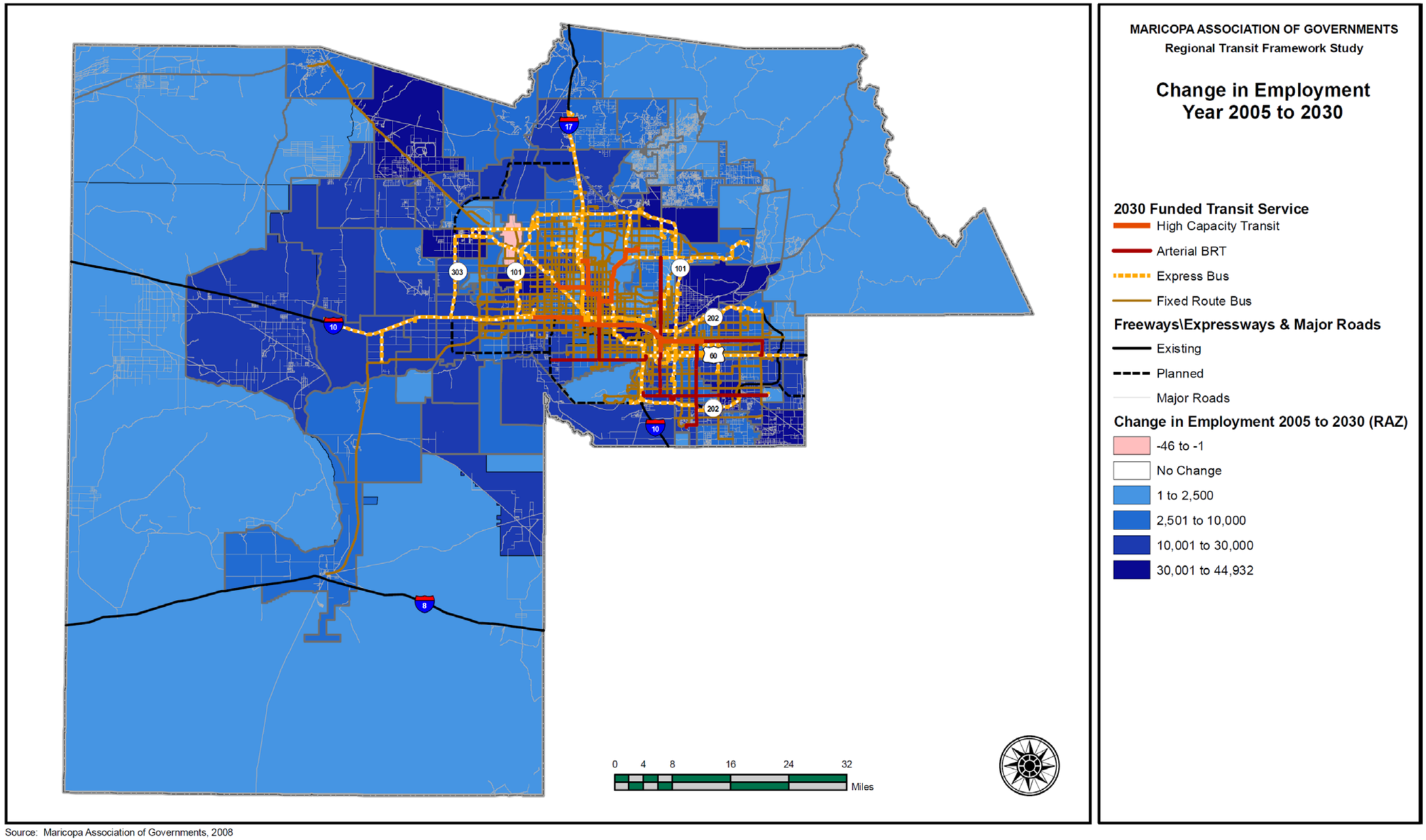
Balancing local transportation interests with regional needs will be essential in delivering future transit services. New revenue sources will be necessary if the region intends to meet growing demand by increasing regional transit investment. Some existing local funding sources (e.g., the 0.4% Transit 2000 sales tax in Phoenix) expire as early as 2020.

Figure 3: Change in Population from Year 2000 to Year 2030



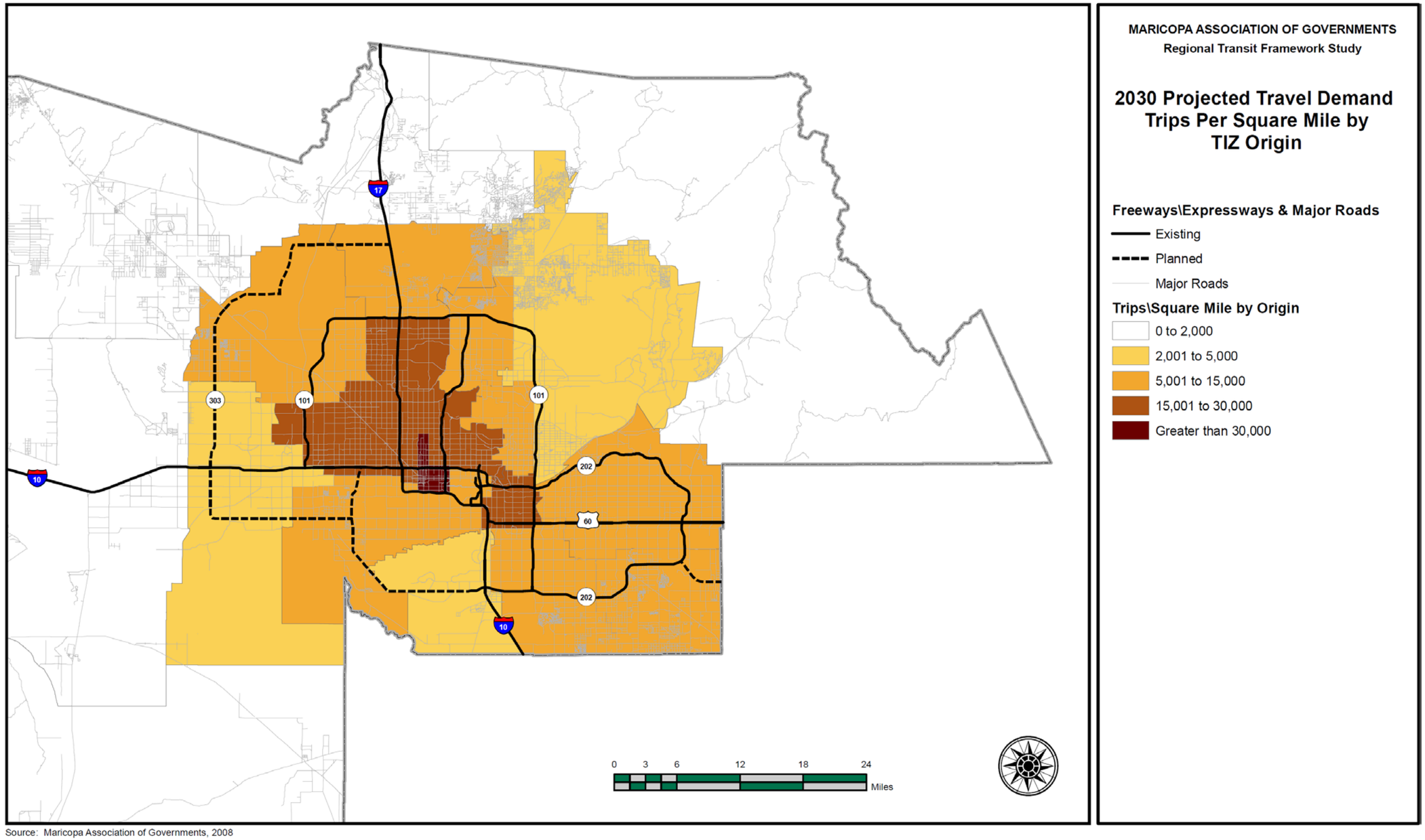
Source: Maricopa Association of Governments, 2008
Map Prepared by: HDR Engineering, Inc.
Version & Date: 1 - September 8, 2008

Figure 4: Change in Employment from Year 2000 to Year 2030



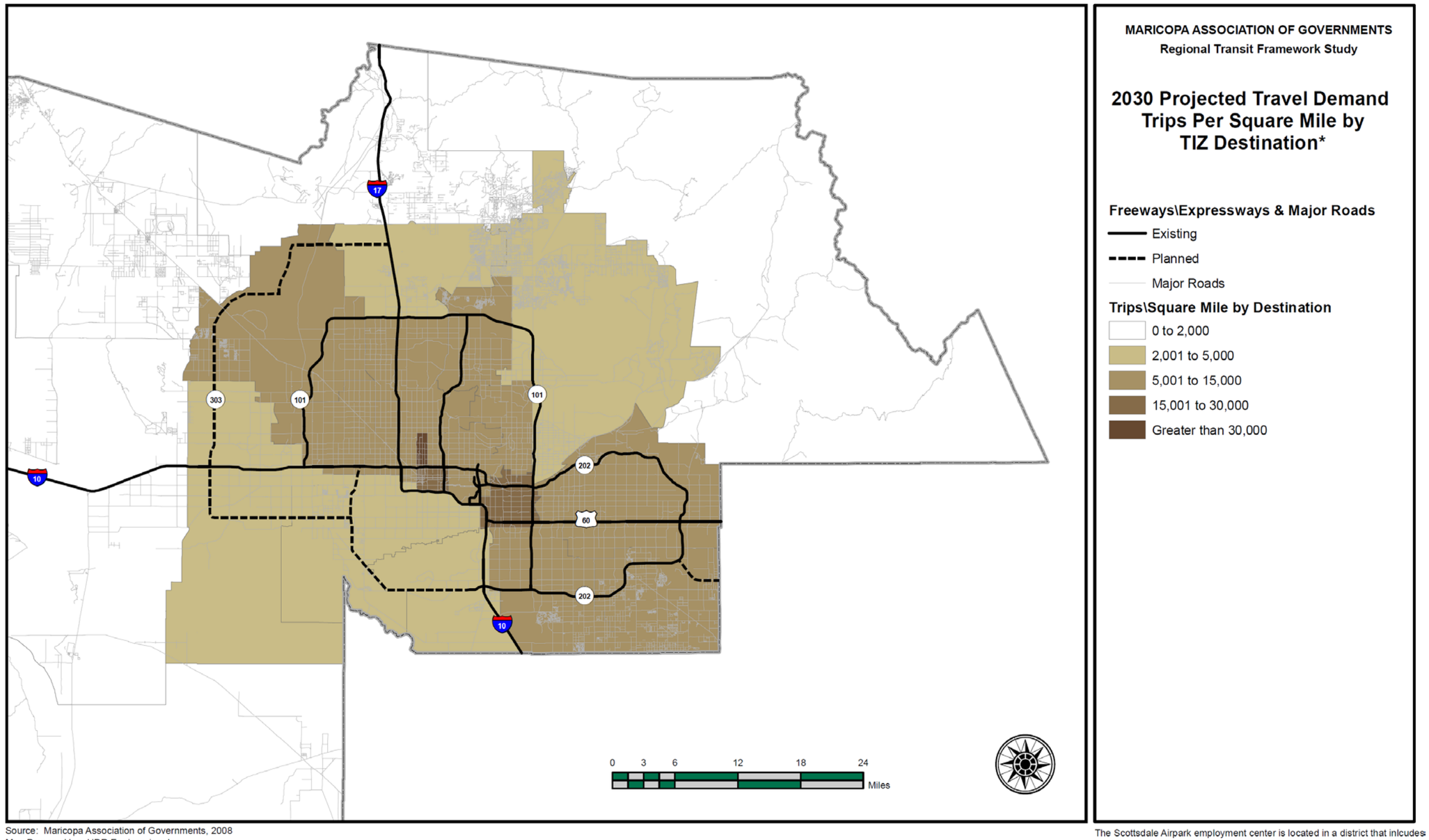
Source: Maricopa Association of Governments, 2008
Map Prepared by: HDR Engineering, Inc.
Version & Date: 1 - September 8, 2008

Figure 5: Estimated Daily Travel Demand by Origin by Transit Influence Zone



Source: Maricopa Association of Governments, 2008
Map Prepared by: HDR Engineering, Inc.
Version & Date: 1 - September 8, 2008

Figure 6: Estimated Daily Travel Demand by Destination by Transit Influence Zone



Source: Maricopa Association of Governments, 2008
Map Prepared by: HDR Engineering, Inc.
Version & Date: 1 - September 8, 2008

The Scottsdale Airpark employment center is located in a district that inlcudes low intensity land uses such as a large desert preserve and agriculture. A total of 853,000 trips or 5% of all regional trips are estimated to be destined to District 6 each day. It is assumed that a large portion of the trips are destined for the Airpark employment center area.

4.1.4 Detailed Regional Transit Deficiencies

The assessment of existing transit service revealed the following primary transit deficiencies in the MAG region. These deficiencies are helpful in identifying, evaluating, and improving potential transit service and capital elements within the region.

1. Some existing developed areas of the region have limited or no public transit service. These areas are continually expanding, along with growing population and employment.

2. Transit demand already exceeds capacity in some existing corridors, in the form of overcrowded vehicles.

3. RTP-funded transit improvements provide for only minimal expansion of service area and basic service levels. Minimal expansion will leave a significant number of residents without close access to transit service, while basic service levels cans cause long travel times, excessive passenger delays (during transfers) and inconsistent headways between connecting transit services. These issues are consistent with the concepts that current transit riders and non-riders stated as factors that limit their use of the region's current transit system.
    a. Many new "Supergrid" routes have 30-minute service throughout the day. Some routes will provide 15-minute peak period service for just a few hours.
    b. Only one of the funded arterial BRT routes has enough funding to provide more than 48 trips per weekday.
    c. Without local funding or additional regional funding, some local bus routes will continue to have limited service hours and no Sunday service.

4. RTP-funded capital improvements may not meet demands for planned transit service expansion.
    a. Existing and programmed operations and maintenance facilities will not accommodate all the vehicles that will be purchased to provide service improvements.
    b. Some park-and-ride facilities are already approaching their capacity. Regional funding identified for park-and-ride lots may not be adequate to provide the needed capacity.
    c. The RTP provides only for minimal expansion of the regional paratransit fleet.

5. Safe and convenient access to transit service and information is not uniform throughout the region, pedestrian infrastructure (e.g., sidewalks, safe crosswalks), shaded passenger waiting areas, lighting, and real-time vehicle arrival information make for safer, more convenient and more attractive transit service.

6. High population growth is projected in areas without existing or funded public transportation services. These areas are predominantly located outside the SR 101 and SR 202 freeways.

7. While existing employment centers are expected to remain strong, future employment is expected to be more broadly dispersed throughout the region. Dispersed employment will result in more dispersed trips requiring a more comprehensive transit system that allows people to travel more easily throughout the region.

8. Roadway congestion may slow bus (and paratransit) operations and discourage choice riders. On some freeways, existing peak period HOV-lane travel speeds are less than 40 MPH; no faster than in general purpose lanes (MAG 2007 Regional Travel Time and Travel Speed Study, 2008).

9. The availability of a good public transportation system is an element that employers consider when locating major regional facilities. The MAG region is currently behind peer regions in transit investments and patronage. Boeing Corporation provides an example of transit availability

influencing relocation. Good access to transit service for its employees played a part in Boeing's decision to move to Chicago.

10. Programmed service levels for some RTP-funded transit services are insufficient to qualify for federal discretionary funding opportunities.
    a. Programmed arterial BRT service levels, with the exception of one route, do not meet FTA Very Small Starts criteria, and may not meet criteria for other discretionary funding.
    b. Inability to demonstrate financial resources to match grants for future federal funding may reduce access to new revenue sources.

11. If the region desires an increase in regional transit investments to meet both current and future demand, new revenue sources will be required. Some local dedicated funding sources will expire as early as 2020.

4.2 Regional Transit Needs

Four categories of regional transit needs were identified by analyzing transit deficiencies and through community input collected through focus groups a telephone survey, and public open house meetings. The categories are:

- Transit improvements in the form of new or expanded service;
- New service corridors;
- Higher-speed travel opportunities; and
- New revenue sources.

4.2.1 New or Expanded Transit Service

A majority of the transit deficiencies identified in the region involve the need for new or expanded transit service, including transit operations and capital investments (i.e., facilities, equipment and vehicles). During the scenario development phase of the RTF, potential transit improvements were carefully evaluated to ensure that these deficiencies were addressed.

4.2.2 New Service Corridors

New service corridors are needed throughout the region to address current and future deficiencies resulting from areas without service and increasingly dispersed employment centers. High-demand corridors were identified and evaluated during the scenario development process to better understand future needs and service requirements.

4.2.3 Higher-Speed Travel Opportunities

Responses from the regional focus groups and the telephone survey indicated a need for higher speed travel opportunities, particularly to attract and retain new transit riders that have other transportation options. This need results in part from congested roads, frequent stopping and time-consuming transfers. Opportunities for maximizing transit travel speeds, either through technology (e.g., transit signal priority), operations (e.g., limited stop service, point-to-point service between activity centers), or infrastructure (e.g., dedicated guideway) will be an important consideration throughout this study.

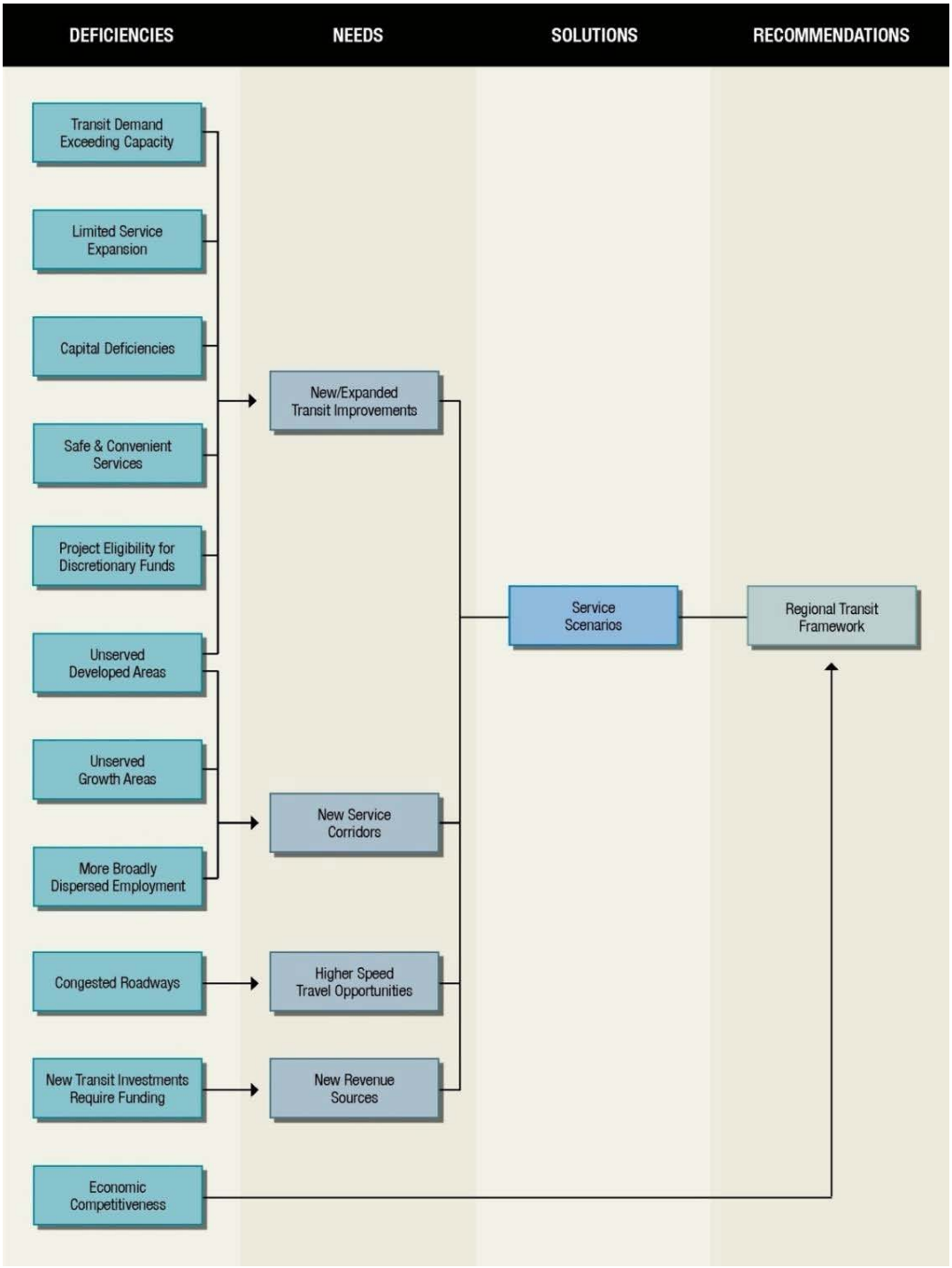
4.2.4 New Revenue Sources

New revenue sources are a prerequisite to meeting transit service needs. Transit services are currently funded through a combination of local, regional and funding sources. These sources are insufficient to meet the deficiencies identified in this report; hence, the deficiencies will remain even after the RTP is fully implemented.

4.3 Relationship of Regional Transit Needs & Deficiencies

The technical analysis performed for this study identified eleven regional transit deficiencies. These deficiencies represent regional transit needs that were classified in four categories. **Figure 7** illustrates the relationship between the regional transit needs and deficiencies.

Figure 7: Regional Transit Needs and Deficiencies Identified



5.0 FUTURE REGIONAL TRANSIT SERVICE OPTIONS FOR THE MAG REGION

The analysis of regional transportation demand corridors and regional transit needs and deficiencies identified several transit service modes that are appropriate for a range of corridor types, including, but not limited to, rural highways, arterial streets, urban freeways and existing railroad lines. This section describes these modes in more detail, with examples from peer regions and elsewhere. In addition, recommended transit service standards for the MAG region are provided.

5.1 *Regional Transit Service Modes*

Six regional transit service modes were selected for inclusion in this framework based on applicability to the region. An applicable mode must address a regional transit need, be reasonably cost-effective for this region, and be a proven public transportation technology. **Table 1** summarizes major characteristics of each mode. The following subsections provide detailed descriptions and examples from peer regions.

5.1.1 Regional Connector

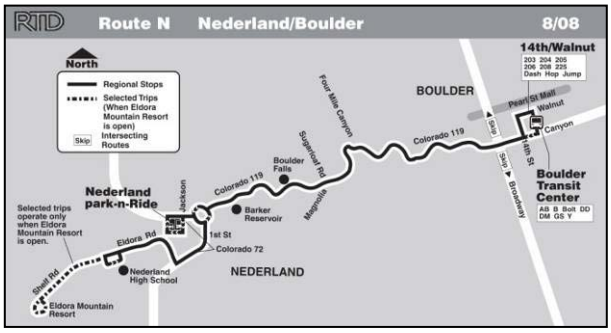
Regional connectors are a two-way service that provides access between rural and urbanized areas in the MAG region. This type of service generally terminates at urban transit centers, allowing riders from rural areas to access a variety of Valley Metro transit routes. Regional connector service typically operates both (peak and off-peak) and weekends. Fixed route bus is the mode for regional connector service, which typically operates on rural roadways, freeways and arterial streets. Passenger access is provided at select locations; however, given advance notice, flex-stop service may be available. The MAG region currently operates two regional connectors: the Wickenburg Connector and the Gila Bend Connector.

Regional Connector
Source: HDR Engineering, Inc.

Regional Connector Examples in Peer Cities

The Salt Lake City region operates a regional service that connects Brigham City and Ogden, Utah. This service, operated by the Utah Transit Authority (UTA), provides service between Brigham City and the Ogden Intermodal Center where transit riders have the ability to connect to several bus routes and the FrontRunner commuter rail service. This service operates Monday through Saturday with 16 daily trips on weekdays and 12 daily trips on Saturday. No Sunday service is provided on this route.

In the Denver region, the Regional Transportation District (RTD) operates a route with regional connector characteristics, known as Route N with service between the Town of Nederland and the Boulder Transit Center in Boulder, Colorado. This service operates seven days a week with hourly service on the weekdays and service every two hours on the weekends. Fourteen daily trips are provided Monday through Friday and ten daily trips on Saturday and Sunday.



RTD Route Map
Source: RTD

The Lane Transit District (LTD) is the primary transit operator in the Eugene, Oregon region. This agency operates two regional connectors: Route 91 (McKenzie Bridge) and Route 98 (Cottage Grove). The McKenzie Bridge route operates between the McKenzie River Ranger Station and Eugene Station, operating a total of eight daily trips during the weekday and four daily trips on the weekends. The Cottage Grove route operates between Cottage

Grove and Eugene Station in Eugene, Oregon, operating a total of nine daily trips on the weekdays and five daily trips on the weekends.

5.1.2 Regional Fixed Route Bus (Supergrid)

Regional fixed route bus is a two-way service that provides both local and regional access to transit riders on the arterial street network. This service, also known in the MAG region as Supergrid, is identified in the *MAG RTP 2007 Update* to provide consistent levels of service across jurisdictions in the region. Supergrid service operates both weekdays and weekends. Fixed route bus is the mode for this service, which generally operates on arterial streets. Passenger access is available at bus stops, which are located approximately every quarter mile.

Supergrid
Source: RPTA

The MAG region began operating Supergrid service in 2007. To date, three Supergrid routes are in service: Scottsdale/Rural Road (2007), Chandler Boulevard (2008), and Glendale Avenue (2008). These routes provide consistent service levels and operate seven days a week.

Regional Fixed Route Bus Examples

In the Denver region, RTD operates 27 local routes labeled "crosstown" which provide routes with similar Supergrid characteristics. Seventeen of the "crosstown" routes operate seven days a week, four operate Monday through Saturday, and six operate only on weekdays. The majority of the routes operate a 30-minute weekday peak frequency, and 1-hour weekday off-peak frequency. Weekend service generally operates hourly frequency throughout the day with a small number of routes operating 30-minute all day service.

The Dallas region also operates several routes with Supergrid characteristics. Operated by Dallas Area Rapid Transit (DART), there are 18 routes classified as "crosstown" throughout the region. These routes provide connections throughout the service area and they all operate seven days a week with the exception of two, which run Monday through Saturday. Frequencies range from 15-minute and 30-minute service during the weekday peak and 30-minute to 1-hour service during the off-peak and weekend period. On the weekdays, these routes generally operate 19 hours a day. On the weekends, service is reduced to 13 hours a day.

5.1.3 Arterial BRT

Arterial bus rapid transit (BRT) is a two-way service that operates at higher speeds than Supergrid service by taking advantage of limited stops and other time- saving enhancements, including signal priority systems, queue jumpers and potentially semi-exclusive shared lanes. In the MAG region and elsewhere, arterial BRT has a special branding. The proposed arterial BRT routes identified in the RTP are intended to operate weekdays both peak and off-peak and on weekends. Arterial BRT is generally overlaid on local bus or Supergrid service. Passenger access is available at enhanced bus stops located approximately one mile apart.

Arterial Bus Rapid Transit
Source: Lane Transit District

There is currently one arterial BRT route in the MAG region, the Main Street LINK in Mesa. LINK connects the Superstition Springs park-and-ride\transit center facility in Mesa to the Sycamore Street Transit Center, where transit riders have the ability to connect to the Central Phoenix/East Valley LRT Starter Line. This is a two-way service that operates seven days a week. On weekdays, service is provided 17.5 hours a day with 15-minute peak frequency and 30-minute off-peak frequency. On the weekend, service is provided 17 hours-a-day with hourly frequency.

Arterial BRT Examples

The Denver region operates a service that is similar to arterial BRT service which is labeled as "limited" routes. RTD currently operates 12 of these routes throughout the region that connect various communities via arterial streets. Although the majority of these routes are overlaid on the local bus network, they differ in the fact that they have limited stops throughout the duration of the trip which enhances overall travel time. Four of the 12 routes provide all day service ranging from 16.5 hours a day to 20 hours-a-day seven days-a-week. These routes typically provide 15-minute service during weekday peak hours and 30-minute to 1-hour frequency during the weekday off-peak period. The remaining eight routes operate Monday through Friday during the AM and PM peak travel periods offering service at 10-minute to 30-minute frequency.

The Salt Lake City region, similar to the MAG region, currently operates one arterial BRT service that connects to the light rail system. Operated by UTA, Route 35M or MAX, provides service between the Magna Township and the 3300 South Millcreek TRAX Station (LRT) located south of Salt Lake City. This is two-way service that operates Monday through Saturday. On weekdays, service is provided approximately 22 hours a day with 15-minute service during the peak and midday period and 30-minute frequency in the off-peak. On Saturdays, frequency shifts to 30-minute all day service.

5.1.4 Express Bus

Express bus provides enhanced-speed, moderate-volume commuter or regional access in the MAG region and is designed to operate primarily on the region's freeway system, including High Occupancy Vehicle (HOV) lanes. Express bus service typically operates from park-and-ride locations to employment centers throughout the region. These routes provide service Monday through Friday during the morning and evening peak time periods. While express bus service usually operates one-way in the peak direction, two-way service may be warranted in reverse commute markets. Passenger access is generally available at park-and-ride facilities and a minimal number of other locations.

Express Bus
Source: RPTA

The MAG region operates more than twenty express bus routes providing three types of service: suburb to downtown Phoenix (and the State Capitol), suburb to suburb, and suburb to light rail. The suburb to downtown Phoenix service, which is the most common type, generally operates morning inbound (to Phoenix) and evening outbound (from Phoenix). The suburb to suburb service operates between suburban communities and suburban employment centers, such as Scottsdale Airpark, during peak periods. Suburb to light rail service provides direct connections to light rail, such as the Northeast Mesa Express that operates between Power Road and Tempe Transportation Center. Four of the routes operate two-way service.

Express Bus Examples

In the Denver region, RTD operates more than 20 express bus routes with the majority of the routes providing suburb to downtown Denver service. Two of the RTD routes provide service between suburban communities and suburban employment centers. Generally, all express bus routes operate Monday through Friday with the exception of two routes. Route 145X provides service between the City of Brighton (northeast of Denver) and Denver International Airport (DIA). This service operates seven days a week with morning inbound (to DIA) peak service and evening outbound (from DIA) peak service. Route 120X provides two-way service between the City of Northglenn and downtown Denver. Service is provided all day Monday through Saturday. Two additional routes operate two-way service.

DART operates ten express routes in the Dallas region with nine of the routes providing suburb to downtown Dallas service. All routes operate Monday through Friday with four routes providing all day service while the remaining routes provide peak period service. Two-way service is provided on seven of the routes.

In the Seattle region, Sound Transit operates 25 express bus routes with 14 of the routes providing suburb to downtown Seattle service; 10 routes providing service from suburban areas to suburban employment centers; and one route providing suburb to commuter rail service. Ten routes provide service seven days a week and fourteen routes provide two-way service. Route 599 provides peak direction suburb to commuter rail service which serves the Lakewood Station and Tacoma Dome Station. This route has a timed transfer with commuter rail giving transit riders the ability to connect to the Sounder.

5.1.5 HCT Peak Period

High-Capacity Transit (HCT) Peak Period provides higher-speed, high-volume commuter or regional access, when compared with express bus. While express bus sometimes operates in mixed traffic, HCT Peak Period generally operates in an exclusive guideway, providing service between park-and-ride locations and major employment centers. This service typically operates Monday through Friday during the morning and evening peak time periods traveling in the peak direction. Fixed route bus or rail vehicles (e.g., commuter rail) are the mode types for this service, which would operate in a dedicated guideway. Passenger access is typically available at park-and-ride facilities and a minimal number of limited non-parking locations.

HCT Peak Period
Source: HDR Engineering, Inc.

HCT Peak Period Examples

As stated previously, HCT Peak Period service can utilize either buses or rail vehicles. The MAG region does not currently provide this service, but numerous bus and rail examples exist in other cities.

In the Miami region, Miami-Dade Transit is the sole operator of regional transit services, which operates HCT Peak Period service called the Busway Flyer. This service operates on the South Miami-Dade Busway (Busway) which began operation in 1997. The Busway is a 13-mile exclusive guideway that connects Florida City, Florida with the Dadeland South Metrorail Station in Kendall, FL. The Busway Flyer provides morning inbound (to Metrorail) peak service and evening outbound (from Metrorail) peak service approximately every 10 minutes. In addition to the Busway Flyer, the Busway MAX provides local all day service.

Sound Transit operates HCT Peak Period or commuter rail service in the Seattle region, known as the Sounder. The region currently operates two commuter rail lines with the north line providing service to Seattle from Everett and the south line providing service to Seattle from Tacoma. The north line is 35 miles in length with 4 stations (including the King Street Station in Seattle). The Sounder operates four morning inbound (to Seattle) peak trips and four evening outbound (from Seattle) peak trips. Amtrak also provides one additional morning roundtrip and one additional evening roundtrip. The south line is 39 miles in length with 7 stations. The south line provides a total of eight morning and eight evening peak trips, with two of the morning and evening trips operating in a reverse commute (from Seattle) manner. Fares are based on distance traveled.

Sounder Route Map
Source: Sound Transit

The Northeast Illinois Regional Commuter Rail Corporation (also known as METRA) is the sole operator of commuter rail service in the Chicago region. Of the 11 commuter rail lines that operate in the region, the Heritage Corridor is the only line in the system that operates during peak-only periods. This line is 37 miles in length with 6 stations and provides service between Joliet and Chicago. This service operate three morning inbound (to Chicago) trips and three evening outbound (from Chicago) trips. Fares are charged based on distance traveled.

The Capital Metropolitan Transportation Authority (also known as Capital Metro) is the primary transit provider in the Austin, Texas region. The first line of the commuter rail service is expected to begin operation in 2009 or 2010 and will provide service between Leander (to the north of Austin) and downtown Austin. The line is 32 miles in length with 9 stations. The service will operate 10 morning and 10 evening peak trips with 3 of the morning and evening trips operating in the reverse commute direction (from Austin).

5.1.6 HCT All Day

HCT All Day provides high-capacity regional access. While Supergrid and arterial BRT service in the MAG region generally operate in mixed traffic, HCT All Day provides a time-saving element by operating solely in an exclusive guideway. HCT All Day typically operates two-way service, seven days a week. Fixed route bus or rail vehicles (e.g., light rail) are used for this service. Passenger access is available at stations located approximately every half-mile to one mile.

In addition to addressing transportation needs, HCT All Day service and related modes that operate in a fixed guideways such as light rail, have demonstrated the ability to provide significant economic development benefits. In a study[1] sponsored by the Dallas Area Rapid Transit District (DART), economic benefits associated through proximity to light rail transit are estimated to exceed $4 billion in the Dallas Fort Worth region.

"While there are many factors contributing to development investment decisions, proximity to an LRT station is often an important site location factor. The total value of projects that are attributable to the presence of a DART Rail station since 1999 is $4.26 billion." (DART, 2007)

[1] *Assessment of the Potential Fiscal Impacts of Existing and Proposed Transit-Oriented Development in the Dallas Area Rapid Transit Service Area*, Dallas Area Rapid Transit, November 2007.

In December 2008, METRO began operating a light rail line in the MAG region connecting Phoenix, Tempe, and Mesa. This service is 20-miles in length operating in an exclusive guideway with 28 stations. Two-way service is provided all day, seven days a week. On the weekday, this service operates approximately 19.5 hours a day with 10-minute peak and midday service and 20-minute early morning and evening service. On the weekdays, this service operates approximately 19.5 hours a day with 15-minute peak and midday service and 20-minute early morning and evening service.

METRO Light Rail
Source: METRO

HCT All Day Examples

The LTD operates an HCT All Day service known as the Emerald Express (EmX) in Eugene, Oregon. EmX provides service between Springfield Station (Springfield) and Eugene Station (Eugene) with 60 percent of the route operating in an exclusive guideway. This service is a total of four miles in length and has nine stations. Two-way service is provided seven days a week. On the weekdays, this service operates approximately 17.5 hours a day with 10-minute peak and midday frequency, and 20-minute off-peak frequency. On the weekends, service is provided approximately 16 hours a day with 20-minute all day frequency.

The Los Angeles County Metropolitan Transportation Authority (LACMTA) operates the Metro Orange Line which is a 14-mile route that operates in an exclusive guideway. This route has 14 stations and operates two-way service, seven days a week. On the weekdays, service is provided approximately 21.5 hours a day with 4 to5-minute peak, 6 to10-minute midday, and 9 to20-minute early morning and evening service. On the weekends, service is provided approximately 21.5 hours a day with 10-minute peak and midday, and 20-minute early morning and evening service.

In the Salt Lake City region, the Utah Transit Authority (UTA) operates a 19-mile exclusive guideway light rail system. The system is comprised of three routes serving 28 stations, with two routes operating two-way all day service, seven days a week, and one route operating one-way service during specific time periods Monday through Sunday. Monday through Thursday service operates approximately 19 hours a day with 15-minute all day service. Friday and Saturday service operates 20 hours a day with 15-minute service all day, with the exception of late night service (after 11:00 PM) every 30 minutes. On Sunday, service operates 12 hours with 20-minute all day service.

In the Denver region, the RTD operates a 35-mile exclusive guideway light rail system. The system is comprised of six routes serving 36 stations. On the weekdays, certain routes operate all day service while others provide additional capacity during peak periods. These routes operate with approximately 22.5 hours of service with 5-15 minute peak service, 15-minute midday, and 20-30 minute late night service. On the weekends, three routes operate with approximately 22.5 hours of service with 15-minute all day service and 30-minute late night service.

While the modern streetcar technology doesn't provide the same capacity as a multi-car light rail train, streetcars can carry a relatively high volume of passengers (compared to buses). One of the most successful modern streetcar lines is in Portland, Oregon. This 8-mile continuous loop system is comprised of 48 stations. Monday through Thursday service operates approximately 18 hours a day with 12-minute headways most of the day (except early mornings and late evenings. Service span is reduced on Saturdays and Sundays to 16 hours and 15 hours respectively.

Portland Modern Streetcar
Source: City of Portland

5.2 *Recommended Regional Transit Service Standards*

The MAG project consultant team has developed recommended service standards for each of the six modes that would be modeled in the transit mobility scenarios. A detailed description of the recommended service standards by mode is provided below, while **Table 10** provides a comprehensive summary.

Regional Connector

Regional connector service standards call for service seven days a week. On weekdays and weekends, service would be provided, at least, on an hourly basis. The recommended span of service is 20 hours Monday through Saturday with 18 hours of service on Sunday.

Supergrid

The recommended service standards for Supergrid call for service seven days-a-week. On weekdays, the 20-hour service span includes 8 hours of peak service. During the morning and afternoon peak periods, Supergrid service would have a minimum frequency of 15 minutes. Off-peak service would operate at least every 30 minutes. On weekends, the recommended service span is 20 hours on Saturday and 18 hours on Sunday, with minimum 30-minute service.

Arterial BRT

Arterial BRT service standards call for a service span of 20 hours, 6 days a week and 18 hours on Sunday. Weekdays would have eight hours of morning and afternoon peak service. During peak hours, the frequency would be every 10 minutes. A minimum frequency of 15 minutes is proposed for weekend service.

Express Bus

Express bus service standards call for a minimum service span of eight hours Monday through Friday. The eight-hour service span consists of four hours in the morning and four hours in the evening. During both peak periods, service would operate at a minimum 15-minute frequency. Express routes may be operated in three modes: one-way peak period, two-way peak period, or two-way all-day.

HCT Peak Period

High-Capacity Transit (HCT) Peak Period calls for a minimum service span of nine hours Monday through Friday: four hours in the morning peak, four in the evening, and one hour midday to provide flexibility for commuters. This service would operate with 15-minute frequency, either one-way or two-way.

HCT All Day

High-Capacity Transit (HCT) All Day would provide service at least 20 hours a day, six days-a-week, and at least 18 hours on Sunday. On weekdays, a minimum 10-minute peak frequency is proposed, while a minimum frequency of 15 minutes is proposed for off-peak and weekend service.

Existing regional transit service does not consistently meet these standards because of limited funding. Nor will the RTP provide this level of service throughout the region.

Table 10: Recommended Minimum Regional Service Standards by Mode

Service Mode	Weekday					Saturday			Sunday		
	Peak Headway (min)	Base Headway (min)	Peak Service Span (hr)[1]	Service Span (hr)	Total Daily Trips	Base Headway (min)	Service Span (hr)	Total Daily Trips	Base Headway (min)	Service Span (hr)	Total Daily Trips
Regional Connector	60	60	N/A	20	**40**	60	20	**40**	60	18	**36**
Supergrid	15	30	8	20	**112**	30	20	**80**	30	18	**76**
Arterial BRT	10	15	8	20	**192**	15	20	**160**	15	18	**144**
Express Bus[2]	15	N/A	8	8	**32**	N/A	N/A	**N/A**	N/A	N/A	**N/A**
HCT Peak Period[2]	15	N/A	9	9	**36**	N/A	N/A	**N/A**	N/A	N/A	**N/A**
HCT All Day	10	15	8	20	**192**	15	20	**160**	15	18	**144**

Source: MAG/consultant project team
[1]Peak Service Span includes morning and evening service.
[2]Assumes one-way service, although two-way service may be offered in some corridors.

6.0 REGIONAL TRANSIT CORRIDORS

6.1 *Prioritization of Transit Corridors*

Upon completion of the analysis of deficiencies and needs, a list of potential high-demand transit corridors was compiled from the following sources:

- Regional Transportation Plan (RTP 2006 Update)
- MAG High-capacity Transit Study (HCTS 2003)
- I-10/Hassayampa Valley Transportation Framework Study (2008)
- I-8 and I-10/Hidden Valley Transportation Framework Study (in progress)

The transit analysis corridors are documented in Working Paper #5 and illustrated in **Figure 8**. The corridors include existing and future roadways, highways and freight rail corridors; however, a corridor includes a relatively wide area, up to 2 miles in width, incorporating adjacent transportation facilities and open space. Standards and performance indicators developed in Working Paper #2 were used to stratify the list of transit analysis corridors by regional performance potential. Each corridor was assigned a high, medium, or low total value based on its characteristics in relation to the standards and performance indicators. Corridors with high evaluation values were then aggregated into the three scenarios: I--Basic Mobility, II--Enhanced Mobility, and III--Transit Choice.

6.2 *Screening of Corridors*

Transit analysis corridors were screened using performance standards and indicators defined in Working Paper #2. The standards and indicators are categorized in three categories: Primary Mode Choice, Rider Perception Characteristics, and System/Policy Compatibility. A general description of how the standards and indicators were applied in the screening process follows.

- Primary Mode Choice Factors
    - Flexibility and Speed/Travel Time (passenger benefits)
        - Opportunities for preferential treatment or exclusive guideway:
            - High = Light Rail Transit Starter Line (Central Phoenix/East Valley)
            - Medium = Freeways/Railroad right-of-way
            - Low = Arterials
        - Estimated Travel Speed and Estimated Travel Time Savings:
            - Same scoring as preferential treatment or exclusive guideway
    - Accessibility/Availability (potential transit demand)
        - Patronage to support high levels of peak service, and patronage to support all-day service:
            - Based on qualitative assessment by project team of land use, densities, connections, and local knowledge of the area
- Rider Perception Characteristics (directness of service)
    - Regional Connectivity (convenience)
        - Direct connections to activity centers:
            - High = corridor connects at least one regional activity center[2]
            - Medium = corridor connects at least one subarea activity center

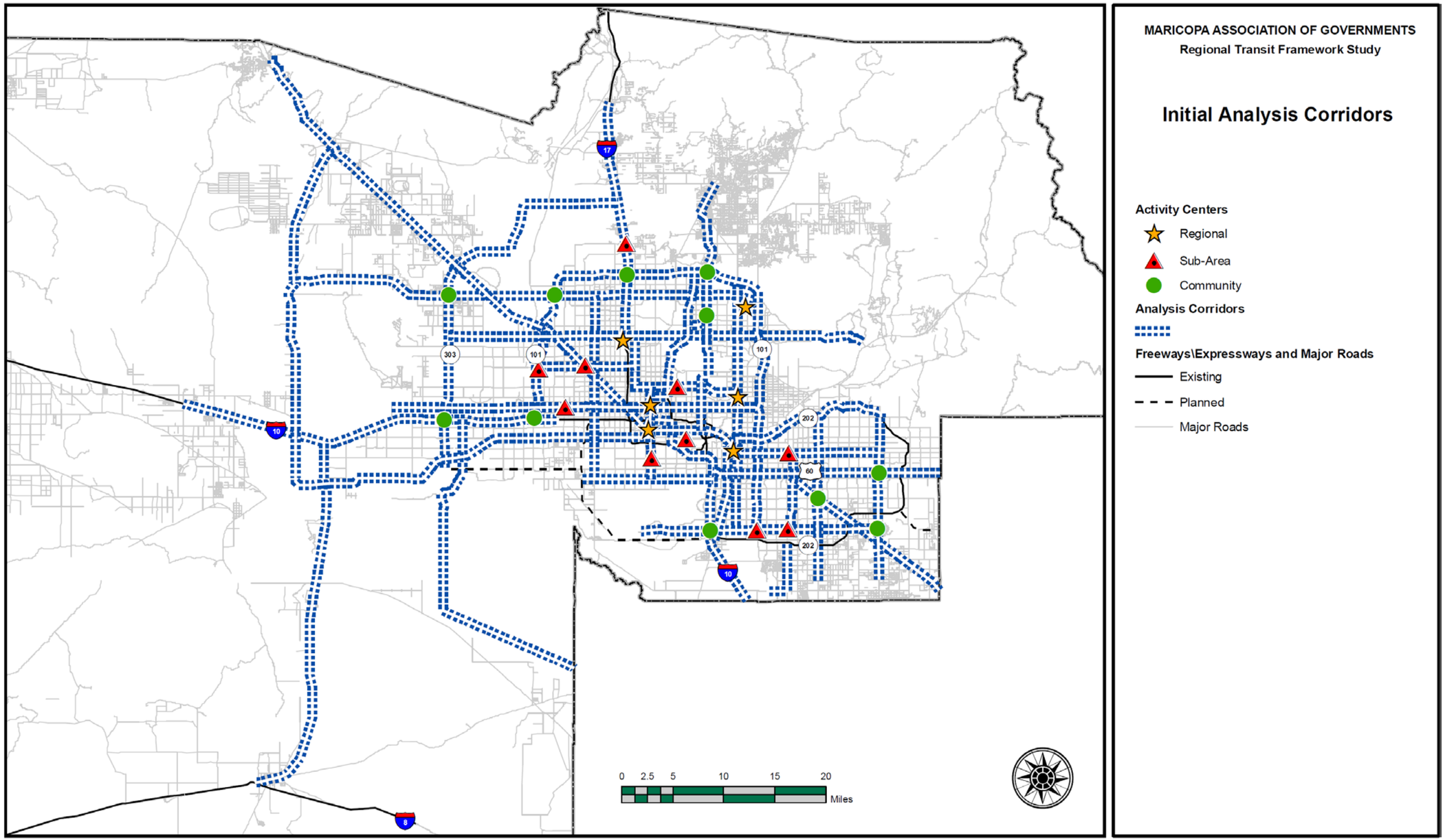
[2] Activity centers are defined in Working Paper #4: Analytical Model for Considering Additional Transit Options and illustrated in Figure 2

- Low = corridor does not connect any regional or subarea activity centers

- System/Policy Compatibility (land use synergies)
  - Land Use Connections
    - Number of activity centers served

The factor score values for the Primary Mode Choice Factors, Rider Perception Characteristics, and System/Policy Compatibility were evaluated to find the highest scoring corridors. **Table 11** provides a summary of the results of this process. The table includes a description of each corridor, the classification, the ranking for each category of factors, and the overall potential to increase mobility. The corridors were scored in the overall potential to increase mobility as high, higher, and highest.

Figure 8: Initial Analysis Corridors



Map Prepared by: HDR Engineering, Inc.
Version & Date: 2 - October 16, 2008

Table 11: Corridor Description, Classification, and Rating by Performance Standard

Corridor	From	To	Classification	Primary Mode Choice Factors			Rider Perception Characteristics	System/Policy Compatibility	Overall Potential To Increase Mobility
				Flexibility & Speed/Travel Time	Patronage to support high levels of all-day service	Patronage to support high levels of peak period service	Regional Connectivity (Convenience)	Land Use Connectivity	
LRT Starter Line	Sycamore/Main St	19th Ave/ Montebello Ave	Regional	High	High	High	High	High	+++
UP Tempe Branch	Pecos Rd	Downtown Tempe/ ASU	Community	High	Low	High	High	Medium	+++
I-10 West	79th Ave	Avondale Blvd	Regional	Medium	High	High	High	Medium	+++
Grand Ave/BNSF	Downtown Phoenix	SR 101L (Agua Fria Fwy)	Regional	High	Low	High	High	Medium	+++
UP Chandler Branch	Main St	SR 202L (Santan Fwy)	Subarea	High	Medium	High	Medium	Low	+++
SR 51	Paradise Valley Mall	Central Ave/Indian School Rd	Regional	Medium	Medium	High	High	Medium	+++
SR 101L (Pima/ Price Fwy)	Bell Rd/Frank L Wright Blvd	Chandler Blvd	Regional	Medium	Medium	High	High	Medium	+++
Buckeye Rd/ MC-85/UP	Downtown Phoenix	Avondale Blvd	Regional	High	Low	Medium	High	Low	+++
Thomas Rd	SR 101L (Pima Fwy)	Dysart Rd	Regional	Low	High	High	High	Medium	+++
SR 202L (Red Mountain)	Power Rd	Downtown Tempe/ ASU	Subarea	Medium	Low	High	High	Low	+++
SR 101L (Pima)	I-17	Bell Rd/Frank L Wright	Subarea	Medium	Low	High	High	Medium	+++
Scottsdale Rd	University Dr	SR 101L (Pima Fwy)	Regional	Low	High	High	High	Medium	+++
Rural Rd	University Dr	Chandler Blvd	Community	Low	High	High	High	Low	+++
I-17	Metrocenter Mall	Anthem	Regional	Medium	Low	High	High	Medium	+++
I-10 East	Pecos Rd	Central Ave	Subarea	Medium	Low	High	High	Medium	+++
Central Ave	Washington St	Baseline Rd	Subarea	Low	High	High	High	Medium	+++
Camelback Rd	Central Ave	Scottsdale Rd	Subarea	Low	High	High	High	Medium	+++
Bell Rd	SR 303L (Estrella Fwy)	SR 101L (Pima Fwy)	Regional	Low	High	High	High	Medium	+++
19th Ave	Bethany Home Rd	I-17/ Mountain View Rd	Community	Low	High	High	High	Low	+++
SR 101L (Agua Fria)	Glendale Ave	I-10	Subarea	Medium	Low	High	Medium	Medium	+++
SR 101L (Agua Fria)	Glendale Ave	I-17/ Mountain View Rd	Subarea	Medium	Low	High	Medium	Medium	+++

Corridor	From	To	Classification	Primary Mode Choice Factors			Rider Perception Characteristics	System/Policy Compatibility	Overall Potential To Increase Mobility
				Flexibility & Speed/Travel Time	Patronage to support high levels of all-day service	Patronage to support high levels of peak period service	Regional Connectivity (Convenience)	Land Use Connectivity	
Peoria Ave/Shea Blvd	Saguaro Blvd	I-17	Regional	Low	Medium	Medium	High	Medium	+++
Chandler Blvd	Gateway Airport	19th Ave	Subarea	Low	Medium	Medium	Medium	High	++
Peoria Ave	I-17	SR 303L (Estrella Fwy)	Regional	Low	Medium	Medium	High	Low	++
Main St	Sycamore	Power Rd (to Superstition Springs)	Community	Low	High	High	Medium	Low	++
UP Chandler Branch	SR 202L (Santan Fwy)	Sun Lakes	Community	High	Low	Medium	Low	Low	++
SR 51	Paradise Valley Mall	Deer Valley Rd	Community	Medium	Medium	High	Low	Medium	++
Rittenhouse Rd	UP Chandler Branch	Town of Queen Creek	Subarea	High	Low	Medium	Low	Medium	++
Rittenhouse Rd	Pinal County	Town of Queen Creek	Subarea	High	Low	Medium	Low	Low	++
Grand Ave/BNSF	SR 101L (Agua Fria Fwy)	SR 303L	Regional	High	Low	Medium	Low	Low	++
Glendale Ave	59th Ave	19th Ave	Subarea	Low	High	Medium	Medium	Low	++
44th St/Tatum Blvd	Washington St	SR 101L	Subarea	Low	Medium	High	Medium	Medium	++
US 60/ Southern Ave	Meridian Rd	I-10	Regional	Medium	Low	High	Low	Low	++
Grand Ave/BNSF	SR-303L (Estrella Fwy)	Town of Wickenburg	Regional	High	Low	Low	Low	Low	++
51st Ave/59th Ave	Baseline Rd	Bell Rd	Regional	Low	Medium	Medium	Medium	Low	++
Buckeye Rd/MC-85	Avondale Blvd	Town of Buckeye	Regional	High	Low	Low	Low	Low	++
SR 303L (Estrella Fwy)	Bell Rd/Sun Valley Pkwy	SR 801	Regional	Medium	Low	Medium	Low	Medium	++
SR 303L (Estrella Fwy)	I-17	Bell/Sun Valley Pkwy	Regional	Medium	Low	Medium	Low	Low	++
I-10 West	Avondale Blvd	Wintersburg Rd	Regional	Medium	Low	Medium	Low	Low	++
I-10 East	Pecos Rd	Pinal County	Subarea	Medium	Low	Medium	Low	Low	++
Glendale Ave	59th Ave	SR 101L (Agua Fria Fwy)	Subarea	Low	Low	Medium	Medium	Medium	++
Power Rd	Chandler Heights Rd	McDowell Rd	Community	Low	Medium	Medium	Low	Medium	+

Corridor	From	To	Classification	Primary Mode Choice Factors			Rider Perception Characteristics	System/Policy Compatibility	Overall Potential To Increase Mobility
				Flexibility & Speed/Travel Time	Patronage to support high levels of all-day service	Patronage to support high levels of peak period service	Regional Connectivity (Convenience)	Land Use Connectivity	
Palo Verde Rd/ Sun Valley Pky/Bell Rd	Baseline Rd	SR 101L (Agua Fria Fwy)	Regional	Medium	Low	Low	Low	Low	+
Northwest Corridor	Sun Valley Pky	Grand Ave	Subarea	Medium	Low	Low	Low	Low	+
Baseline Rd	I-10	SR 202L (51st Ave)	Community	Low	Medium	Medium	Low	Low	+
Thomas Rd	Dysart Rd	Verrado Way	Regional	Low	Low	Low	Low	Low	+
Tatum/ Cave Creek Rd	SR 101L (Pima Fwy)	Carefree Hwy	Community	Low	Low	Low	Low	Low	+
SR 85	I-10	I-8	Regional	Low	Low	Low	Low	Low	+
Estrella Pky	I-10	Pinal County	Regional	Low	Low	Low	Low	Low	+

Source: MAG/Consultant project team
+ = High
++ = Higher
+++ = Highest

6.3 *Performance of the Corridors in the MAG Regional Travel Demand Model*

The prioritization of the transit analysis corridors served as the basis for developing three regional transit service scenarios. Through the MAG regional travel demand model, which uses year 2030 projected socioeconomic data and the RTP highway network, the transit analysis corridors were evaluated to identify their potential to attract passengers (peak period and off-peak period). Results generated from the regional travel demand model can be classified in two categories: general and corridor-specific. General results include:

- Increased service levels and modal upgrades (bus to rail) generally increase passenger boardings.
- A regional "system" approach where services connect with consistent headways increases transit ridership.

Specific corridors that generated high levels of passenger boardings in multiple scenarios include:

- The Central Phoenix/East Valley light rail transit (LRT) starter line;
- Thomas Rd (SR 101L – Pima Frwy to Dysart Rd);
- Scottsdale Rd\Rural Rd (SR 101L – Pima Frwy to Chandler Blvd);
- 19th Ave;
- 44th St;
- Van Buren St; and
- Peoria Ave.

6.4 *Performance of Transit Service in Freight Rail Corridors*

Freight rail corridors scored relatively high in the screening process due to their potential to provide higher speed travel options through a semi-dedicated right-of-way. However, the land uses that are generally near freight corridors are not typically conducive to supporting high all day ridership, and as a result perform moderately in terms of ridership production in the MAG regional travel demand model. In some cases, a bus operating on an adjacent roadway\highway is sufficient to meet the demand found in the freight rail corridors. A summary table of the transit services proposed for each freight rail corridors is provided in section 7.6 of this report.

7.0 REGIONAL TRANSIT FRAMEWORK SCENARIOS FOR YEAR 2030

This chapter describes three regional transit mobility scenarios that comprise the Regional Transit Framework. The scenarios represent three distinct alternatives that provide demand based solutions for addressing regional transit deficiencies and needs through different funding level assumptions. A description of the scenarios and a comparison of the travel demand modeling results are described in the remaining sections of this chapter.

MAG's regional travel demand model was used to identify potential demand in each of the transit analysis corridors. An initial year 2030 model run that included all of the transit analysis corridors coded as urban rail service (high-capacity transit) was completed to identify the corridors that have the highest potential for transit ridership. Coding all routes as urban rail in the initial model run allowed for all corridors to be reviewed from a mode neutral perspective. The top performing corridors from the initial model run were analyzed through multiple iterations of the regional travel demand model, to develop the three transit mobility scenarios created for the Framework.

7.1 *Transit Mobility Scenario Concepts*

The three transit mobility scenario concepts are identified as follows: Basic Mobility (Scenario I), Enhanced Mobility (Scenario II), and Transit Choice (Scenario III). The Basic Mobility Scenario contains new service or service enhancements (including capital investments) in corridors that were screened as some of the highest-priority corridors, with consideration given to regional transit system connectivity and functionality. The other two scenarios include additional transit investments not identified in the Basic Mobility scenario. With each scenario building on the previous, the mode or level of investment in a corridor may differ from one scenario to another. For example, a corridor designated for express bus service in one scenario may be designated as HCT Peak Period in a subsequent scenario. A comparison of the scenarios is provided in **Table 12**.

Table 12: Comparison of Transit Mobility Scenarios

	Basic Mobility Scenario	Enhanced Mobility Scenario	Transit Choice Scenario
Types of Services	- Supergrid - Arterial BRT - Express Bus	- Regional Connector - Supergrid - Arterial BRT - Express Bus - HCT Peak Period - HCT All Day	- Regional Connector - Supergrid - Arterial BRT - Express Bus - HCT Peak Period - HCT All Day
Transit Passenger Facilities	Park-and-Ride Facilities - Provides additional facilities to serve improved express bus service	Park-and-Ride Facilities - Provides additional facilities to serve improved express bus service - Provides additional access to activity centers via Supergrid, express bus, arterial BRT, and high-capacity transit	Transit Centers - Along existing/newly emerging corridors or adjacent to activity centers Park-and-Ride Facilities - Provides additional facilities to serve improved express bus service - Covers major corridors that provide access to high-capacity transit

	Basic Mobility Scenario	Enhanced Mobility Scenario	Transit Choice Scenario
Service Levels	- Enhances headways, service spans, capacity on a limited number of routes	- Increases headways, service spans, capacity on several arterial BRT and express bus routes	- Increases headways and service spans to the minimum regional service standard on all regional connector, supergrid, express, and arterial BRT routes - Provides feeder service to high-capacity transit stations - Provides suburb-to-suburb service along major corridors
Coverage	- Focuses on high-demand corridors and areas where no service exists	- Includes money for local (non-regional) transit service expansion and development*** - Expands coverage on a limited number of Supergrid routes - Expands arterial BRT service to more activity centers - Expands express bus on freeways serving activity centers - Implements a limited number of arterial BRT and express bus routes in high demand areas	- Includes money for local (non-regional) transit service expansion and development - Expands coverage on several Supergrid routes - Provides new coverage in the MAG region via arterial BRT and express bus routes - Provides enhanced access to all major corridors and activity centers
Revenue Assumptions**	- Extension of Proposition 400 sales tax to 2030	- Extension of Proposition 400 sales tax to 2030 - New funding source equal to 1.75 times the amount allocated to transit from Proposition 400, beginning in 2015 - Provides per capita revenue approximately equivalent to the peer regions' average per capita expenditures in 2006	- Extension of Proposition 400 sales tax to 2030 - New funding source equal to 3.75 times the amount allocated to transit from Proposition 400, beginning in 2015 - Provides per capita revenue approximately equivalent to the Seattle region's per capita expenditures in 2006

Source: MAG/Consultant project team
*Services and facilities listed are in addition to those currently funded locally or as part of the RTP.
**Revenue assumptions are constrained to assure that the scenarios are limited by reasonable financial thresholds.
***Local services generally operate in one community and are intended to address that community's transportation needs. Regional services connect multiple communities.

Scenario I: Basic Mobility

The Basic Mobility Scenario is a low-cost expansion plan that includes a limited number of new routes, services and capital investments. This scenario also includes a few extensions to existing regional routes to serve growing areas and provide enhanced service levels on existing regional routes with high demand. This scenario necessarily keeps additional operating and capital costs to a minimum. Revenue assumptions for this alternative are based on the continuation of all existing regional and local transit funding sources through year 2030. The continuation of existing transit revenue would generate approximately $2.05 billion between 2027 and 2030.

Scenario II: Enhanced Mobility

The Enhanced Mobility Scenario is an intermediate plan that includes the transit investments from Scenario I, but focuses on providing options for faster regional transit services in the highest-demand corridors. Regional transit investments focus on addressing regional transit service levels, overcrowding, and travel speeds in a limited number of high-priority corridors. This scenario emphasizes developing transfer hubs at key locations in the region to provide sub-regional access points for higher-speed travel alternatives. Improved transfers will be facilitated by increased service frequencies. This scenario has moderate additional costs to build and operate, and provides premium transit services in a limited number of corridors that connect sub-regional transit nodes with the region's activity centers. The

scenario assumes a continuation of all regional and local transit funding sources through 2030, plus an additional $11.05 billion in public transit revenue between years 2015 and 2030 (in 2008 dollars). The $11.05 billion is above the planned RTP expenditures. The total investment is comparable to the 2006 average annual transit expenditures per capita of the MAG region's peers (Denver, Atlanta, Salt Lake City, Dallas, San Diego and Seattle).

Scenario III: Transit Choice

The Transit Choice Scenario includes the transit investments from Scenarios I and II. In addition, more areas with high transit demand are served with new or expanded regional transit service options, providing a more comprehensive regional transit system. Because there are more options in more areas, travel on transit throughout the region will be easier, but this scenario also has a higher cost than the others to build and operate. This scenario includes a total of $21.46 billion in additional public transit revenue between 2015 and 2030. The $21.46 billion is above the planned RTP expenditures. The total investment is comparable to the 2006 average annual rail and bus transit expenditures per capita in the Seattle Region (adjusted based on the Cost of Living Index).

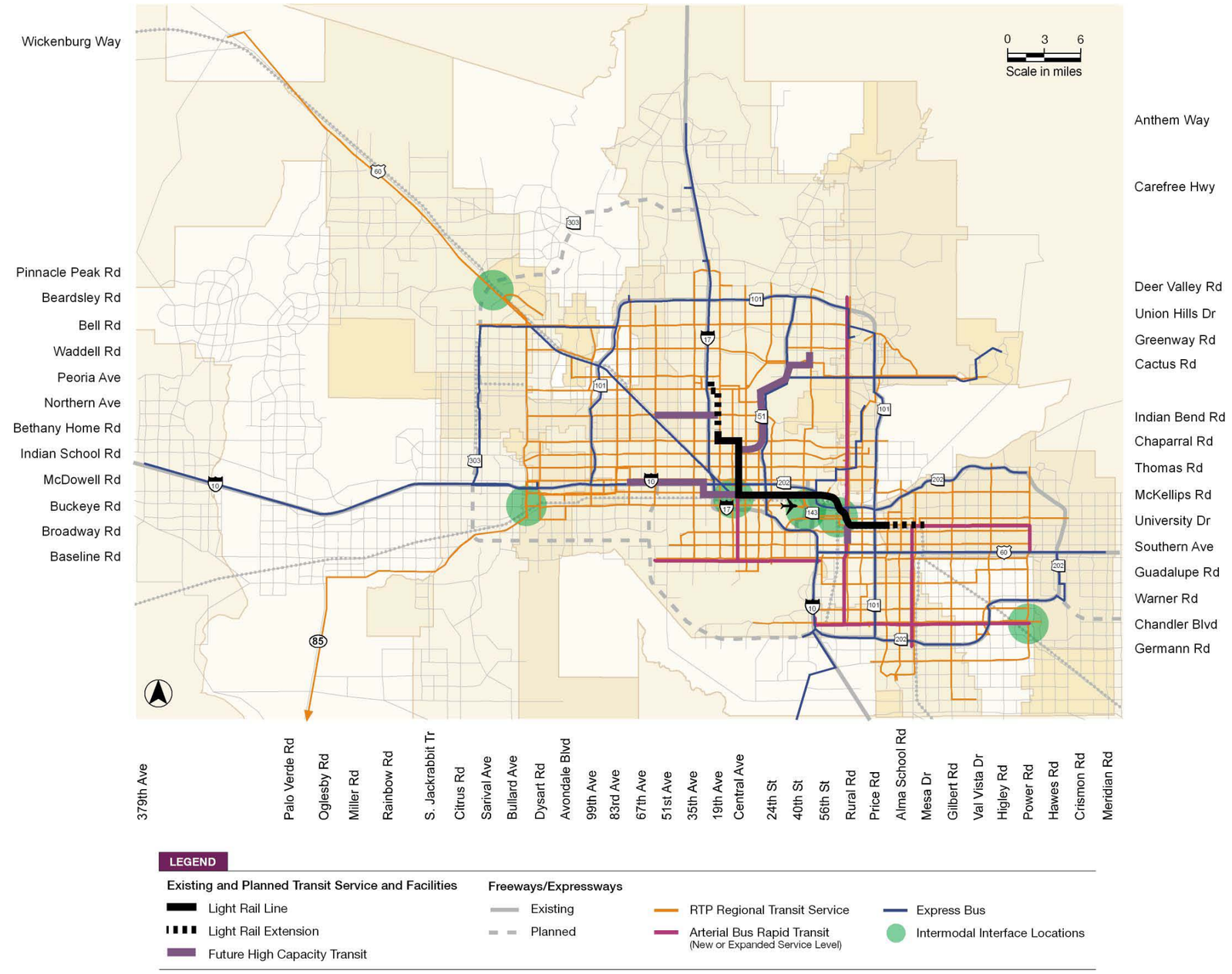
7.2 *Transit Mobility Scenarios Common Elements – Year 2030 Funded Transit System*

Each transit mobility scenario includes all the enhancements identified in the MAG RTP, which are funded principally through Proposition 400 revenue (which expires in 2026) and local transit sources, including fares. The following transit elements comprise the MAG 2030 funded transit system:

- Fixed Route Bus Service (local bus, express bus and regional connector);
- Arterial BRT;
- High-Capacity Transit (All Day); and
- Transit Capital Facilities (passenger facilities and operations and maintenance facilities).

Figure 9 illustrates the MAG 2030 planned regional transit system.

Figure 9: MAG 2030 Planned Regional Transit System



7.2.1 Fixed Route Service

Local/Supergrid Bus

The three transit modeling scenarios include all thirty-four Supergrid bus routes that are planned to be fully or partially funded by Proposition 400 revenue by 2030. Supergrid routes will offer a consistent level of service across all the jurisdictions that they serve in the MAG region. **Table 13** identifies the Supergrid routes, fiscal year of initial funding, frequencies, service span, and the current number of daily trips each.

Table 13: MAG RTP Supergrid Routes

Route	Initial Fiscal Year of Regional Funding	Weekday*			Saturday*			Sunday*		
		Peak/Base Headway (min)	Service Span (hr)	Daily Trips	Base Headway (min)	Service Span (hr)	Daily Trips	Base Headway (min)	Service Span (hr)	Daily Trips
Scottsdale/Rural Rd (Rte 72)	2007	15/30	21	134	30	19.75	79	30	19.75	79
Chandler Blvd (Rte 156)	2008	30/30	18	72	30	16	64	30	16	64
Glendale Ave (Rte 70)	2008	15/30	18	99	30	17	63	30	17	56
Main St (Rte 40)	2009	15/30	18	88	30	16	64	30	16	64
Southern Ave (Rte 61)	2009	15/30	20	104	30	18	72	30	18	72
Dobson Rd (Rte 96)	2009	15/30	18	88	30	17	68	30	17	68
Gilbert Rd (Rte 136)	2010	30/30	17	68	30	17	68	30	17	68
Power Rd	2010	30/30	17	68	30	16	64	30	16	64
Baseline Rd	2011	15/30	18	88	30	17	68	30	17	68
Arizona Ave/Country Club Dr	2012	15/30	18	84	30	16	64	30	16	64
University Dr	2012	15/30	18	84	30	16	68	30	16	68
Camelback Rd	2013	15/30	19	88	30	17	68	30	17	68
Elliot Rd	2013	15/30	17	80	30	16	64	30	16	64
Broadway Rd	2013	15/30	17	80	30	17	68	30	17	68
Alma School Rd	2014	15/30	17	80	30	16	64	30	16	64
McDowell/McKellips Rd	2014	15/30	18	88	30	17	68	30	17	68
Dysart Rd	2015	60/60	17	34	30	14	34	30	14	34
Hayden Rd/McClintock Dr	2015	15/30	17	80	30	17	68	30	17	68
Peoria Ave/Shea Blvd	2015	20/20	18	108	30	17	68	30	17	68
Ray Rd	2016	30/30	17	68	30	16	64	30	16	64
Bell Rd	2019	15/15	18	88	30	17	68	30	17	68
Queen Creek Rd	2019	30/30	17	68	30	16	64	30	16	64
59th Ave	2020	30/30	17	68	30	16	64	30	16	64
Tatum Blvd/44th St	2020	15/15	18	88	30	17	68	30	17	68
Van Buren St	2020	15/30	19	88	30	18	72	30	18	72
Waddell/Thunderbird Rd	2020	30/30	17	68	30	17	68	30	17	68
Indian School Rd	2020	15/30	18	84	30	17	68	30	17	68
Thomas Rd	2020	15/30	18	84	30	17	68	30	17	68
99th Ave	2021	30/30	17	68	30	16	64	30	16	64
Buckeye Rd	2021	30/30	18	72	30	17	68	30	17	68
Dunlap/Olive Ave	2021	15/30	18	84	30	17	68	30	17	68
Greenfield Rd	2022	30/30	17	68	30	16	64	30	16	64
83rd/75th Ave	2023	30/30	18	72	30	16	64	30	16	64
Litchfield Rd	2024	30/30	17	68	30	16	64	30	16	64

*These service levels are supported by regional funding provided through the RTP. Individual jurisdictions may enhance them with locally raised operating and capital funds.
Source: MAG Regional Transportation Plan 2007 Update.

Two of the three scenarios recognize an additional local bus component (beyond the RTP network). This local component is derived from deficiencies identified in Working Paper #3. In Figure 20 of *Working Paper #3, "Existing Transit Services and Deficiencies,"* the MAG study team divided Maricopa County into twenty-four Transit Influence Zones (TIZ). Table 26 of Working Paper #3 classified these zones into three categories, representing both the amount of service and the amount of existing and potential demand.

- High—Refers to zones with local transit service that currently (2006) operates frequently on most or all of the arterial street network; and to a level of demand generated (in 2006 or 2030) by a population density of at least 3,000 per square mile or an employment density of at least 2,000 per square mile.

- Moderate—Refers to areas where local transit serves only portions of the zone or only partially covers its arterial street system; and to a level of demand generated by a population or employment density of at least 200 per square mile, but less than 3,000 residents and 2,000 employees per square mile.

- Low—Refers to zones that have little or no local transit service, and to a level of demand generated by fewer than 200 residents and 200 employees per square mile.

In order to identify areas that will need additional local transit service beyond the 2030 Regional Transit Plan, MAG first identified the zones (14 of the 24) that have both a Moderate or Low level of service today, and Moderate or High projected demand for service by 2030. The TIZ boundaries were then overlaid on a county base map showing major roads and the 2030 RTP transit network (Working Paper #3, Figure 3), to find portions of these zones that (a) are developed or developable (i.e., that have the potential to generate substantial transit demand in 2030), and (b) lack a complete network of locally or regionally-funded transit routes on arterial streets.

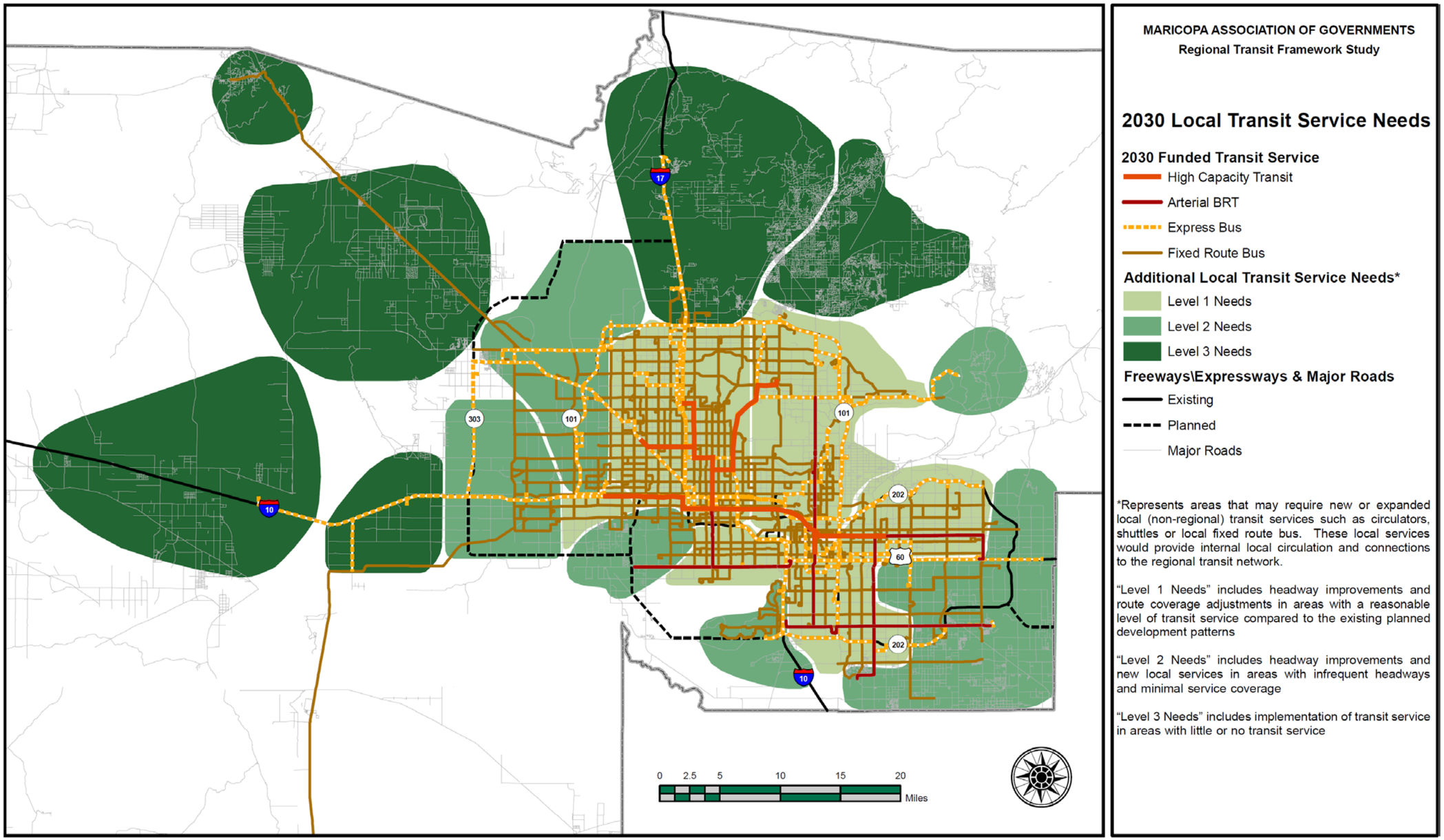
Table 32 in Chapter 10 of this report provides a comparison of the relationship of residential and employment density to transit service mode. Based on unit of analysis, the threshold densities for transit service in Table 32 are higher than what are referenced in this section for identifying local transit needs. The thresholds presented in Table 32 are useful for identifying potential transit modal requirements in defined corridors or activity center districts. For analyzing large areas that may contain multiple corridors and activity center districts as well as undeveloped or underdeveloped areas, a lower density threshold are required. For example, if the local bus service threshold of seven dwelling units per acre were applied to the entire Phoenix UZA, local bus service wouldn't be warranted, even though there are corridors or districts in the region that currently support high capacity transit service.

Figure 10 shows that large parts of Maricopa County, primarily outside the ADOT "loop" freeways but within the area that will be urban or urbanizing in 2030, will require more local bus service than what the RTP offers. The figure also identifies areas that meet criteria (a) and (b) and whose zones currently have a Moderate level of transit service and finally, the figure identifies areas that currently have a Low service level but will have Moderate demand by 2030.

Additional funding must be found so that the transit system can attract choice riders beyond the established service area. The financially constrained budgets for Scenarios II and III include funds set aside to address local transit service needs, but detailed local service needs such as route alignments and frequencies are not defined in this study. The source of funds (local, regional, or other) to operate expanded local services is also not defined. As a technical study of regional transportation needs, the Framework is not a detailed implementation plan. Funding of additional local transit service must be included in policy discussions regarding the delivery of a regional public transportation system. The current practice of funding has led to a disparity in the availability and level of local transit service

throughout the region. Some areas of the region have no local transit services, while others have service levels (on the same route) that are inconsistent in neighboring communities. Lack of and inconsistent local service negatively impacts the passenger experience and deters transit patronage.

Figure 10: Local Transit Service Needs



Source: HDR Engineering Inc & DMJM | AECOM, 2008
Map Prepared by: HDR Engineering, Inc.
Version & Date: 3 - January 9, 2009

7.2.2 Express Bus Routes

The three transit modeling scenarios also include the express bus corridors that are funded through Proposition 400 revenue. In addition, several other express routes were operating in the region when voters approved Proposition 400. Operations costs for these pre-existing express routes are now being funded by Proposition 400 revenue. Regional funding for some of these routes will be transferred to new RTP-defined routes when the new routes are implemented.

The existing and planned express bus routes are designed to primarily operate on the region's freeway system, including available HOV lanes. Service will include connections between cities in the MAG region, as well as to downtown Phoenix and the State Capitol. **Table 14** identifies the express bus routes, initial fiscal year of funding, total number of planned weekday trips, and operating characteristics. The three transit mobility scenarios incorporate the planned RTP express services; however, the routes are adjusted to maximize regional connectivity and service efficiency.

Table 14: MAG RTP Express Routes

Route	Initial Fiscal Year of Regional Funding	Total Weekday Trips*	Operating Characteristics*
SR 51 RAPID	2006	25	One-way
I-10 East RAPID	2006	28	One-way
I-10 West RAPID	2006	25	One-way
I-17 RAPID	2006	39	One-way
North Glendale Express (Route 573)	2008	12	Two-way
North SR 101L Connector (Route 572)	2008	12	Two-way
East SR 101L Connector (Route 511)	2009	8	Two-way
Papago Freeway Connector (Route 562)	2009	8	One-way
Red Mountain Express (Routes 535 & 536)	2009	8	A Pattern One way B Pattern Two-way
West SR 101L Connector (Routes 575 & 576)	2009	12	Two-way
Apache Junction Express	2011	8	One-way
Superstition Freeway Connector	2012	6	Two-way
Grand Avenue Limited	2013	24	Two-way
Pima Express	2013	8	One-way
Peoria Express	2014	12	One-way
Buckeye Express	2015	6	One-way
South Central Express	2015	48	Two-way
Black Canyon Freeway Connector	2016	16	One-way
Ahwatukee Connector	2017	8	Two-way
Anthem Express	2018	10	One-way
Santan Express	2018	20	Two-way
Red Mountain Freeway Connector	2019	16	Two-way
Superstition Springs Express	2019	20	Two-way
Avondale Express	2020	16	Two-way
North I-17 Express	2022	10	One-way
SR 303L Express	2023	8	One-way

Source: MAG Regional Transportation Plan 2007 Update.
*These service levels are supported by regional funding provided through the RTP.
Individual jurisdictions may enhance them with locally raised operating and capital funds.

7.2.3 High-Capacity Transit and Arterial BRT

High-capacity transit refers to service that can carry large numbers of passengers, typically at higher speeds than local buses sharing travel lanes with private vehicles. Arterial BRT routes—while not defined as high-capacity transit--provide higher-speed service than local buses by operating with limited stops and other enhancements, such as queue jumpers and signal priority systems. The proposed arterial BRT routes as identified in the RTP are intended to operate during both peak and off-peak periods.

The 20-mile Central Phoenix/East Valley Light Rail Starter Line (CP/EV LRT Starter Line) currently offers 10-minute peak and 20-minute off-peak service and maintains the same fare structure as the local bus system. The RTP identifies funding for seven additional high-capacity transit lines, totaling 37.7 miles: the Northwest Extension Phase I (approximately 3 miles), Northwest Extension Phase II (2 miles), Central Mesa (2.7 miles), South Tempe (2 miles), Glendale (5 miles), I-10 West (11 miles), and Northeast Phoenix (12 miles). Peak frequencies for portions of the high-capacity transit network are planned to be as high as 6 minutes (10 trips per direction per hour) by 2030.

In addition to the currently operating Main Street LINK, four other RTP-funded arterial BRT routes will connect to the existing and future high-capacity transit corridors. **Table 15** identifies the "all day" high-capacity transit corridors and arterial BRT corridors, the first fiscal year of operation, and the number of weekday trips (for arterial BRT only).

Table 15: MAG RTP High-Capacity Transit/ Arterial BRT

Route	First Fiscal Year of Operation	No. of Weekday Trips*
High-Capacity Transit		
CP/EV LRT Starter Line	2009	-
Northwest Extension – Phase 1	2012	-
Central Mesa	2015	-
Tempe South	2015	-
Glendale	2017	-
Northwest Extension – Phase 2	2018	-
I-10 West	2020	-
Northeast Phoenix	2025	-
Arterial BRT		
Mesa Arterial BRT	2009	90
Arizona Avenue Arterial BRT	2011	40
Scottsdale/Rural Road Arterial BRT	2014	48
South Central Avenue Arterial BRT[1]	2016	40
Chandler Boulevard Arterial BRT	2024	48

Source: MAG Regional Transportation Plan 2007 Update.
*These service levels are supported by regional funding provided through the RTP. Individual jurisdictions may enhance them with locally raised operating and capital funds.
[1] South Central Express will provide an additional 48 daily trips in a portion of the Central Avenue corridor.

7.2.4 Transit Passenger Facilities

Transit passenger facilities are a vital component of the MAG regional transit system. Transit centers serve as hubs that connect transit riders to a variety of routes, facilitating mobility throughout the region. Park-and-ride facilities expand transit access to suburban areas, by allowing riders to park their vehicles and take a bus or rail to their destinations. In addition, park-and-ride lots are used by people who carpool or vanpool to destinations throughout the region.

7.2.4.1 Transit Centers

The current RTP includes 15 existing and 12 planned transit centers to be operating by 2030. **Table 16** identifies these transit centers (includes regionally or locally funded facilities).

Table 16: Existing and Planned Transit Centers

Transit Center*	Location	City
Existing		
Chandler Fashion Square	SE corner of Chandler Village Dr N & Chandler Blvd	Chandler
Superstition Springs Center	SW corner of Southern Ave & Power Rd	Mesa
Main St/Sycamore TC park-and-ride	Main St & Sycamore	Mesa
Central Station	NW corner of Van Buren St & Central Ave	Phoenix
Desert Sky Mall TC	SW corner of Thomas Rd & 75th Ave	Phoenix
Ed Pastor TC	NW corner of Broadway Rd & Central Ave	Phoenix
Metrocenter Mall TC	SW corner of Peoria Ave & 28th Dr	Phoenix
Paradise Valley Mall TC	NW corner of Cactus Rd & Tatum Blvd	Phoenix
Sunnyslope TC	SE corner of Dunlap Ave & 3rd St	Phoenix
Washington St/44th St TC	Washington St & 44th St	Phoenix
Spectrum Mall TC & park-and-ride	Montebello Ave & 19th Ave	Phoenix
Central/Camelback TC & park-and-ride	Central Ave & Camelback Rd	Phoenix
Loloma Station	NE corner of 2nd St & Marshall Way	Scottsdale
Downtown Tempe	College Ave & 5th St	Tempe
Arizona Mills Mall	NW corner of Baseline Rd & Priest Dr	Tempe
Planned		
Downtown Chandler	Chandler Blvd & Arizona Ave	Chandler
South Chandler TC	Alma School Rd & Chandler Heights Rd	Chandler
Glendale Ave/Grand Ave	Glendale Ave & Grand Ave	Glendale
Bell Rd/SR 101	Bell Rd & 83rd Ave	Glendale
Downtown Mesa	Main St & Center St	Mesa
Downtown Peoria	Peoria Ave & Grand Ave	Peoria
19th Ave/Camelback Rd	19th Ave & Camelback Rd	Phoenix
44th St/Cactus Rd	44th St & Cactus Rd	Phoenix
Scottsdale Airpark/SR 101	Scottsdale Rd & Frank Lloyd Wright Blvd	Scottsdale
Skysong TC	Scottsdale Rd & McDowell Rd	Scottsdale
Mustang TC & park-and-ride	Shea Blvd & 90th St	Scottsdale
South Tempe	Guadalupe Rd & McClintock Rd	Tempe

Source: Valley Metro, 2008; MAG Regional Transportation Plan 2007 Update; Scottsdale Transportation Master Plan – Transportation Element, 2008.
*Transit centers being developed to support light rail on opening day of service are considered existing facilities.

7.2.4.2 Park-and-Ride Facilities

Table 17 shows the publicly owned park-and-ride facilities that will be in operation by 2030, according to the RTP. There is some duplication between **Tables 16** and **17**, since some transit centers are also park-and-ride lots.

Table 17: Existing and Planned Publically Owned Park-and-Ride Facilities

Park-and-Ride Facility	Location	City
Existing		
Gilbert	Ash St & Page Ave	Gilbert
Glendale city Lot	59th Ave & Myrtle Ave	Glendale
Glendale	7111 N 99th Ave	Glendale
Superstition Springs	Power Rd & US-60	Mesa
Main St/Sycamore	Main St & Sycamore	Mesa
Peoria East	Jefferson St & 84th Ave	Peoria
Spectrum Mall	Montebello Ave & 19th Ave	Phoenix
Central Ave/Camelback Rd	Central Ave & Camelback Rd	Phoenix
19th Ave/Camelback Rd	19th Ave & Camelback Rd	Phoenix
Washington St/38th St	Washington St & 38th St	Phoenix
Bell Rd/SR-51	SR-51 & Bell Rd	Phoenix
Shea Blvd/SR-51	Shea Blvd & SR-51	Phoenix
Bell Rd & I-17	Bell Rd & I-17	Phoenix
40th St/Pecos Rd	Pecos Rd & 40th St	Phoenix
79th Ave/I-10 Park-and-ride	79th Ave & I-10	Phoenix
Metrocenter	Between Peoria Ave and Dunlap Ave	Phoenix
Sunnyslope	3rd St & Dunlap Ave	Phoenix
SR 101/Apache Blvd	SR-101L & Apache Blvd	Tempe
McClintock Dr/Apache Blvd	McClintock Dr & Apache Blvd	Tempe
Apache Blvd/Dorsey Ln	Apache Blvd & Dorsey Ln	Tempe
Planned		
East Buckeye	I-10 & Verrado Way	Buckeye
Price Fwy/SR 202	Price Freeway & SR-202L	Chandler
Val Vista Dr/SR 202	Val Vista Dr & SR-202L	Gilbert
Glendale/Grand Ave	Glendale Ave & Grand Ave	Glendale
SR 303	Northern Ave & SR-303L	Glendale
Dysart Rd/I-10	Dysart Rd & I-10	Goodyear
Country Club Dr/US-60	Country Club Dr & US-60	Mesa
Power Rd/SR 202	Power Rd & SR-202L	Mesa
Gilbert Rd/SR 202	Gilbert Rd & SR-202L	Mesa
Peoria Ave/Grand Ave	SR-101L & Grand Ave	Peoria
Happy Valley Rd/I-17[1]	Happy Valley Rd & I-17	Phoenix
Camelback Rd/SR 101	Camelback Rd & SR-101L	Phoenix
Laveen/59th Ave	59th Ave & Baseline Rd	Phoenix
Elliot Rd/I-10	Elliot Rd & I-10	Phoenix
Baseline Rd/27th Ave	Baseline Rd & 27th Ave	Phoenix
Desert Ridge	Tatum Blvd & SR-101L	Phoenix
Cactus Rd/SR 101	Cactus Rd & SR-101L	Scottsdale
Mustang	Shea Blvd & 90th St	Scottsdale
Grand Ave/Surprise	Grand Ave & Bell Rd	Surprise

Source: Valley Metro, 2008; MAG Regional Transportation Plan 2007 Update; Scottsdale Transportation Master Plan – Transportation Element, 2008.

7.3 *Transit Scenario I: Basic Mobility*

The Basic Mobility Scenario is based on the assumption that the current RTP funding for transit will be extended from its current expiration in 2026 through 2030. Transit revenue from the half-cent sales tax (or its equivalent) is assumed to grow in proportion to the population of Maricopa County. Implementation of this scenario requires no new revenue sources or tax increase beyond existing levels.

Projected revenue during the last four years of the planning horizon (2026 through 2030) should be sufficient to continue year 2026 regional transit service, and to allow modest service improvements and a few additional capital facilities. Scenario I enhances Supergrid and arterial BRT service in selected corridors. However, the express bus network is significantly restructured to reduce competition with other services and provide direct transit connections in some corridors. Scenario I enhances Supergrid, arterial BRT and express bus service in selected corridors. Additional HCT service is not included in this scenario because of its high capital cost and the limited amount of funding available for post-2026 transit improvements.

Table 18 and **Figures 11** and **12** identify the service improvements proposed for Scenario I. These services would begin operation in 2027 and continue through a hypothetical RTP sunset date of 2030. Only the new Queen Creek express and the three Supergrid extensions would extend service coverage (i.e., serve previously unserved areas) beyond the network funded in the RTP.

In all the scenarios, additional ADA paratransit service would be provided to meet requirements of the federal Americans with Disabilities Act (ADA). All scenarios also include funding for street-side passenger bus stops/amenities and new vehicles necessary to operate additional service.

Table 18: Proposed Scenario I Service Improvements

Service Type	*Corridor*	Description*	Rationale
Supergrid	*Peoria Ave*	Service level increase	Improved service to meet regional standards
	19th Ave	Service level increase	Improved service to meet regional standards
	Van Buren St	Service level increase	Improved service to meet regional standards
	44th St|Tatum Blvd	Service level increase	Improved service to meet regional standards
	Peoria Ave|Thunderbird Rd (111th Ave|Grand Ave to Thunderbird Rd/SR-303)	West Extension	New service to logical terminus
	Main St|Apache Trl (Power Rd to Pinal County Line)	East Extension	New service to logical terminus
	Queen Creek Rd (Power Rd to Pinal County Line)	East Extension	New service to logical terminus
	Power Rd (Rittenhouse Rd to Chandler Heights Rd)	South Extension	New service to logical terminus
	Tatum|Cave Creek Rd (Deer Valley Rd to Carefree Hwy)	North Extension	New service to logical terminus
	Scottsdale Rd((SR-101 [Pima] to Carefree Hwy)	North Extension	New service to logical terminus
	McKellips Rd (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Southern Ave (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Baseline Rd (Dobson Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Ellsworth Rd (McKellips Rd to Chandler Heights Rd)	New Route	New service to logical terminus
	Cotton Ln (Grand Ave to MC-85)	New Route	New service to logical terminus

Service Type	*Corridor*	Description*	Rationale
	Olive Ave (Litchfield Rd to SR-303)	West extension	New service to logical terminus
	Camelback Rd (Litchfield Rd to SR-303)	West extension	New service to logical terminus
	McDowell Rd (Litchfield Rd to SR-303)	West extension	New service to logical terminus
Arterial BRT	*Arizona Ave (Germann Rd to Main St)*	Service level increase	Improved service to meet regional standards
	Scottsdale/Rural Rd (Chandler Fashion Center to Thompson Peak Pkwy)	Service level increase and extension	Improved service to meet regional standards; extension to major activity center
	Thomas Rd (SR-101 [Agua Fria] to SR-101 [Price])	New route	Key east-west regional corridor with very high demand
	Central Ave South (Van Buren St to Baseline Rd)	Service level increase	Improved service to meet regional standards
	Baseline Rd (Country Club Dr/Baseline Rd to 51st Ave/Baseline Rd)	Service level increase	Improved service to meet regional standards
	Chandler Blvd (ASU Polytechnic to 54th St)	Service level increase	Improved service to meet regional standards
	Glendale Ave (SR-101 [Agua Fria] to 59th Ave)	New route	Important east-west regional corridor with high demand
	59th/51st Ave (Union Hills Dr to 51st Ave/Baseline Rd)	New route	Important regional corridor that will connect with the region's HCT services as well as the Thomas and Glendale arterial BRT routes
Express Bus	*Queen Creek Express, US 60 (Queen Creek to SR 101 LRT/Price Rd)*	New route (32 trips\day)	Service to high-growth area with substantial demand
	East SR 101 Connector (Germann PNR to Scottsdale Airpark)	Service level increase, 32 trips per day	Express bus emphasis provides quick connections to regional activity centers and regional transit services
	Buckeye Express, I-10 (379th Ave to 79th Ave)	Service level increase, 32 trips per day	Improved service to meet regional standards
	Grand Ave Limited (Bell Rd to PHX CBD)	Service level increase, Two-Way Peak Period Express, 54 trips per day	Improved service to meet regional standards
	Red Mountain Express (Power Rd/SR-202 to PHX CBD)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	SR 51 RAPID (Tatum/Deer Valley Rd to PHX CBD)	Service level increase, One-Way Peak Period Express, 54 trips per day	Improved service to meet regional standards
	I-10 East RAPID (40th St/Pecos to PHX CBD)	Service level increase, One-Way Peak Period Express, 54 trips per day	Improved service to meet regional standards
	I-17 RAPID (Happy Valley Rd to PHX CBD)	Service level increase, One-Way Peak Period Express, 54 trips per day	Improved service to meet regional standards
	Ahwatukee Tempe Connector (40th St/Pecos to Downtown Tempe)	Service level increase, Two-Way All-Day Express, 192 weekday, 160 Sat and 144 Sun	Improved service to meet regional standards
	I-10 West Express (Johnson Rd/I-10 to 79th Ave)	Service level increase, Two-Way All-Day Express, 192 weekday, 160 Sat and 144 Sun	Improved service to meet regional standards

Service Type	*Corridor*	Description*	Rationale
	Superstition Springs Express (Meridian Rd to Mesa Dr/Main St)	Service level increase, Two-Way All-Day Express, 192 weekday, 160 Sat and 144 Sun	Improved service to meet regional standards
	West SR-101 Connector (75^{th} Ave/SR-101 to 79^{th} Ave/I-10)	Service level increase, Two-Way All-Day Express, 192 weekday, 160 Sat and 144 Sun	Improved service to meet regional standards
	Black Canyon Freeway Connector (Anthem to Metrocenter)	Service level increase, Two-Way All-Day Express, 192 weekday, 160 Sat and 144 Sun	Improved service to meet regional standards
	SanTan Express (Power Rd to PHX CBD)	Service level increase, Two-Way Peak Period Express, 54 trips per day	Improved service to meet regional standards
	I-10 East Pinal County (Pinal County Line to State Capitol)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	Scottsdale Express (Hayden/McCormick to PHX CBD)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	Fountain Hills/Scottsdale Express (Fountain Hills to SR 51/Shea)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	South Tempe Express (Broadway/SR 101[Price] to State Capitol)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	Pima Express (Scottsdale Airpark to Downtown Tempe)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	North Glendale Express (51st Ave/SR 101 to Metrocenter)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
	Anthem/Scottsdale Express (Anthem to Scottsdale Airpark)	Service level increase, One-Way Peak Period Express, 32 trips per day	Improved service to meet regional standards
HCT All Day	*57-Mile RTP Network*	Regional Operations Funding	Allows local communities to invest savings into enhanced local transit services

Source: MAG/Consultant project team
*"Service level increase" = More frequent service, a longer span, or both

Figure 11: Proposed 2030 Scenario I Supergrid Bus and Regional Connector Network

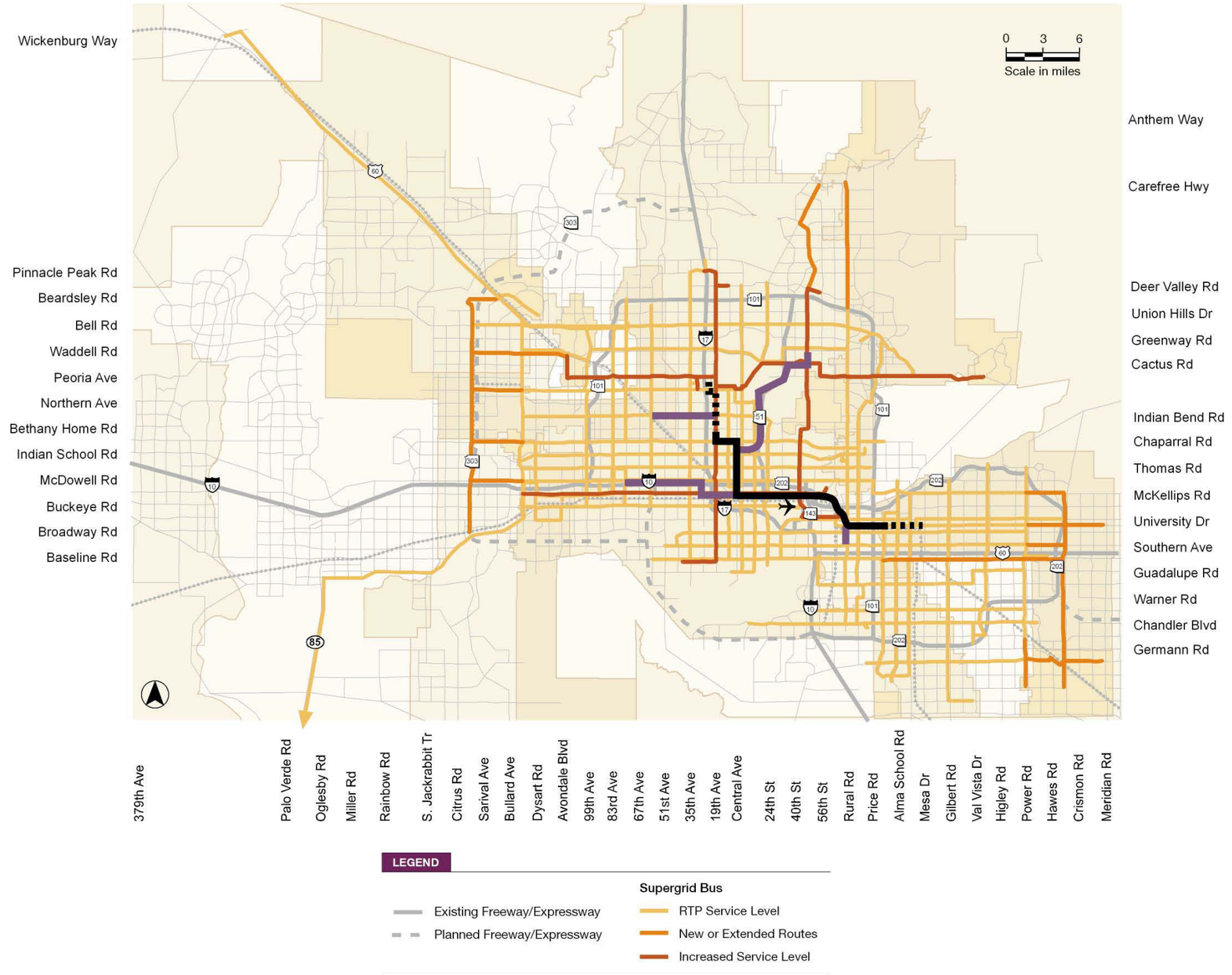
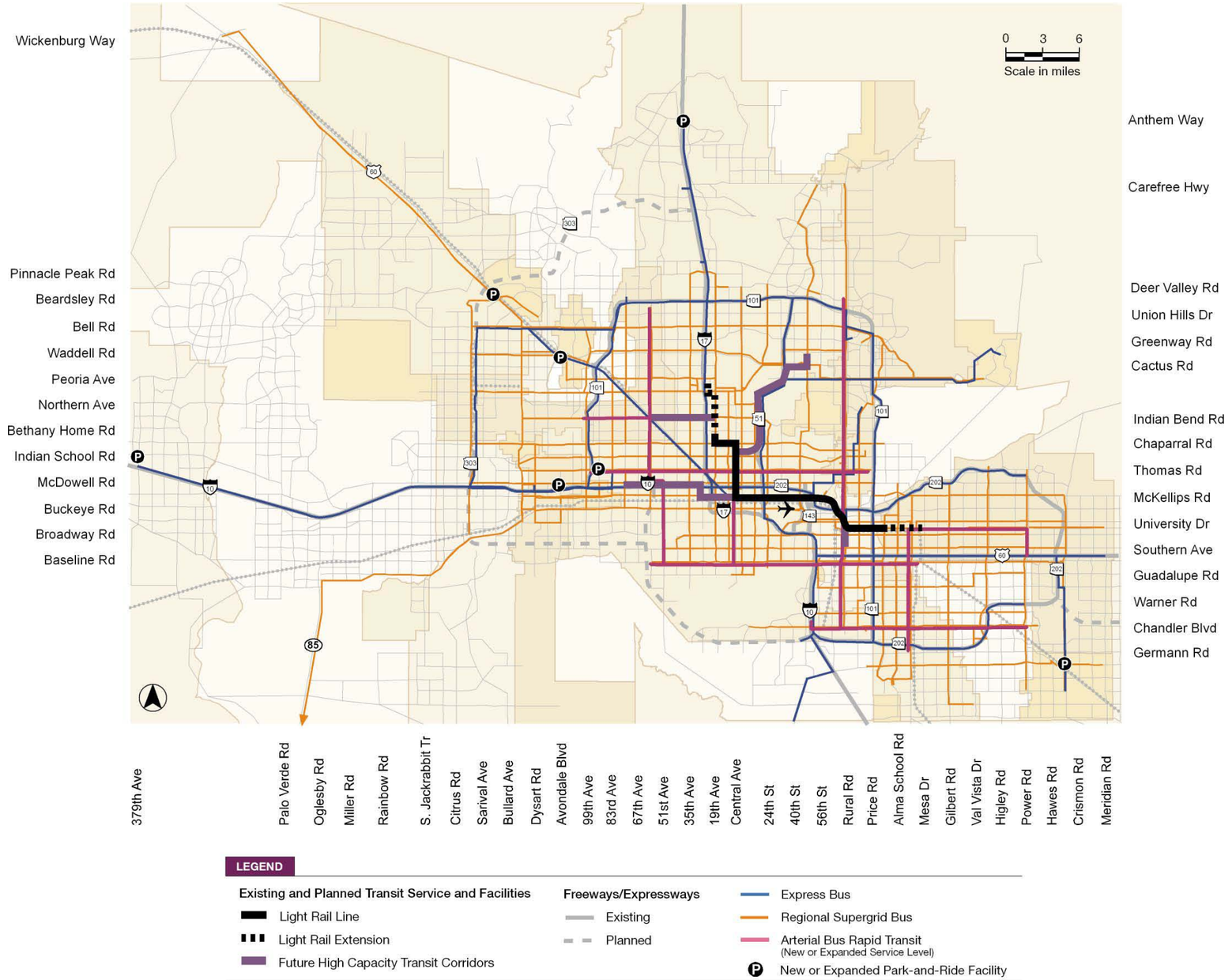


Figure 12: Proposed 2030 Scenario I HCT, Arterial BRT, and Express Bus Network



In order to accommodate the transit service enhancements identified in **Table 18**, one new operations and maintenance (O&M) facility and several park-and-ride facilities would be required and funded in this scenario. **Table 19** and **Figure 12** show the new capital facilities designated for Scenario I.

Table 19: Proposed Scenario I Capital Facilities

Facility Type	Location*	Rationale
Operations & Maintenance	To be determined	Required to service expanded vehicle fleet
Park-and-Ride	79th Ave/Thomas Rd	Relieve 79th Ave/I-10 facility and serve Thomas Rd BRT
	Grand Ave/SR-303L	Improved Grand Ave Limited
	Grand Ave/Thunderbird Rd	Improved Grand Ave Limited
	379th Ave/I-10	Improved Buckeye express
	Avondale Blvd/I-10	Improved Buckeye express
	Anthem Way/I-17	Serve Anthem area
	Queen Creek Rd/Ellsworth Rd	Queen Creek express (US 60)

Source: MAG/Consultant project team
*All locations are approximate.

The expansion of arterial BRT would also require additional infrastructure investments to properly accommodate passengers using the transit services. Arterial BRT investments include passenger stations, transit signal priority equipment, ticket vending machines, and other capital infrastructure. Arterial BRT vehicles are accounted for separately. **Table 20** identifies roadway corridors that would require infrastructure investments to operate arterial BRT service.

Table 20: Proposed Scenario I Corridor Infrastructure Investments

Service Type	*Corridor*	Corridor Length
Arterial BRT	*Scottsdale/Rural Rd*	3.9 miles*
	Thomas Rd	21.9 miles
	Central Ave South	16.1 miles
	Baseline Rd	13.6 miles
	Chandler Blvd	14 miles
	Glendale Ave	8 miles
	59th/51st Ave	16 miles

Source: MAG/Consultant project team
*Includes only the corridor from Shea Blvd to Scottsdale Airpark. Scottsdale Rd arterial BRT capital investments south of Shea Blvd are funded by current RTP.

In summary, Scenario I focuses its modest additional resources on:

- Preserving RTP-funded services;
- Significant restructuring of the regional express bus network to reduce competition between modes and provide a higher-speed, all-day travel alternative
- Logical extensions of RTP-funded Supergrid routes to provide regional transit connections and potential high-demand areas, for a relatively small additional operating and capital cost;
- Improvement of key arterial BRT routes to meet minimum regional standards (i.e., service seven days-a-week with reasonable frequencies throughout the day);
- Two new routes: an arterial BRT overlay on existing local service in a high-demand urban corridor (e.g., Thomas Road), and a new express route to a rapidly growing community not covered in the original RTP network (e.g., Queen Creek);
- One new operations/maintenance facility; and
- Several new park-and-ride facilities.

7.4 *Transit Scenario II: Enhanced Mobility*

The Enhanced Mobility Scenario assumes that, as in Scenario I, the current RTP funding for transit will be extended from its current expiration in FY 2026 through FY 2030. It also assumes, however, that an additional funding source will be available beginning in FY 2015 through FY 2030. The additional regional funding will be equal to approximately $11.05 billion. This increase in regional resources beginning in FY 2015 would permit a significant increase in transit services and facilities throughout the MAG region. The total local and regional transit investment (per capita) would be similar to the 2006 average annual expenditures per capita of the MAG region's peers. Scenario II introduces or enhances all six regional transit modes, which include:

- Regional Connector;
- Supergrid;
- Arterial BRT;
- Express Bus;
- HCT Peak Period; and
- HCT All Day.

The increase in funding enables this scenario to include the addition of HCT peak-period and all-day services (beyond the RTP level) after 2015.

Proposed transit service improvements in Scenario II are identified in **Table 21**. While this scenario includes transit investments in corridors identified in Scenario I, improvements in selected corridors would occur earlier, due to the availability of additional funding starting in 2016 and continuing through year 2030. This scenario emphasizes new high-capacity transit and premium-quality services throughout the RTP service area, rather than significantly expand the area that the regional transit system will cover. All supergrid bus routes and express services in the region are enhanced to provide service based on the standard regional service levels presented in Chapter 5 of this Framework.

As in Scenario I, the express bus network is significantly modified to expand the coverage of high-capacity transit services, through direct connections. A few express routes will operate all day to provide direct connections to HCT services and regional activity centers. Proposed Scenario II transit services are illustrated in **Figures 13**, **14**, and **15**.

Like Scenario I, Scenarios II and III provide additional paratransit service to meet ADA requirements associated with expanded fixed route bus and high-capacity transit service. In addition, Scenarios II and III include funding for a centrally-administered regional ADA paratransit program to provide the ability to travel seamlessly throughout the transit service area. Elements of the program will include a regional ADA paratransit call center and program-related capital costs. The inclusion of this element in Scenarios II and III will improve mobility options for persons eligible for ADA paratransit services.

Table 21: Proposed Scenario II Service Improvements

Service Type	*Corridor*	Description	Rationale
Regional Connector	*Grand Ave (Wickenburg to Glendale)*	Service level increase	Address demand for urban area connections
	SR 85 (Gila Bend to Phoenix)	Service level increase	Address demand for urban area connections
Supergrid	*Olive Ave (Litchfield Rd to SR-303)*	West extension	New service to logical terminus
	Camelback Rd (Litchfield Rd to SR-303)	West extension	New service to logical terminus
	McDowell Rd (Litchfield Rd to SR-303)	West extension	New service to logical terminus
	Peoria Ave/Thunderbird Rd (111th Ave/Grand Ave to Thunderbird Rd/SR-303)	West extension	New service to logical terminus
	Main St/Apache Trl (Power Rd to Pinal County Line	East Extension	New service to logical terminus
	Queen Creek Rd (Power Rd to Pinal County Line	East Extension	New service to logical terminus
	Tatum/Cave Creek Rd (Deer Valley Rd to Carefree Hwy)	North Extension	New service to logical terminus
	Scottsdale Rd (SR-101 (Pima) to Carefree Hwy)	North Extension	New service to logical terminus
	Southern Ave (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Baseline Rd (Dobson Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Ellsworth Rd (McKellips Rd to Chandler Heights Rd)	New Route	New service to logical terminus
	Cotton Ln (Grand Ave to MC-85)	New Route	New service to logical terminus
	McKellips Rd (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	16th St	Increased service	Operate at Standard Regional Service Level
	19th Ave	Increased service	Operate at Standard Regional Service Level
	35th Ave	Increased service	Operate at Standard Regional Service Level
	44th St\Tatum Blvd	Increased service	Operate at Standard Regional Service Level
	59th Ave	Increased service	Operate at Standard Regional Service Level
	7th Ave	Increased service	Operate at Standard Regional Service Level
	7th St	Increased service	Operate at Standard Regional Service Level
	83rd Ave	Increased service	Operate at Standard Regional Service Level
	83rd Ave\75th Ave	Increased service	Operate at Standard Regional Service Level
	99th Ave	Increased service	Operate at Standard Regional Service Level
	Alma School Rd	Increased service	Operate at Standard Regional Service Level
	Baseline	Increased service	Operate at Standard Regional Service Level
	Bell Rd	Increased service	Operate at Standard Regional Service Level
	Broadway Rd	Increased service	Operate at Standard Regional Service Level
	Buckeye Rd	Increased service	Operate at Standard Regional Service Level
	Camelback Rd	Increased service	Operate at Standard Regional Service Level
	Chandler Blvd	Increased service	Operate at Standard Regional Service Level
	Country Club/Arizona	Increased service	Operate at Standard Regional Service Level
	Dobson Rd	Increased service	Operate at Standard Regional Service Level
	Dunlap Ave	Increased service	Operate at Standard Regional Service Level
	Elliot Rd	Increased service	Operate at Standard Regional Service Level
	Gilbert Rd	Increased service	Operate at Standard Regional Service Level
	Glendale Ave\24th St	Increased service	Operate at Standard Regional Service Level
	Greenfield Rd	Increased service	Operate at Standard Regional Service Level
	Hayden Rd\McClintock	Increased service	Operate at Standard Regional Service Level
	Indian School Rd	Increased service	Operate at Standard Regional Service Level
	Litchfield Rd	Increased service	Operate at Standard Regional Service Level

Service Type	*Corridor*	Description	Rationale
	Main St\Apache Blvd	Increased service	Operate at Standard Regional Service Level
	McDowell\McKellips	Increased service	Operate at Standard Regional Service Level
	Peoria Ave	Increased service	Operate at Standard Regional Service Level
	Power Rd	Increased service	Operate at Standard Regional Service Level
	Queen Creek	Increased service	Operate at Standard Regional Service Level
	Ray Rd	Increased service	Operate at Standard Regional Service Level
	Scottsdale\Rural Rd	Increased service	Operate at Standard Regional Service Level
	Southern Ave	Increased service	Operate at Standard Regional Service Level
	Dysart Rd (START)	Increased service	Operate at Standard Regional Service Level
	Thomas Rd	Increased service	Operate at Standard Regional Service Level
	Thunderbird Rd	Increased service	Operate at Standard Regional Service Level
	University Dr	Increased service	Operate at Standard Regional Service Level
	Van Buren St	Increased service	Operate at Standard Regional Service Level
Arterial BRT	*Scottsdale/Rural Rd (Chandler FC to Baseline Rd) and (Scottsdale FS to Thompson Peak Pkwy)*	Service Level Increase and extension	Improved service to meet regional standards; extension to major activity center. Central portion is upgraded to HCT All Day
	Thomas Rd (44th St/Washington to SR 101 (Price))	New Route	Key east-west regional corridor with very high demand. Central and Western portion to operate as HCT All Day
	Baseline Rd (Rural Rd to 51st Ave)	New Route	Key east-west regional corridor with very high demand
	Arizona Ave (Germann to Main St)	Service Level Increase	Improved service to meet regional standards in high-demand corridor
	Bell Rd (Grand Ave to Scottsdale Air Park)	New Route	Key east-west regional corridor with very high demand
	Glendale Ave (59th Ave to SR 101 (Agua Fria))	New Route	Key east-west regional corridor with very high demand
	Chandler Blvd (ASU Polytechnic to 54th St)	Service Level Increase	Improved service to meet regional standards
	59th/51st Ave (Union Hills Dr to 51st Ave/Baseline Rd)	New Route	Important regional corridor that will connect with the region's HCT services as well as the Thomas and Glendale arterial BRT routes
Express Bus	*Scottsdale Express (Hayden/McCormick to PHX CBD)*	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Fountain Hills/Scottsdale Express (Fountain Hills to SR 51/Shea)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	South Tempe Express (Broadway/SR 101(Price) to State Capitol)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Pima Express (Scottsdale Airpark to DT Tempe)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Red Mountain Express (Power Rd to PHX CBD)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	I-10 East Pinal County (Pinal County Line to State Capitol)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Buckeye Express (379th Ave to 79th Ave)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	North Glendale Express (51st Ave/SR 101 to Metrocenter)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Anthem/Scottsdale Express (Anthem to Scottsdale Airpark)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services

Service Type	*Corridor*	Description	Rationale
	Happy Valley to 303 (Happy Valley Rd/I-17 to Grand Ave/SR 303)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	SR 303 Express (Bell Rd/SR 101 to 79th Ave PNR via SR 303)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	North Loop 101 Connector (Scottsdale Airpark to Bullard/Greenway)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	East Loop 101 Connector (Germann PNR to Scottsdale Airpark)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Red Mountain Freeway Connector (Power Rd to DT Tempe)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Superstition Springs Connector Pinal County Line to AZ Mills Mall)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	San Tan Express (Germann PNR to PHX CBD)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Ahwatukee Tempe Connector (Pecos/40th St to DT Tempe)	Service Level Increase (Two Way Peak Period Express)	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	I-10 West Express (Johnson Rd/I-10 to 79th Ave)	Service Level Increase Two Way All Day Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	West Loop 101 Connector (75th Ave/SR 101 to Glendale Ave/SR 101)	Service Level Increase Two Way All Day Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	Black Canyon Freeway Connector (Anthem to Metrocenter)	Service Level Increase Two Way All Day Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	SR 51 RAPID	Service Level Increase one Way All Day Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	I-10 East RAPID (Pecos/40th St to PHX CBD)	Service Level Increase two Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
	I-17 RAPID (Happy Valley Rd to PHX CBD)	Service Level Increase One Way Peak Period Express	Express Bus empahsis provides quick connections to regional activity centers and regional transit services
HCT Peak	*HCT NW Corridor (Grand Ave Corridor)*	New service	Serves high demand commuter corridor
	HCT SE Corridor (Queen Creek)	New service	Serves high demand commuter corridor
	HCT SW Corridor (Yuma RR Corridor)	New service	Serves high demand commuter corridor
HCT All Day	*57-Mile RTP Network*	Regional Operations Funding	Allows local communities to invest savings into enhanced local transit services
	Mesa Extension Phase 2 (Main St/Mesa Dr to Gilbert Rd/US 60)	Corridor extension	Regional corridor serving two CBDs and connecting with LRT
	West Phoenix Corridor Phase 2 (79th Ave/I-10 to Glendale Ave/SR-101 [Agua Fria])	Corridor extension	Direct extension of RTP HCT route in rapidly growing area
	Thomas Rd (99th Ave to 44th St)	New Route	Congested regional corridor connecting LRT with major activity centers
	Central Phoenix South (Washington St to Baseline Rd)	Corridor extension	Key north-south corridor connecting to Phoenix CBD
	Rural\Scottsdale Rd (University Dr to Camelback)	Corridor extension	Key corridor connecting LRT with regional activity centers and extending a RTP planned HCT corridor

Source: MAG/Consultant project team
*Indicates replacement of one mode by another (as identified in the RTP) that offers superior service.
**Indicates that a portion of the corridor operates with more than one mode.

Figure 13: Proposed 2030 Scenario II Supergrid Bus and Regional Connector Network

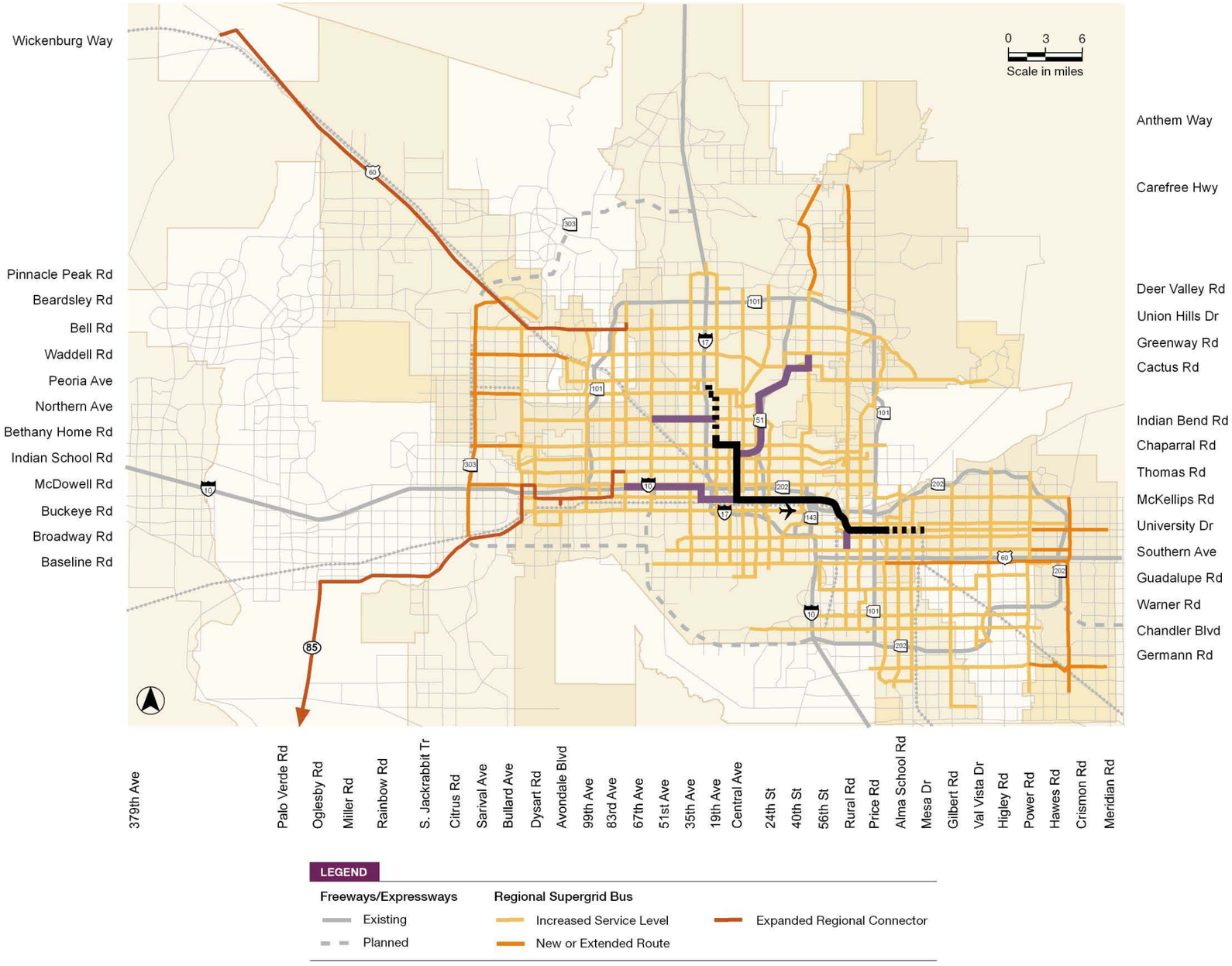


Figure 14: Proposed 2030 Scenario II Supergrid and Express Bus Network

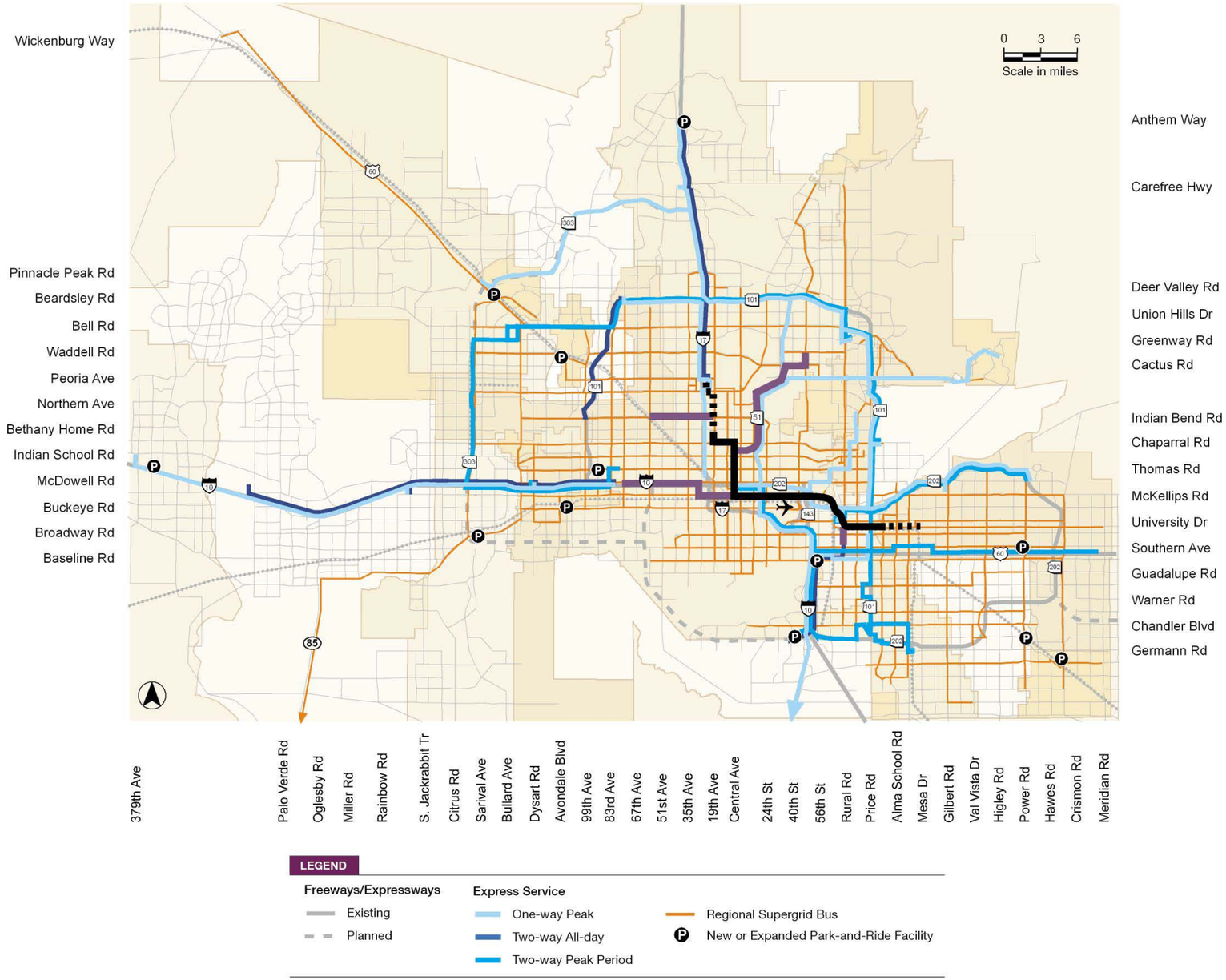
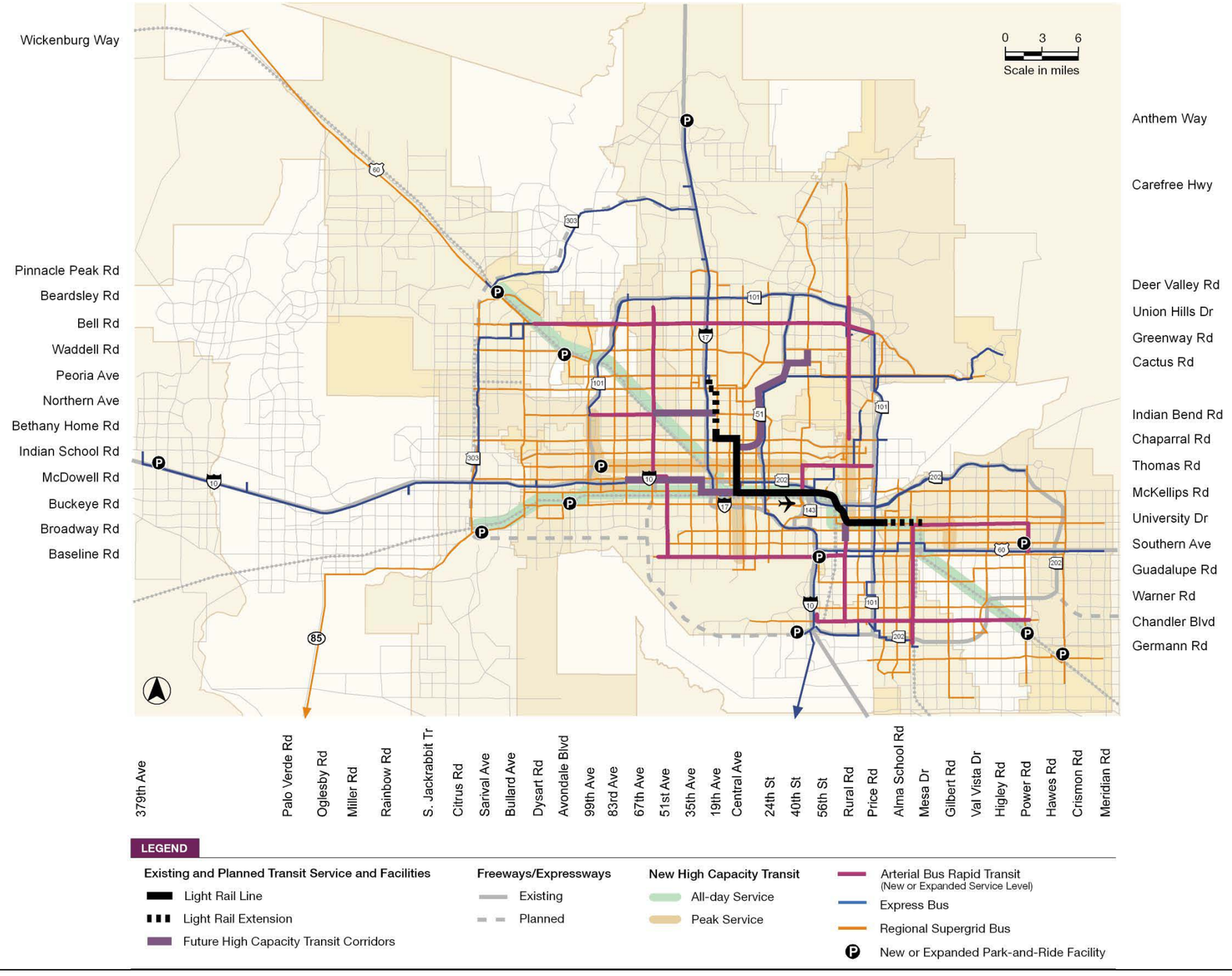


Figure 15: Proposed 2030 Scenario II HCT, Arterial BRT & Express Bus Network



To accommodate the transit service enhancements identified in **Table 21**, two new O&M facilities, one specialized O&M facility and several park-and-ride lots will be needed. **Table 22** and **Figure 15** identify the new (in addition to those already identified in the RTP) transit facilities in Scenario II. In addition to the capital investments identified in **Table 22**, funding is identified for street-side passenger bus stops, expansion buses and replacement buses through 2030.

Table 22: Proposed Scenario II Capital Facilities

Facility Type	Location*	Rationale
Fixed Route Operations & Maintenance	To be determined	Facility needed to service expanded vehicle fleet
	To be determined	Facility needed to service expanded vehicle fleet
Park-and-Ride	SR 101 (Agua Fria) & Thomas Rd	Relieve 79th Ave/I-10 facility and serve Thomas Rd HCT
	Grand Ave & SR 303	Serve new HCT peak period service
	Queen Creek Rd & Ellsworth Rd	Serve new express service
	Anthem Way & I-17	Serve Anthem area and extended I-17 BRT
	379th Ave & I-10	Needed for expanded express service
	Pecos & 44th St Expansion	Needed for expanded express service
	Baseline Rd & I-10	Needed for expanded express and arterial BRT service
	Cotton Lane & Buckeye Rd	Programmed facility size insufficient to meet expected future needs
	Grand Ave & Thundebird Rd	Serve new HCT peak period service
	Superstition Springs Expansion	Needed to serve Apache Junction Express
	Avondale & Buckeye Rd	Serves express service in I-10 West corridor
	ASU Polytechnic/Gateway Airport	Serve new HCT peak period service

Source: MAG/Consultant project team
*All locations are approximate.

The expansion of arterial BRT, HCT peak-period, and HCT All Day service would require additional infrastructure investments to properly accommodate passengers using the transit services. Arterial BRT investments include passenger stations, transit signal priority equipment, ticket vending machines, and other capital infrastructure. Arterial BRT vehicles are accounted for separately. HCT investments include vehicles, allowances for O&M facility development, passenger stations, signal equipment, and right-of-way. **Table 23** identifies the corridors that would require infrastructure investments to operate arterial BRT or HCT service.

Table 23: Proposed Scenario II Corridor Infrastructure Investments

Service Type	Corridor	Corridor Length
Arterial BRT	Baseline Rd	14.9 miles
	Glendale Ave	5.2 miles
	Bell Rd	26.5 miles
	59th/51st Ave	20.6 miles
	Thomas Rd	7.8 miles
	Scottsdale Rd	19.5 miles
HCT Peak Period	HCT NW Corridor (Grand Ave Corridor)	25.2 miles
	HCT SE Corridor (Queen Creek)	28.9 miles
	HCT SW Corridor (Yuma RR Corridor)	20.8 miles
HCT All Day	Mesa Extension	3.7 miles
	Phoenix West Corridor	7.7 miles
	Thomas Rd	15.8 miles
	Central Ave	4.9 miles
	Scottsdale/Rural Rd	6.7 miles

Source: MAG/Consultant project team
*Includes only the corridor from Shea Blvd to Scottsdale Airpark.
Scottsdale Rd arterial BRT capital investments south of Shea Blvd are funded by current RTP.

In summary, Scenario II focuses regional transit investments from FY 2015 through 2030 on:

- Preserving RTP-funded services;
- Improvement of all Supergrid and express bus routes to meet the identified regional service standard;
- New arterial BRT routes and improvement of RTP routes to meet regional service standards;
- Development of new all-day, high-capacity transit service in key regional corridors-which in some cases will expand arterial BRT service programmed in the RTP;
- New peak-period, high-capacity transit service in three corridors that contain existing freight rail lines;
- Improved service on selected express routes and regional connectors;
- Two new fixed route O&M facilities;
- One new specialized O&M facility; and
- Several new park-and-ride facilities.

Figure 15 illustrates all of the proposed transit services and passenger facilities in Scenario II.

7.5 *Transit Scenario III: Transit Choice*

The Transit Choice Scenario assumes, like Scenarios I and II, that the current RTP funding for transit will be extended from its current expiration in 2026 through 2030. However, this scenario provides additional regional funding, including an allocation for local service (beyond the RTP) of approximately $21.46 billion between 2015 and 2030. The total regional transit resources are similar to the 2006 expenditure per capita in the Seattle region. Scenario III enhances the following types of transit service in selected corridors:

- Regional Connector;
- Supergrid;
- Arterial BRT;
- Express Bus;
- HCT Peak Period; and
- HCT All Day.

Service improvements in this scenario emphasize new high-capacity transit and premium services, such as direct express routes and arterial BRT throughout the RTP service area. Coverage is expanded beyond the current RTP service area through a new regional connector, new Supergrid routes, new express bus service, several new arterial BRT routes, and new or extended HCT corridors. Service levels will meet the transit service standards for all regional transit service modes. **Table 24** identifies the proposed new routes and route extensions. **Figures 16 and 17** illustrates the proposed 2030 Scenario III Supergrid network.

The HCT transit network is greatly expanded in Scenario III to include approximately 99 new miles (total length of all corridors) of HCT peak period infrastructure and 100 new miles of guideway to support HCT all-day operations. Arterial BRT and express networks are modified to support the new HCT services. The proposed HCT network is identified in **Figure 18**.

Arterial BRT will operate in nine corridors. With service operating as frequently as the HCT all-day services, passengers will be able to use the proposed 161-mile arterial BRT network to access many regional activity centers. The proposed regional express bus network is significantly restructured from the one identified in the RTP. Depending on the corridor and destination, express routes will operate either one-way peak period service, two-way peak service, or two-way all day service. Two all-day

express services will provide direct connections to the expanded high-capacity transit network. The proposed arterial BRT and express bus networks are identified in **Figure 18**.

Finally, Scenario III includes additional paratransit service near new Supergrid routes to meet ADA requirements and funding for a regional ADA administration program. This scenario also contains funding for street-side passenger bus stops and new vehicles necessary to operate additional service.

Table 24: Proposed Scenario III Service Improvements

Service Type	*Corridor*	Description	Rationale
Regional Connector	*Grand Ave (Wickenburg to Glendale)*	Service level increase	Address demand for urban area connections
	SR 85 (Gila Bend to Phoenix)	Service level increase	Address demand for urban area connections
	Hidden Valley (I-10 West to Pinal County Line)	New route	Key north-south regional corridor with high demand
Supergrid	*Olive Ave (Litchfield Rd to SR-303)*	West Extension	New service to logical terminus
	Camelback Rd (Litchfield Rd to SR-303)	West Extension	New service to logical terminus
	McDowell Rd (Litchfield Rd to SR-303)	West Extension	New service to logical terminus
	Peoria Ave/Thunderbird Ave (111th Ave/Grand Ave to ThunderbirdRd/SR-303)	West Extension	New service to logical terminus
	Main St/Apache Trl (Power Rd to Pinal County Line	East Extension	New service to logical terminus
	Queen Creek Rd (Power Rd to Pinal County Line)	East Extension	New service to logical terminus
	Ellsworth Rd (McKellips Rd to Chandler Heights Rd)	New Route	Key north-south corridor with high growth
	Power Rd (Queen Creek Rd to Chandler Heights Rd)	South Extension	New service to logical terminus
	Tatum/Cave Creek Rd (Deer Valley Rd to Carefree Hwy)	North Extension	New service to logical terminus
	Bell Rd (SR 303 to Sun Valley Parkway)	West Extension	New service to logical terminus
	Sun Valley Parkway (Miller Rd/MC 85 to Grand Ave)	New Route	Key north-south corridor with high growth
	Van Buren St (Litchfield Rd to Verrado Way)	West Extension	New service to logical terminus
	McKellips Rd (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Southern Ave (Power Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Baseline Rd (Dobson Rd to Ellsworth Rd)	East Extension	New service to logical terminus
	Buckeye Rd/Yuma Rd (Litchfield Rd to Miller Rd)	West Extension	New service to logical terminus
	Cotton Ln (Grand Ave to MC-85)	New Route	New service to logical terminus
	Scottsdale Rd(SR-101 (Pima) to Carefree Hwy)	North Extension	New service to logical terminus
	16th St	Increased service	Operate at Standard Regional Service Level
	19th Ave	Increased service	Operate at Standard Regional Service Level
	35th Ave	Increased service	Operate at Standard Regional Service Level
	44th/Tatum Blvd	Increased service	Operate at Standard Regional Service Level

Service Type	*Corridor*	Description	Rationale
	59th Ave	Increased service	Operate at Standard Regional Service Level
	7th Ave	Increased service	Operate at Standard Regional Service Level
	7th St	Increased service	Operate at Standard Regional Service Level
	83rd Ave	Increased service	Operate at Standard Regional Service Level
	83rd Ave\75th Ave	Increased service	Operate at Standard Regional Service Level
	99th Ave	Increased service	Operate at Standard Regional Service Level
	Alma School Rd	Increased service	Operate at Standard Regional Service Level
	Baseline Rd	Increased service	Operate at Standard Regional Service Level
	Bell Rd	Increased service	Operate at Standard Regional Service Level
	Broadway Rd	Increased service	Operate at Standard Regional Service Level
	Buckeye Rd	Increased service	Operate at Standard Regional Service Level
	Camelback Rd	Increased service	Operate at Standard Regional Service Level
	Chandler Blvd	Increased service	Operate at Standard Regional Service Level
	Country Club/Arizona	Increased service	Operate at Standard Regional Service Level
	Dobson Rd	Increased service	Operate at Standard Regional Service Level
	Dunlap	Increased service	Operate at Standard Regional Service Level
	Elliot Rd	Increased service	Operate at Standard Regional Service Level
	Gilbert Rd	Increased service	Operate at Standard Regional Service Level
	Glendale Ave\24th St	Increased service	Operate at Standard Regional Service Level
	Greenfield Rd	Increased service	Operate at Standard Regional Service Level
	Hayden Rd\McClintock	Increased service	Operate at Standard Regional Service Level
	Indian School Rd	Increased service	Operate at Standard Regional Service Level
	Litchfield Rd	Increased service	Operate at Standard Regional Service Level
	Main St/Apache Blvd	Increased service	Operate at Standard Regional Service Level
	McDowell Rd/McKellips Rd	Increased service	Operate at Standard Regional Service Level
	Peoria Ave	Increased service	Operate at Standard Regional Service Level
	Power Rd	Increased service	Operate at Standard Regional Service Level
	Queen Creek Rd	Increased service	Operate at Standard Regional Service Level
	Ray Rd	Increased service	Operate at Standard Regional Service Level
	Scottsdale\Rural Rd	Increased service	Operate at Standard Regional Service Level
	Southern Ave	Increased service	Operate at Standard Regional Service Level
	START Dysart	Increased service	Operate at Standard Regional Service Level
	Thomas Rd	Increased service	Operate at Standard Regional Service Level
	Thunderbird Rd	Increased service	Operate at Standard Regional Service Level
	University Dr	Increased service	Operate at Standard Regional Service Level
	Van Buren St	Increased service	Operate at Standard Regional Service Level
Arterial BRT	*Arizona Ave, Chandler Blvd to Alma School/Ocotillo*	Service level increase	Integral component of integrated arterial BRT, HCT and express bus network
	Baseline Rd, Country Club Dr/Baseline Rd to 51st Ave/Baseline Rd	Service level increase	Integral component of integrated arterial BRT, HCT and express bus network
	Glendale Ave, Litchfield Rd to 59th Ave	New route	Integral component of integrated arterial BRT, HCT and express bus network
	Bell Rd, Litchfield Rd to Scottsdale Airpark	New route	Integral component of integrated arterial BRT, HCT and express bus network
	59th/51st Ave, Union Hills Dr to 51st Ave/Baseline Rd	New route	Integral component of integrated arterial BRT, HCT and express bus network
	Chandler Blvd, ASU Polytechnic to 54th St	Service level increase	Integral component of integrated arterial BRT, HCT and express bus network
	Power Rd, McDowell Rd to ASU Polytechnic	New route	Integral component of integrated arterial BRT, HCT and express bus network
	Litchfield Rd, Grand Ave/Bell Rd to Lower Buckeye Rd	New route	Integral component of integrated arterial BRT, HCT and express bus network
	Dunlap/Peoria/Shea, 99th Ave/Glendale Ave to Frank Lloyd Wright Blvd	New route	Integral component of integrated arterial BRT, HCT and express bus network
Express Bus	*US-60, Queen Creek to Price Rd/SR 101L LRT (Queen Creek Express)*	New route	Service to high-growth area with substantial demand

Service Type	*Corridor*	Description	Rationale
	SR-101L (Price/Pima Fwy), Germann Rd to Scottsdale Airpark	Service level increase	Improved service to meet regional standards
	I-10, 379th Ave to Avondale Blvd (Buckeye Express)	Service level increase	Improved service to meet regional standards
	I-10 East/Pinal County, Pinal County line to State Capitol	New route	Service to high-growth area with substantial demand
	I-10 East, 44th St/Pecos Rd to State Capitol (I-10 East RAPID)	Service level increase	Expanded trips needed to serve high-demand peak commute corridor
	I-17, Happy Valley Rd to Anthem (Black Canyon Fwy Connector)	Service level increase and extension	Service in high growth area with substantial demand
	SR 101L (Agua Fria Fwy), Bell Rd/SR 101L to 79th Ave/I-10 park-and-ride	Service level increase	More trips needed to serve high-demand peak commute corridor
	SR 303L, Grand Ave/Bell Rd to Happy Valley/I-17 Park-and-ride	New route	Service to high-growth area
	SR 202L (Red Mountain Fwy), Power Rd to Downtown Tempe/ASU	Service level increase	Expanded trips needed to serve high-demand peak commute corridor
	Apache Junction, Signal Butte Rd to Pinal County Line	Route extension	New service to logical terminus
HCT Peak	*HCT NW Corridor (Grand Ave Corridor)*	New service	Serves high demand commuter corridor
	HCT SE Corridor (Queen Creek)	New service	Serves high demand commuter corridor
	HCT SW Corridor (Yuma RR Corridor)	New service	Serves high demand commuter corridor
HCT All Day	*Arizona Ave/Country Club Dr, Frye Rd to Main St*	New corridor	Demand in corridor is very high
	Thomas, 99th Ave to SR-101 (Price)	New corridor	Demand in corridor is very high
	Rural\Scottsdale Rd, Chandler Blvd to SR 101 (Pima)	Route extension	Demand in corridor is very high
	West Phoenix Corridor Phase 2, 79th Ave/I-10 to Glendale Ave/SR 101 [Agua Fria]	Route extension	Connects regional activity centers
	Mesa Extension Phase 2, Main St/Mesa Dr to Power Rd/Southern Ave	Route extension	Connects regional activity centers
	Thomas Phase 2, 99th Ave to Litchfield Rd	Route extension	Demand in corridor is very high
	Northwest Extension Phase 3, 25th Ave/Mtn View to Happy Valley Rd/I-17	Route extension	Connects key regional activity centers
	Central Phoenix East, Camelback/SR-51 to 44th St/Washington	New corridor	Connects key regional activity centers
	Central Phoenix South, Washington St to Baseline Rd	Route extension	Demand in corridor is very high

Source: MAG/Consultant project team
*Indicates replacement of one mode by another (as identified in the RTP) that offers superior service.
**Indicates replacement of one mode by another that offers superior service.

Figure 16 Proposed 2030 Scenario III Supergrid Bus and Regional Connector Net

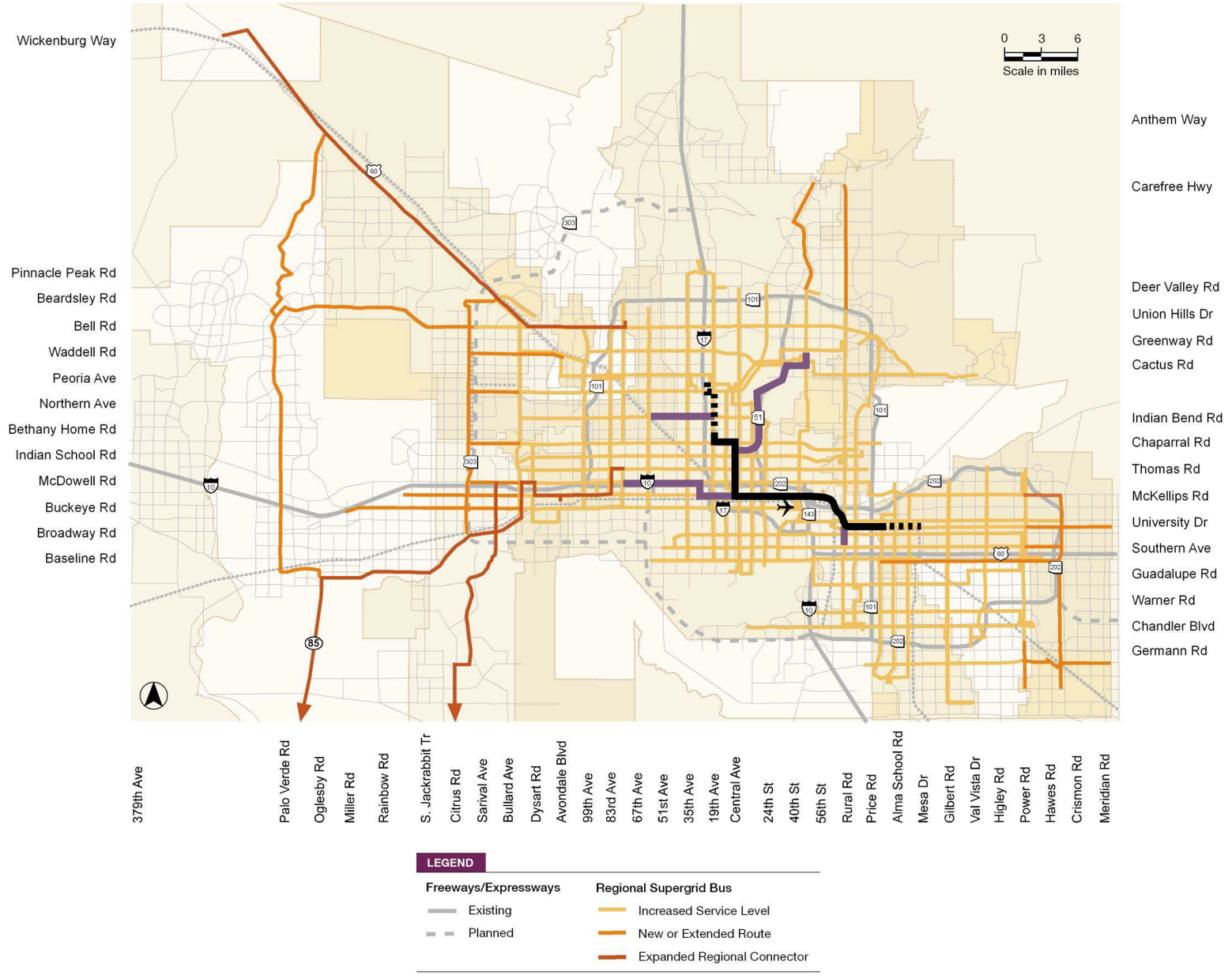


Figure 17: Proposed 2030 Scenario III Supergrid and Express Bus Network

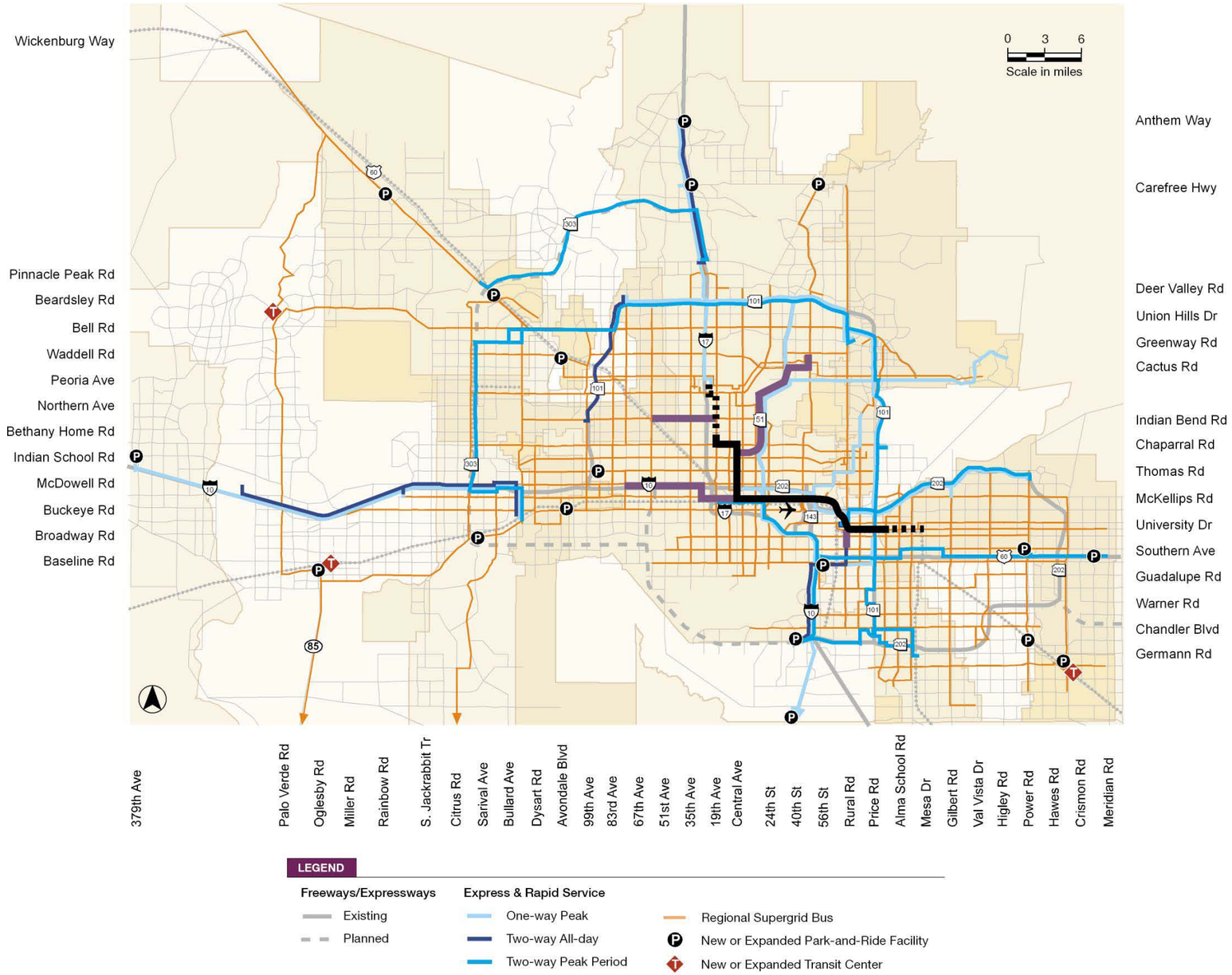
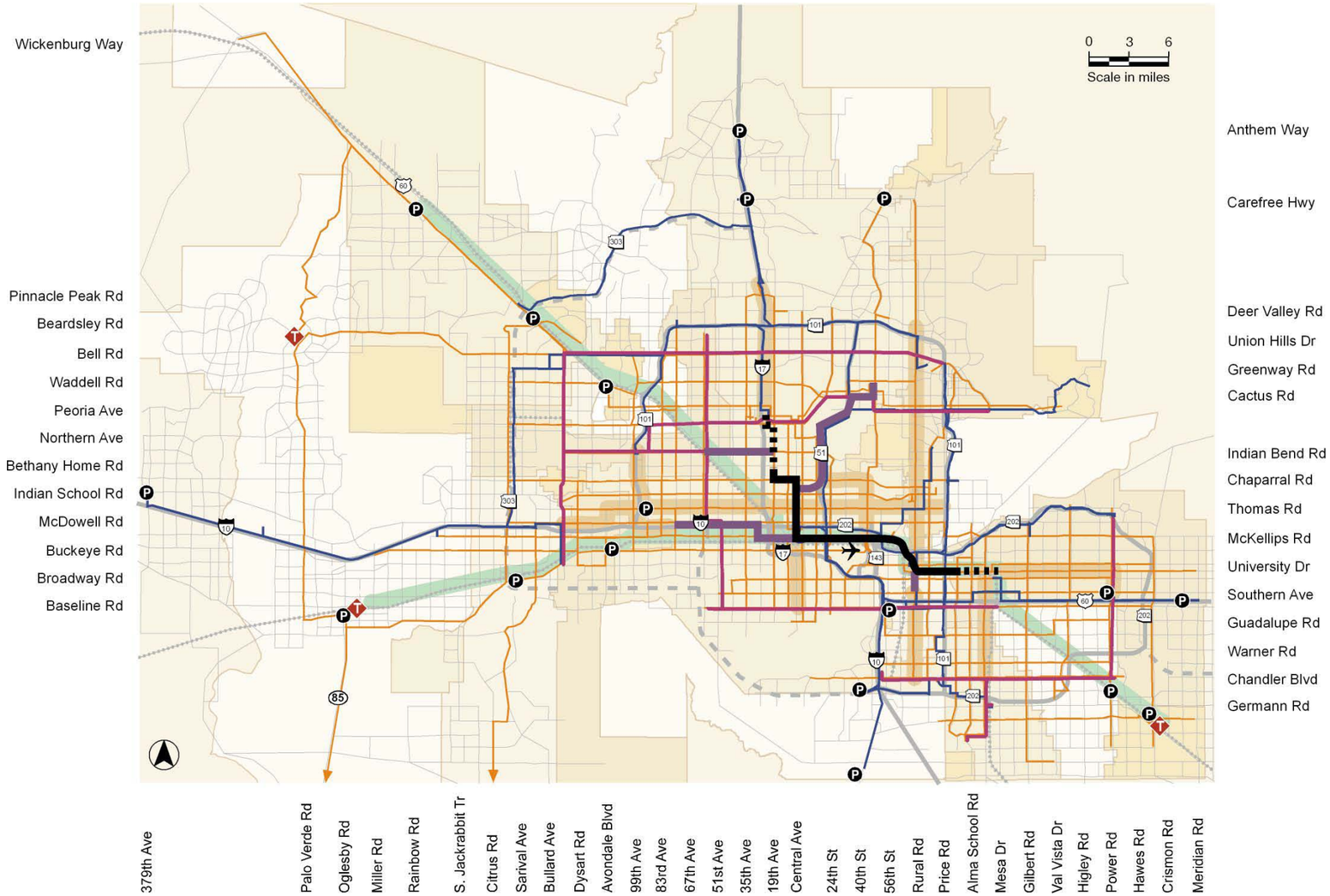


Figure 18: Proposed 2030 Scenario III HCT, Arterial BRT & Express Bus Network



To accommodate the transit service enhancements identified in **Table 25**, two new fixed route O&M facilities, several park-and-ride facilities, and three transit centers will be required. **Table 25** shows the new passenger facilities that Scenario III adds to the RTP base after 2015.

Table 25: Proposed Scenario III Capital Facilities

Facility Type	Location*	Rationale
Fixed Route Operations & Maintenance	To be determined	Facility needed to service expanded vehicle fleet
	To be determined	Facility needed to service expanded vehicle fleet
Park-and-Ride	79th Ave/Thomas Rd	Relieve 79th Ave/I-10 facility and serve Thomas Road HCT
	Grand Ave/SR-303L	Needed to serve Grand Ave HCT corridor
	Grand Ave/Thunderbird Rd	Needed to serve Grand Ave HCT corridor
	379th Ave/I-10	Needed to serve improved Buckeye express
	Avondale Blvd/I-10	Needed to serve improved Buckeye express
	Anthem Way/I-17	Serve Anthem area
	Queen Creek Rd/Ellsworth Rd	Needed to serve HCT and Supergrid routes
	Pecos Rd/44th St expansion	Programmed facility size is insufficient to meet expected future demand
	Baseline Rd/I-10	Needed to serve Baseline Rd BRT
	US 60/Signal Butte Rd	Needed to serve Superstition Springs Connector
	Superstition Springs Expansion	Needed to serve Superstition Springs Connector
	MC 85/Buckeye Rd	Needed to serve Buckeye Rd Supergrid, Buckeye Express, and Sun Valley Pkwy Supergrid
	Cotton Lane/Buckeye Rd	Needed to serve Cotton Lane Supergrid
	Riggs Rd/MC-387 or I-10 East	Needed to serve Pinal County Express
	I-17/Carefree Hwy	Needed to serve I-17 RAPID needs
	ASU Polytech/Gateway Airport	Needed to serve HCT
	Cave Creek Rd/Carefree Hwy	Needed to serve I-17 RAPID needs
	US 60/Dove Valley Rd	Needed to serve Grand Ave HCT
Transit Center	Sun Valley Pkwy/Bell Rd	Provides transfer location for new supergrid routes
	Queen Creek Rd/Ellsworth Rd	Needed to serve HCT and Supergrid routes
	MC 85/Buckeye Rd	Needed to serve HCT and Supergrid routes

Source: MAG/Consultant project team
*All locations are approximate.

The expansion of arterial BRT, HCT peak-period, and HCT all-day service would also require additional infrastructure investments to properly accommodate passengers using the transit services. Arterial BRT investments include passenger stations, Transportation Signal Priority equipment, and ticket vending machines. Arterial BRT vehicles are accounted for separately. HCT investments include vehicles, allowances for O&M facility development, passenger stations, TSP equipment, right-of-way and other capital infrastructure. **Table 26** identifies the corridors that would require infrastructure investments to operate arterial BRT or HCT service.

Table 26: Proposed Scenario III Corridor Infrastructure Investments

Service Type	*Corridor*	Corridor Length
Arterial BRT	*Arizona Ave*	9.4 miles
	Baseline Rd	20.7 miles
	Glendale Ave	10.1 miles
	Bell Rd	26.5 miles
	59th/51st Ave	20.6 miles
	Power Rd	11.7 miles
	Litchfield Rd	15.8 miles
	Dunlap/Peoria	29.2 miles
HCT Peak Period	*HCT NW Corridor*	35.9 miles
	HCT SE Corridor	32.5 miles
	HCT SW Corridor	30.6 miles

Service Type	*Corridor*	Corridor Length
HCT All Day	*Arizona Ave/Country Club Dr (Frye Rd to Main St)*	8.1 miles
	Thomas (99th Ave to SR-101 [Price])	21.5 miles
	Rural/Scottsdale Rd (Chandler Blvd to SR-101 [Pima])	24.3 miles
	West Phoenix Phase 2 (79th Ave/I-10 to Glendale Ave/SR-101 [Agua Fria])	7.7 miles
	Mesa Extension Phase 2 (Main St/Mesa Dr to Power Rd/Southern Ave)	9.6 miles
	Thomas Phase 2 (99th Ave to Litchfield Rd)	6.2 miles
	Northwest Extension Phase 3(25th Ave/Mtn View to Happy Valley Rd/I-17)	9.7 miles
	Central Phoenix East (Camelback/SR-51 to 44th St/Washington)	7.9 miles
	Central Phoenix South (Baseline Rd to Washington St)	4.9 miles
	Thomas (99th Ave to SR-101 [Price])	21.5 miles

Source: MAG/Consultant project team
*Includes only the corridor from Shea Blvd to Scottsdale Airpark.
Scottsdale Rd arterial BRT capital investments south of Shea Blvd are funded by current RTP.

In summary, Scenario III focuses on the following regional transit investments:

- Preserving RTP-funded services;
- New and expanded regional connector service;
- Extensions of several Supergrid routes and substantial new service in the West Valley (and elsewhere);
- New arterial BRT routes and improvement of RTP routes to meet regional service standards;
- Development of new all-day, high-capacity transit service in key regional corridors—which in some cases would replace and upgrade arterial BRT service programmed in the RTP;
- New peak-period, high-capacity transit service in three corridors that contain existing freight rail (Union Pacific and BNSF) lines;
- New and expanded express bus service;
- Two new fixed-route maintenance O&M facilities; and
- Several new park-and-ride facilities and transit centers.

7.6 *Comparison of Services within Freight Rail Corridors by Scenario*

Each of the three scenarios include transit services within or parallel to existing freight rail corridors. Services were proposed for each corridor based on the level of funding assigned to the scenario, a corridor's ability to attract riders during peak travel periods and throughout the day, and how a corridor relates to other services in each respective scenario. A more detailed analysis of the individual corridors would be necessary to determine operational feasibility and potential constraints. Please note that all of the service concepts remain within the borders of Maricopa County. Analyzing the corridors in the context of intra-county connections may potentially validate different service types. **Table 27** provides a summary of the proposed services within or adjacent to freight rail corridors by scenario.

Table 27: Summary of Proposed Services within or Adjacent to Freight Rail Corridors

Corridors	To	From	Scenario I	Scenario II	Scenario III
Buckeye Rd/MC-85/ UP Yuma-West	Downtown Phoenix	SR-303L (Estrella Fwy)	---	HCT Peak Period	HCT Peak Period
Buckeye Rd/MC-85 UP Yuma-West	SR-303L (Estrella Fwy)	Town of Buckeye	---	---	HCT Peak Period
Grand Ave/BNSF	Downtown Phoenix	Bell Rd	Express	HCT Peak Period	HCT Peak Period
Grand Ave/BNSF	Bell Rd	SR-303L (Estrella Fwy)	---	HCT Peak Period	HCT Peak Period
Grand Ave/BNSF	SR-303L (Estrella Fwy)	Town of Wickenburg	Regional Connector	Regional Connector	HCT Peak Period (portion of corridor)
Rittenhouse Rd/ UP Southwest	UP Chandler Branch	Power Rd	---	HCT Peak Period	HCT Peak Period
Rittenhouse Rd/ UP Southwest	Power Rd	Town of Queen Creek	---	---	HCT Peak Period
Arizona Ave/ UP Chandler Branch	Main St	Downtown Chandler	Arterial BRT	Arterial BRT	HCT All Day
Arizona Ave/ UP Chandler Branch	Downtown Chandler	Sun Lakes	---	---	Arterial BRT
Kyrene Rd/I-10 UP Tempe Branch	Pecos Rd	Downtown Tempe/ASU	---	Express	Express

Source: MAG/Consultant project team

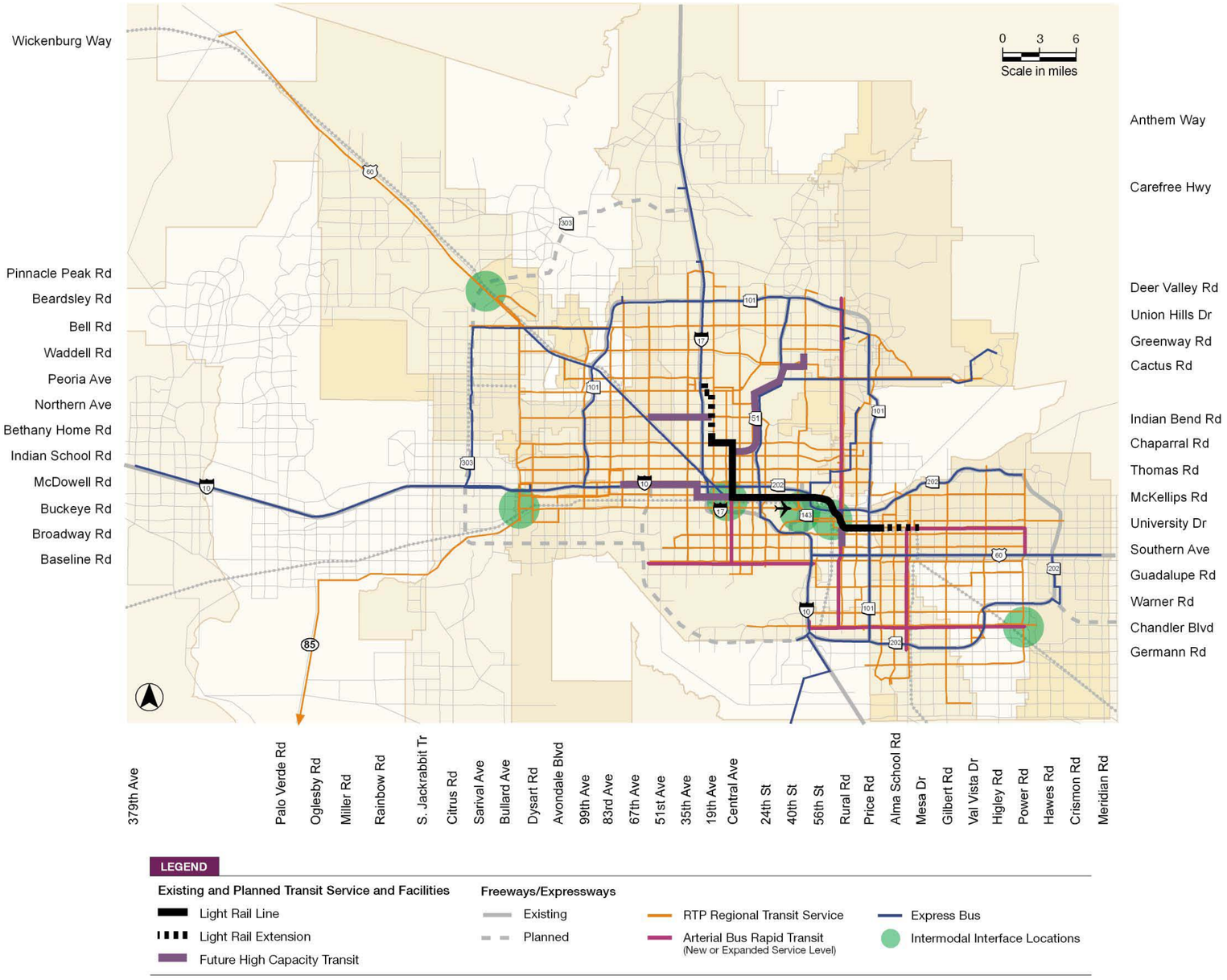
7.7 *Regional Intermodal Connections*

Connecting transportation modes including bus, rail, auto (freeways), air travel, and other modes is important to provide seamless travel throughout the region. Accommodating transfers between modes can facilitate transfers between transit modes including higher speed services (local bus to express bus\BRT\train); assist in relieving congestion (transfer from car to bus\train in congested freeway corridor); and accommodate regional circulation for intercity travel (transfer from intercity bus\train\airplane to regional bus\train). Several strategic locations throughout the region have been identified as potential intermodal connection points.

- Phoenix Sky Harbor Airport Area
- Downtown Tempe\Arizona State University Area
- Downtown Phoenix Area
- Phoenix-Mesa Gateway Airport Area
- Northwest Valley Loop 303 Area (near US 60 and SR 303 Loop)
- Southwest Valley (near Phoenix-Goodyear Airport)

Figure 19 illustrates the general areas within the region where intermodal connections will likely need to be accommodated.

Figure 19: Potential Intermodal Connection Locations



7.8 *Regional Transit Mobility Scenarios Comparison of Performance*

The MAG regional travel demand model produces transit performance statistics that allow users to compare the relative performance of alternative scenarios. Two primary statistics, passenger boardings and transit mode share, indicate overall utilization of the transit investments proposed and the impact that these investments have on the region's ability to attract new users.

7.8.1 Estimated Transit Patronage by Scenario

Transit ridership or passenger boarding is a simple count of the number of passengers that boarded a transit vehicle. Data from the MAG regional travel demand model indicates that as additional investment in transit is made and a more comprehensive and integrated regional transit system is provided, passenger boardings increase. A comparison of projected daily passenger boardings and revenue miles (service supplied) is provided in **Table 28**. The change in ridership from the RTP Base to Scenario I is minimal; however, comparing the RTP Base Scenario to Scenarios II and III shows an increase in ridership of 15.6% and 30.2% respectively. In terms of efficiency, measured as the number of boardings generated per revenue mile supplied, the RTP Base Scenario and Scenario I are equally efficient, while Scenarios II and III are slightly less efficient than the RTP Base Scenario. This difference in efficiency is largely based on the level of service expansion in Scenarios II and III to areas of the region that are less densely populated than in the more limited service area covered by the RTP Base Scenario and Scenario I.

Table 28: Estimated Annual Passenger Boardings and Revenue Miles

Scenario	Estimated Annual Boardings	Revenue Miles	Boardings per Revenue Mile
FY 2009 Actual	71,251,667	33,409,055	2.1
RTP Base	117,263,664	51,754,584	2.3
Scenario I	120,220,716	53,006,142	2.3
Scenario II	135,585,156	70,232,190	1.9
Scenario III	152,660,088	78,837,864	1.9

Sources: MAG regional travel demand model, July 2009
RPTA Revised FY 2008-2009 Annual Ridership Report, July 2009

7.8.2 Estimated Transit Patronage by Mode

Transit ridership by mode shows the percent of ridership by scenario. The RTP Base Scenario and Scenario I have no new HCT investments (beyond what is included in the RTP) and as a result, slightly more than two-thirds of passenger boardings occur on Supergrid or local bus routes. Scenario II has slightly smaller percentage of riders on Supergrid and local buses; however, Scenario III significantly reduces the percentage of passengers on the Supergrid and local service to just over one-half of the passengers by providing increased coverage of HCT services throughout the region. This could translate into more efficient operations as HCT services generally operate at higher speeds and can carry more passengers per operator and vehicle than Supergrid and local bus service.

Table 29: Estimated Weekday Passenger Boardings by Mode

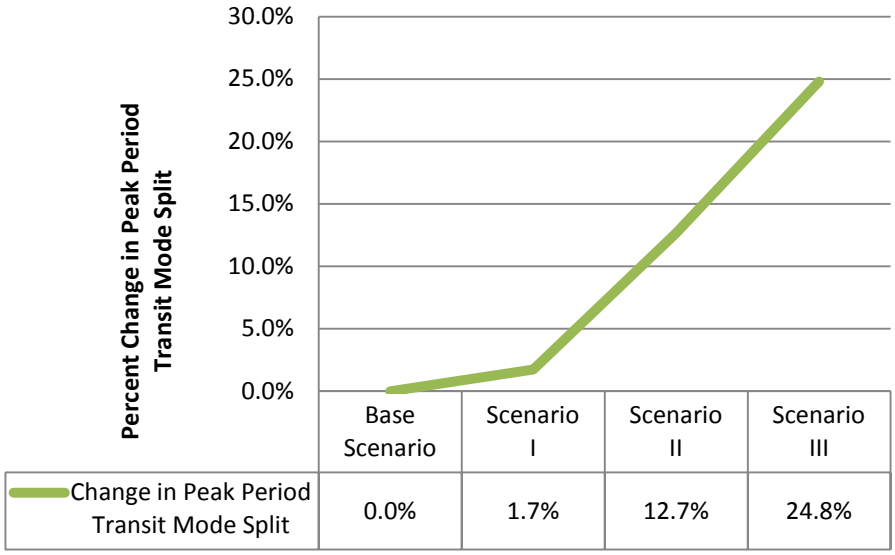
Scenario	Supergrid & Local	Express	Arterial BRT	HCT Peak & All Day	Total
FY 2009 Actual	89.8%	3.0%	0.2%	7.0%	100.0%
RTP Base	70.5%	2.1%	2.0%	25.4%	100.0%
Scenario I	68.8%	2.1%	3.7%	25.4%	100.0%
Scenario II	64.2%	2.2%	6.8%	26.8%	100.0%
Scenario III	55.5%	1.8%	4.0%	38.7%	100.0%

Sources: MAG regional travel demand model, July 2009
RPTA Revised FY 2008-2009 Annual Ridership Report, July 2009

7.8.3 Transit Mode Split by Scenario

Transit mode split is a measure of the percent of trips in the region that are accommodated through transit as opposed to other modes such as automobiles. Because travel by automobile is the single highest utilized travel mode in the region, even small changes to peak period mode split can have a significant impact on roadway performance (i.e. congestion). Results from the regional travel demand model indicate that transit's mode split during the peak period for the RTP Base Scenario is 3.2%. Compared to the RTP Base Scenario, Scenario III has the greatest change in peak period transit mode split from 3.2% of all trips to 4.0% (a 24.8% increase). This change in peak period mode split is significant as it represents nearly 38,000 additional person trips that switched from primarily automobiles to transit during the peak period. **Figure 20** illustrates the change in peak period transit mode split from the RTP Base Scenario for each alternative transit scenario.

Figure 20: Change in Peak Period Transit Mode Split from the RTP Base Scenario



Source: MAG regional travel demand model, July 2009

7.8.4 Factors Affecting Projected Ridership

A number of factors can affect transit ridership including but not limited to population density, employment density, land use (including Transit Oriented Development), and parking availability\cost. When modeling the regional transit mobility scenarios the base assumptions used in the regional travel

demand model for these variables were not changed. It is likely that with the additional investments in HCT All Day service in Scenarios II and III, population density, employment density and land use would likely be affected within the HCT ALL Day service investment corridors. Adjustments to these variables can positively affect actual and projected ridership; however, the modeling exercise didn't account for changes to land use resulting from investments in transit. With consideration to the relationship between transit and development, it is reasonable to assume that projected ridership for Scenarios II and II could potentially be higher. Likewise, as transit investments are made throughout the region, local support of transit oriented development (TOD) and other land use management tools can be vital to shaping an urban form that is complimentary to public transit. Chapter 10 of this report provides a summary of potential TOD, parking and other land use measures that should be coordinated with transit investments.

8.0 REGIONAL TRANSIT FRAMEWORK FINANCIAL SUMMARY

8.1 *Introduction*

The Regional Transit Framework scenarios were based on the region's needs and deficiencies as well as other factors, including regional connectivity and integration with other transportation modes. However, another important factor that influenced the transit services and capital investments identified in each scenario was the establishment of financial assumptions for the revenue limits assumed for each scenario. This chapter summarizes the revenue and expense assumptions for each scenario.

8.2 *History of Transit Funding*

Transit funding in the region has historically been provided by local municipalities and regional and federal sources. In 1985, a regional transportation sales tax (0.50%) was approved by voters to primarily fund a regional urban freeway system. A limited amount of funding was ($4 million annually) allocated for public transportation. These revenues were used to support a limited number of local, regional and express bus routes and capital investments such as local match for transit vehicles. However, throughout the life of the sales tax (1985 to 2005), local municipalities provided a majority of funding for transit in the region.

In 2004, voters approved Proposition 400, which provided an additional 20 years of regional transportation funding (2006 through 2026). While, Proposition 400 provides additional funding for public transit, it is still only equivalent to a 0.17% regional sales tax for transit[3]. Compared to the MAG Peer regions, several peers have a 1.0% regional sales tax to support public transportation plus other local and regional taxes\revenue sources.

Both historically and currently, local revenues applied towards public transit represent a greater percent of total annual revenue available for public transportation than regional sales tax sources. A list of the major local revenue sources is provided below; however, other municipalities contribute to the provision of public transportation:

- Local Sales Tax-City of Phoenix (0.40%);
- Local Sales Tax-City of Tempe (0.50%); and,
- Local Sales Tax-Glendale, Peoria and Scottsdale (varies).

Local revenue sources fund a variety of transit services and capital infrastructure needs, including the support of regional services such as supergrid and express bus service. Some revenue sources will expire and will require future voter approval to extend, while others do not

8.3 *General Revenue Assumptions*

Revenue assumptions for each scenario were derived from comparisons to peer regions. Since the framework establishes a guide for future regional planning, and does not represent a financially constrained implementation plan, no assumptions were made about the source of future revenue. In theory, revenue could be generated from local sources, regional sources, user fees, or a combination of sources. The revenue assumptions for each scenario are described below:

[3] The transit element of the Proposition 400 sales tax is 33% of the 0.50% sales tax rate, which is equivalent to a sales tax rate of 0.17%.

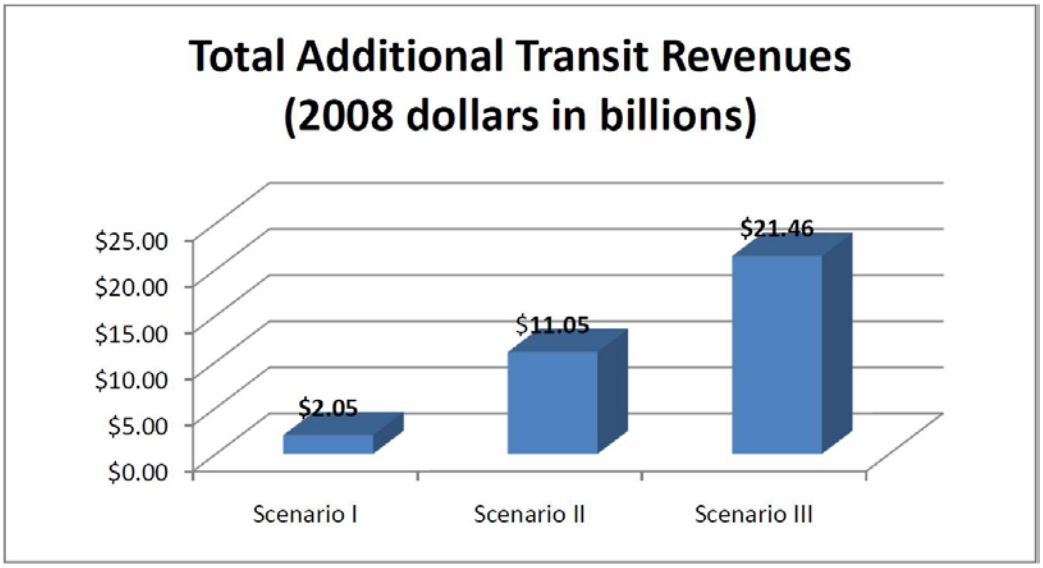
Scenario I – This scenario provides additional revenue beginning in 2027 equivalent to the current regional transportation sales tax (approved by voters through Proposition 400). This scenario would maintain the regional transit system already in place by 2027 and provide limited funding for expansion of the regional bus network. In year 2008 constant dollars, this scenario would produce an estimated $2.05 billion between 2027 and 2030.

Scenario II – The analysis of peer regions was used to establish revenue thresholds for Scenarios II and III. The Scenario II threshold is based on a revenue source or sources that could provide (per capita) revenue approximately equivalent to the peer regions' average 2006 transit expenditures per capita. It is important to note that one region (Seattle) has since passed a voter approved measure to provide an additional half-cent sales tax dedicated for regional transit use. However, based on indexing this scenario's financial threshold to the 2006 peer region average, an additional $11.05 billion (in 2008 dollars) for transit in the MAG region is assumed for the period from 2015 to 2030. These dollars are assumed to be new revenue that will not replace any portion of the current regional transportation tax (or other current transit funding).

Scenario III – Like Scenario II, this scenario assumes the continuation of all regional and local transit funding sources through year 2030. It also assumes an additional $21.46 billion in transit revenue between 2015 and 2030). The revenue (per capita) for investment would be comparable to the 2006 average annual rail and bus transit expenditures per capita in the Seattle region (adjusted for the difference in cost of living between the Seattle and MAG regions).

Figure 21 compares the assumed additional regional transit revenue by scenario. This report uses year 2008 constant dollars throughout.

Figure 21: Assumed Additional Regional Transit Revenue



Source: HDR Engineering, Inc.

8.4 *Expenditure Assumptions*

Expenditures represent the estimated costs associated with implementing, developing, purchasing operating and maintaining the transit elements defined in each scenario. Expenditure estimates were calculated for individual expense categories using unit cost variables. This method produces "order of magnitude" cost estimates that can be used to compare the cost differences between scenarios.

8.4.1 Expenditure Categories

Expenditures were classified in two primary categories: operations (including maintenance and administration) and capital. Within the operations and capital categories, subcategories provide additional detail about the allocation of expenditures. Operations expenditures include:

- **Fixed Route Transit Service**
  - Regional Connectors
  - Local (dollar allocation only, no services specifically defined)[4]
  - Supergrid
  - Express
  - Arterial BRT
  - HCT All Day
  - HCT Peak Period
- **Other**
  - Regional ADA Administration
  - ADA Expansion
  - Intelligent Transportation Systems
  - Safety and Security
  - Regional Services (e.g., customer service web site, transit book, etc.)
  - Contingency
  - Operating Reserve

Capital investments include:

- **Transit Fleet**
  - Regional Connectors
  - Local Bus (dollar allocation only, no services are defined)
  - Supergrid Bus
  - Express
  - Arterial BRT
  - Paratransit Expansion
  - Vanpool Expansion
  - HCT Vehicles
  - Contingency

[4] Local transit services such as neighborhood circulators and local fixed route bus are critical to supporting a regional transit program. Several communities in the region currently fund local transit services through local revenue sources; however, not all communities have or fund local services and those that do, may need additional resources to meet current to projected demand. Therefore, a funding allocation to support local transit services is provided in Scenarios II and III. A local funding allocation is not included in Scenario I, due to its low level of additional funding; however, deficiencies in local transit services will remain unmet. The local funding allocation is intended to provide new and expanded local services along with associated capital.

- **Transit Facilities**[5]
  - Supergrid Bus Stops
  - Park-and-Ride Facilities
  - Transit Centers
  - HCT and Arterial BRT Corridor Infrastructure Improvements (includes right-of-way, guideway, power transmission equipment, passenger stations, signal priority equipment, ticket machines, basic amenities)
  - Bus, Rail and ADA O&M Facilities
  - Contingency

8.5 *Unit Cost Variables*

Unit cost assumptions for operations and capital investments were derived from local experience. Standard calculation methods were used to develop quantities for transit operations, the fixed route bus fleet, and street-side passenger facilities. The unit cost variables are provided in **Table 30.**

Table 30: Unit Cost Variables

Category	Subcategory	Unit	Unit Cost
Operations	Regional Connectors & Supergrid Bus	Revenue Mile	$6.00
	Local Bus	Dollar Allocation	Varies
	Arterial BRT & Express	Revenue Mile	$8.00
	HCT Peak	Revenue Mile	$14.03
	HCT All Day	Revenue Mile	$20.00
	ADA Administration	Fixed Cost	Approx $1.29 million annually
	ADA Expansion	Fixed Route Revenue Mile	$3.51
	Intelligent Transportation Systems (ITS)	% of Annual Operating Cost	3%
	Safety and Security	% of Annual Operating Cost	3%
	Regional Services	% of Annual Operating Cost	3%
	Contingency	% of Annual Operating Cost	2.5%
	Operating Reserve	% of Annual Operating Cost	12%
Capital – Fleet	Regional Connectors & ADA	Vehicle	$80,000
	Supergrid & Express Bus	Vehicle	$500,000
	Arterial BRT	Vehicle	$800,000
	Vanpool	Vehicle	$32,000
	Contingency	% of Vehicle Purchase Cost	10%
Capital - Facilities	Supergrid Bus Stops	Corridor Mile	$33,500
	Park-and-Ride Facilities	Facility	$13,000,000
	Transit Centers	Facility	$8,000,000
	Arterial BRT Corridor Infrastructure Improvements	Corridor Mile	$540,00
	HCT Peak Corridor Infrastructure Improvements	Corridor Mile	$9,000,000
	HCT All Day Corridor Infrastructure Improvements	Corridor Mile	$85,000,000
	Bus Operations and Maintenance Facilities	Facility	$50,000,000
	Contingency	% of Infrastructure Cost	10%

Source: HDR Engineering, Inc.

[5] The cost of freeway HOV lanes and freeway HOV ramps are not imputed to the transit budget.

8.6 *Estimated Expenditures by Scenario*

Applying the unit costs and service level assumptions identified above, expenditures were estimated for each Scenario. **Table 31** summarizes the expenditures by subcategory. The table clearly shows the change in focus between the three scenarios. Only 42% of the expenditures for Scenario I are used for capital projects. Scenarios II and III expend approximately 47% and 52% of their total expenditures on capital. The expenditures for HCT capital and operations greatly increase in Scenario III over Scenario II. Scenario III includes approximately $10.5 billion for HCT capital and operations, while Scenario II provides less than half as much, or $5.1 billion.

While both Scenarios II and III improve the level of service on regional Supergrid routes, fewer total dollars are spent in Scenario II for Supergrid service. The difference in expenditures is a product of a delay in upgrading Supergrid service levels until closer to 2030 in Scenario II, because less money is available than in Scenario III. While this Framework focuses on regional services, it is recognized that local services are also critical. Therefore, a funding allocation to support local transit services is provided in Scenarios II and III. A local funding allocation is not included in Scenario I, due to its low level of additional funding; however, deficiencies in local transit services will remain unmet. The intent of the local funding allocation is to provide new and expanded local bus and neighborhood circulator services along with associated capital such as bus stops and vehicles to support regional services.

Table 31: Comparison of Estimated Expenditures by Scenario (in 2008 Dollars)

Operations	**Scenario 1**	**Scenario 2**	**Scenario 3**
Supergrid, Express & Regional Connector	$799,108,004	$1,864,102,220	$3,741,768,793
Local Bus	$0	$2,862,112,290	$3,816,149,720
Arterial BRT	$159,094,298	$312,775,859	$471,552,794
HCT Peak	$0	$69,613,914	$81,141,684
HCT All Day	$299,281,920	$1,096,841,984	$1,523,874,058
ADA Expansion & Regional ADA	$97,617,828	$259,902,450	$534,269,703
Other	$99,080,931	$840,041,513	$1,287,943,960
Net Operations Credit	$0	-$1,423,124,278	-$1,423,124,278
Total Operations	**$1,454,182,980**	**$5,882,265,951**	**$10,033,576,433**
Capital			
Regional Fleet	$375,690,000	$897,666,477	$1,058,646,636
Supergrid Bus Stops	$7,577,374	$35,099,097	$25,594,036
Transit Centers	$0	$0	$24,000,000
Park-and-Ride Facilities	$91,000,000	$156,000,000	$234,000,000
Arterial BRT Corridor Infrastructure Improvements	$30,002,400	$48,222,000	$72,684,000
HCT Peak Corridor Infrastructure Improvements	$0	$674,100,000	$890,456,577
HCT All Day Corridor Infrastructure Improvements	$0	$3,298,000,000	$8,488,230,456
Bus Operations and Maintenance Facilities	$50,000,000	$100,000,000	$100,000,000
Other	$37,177,977	$520,908,757	$1,089,361,170
Net Capital Credit	$0	-$560,840,000	-$560,840,000
Total Capital	**$591,447,751**	**$5,169,156,331**	**$11,422,132,875**
Total Expenditures	**$2,045,630,732**	**$11,051,422,282**	**$21,455,709,307**

Source: HDR Engineering, Inc.

9.0 LONG RANGE TRANSIT NEEDS BEYOND 2030

Transit corridors often span multiple jurisdictions and involve complex patterns of land ownership. Transit forecasts help to identify areas within a region that require the strengthening of an existing system as well as planning for new routes, and extending existing routes. If regional transit needs are understood before projected build out occurs it will be easier to work with local communities in order set aside right-of-way for future transit infrastructure. Advance planning for passenger stops, transit only lanes and park-and-ride facilities increases transportation system efficiency and can reduce overall investment costs. In addition, a broad view of future transit patterns, that includes consideration of connectivity to other regions, helps to identify areas within the region that will require additional investment.

9.1 *Analysis of Potential Transit Corridors Beyond 2030*

MAG regional socioeconomic and employment data was used to identify corridors in the region that have a potentially high demand for transit beyond 2030. Detailed analysis of the MAG data identified a focus area west of metropolitan Phoenix that is projected to have the highest employment and population growth by 2050 (see **Table 32**). However, other areas of the region, including those areas that are currently densely developed are projected to continue to have high demand for public transit. The identified focus area includes parts of the Municipal Planning Areas of Avondale, Buckeye, Gila Bend, Goodyear, Surprise, and Wickenburg. The area also includes the Maricopa County portion of the Hassayampa and Hidden Valley Transportation Framework studies.

Table 32: Projected Gross Regional and Focus Area Characteristics, Year 2050

Characteristic	MAG Region-Year 2050	Focus Area-Year 2050
Number of Regional Analysis Zone	169*	30**
Total area (square miles)	11,196	4,555
Projected 2050 resident population in households	6,997,000	1,233,000
Projected 2050 employment	3,594,000	528,000
Population per square mile (density)	625	271
Employment per square mile (density)	321	116

Source: MAG year 2050 socioeconomic projections, May 2009.
*Includes northwestern Pinal County.
**Maricopa County portion of Hassayampa and Hidden Valley Framework study areas (approximately).

To determine the parts of the focus area with the potentially highest demand for transit service, MAG data was analyzed by Regional Analysis Zone (RAZ). This analysis identified 15 relatively high growth areas that form a tier along the west side of SR 303L. **Figure 22** illustrates some *generalized* transit corridors that might link these zones with each other, and with the currently urbanized portion of the Phoenix metropolitan area, by 2050. Future roadway names marked with an asterisk (*) were proposed in the MAG Hassayampa Valley Framework Study. A limited number of the corridors identified in the beyond 2030 analysis are also identified in the three transit mobility scenarios presented in Chapter 7; however, projected growth beyond 2030 may require additional investment to meet transit demand.

1. A future transit corridor (or two corridors, depending on demand), generally following SR 303L, Cotton Lane, and/or the Jackrabbit Trail Parkway*.

2. A corridor generally following the proposed Watson Road Parkway* south from I-10 to the Rainbow Valley area.
3. A corridor generally following the 211th Avenue Parkway* alignment from Sun Valley Parkway to US 60.
4. A corridor along the SR 85 and Turner Parkway* alignments from approximately SR 801 to US 60.
5. Continuation of the US 60 transit corridor (including possible High Capacity All Day service) northwest to the Morristown or Wickenburg area.
6. An east-west corridor generally following Dove Valley Parkway* from Turner Parkway to SR 303L (and possibly beyond).
7. A similar east-west corridor in the vicinity of the proposed White Tanks Freeway* and Jomax Road.
8. Significant transit services/facilities generally in the Sun Valley Parkway and Bell Road corridor.
9. Extension and intensification of express or high-capacity transit service west on I-10 to approximately the Hassayampa River.
10. An additional east-west corridor to supplement I-10, possibly following the Southern Avenue Parkway*, SR 85 or SR 801 alignment.

9.2 *Considerations for Potential Transit Corridors Beyond 2030*

Transit service options are identified in the transit mobility scenarios to serve some of the long-range transit corridors identified in the previous section, but after 2030, upgrades in mode may be required to provide adequate capacity. To ensure future transit access in these corridors, communities and developers may want to consider the following actions:

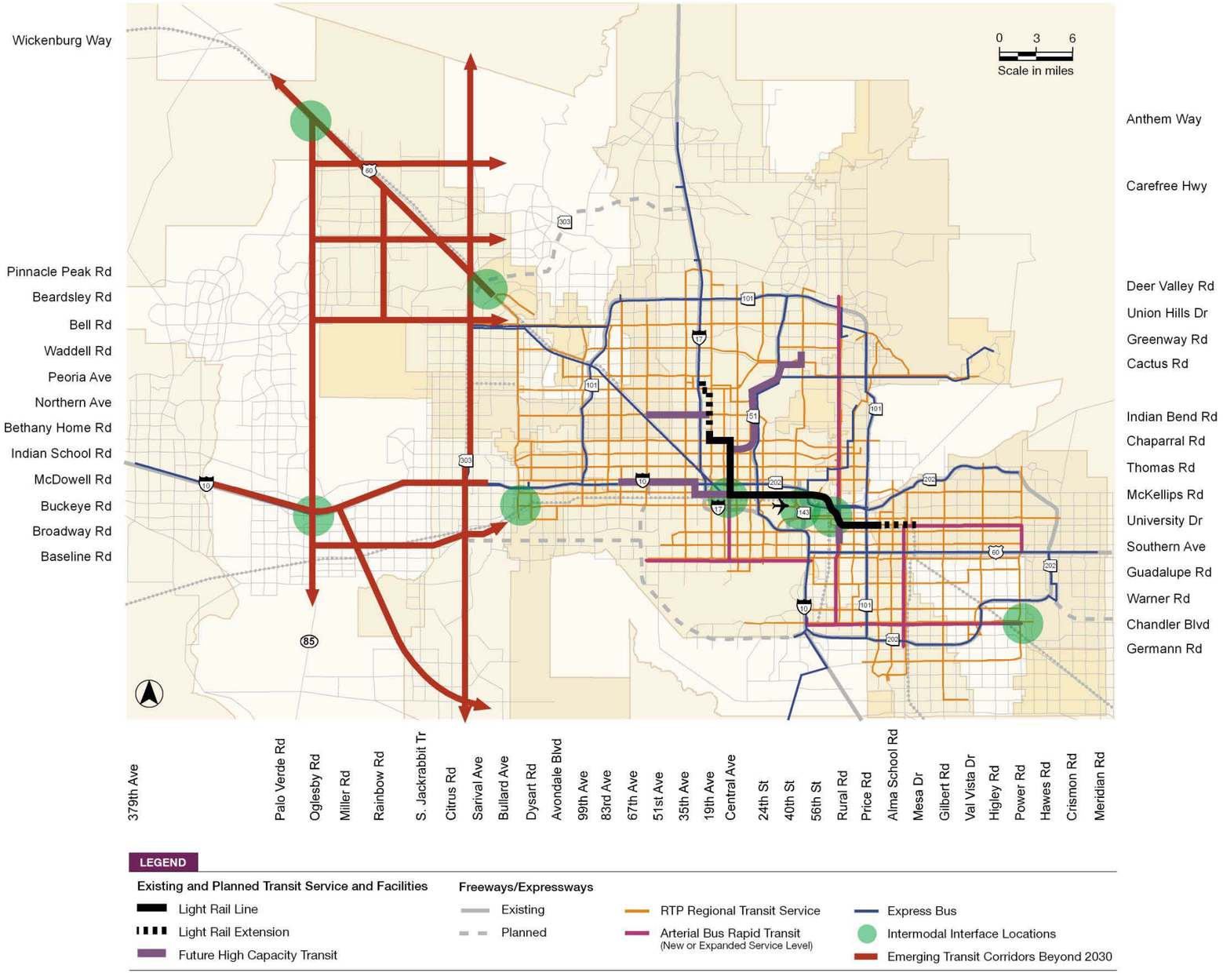
1. *Preserve right-of-way for future transit use in a travel corridor (transitway)*. This measure includes providing adequate space either within or next to a roadway to accommodate a future dedicated transitway. A transitway could support various transit modes from buses to commuter rail. Preservation of right-of-way for this purpose may significantly reduce future costs of implementation.

2. *Incorporate street-side transit-supportive infrastructure in roadway design*. In advance of future transit services, local communities or developers may consider building transit-supportive infrastructure into new roadways or roadway reconstruction\expansion projects. Amenities might include universally accessible sidewalks, ADA-compliant transit pads, future bus stop or shelter installations, bus bulbs, and bus pullouts. A bus bulb is an extension of the sidewalk into the roadway, designed to minimize transit vehicle dwell time by keeping the transit vehicle in the travel lane during passenger boarding stops. Bus bulbs are generally desired in congested urban environments with relatively slow traffic. Bus pullouts, on the other hand, enable buses to board or discharge passengers in a "pocket" outside the traffic lanes. While they generally slow down bus service, pullouts may be necessary to avoid obstruction of traffic at layover locations.

   Several communities throughout the region have already recognized the value of incorporating street-side infrastructure integrated with new developments or redeveloped properties. The City of Tempe's Zoning and Development Code (amended October 2, 2008) includes provisions for pedestrian and transit patron amenities. Many communities have required that a review of potential transit infrastructure needs be conducted during in the plan review process.

3. *Provide dedicated parking for transit use*. Dedicated parking can be either a publicly constructed and maintained park-and-ride, or parking that private landowners make available. Stipulations for parking spaces dedicated to transit use have been incorporated into some local agreements with private developers in the MAG region. An example is the Anthem master-planned community.

Figure 22: Projected Future High Demand Corridors and Potential Intermodal Interface Locations



9.3 *Additional Long-Range Public Transportation System Needs Beyond 2030*

A comprehensive urban transportation system should include multimodal connections to destinations outside the MAG region. This involves identifying means to enhance the existing regional transit infrastructure to link with statewide and national transportation corridors. For example, local bus or high-capacity transit service could be planned so as to improve access between major regional activity centers and future intercity rail connections. With advance planning, the regional public transportation system could become an important part of the journey between the MAG region and cities such as Tucson or Los Angeles. Some studies currently underway such as the other framework studies being completed throughout the state and the MAG Commuter Rail Study will provide a larger perspective of inter-regional public transportation needs. A future high-speed rail study considering alternatives connecting the MAG region with the Tucson region may be initiated in the future.

Planning for regional long-range transit needs should consider how to improve transit operations and system reliability. This is particularly important for any system considering multimodal connectivity and links to out-of-town destinations. Local residents and visitors accessing the transit system by air, rail or other transportation modes will expect frequent service levels and direct connections to desirable destinations. As the complexity of a public transportation system increases, the system must remain easy to use.

Intermodal transit facilities will play an increasingly important role in the region's future as more modes (intercity or high-speed rail) are introduced. These facilities should include amenities such as connected passenger platforms for easy transfers between transportation modes, parking, and services such as information, ticket sales and security. In addition, direct auto access to facilities next to or within regional freeway corridors may increase their usability and accessibility.

10.0 TRANSIT AND SUSTAINABLE DEVELOPMENT

Maricopa County's investment today in transit and rail infrastructure is an important element shaping the region's future travel behavior. The support for transit investment to provide a system that is convenient, supports economic development, and provides mobility choice was voiced through input from focus groups and the general public, and through feedback from the peer region evaluation. The focus groups commented on the desire for use of funding to provide a transit system that allows trip choices to be accommodated conveniently through fast, frequent service, accessible stops, and park-and-ride facilities. Successful public transportation comes from careful planning, logical prioritization of transit investments, and regional collaboration. Building a successful transit system requires consideration of technology, service, and the integration of land use and parking practices that support effective and efficient transit. These considerations are critical to getting the most from investments in transit capital and operations.

As noted in the Peer Region Evaluation, many transit systems around the country are working with local municipal agencies to set a consistent course for successful transit and land use integration. They recognize that the relationship between regional land use development and transit service is key to sustaining ridership and a successful transit system. This was noted as a factor in the success of the Salt Lake City transit system, as higher density development has become a more prominent factor in determining where service will be upgraded or added. Agencies such as Utah Transit Authority have worked to promote the adoption of transit-oriented land use policies, develop design guidelines, and identify development practices that concentrate and properly mix uses around transit stations, increasing densities and supporting pedestrian mobility. These agencies have also given strong consideration to parking supply and its parking strategies at stations.

This chapter briefly highlights characteristics of transit-supportive development, identifies the role of land use and activity centers in generating ridership, and examines the role of parking in creating transit-friendly environments. The discussion includes examples from selected peer cities.

10.1 *Transit-Supportive Land Use*

The American Public Transportation Association (APTA) Transit Resource Guide states that "Transit Oriented Development (TOD) is compact mixed-use development, located within an easy walk of a transit stop, generally with a mix of residential, employment and shopping opportunities designed for pedestrians without excluding the auto."

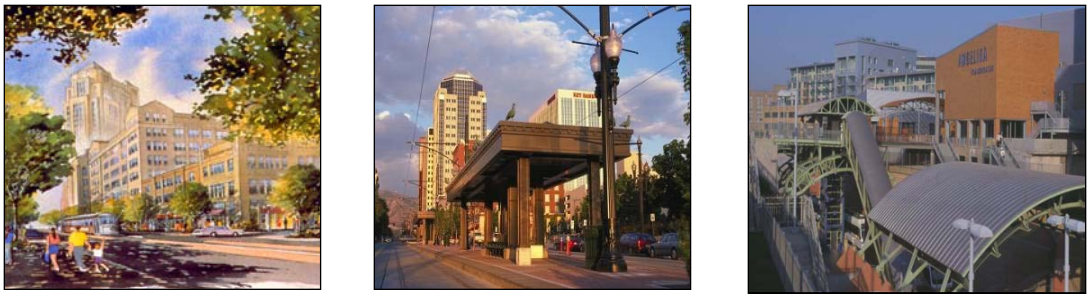
By focusing compact development around transit stations, transit-supportive developments capitalize on public infrastructure investments and promote sustainability. This concentrated development pattern not only encourages transit ridership, but also promotes local economic development and helps communities plan for future infill growth. While TOD can take many physical forms, it is based on the following principles:

- More compact and denser development around transit facilities, compared with existing development patterns in the same area, is desirable.
- A mix of uses, horizontally or vertically (including residential, retail and office) generate greater activity.
- High-quality, pedestrian-oriented urban design and streetscapes make the area appealing.

The typical physical components of transit-supportive development near a station include:

- Moderate to high-density development
- Mix of land uses
- New construction or redevelopment, with urban form details addressing building massing and frontage (i.e., reduction of side and front setbacks)
- Parking in rear of building; on-street parking
- Streets that relate to the station through access and design (i.e., minimize number of auto lanes, include sidewalk intersection bulb-outs to reduce pedestrian exposure to auto traffic)
- Signature streets, streetscapes and sidewalks
- Plazas or public spaces
- Gateway features and public art

High-density mixed-use development is typically composed of buildings that are six stories or higher, with 30 to 60 dwelling units per acre and ground level retail and other activities. The floor area ratio (the ratio of usable space to the land area occupied by the building, or footprint, of the building) is generally .60 to 1 or higher in areas of high density development. High-density mixed-use development can be located near high-capacity transit stations for efficient and convenient access, with pedestrian-oriented streetscape and sidewalks.



Examples of high density mixed-use development

Medium-density mixed-use development can have 17 dwelling units per acre in buildings that are mid-rise, or 2 to 5 stories high. The floor area ratio can be .40 or higher (moderate). Medium-density mixed-use development is often characterized by ground level retail and on-street parking. The surrounding area is highly walkable.

Examples of medium density mixed-use development

Transit use is strongly dependent on development density and land use form. Typically a concentrated multi-use development encourages higher residential density and greater employment concentration, both elements of stronger transit ridership. The residential and employment densities may vary, but residential densities between 1 and 7 dwelling units per acre result in minimal transit use. Transit use increases with residential density (*Transit Cooperative Research Program Report 128, 2008)*.

Employment density also affects ridership. Concentrated employment centers with limited or costly parking tend to generate strong transit ridership. **Table 33** shows the relationship of various residential and employment densities to support transit modes. Land use and density is strongly linked to transit ridership and the feasibility of each mode. High-capacity, capital-intense modes require greater densities to work well.

Table 33: Relationship of Residential and Employment Density to Transit Service Mode

Transit Type	Residential/Employment Density (within corridor or sub-area)	Service Characteristics			Passenger Trip Length in miles		
		Capacity	Average Speed	Distance between stops	< 5	5 -20	>20
Vanpool/carpool	Very Low (4 dwelling unit/acre) 5-8 million sq ft. commercial/office	Low	Varies	Varies		X	X
Local Circulator	Low (7 dwelling unit/acre) 8-20 million sq ft. commercial/office	Low	Low	Low	X		
Local Bus (supergrid)	Low (7 dwelling unit/acre) 8-20 million sq ft. commercial/office	Medium	Low	Low	X	X	
Limited Stop Bus	Medium (15 dwelling unit/acre)	Medium	Medium	Medium	X	X	
Regional Connector	Medium (15+ dwelling unit/acre) 35-50 million sq. ft commercial/office	Medium	Medium/ High	High			X
Regional Express Bus	Medium (15+ dwelling unit/acre)	Medium	High	High		X	X
Bus Rapid Transit	High (20-50 dwelling unit/acre) Concentrated employment density at centers	Medium	Medium/ High	Medium/High	X	X	X
High-Capacity Transit—All Day	High (20-50 dwelling unit/acre) Concentrated employment density at centers	High	Medium/ High	Medium	X	X	
High-Capacity Transit—Peak Hour	Medium (15+ dwelling unit/acre) Concentrated employment density at centers	High	High	High		X	X

Source: HDR Engineering, Inc

Transit vehicles and service characteristics differ, as do the densities typically associated with each. Ridership levels, service characteristics and length of trip vary with transit service type, as well. Some transit services rely heavily on a dense residential and employment pattern along the length of the route, generating a more consistent level of ridership over the entire route. Other services, such as light rail transit (LRT) and bus rapid transit (BRT) can support dense residential patterns coupled with concentrated employment use at key destinations along the route, such as a shopping mall, downtown or other major activity center. These transit services synergize well with activity center destinations.

Cities such as Denver, Atlanta, San Diego and Dallas are embracing the principles of TOD at stations along LRT, BRT and commuter rail lines, and looking toward land use policies and zoning regulations supportive of these changes. Traditional zoning code is often a barrier to mixed-use developments. Today's form-based codes and districts better enable TOD. For example, the City of Denver and neighboring municipalities have adopted TOD zoning districts or transit mixed-use (TMU) districts to create an environment promoting efficient transit and pedestrian-oriented mixed-use projects near future

stations. Subareas with TOD or TMU zoning specify allowable land uses and development densities required to support transit, as illustrated in **Table 34**.

Table 34: Example TMU Subarea Density Regulations and Dimensional Requirements

	TMU- Station Core	TMU- Commercial	TMU-Office	TMU-Research and Development	TMU-High Density Residential	TMU-Medium Density Residential	TMU-Low Density Residential
Minimum Residential Density	35 du/ac	25 du/ac	20 du/ac	N/A(1)	30 du/ac	5 du/ac	None
Maximum Residential Density	None	None	None	N/A(1)	None	25 du/ac	10 du/ac
Minimum Height	3 stories	2 stories	2 stories	1 story	3 stories	2 stories	1 story
Maximum Height	8 stories	6 stories	6 stories	NA (1)	6 stories	4 stories	2 stories

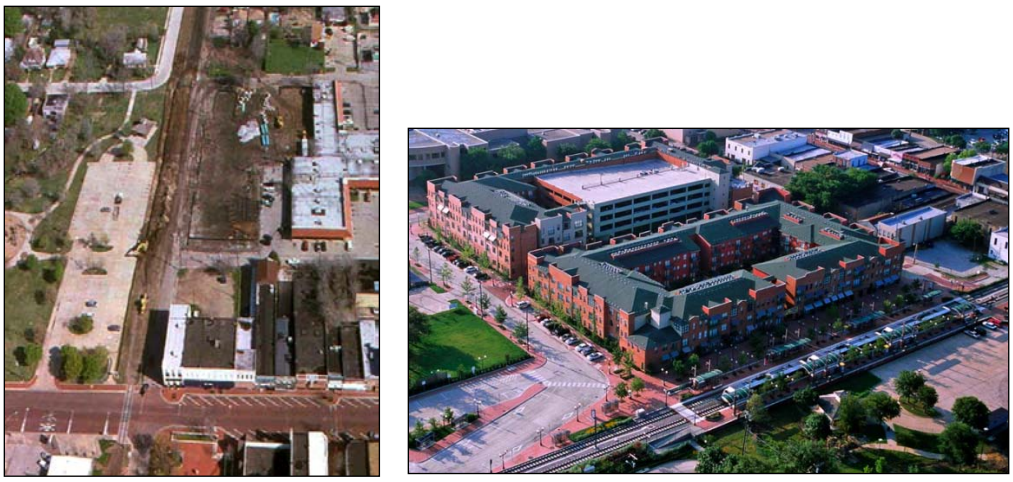
(1) Residential uses are not permitted in the Research and Development sub-area.

Source: City of Lakewood, Colorado TMU Zone District of the Lakewood Zoning Ordinance, January 2007

In cities such as Dallas and Denver, many stations are in suburban areas. These suburban stations tend to be surrounded by moderate- to low-density development with a less diverse mix of uses. The Southeast LRT line in Denver has four stations along the I-25 highway corridor that serve the Denver Tech Center, a low- to moderate-density suburban office center. Surface parking in this suburban development pattern is widely available and pedestrian mobility is impeded by the distances between uses and their location on major arterials.

Suburban stations may rely on a robust circulator system to move passengers from the station to neighboring uses. The bus or circulator system acts as a distribution network for the area surrounding the station. In the Denver Tech Center, RTD had very limited success with its circulator operation because of the distances required to move passengers from the station to offices.

Urban infill stations, on the other hand, rely on development near the station. The more integrated land use pattern carries a higher density and floor area ratio and a higher concentration of mixed uses. In Dallas the urban infill stations have a residential density of 35 or more dwelling units per acre. There is a more diverse mix of uses both vertically and horizontally, often with ground floor retail and upper floor office and residential uses. The short block size and higher densities make walking feasible and pleasant. Structured parking is built into the development and few or no surface parking lots are near the station.



Plano, Texas station before and after TOD development

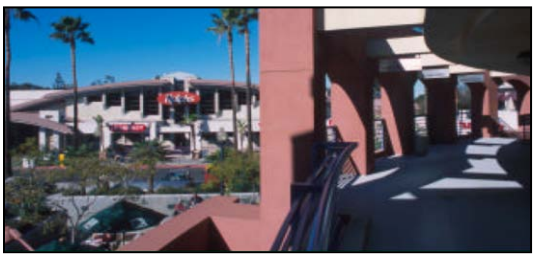
The Downtown Plano station north of Dallas is served by the North Central light rail line. Downtown Plano station provides access to the city's municipal center, courthouse and business district, and has encouraged a high level of transit ridership to the multi-use area.

Medium density development, Englewood, CO
Source: Ordonez & Volgelsang

This 55-acre public-private project in Englewood, Colorado supports medium-density mixed-use development with a central public place and connections to the site; it has walkable streets, civic and cultural uses, and an LRT station. The Englewood Civic station site includes 440 residential units, 330,000 square feet of retail, 300,000 square feet of office, and 50,000 square feet of restaurant space, city offices and public library.

The San Diego Sears building area is home to the Uptown station, a 14-acre bus TOD project. This TOD hosts 318 residential units at 43 per acre and 145,000 square feet of retail and office use.

These regions have taken steps to move toward an integrated land use and transit pattern in their communities. **Table 35** illustrates some of the policy, programs and design efforts underway to prepare successful transit services.



San Diego's Uptown Station
Source: Ordonez & Vogelsang

Table 35: Examples of Transit-Supportive Policies and Programs

Policy Program	Description	Results/ Impacts
Joint Development Program (San Diego, CA)	The Joint Development Program developed by the San Diego Metropolitan Transit System is designed to maximize potential of real estate assets consistent with transportation goals and community development objectives. The goals, criteria, and process format were developed to consider joint use and development.	• Morena Vista Development – Expected occupancy October 2006. $50 million investment; 161 residential units with 10% affordable housing; 18,500 sq. ft. retail space; 200 park and ride spaces • Smart Corner - $100 million investment. 12-story, 175- residential units; 5-story office space; LRT station relocation; $6.8 million state/federal funding
Beltline Tax Allocation District (TAD) (Atlanta, GA)	BeltLine TAD financing is the primary local funding source for the BeltLine and is expected to generate approximately $1.7B of the total project cost of $2.8B over 25 years. The 6500-acre BeltLine TAD was created in 2005 after receiving overwhelming support from the community and votes of approval by the Atlanta City Council, the Atlanta Public School Board, and the Fulton County Commission. Importantly, TAD financing does not require a tax increase. It is a means of using future tax funds to pay for investment in the Beltline now.	Established in 2005, the BeltLine TAD will fund improvement of greenspaces, trails, pedestrian ways, strategic transit integration, traffic impact and roadway improvement, workforce housing, and environmental clean-up. The 2005 assessed valuation of the TAD redevelopment area was $546,630,280.
TODay (Denver Regional Council of Governments)	TODay was created to broaden the regional dialogue around shaping transit-oriented development successes in metropolitan Denver. The DRCOG and Colorado Chapter of the ULI partnered to create a workshop series bringing municipal teams together with local, regional, and national private sector experts to discuss phasing, financing, and differentiating TOD.	The TODay Workshop series has been held annually since 2007 and is a forum in which representatives from the public and private sector discuss strategic transit planning including regional TOD strategies, and develop essential steps in achieving successful TOD. During the workshop, participating teams meet with private sector developers to discuss TOD implementation tactics. Following the workshops, Findings Reports, for topics such as phasing, financing, and distinctiveness, are published.
Envision Utah (Salt Lake City, UT)	A public-private partnership organization sponsored by the Coalition for Utah's Future which promotes quality growth strategies including creating transportation choices and TOD. Envision Utah was formed to guide the development of the broadly and publicly supported quality growth strategy – a vision to protect Utah's environment, economic strength, and quality of life for generations.	Envision Utah has sponsored studies and projects including TOD site design, local visioning, regional visioning, general plan updates, and public forums and is continuing its on-going effort to promote quality growth. West Valley City TOD Study (2004) – Envision Utah developed and presented a TOD study to a joint planning commission and city council. The study has been influential in helping the City plan for a TOD near its city center. In 2008, a BRT will run along 3500 South and connect to the TOD when it is completed. The TOD study calls for major redevelopment of the area and integrates many pedestrian-friendly elements.

Policy Program	Description	Results/Impacts
Partners in Transit (Seattle, WA)	The Partners in Transit program is a new way to work with organizations that share the commitment to sustainable living. The program is geared to helping individuals think about every trip they make, and finding the ones that are easy to change from driving to taking the bus, walking, biking or sharing a ride. Partners in Transit promotes healthy transportation through communications with Partner members, shoppers, and/or affiliates. The Partners provide information and incentives to encourage the use of sustainable transportation as well as touching individuals through more traditional advertising and promotion.	Partners include businesses or organizations that promote the value of transit and alternative transportation modes in the way that business is done including promoting FlexPass, CTR program support, BEST workplaces for commuters, etc.
Assessment of the Potential Fiscal Impacts of Existing and Proposed Transit Oriented Development in the Dallas Area Rapid Transit Service Area.	A study of the fiscal impacts of TOD associated with the development of DART. The study considers development near existing and planned LRT stations.	Findings of this TOD study support the conclusion that the TOD associated with the DART Rail stations offer substantial fiscal impacts for local taxing entities. Including: • The announced existing and projected values of development projects located near DART Rail stations have increased by almost 50% since 2005. • While there are many factors contributing to development investment decisions; proximity to an LRT station is often an important site location factor. The total value of projects that are attributable to the presence of a DART Rail station since 1999 is $4.26B. • Adjusting for tax exemptions and the value of public buildings, the taxable value of real and business personal property associated with the projects reviewed in this analysis along existing DART Rail corridors and the planned Green, Orange, and Blue Line extensions exceed $2.84B. • Increased taxable property values associated with the rail stations have the potential to generate on-going annual tax revenue. • Based on the fiscal planning model, the retail component of TOD projects in the DART service area will generate over $660M in annual taxable retail sales boosting local municipal revenue by $6.6M annually.

Sources: *http://www.sdmts.com/Marketing/documents/TODoverview.pdf*; *http://www.beltline.org/Funding/TaxAllocationDistrictTAD/tabid/1731/Default.aspx*; *http://www.drcog.org/index.cfm?page=TODWorkshops*; *http://www.envisionutah.org/index.phtml*; *http://metro.kingcounty.gov/prog/partners/p-info.html;*
Center for Economic Development and Research University of North Texas 2007

10.2 *Activity Centers*

Land uses at stations are unique and do not always call for a mixed-use TOD pattern. Transit stations with intense activity can produce high transit ridership. An activity center can be an employment hub, a recreational or sports venue, a major shopping destination, or an entertainment destination. Activity center stations may serve specific venues directly and parking may be limited, commensurate with

estimated demand at the facility. Often structured parking is built next to the site in conjunction with less auto-dominated uses. At some locations, parking is shared between uses to allow a more intense land use pattern. The combination of limited parking and activity center demand can mean higher transit ridership to these locations.

The Central Platte Valley light rail line in Denver serves the Broncos' station, Pepsi Center and Denver Union Station adjacent to Coors Field. The activity and entertainment venues along this line support significant ridership on weekends and event days, as well as daily ridership to lower downtown Denver attractions.

The Arena station in Atlanta is another example of an integrated station at a major activity center. This station serves the Georgia Dome, the Georgia World Congress Center, Philips Arena and the CNN Center. Ridership at this station on the east-west line continues to grow.

Salt Lake City's TRAX LRT includes two branch lines that connect key activity centers in the city. A 2.3-mile branch connects Main Street with Rice Eccles Stadium and carries over 10,000 riders per day, twice the projected number of riders. An additional 1.5-mile extension links downtown, the stadium and the University of Utah campus with the University Medical Center. The Medical Center employs more than 14,000 workers and has limited parking availability, thereby generating transit ridership to this major activity center.

10.3 *Parking and Transit*

According to the Transit Research Board's publication *Transit Cooperative Research Program Report 128*, the factors that most influence ridership from a supportive land use development pattern are station proximity, transit quality and parking policies. Fast frequent and comfortable transit will increase transit ridership, as will parking pricing and/or constrained parking supply at destinations served by transit. Parking supply, or reductions in that supply, can be a key strategy in ensuring transit ridership. In fact, creating a successful transit system is really about getting the parking right. An ample and easily accessible supply of parking such as that found in many suburban office parks encourages auto use and reduces the viability of attracting transit riders. Conversely, the concentrated uses and limited and costly parking supply found in most major downtowns, leads to a more viable transit ridership pattern. In order to get parking "right", consider the following:

- Locate parking to allow development at stations and to minimize the acreage dedicated to parking use
- Share transit parking with compatible uses
- Deck parking to free land for development
- Wrap parking with retail, especially ground floor active uses

Parking wrapped with retail
Source: Ordonez & Volgelsang

Effective parking strategies should address the projected level of transit use to the site, minimize parking supply and consider allowances for shared development costs and fees for operation and maintenance of the parking facility. Well planned parking strategies, combined with appropriate zoning code, are being used in many cities. TOD and TMU zoning codes often specify limited auto access and reduced parking supply at development surrounding the station, thereby encouraging people to arrive by transit. New development within TOD and TMU zone districts often must adhere to required minimum and maximum number of off-street parking spaces as illustrated in **Table 36**:

Table 36: Minimum and Maximum Number of Parking Spaces

Use	Ratio
Hospital	One space per bed minimum, 2 spaces per bed maximum
Hotels/Motels/Bed and Breakfast	One space per three rooms minimum, one space per room maximum
Laboratory/Light Manufacturing/Light Industrial	One space per 1,000 square feet minimum, 2 spaces per 1,000 square feet maximum
Office/Bank	Two spaces per 1,000 square feet minimum, three and one-half spaces per 1,000 square feet maximum
Place of Worship	One space per five seats minimum, one space per two seats maximum
Residential	One space per unit minimum, two spaces per unit maximum
Restaurant	Four spaces per 1,000 square feet minimum, eight spaces per 1,000 square feet maximum
Retail	Two spaces per 1,000 square feet minimum, four spaces per 1,000 square feet maximum
Theater	One space per five seats minimum, one space per two seats maximum
All other non-residential uses	Parking requirements for uses not specifically identified above shall be subject to a parking analysis submitted as part of any development application

Source: City of Lakewood TMU Zone District, 2007

In some cases, these maximum and minimum requirements are modified if parking within the development is shared and structured, instead of surface paring. Shared access to surface parking lots is also typically encouraged. TRCP research indicates that reducing parking ratios often helps realize benefits to the community such as limiting traffic, encouraging walking, biking, and transit use, making transit oriented development housing more affordable, and providing more space for other kinds of development. Municipal governments such as San Diego, encourages shared parking whereas parking facilities can be shared to meet minimum standards. In San Diego specifically, shared parking is allowed within 600-feet of the uses being served.

Bicycle parking is also often required within a TOD development area in order to encourage the use of this mode of transportation. The number of bike parking spaces per dwelling unit or use is sometimes specified to ensure safe and convenient parking for this mode of travel. In addition, other amenities for bicyclists may be included in TOD ordinances including public shower facilities, while local communities may also want to consider the relation of bicycle supportive infrastructure, such as bicycle lanes and signal detection.

Transit stations may also be accompanied, although usually not in dense urban centers, by park-and-ride facilities that feature drop-off locations near the station platforms. Transit agencies often assume that the majority of riders at suburban stations will arrive by automobile, and local governments need to consider how park-and-rides works with surrounding TOD development that may limit parking and attempt to

encourage pedestrian mobility. Parking at the station can be shared parking or alternatives to surface parking, so as to work well with adjacent development. Structured parking may be necessary, depending on the land constraints of the site. Costs for structured parking can range from $20,000 to $30,000 per space, but can sometimes be financed through public/private partnerships. It is essential to avoid illegal spillover parking in private lots that are not shared with transit.

In order to address the overall parking supply and the integration of that supply with surrounding development, many cities are working with the local transit agency and developers on joint development efforts that work for all parties. The FTA has developed Joint Development Guidelines that:

- Address the physical and functional relationship of development to transit
- Enhance urban economic development
- Incorporate private investment
- Enhance the effectiveness of transit
- Retain effective control with the City
- Promote the highest and best uses, and
- Generate financial benefit for the transit system

A Joint Development Agreement formalizes the public-private partnership and follows these guidelines if using FTA funding.

The City of Tempe, Arizona entered into such an agreement with the Valley Metro Regional Public Transportation Authority, the FTA and private developers for the development of the McClintock Station Park-n-Ride site. The City acquired 4.5 acres with FTA funds for a 300-space future park-n-ride and entered into an agreement with a private developer for the development of the 300 space structure, 408 residential units and 16,000 sq. ft. of retail space adjacent to the Light Rail station.

GRIGIO METRO Apartments

In many circumstances, the cost of structured parking at $20-30,000 per space can by cost prohibitive for the transit agency unless a joint development or public-private partnership effort is possible. Getting all the stakeholders to the table and successfully undergoing an agreement is not always easy. The Shannon Station Transit Village in Pittsburgh has been in the works for many years. The station and 500-space park-n-ride lot opened in 1987 and subsequently a project to convert the 7.5 acres to a mixed-use transit village at the station was developed. The developer acquired the development rights from the Port Authority of Allegheny County and entered into a financing arrangement whereby the Port receives 25% of the profits and after a 15% return on project equity. The development plan includes 114 residential units, 54,000 sq. ft. of ground floor retail and a public plaza and is hoped to be a great stimulus to business in the area.


Shannon St Transit Village

The Contra Costa Centre transit village was the first attempt at a joint development transit village at a station in California. The term "transit village" refers to a planned housing and commercial development clustered around a transit hub. In such a development, the transit agency may lease its land to a developer, help assemble adjacent properties, or participate as an equity partner. In Contra Costa, the Bay Area Rapid Transit District (BART) aggressively pursued joint development with the Contra Costa County to fund a master plan for the station area and the County used its redevelopment powers to buy properties surrounding the station and assemble the land. The first phase of the transit village to be constructed was the 1,547-space Pleasant Hill BART parking garage and subsequent phases include 422 apartments, 100 condominiums and 35,590 sq. ft of retail space, 270,000 sq. ft of office space and a 19,400 sq. ft. conference center. Funding for the project includes $135 million in tax-exempt revenue bonds, $14.2 million from the redevelopment agency and $168 million from private developers and is being built on 7.5 acres of BART owned land.

Contra Costra Centre Transit Village

11.0 REGIONAL TRANSIT FRAMEWORK SUMMARY AND FUTURE PLANNING NEEDS

11.1 *Regional Transit Framework Summary*

The Regional Transit Framework identifies current and future transit deficiencies in an effort to define a long range regional approach for addressing transit needs in the MAG region. Three transit scenarios were developed as alternative long range approaches for the region's 2030 transit program. Each scenario addresses at least some of the region's transit needs and deficiencies; however, the scope of each scenario differs significantly.

- Scenario I assumes that the existing transit revenues sources (local and regional) will be continued through at least year 2030 and focuses on service level improvements in a limited number of corridors to better address projected demand; however, many deficiencies are not addressed. Deficiencies include the improvement of all service levels to a regional standard that is expected in most communities the size of the MAG region as demonstrated by service levels in peer regions; many areas of the region will continue to have limited or no transit access; and, there will be few transit options, that provide competitive travel time savings (compared to today's transit travel speeds).

- Scenario II was developed based on the region expanding funding for transit to a level consistent with the region's peer's in 2006. Funding required for this scenario is approximately $11.05 billion, (2008 constant value), which represents an approximate doubling of the existing revenues used to build, maintain and operate the transit system defined in the RTP. Many transit deficiencies are addressed in this scenario through: increased service levels to a regional standard on all regional bus routes; expansion of transit service in existing developed areas that have no or limited service defined in the RTP; and, the inclusion of new express bus, Bus Rapid Transit and high-capacity transit options to provide higher speed regional travel options using public transit.

- Scenario III emphasizes the expansion of the regional transit system in terms of improved service levels on all regional transit services, an increase in the regional transit service area to directly serve more people, and the development of a more comprehensive network of higher speed transit services. The funding levels associated with this scenario are approximately $21.46 billion or four times the public transit investment defined in the RTP.

The performance of the scenarios, measured as the ability to attract passengers, indicates that a more comprehensive and interconnected regional transit system (compared to planned local and regional transit improvements in the RTP) increases total transit utilization throughout the region. Furthermore, a comprehensive regional transit network, as defined in Scenarios II and III, will elevate the region's transit profile to a level similar to its peers (Scenario II) or at a high level among the peers (Scenario III), which may provide increased economic competitiveness in attracting and retaining people and businesses in the future. **Table 37** summarizes the elements included in each scenario.

Funding sources to support the new expenditures identified in each scenario have not been identified. In all scenarios, additional revenues beyond current local sources and the regional transportation sales tax will be required to implement the recommendations and address the transit service deficiencies identified in the Regional Transit Framework.

Table 37: Comparison of Transit Scenarios

Investment Options	Scenario I	Scenario II	Scenario III
Local Transit Service Improvements	---	✓	✓
Basic Expansion of ADA Paratransit Service	✓	✓	✓
Regional Paratransit Service	---	✓	✓
Regional Connector – New Routes	---	---	✓
Supergrid - Route Extensions	✓	✓	✓
Supergrid - Increased Frequency	---	✓	✓
Express – New Routes & Increased Frequency	✓	✓	✓
Express – Two-way All-day Service	✓	✓	✓
Arterial BRT – New Routes	---	---	✓
Arterial BRT – Increased Frequency	✓	✓	✓
HCT Peak Period – New Routes	---	✓	✓
HCT All Day – Route Extensions	---	✓	✓

Source: HDR Engineering, Inc. 2009

Beyond year 2030, the MAG region is projected to experience significant growth in the western part of the region. This growth will increase the region's overall travel demand and will require additional transit and roadway capacity to support the demand. The Regional Transit Framework identifies potential future high volume travel corridors that may benefit from new transit investments. The Framework recommends that measures are implemented to protect future transit investments in these corridors. Measures include preserving right-of-way for future transit use (transit-way), incorporating street-side transit supportive infrastructure in roadway design such as transit shelter pads and bus-bulbs, and reserving\providing dedicated parking for future transit use.

11.2 *Future Planning Needs*

The Regional Transit Framework presents three alternative scenarios for the region's future. Each alternative scenario requires some level of additional financial resources compared to what is programmed in the RTP; however, the need for additional revenue is only one of the needs that must be considered in developing a regional transit program that can be sustained long-term. In November 2008, MAG assembled a peer region panel of transit managers to assess the region's existing and planned RTP transit system. The peer panel emphasized that the region's transit program appears to be a collection of transit services, programs, and infrastructure investments, as opposed to a coordinated and integrated system. This observation is based on the region's inconsistent service frequencies within and between service types and jurisdictions and the panelist's perception that the regional transit investments identified in the RTP are not necessarily based on addressing regional transit demands.

The alternative scenarios identified in the Regional Transit Framework provide a blueprint for a better coordinated and integrated regional transit system that is derived from a market or demand based approach. With a blueprint available, the region must earnestly begin the process of building a foundation for a system that will provide the benefits that are being realized in peer regions such as Salt Lake City and San Diego. Benefits include operations performance (boardings per capita) and public support (annual investment per capita) that exceed those in the MAG region. The realization that revenues may always lag behind needs was a factor in moving these regions to adopt a demand or

market based approach to financing, building, operating and maintaining their respective regional transit systems. Similarly, the MAG region must balance the current availability and potential for future transit funding with regional transit needs; therefore, a critical next step for the MAG region is to create a new foundation or vision from which to develop a future regional transit system. Ideally, a Regional Transit Foundation would serve as the base for transforming the current regional transit system from a collection of services and programs to a new regional transit system that more efficiently addresses the needs of regional mobility.

In addition to the need for developing a Regional Transit Foundation, other future panning work may be necessary to address regional transit needs and to refine the elements of the Regional Transit Framework from a concept to an implementable service or project. **Table 38** provides a list of recommended future planning actions and studies.

Table 38: Recommended Future Planning Actions

Action or Study	Description
Establish a Regional Transit Foundation	Conduct a study to establish a regional transit vision and priorities for planning, programming and operating regional transit services and infrastructure investments. This effort would serve as the basis for transforming the current regional transit system from a collection of services and programs to a market based, regional transit system that more efficiently addresses the needs of regional mobility.
Regional Transit Implementation Plan	Develop a detailed regional transit service implementation plan, based on a transit mobility scenario identified in this report or a combination of the mobility scenarios.
Regional Transit Revenue Opportunities	Conduct a comprehensive analysis of potential revenue sources.
Multimodal Transit Connection Study	Identify potential service and infrastructure needs necessary to support intercity transit service connections.
Regional Park-and-Ride Opportunities Study	Identify potential site locations for future park-and-ride facilities identified in the Regional Transit Framework. The study would also assist in refining capital and operations costs.
Regional Operations and Maintenance Facilities Study	Assess existing and future needs and opportunities for regional operations and maintenance facilities. The study would include facilities to support all modes of public transit in the region and would identify potential opportunities for combining modes at facilities to take advantage of economies of scale.
Corridor Studies	Conduct detailed corridor studies for high-capacity transit alternatives identified in this Framework or in other studies. The studies would identify local feasibility of corridor investments.
Alternative Land Use Scenarios/Transit Oriented Development	Conduct a study to evaluate the impacts of alternative land use scenarios along designated regional transit corridors.

Source: MAG/consultant project team

LIST OF ACRONYMS

ADA – American's with Disabilities Act of 1990

ADOT – Arizona Department of Transportation

APTA – American Public Transit Association

BRT – Bus Rapid Transit

CBD – Central business district

CCT – Cobb Community Transit (Cobb County, Georgia)

CMAQ – Congestion Mitigation and Air Quality

CNG – Compressed natural gas

DART – Dallas Area Rapid Transit

DCTA – Denton County Transportation Authority (Denton County, Texas)

FTA – Federal Transit Administration

GRTA – Georgia Regional Transportation Authority

HCT – High-Capacity Transit

HOT Lane – High occupancy toll lane

HOV Lane – High occupancy vehicle lane

ISTEA – Intermodal Surface Transportation Efficiency Act of 1991

LACTMA – Los Angeles County Metropolitan Transit Authority

LTD – Lane Transit District

LRT – Light Rail Transit

MAG – Maricopa Association of Governments

MARTA – Metropolitan Atlanta Rapid Transit Authority

MTED – Mesquite Transportation for the Elderly and Disabled

NCTD – North County Transit District

RTD – Regional Transportation District (Denver, Colorado)

RTP – Regional Transportation Plan

RPTA – Regional Public Transportation Authority

SANDAG – San Diego Association of Governments

SCAT – South County Area Transit (South County, California)

SDMTS – San Diego Metro Transit System

TIP – Transportation Improvement Program

TOD – Transit Oriented Development

TSM – Transportation System Management

UTA – Utah Transit Authority

GLOSSARY OF TERMS

Activity Center – an area with high population and concentrated activities which generate a large number of trips (e.g., central business district, shopping centers, business or industrial parks, recreational facilities).

Alignment – the horizontal and vertical ground plan of a roadway, railroad, transit route, or other facility.

Allocation – an administrative distribution of funds, for example, federal funds among the states; used for funds that do not have legislatively mandated distribution formulae.

American's with Disabilities Act of 1990 (ADA) – the law passed by Congress in 1990 which makes it illegal to discriminate against people with disabilities in employment, services provided by state and local governments, public and private transportation, public accommodations and telecommunications.

A.M. peak – the morning rush period in which the greatest movement of passengers occurs, generally from home to work. In the Phoenix metro area, a.m. peak time is 6 to 9 a.m.

Arterial Street – a major thoroughfare, used primarily for through traffic rather than for access to adjacent land, that is characterized by high vehicular capacity and continuity of movement.

Boarding – the act of passengers entering a transit vehicle.

Bus – a rubber-tire transit vehicle designed for roadway operation to transport a large number of persons for public transportation service. In most cases, it operates with a self-contained source of motive power.

Bus Bulb or Bus Pullout – a cutout in the roadside to permit a transit vehicle to dwell at a curb.

Bus Rapid Transit (BRT) – Combines the quality of rail transit and the flexibility of buses. It can operate on exclusive transitways, HOV lanes, expressways, or ordinary streets. A BRT system combines intelligent transportation systems technology, priority for transit, cleaner and quieter vehicles, rapid and convenient fare collection, and integration with land use policy.

Busway – a special roadway designed for exclusive use by buses, and sometimes carpools and vanpools.

Capital Costs – costs of long-term assets of a public transit system such as property, buildings, vehicles, etc.

Carpool – an arrangement in which two or more people share the use and cost of privately owned automobiles in traveling to and from pre-arranged destinations.

Central Business District (CBD) – the downtown retail trade and commercial area of a city or an area of very high land valuation, traffic flow, and concentration of retail business offices, theaters, hotels, and services.

Choice Riders – transit riders who are able to select the type of transportation they use (e.g., automobile, LRT, commuter rail, bus, etc).

Commuter – passenger who travels between two points regularly.

Commuter Rail – local and regional passenger train service between a central city, its suburbs and/or another central city, operating primarily during commuting hours. Designed to transport passengers from

their residences to their job sites. Differs from rail rapid transit in that the passenger cars generally are heavier, the average trip lengths are usually longer, and the operations are carried out over tracks that are part of the railroad system.

Corridor – A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, and transit route alignments.

Crosstown – non-radial bus service that normally does not enter the central business district.

Demand Response – a transportation service with flexible routing and scheduling, usually in small vehicles, to provide door-to-door or point-to-point transportation at the user's request.

Discretionary funds – any funds that do not have automatic distribution. Decisions on the distribution of discretionary funds are made by an agency or person based on that agency or person's choice or judgment and in accordance with criteria set out in laws or regulations.

Express bus service – scheduled bus service operating on a fixed route that provides higher speeds and fewer stops than found on other portions of the bus system or on the same route in local service. Pick ups are made at or near an express route's point of origin and the bus does not stop to pick up or discharge passengers until it reaches its scheduled destination. Express bus service usually uses freeways or busways where they are available.

Fare – payment in the form of coins, bills, tickets, or tokens collected for transit riders.

Fare Structure – the system set up to determine how much is to be paid by various passengers using the system at any given time.

Fixed Guideway Transit – a transportation system composed of vehicles that can operate only on their own guideways, which were constructed for that purpose. Examples are rapid rail, light rail, and monorail.

Fixed Route – a system in which transit vehicles follow a schedule over one or more prescribed routes. It is different from modes of transportation such as demand-responsive transportation in which each trip may differ in its origin and destination.

Fleet – A transit system's vehicles. Fleet usually refers to highway or street vehicles.

Flex-Stop – a transit service whereas a rider can request that a bus deviate from the established route (within reason) to pick up the rider.

Form-Based Code – a method of managing development to encourage specific types of growth.

Frequency of Service – the number of transit vehicles on a given route or line, moving in the same direction, which pass a given point within a specified interval of time. Also known as headway.

Headway – the time interval between transit vehicles moving in the same direction on a particular route, usually expressed in minutes.

Heavy Rail Transit – an electric railway with capacity for a "heavy volume" of traffic, and characterized by exclusive right-of-way, high speed and rapid acceleration. Heavy rail is different from commuter rail and light rail.

High Occupancy Vehicle – Vehicles that can carry more than two persons. Examples of high occupancy vehicles are a bus, vanpool, carpool, etc.

High Occupancy Vehicle Lane (HOV) – a highway or street lane reserved (generally during specified hours) for one or more specified categories of vehicles such as buses, carpools, and vanpools.

High-Capacity Transit – transit that typically makes fewer stops, travels at higher speeds, has more frequent service, and carries more people than the local bus service.

Intermodal – switching from one form of transportation to another.

Layover – time built into a transit schedule between arrivals and departures, used for the recovery of delays and preparation or the return trip. The term may refer to transit vehicles (vehicle layover) or operator (operator layover).

Light Rail Transit (LRT) – A type of electric rail system with a total passenger carrying capacity that is relatively "light" compared to heavy rail transit. Light rail may be on exclusive or shared right-of-way, high or low platform, multi-car trains or single cars, automated or manually operated. In generic usage light rail includes streetcars, trolley cars, and trams; in contemporary usage light rail refers to very modern and more sophisticated developments of these older rail modes.

Light Rail Vehicle – a rail vehicle similar to a streetcar, it may be larger, however, and is often articulated. Light rail vehicles are capable of boarding and discharging passengers at either track or station platform level.

Limited Service – higher speed train or bus service where designated vehicles stop only at transfer points or major activity centers, usually about every ½ mile. Limited stop service is usually provided on major trunk lines operating during a certain part of the day or in a specified area in addition to local service that makes all stops. As opposed to express service, there is not usually a significant stretch of non-stop operation.

Local Bus Service – 1. Scheduled bus service operating on a fixed route that involves frequent stops and consequent low average speeds, the purpose is to deliver and pick up transit passengers close to their destinations or origins. 2. Transit service in a city or its immediate vicinity, distinguished from regional transit service or interurban lines.

Metropolitan Planning Organization (MPO) – The organization designated by local elected officials as being responsible for carrying out the regional urban transportation planning process and other regional planning processes. The MPO is designated by the governor and must be in place in every urbanized area over 50,000 in population. The MPO is responsible for the 20-year long-range plan and the transportation improvement program.

Modal Split – how many people use different forms of transportation. Frequently used to describe the percentage of people using private automobiles as opposed to the percentage using public transportation.

Monorail – rail transit based on a single rail guideway.

Multimodal – concerning or involving more than one transportation mode.

Off-peak – the periods of time outside the A.M. and P.M. peak hours. The non-rush hour periods of the day when travel activity is generally lower and transit service is generally scheduled with less frequency.

Operating cost – the total cost to operate and maintain a transit system including labor, fuel, and maintenance. Operating costs usually exclude such fixed costs as depreciation on plant and equipment; interest paid for loans on capital equipment, and property taxes on capital items.

Operator – 1. An employee of a transit system whose workday is spent in the operation of a transit vehicle; for example a bus driver. 2. The organization that runs a transportation system on a day-to-day basis. It is also known as an operation, property, or system.

Paratransit – flexible forms of public transportation services that are not provided over a fixed route. The vehicles are usually low- or medium-capacity highway vehicles, and the service offered is adjustable in varying degrees to individual users' desires.

Park-and-Ride – a location where passengers drive their vehicles to designated parking areas and then board transit vehicles from these locations.

Peak Period – 1. The period during which the maximum amount of travel occurs. It may be specified as the morning (a.m.) or evening (p.m.) peak. 2. The period when demand for transportation service is heaviest.

Platform or Station Platform – that portion of a transit station directly adjacent to the track or roadway at which transit vehicles stop to load and unload passengers.

P.M. Peak – the evening rush period during which the greatest movement of people occurs in a community, usually traveling home from work or school. In the Phoenix metro area, p.m. peak is 3 to 6 p.m.

Public Transit or Transportation – services provided for the public on a regular basis by vehicles such as bus or rail vehicle on public ways, using specific routes and schedules, usually on a fare-paying basis. Also includes non-scheduled, on-demand transit services, such as paratransit or dial-a-ride. Also see mass transit.

Queue Jumper – arterial intersections are modified, typically with an additional exclusive lane, to allow transit vehicles priority at intersections.

Regional Public Transportation Authority (RPTA) – now known as Valley Metro/Regional Public Transportation Authority. The Arizona Legislature passed a law enabling the citizens of Maricopa County to vote in 1985 on a sales tax increase to fund regional freeway improvements and to provide for ht creation of the Regional Public Transportation Authority.

Regional Connector – two-way service that provides access between rural and urbanized areas in the MAG region. Generally terminates at urban transit centers allowing riders from rural areas to access a variety of Valley Metro transit routes.

Regional Route – public transportation routes that cross into other cities in Maricopa County. Any route that provides service to a regional destination.

Revenue – receipts derived from or for the operation of transit service including fare box revenue, revenue from other commercial sources, and operating assistance from governments. Fare box revenue includes all fares paid by transit passengers.

Revenue Miles – miles operated by vehicles available for passenger service.

Reverse Commute – movement in a direction opposite to the main flow of travel, such as from the central city to a suburb during the morning commute hour.

Ridership – the number of people making one-way trips on a public transportation system in a given time period.

Right-of-Way – the land over which a public road or rail line is built. An exclusive right-of-way is a road, lane, or other right-of-way designated exclusively for a specific purpose or for a particular group of users, such as light rail vehicles or buses.

Route – a specified path taken by a transit vehicle usually designated by a number or a name, along which passengers are picked up or discharged.

Service Area – a geographic area which is provided with transit services. Service area is now defined consistent with ADA requirements.

Service Span – the span of hours over which service is operated, e.g., 6 a.m. to 10 p.m. or 24 hour. Service span often varies by weekday, Saturday, or Sunday.

Supergrid – known in the MAG region as the two-way service that provides both local and regional access to transit riders on the arterial street network, also known as regional fixed route bus.

Sustainability – defined by the Brundtland Commission as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.

Transit Center – a facility where transit vehicles converge, enabling passengers to transfer among routes and services. Transit centers are generally located off the street and provide passengers with shaded or enclosed waiting area, seats, drinking fountains, and transit information.

Transit Corridor – a broad geographic band that follows a general route alignment such as a roadway or rail right-of-way and includes a service area within that band that would accessible to the transit system.

Transit Dependent – someone who must use public transportation for travel.

Transit Route – a designated, specified path to which a transit vehicle is assigned. Several routes may traverse a single portion of road or line.

Transit Signal Priority – normal traffic signal operations are modified to allow transit vehicles priority in order to reduce time delays at intersections.

Transit Station – an off-street facility where passengers wait for, board, alight, or transfer between transit vehicles. A station usually provides information and a waiting area and my have boarding and alighting platform, ticket sales, fare collection, and other related facilities.

Transit Stop – an area where passengers wait for, board, alight, and transfer between transit vehicles. It is usually indicated by distinctive signs and by curb or pavement markings and may provide service information, shelter, seating or any combination of these.

Transit Oriented Demand (TOD) – compact, mixed-use development, located within an easy walk of a transit stop generally with a mix of residential, employment, and shopping opportunities designed for pedestrian without excluding automobiles.

Trip – 1. A one-way movement of a person or vehicle between two points for a specific purpose; sometimes called a one-way trip to distinguish it from a round trip. Also see boarding. 2. The movement of a transit vehicle in one direction from the beginning of a route to the end of it; also known as a run.

Trolley bus – an electric, rubber-tire bus propelled by a direct-current motor that draws power through a trolley from overhead electric wires through a mechanism (trolley poles or pantograph), designed to allow the bus to maneuver in mixed traffic over several lanes, and pick up and drop off passengers at the street curb.

Unlinked Passenger Trips – the total number of passengers who board public transit vehicles. A passenger is counted each time he/she boards a revenue vehicle even though the boarding may be the result of a transfer from another route to complete the same one-way journey. Where linked or unlinked is not designated, unlinked is assumed.

Urbanized Area (UZA or UA) – as defined by the Bureau of the Census, a population concentration of at least 50,000 inhabitants, generally consisting of a central city and the surrounding, closely settled, contiguous territory (suburbs). The boundary is based primarily on a population density of 1,000 people/square mile, but also includes some less densely settled areas such as industrial parks and railroad yards if they are within areas of dense urban development.

Valley Metro – an umbrella identity for the regional transit system that is made up of 11 transit agencies. Created in 1993 by the Regional Public Transportation Authority board, the brand represents seamless service to public transportation passengers.

Vanpool – an organized ridesharing arrangement in which a number of people travel together on a regular basis in a van. The can may be company owned, individually owned, leased, or owned by a third party. Expenses are shared, and there is usually a regular volunteer driver.