



REGIONAL TRANSIT FRAMEWORK STUDY UPDATE

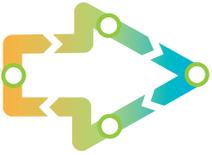


REVIEW OF RECENT PLANS AND STUDIES 2.1.17

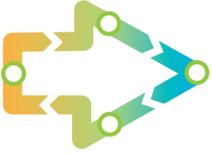


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INTRODUCTION

Over the past 10 years, a number of studies and reports addressing transit services in the Maricopa Association of Governments (MAG) planning area either directly or indirectly focused on the unique requirements associated with the integration of transit services, regional travel demand, and growth/development. Although bus transit service operates widely throughout the expansive MAG planning area, many of the studies/reports focused on expanding the transit system to include new methods of transporting people and expediting commutes. The MAG Regional Transit Framework Study, published January 5, 2010, was undertaken to gain a better understanding of the MAG region's transit needs and deficiencies. Another significant study – the Sustainable Transportation and Land Use Integration Study (STLUIS) – was initiated in 2010 and completed May, 2013. It focused on answering several of the following questions:

- How can transit investments increase the MAG region's economic competitiveness?
- What is sustainable transportation and how does it fit into the region's future?
- Which development policies can “move the needle” toward transit-supportive places?
- What kinds of transportation investments can support sustainable neighborhoods and business districts in the absence of high-cost transit investment?

Other studies looked at the region's system wide needs and long term, capital intensive commuting solutions. Still others shed light on various alternative transit modes, such as Light Rail Transit (LRT), Bus Rapid Transit (BRT), and the transit/commuter interface through park and ride (P&R) facilities. One study sought to provide greater definition for a particularly innovative commuting solution – the Direct High Occupancy Vehicle (DHOV) Ramp, which offers greater integration of transit services, carpools, and vanpools with the regional freeway network. Additionally, special studies were prepared to improve the understanding of travel demand, as well as to reveal how transit service standards and system performance could be improved.

The studies and reports reviewed for this update of the MAG 2010 Regional Transit Framework Study are listed below. Their corresponding summaries are provided with key information from each study/report in the following sections.

MAG 2010 REGIONAL TRANSIT FRAMEWORK STUDY (JANUARY 5, 2010)

SUSTAINABLE TRANSPORTATION & LAND USE INTEGRATION STUDY (STLUIS)



- STLUIS: Working Paper 1, Regional Transportation Framework & Issues (January 3, 2011)
- STLUIS: Working Paper 2, Moving Toward Sustainable Transportation (October 19, 2011)
- STLUIS: Final Employment Analysis Memo (June 27, 2012)
- STLUIS: Market Study Memo (December 18, 2012)
- STLUIS: Working Paper 3, Scenario Modeling and Results (March 19, 2013)
- STLUIS: Working Paper 4, Findings and Recommendations (May 12, 2013)
- STLUIS: Key Recommendations and Tools (March 29, 2013)

TRANSIT LIFE CYCLE PROGRAM

- Transit Life Cycle Program (TLCP), FY2015 Update
- Transit Life Cycle Program (TLCP): Background Information: Geographical Equity (April, 2010)

COMMUTER RAIL STUDIES

- Commuter Rail System Study (May, 2010)
- Grand Avenue Commuter Rail Corridor Development Plan (May, 2010)
- Yuma West Commuter Rail Development Plan (May, 2010)
- Commuter Rail System Study Update (to begin in 2017)

OTHER HIGH CAPACITY TRANSIT STUDIES AND EFFORTS

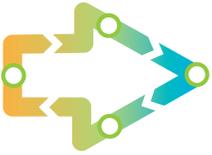
- Valley Metro High Capacity Transit Corridor Development Activities (November, 2016)
- Regional Public Transit Authority (RPTA) Comprehensive Arterial Bus Rapid Transit Planning Study (September, 2009)
- Direct High Occupancy Vehicle (DHOV) Strategies & Park-and Ride (P&R) Connectivity (October 21, 2014)

LOCAL AREA/LOCAL SERVICE TRANSIT STUDIES

- Southeast Valley Transit System Study (May, 2013)
- Northwest Valley Local Transit System Study (June, 2013)
- Southwest Valley Local Transit System Study (July, 2013)
- Pinal County Transit Feasibility Study (April 2011)

TRANSIT STANDARDS AND PERFORMANCE MEASURES

- Regional Transit Standards & Performance Measures – Phase I, Recommendations (November, 2013)
- Regional Transit Standards & Performance Measures – Phase II, Adopted Goals Report (December, 2014)



- Regional Transit Standards & Performance Measures – Phase III, Executive Summary (May, 2016)

DEMOGRAPHIC DATA

- Socioeconomic Projections: Population & Employment (June, 2016)
- “Population Update: Census 2010 and July 2, 2015,” White Paper (Originated: February 23, 2016; Modified December 9, 2016)

REGIONAL TRANSIT FRAMEWORK STUDY

January 5, 2010; MAG

OVERVIEW

This study identified current and future transit deficiencies to define a long range regional approach for addressing transit needs within the MAG region. The study was launched to understand the region’s transit needs and deficiencies with the goal of identifying high-leverage transit investments to attract a significant number of new passengers while improving transit service for existing patrons.

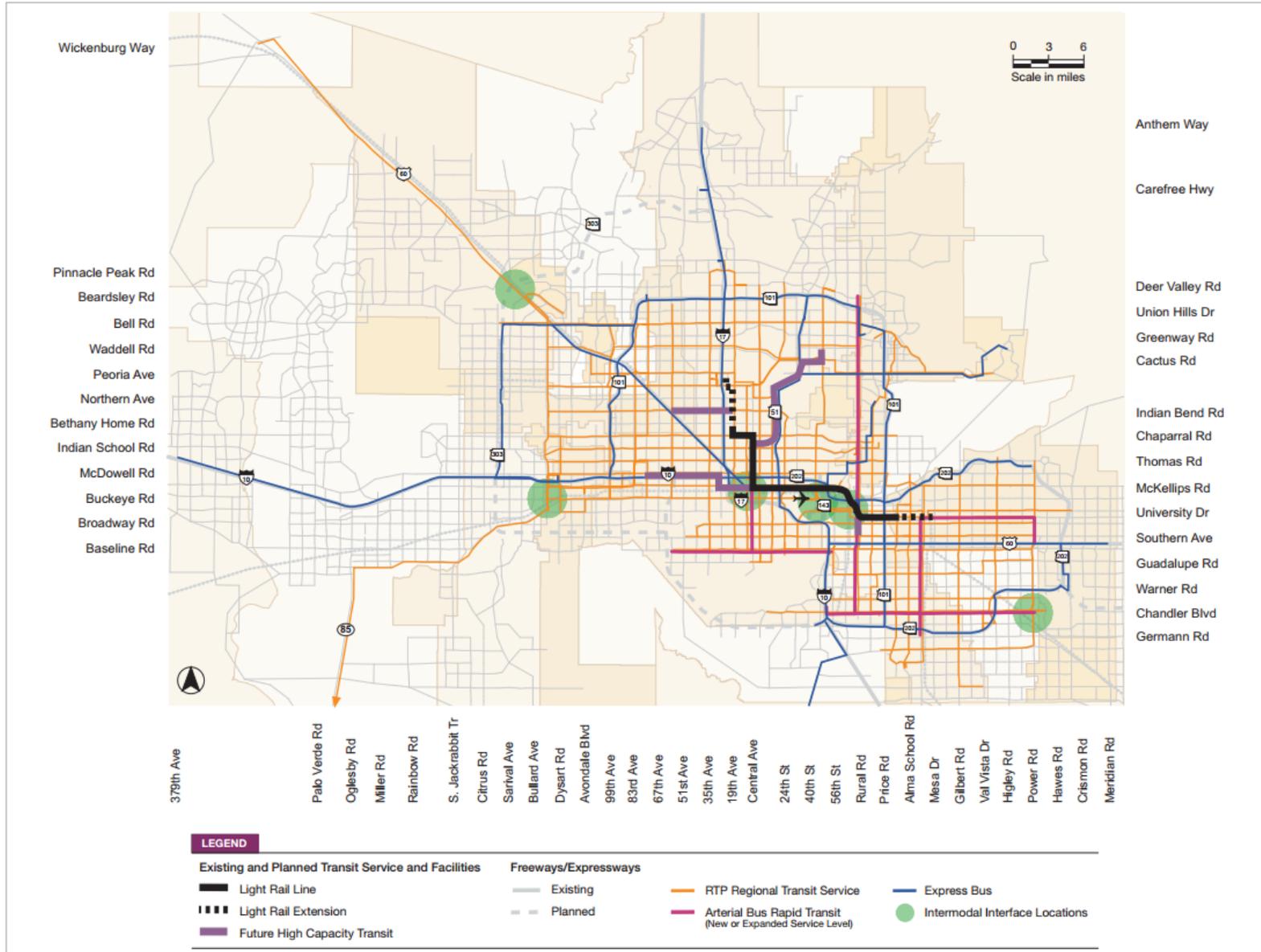
TRANSIT DEFICIENCIES

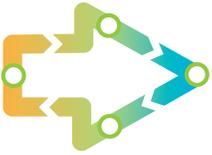
Basic deficiencies were established through this study and notable deficiencies are outlined below (see Figure 1).

Service Area Coverage

- Large gaps exist within the current transit coverage area. These gaps become larger and more prevalent as one moves outward from the Loop 101 and Loop 202 freeways.
- Employment locations are anticipated to become more widely dispersed throughout much of Maricopa County by 2030.
- Population is anticipated to continue to grow toward the edges of the region and increase around many currently developed areas.
- Employment, similar to population, is projected to grow; however, not as far out or as quickly as population in the undeveloped parts of the region.

Figure 1: Regional Transit Framework Study – 2030 Planned Regional Transit System (As Planned in 2010)





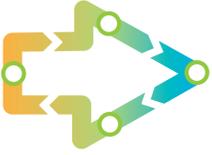
- Population and employment growth is anticipated to occur in areas that do not currently have funded transit service improvements.
- Funded growth for the 2007 Regional Transportation Plan (RTP) of the transit system to 2030 will be vastly insufficient for keeping up with rapidly increasing population and employment on the urban fringes.
- New regional travel demand patterns (e.g., between large suburban activity centers) will emerge, while travel demand between the central area and suburban areas of the MAG region will continue to remain strong between now and 2030.

Passenger Convenience

- Overcrowding is an issue on some routes, especially during peak-period express services, which lack the passenger turnover of local routes.
- Decreased satisfaction with transit service may result in reduced ridership and fewer choice riders.
- Concerns that the demand for parking at LRT stations will eventually exceed the supply.
- Limited funds are offered by the RTP for P&R expansion in areas with the greatest need.
- Demand response services are inconsistent because they have different providers in different cities, resulting in non-uniform fares, varying hours of operation, inconsistent eligibility requirements, confusion, and time consuming transfers.

Funding Limitations

- Development is hindered on inter-jurisdictional bus routes because local bus routes are funded by individual jurisdictions (cities and towns).
- Funding is unbalanced because some cities have approved a dedicated transit funding source and some do not; this imbalance limits the ability to create and maintain a seamless transit system with efficient connections from one part of the metropolitan area to another.
- 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 federal transit programs.
- Capital improvements funded by Proposition 400 for planned transit service expansion will not meet the full transit demand.
- New revenue sources will be necessary for regional transit investment if the region intends to meet growing transit demand.



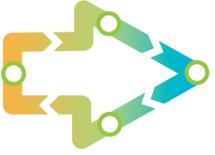
TRANSIT IMPROVEMENT SCENARIOS

Analysis of the regional transportation demand corridors, transit needs, and deficiencies identified several transit modes potentially appropriate for serving different types of travel corridors, including, but not limited to, highways in rural areas, arterial streets in urban areas, urban freeways, and existing railroad lines. These modes were:

- **ADA Paratransit** (dial-a-ride) – Curb-to-curb shared ride service for eligible persons with disabilities, who are unable to travel alone by transit;
- **Regional Connectors** – Intercity buses connecting outlying communities with activity centers;
- **Supergrid**—Bus service on major arterial streets serving major activity centers with consistent levels of service operating across jurisdictional boundaries;
- **Express Bus**—Services using the regional freeway system and high occupancy vehicle (HOV) lanes to connect park-and-ride lots with major employment centers;
- **Arterial Bus Rapid Transit (BRT)** – Arterial bus service that operates faster than Supergrid routes, by making a limited number of stops and taking advantage of features such as traffic signal priority;
- **High-Capacity Transit All-Day** – Frequent, all-day rail or bus service that typically operates in a dedicated guideway and stops for passengers only at designated stations to provide high-capacity transit (HCT) service in heavily traveled corridors; and
- **HCT Peak-Period** – Long-distance rail (i.e., commuter rail) or bus service operating in a dedicated guideway, making infrequent stops, and operating primarily during the morning and afternoon peak periods.

Using these modes, three transit scenarios were developed that would provide demand based solutions based on different funding level assumptions. The three scenarios were:

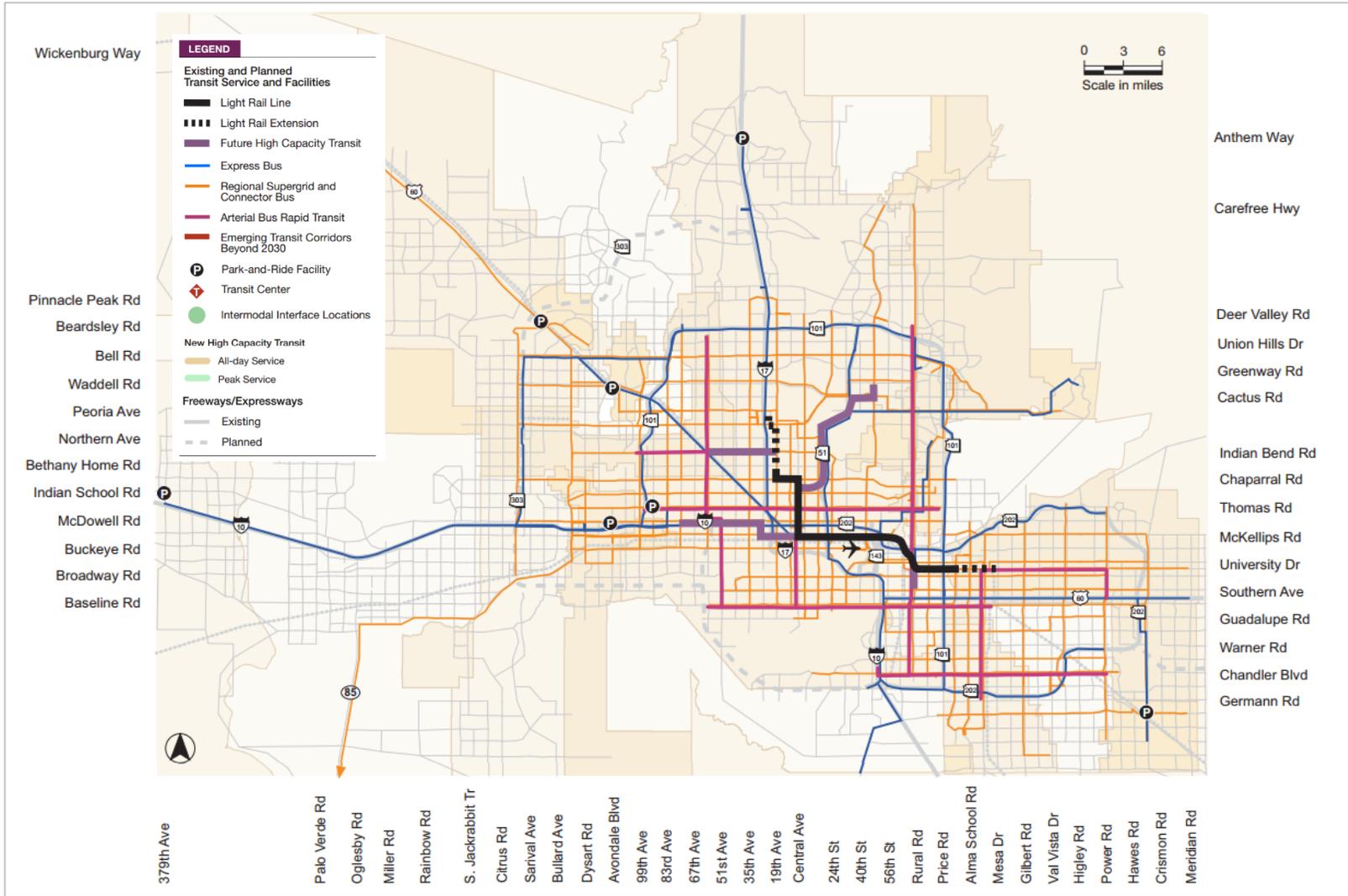
- **Scenario I, Basic Mobility** – This alternative was based on the assumption that current RTP funding for transit would be extended from its current expiration in 2026 through 2030 (see Figure 2);
- **Scenario II, Enhanced Mobility** – This alternative included additional funding, reflecting an approximate doubling of existing revenue levels (see Figure 3); and
- **Scenario III, Transit Choice** – This alternative included expanding the regional transit system with expenditures almost four times greater than existing funding levels (see Figure 4).



FINDINGS

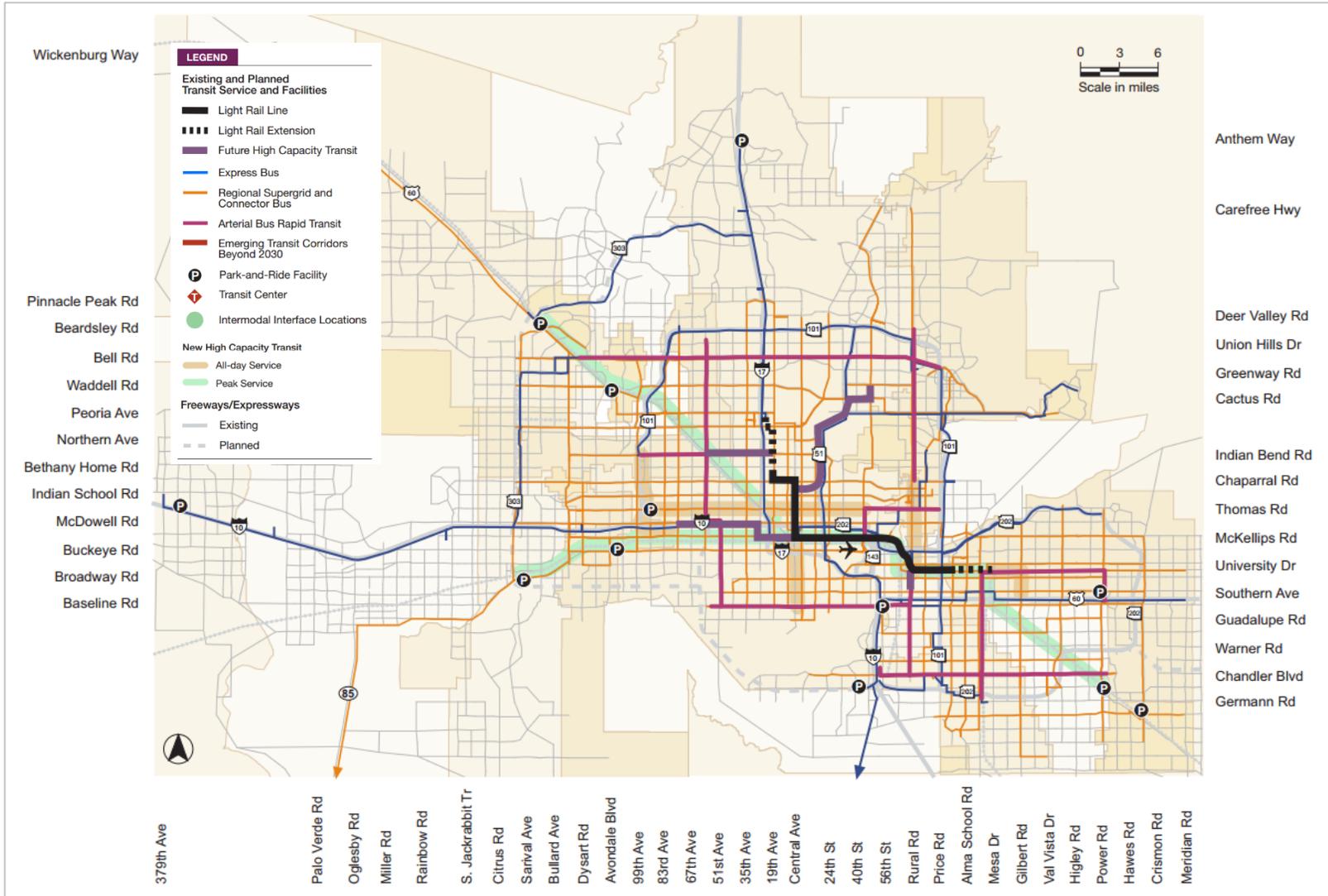
The completed transit framework established guidance relating to appropriate residential and employment densities to support different transit modes. Specific corridors were identified for BRT and HCT, as defined above, along with key intermodal connection locations. Preparation of the MAG Regional Transit Framework Study (2010) resulted in some relatively specific conclusions regarding ridership and productivity, transit patronage by mode, and transit mode split. These conclusions are presented in the following paragraphs.

Figure 2: Regional Transit Framework Study – Scenario I Basic Mobility



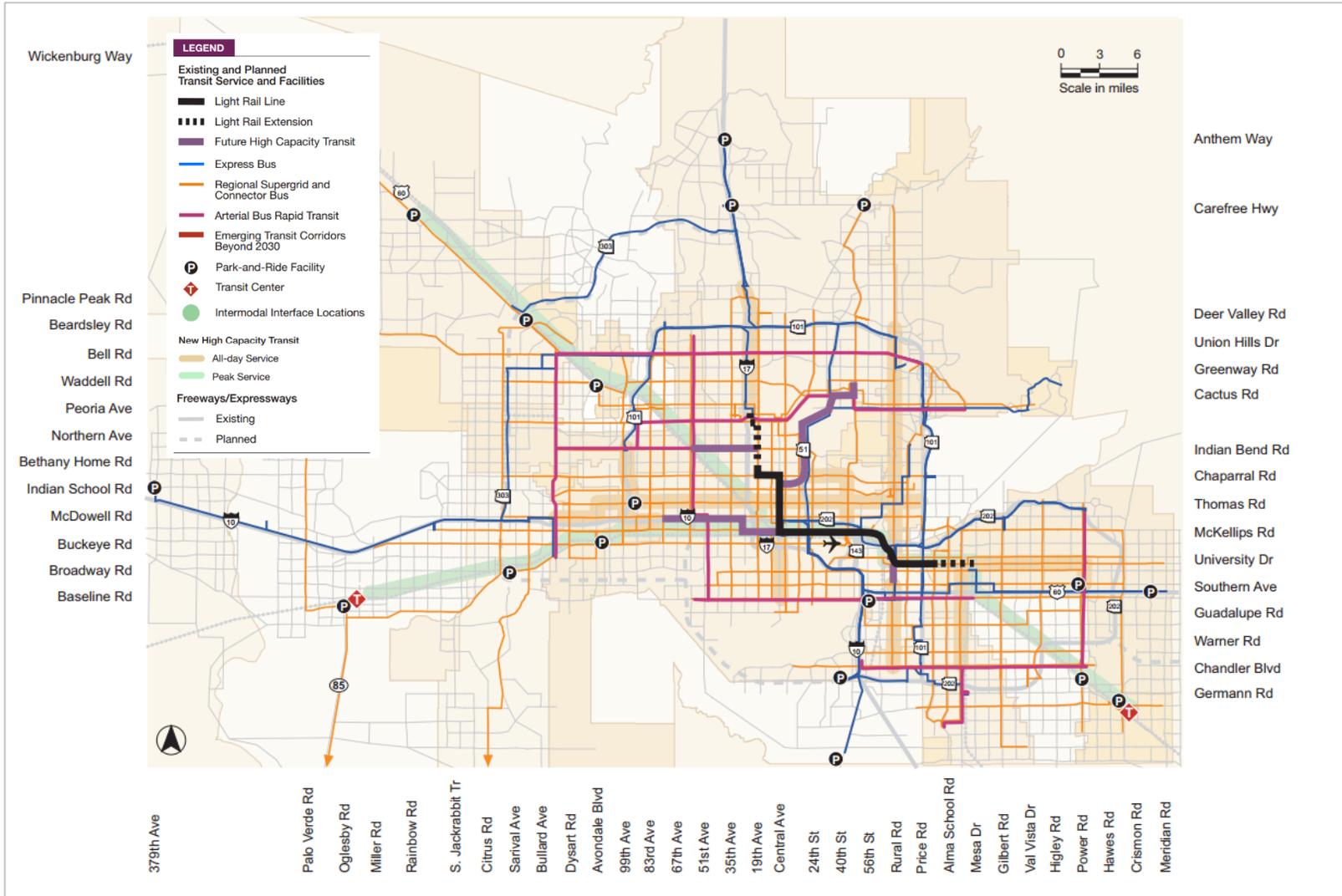
Source: MAG Regional Transit Framework Study, Executive Summary, Maricopa Association of Governments, April 2010.

Figure 3: Regional Transit Framework Study – Scenario II Enhanced Mobility

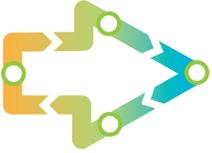


Source: MAG Regional Transit Framework Study, Executive Summary, Maricopa Association of Governments, April 2010.

Figure 4: Regional Transit Framework Study – Scenario III Transit Choice



Source: MAG Regional Transit Framework Study, Executive Summary, Maricopa Association of Governments, April 2010.

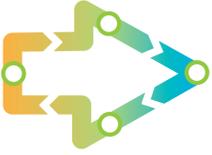


- **Ridership and Productivity** – As would be expected, when additional investment in transit is made and a more comprehensive and integrated regional transit system is provided, passenger boardings increase. Scenario I would serve 120 million passengers per year and Scenario III would serve 153 million. However, Scenario I would be more productive, carrying 2.3 passengers per vehicle mile, versus 1.9 for Scenario III.
- **Transit Patronage by Mode** – Due to a combination of the amount of services provided by transit type and rider preferences, there would be significant differences in the percentage of passengers using HCT versus local services. With Scenario I, 29.1% of passengers would use HCT services, 68.8% Supergrid and local services, and 2.1% express services. With Scenario III, those percentages would be 42.7%, 55.5%, and 1.8%, respectively.
- **Transit Mode Split** – With Scenario I, the peak period transit mode split would increase by 1.7%, while with Scenario III it would increase by 24.8%.

In summary, 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, would 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.

The study did not produce specific recommendations, but concluded:

“Developed through a demand-based approach, the regional transit framework scenarios provide a blueprint for a better coordinated and integrated regional transit system. Implementation of the concepts in these scenarios would transform the current regional transit system to one that more effectively and efficiently addresses travel needs throughout the region. To advance the transit service scenarios beyond a mere blueprint, the region must reach consensus on the future transit vision, identify resources and develop a detailed implementation strategy.”



SUSTAINABLE TRANSPORTATION AND LAND USE STUDY (STLUIS)

WORKING PAPER 1, REGIONAL TRANSPORTATION FRAMEWORK & ISSUES

January 3, 2011; MAG

Overview

The Sustainable Transportation and Land Use Study (STLUIS) was undertaken to (1) examine the relationship of regional transportation planning with land use decisions, (2) respond to growing interest in sustainability by MAG member agencies, and (3) provide a foundation for establishing greater emphasis on “sustainability” in transportation funding criteria. Working Paper 1:

- Identified established themes for the region’s transportation network;
- Described the recent progress toward sustainability and land use integration;
- Reviewed planned, proposed, and potential transit corridors; and
- Highlighted challenges and opportunities related to creating an integrated regional transportation network that maximizes economic, social, and environmental value.

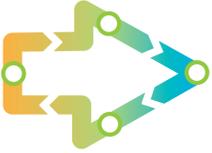
This study served as a background document for other past planning efforts in the region, described the existing transit system, and examined how past planning actions have sought to integrate HCT investment with land use planning.

Issues Identified

This Working Paper identified four issues associated with achieving a more sustainable transportation system through closer coordination of transit services in HCT corridors with land development. These issues guided additional studies conducted as part of the STLUIS work program. This Working Paper also highlighted opportunities for mitigating the effects/influences of issues identified.

Issue One: Land Use and Transit Integration

The cost-effective provision of transit services generally requires people, businesses, and social institutions to be somewhat concentrated and located in



a manner that will support a reasonable network of routes (example: New York City subway system). Therefore, coordinating land use planning with the provision of transit service supports community mobility and enhances the ability to forecast travel demand. A related issue is the lack of coordination among and between neighboring communities or jurisdictions, each of which may or may not provide transit services. The fragmentation of transit service in a large region and lack of connections to key destinations or convenient transfers impedes mobility.

To overcome the pitfalls of poor land use/transit integration and fragmented services, travel models can be utilized to evaluate land use patterns and how they can complement transit networks. The modeling can provide a basis for defining tools and strategies to influence future land use and transit planning. Transit oriented development (TOD) has been validated as an effective method for integrating land use and transit services. The result can be a “collection of routes” that provides connectivity between existing activity centers and neighborhoods with greater focus given to TOD actions.

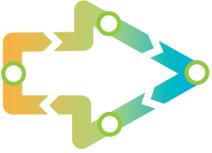
Issue Two: Sustainable Transportation Definition and Implementation

Sustainable transportation objectives seek integration with all modes of transportation to optimize travel opportunities for persons of all ages and capabilities. The concept is multimodal in nature and requires careful prioritization of investments and initiatives. Multimodal planning takes into consideration the best qualities of each travel mode and seeks to establish a continuous multimodal travel network that supports safe, secure, and convenient movement between modes, as determined by the type and length of trip. This effort requires, in turn, recognition of the travel environment and careful examination of measures to make alternative modes more attractive for commuting and leisure travel.

This initial Working Paper focused on examining system, network, and facility improvements in association with specific implementation measures to create a more integrated traveling environment. Criteria were identified to evaluate differing investments in services and infrastructure to support creation of a sustainable transportation system. Potential investments in transit, non-motorized travel modes, and transportation demand management (TDM) strategies were slated to be investigated and scrutinized in further studies.

Issue Three: Viability of Transit-Oriented Development

Due to the lack of effective coordination between land use and transit in the past, there are a number of large “entitled” developments (residential and commercial) outside corridors identified as having the potential for HCT transit services. Entitled developments have been through several stages of site



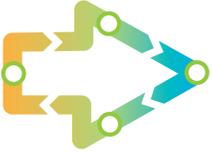
planning and have received approval from the appropriate regulatory body to use or develop the site/land as proposed. Because these large developments are outside identified potential HCT corridors, it is a challenge to serve the developments with appropriate transit services. In addition, developers have already invested time and resources into gaining these entitlements, resulting in the challenge of getting new development to focus around the planned transit network. In other cases, many entitlements in the region have expired. Thus, there is difficulty in bringing about a meaningful complement of TODs that can take advantage of and support both the local and HCT services.

Overcoming the challenges associated with planned development was targeted as a subject to study during the STLUIS. Market demand studies were noted as being an activity to help clarify what actually might be developed and how strategic investments in transit services and facilities could best leverage commercial and residential demand. It also was noted that types of transit supportive development should be evaluated and identified with respect to various regional locations. Furthermore, the level of transit service could be scaled against regional locations to aid in making investment decisions.

Issue Four: Financing Transit and Transit Oriented Development

Funding for transit services and facilities has historically been relatively low and not very stable. Billions of dollars were expended developing the national, state, regional, and local roadway system before dedicated funds became available for transit systems. As noted above, the lack of coordinated land use development and transit service planning increases the difficulty of creating effective and efficient transit systems within an established urban environment. The stability of transit funding, therefore, is important and the STLUIS gave focus to this issue. Funding can be augmented with sound TOD, because economic benefits accrue to the community, although committing land to public uses, such as a transit facility, can also have negative tax base effects. Nevertheless, the corollary issues of efficient land use and quality of life associated with integrating transit services with TOD can enhance the overall community development pattern and infrastructure systems.

The need to attain stable transit funding gave rise to a recommendation to investigate the viability of regional and district transit infrastructure banks, district oriented “value capture” concepts, and the potential for new federal funding sources. The identification of this issue also gave focus to the need to analyze the infrastructure cost burden associated with different development patterns. It is noted in the Working Paper that coordination of concurrent planning efforts at the regional and state levels offers opportunities for enhancing the results of the STLUIS and would help spur development of a sustainable regional transportation network coordinated with land use.



WORKING PAPER 2, MOVING TOWARD SUSTAINABLE TRANSPORTATION

October 19, 2011; MAG

Overview

Working Paper 2 focused on potential strategies to create a more sustainable transportation system. Potential strategies were screened for applicability to the MAG region, as part of a best practices assessment. The report provides a comprehensive definition of “sustainable transit,” presents evidence relating to successes associated with key parameters affecting travel demand and sustainable transit practices, and briefly examines future trends that can influence future travel patterns.

Recommended Strategies

The working paper defines six community strategies:

- Walkable streets
- Mixed-use communities
- Transit supportive densities
- Sustainable transportation districts
- Affordable TOD housing
- Transportation demand management

It also defines three regional strategies that MAG and member agencies can take to achieve a sustainable transportation priority or priorities:

- Walkable streets
- Mixed-use communities,
- Transportation demand management)

An assessment of impacts respecting walking/biking, transit use, equity, and vehicle miles of travel is associated with each of the community strategies. A summary of the application of these six strategies is shown in Figure 5.

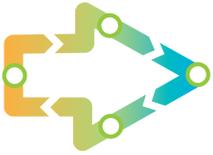
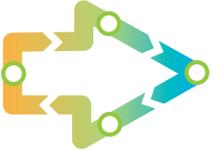


Figure 5: STLUIS Study – Sustainable Transportation Strategy Menu

Community Strategy	Applicable Places	
	Transit-Oriented 	Walkable 
Walkable Streets	●	●
Mixed-Use Communities	●	●
Transit-Supportive Densities	●	
Sustainable Transportation Districts	●	
Affordable TOD Housing	●	
Transportation Demand Management	●	●

Source: STLUIS Study, Working Paper 2, Moving Toward Sustainable Transportation, Sustainable Transportation & Land Use

All six strategies were tailored to transit-oriented places located within HCT supportive corridors, while three are also applicable to areas considered walkable places that may be located outside HCT corridors. Thus, the strategies can be applied to new or infill development or as “retrofit” projects to improve walkability associated within existing areas.



SUPPORTIVE HIGH CAPACITY TRANSIT CORRIDOR TECHNICAL ANALYSIS

November 7, 2011; MAG

Overview

This memorandum, prepared as a foundation for the STLUIS study, examined 40 HCT corridors for arterial BRT or LRT all-day operations and four corridors for peak-period commuter rail operations. A two-step analysis was conducted to:

1. Prioritize potential HCT services; and
2. Evaluate corridors that could support significantly enhanced levels of transit service.

Key Findings

Key findings from Step 1 are as follows:

- Eighteen of the 40 HCT all-day corridors meet or exceed the 60% supportive score threshold and were carried forward for Step 2 analysis.
- All RTP-funded HCT corridors achieve the minimum 60% supportive score threshold.
- The 22 remaining HCT all-day corridors were classified as Tier 3 corridors.

Step 1 rankings of the initial 40 corridors are shown in Table 1.

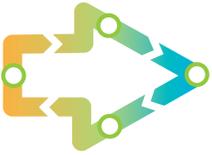


Table 1: STLUIS Study – HCT Supportive Score, All Day Corridors Step 1

Rank	Corridor ^{A, B}	Corridor Number #	Score (Out of 60)	Progress to Step 2 Analysis?
1	I-10 to 79th Avenue *	18	55	YES
2	CP/EV Starter Line *	13	54	YES
3	Central Ave	9	53	YES
4	Central Ave (a)	10	52	YES
5	Thomas Rd (Agua Fria to 44th)	35	51	YES
6	Thomas Rd (Agua Fria to Price)	36	51	YES
7	Thomas Rd (a)	37	49	YES
8	Rural/Scottsdale	27	47	YES
9	Central Phoenix East	11	45	YES
10	Main Street Extension *	21	43	YES
11	Metrocenter Extension *	24	41	YES
12	Tempe Streetcar *	34	37	YES
13	Scottsdale Rd	32	37	YES
14	NW Extension Phase 3	25	37	YES
15	SR 51 *	33	36	YES
16	Arizona Ave (a)	3	36	YES
17	Thomas Rd (b)	38	36	YES
18	Glendale Extension *	17	36	YES
19	Arizona Ave (b)	4	35	See note ^C (Tier 3)
20	Rural/Scottsdale (a)	28	35	See note ^C (Tier 3)
21	Rural/Scottsdale Rd	31	34	NO (Tier 3)
22	Mesa Ext Phase 2 (Gilbert/US60)	22	34	See note ^C (Tier 3)
23	Main St	20	33	NO (Tier 3)
24	59th/51st Ave	1	33	NO (Tier 3)
25	Baseline Rd	6	32	NO (Tier 3)
26	Glendale Ave (a)	15	32	NO (Tier 3)
27	Dunlap/Peoria/Shea	14	31	NO (Tier 3)
28	Baseline Rd (b)	7	30	NO (Tier 3)
29	Bell Rd	8	30	NO (Tier 3)
30	Mesa Ext Phase 2 (Power/US60)	23	29	NO (Tier 3)
31	Chandler Blvd (A)	12	27	NO (Tier 3)
32	Arizona Ave	2	26	NO (Tier 3)
33	Glendale Ave (b)	16	25	See note ^C (Tier 3)
34	Rural/Scottsdale (c)	30	25	NO (Tier 3)
35	West Phx Phase 2	40	24	NO (Tier 3)
36	Litchfield Rd	19	20	NO (Tier 3)
37	Arizona Ave (c)	5	20	See note ^C (Tier 3)
38	Rural/Scottsdale (b)	29	19	NO (Tier 3)
39	Thomas Rd Phase 2	39	18	NO (Tier 3)
40	Power Rd	26	16	NO (Tier 3)

Notes:

^A * connotes RTP-funded HCT corridors

^B **Bold** indicates corridor score achieves or surpasses the 60% minimum threshold for inclusion in Step 2 analysis.

^C Portion of analysis corridor included in Stage Two analysis through inclusion in higher scoring analysis corridor.

Source: STLUIS Study, "Supportive High Capacity Transit (HCT) Corridor Technical Analysis," Memorandum, To: Sustainable Transportation Shareholders, From: Eileen Yazzie, Transportation Programming Manager, November 7, 2011.

In Step 2, viable corridors (the 18 corridors meeting or exceeding the 60 percent supportive score threshold) were ranked and classified into three tiers, based on natural breaks in scores (see Table 2).

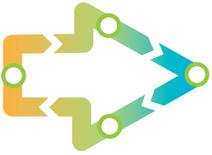


Table 2: STLUIS Study – HCT Supportive Score, All Day Corridors Step 2

Rank	Corridor ^{A, B}	Corridor Number #	Score (Out of 145)	Recommended HCT Tier	Tier 1 “Service Route”
1	CP/EV Starter Line *	13	130	Tier 1A	CP/EV Line
2	Central Ave	9	116	Tier 1A	Central Ave
3	Central Ave (a)	10	116	Tier 1A	Central Ave
4	I-10 to 79th Avenue *	18	114	Tier 1A	I-10 to 79th Ave
5	Thomas Rd (Agua Fria to 44th)	35	101	Tier 1B	Thomas
6	Thomas Rd (Agua Fria to Price)	36	99	Tier 1B	Thomas
7	Thomas Rd (a)	37	97	Tier 1B	Thomas
8	Rural/Scottsdale *	27	96	Tier 1B	Rural/Scottsdale
9	Tempe Streetcar *	34	96	Tier 1B	Tempe Streetcar
10	Scottsdale Rd	32	93	Tier 1B	Scottsdale
11	Central Phoenix East	11	90	Tier 1B	Central Phoenix East
12	Main Street Extension *	21	87	Tier 1B	Main Street Extn
13	Metrocenter Extension *	24	84	Tier 1B	Metrocenter Extn
14	Glendale Extension *	17	82	Tier 1B	Glendale Extn
15	SR 51 *	33	66	Tier 2	
16	Thomas Rd (b)	38	61	Tier 2	
17	Arizona Ave (a)	3	61	Tier 2	
18	NW Extension Phase 3	25	51	Tier 2	

Notes:

^A * connotes RTP-funded HCT corridors

^B **Bold** indicates corridor score achieves or surpasses a score of 93; the minimum threshold for a Tier 1A corridor.

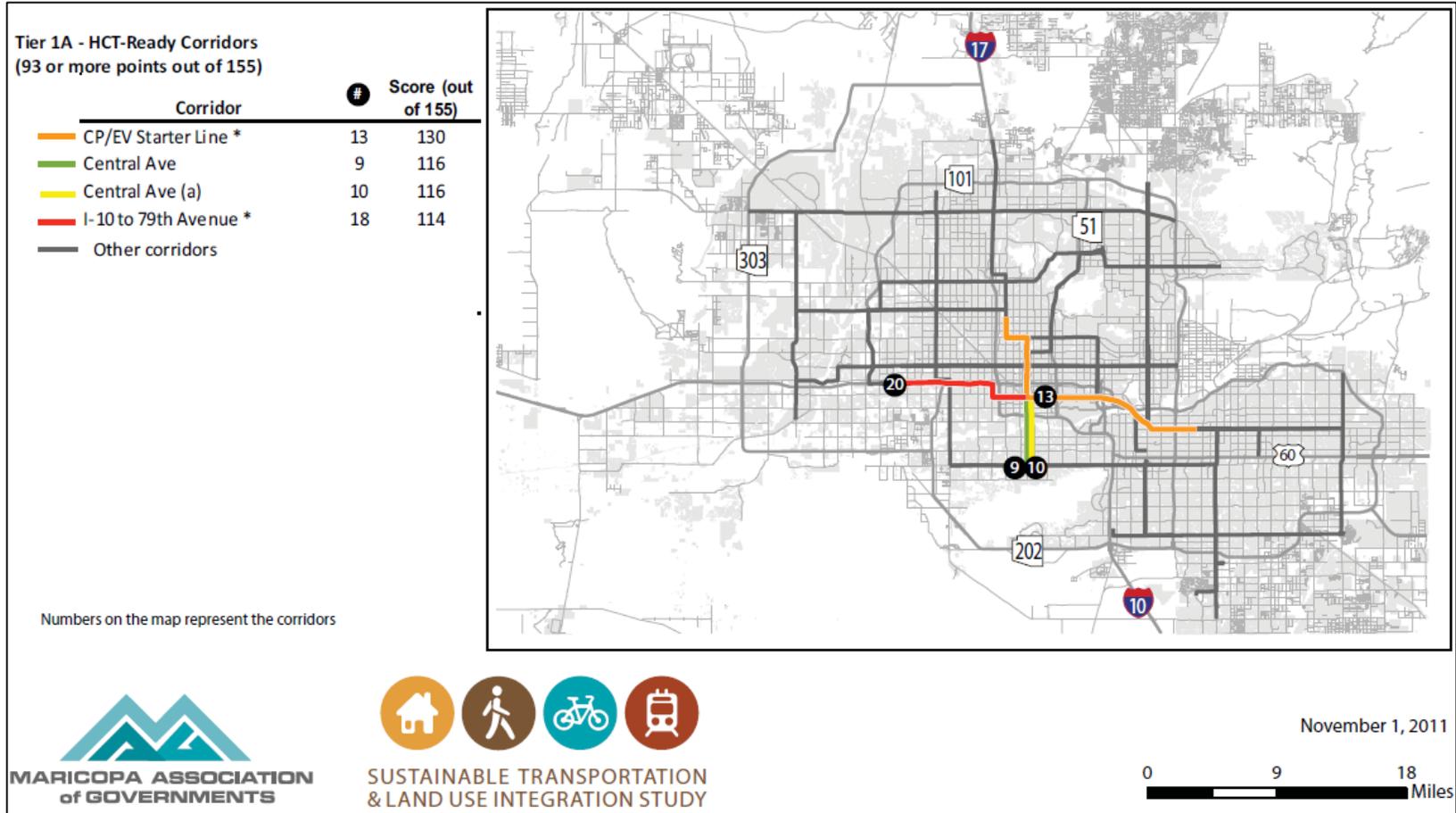
Source: STLUIS Study, “Supportive High Capacity Transit (HCT) Corridor Technical Analysis,” Memorandum, To: Sustainable Transportation Shareholders, From: Eileen Yazzie, Transportation Programming Manager, November 7, 2011.

The Memorandum stated “analysis corridors” could be consolidated into “service corridors,” being served by one or more HCT routes. The 14 Tier 1A and Tier 1B analysis corridors could thus be consolidated into 10 service corridors, as many of the Tier 1A and Tier 1B corridors were represented by different segments of the same corridor or parallel segments/corridors:

- Tier 1A Service Corridors
 - CP/EV Starter Line
 - Central Avenue
 - I-10 to 79th Avenue
- Tier 1B Service Corridors
 - Thomas Road
 - Rural/Scottsdale
 - Tempe Streetcar
 - Central Phoenix East
 - Main Street Extension
 - Metrocenter Extension
 - Glendale Extension

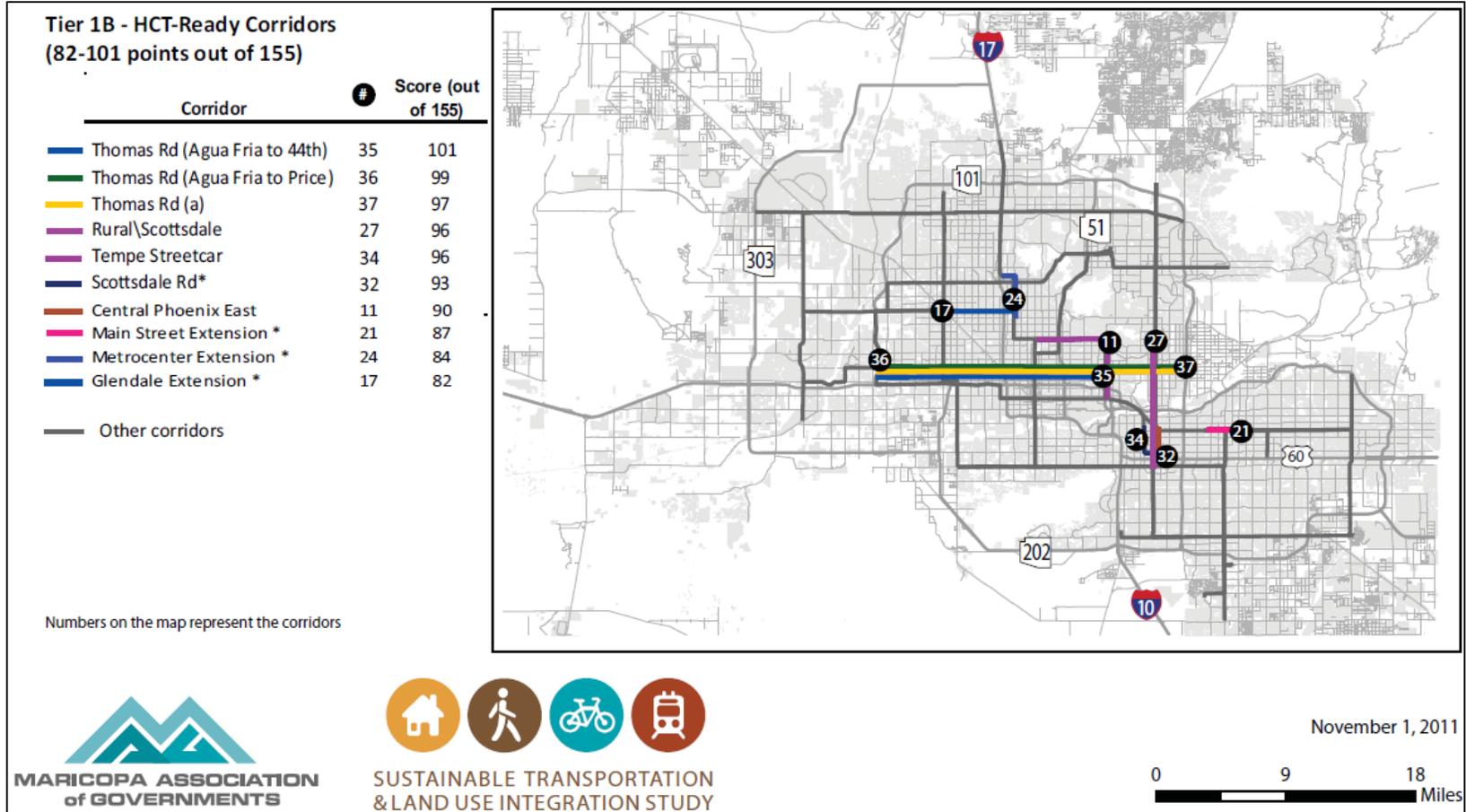
Figures 6 and 7 depict the Tier 1A and Tier 1B corridors.

Figure 6: STLUIS Study – Tier 1A High-Capacity Transit Corridors

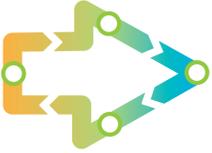


Source: STLUIS Study, Step 2 High Capacity Transit-Supportive Analysis: Map to HCT All Day Corridors by Composite Score (Tier 1A – HCT-Ready Corridors), Supportive High Capacity Transit (HCT) Corridor Technical Analysis, Memorandum, To: Sustainable Transportation Shareholders, From: Eileen Yazzie, Transportation Programming Manager, November 7, 2011.

Figure 7: STLUIS Study – Tier 1B High Capacity Transit Corridors



Source: STLUIS Study, Step 2 High Capacity Transit-Supportive Analysis: Map to HCT All Day Corridors by Composite Score (Tier 1A – HCT-Ready Corridors), Supportive High Capacity Transit (HCT) Corridor Technical Analysis, Memorandum, To: Sustainable Transportation Shareholders, From: Eileen Yazzie, Transportation Programming Manager, November 7, 2011.



FINAL EMPLOYMENT ANALYSIS MEMO

June 27, 2012; MAG

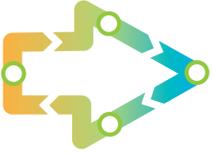
Overview

This memorandum, prepared as part of STLUIS activities, was developed to provide insight into the relationship between existing and planned transit investments and employment patterns in the MAG region. It highlighted existing job centers in Maricopa County and noted key characteristics relating to employment density, industry sector composition, and relative role within the region's growth trends. The memorandum was limited to examining the employment side of the commute trip. It presented a spatial and quantitative assessment of employment patterns, providing an in-depth look at existing employment clusters, changes in these clusters over time, the degree to which the clusters could support HCT transit services, and the distribution of "transit-supportive" employment within the region.

Key Findings

Key findings presented in this memorandum are excerpted below:

- Maricopa County, like much of the nation, has experienced significant employment and residential growth in recent years, with many new jobs and households locating outside of central business districts and downtowns.
- Households and businesses on the region's fringe are generally more difficult to serve through public transit, and therefore are more reliant on the automobile for work and other trips.
- Auto-oriented travel and land use patterns can provide challenges for individuals and businesses, contributing to traffic congestion, longer travel times, increased infrastructure costs, the loss of open space, greater pollution and greenhouse gas emissions, and increased transportation costs.
- A stronger integration between land use and transportation planning can provide greater mobility and enhanced options for residents and workers, and can help to support future transit investments.
- Transit systems that effectively connect higher density housing and employment uses generate strong ridership. This is particularly true for high density employment uses, as they are more closely associated to transit ridership than dense residential uses.
- Specific industries, such as government and knowledge-based sectors, are less likely to decentralize, and have demonstrated desire to locate in higher-density single use and mixed use centers near transit.



- Focusing on the transit connection to major employment centers provides better regional access to jobs for low and moderate income households, who also carry the greatest burden in terms of transportation costs as a percent of household income.

MAG SUSTAINABLE LAND USE & TRANSPORTATION MARKET STUDY

December 18, 2012; MAG

Overview

This memorandum, prepared by Strategic Economics, represented a comprehensive overview of the real estate market in the MAG region, including the market for transit-oriented and other compact forms of development. It:

1. Provided a detailed overview of demographic trends in Maricopa County, compared historic employment and population growth within the county; and presented an assessment of regional employment and population projections;
2. Summarized at the regional and submarket level key commercial and residential market characteristics, including historic trends and current market conditions; and
3. Presented demand projections for residential and commercial TOD over the next 30 years.

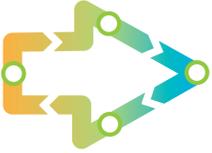
Its findings gave definition to the potential to shift regional growth to targeted transit corridors and identified submarkets where compact development patterns are most likely to be supported by local market conditions.

Key Findings

Demand for Residential and Commercial TOD

The key findings related to the demand for residential and commercial TOD are as follows:

- Maricopa County can expect demand for TOD housing from nearly 485,000 households by 2040, including a variety of compact housing types ranging from small-lot single family homes and townhomes to mid-rise and high-rise multifamily towers.
- Transit oriented development and compact development patterns are most likely to be supported by local market conditions in the downtown Phoenix, Camelback Corridor, downtown Scottsdale, and downtown Tempe submarkets.



- Potential demand for TOD among the most transit-supportive commercial industries amounts to more than 127 million square feet of space in 2040.
- The downtown Phoenix, downtown Tempe, and Camelback Corridor submarkets are the most likely to attract transit-oriented commercial development.
- The Chandler and Scottsdale Airpark submarkets are also likely to experience significant growth.

Demographic Trends

The key findings related to demographic trends are as follows:

- Although population growth in Maricopa County significantly outpaced growth at the national level from 1990 to 2010, the rate of growth slowed precipitously from 2000 to 2010.
- The majority of Maricopa County's growth from 1990 to 2009 can be attributed to smaller households of one to two persons.
- Over the last 20 years, the age distribution in Maricopa County has shifted to a slightly older demographic.
- Nearly half of Maricopa County population growth from 1990 to 2010 can be attributed to Hispanic or Latino residents, and nearly 16 percent of residents were foreign-born in 2009.

Residential Market Conditions

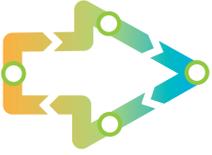
The key findings related to residential market conditions are as follows:

- The market for single family housing in Maricopa County is currently overbuilt and will return slowly.
- Attached housing performs better in places with a good mix of uses, close to employment centers, and with nearby amenities like retail.
- In the wake of high gas prices, Maricopa County residents have expressed a desire to locate closer to employment and/or the region's core.

Commercial Market Conditions

The key findings related to commercial market conditions are as follows:

- The real estate market in Maricopa County was hit hard by the Great Recession, and commercial recovery is likely to lag the residential market.
- In Maricopa County, commercial development patterns are shaped by transportation infrastructure investments and the location of workforce housing.



- Submarkets and cities within the region are competing with each other for existing jobs as well as new jobs, creating a dynamic where new construction is in some cases drawing jobs away from existing cores to the suburban fringe.

WORKING PAPER 3, SCENARIO MODELING AND RESULTS

March 19, 2013; MAG

Overview

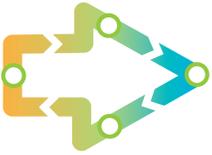
This Working Paper provided an analysis of alternative scenarios for MAG region's transit investments and development pattern. It describes the process followed in developing and modeling three scenarios, identifies the components of each scenario, and details the modeling results with a focus on transit ridership and productivity. Three scenarios were defined to permit examination of moderate expansion of the transit system:

- **Scenario 1 – Enhanced Transit**, which reflected moderate expansion of the MAG Base Case Buildout scenario transit network and included reallocation of total regional growth to specify TOD, consistent with the STLUIS “place types” within one half mile of transit stations (“station areas”).
- **Scenario 2 – Transit Supply**, reflected a very generous expansion of the MAG Base Case Buildout scenario transit network, and included reallocation of total regional growth to direct TOD and compact walkable development to station areas that are expected to be supported by future market conditions.
- **Scenario 3 – Refined Transit Supply**, which tested a transit network more extensive than Scenario 1, but not as extensive as Scenario 2 with assumptions for increasing network productivity, and reflected constraints on HCT supportive densities in some locations.

Key Findings

Key findings relating to performance of the three scenarios were presented as follows:

- A small, compact, and selective HCT network is the most productive.
- Targeted corridor modifications improve productivity.
- A larger, more extensive network generates more ridership, but costs significantly more.
- Regional transit mode share increases with a mix of LRT and BRT services.



- A variety of high-quality, rubber-tire services could increase productivity.
- A more extensive HCT network is not projected to generate significantly higher HCT mode share within station areas.
- Finite demand exists for transit supportive development.
- Existing conditions are essential to supporting future HCT service.

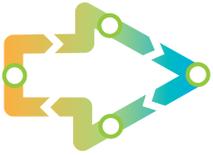
Three transit “Place Types” were identified by which the scenarios could be compared relative to efficiency and effectiveness. The principal characteristics of these Place Types are:

- **Compact Walkable Place Type:** 15-30 persons per acre, plus supportive urban form and transportation characteristics.
- **Transit-Served:** 30-45 persons per acre on an area-wide basis, plus supportive urban form and transportation characteristics. The threshold density of 30 persons per acre is assumed in all station areas in which the Transit-supportive place type is applied.
- **HCT-Oriented (or Supportive):** 45+ persons per acre on an area-wide basis, plus supportive urban form and transportation characteristics:
 - Densities greater than 45 persons per acre are assumed in downtown and North Central Phoenix in all scenarios, and in downtown Scottsdale and Tempe in Scenarios 1 and 2.
 - The threshold density of 45 persons per acre is assumed in all other station areas in which the HCT-supportive place type is allocated.

Conclusions

The overall conclusions derived during this phase of the STLUIS was that Scenario 1 – Enhanced Transit was the “Best Performing.” Scenario 3 – Refined Transit Supply was the “Worst Performing.” Scenario 2 – Transit Supply was rated “Moderate Performing.” Table 3 provides a comparison of the three scenarios as presented in the Working Paper 3. A summary of key conclusions are as follows:

- **Size and Growth of Transit System** – Scenario 2 represented the most extensive deployment of HCT, with a combination of LRT, BRT, commuter rail, and streetcar modes (435 network miles), Scenario 1 represented moderate expansion of existing services (137 network miles), and Scenario 3 represented expansion of regular transit services and included some HCT service (366 network miles).
- **Ridership** – Scenario 2 generated the highest ridership at 482,860 weekday boardings, doubling that of Scenario 1 (or nearly 244,000 additional daily riders), and Scenario 3 generated only nine percent fewer daily riders than Scenario 2 despite having 15 percent fewer network miles.



- Capital Cost** – The cost estimate of Scenario 1 was determined to be \$6,606.7 million. Scenario 2 was estimated to cost more than twice as much to build (i.e., an additional \$6,940.0 million). Scenario 3 would almost split the difference between Scenario 1 and Scenario 2 at \$9,723.4 million.

Table 3: STLUIS Study –Performance of Transit Network Scenarios

	Scenario		
	Enhanced Transit - Scenario 1	Transit Supply - Scenario 2	Refined Transit Supply - Scenario 3
Descriptive Statistics			
Avg. Weekday HCT Boardings	238,841	482,860	439,195
Annual HCT Boardings	75,903,670	153,452,908	139,576,171
Avg. Weekday Vehicle Revenue Miles (VRM)	33,713	86,594	73,875
Annual Vehicle Revenue Miles	12,653,248	32,454,185	27,677,425
Avg. Weekday Vehicle Revenue Hours (VRH)	2,241	6,096	5,382
Annual Vehicle Revenue Hours	842,269	2,286,538	2,017,142
Capital Cost (US\$M)	\$6,414.70	\$13,354.68	\$9,531.42
Annual O&M Cost (US\$M)	\$170.10	\$399.00	\$322.45
Productivity Statistics			
Avg. Weekday HCT Boardings / Route Mile	1,533	1,121	1,242
Avg. Weekday HCT Boardings / Stop	1,926	1,372	1,360
Avg. Weekday HCT Boardings / VRM	7.1	5.6	5.9
Avg. Weekday HCT Boardings / VRH	106.6	79.2	81.6
Avg. Annual HCT Boardings / VRM	6.0	4.7	5.0
Avg. Annual HCT Boardings / VRH	90.1	67.1	69.2
Avg. Annual O&M Cost / VRM	\$13.44	\$12.29	\$11.65
Avg. Annual O&M Cost / VRH	\$75,914.45	\$65,453.05	\$59,911.88
Avg. Annual O&M Cost / HCT Boarding	\$2.24	\$2.60	\$2.31
Mode Share			
Transit Mode Share (w/n Station Catchment)	8.2%	7.9%	7.5%
Transit Mode Share (w/n Downtown Phoenix)	22.0%	22.8%	20.6%
Transit Mode Share (Region-Wide)	1.8%	2.9%	2.8%

Key:

Best Performing	Moderate Performing	Worst Performing
-----------------	---------------------	------------------

Notes:

Green represents the highest performing scenario.

Yellow represents the medium performing scenario.

Red represents the lowest performing scenario.

Source: STLUIS Study, "Comparison of Performance Metrics for All Scenarios," Working Paper 3, Scenario Modeling and Results, Final, Sustainable Transportation and Land Use Integration Study, March 15, 2013.

- Annual Operating Cost** – Scenario 1 would be least expensive system to operate on an annual basis at \$170.1 million. Scenario 2 would be the most expensive to operate at \$399.0 million. Scenario 3, although having a capital cost 29 percent less than Scenario 2, would only save 19 percent in operating costs compared to Scenario 2.



- **Productivity (Regional Transit Mode Share)** – Scenario 1 performed the worst at 1.8 percent; Scenario 2 was the best performing at 2.9 percent, and Scenario 3 at 2.8 percent almost as well as Scenario 2. Transit mode share in the region was comparable between Scenario 2 and Scenario 3 (2.8% versus 2.9%, respectively).

KEY RECOMMENDATIONS AND TOOLS

March 29, 2013; MAG

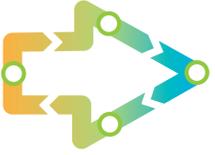
Overview

STLUIIS used a holistic approach to investigate transit’s potential through the integration of real estate market analysis coupled with transit corridor assessment and ridership modeling. The integration of transit service and land use was joined up with recommendations for creating compact walkable places throughout the MAG region. This document included key study recommendations and tools. It also summarized research and analysis activities, introduced scenario planning, and explained tools and strategies for integrating real estate development, transit opportunities, and potential ridership.

This report relied on the definition of three “Place Types” (types of development) or areas: Compact Walkable, Transit Served, and HCT Oriented. It also defined eight criteria — density, land use, transit, employment, walk access to transit, location, market opportunity, and feasible development types — for assessing the applicability of transit solutions to these Place Types. “Suburban” areas also were described as Place Type, but such areas were noted to be the “hardest to serve effectively with transit services” and, therefore, included only for reference.

Two tools were developed to assist local officials in the region to correlate transit service development with land use development: Pathway Tool 1 and Pathway Tool 2 were defined as working together, recognizing there is not a “*One Size Fits All*” solution. These tools allow a region and local agencies to evaluate transportation and land use options in concert from a market-based and data-driven approach.

Figure 8 characterizes the applicability of each Place Type relative to the issue of sustainable transit services and lists the eight criteria. (Note: Suburban development is not considered a Place Type, as these areas support low walkability and bikeability in large single-use spaces conducive to effective transit service. Suburban areas were included for reference purposes only). Important and easily definable influences affecting the feasibility of providing transit service included: density, land use, transit operability, employment.



Recommended Strategies

Specific strategies for moving the region toward a sustainable transportation system are outlined below:

- **Strategy 1: Redefine regional projects** – continue and expand regional support for projects with a local focus.
- **Strategy 2: Integrate the STLUIS findings and tools into RTP planning process** – move forward with HCT network planning based on STLUIS results.
- **Strategy 3: Upgrade transit services** – improve transit quality, offering a mix of complementary services, and enabling easy, safe and comfortable multi-modal trips.
- **Strategy 4: Support municipal action** – local government action is essential in supporting a move to sustainable transportation.

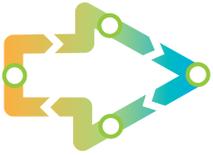


Figure 8: STLUIS Study – Place Types

	ST-LUIS PLACE TYPES			
	 SUBURBAN Suburban places typically host low walkability and bikeability in large, single-use areas. They are hardest to serve effectively with transit service. <i>For reference only. Not a ST-LUIS Place Type.</i>	 COMPACT WALKABLE Compact places accommodate a range of housing styles, typically on smaller lots. These places have pedestrian and bicycle-friendly streets, better connected street networks, and a mix of uses.	 TRANSIT SERVED Transit Served places have small blocks, highly connected streets, mixed uses, and walk- and bike-friendly streets. Some corridors can support high quality transit service.	 HCT ORIENTED HCT Oriented places have the highest levels of activity, a diverse mix of uses, including employment centers. Small, highly connected blocks make walking and biking attractive. High capacity transit is conveniently located nearby.
Density	15-30 persons/acre	30-45 persons/acre	45+ persons/acre	
Land Use	Neighborhood land uses with mix of local serving employment	Neighborhood land uses with mix of employment	Mixed use, employment/office, regional uses (universities, centers)	
Transit	Local bus, Commute services (RAPID & Express), Dial-a-Ride	LINK bus, Local bus, Commute services (RAPID & Express), Dial-a-Ride, Commuter Rail	LRT, Streetcar, LINK bus, Local bus, Commute services (RAPID & Express), Dial-a-Ride, Commuter Rail	
Employment (Share of transit-supportive jobs)	Low	Moderate	High	
Walk Access to Transit	Walk access to local transit and feeder service to HCT stops	Walk access to BRT or commuter rail stops and complementary local services	Walk access to LRT, streetcar or commuter rail stops and complementary local services	
Locations	Outside HCT station areas (more than 1/2 mile from stops)	HCT Corridors, typically within 1/2 mile of BRT or Commuter Rail stops	HCT Corridors, typically within 1/2 mile of LRT, streetcar or commuter rail stops	
Market Opportunity	Widespread	Moderate	Limited	
Feasible Development Types: Residential and Mixed Use	Small lot/courtyard single family 1-2 story office/retail	2-3 story apartments, townhomes 3-4 story retail/office park	3-7 story mixed use, multifamily	

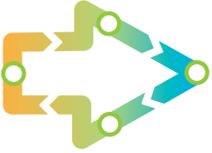
Source: STLUIS Study, Place Type Characteristics, Key Recommendations and Tools, Sustainable Transportation & Land Use Study, Maricopa Association of Governments, July 2013.

WORKING PAPER 4, FINDINGS AND RECOMMENDATIONS

May 12, 2013; MAG

Overview

This document presented an overview of the findings derived during the STLUIS study and included key recommendations.



Key Findings

The key study findings, based on the projects three scenarios, were:

- **Scenario 1 – Enhanced Transit** included a focus on TOD and provision of HCT in 10 corridors.
- **Scenario 2 – Transit Supply** reflects an expansive transit system with extensive development to stations and supportive land use integrated with 44 HCT corridors.
- **Scenario 3 – Refined Transit Supply** that reflects a system between the other two scenarios to increase network productivity and constrain higher cost HCT investments.

The overall result was that Scenario 3 achieved 2.8 percent transit mode share region-wide, compared to 2.9 percent for the more expansive Scenario 2, and reduced the estimate capital cost from \$13.55 billion to \$9.72 billion.

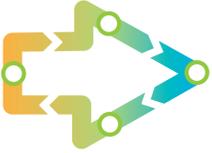
Results of STLUIS yielded the conclusion that the MAG region can increasingly support sustainable transportation through the creation of compact walkable and transit oriented places served by a multi-modal transportation system. Key findings associated with sustainable transportation included:

- Regarding sustainable transit and land use program:
- A growing share of the region’s development, appropriately shaped, can support sustainable transportation.
- Demands to create TOD will be driven by projected regional growth in population and jobs, and supported by demographic shifts.
- Transit-supportive and compact walkable development is achievable and distinct opportunities exist in different parts of the region.
- A large rail network would oversupply land for TOD, i.e., excess development of developments oriented to fixed transit services.
- Regarding the transit system:
- A small, compact, and selective HCT network is most productive.
- Targeted corridor modifications improve productivity.
- Regional transit mode share and regional access increase with a mix of LRT and high quality bus services.
- Existing conditions are essential to supporting future HCT service.

Recommendations

Four recommendations were derived from the analyses conducted in conjunction with Working Paper 4:

1. Plan for an enhanced transit system correlated with land development to support sustainable transportation;
2. Complement rail services with bus services that extend high quality transit throughout the region;



3. Support transition to STLUIS Place Types with densities, transportation, and urban form characteristics supporting sustainable transportation; and
4. Select a limited number of corridors for LRT, based on projected productivity and development opportunities.

TRANSIT LIFE CYCLE PROGRAM REPORTS

FY 2015 UPDATE

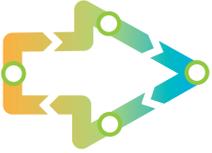
June 2015, Valley Metro

Overview

The Transit Life Cycle Program (TLCP) is maintained by the Regional Public Transportation Authority (RPTA) and implements transit projects in the MAGRTP. The Program meets the requirements of state legislation calling on the RPTA to conduct a budget process that ensures the estimated cost of the Regional Public Transportation System does not exceed the total amount of revenues expected to be available. This report included expenses such as bus purchases and operating costs, passenger facilities, maintenance facilities, park-and-ride lot construction, light rail construction and other transit projects.

Guiding principles for the TLCP are:

1. A defined and consistent process will be established for allocating funding for projects in the MAG RTP.
2. A defined and consistent process for Plan amendments and changes will be established.
3. Funding allocations will be regularly monitored and managed.
4. A defined and consistent process will be established to ensure legislated compliance audit, reporting and performance requirements are met.
5. Budgeting and accounting systems will be established to manage Public Transportation Funds (PTF) and monitor and report results.
6. Jurisdictional equity will be maintained.



2015 Update

Bus Services

The 2015 Update included several changes in the funding of bus services; some services were identified as enhanced and some currently locally funded were designated to receive regional funding (see Table 4).

Some adjustments also were made to fleet purchases, primarily related to updating replacement schedules. In addition, some expansion buses were added to address the Short Range Transit Program (SRTP) improvements.

Facilities

The 2015 Update included no changes to the development of new facilities, with the projects shown in Table 5 remaining in the program.

High Capacity/Light Rail Transit

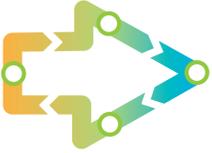
Completion dates for existing HCT/LRT corridors presented in the 2014 TLCP Update were not changed; however, a new corridor was amended into the RTP and included in the 2015 TLCP Update (see Figure 9). The South Central corridor was amended to reflect a completion year of 2034.

The 2015 Update retained the Northeast Phoenix project, as it remains in the MAG RTP, which extends to 2035. Also, most of the project's duration extends beyond the timeframe of the TLCP and the Proposition 400 sales tax, noted to be ending in FY 2026. An extension of the sales tax was assumed in the 2015 TLCP to allow completion of the Northeast Extension.

Completion of the Northwest Phase II and West Phoenix/Central Glendale projects were noted to be dependent on local funds from Phoenix and Glendale. Again, the 2015 Update assumed the Phoenix Transit 2000 tax would be extended beyond 2020.

Table 4: TLCP FY2015 Update – Bus Service Changes

Route	Fiscal Year	Description
Scottsdale/Rural LINK	2015	New service is deferred beyond 2026
Main Street LINK	2016	Eliminate LINK service between Sycamore and Country Club when Central Mesa Light Rail opens
50 Camelback Road	2016	Increased weekday frequency in Scottsdale
61 Southern Avenue	2016	Increased Sunday frequency in Mesa
72 Scottsdale/Rural	2016	Increased weekday frequency in Scottsdale and Tempe



81 Hayden/McClintock	2016	Fund existing service in Scottsdale and Tempe
156 Chandler Blvd.	2016	Extend two morning trips to Gilbert
542 Chandler Express	2016	One additional round trip
562 Goodyear Express	2016	Fund existing service
563 Buckeye Express	2016	Fund existing service
104 Alma School Rd.	2018	Add Saturday service in Chandler; replace local funding in Mesa
50 Camelback Road	2019	Replace local funding, existing service levels in Scottsdale only
30 University Drive	2021	Replace local funding, existing service levels in Mesa only
81 Hayden/McClintock	2021	Replace local funding, existing service levels in Scottsdale only
170 Bell Road	2022	Replace local funding, existing service levels

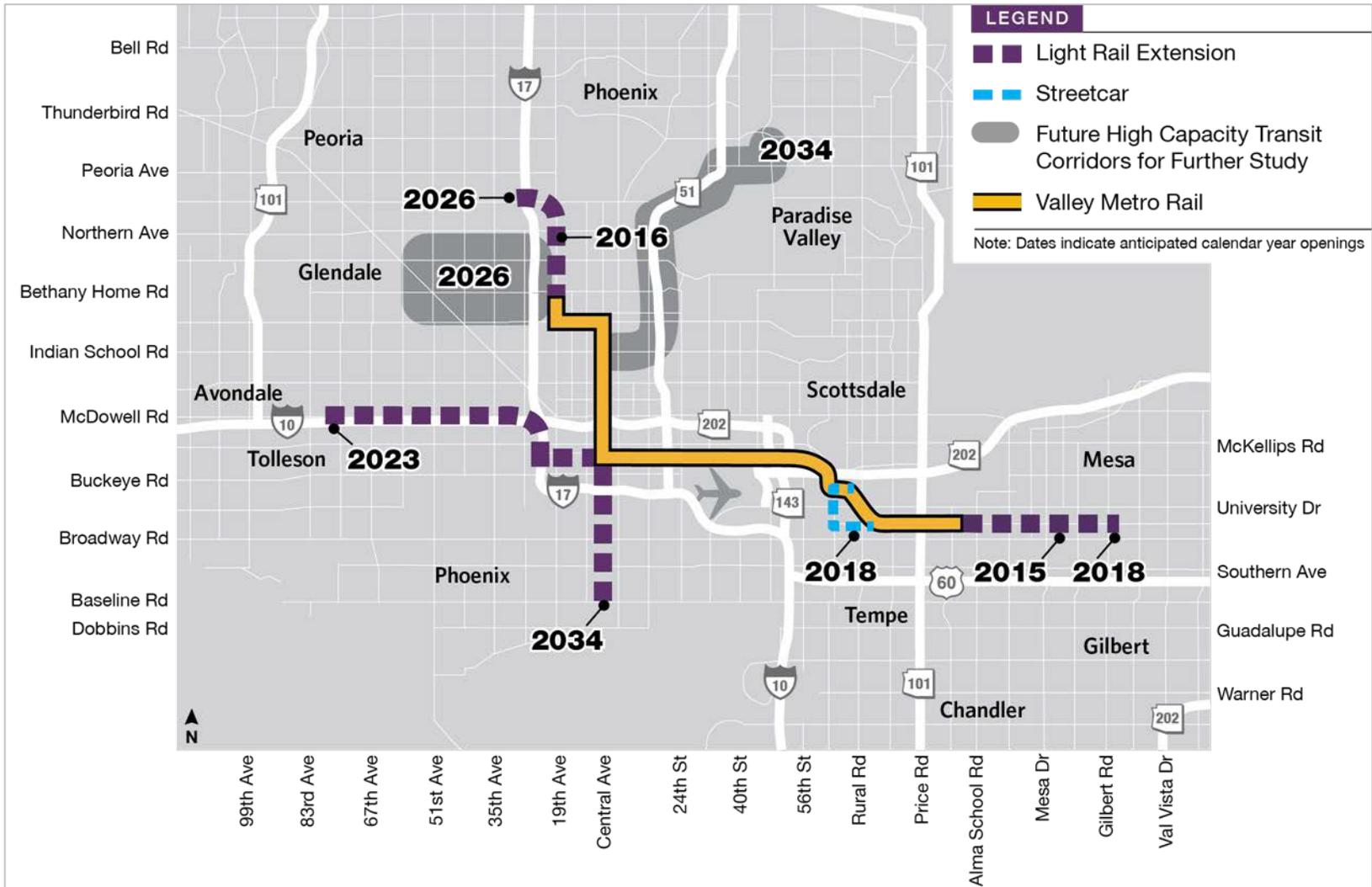
Source: Transit Life Cycle Program FY2015 Update, Valley Metro, June 2015.

Table 5: TLCP FY2015 Update – Bus Service Changes

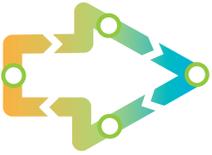
Type	Jurisdiction	Name of Facility	Year
Park and Ride	Glendale	North Glendale	2016
Park and Ride	Phoenix	Desert Sky	2016
Park and Ride	Phoenix	Baseline/24th St	2016
Transit Center	Mesa	Mesa Downtown	2016
Park and Ride	Phoenix	Laveen/59th Ave	2017
Transit Center	Peoria	Peoria Downtown	2017
Transit Center	Mesa	Gilbert Road	2018
Park and Ride	Peoria	Peoria Grand	2018

Source: Transit Life Cycle Program FY2015 Update, Valley Metro, June 2015.

Figure 9: HCT and LRT Corridors presented in the TLCP FY 2015 Update



Source: Transit Life Cycle Program FY2015 Update, Valley Metro, June 2015.



Jurisdictional Equity

The Guiding Principles for the 2015 TLCP Update included a requirement that jurisdictional equity be maintained within the bus program. To meet this principal, two specific policies were adopted to guide its preparation and supporting modeling. Jurisdictional equity only applies to the amount of transportation excise tax revenues deposited into the PTF. The 20-year total for the 2015 TLCP Update included actual revenues for FY 2006 through FY 2014 and the official forecast for FY 2015 through FY 2026 prepared by the Arizona Department of Transportation (ADOT). Any amounts used for regional purposes and not allocated to jurisdictions were subtracted from the 20-year total.

The net amount available then was distributed to jurisdictions with the MAG region, based on percentages identified in the TLCP Policies. These policy allocations were compared to the model allocations to determine if a jurisdiction is above or below its policy allocation. If a particular jurisdiction was under its policy amount by more than \$7.5 million, the model results cannot move forward for approval without the express consent of that jurisdiction. In this 2015 Update, there were three jurisdictions that met this condition.

GEOGRAPHICAL EQUITY

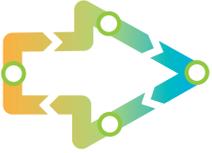
April, 2010; Valley Metro

Overview and History

This discussion paper was prepared in 2010 to summarize how MAG had allocate tax revenues from Proposition 300 (passed in 1985). It also address how MAG policies for allocation were adjusted to assure no individual sub-region would be disproportionately impacted relative to revenue sharing under Proposition 400 (passed in 2004)e

It noted that the MAG RTP was developed in 2002 through an extensive process and was guided by the MAG Transportation Policy Committee (TPC). The TPC is a public/private partnership established by MAG and charged with finding solutions to the region's transportation challenges. The Committee consists of 23 members, including a cross-section of MAG member agencies, community business representatives, and representatives from transit, freight, the Citizens Transportation Oversight Committee, and ADOT.

Many of MAG member agencies were dissatisfied with how Proposition 300 plan was implemented. The plan supporting Proposition 300 primarily focused on construction of facilities identified in the regional freeway program. The paper noted the recession in the late 80s and early 90s significantly impact the amount of the tax revenues collected under Proposition 300, resulting in some planned freeway construction not being completed. There followed a view that



the West Valley and Phoenix suffered a higher share of freeway construction deferrals than the East Valley relative to the populations in these two areas. To avoid a similar situation under the new RTP adopted in 2007, the concept of geographic equity was developed.

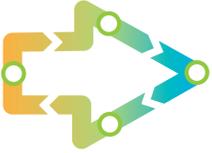
Geographic equity was identified as an objective of the RTP. The objective was to “develop a regionally balanced plan that provides geographic equity in the distribution of investments.” MAG’s view was that geographic equity was not jurisdiction based, but, rather, based on sub-regions, specifically: West Valley, Phoenix, and East Valley. Geographic equity divided the total capacity of expected expenditures roughly according to the population of each sub-region. Each sub-region then was able to prioritize projects that fit within the equity amount. For the West Valley, the priority among its TPC members was to complete the freeway system, particularly corridors that were deferred from Proposition 300. That decision left limited expenditures to program arterial street and transit improvements. Conversely, Phoenix’s highest priority was for the construction of light rail extensions. The East Valley priorities also were weighted heavily to transit, with some significant arterial improvements in a few cities.

The sum of the projects by mode across the MAG region then determined the split of tax revenues by mode, with transit receiving 33.3% of the tax revenues. While this was an average across the region, it did not hold true when calculated by sub-region. The statute authorizing Proposition 400 required that the transit portion of collected tax revenues be deposited into the PTF managed by the RPTA. The statute further required that RPTA develop a TLCP that ensures revenues and expenditures are balanced for the life of the Proposition 400 tax.

Apportionment

After the passage of Proposition 400, Valley Metro RPTA separately adopted policies that further defined geographic equity down to the jurisdictional level (e.g. jurisdictional equity or JE). During development of the RTP, transit expenditures by RPTA members, which do not include all members of MAG, were given to the MAG TPC to illustrate the estimated return of tax revenues to each RPTA member. Ultimately, the distribution of incremental transit expenditures associated with Proposition 400 revenues are programmed according to this formula and is utilized in Valley Metro’s service and operations.

The 2015 TLCP Update noted the RPTA Board separately adopted policies were designed to ensure geographic equity by sub-region is maintained within five percent of the original distribution percentages. This was designed to ensure no individual sub-region would be disproportionately impacted by a significant change in revenues.



COMMUTER RAIL STUDIES

COMMUTER RAIL SYSTEM STUDY

May, 2010; MAG

Overview

The purpose of this study was to define an optimized network of commuter rail corridors and identify the necessary elements to implement a regional commuter rail system. This study focused on detailed evaluation of potential commuter rail links to the East Valley (including the Tempe, Chandler, and Southeast Corridors) and links to the West Valley. Findings of the previously prepared Grand Avenue and Yuma West Corridor Development Plans were included. Both of these plans were produced in conjunction with this Study.

This study produced an assessment of the advantages and disadvantages of a set of “stand-alone commuter rail alternatives” serving single corridors. The results of that assessment were compared to an assessment of a set of alternative “Interlined Commuter Rail” operations. The comparison of alternatives considered a number of factors, including ridership forecasts, travel time savings, cost-effectiveness, and ease of implementation or constructability. The sets of alternatives compared revealed three distinct performance levels, referred to as Tiers (i.e., Top, Middle, and Lower). Categorizing alternatives by tiers helped to prioritize corridors and develop a full commuter rail system.

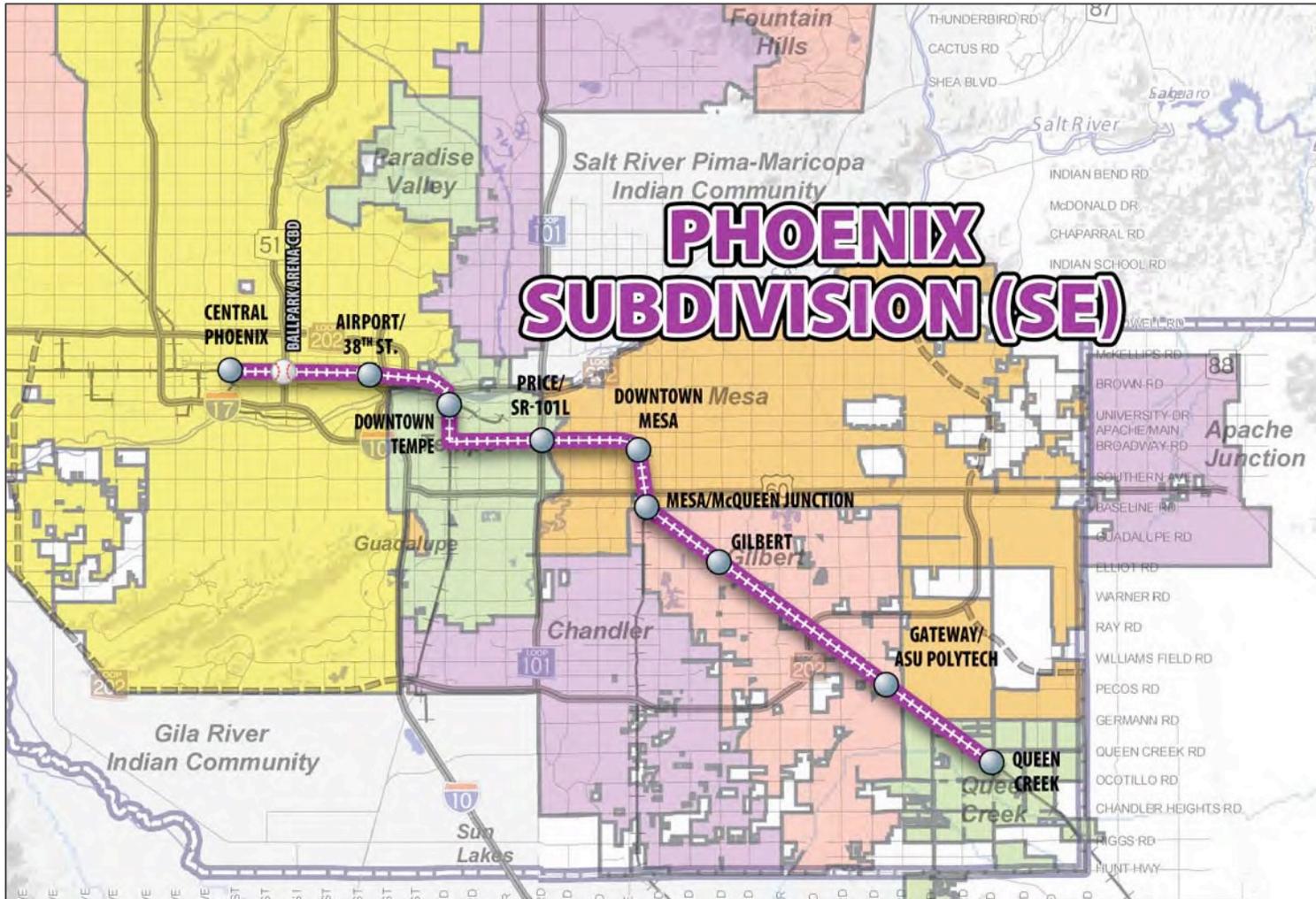
The analysis presented a phased implementation approach, assuming limited financial resources available for full system build out of all commuter rail corridors concurrently. The study document noted that this approach was much like the phased implementation of Phoenix’s 57-mile LRT system.

Recommendations

Recommendations for Stand Alone Commuter Rail Lines presented in this study included the following:

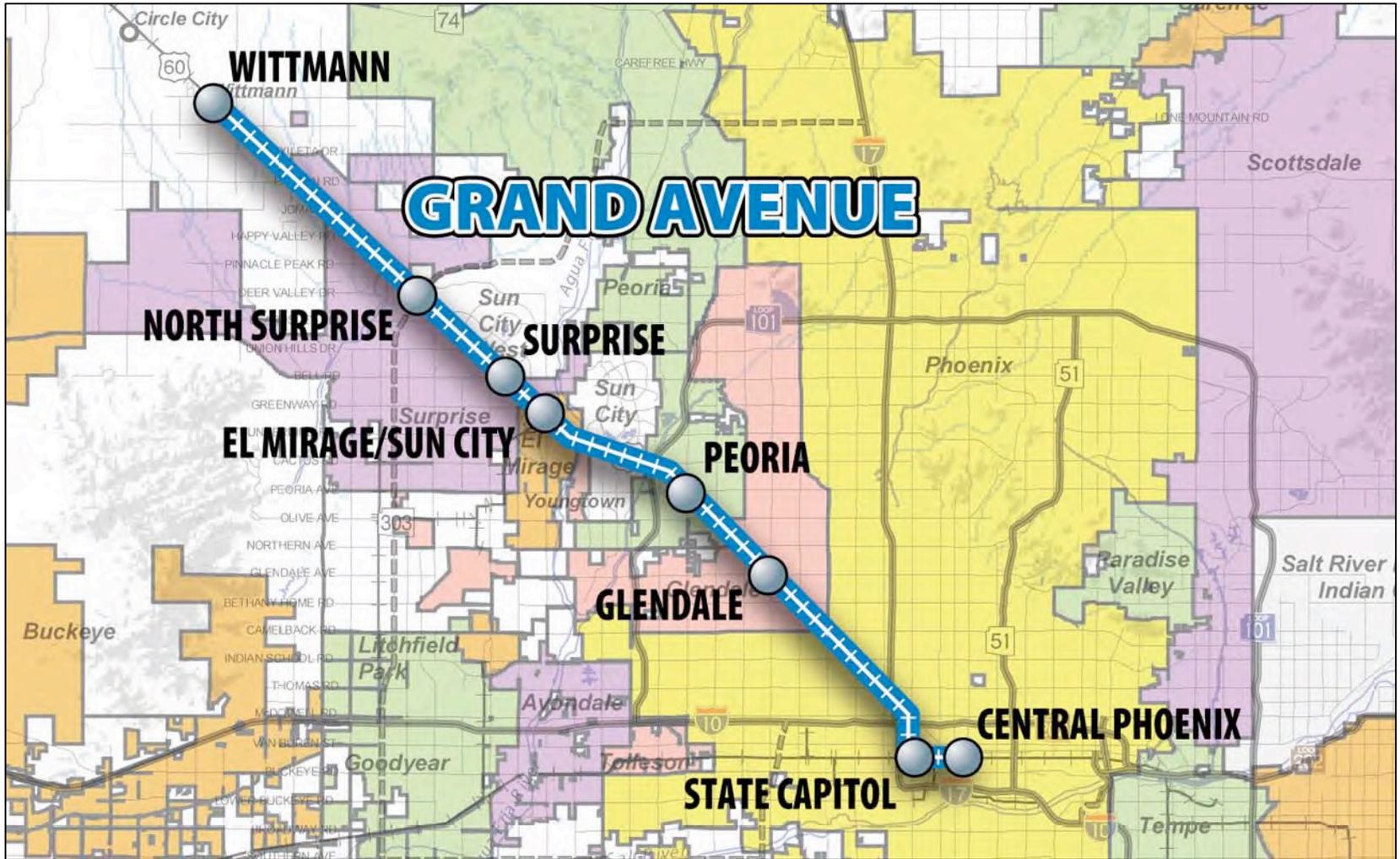
- **Start-Up Service Scenario 1: Build the SE Corridor** – The SE Corridor (see Figure 10) offers the highest ridership by a significant margin, offers substantial travel time savings, and is cost-effective.
- **Start-Up Service Scenario 1A: Build the Grand Avenue Corridor** – The Grand Avenue Corridor (see Figure 11) offers ridership that is on par with other commuter rail systems in operation throughout the Western US, offers substantial travel time savings, and is moderately cost effective.

Figure 10: Commuter Rail System Study – Southeast Corridor Commuter Rail Line

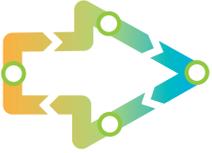


Source: Commuter Rail System Study, Final Report, Maricopa Association of Governments (MAG), May 2010.

Figure 11: Commuter rail System Study – Grand Avenue Corridor Commuter Rail Line



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



Once the initial “Starter” or “Stand-Alone” commuter rail lines are fully operational, interlining to extend service to the south and west would be initiated. It was determined that initial, startup ridership would be greatest when the most productive Phoenix Subdivision – SE (Santan Line) and Grand Avenue (Grand Line) corridors were combined (see Figure 12). Interlined service, combining the Phoenix Subdivision – SE (Santan Line) Corridor with Yuma West (Estrella Line) Corridor, would result in the lowest capital cost per mile of any interlined combination. This interlining operation had good overall ridership and the second highest boardings per revenue mile of any combination.

With full system buildout, a mature, four-corridor, 110-mile network would feature: Phoenix Subdivision - SE (Santan Line) Corridor interlined with Yuma West (Estrella Line) Corridor; and the Grand Avenue (Grand Line) Corridor interlined with the Tempe (Kyrene Line) Corridor. This configuration features the highest ridership potential within the commuter rail system; 19,000 – 21,000 trips per day.

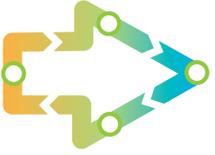
Phased implementation of commuter rail service for other corridors was identified as being highly dependent on a number of factors. The alternatives evaluation revealed no single outstanding performer among corridors defined to serve Tempe (Kyrene Line), Chandler, and Yuma West (Estrella). Therefore, five considerations were identified for future phasing to achieve buildout of the regional commuter rail system:

- Development patterns
- Changes in travel demand
- Community support
- Potential funding sources
- Potential integration with Phoenix/Tucson intercity rail

These considerations and others are currently being reviewed and evaluated for the update of the Commuter Rail System Study.

This report also addressed governance structures and funding sources necessary to implement the commuter rail system. This is followed by identification of nine steps recommended to be followed in the near term (2010-2015) to move commuter rail forward as an integral part of MAG region’s transportation system:

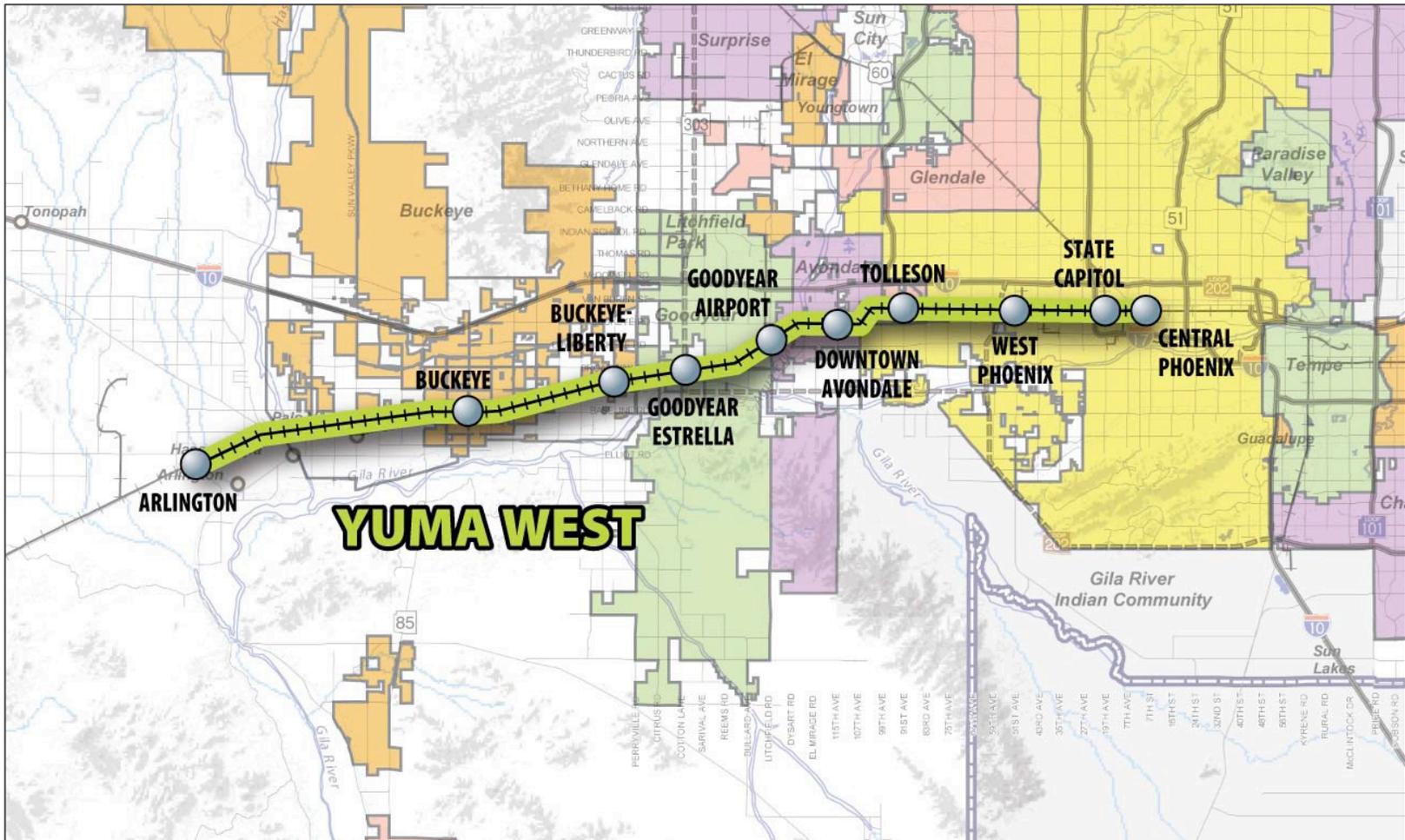
- Periodic ridership forecasting updates.
- Coordination with Union Pacific Railroad (UPRR) and BNSF Railway Company.
- Address enabling legislation regarding liability and indemnification.
- Coordination of infrastructure improvements with the railroads, ADOT, and local jurisdictions.
- Identify funding commitments.



**REGIONAL TRANSIT FRAMEWORK
STUDY UPDATE**
Maricopa Association of Governments

- Initiate process for federal funding.
- Develop and implement governance plan.
- Preserve future options.
- Local planning efforts.

Figure 12: Yuma West Commuter Rail Development Plan – Yuma West Commuter Rail Corridor



Source: Yuma West Commuter Rail Corridor Development Plan, Final Report, Maricopa Association of Governments (MAG), May 2010.



GRAND AVENUE COMMUTER RAIL CORRIDOR DEVELOPMENT PLAN

May, 2010; MAG

Overview

The Grand Avenue Commuter Rail Corridor Development Plan further explored the development of Grand Avenue commuter rail. It:

- Inventoried BNSF Railway Company right-of-way conditions between Phoenix and Wickenburg;
- Developed conceptual commuter rail operating plan;
- Identified infrastructure improvements needed for the implementation of commuter rail service;
- Produced capital cost estimates; and
- Produced annual operating cost estimates.

Phase 1 service was envisioned to operate between Wittmann and Central Phoenix within an implementation date of “before 2020.” Phase 2 service (2020 to 2030) also would operate between Wittmann and Central Phoenix, with additional midday service. Phase 3 (2030 to 2040) would extend service to Wickenburg (see Figure 13). An implementation strategy also was outlined.

YUMA WEST COMMUTER RAIL DEVELOPMENT PLAN

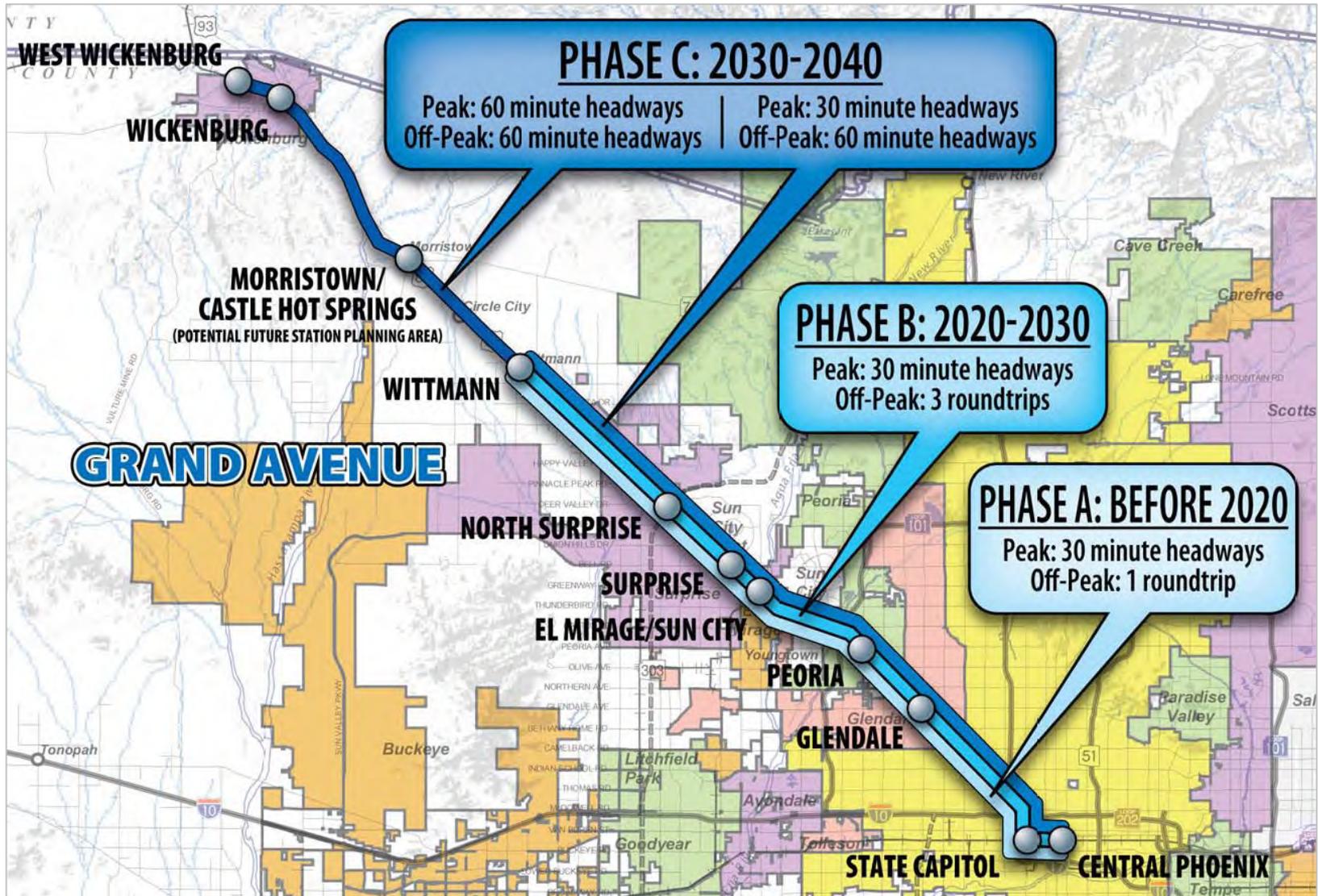
May, 2010; MAG

Overview

Similar to the Grand Avenue Commuter Rail Development Plan, the Yuma West Commuter Rail Development Plan further explores the development of commuter rail in the Yuma West corridor (see Figure 14), as recommended in the Commuter Rail System Study. Also, similar to the Grand Avenue plan, the Yuma West Commuter Rail Development Plan:

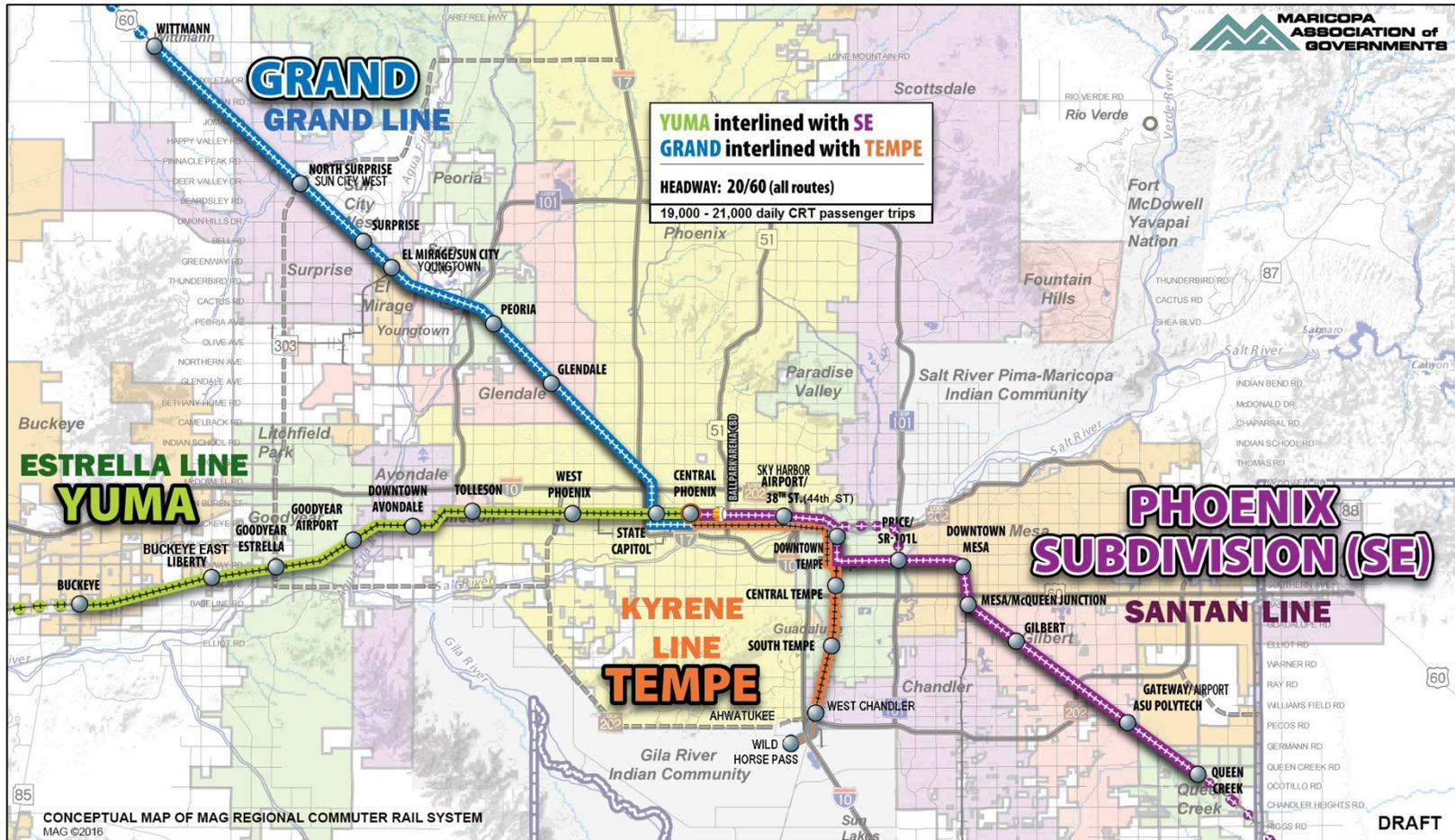
- Inventoried UPRR right-of-way conditions between Phoenix and Arlington;
- Developed conceptual commuter rail operating plan;
- Identified required infrastructure improvements (although UPRR has formally eliminated shared operations as an option);
- Produced capital cost estimates; and
- Produced annual operating cost estimates.

Figure 13: Grand Avenue Commuter Rail Corridor Development Plan – Grand Avenue Commuter Rail Corridor Phasing

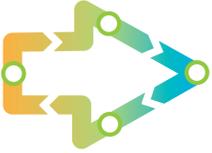


Source: Grand Avenue Commuter Rail Corridor Development Plan, Final Report, Maricopa Association of Governments (MAG), May 2010.

Figure 14: Commuter Rail System Study –Regional Commuter Rail System



Source: Maricopa Association of Governments (MAG), 2016.



Near term and long term implementation steps were outlined in addition to a recommended institutional structure for the regional commuter rail. Furthermore, funding opportunities were analyzed from the federal, state, and local levels.

COMMUTER RAIL SYSTEM STUDY UPDATE

To begin in 2017

Overview

In 2017, MAG will begin the Regional Commuter Rail System Study Update. The purpose of the study is to revise the data included in the original MAG 2010 Commuter Rail System Study, specifically new regional socioeconomic forecasts, revised ridership, cost estimates, corridor rankings, and information from other relevant passenger rail studies and technical content.

Governance and indemnity/liability issues related to passenger rail implementation will also be studied, as these elements must be addressed prior to any agreement between the owner railroads and the eventual commuter rail governing/operating agency. Increased mobility to jobs, housing alternatives, and connectivity to downtowns, airports and entertainment centers, travel and tourism options, and traffic mitigation will also be evaluated.

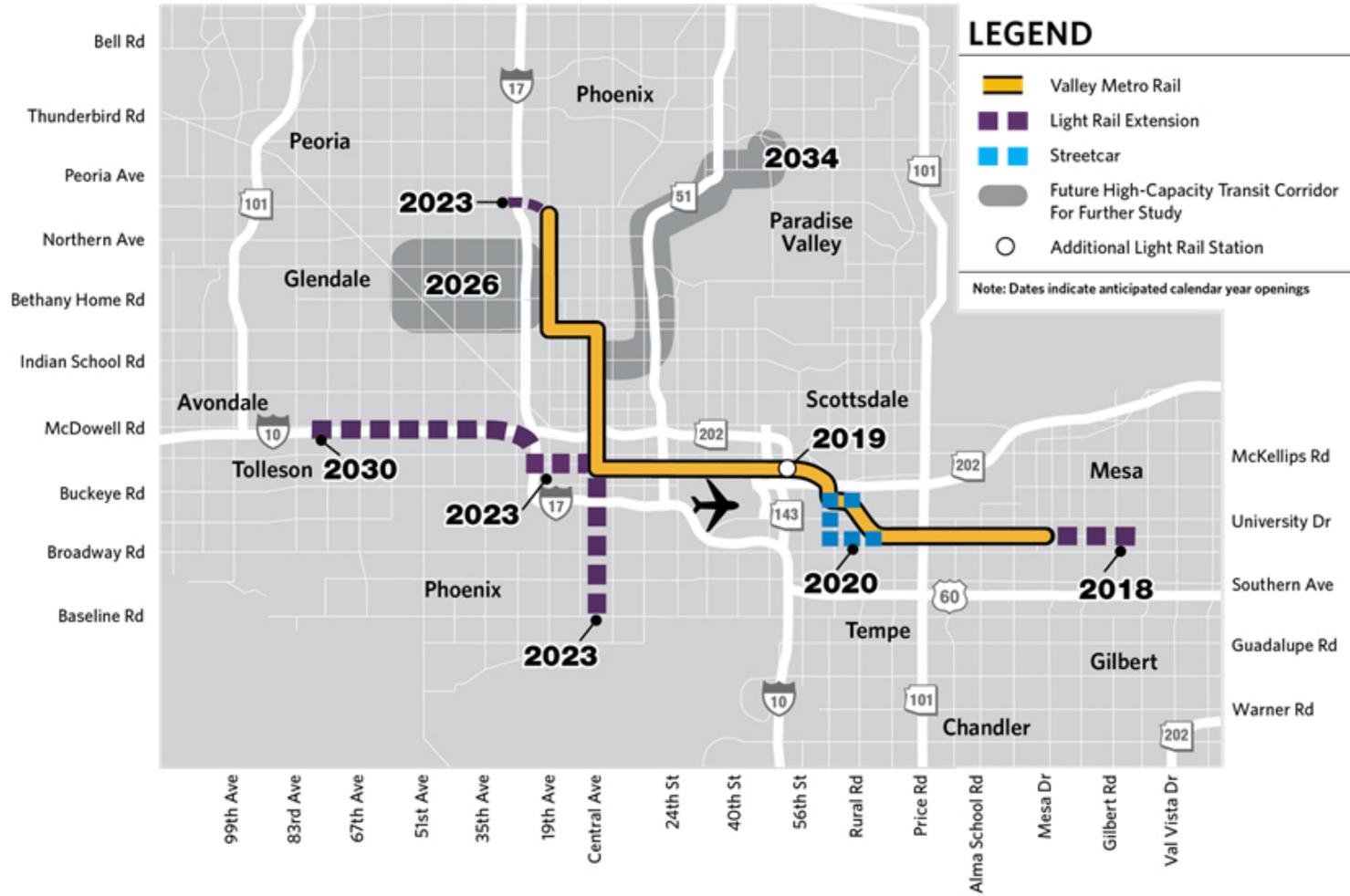
OTHER HIGH CAPACITY TRANSIT STUDIES AND EFFORTS

VALLEY METRO HIGH CAPACITY TRANSIT CORRIDOR DEVELOPMENT ACTIVITIES

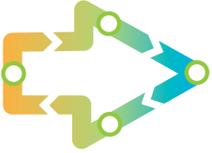
November, 2016; Valley Metro

According to efforts provided by Valley Metro, 11 future transit corridors have been identified, which extend the service area, help meet demand, and encourage development. Figure 15 illustrates the various planned corridors.

Figure 15: Valley Metro Future Transit Corridors



Source: Valley Metro Future Transit Corridors, Valley Metro, November 2016.



Gilbert Road Light Rail Extension

The Gilbert Road Light Rail extension project recently broke ground at Main Street & Stapley Drive in October 2016 and will be completed in 2018.

Tempe Streetcar

Preliminary engineering has been completed and the city is currently evaluating proposals from vehicle manufacturers, for final design, and for public art. In addition, the Tempe Streetcar project is awaiting qualifications from contractors for the Construction Manager at Risk (CMAR) contract, and intends to continue coordination with the assigned Project Management Oversight Consultant. The project is scheduled for completion in 2020.

Capitol/I-10 West Light Rail Extension

The Environmental Assessment (EA) underway and will be completed in the Spring of 2017. Coordination is ongoing between ADOT, the County, and City, and Phase I is slated to be completed by 2023, with completion of Phase II anticipated in 2030.

Northwest LRT Extension

This project extended LRT along 19th Avenue between Montebello Avenue and Dunlap Avenue in Phoenix. Phase I was opened March 16, 2016. Phase II to extend the LRT service west towards I-17 currently is slated to open in 2026.

South Central LRT

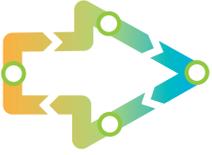
Preliminary engineering is underway and is scheduled for completion in 2017. The Finance Plan, Fleet management, Operations and Maintenance plans have all been updated. In addition, materials have been submitted to FTA for New Starts Review and consideration of inclusion in FY18 President's budget.

West Phoenix/Central Glendale:

Alternative routes are currently being analyzed to connect Downtown Glendale to the Valley Metro Rail near Grand Canyon University. The leading alternative, which follows Glendale Avenue to 43rd Avenue and east on Camelback Road, has been approved by Glendale City Council. Plans to cross I-17, transition into Downtown Glendale, and cross Grand Avenue are still being analyzed. The project is scheduled for completion in 2026.

50th Street Light Rail Station:

Conceptual engineering is 60% complete and the CMAR, designers, and artists are working together incorporate the 'Innovation Games' concept. The station will be completed in 2019.



Fiesta-Downtown Chandler Transit Corridor Study:

Preparation of a feasibility study is underway and will be completed in 2017. Scenario evaluations have been created and Dobson Road, Southern Avenue, and County Club Road have been recommended for HCT. Preliminary planning has been conducted for a potential Phase 1 LRT option, including conceptual designs, travel forecasting and capital cost estimates.

Operations & Maintenance Center (OMC) Expansion Study:

Development of an Early Action Plan for expanding the OMC before the delivery of the 6 streetcar vehicles and 11 light rail vehicles in 2019 is underway and will be completed in 2017. This entails identifying the vehicle delivery schedule for each planned HCT corridor.

Northeast LRT Feasibility Study:

This study began in the fall of 2016 and will be completed in 2017, with service scheduled for 2034.

I-10/I-17 Direct Access Bus Ramp:

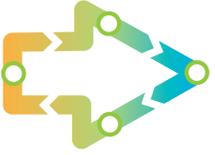
This project is currently in the planning phase, including coordination between ADOT and City of Phoenix on next steps. The project would improve the reliability of scheduled headways that fluctuate due to heavy peak hour congestion along I-10 and provides near-term traffic benefits along I-10 in the downtown area. The project is revising the Categorical Exclusion and Interstate Change of Access Methods and Assumptions for approval from ADOT, FHWA, and City of Phoenix. Early action for the Capitol/I-10 West Light Rail Extension project provides a near-term benefit for west valley bus commuters' travel time to downtown Phoenix.

COMPREHENSIVE ARTERIAL BUS RAPID TRANSIT PLANNING STUDY

September, 2009; Valley Metro/RPTA

Overview

The Comprehensive Arterial Bus Rapid Transit Planning Study identified demand for arterial BRT service and defined operational characteristics, capital infrastructure needs, and fleet requirements for several travel corridors, including: Arizona Avenue; Grand Avenue; Scottsdale Road/Rural Road; South Central Avenue/Baseline Road; and Chandler Boulevard. The study provided recommendations for implementing BRT service in eight areas relating to operations, physical facilities, and branding.



The RPTA considered how the operational characteristics and needs of BRT in particular corridors may change as the regional transit network develops over the life of the 20 year transit program. The study also included recommendations regarding specific travel corridors investigated for potential BRT service. Table 10 on the following page depicts the various service types and service thresholds. Lastly, it included reviews of prospects for obtaining Federal Very Small Starts funding for each of the corridors in the study, concluding: “While funding for the arterial BRT system is uncertain at this point, Valley agencies involved in the provision of transit services can be actively taking steps to anticipate capital improvements in each corridor and ensure that transit supportive land use and design measures are in place.”

Recommendations

The study produced recommendations in terms of how different BRT elements should be implemented. Major recommendations included:

Running Ways

The precise elements of running ways for each of the corridors in the Valley BRT system will vary based on the anticipated boardings and hence service levels for each corridor, as well as local traffic conditions (see Table 6).

At the lower end bus volume scale, with buses operating in mixed-flow scenario, transit priority should be focused at the intersection level, with TSP, queue jump signals, bypass lanes and/or curb extensions.

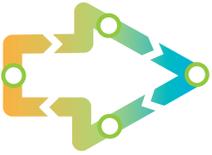


Table 6: BRT Planning Study – BRT Running Ways and Intersection Priority Treatments

Running Way Type	Peak Hour Bus Volumes	Demarcation	Applicable Intersection Priority Treatment
Mixed-flow operation	<15	None	TSP, queue jump/bypass lanes, curb extensions (where shoulder or parking exist)
Business/Transit Access Lane (BAT)	15-40	Striped, signed lane	TSP
Exclusive lane/busway (buses only)	>40	Striped, signed lane exclusive at all times for transit/separate guideway	TSP

Source: RPTA Comprehensive Arterial Bus Rapid Transit Planning Study Valley Metro/RPTA, September 2009;

Station Locations

BRT stations should be placed primarily at intersections of major arterials with intersecting bus routes or major trip generators/destinations. Stations should generally be about one mile apart, except in downtown areas, where closer spacing would be preferable.

Station Amenities

BRT stations should be sized to respond to the anticipated level of demand. Minimally, a BRT station should incorporate shelter and shade, seating, trash facilities, real-time passenger information systems, static passenger information (maps, agency information, etc.), and landscaping. Where BRT vehicle dwell time is lengthy and/or passenger queues develop at the vehicle entrance, ticket vending machines should be incorporated into the design. All BRT stations should clearly incorporate Valley Metro and LINK logos. Park-and-ride facilities should be located at end-of-line BRT stations as well as at intermediate locations where access is primarily by car.

Vehicles

Continued use of the New Flyer specialized BRT vehicle – or a similarly differentiated vehicle on arterial BRT routes is recommended to clearly communicate to customers the distinctive service that arterial BRT service provides (see Figure 16).

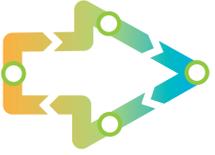


Figure 16: New Flyer Link Vehicle



Source: RPTA Comprehensive Arterial Bus Rapid Transit Planning Study Valley Metro/RPTA, September 2009

Fare Collection

It was recommended that the integrated fare system that allows the use of the same fare media on Valley Metro local services, LINK services, and the METRO light rail system be continued. In addition, the presence of ticket vending machines is recommended at stations where vehicle dwell time or passenger queuing at boarding doors is lengthy. A future goal should be a transition to off-board fare collection on all arterial BRT routes to allow for all-door boardings. This will further reduce dwell times at stations since riders will be able to board at all doors, not just the front door.

Real-Time Passenger Information

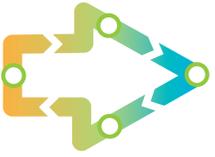
Real-time passenger information is a key customer service upgrade on BRT systems and was recommended as a standard station amenity throughout the arterial BRT network

Service Design

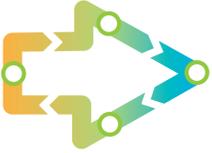
In general, the Valley BRT system was envisioned to have line-haul, trunk service along the targeted corridors as an overlay local arterial service.

Station Access

A number of strategies were recommended to integrate stations with surrounding areas:



- Encourage direct connections to stations from surrounding development in order to promote pedestrian and non-motorized access.
- Enhance intersection crossings to promote walkability.
- Create inviting streetscapes.
- Ensure safe lighting.
- Encourage pedestrian services and uses.
- Establish innovative zoning to allow a mix of uses.
- Provide meaningful open space.



DIRECT HIGH-OCCUPANCY VEHICLE (HOV) STRATEGIES AND PARK AND RIDE (P&R) CONNECTIVITY

October, 2014; MAG

Overview

Preparation of this Technical Memorandum was undertaken as part of the Central Phoenix Transportation Framework Study. It assessed the use of DHOV access ramps to: (1) facilitate more efficient and expedited traffic flow into and out of some regional P&R facilities located near Valley freeways; and, (2) improve the capacity of some arterials by providing alternate access routes to regional destinations.

Locations

The Technical Memorandum identified 12 potentially desirable or feasible DHOV locations, in addition to the four DHOV facilities serving or programmed for the regional freeway system (see Figure 17). One location, where West Adams and West Jefferson crosses I-17, has the potential to be developed in connection with westward extension of the METRO Light Rail into the I-10 west freeway corridor. Although not stated in the memorandum, these locations also be used by Freeway BRT services and provide connections to arterial HCT services.

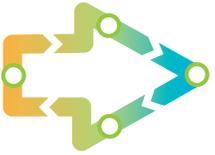
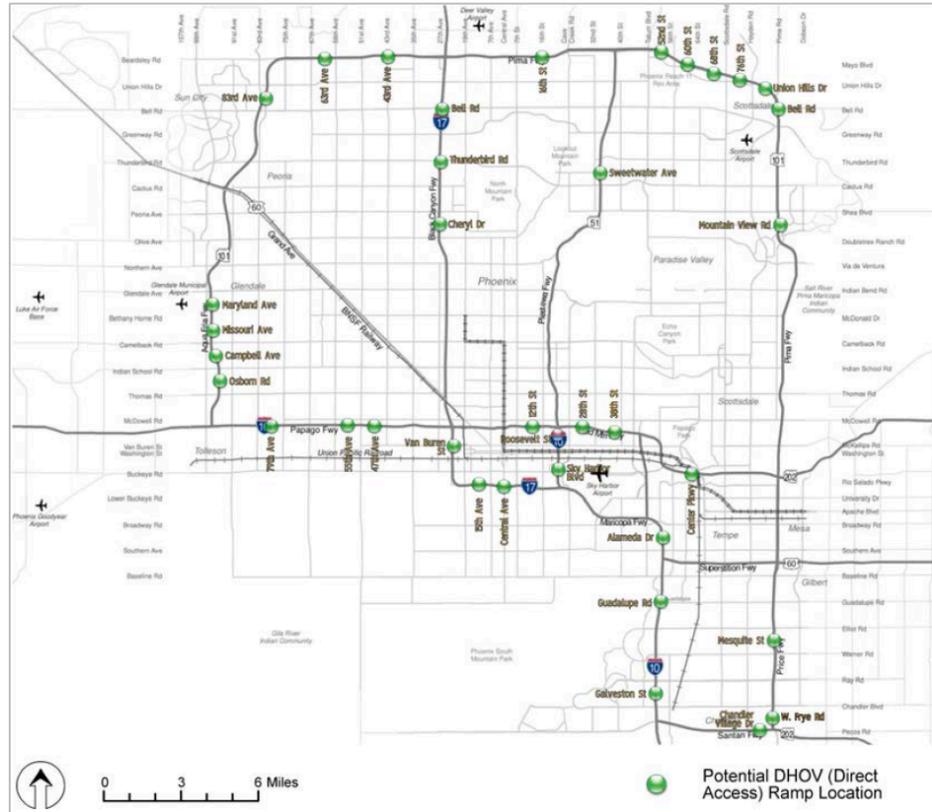
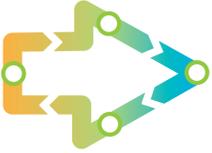


Figure 17: Central Phoenix Transportation Framework Study – DHOV Access Ramp Locations



Source: Central Phoenix Transportation Framework Study presentation, 2013



LOCAL AREA/LOCAL SERVICE TRANSIT STUDIES

SOUTHEAST VALLEY TRANSIT SYSTEM STUDY

May, 2013; MAG and Valley Metro

Overview

The Southeast Valley Transit System Study encompassed the cities of Tempe, Mesa, Chandler, Gilbert, Queen Creek in Maricopa County and the cities of Apache Junction and Maricopa, and Town of Florence in Pinal County. The study identified existing Circulator, Express, LRT, LINK, Local Fixed Route, and RAPID transit service and highlighted future Local Fixed Route, Express, and LRT service. Potential locations for P&R facilities also were noted. Commuter rail transit was not part of the analysis. The report does note the possibility of HCT service in the future on Power Road, Williams Field Road/Chandler Boulevard, Arizona Avenue, and Rural Road.

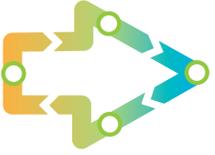
The study produced concepts for (1) optimizing existing transit services, (2) mid-term improvements within the next 10 years, and (3) long-term improvements that would be anticipated in more than 10 years. Overall, important considerations for the evolution of the transit system in the Southeast Valley included:

- Promote higher frequency service in core areas and greater network connectivity that will make transit a more robust and convenient option for more customers.
- Expand the transit service area as population and employment densities grow.
- Monitor network performance and actual changes in population and land use over time to adjust service to meet needs.
- Coordinate transit service expansion priorities with local land use planning policies and decision-making.

Recommendations

The study produced a large number of specific recommendations. In the short-term, recommendations for the optimization of existing services were designed to (see Figure 18):

- Consolidate the resources invested in the Arizona Avenue and Main Street corridors to provide a robust, high frequency service.
- Explore alternative service types to more efficiently serve some deviations or lower-productivity route segments.



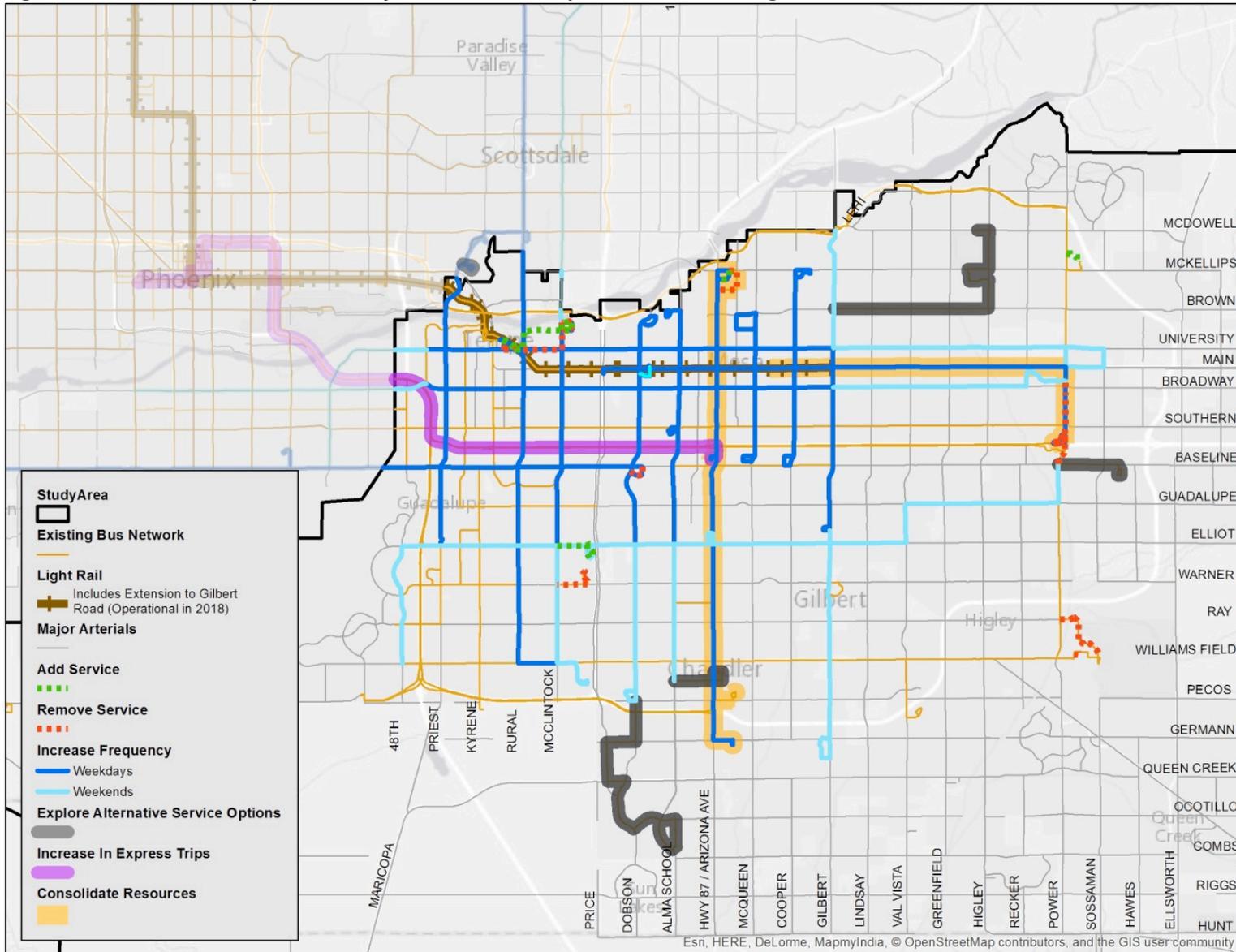
- Obtain a minimum of 30-minute frequency service.
- As possible, improve frequencies on high ridership routes.

Recommendations for the mid-term were designed to (see Figure 19):

- Increase service frequency on productive routes.
- Explore new service types as a way to more efficiently provide service in low-ridership areas, or as a lower cost way to expand service to new areas.
- Expand service to the east and the south as population, employment, and transit demand grow.

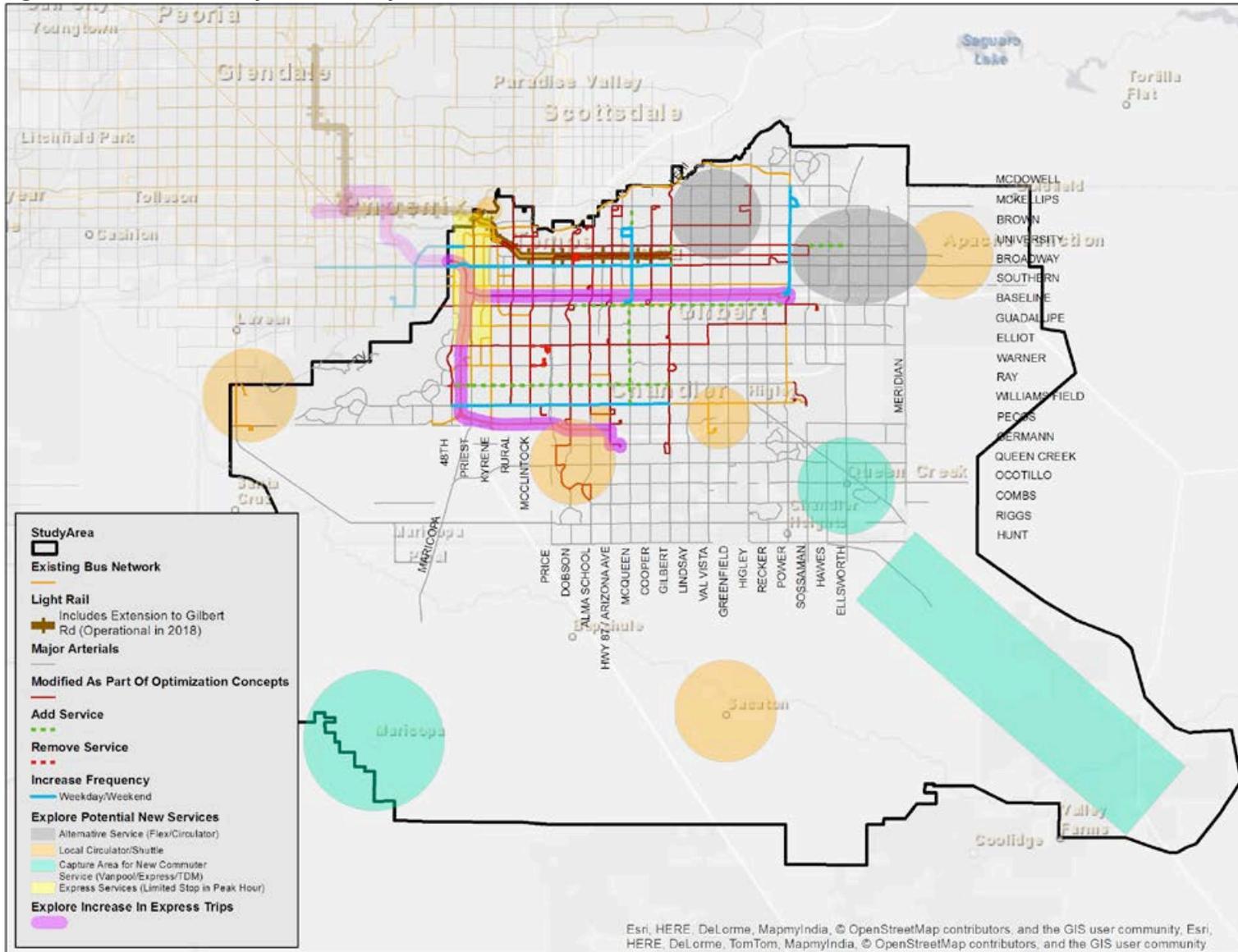
The long-term planning timeframe included project recommendations to extend transit services within the Southeast Valley to areas of future projected growth (see Figure 20). Implementation would occur beyond 10 years and focus on

Figure 18: Southeast Valley Transit Study: Recommended Optimization of Existing Transit Services (Short-Term)

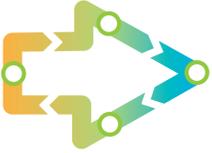


Source: Southeast Valley Transit System Study, Final Report, Maricopa Association of Governments and Valley Metro, May 2013.

Figure 19: Southeast Valley Transit Study: Mid-Term Recommendations (Within 10 Years)



Source: Southeast Valley Transit System Study, Final Report, Maricopa Association of Governments and Valley Metro, May 2013.



expanding service to potential growth areas and providing connections to communities that are not immediately adjacent to the existing transit service areas. The long-term concepts address service expansion, new service, route alignments, service types, service facilities, and connections to currently unserved areas of the Southeast Valley.

NORTHWEST VALLEY LOCAL TRANSIT SYSTEM STUDY

June, 2013; MAG

Overview

At the time the study was conducted, the Northwest Valley Sub-Region of the Phoenix metropolitan area was home to over 600,000 residents. It also was home to many of Central Arizona's top attractions, including: Spring Training for several Major League Baseball teams, Arizona Cardinals football, Phoenix Coyotes ice hockey, Arizona State University West Campus, Thunderbird School of Global Management, Midwestern University, and others. This document presented transit service improvement options, based on assessment of four service types: Fixed Route Service; Limited Stop Express Service; Deviated Fixed Route Service; and Dial-A-Ride (DAR) Service.

Key Findings

Key findings from this study included:

- Existing transit service was limited in most portions of the Northwest Valley. The existing service ran either hourly or less frequently on weekdays as a limited express route for persons working in downtown Phoenix.
- Residents of the Northwest Valley exhibited a strong desire to access local retail centers and healthcare centers via public transit.
- Participants in community workshops indicated an overall desire for local circulators as a means of addressing intra-community mobility needs.
- Many survey respondents/workshop attendees expressed a desire for improved transit connectivity/service to destinations beyond the Northwest Valley, especially downtown Phoenix and Sky Harbor Airport.

Recommendations

The study recommendations were largely focused on the implementation of circulator routes and increasing service throughout the Northwest Valley:

Near-Term (see Figure 21)



- Establish an Intergovernmental Cooperative Agreement among the Northwest Valley communities to address, administrative, operational, and funding functions.
- Improve express service.
- Create six local circulators.
- Create a volunteer driver program for the Sun City Festival community.
- Continue the Northwest Valley DAR program and adjust its service area where needed to comply with ADA requirements regarding fixed-route service.

Mid-Term (see Figure 22)

- Extend two Valley Metro routes farther into the Northwest Valley.
- Increase service on one Valley Metro route and on the six community circulators as demand and funding warrant.

Long-Term (see Figure 23)

- Support eventual implementation of high-capacity transit service from Surprise to Downtown Phoenix along Grand Avenue.
- Extend additional Valley Metro routes into the Northwest Valley and establish new Valley Metro routes.
- Transition the Sun City Festival volunteer driver program to a limited express service from Sun City Festival to Surprise.

SOUTHWEST VALLEY LOCAL TRANSIT SYSTEM STUDY

July, 2013; MAG

Overview

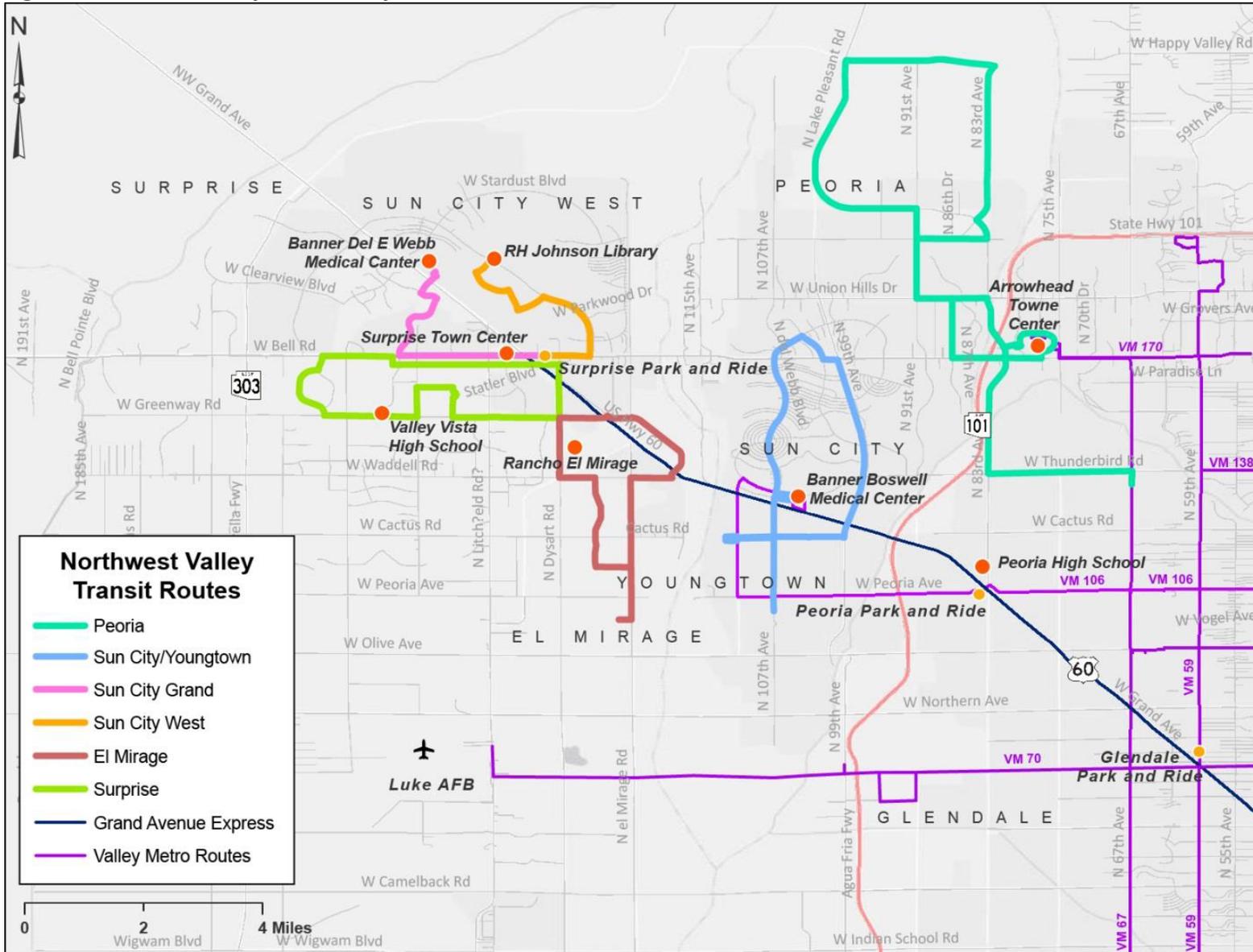
The Southwest Valley Local Transit System Study in the Southwest Valley in Phoenix, Avondale, Goodyear, Tolleson, Litchfield Park, the Town of Buckeye, and unincorporated Maricopa County.

Community Desires

The study identified the most important community desires, which were service that was:

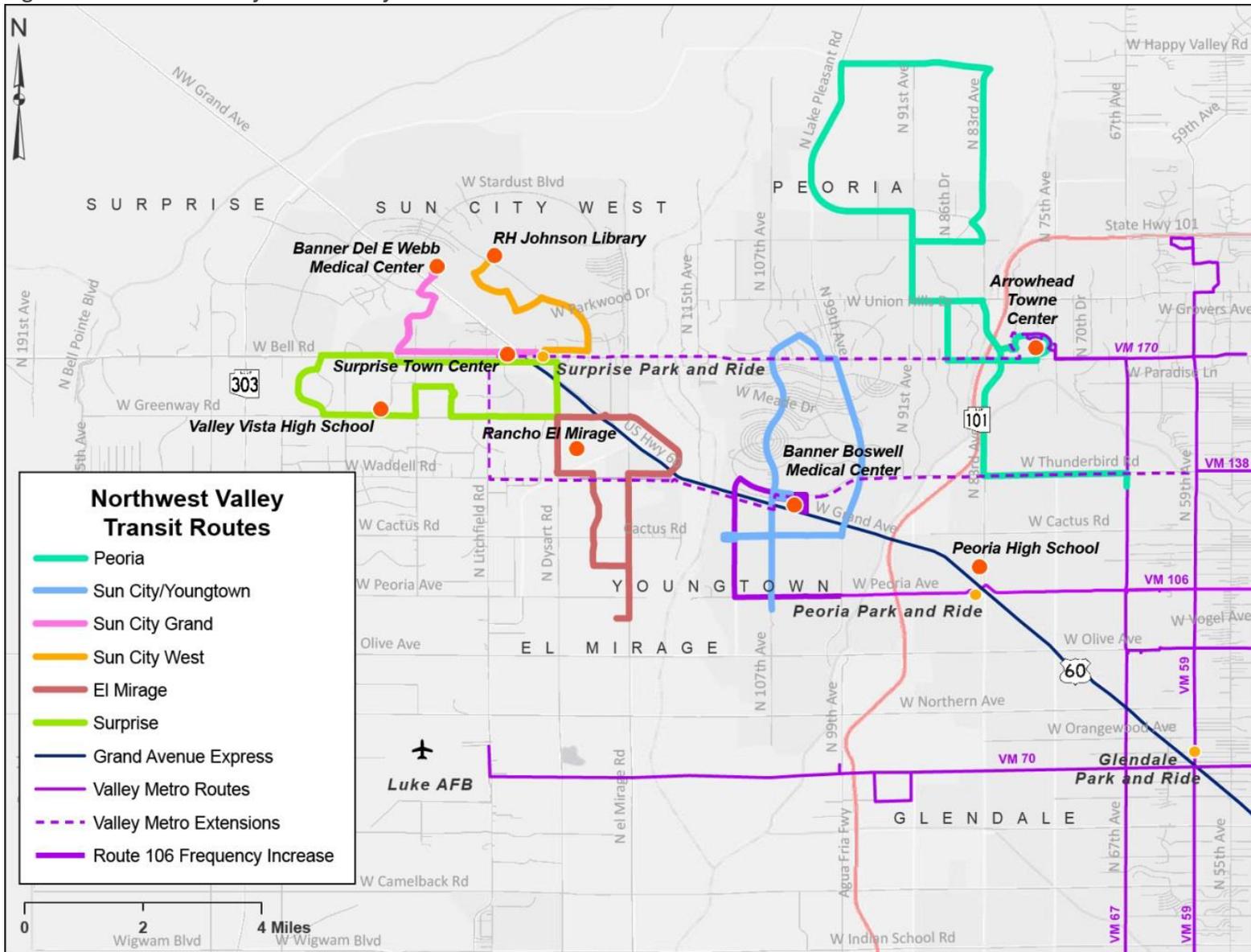
- **Accessible** – easy-to-use route map and passenger information that are available to all generations.
- **Affordable** – a simple, low-cost fare policy.

Figure 21: Northwest Valley Transit Study: Short-Term Recommendations



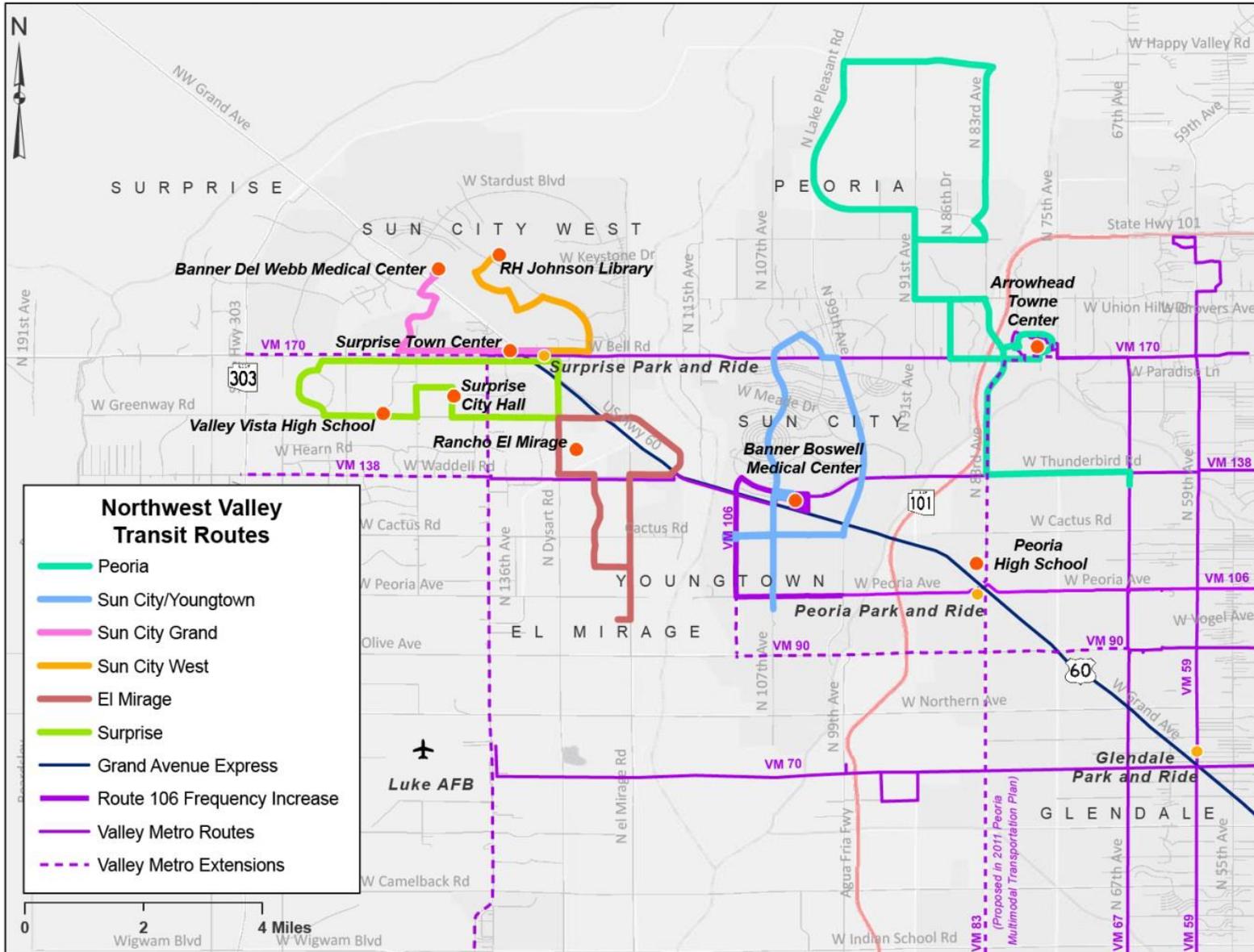
Source: Northwest Valley Transit System Study, Final Report, Maricopa Association of Governments, June 2013.

Figure 22: Northwest Valley Transit Study: Mid-Term Recommendations

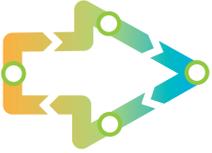


Source: Northwest Valley Transit System Study, Final Report, Maricopa Association of Governments, June 2013.

Figure 23: Northwest Valley Transit Study: Long-Term Recommendations



Source: Northwest Valley Transit System Study, Final Report, Maricopa Association of Governments, June 2013.



- **Convenient** – frequent service, seven days a week with service to key activity centers: downtowns, medical facilities, employment centers, shopping and schools.
- **Multi-modal** – a total transit system which provides for transfers between local buses, regional buses, dial-a-ride, express buses and light rail.
- **Regional** – easy transfers to Valley Metro buses, express buses, and light rail with service to major employment centers such downtown Phoenix, Luke Air Force Base and Palo Verde Nuclear Generating Station.

Recommendations

The study presented short term, mid-term, and long term transit service improvement options for implementation by 2015, 2020, and 2030:

Short-Term (see Figure 24)

- Improving service on existing arterial fixed routes along McDowell Road and Van Buren Street to 30 minute frequency and interlining routes or expanding hours of service.
- Building on the success of the ZOOM circulator by increasing service area to the north and/or increasing capacity.
- Initiating circulator services in Goodyear.
- Conducting a planning study to investigate a circulator service in Buckeye.
- Establishing an ongoing planning group or other institutional structure for continuing coordination among the jurisdictions who wish to advance the mid-term and long-term implementation steps, including funding strategies.
- Promoting transit through partnerships with local businesses and coordinated transportation and land use decision making.

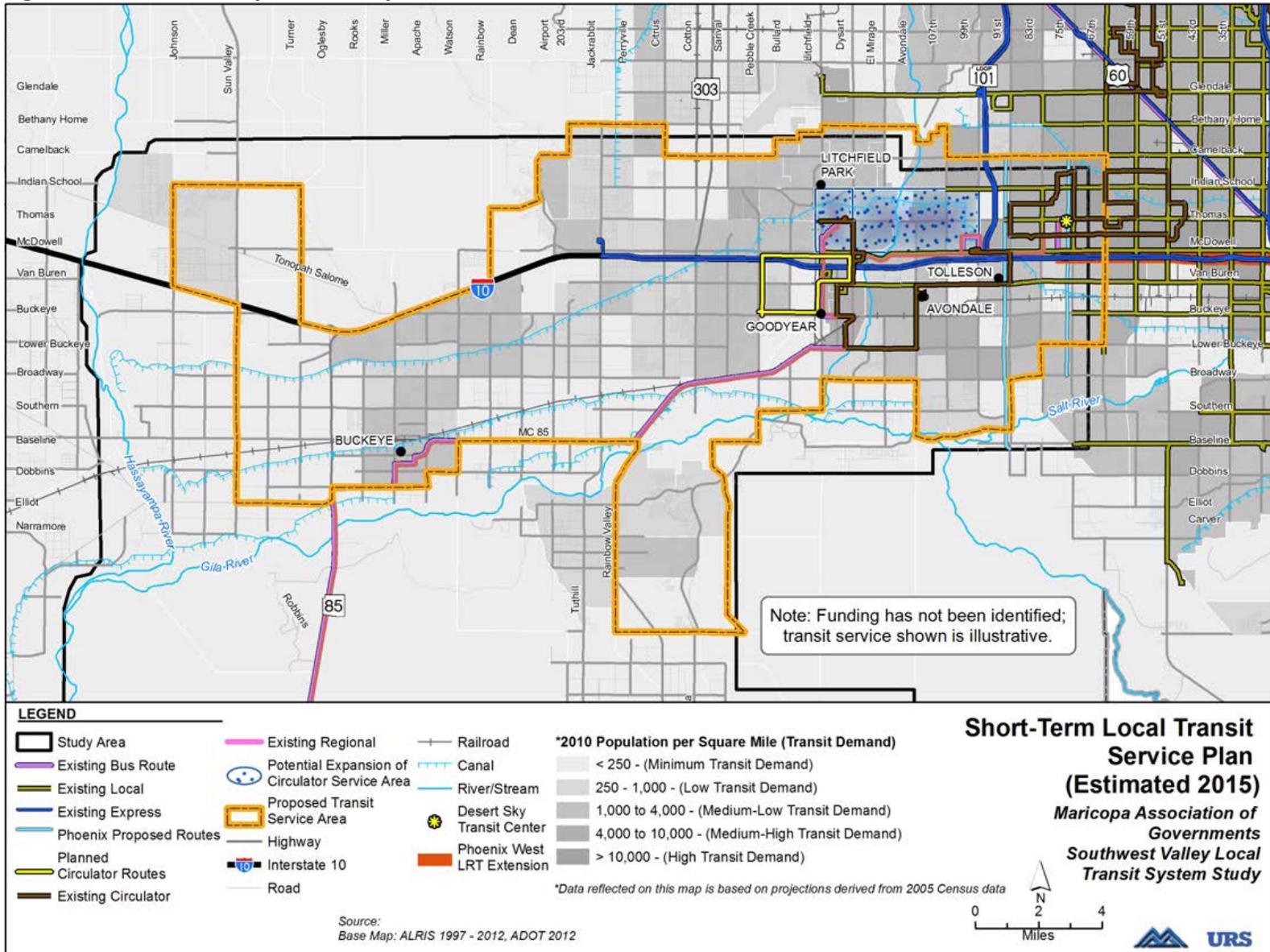
Mid-Term (see Figure 25)

- Expanding east-west fixed route bus service on major arterials west to Litchfield Road, providing 30 minute service or matching the connecting service levels.
- Introducing 30 minute, north-south, fixed route service on major arterials, such as Litchfield and/or Dysart Roads.
- Expanding circulator service area in Goodyear and modifying continuing circulator services to respond to conditions
- Initiating pilot circulator service in Buckeye.

Long-Term (see Figure 26)

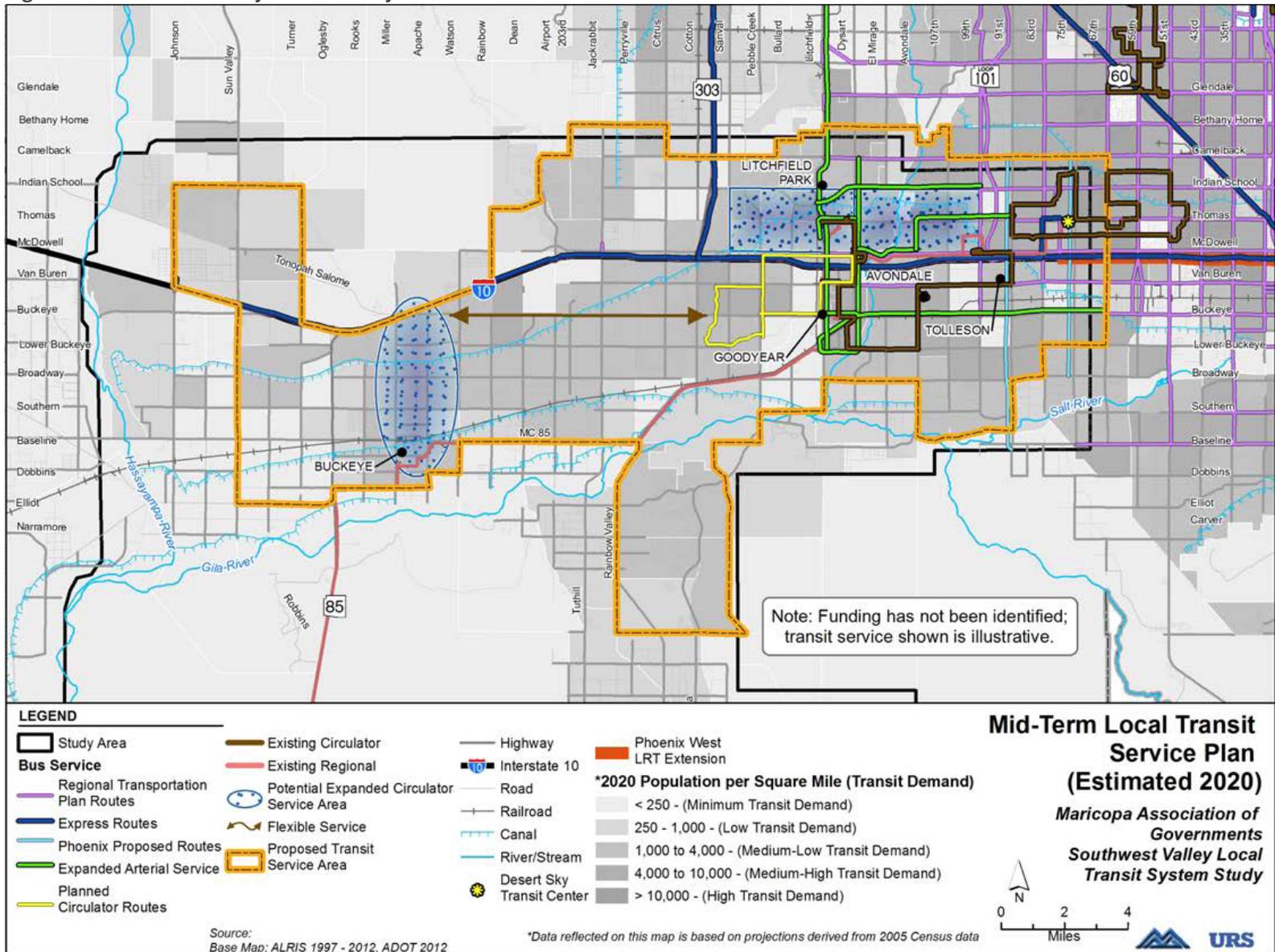
- Improving service frequencies, as appropriate, on productive routes.

Figure 24: Southwest Valley Transit Study: Short-Term Recommendations



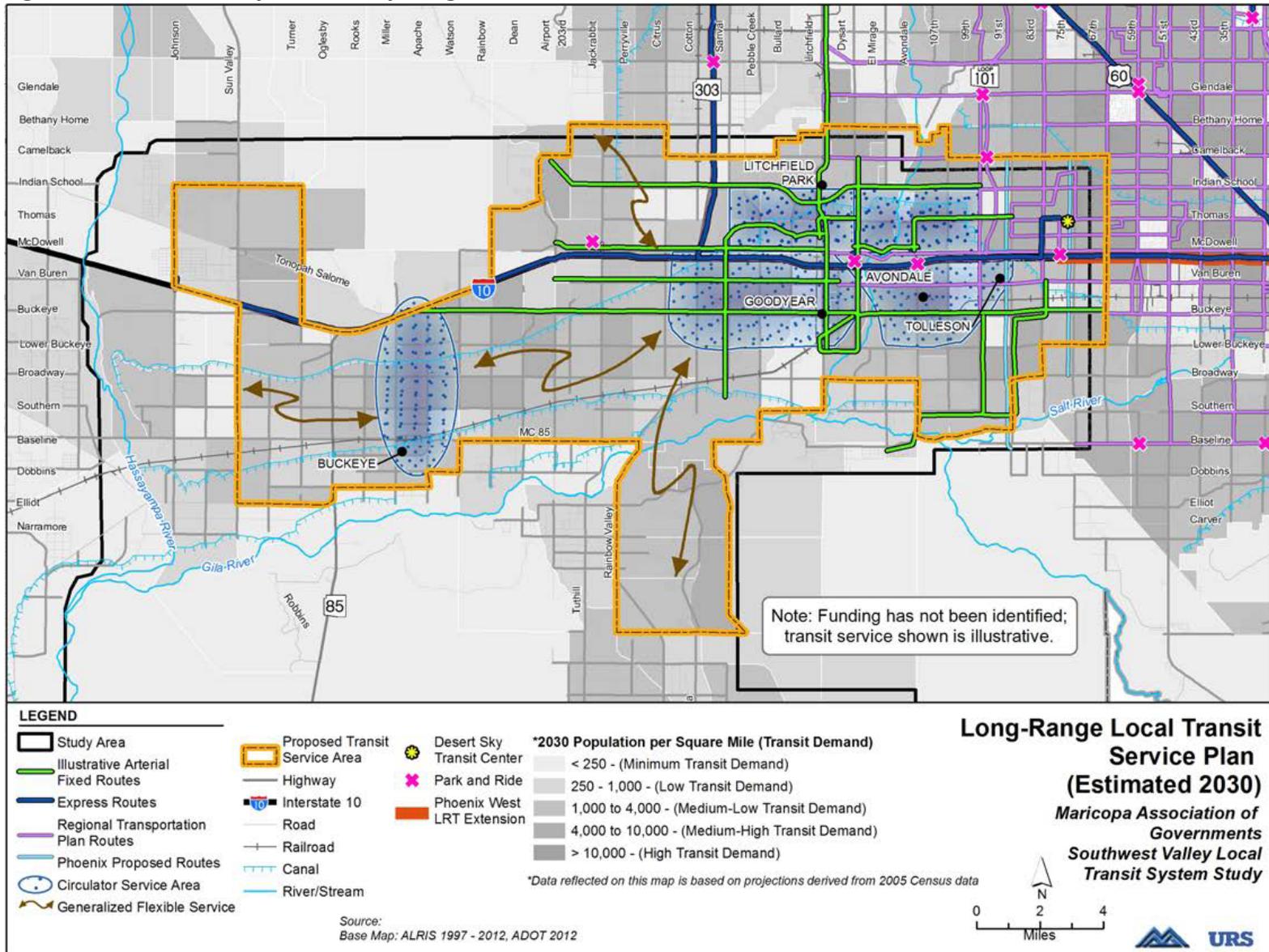
Source: Southwest Valley Transit System Study, Final Report, Maricopa Association of Governments and Valley Metro, July 2013.

Figure 25: Southwest Valley Transit Study: Mid-Term Recommendations

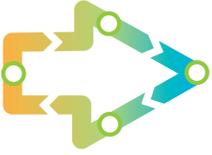


Source: Southwest Valley Transit System Study, Final Report, Maricopa Association of Governments and Valley Metro, July 2013.

Figure 26: Southwest Valley Transit Study: Long-Term Recommendations



Source: Southwest Valley Transit System Study, Final Report, Maricopa Association of Governments and Valley Metro, July 2013.



- Expanding the service area for arterial fixed route transit service farther west.
- Identifying opportunities for flexible service (such as route deviation or demand responsive, non-Americans with Disability Act (ADA) service that is reservations-based or serves specific activity centers).
- Continuing to modify circulator routes or operations to respond to changes in conditions.

PINAL COUNTY TRANSIT FEASIBILITY STUDY

April 2011, Pinal County

Overview

The Pinal County Transit Feasibility Study examined transit needs in Pinal County and identified services and strategies to service though needs, including in the Northwest portion of the county that is now in the MAG region.

Findings

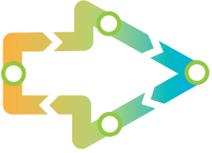
Findings for the part of Pinal County that are now in the MAG region included:

- Between 2000 and 2007, Pinal County's incorporated areas grew by 66%, with the largest growth in Casa Grande, Apache Junction, Maricopa, and Florence. During the same period, unincorporated areas grew even faster – by 105%. San Tan Valley has become the county's largest and fastest growing community, with a population of approximately 80,000. The community of Maricopa, which had fewer than 700 residents in 2000, is now the county's fourth largest community.
- Moving forward, Pinal County will continue to grow rapidly:
 - Casa Grande, Apache Junction, Eloy, and Florence will grow to medium-size cities that will also become regional employment centers.
 - Undeveloped areas between Apache Junction and San Tan Valley will be developed.
 - The City of Maricopa will continue to grow. Travel will continue to be highly oriented toward Maricopa County, but also with higher levels of travel to Casa Grande.

Recommendations and Service Options

Recommendations focused largely on how to develop transit services in areas where none now exist.

In addition, the study also identified potential service improvements. Short-term improvements related to the portions of the county now in the MAG region included (see Figure 27):



- **Transit centers** at key locations around which transit services could be focused.
- **Park and ride lots along key bus routes (that could also be used as staging areas for vanpools and carpools), express service** from Maricopa, Casa Grande, San Tan Valley, and Apache Junction to downtown Phoenix with connections to light rail and Sky Harbor Airport.
- **Arterial BRT service** between Apache Junction and the end of the Valley Metro Rail Line in Tempe that would utilize the existing Valley Metro Link BRT corridor.
- **Regional routes** between Florence and Casa Grande via Coolidge and Central Arizona College, between Maricopa and Casa Grande, and part time service between Arizona City and Casa Grande via Eloy and Toltec.
- **Local service** within Apache Junction, Coolidge, and Casa Grande.

Long-term improvements, the need for which would depend heavily on anticipated development, were much more extensive (see Figure 28), and included transit centers/park and ride lots, commuter rail, express bus, arterial BRT, regional service, and local service, among others.

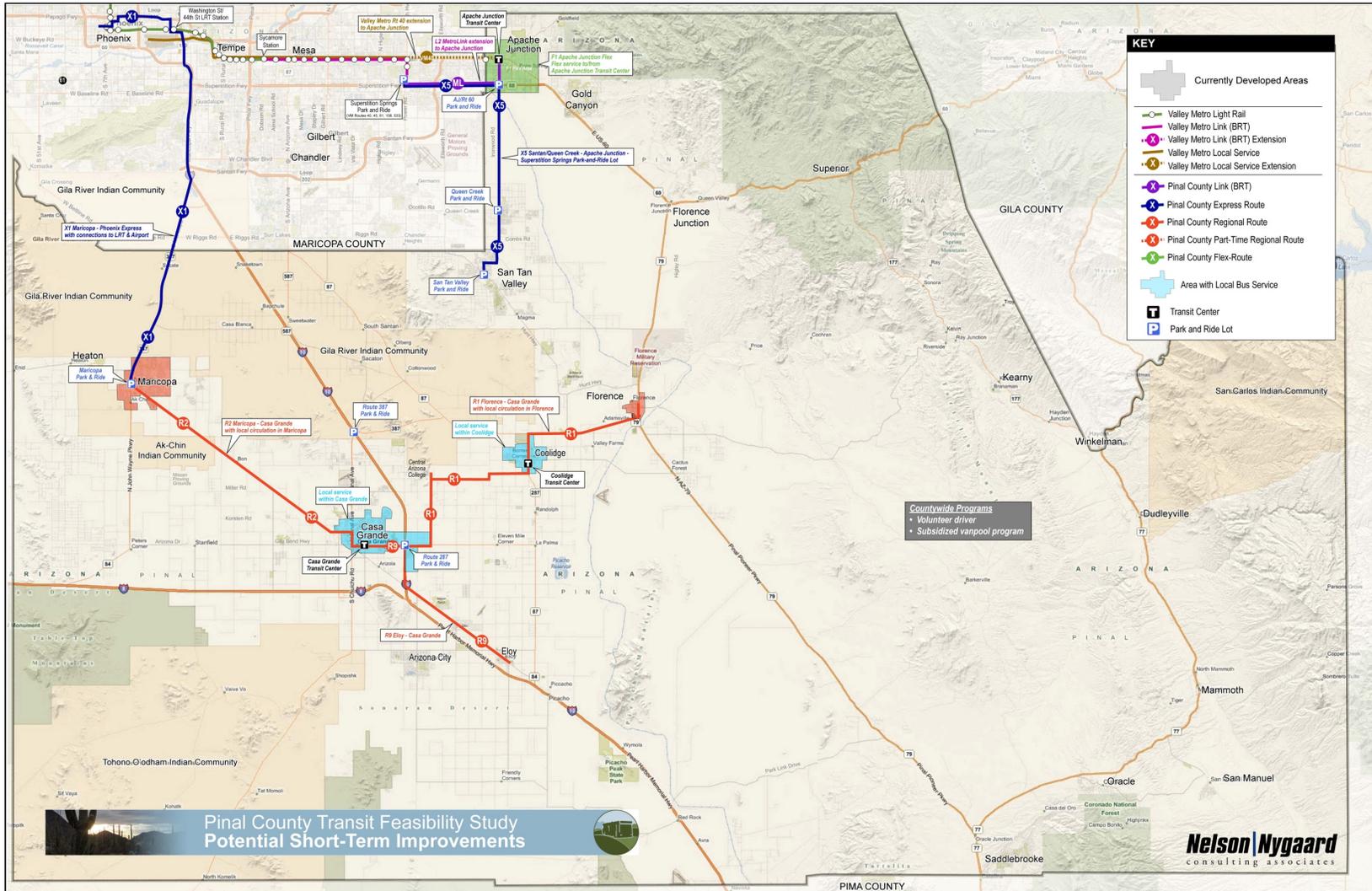
VALLEY METRO SHORT RANGE TRANSIT PROGRAM FY17-21

May, 2016; Valley Metro

Overview

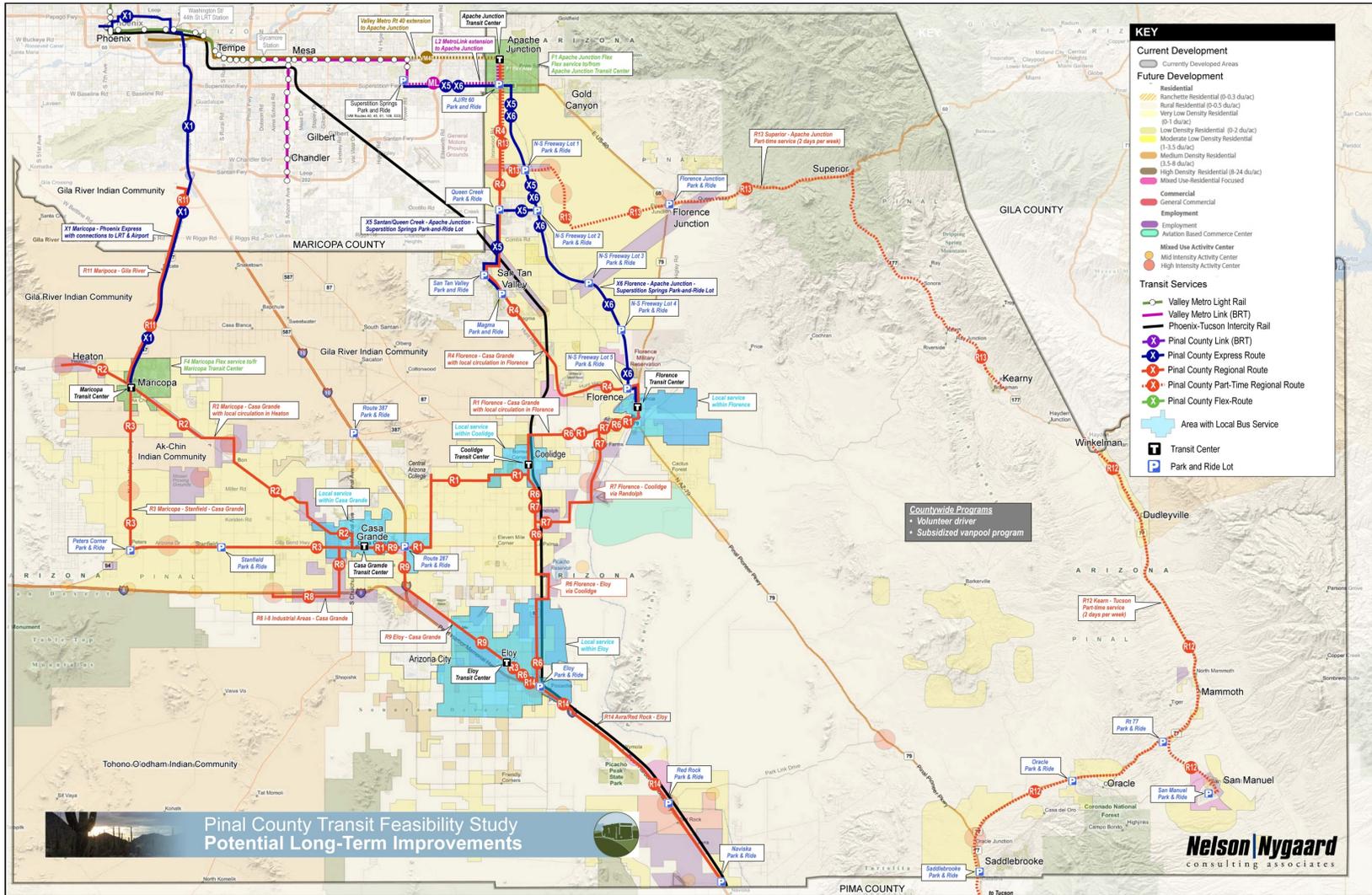
The SRTP identifies transit service improvements needed during the next five years and builds upon previous and ongoing Valley Metro efforts. The SRTP identifies regional and local transit service improvements programmed in the TLCP as well as local operating budgets. The SRTP is based on input submitted by individual member agencies, as well as concepts developed by Valley Metro staff in conjunction with the Board approved Transit Standards and Performance Measures (TSPM). The SRTP serves as input for processes such as the Transit Life Cycle Program, Fleet Management Plan, bi-annual service changes and the Transportation Improvement Program (TIP).

Figure 27: Pinal County Transit Feasibility Study – Potential Short-Term Transit Improvements



Source: Pinal County Transit Feasibility Study, Pinal County, April 2011.

Figure 28: Pinal County Transit Feasibility Study – Potential Short-Term Transit Improvements



Source: Pinal County Transit Feasibility Study, Pinal County, April 2011.

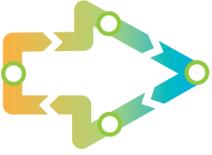


Potential Service Changes

The SRTP is divided in two planning periods, the short-term (one to two years), known as “production years,” and the long-term (three to five years), known as the “development” years. Service improvements listed under production years must have committed funding sources and an implementation schedule.

Service improvements under development years may require further analysis. For the production years, the SRTP analyzes all potential regionally funded modifications through a set of guiding principles and member agency feedback; the recommendations are shared with the TLCP update process.

For FY2017-18, the SRTP focuses largely on span of service and frequency changes on existing services, plus a few extensions. More significant changes are considered for FY2019-20.



REGIONAL TRANSIT STANDARDS AND PERFORMANCE MEASURES

PHASE I RECOMMENDATIONS

November, 2013; Valley Metro

Overview

The Regional Transit Standards and Performance Measures (TSPM) Phase 1 Recommendations documented the initial phase of the multi-phase process to develop and implement transit standards and performance measures for Valley Metro. This initial phase considered the following elements critical to establishment of transit service standards:

- Identification of service provision goals.
- Service types.
- Minimum operating standards.
- Performance measures.
- Guidance for evaluation of and recommendations for service changes.

Service Standards

Phase I produced specific guidance in three areas: (1) service standards by service type (see Table 7), (2) minimum stop spacing (see Table 8), and (3) performance measures (see Table 9).

Table 7: TSPM Phase 1 Service Standards by Transit Service Type

Service Type	Minimum Headway or Daily Trips	Minimum Span Week / Sat / Sun	Minimum Operating Days
Dial-a-Ride (ADA)	NA	ADA service shall be available throughout the same hours and days as fixed route service	
Rural Connector	4 trips inbound / 4 trips outbound	NA	Mon – Fri
Community/Circulator	30 min	12 hrs / 0 hrs / 0 hrs	Mon – Fri
Local Bus	30 min*	16 hrs / 14 hrs / 12 hrs	Mon – Sun
Key Local Bus	15 min peak / 30 min base*	16 hrs / 14 hrs / 12 hrs	Mon – Sun
Limited Stop Peak	4 trips AM / 4 trips PM	NA	Mon – Fri
Limited Stop All-Day	Headways same as LRT, up to 2X Peak	16 hrs / 14 hrs / 12 hrs (Same as LRT)	Mon – Fri
Commuter Express	4 trips AM / 4 trips PM	NA	Mon – Fri
Light Rail Transit	12 min peak / 20 min base	18 hrs / 14 hrs / 12 hrs	Mon – Sun

*60 min early morning and late night service

Source: TSPM Phase 1 Recommendations, Valley Metro, November 2013

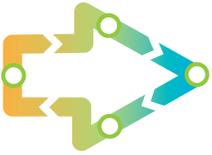


Table 8: TSPM Phase 1 Minimum Stop Spacing

Service Type	Base*
Dial-a-Ride (ADA)	NA
Rural Connector	NA
Community/Circulator**	¼ Mile
Local Bus	¼ Mile
Key Local Bus	¼ Mile
Limited Stop Peak	1 Mile
Limited Stop All-Day	1 Mile
Commuter Express	4 Maximum Inbound Stops
Light Rail Transit	1 Mile

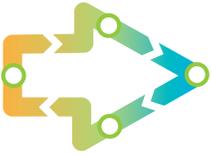
*There can be stops spaced up to 1/8 of a mile in High Density Areas
**Some circulators have flag stops so spacing may vary

Source: TSPM Phase 1 Recommendations, Valley Metro, November 2013

Table 9: TSPM Phase 1 Performance Measures

Measure	Contained In TPR	Route Level	Service Type Level
Total Boardings	✓	✓	✓
On-time Performance (%)		✓	✓
Vehicle Revenue Miles	✓	✓	✓
Vehicle Revenue Hours		✓	✓
Boardings/Revenue Mile	✓	✓	✓
Boardings/Revenue Hour		✓	✓
Average Fare	✓		
Farebox Recovery Rate (%)	✓	✓	✓
Operating Cost / Revenue Mile	✓	✓	✓
Operating Cost / Boarding	✓	✓	✓
Subsidy / Boarding	✓		✓

Source: TSPM Phase 1 Recommendations, Valley Metro, November 2013



PHASE II, ADOPTED GOALS REPORT

December, 2014; Valley Metro

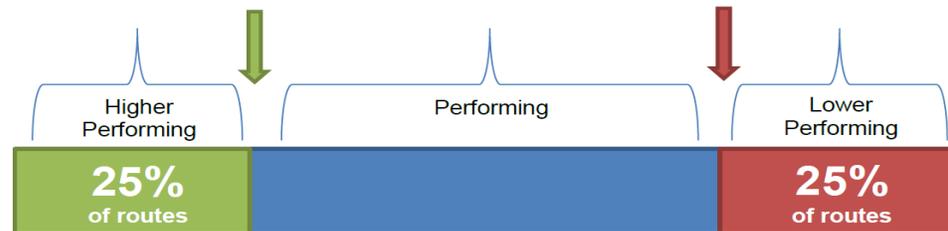
Overview

The second phase of TSPM focused on development of performance measures, service thresholds, application principles, and implementation standards for new services. The document sets forth five goals adopted to guide provision of transit services, including:

- Implement services in the RTP in consideration of a performance-based system.
- Give high priority to services that focus on the transit-dependent population.
- As a secondary priority, provide desirable transit service as an alternate mode to automobile travel.
- Improve Valley Metro's overall performance and promote the long-term financial stability of the agency.
- Promote expansion that builds existing services to meet standards and focuses new services in key areas such as:
 - Higher population density
 - Limited auto availability
 - Low income
 - Major activity centers.

Each goal was supported by specific service objectives, measures or planning tools to gauge transit system performance, level of analysis (e.g., route or system), frequency of evaluation/reporting, primary data sources, and thresholds (see Figure 29).

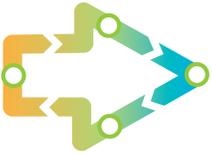
Figure 29: TSPM Phase II Quartile-Based Performance Threshold Concept



Source: *Regional Transit Standards and Performance Measures, Phase II Report, December 2014*

Application of Measures

The Phase II report provided guidance for applying performance measures and thresholds. This guidance focused on the review process, development of performance improvement action, responsibilities of local jurisdictions, criteria



for when and when not to identify a service for additional evaluation, and availability of Valley Metro to assist local jurisdictions.

Service implementation standards were developed for each of the fixed route types of transit service. These implementation standards were recommendations for classifying modified and new transit services proposed for implementation within five years from the date proposed (see Table 10).

Table 10: TSPM Phase II New Service Thresholds by Service Type

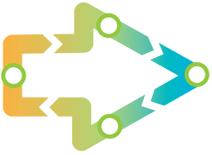
Service Type	New Service Thresholds
Key Local	<ul style="list-style-type: none"> Projected Boardings/Revenue Mile > 90% of Bottom Quartile Threshold
Local	<ul style="list-style-type: none"> Projected Boardings/Revenue Mile > 90% of Bottom Quartile Threshold
Light Rail	<ul style="list-style-type: none"> Determined through the completion of corridor-specific transit planning studies and through incorporation into the Regional Transportation Plan (RTP)
Limited Stop All Day	<ul style="list-style-type: none"> Key local service operating in corridor has boardings/revenue mile \geq Top Quartile Threshold Demand exceeding capacity on existing services in corridor
Limited Stop Peak	<ul style="list-style-type: none"> Key local service operating in corridor has boardings/revenue mile \geq Top Quartile Threshold Demand exceeding capacity on existing services in corridor OR Existing commuter-based market on a non-freeway corridor <ul style="list-style-type: none"> Estimated 6,400 person trips in market Corridor greater than 8 miles in length Serve top 10 regional employment center
Commuter Express	<ul style="list-style-type: none"> Must serve a top 10 employment district Existing commuter-based market on a freeway corridor <ul style="list-style-type: none"> Estimated 6,400 person trips in market Corridor greater than 8 miles in length
Community Circulator	<ul style="list-style-type: none"> Based on market demand Routing structure connects neighborhoods to local or regional activity centers and resources Proposed new routes that are generally less than 10 miles in length that fall below the projected boardings per revenue mile for local service would be a candidate for community circulator standard of service, to help build a future market for transit use.
Rural Connector	<ul style="list-style-type: none"> Connect a rural community into the regional transit network Based on market demand
Demand Response/Flex Route	<ul style="list-style-type: none"> Serves low-density (4 DU/Acre or lower) areas without fixed-route transit service or other available transit service options Can help build future demand for local transit market
Vanpool	<ul style="list-style-type: none"> Serves groups of 6 to 15 persons with a common destination Provides a commuter express type option for limited-demand worksites not necessarily located within one of the top 10 regional employment centers

Source: Regional Transit Standards and Performance Measures, Phase II Report, December 2014

High Capacity Transit Definitions

The report also established definitions for High Capacity Transit, which are as follows:

- Light Rail Transit** – LRT is a high-capacity rail technology that generally operates on a fixed, semi exclusive guideway. It serves moderate to high-density urban/suburban areas and provides



connections to regional employment as well as major activity centers. New LRT service recommendations are determined through completion of corridor-specific studies and must be incorporated into the RTP.

- **Limited Stop All Day Service** – This service would be prescribed in corridors with high transit demand that exceeds current capacity of existing services. It generally would operate on arterial roadways with a limited or infrequent number of passenger stops, and may service a corridor or roadway with one or more service types available.
- **Limited-Stop Peak Service** – This service would either augment existing key local service in a high-demand corridor, or serve a commuter-based market on a non-freeway corridor. Under the latter condition, implementation of this service should be weighed against three criteria: need (minimum 6,400 person trips between origin and destination); a travel distance equal to or greater than eight miles, so service can provide sufficient time savings; and service to one of the area’s top 10 employment centers (e.g., Downtown Phoenix, Scottsdale Airpark).
- **Commuter Express Service** – This service would rely on the region’s freeway infrastructure to serve commuter markets during peak periods. This limited-stop service would generally be implemented from residential areas or suburban centers to regional employment centers. Implementation of this service should be weighed against the same three criteria identified above for Limited Stop Peak Service.

PHASE III, EXECUTIVE SUMMARY

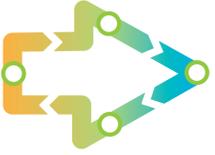
May, 2016; Valley Metro

Overview

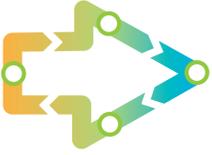
The Phase III report is an Executive Summary that summarized and presented the results of Phases I and II. In addition, service design standards were proposed “to establish the maximum number and length of deviations from the primary operating corridor of a route, minimize route duplications, and provide routing parameters for revenue service end-of-line vehicle turnarounds.”

Proposed service standards addressed route deviation operations that provides for departure from a route to serve a specific area with the return to the departure location or a different location. The standards also addressed route duplication wherein two distinct routes operate on the same or closely parallel streets. The standards sought to provide guidance as to when such operations would be appropriate and when they would not be appropriate. A third set of standards addressed revenue-service vehicle turnarounds, which must be carefully established to avoid excessive circulation and minimize operating costs.

This report also highlighted the regional bus fleet prioritization process which focused on determining adjusting or expanding the bus fleet in response to



demand. A 12-level prioritization process was developed for the existing fleet. This process serves as a “ranking mechanism” to weigh funding sources, type of service adjustment required or desired, and the purpose of the adjustment. A separate prioritization process was defined for the expansion fleet. This process is designed to assign points to a list of fleet requests (more points equals higher priority) based on “...funding characteristics, compliance with established TSPM standards, and regional connectivity.” When two or more requests obtain the same score, additional attention is given to weekend service, performance relative to two or more standards, and number of jurisdictions served.



DEMOGRAPHIC DATA

SOCIOECONOMIC PROJECTIONS: POPULATION AND EMPLOYMENT

June, 2016; MAG

Overview

This report presents tabulated population and employment data for each MAG jurisdiction. Population and employment is provided for 2015 and then presented for 10 year periods from 2020 to 2050. Annual projected population changes by jurisdiction also are provided for each year for the period 2015 to 2050. Finally, tables are presented to show current (2015) population and employment projections by Regional Analysis Zone and jurisdiction and summarized in ten year increments beginning at 2020.

POPULATION UPDATE: CENSUS JULY 1, 2010, AND JULY 1, 2015

February 23, 2016; MAG

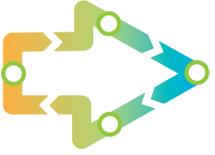
Overview

This document provided estimates of population and housing units within the MAG Municipal Planning Area (MPA), which includes Maricopa County and parts of Pinal and Yavapai counties. County-level information is presented for July 1, 2010, and July 1, 2015, based on data from the U.S. Census Bureau, Arizona State Demographer’s Office, MAG, and Central Arizona Governments (CAG). Table 11 below shows the values for the MAG MPA, which indicates a seven percent population growth between 2010 and 2015.

Table 11: Population Estimates for July 1, 2010, and July 1, 2015

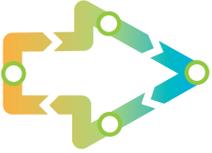
	July 1, 2010	July 1, 2015	Change
Maricopa County	3,817,117	4,076,438	259,321
Pinal County	375,770	406,468	30,698
In MAG MPA	238,159	260,357	22,198
Yavapai County	211,033	217,778	6,745
In MAG MPA	7	25	18
MAG MPA total	4,055,283	4,336,820	281,537

Source: Extracted from "Population Update: Census 2010 and July 1, 2015," White Paper, Maricopa Association of Governments, Originated: February 23, 2016; Modified December 9, 2016.



**REGIONAL TRANSIT FRAMEWORK
STUDY UPDATE**
Maricopa Association of Governments

Population and housing unit information at the municipal level is summarized for April 1, 2010, and July 1, 2015, along with the calculated change that occurred within this time frame. Municipal level data also was provided for households, housing, and housing occupancy for this same period as well the calculated change that occurred. The population and housing data established for the July 1, 2014 update was presented in comparison with the July 1, 2015, update.



SUMMARY

As described above, a large number of previous efforts have addressed a large range of transit issues in the MAG region, and have been instrumental in the great improvements that have been made to the Valley's transit services. Most of these efforts generally were consistent with each other, and built off of the 2007 RTP Update. However, there were some inconsistencies, as well as ideas that were unique to specific studies:

- The MAG Regional Transit Framework Study (2010) and the Supportive High-Capacity Transit Corridor Analysis both identify Rural Road/Scottsdale Road, respectively, as a BRT corridor and an "HCT ready corridor." In the MAG Regional Transit Framework Study (2010), this corridor was defined as running from the Loop 202 on the south to the Loop 101 on the north, whereas the Supportive High-Capacity Transit Corridor Analysis only identified the corridor as being HCT ready from Chandler Boulevard to the point at which Rural Road becomes Scottsdale Road.
- The MAG Regional Transit Framework Study (2010) identified Baseline Road as a future arterial BRT from 51st Avenue on the west to I-10 on the east.
- The Southeast Valley Transit System Study identified more HCT in the Chandler and Gilbert areas than the MAG Regional Transit Framework Study (2010).
- The MAG Regional Transit Framework Study (2010) identified Chandler Boulevard/Williams Field Road as the BRT corridor, whereas the Southeast Valley Transit System Study identified Chandler Boulevard/Williams Field Road along with Southern Avenue as "increased frequency corridors."
- In its long-term recommendations, the Southwest Valley Local Transit System Study indicated HCT would extend to Buckeye. However, neither the MAG Regional Transit Framework Study (2010) or the 2016 Valley Metro future transit corridors initiatives show HCT extended farther west than Avondale.
- The Northwest Valley Local Transit System Study was the only study to identify long term recommendations beyond rail in the Northwest Valley.

Overall, many of the recommended routes for BRT or LRT remain consistent throughout the different documents, with continuing analysis either confirming or extending those routes.

Additional observations included:

- A major focus has been on the expansion of the LRT system. This is understandable, as this has been the major interest of many



communities. However, it will not be possible to provide LRT service everywhere, and increased emphasis on BRT or Rapid Bus (BRT without exclusive lanes) could produce significant improvements in areas where LRT will not be developed.

- Most studies have focused on particular corridors and subareas and/or specific services, with less attention to how they all fit together as a network. As can be seen in Figure 15 in the TLCP section, the current HCT network is relatively “thin.” This current action to update the Regional Transit Framework provides the opportunity to identify and define a robust HCT network.