
RPTA Freeway Express Bus/BRT Operating Plan

FINAL REPORT



Prepared for
Regional Public Transportation Authority



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1. Introduction

The Valley's express bus network currently consists of 20 bus routes, including 16 routes operated by Valley Metro and four RAPID bus routes, developed and operated by the City of Phoenix. Combined, this network provided almost 6,000 passenger trips per day in February 2007. The four RAPID routes alone carried more than 3,500, demonstrating the popular acceptance of the RAPID service model, which includes fast connections between park-and-rides and downtown Phoenix via the regional freeway system. Based on the success of the existing express system, the Valley has great expectations for freeway-based express bus as one component of a regional approach to alleviating congestion.

This report details the major findings and recommendations produced during the course of the eleven-month Freeway Express Bus/BRT Operating Plan. The project produced recommendations for the structure and scheduling of 24 new regional, freeway-based express bus routes and identified steps to be taken for implementation of each route. In addition, the project developed recommendations for action to be taken to further strengthen the Valley's express route system.

1.1 Purpose and Need

The 2004 Regional Transportation Plan (RTP) and Proposition 400 allocated \$186.5 million¹ for freeway express bus operations and passenger support services over the 20-year program.

1.1.a Project Goals

The goals of the Freeway Express Bus/BRT Operating Plan project are as follows:

1. Define the operational characteristics of the freeway-based regional Express Bus/BRT network identified in the Regional Transportation Plan and funded through Proposition 400.
2. Consider how operational characteristics may change as the regional network develops over the 20-year life of the regional transportation funding program.

1.2 Project Process

The process for the Freeway Express Bus/BRT Operating Plan was designed to promote information gathering, information sharing, group discussion, and consensus building. The project was led by RPTA under the oversight of a Technical Advisory Group (TAG), which met periodically throughout the study to discuss project findings and consider project recommendations.

1.2.a Formation and Composition of TAG

The TAG was designed to be inclusive with a broad-based membership. Representatives from the following groups regularly attended meetings and workshops:

- City of Apache Junction
- City of Avondale
- Town of Buckeye
- City of Chandler
- Town of Gilbert
- City of Glendale
- City of Goodyear

¹ Funding allocation is in FY 2005/06 dollars.

- City of Mesa
- City of Phoenix
- City of Scottsdale
- City of Tempe
- Arizona Department of Transportation
- Maricopa County Department of Transportation
- Maricopa Association of Governments
- RPTA

1.2.b TAG meetings and Workshops

Over the eleven-month span of the project, TAG members attended five meetings to review working papers and to make further recommendations. In addition, TAG members each participated in one of three half-day workshops held in different locations throughout the Valley. The purpose of the workshops was to discuss operational characteristics of each of the bus lines at a detailed level and to sketch out revised routings and schedules.

1.2.c Project Sub-tasks

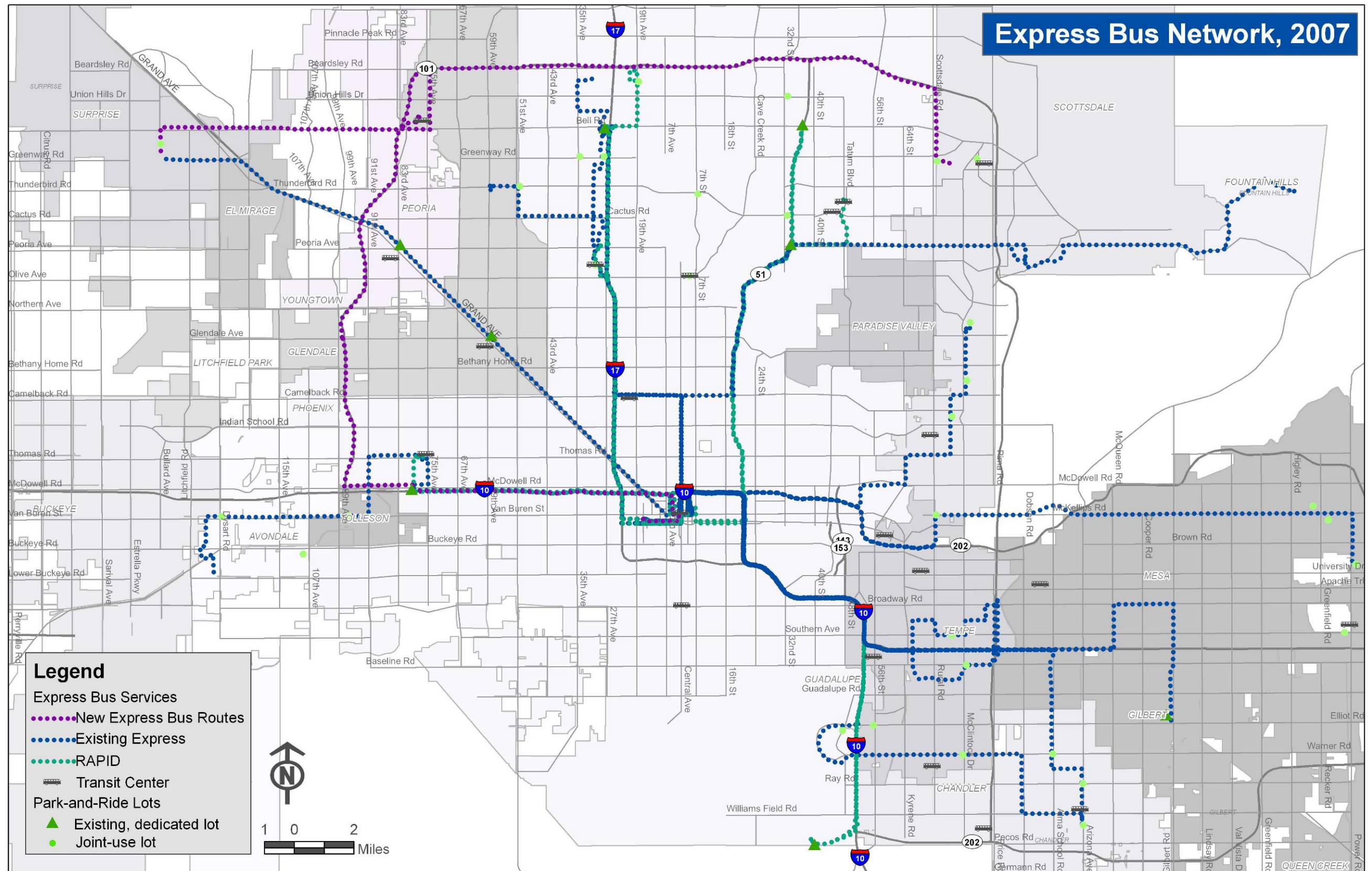
In order to develop an operating plan for the freeway-based express bus program, the project team reviewed existing and ongoing planning documents from RPTA, its member agencies, and the Maricopa Association of Governments (MAG) to examine the socioeconomic trends, transportation infrastructure, current and projected land use, and system connectivity in order to identify demand for and recommend operational characteristics of a freeway-based express bus/BRT system. In a review of peer systems, the project team presented information gleaned from express bus networks in Houston, Texas; Ottawa, Ontario, Canada; and Los Angeles and San Diego, California. In addition, the project team requested input from Denver, Colorado's Regional Transit District regarding integration of express bus systems with light rail.

1.3 Express Bus Network over Time

During the 20-year timeframe of the RTP, 24 new express bus routes will be implemented, some existing express routes will be phased out, and some will be maintained at the current level of service. The figures on the next four pages show how the overall express bus network changes over the next twenty years, according to the timeframe developed in the RTP and refined in the TLCP Audit. (Note: The current 500-series express routes are shown according to their existing route structure, rather than as "streamlined" routes.)

Figure 1 Express System in 2007

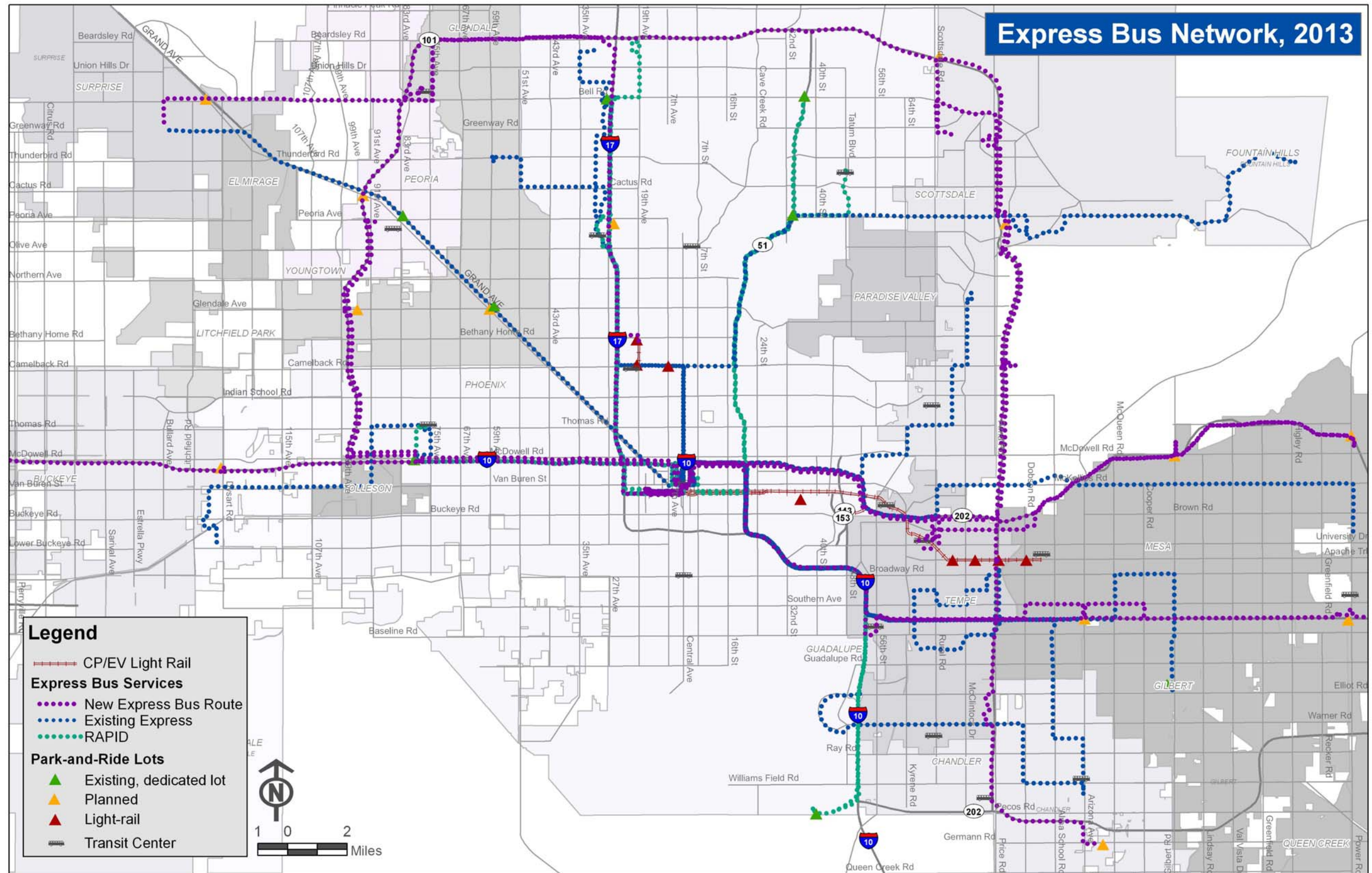
Figure 1 shows the express system as it looks at the end of July 2007. Existing RAPID and 500-series express routes are shown on this map, along with two new freeway express routes: Rt. 572 (the Surprise-Scottsdale Express) and Rt. 573 (the Arrowhead-Downtown Phoenix Express). As the map shows, the current express system emphasizes downtown Phoenix as a destination, although some of the 500-series express routes serve downtown Tempe. With the addition of the Surprise-Scottsdale Express, the third "critical destination" in the Valley identified during the course of this project will have express bus service.



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Figure 2 Express System in 2013

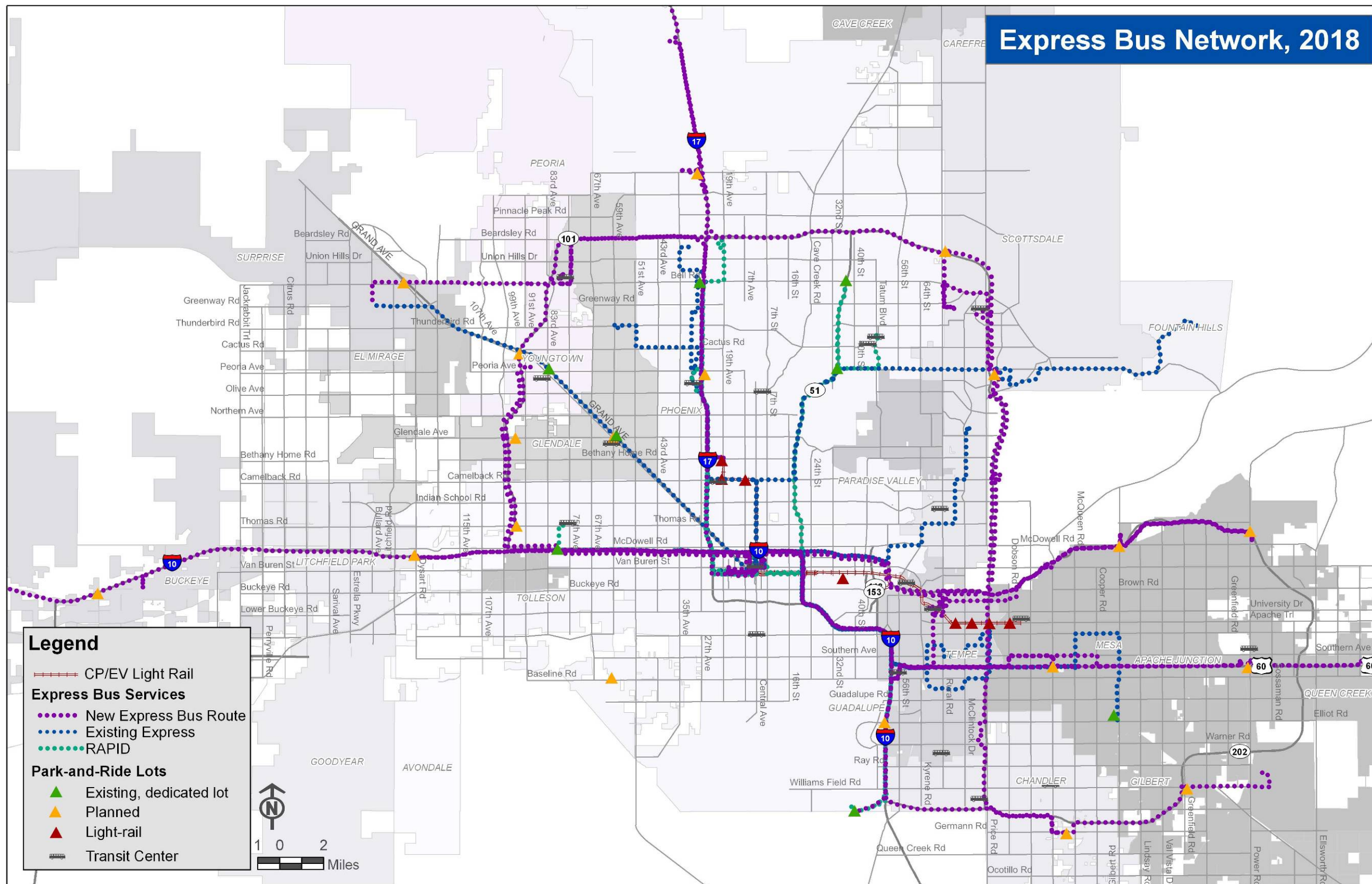
By 2013, the express system extends to farther reaches of the Valley, with the Papago Freeway Express extending to the Town of Buckeye in the southwest Valley and the Apache Junction Express extending east nearly to the Pinal County line. The second regional connector route, the East Loop 101 Connector, is also implemented at this time. In the southeast Valley, route 533 will have been replaced by the Superstition Springs Express, but the 532 still operates just south of Loop 202 in Mesa, perhaps redundant with the Red Mountain Express. Several A/B services will be in place by 2013: The Red Mountain Express connects to light rail in Tempe and also serves downtown Phoenix; the Northwest Valley Express connects to light rail in central Phoenix and also serves downtown non-stop. These A/B services will address the need for trips to central Phoenix as well as for the distribution of trips to multiple destinations via the LRT. In the case of the Northwest Valley Express, riders seeking to access employment destinations along north Central Avenue will be able to eliminate the out of direction travel forced by making connections through Central Station.



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Figure 3 Express System in 2018

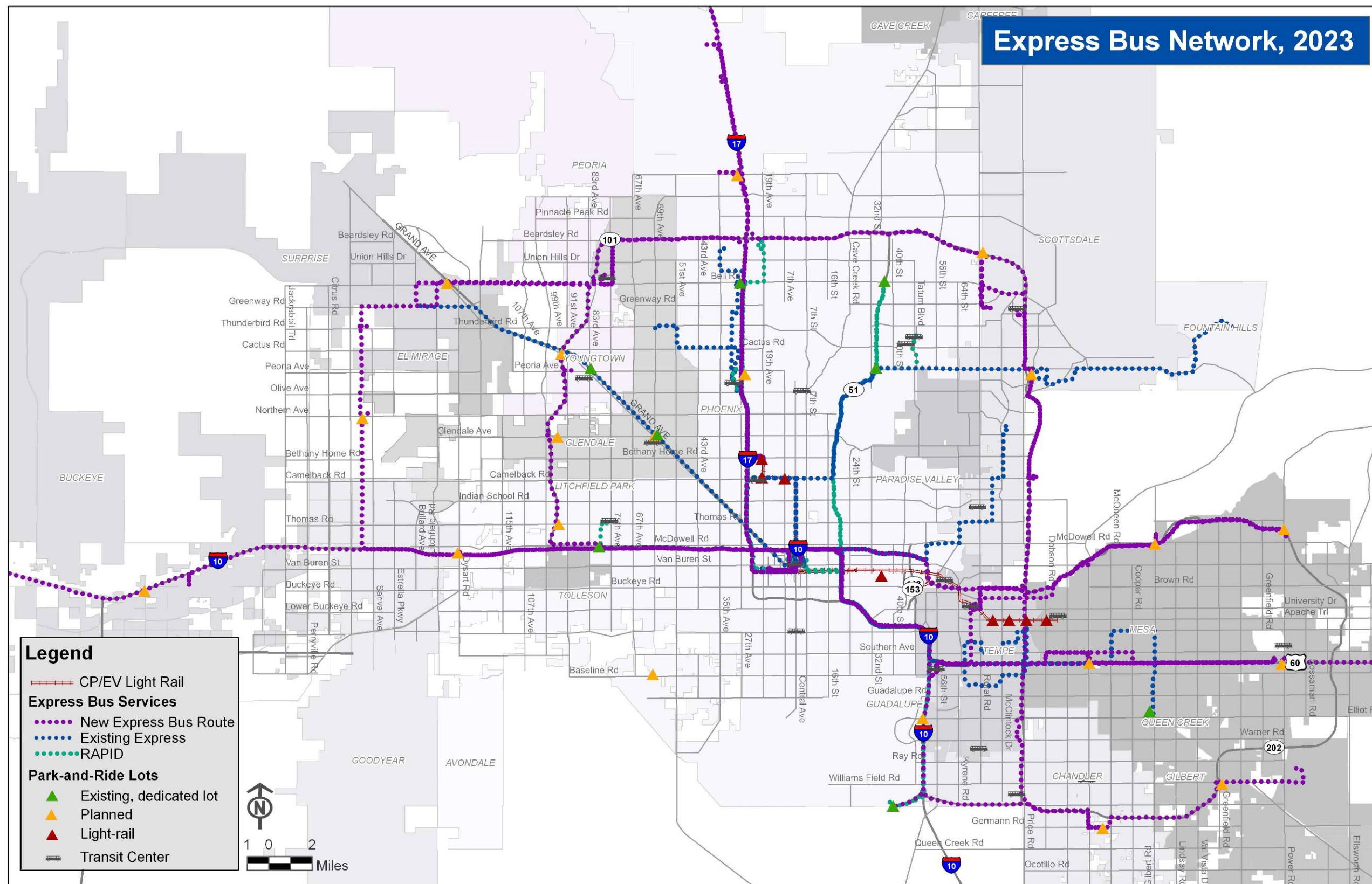
By 2018, express routes extend to the northernmost reaches of the Valley, to Anthem, and as far as west Buckeye. The 540 and 541 express routes in central and southern Tempe are replaced at this point by light rail and additional freeway-based express routes. Note: although A/B services are still shown on this map, by 2018 a clear policy of integration with light rail should be established.



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Figure 4 Express System in 2023

By 2023, all new freeway-based express routes will have been introduced. Figure 4 shows the future express bus network as it is currently envisioned. All Valley freeways have express bus service at this point, including the future Loop 303.



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2. Major Findings and Recommendations

Although the emphasis of the Freeway Express Bus/BRT Operating Plan project was on developing detailed operating plans for the RTP routes, many peripheral issues arose as the project progressed. This section discusses findings and/or recommendations on route operations and route structures and other issues relevant to express bus operations and planning.

2.1 Route Structure Planning Principles

During the operations planning phase, especially in discussions with TAG members and other stakeholders, several themes emerged regarding the operational characteristics of the future express bus routes. These themes are described in this section and are the basis of general principles upon which each route was analyzed and structured. A summary description of route structures and changes made to each route is contained in Appendix I. A detailed description of each route – along with a map of each – is provided in Appendix II.

Finding 1: Critical Destinations

The express bus network was set up to connect remote park-and-ride sites to major activity centers in the region and to provide suburb-to-suburb connections. The project team identified several critical destination and coordination points:

- Downtown Phoenix, downtown Tempe, and Scottsdale Airpark are the major employment destinations in the Valley
- Scottsdale Airpark is a critical destination/transfer point in the East Valley.
- Arrowhead Towne Center (including the Transit Center) is a critical transfer point in the West Valley.
- Light rail stations provide opportunities for transfer points in Central Phoenix and the Southeast Valley.
 - The 19th Avenue/Montebello transit center will be a key transfer point in Central Phoenix.
 - The Apache/Price light rail station and the Tempe Transportation Center will be key transfer points in the southeast Valley.

These destinations and coordination points provided anchor points for express bus route structure. (The destination points and transfer centers reflect the current situation and will likely change over time. Route performance and structure should be re-evaluated periodically to ensure the express bus network reflects changing travel patterns.)

The tables in Appendix III show how residents from locations around the Valley will be able to reach these critical destinations by express bus or light rail, based on the network structure at build-out in 2022.

Finding 2: Connector Concept & Application

During the operations planning workshops, it became clear that the connector concept applied more readily in some parts of the Valley than others. In the West Valley, connectors were originally routed through Desert Sky transit center to allow transfers to express bus services traveling north on Loop 101 to Peoria, Glendale, and Surprise, or east on I-10 to downtown Phoenix. However, the TAG and stakeholders felt that there is not currently enough demand to Glendale, Peoria, and Surprise to justify the connector system. With downtown Phoenix left as the sole destination to be served by express bus from the West Valley, stakeholders preferred a direct route, and the network was restructured accordingly.

Connectors in East Valley were encouraged, however, because downtown Tempe and Scottsdale Airpark are also key regional employment destinations. Connections in the East Valley were generally routed through Scottsdale Airpark or the Apache/Price light rail station.

The Surprise - Scottsdale Express (formerly the “North Loop 101 Connector”) route was restructured to provide more direct service from Surprise and North Glendale to the Scottsdale Airpark, bypassing the I-17/Bell Rd and SR51/Bell Rd park-and-ride lots for several reasons. First, buses to downtown Phoenix at the I-17/Bell Rd and SR51/Bell Rd park-and-rides generally already have a high load factor, and there was concern that connecting passengers would not be able to find a seat. Second, parking at these park-and-ride lots is at capacity, and there was concern that offering more destinations from these lots would exacerbate the parking situation. Finally, TAG members felt that the time it would take to serve these park-and-rides would negatively impact the overall passenger experience and resulting ridership between the primary origins and destinations. A connection to and from downtown Phoenix for people coming from Surprise origins is provided at Arrowhead Towne Center.²

There was general support to connect express bus services with light rail, although a wholesale policy to structure the express bus network exclusively to feed into light rail was not endorsed.

Finding 3: Express Bus Integration with Light Rail

With the start of light rail operations scheduled for December 2008, there is some concern that, without proper integration, express bus and light rail will create competing systems and redundant services that lead to a less efficient network. At the same time, there is concern that transfer time between express bus and light rail could adversely affect ridership on both systems if express bus were re-structured into a light rail feeder service. The integration of express bus services and light rail is an important issue because the two systems do not function independently; rather, they act as part of an integrated public transit network to transport Valley residents and visitors from one place to another.

Recommendation 1: Integration with Light Rail System

The project team recommends a blended approach in the Valley for now. Since not all express bus services are being introduced in the opening year of light rail, there is opportunity to experiment with early implementation express routes to gather information about local travel behavior. Routes that are introduced earlier and which provide good opportunities for integration should be introduced in a blended fashion, in what is referred to as an “A/B service.” “A” express bus service would travel to the final destination without stopping at light rail; “B” service would terminate at the most reasonable light rail stop. Where there is potential for integration with light rail (that is, where out-of-direction travel would be minimal), A/B service is described for each of the future express routes. (See route descriptions in Appendix II.)

After this integrated service has been operating for a year or more, the project team recommends an in-depth study of the markets being served by express bus and light rail to better understand Valley travel patterns and create a transit network tailored to local travel behavior. (See section 3.1 regarding recommendations for follow-up work.)

² The two routes are currently not well-timed for connections; this should be adjusted in the next schedule change.

2.1.a Downtown Phoenix Operations

Finding

RTP planning documents provided details about the intended route structures of the new freeway express routes. However, the routing in downtown Phoenix was inconsistent from route to route, with some routes terminating at Central Station, some at the State Capitol complex, and some serving both. In workshops and TAG meetings, project stakeholders expressed the need to serve multiple downtown Phoenix destinations.

Recommendation 1: Route structure

All new express bus routes with downtown Phoenix as a destination will be routed to serve both Central Station and the State Capitol complex, with several on-street stops between these two points. Express routes that approach downtown Phoenix from I-10 will travel east-to-west through downtown; those that approach downtown Phoenix from I-17 will serve downtown destinations from west-to-east. (These operations are consistent with existing express bus services.)

Recommendation 2: Downtown Bus Stops

Express buses operated by Valley Metro will not, at this time, use City of Phoenix RAPID stops in the downtown area. Instead, the express buses will use local stops, which are generally located in the vicinity of RAPID stops. (Ideally, these existing local stops can be upgraded to provide the same level of information about bus arrivals and departures currently displayed at RAPID stops.)

2.2 Reconciliation with TLCP Audit

During the course of the Freeway Express Bus/BRT Operating Plan project, the Regional Transportation Plan (RTP) Evaluation was also underway. The RTP Evaluation, also known as the Transit Life Cycle Program (TLCP) Audit, was tasked with ensuring that the financial assumptions underlying transit projects identified in the original RTP were still viable, especially in light of recent cost increases.

The Freeway Express Bus/BRT Operating Plan has worked within the fiscal constraints recommended in the TLCP Audit and has generally followed the route recommendations of the TLCP Audit. However, the Freeway Express Bus/BRT Operating Plan project has recommended some route structure changes that have implications for jurisdictional equity, which will require consideration during the project agreement phase of a route's implementation.

The routes with potentially large impacts on jurisdictional equity – and the extent of the impact – are shown in the tables in Appendix IV. All of these jurisdictional equity impacts are based on current estimates of operational costs and the mileage and trip assumptions made in the plan. Any change in these elements would affect the jurisdictional equity outcomes. At this time, the project team recommends conserving the route mileage “savings” that result from the changes.

2.3 Ridership Potential on New Routes

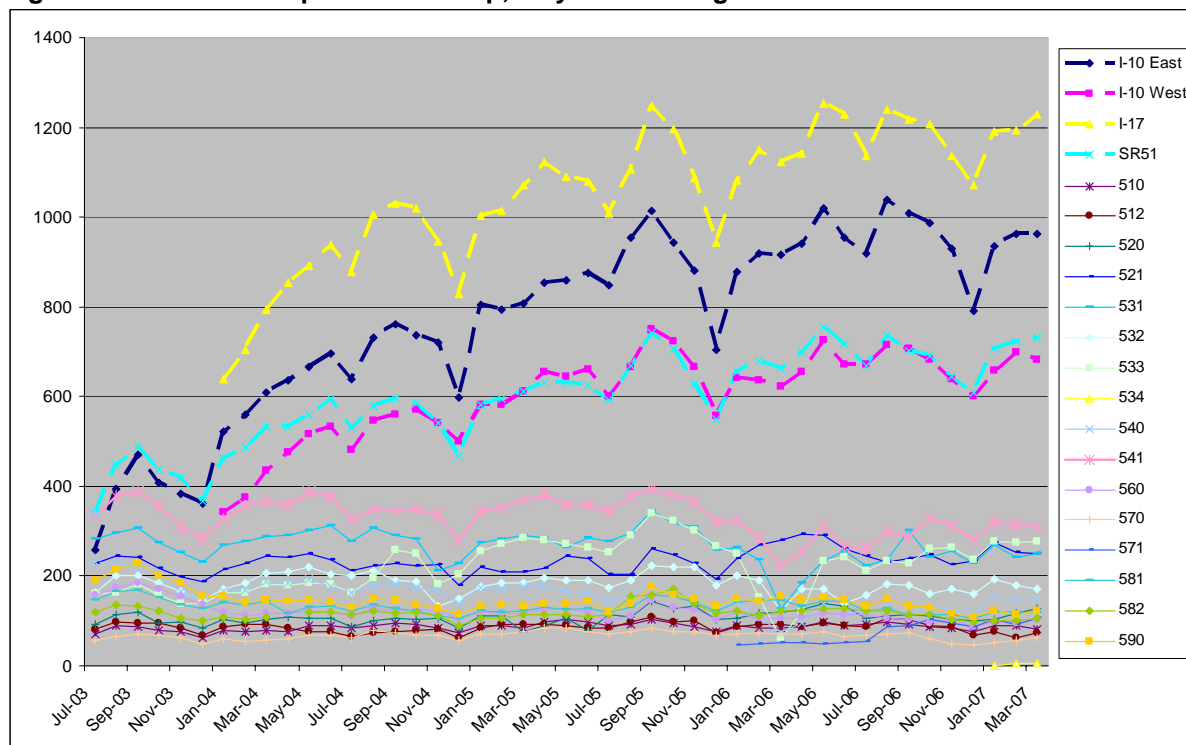
A goal of the Freeway Express Bus/BRT Operating Plan project was to understand how the demand for express bus service should influence route structures and service levels.

Finding 1: Historic Ridership Figures

Boardings data from the last three years showed that the RAPID express system has outperformed the 500-series express routes in terms of ridership. Total ridership is much higher on

the RAPID system, both overall and on a per-trip basis. In addition, RAPID ridership has continued to grow over time, while ridership levels on the 500-series express routes are generally flat. Figure 2 shows ridership data.

Figure 5 RAPID and Express Ridership, July 2003 through March 2007



Source: Valley Metro

RAPID has several qualities that differentiate it from the 500-series express routes:

- streamlined route structures that operate primarily on freeway corridors with few stops
- park-and-ride lots with covered parking
- buses with high-backed seats and luggage racks
- differential branding for RAPID services
- short, easy-to-remember route names
- high-frequency service
- extensive service hours; morning trips occur as late as 8am and evening trips continue until 6:30 pm
- dynamic message signs providing arrival information at RAPID stops.

Whether all or any of these qualities has caused the difference in ridership between RAPID and the 500-series express routes is not certain. However, since anecdotal evidence strongly suggests that existing and potential transit patrons perceive a difference between RAPID and non-RAPID express bus services, the new express routes were structured for streamlined operations. It is assumed that the travel time savings that this structure creates will lead to higher ridership.

Finding 2: Lack of Modeling Support

Ideally, ridership estimates could be generated based on the regional travel demand model, which uses information on land use, socio-economic information, and travel behavior to predict

where, when, and how people will travel. Unfortunately, even after extensive efforts on the part of the project team and the MAG modeling staff, the ridership results produced by the MAG model were not sufficiently refined to use in this analysis.

Possible explanations for the unexpected modeling results include the following:

1. The recent RAPID passenger survey found that a substantial majority of RAPID bus riders are “choice” riders (that is, people who have the option of using their own vehicle, but choose to take the bus). The MAG model tends to assume transit riders are largely drawn from a transit-dependent audience. The model does currently not adequately capture drive-to-transit trips.
2. The MAG mode choice model was last validated and calibrated in 2001, based on the 2001 O&D survey (before RAPID services were in place), and does not reflect the most updated ridership figures and trends. A recent RAPID survey conducted by METRO seeks to address this issue but model recalibration based on this study has not yet occurred. As mentioned above, the existing calibration does not capture drive-to-transit trips. As a result, routes such as RAPID that are park-and-ride-based model poorly since there are few stops to support walk-to-transit access.
3. The model also did not have the most updated information on the overall transit network or transit infrastructure, such as park-and-ride facilities and transit centers.

Finding 3: Service Frequency and Ridership

An analysis of the historic ridership data showed that service frequency influences ridership levels: each time an additional trip was added to a RAPID route, ridership grew by about 40 passengers. In other words, at the margin, adding trips did not result in diminishing returns, but in increased ridership overall. (Of course, it should not be assumed that ridership growth is unlimited. However, the regression analysis implies that there is more demand than is currently served by the existing express system. In addition, parking capacity at park-and-ride lots creates an upper boundary for ridership.³)

Finding 4: Density Scale Analysis

The Density Scale Analysis⁴ compares the transit service area population and employment density to the service area population and employment density of the planned bus route. Density scores above zero indicate routes that are likely to perform above system averages for ridership. The value indicates a propensity of an area to have a higher or lower demand for transit, rather than an absolute indication of the number of riders. The Density Scale for each of the new express bus routes to be implemented in the next two years is shown in Table 1.

³ Creating feeder bus routes that allow transfers at park-and-ride lots can help alleviate parking capacity constraints.

⁴ The Density Scale Analysis was developed by HDR | S.R. Beard & Associates based on research that has successfully shown an empirical link between density and transit performance.

Table 1 Density Scale Analysis

Route	Density Score (from TLCP Audit)		
	Population density, compared to existing express system	Employment density, compared to existing express system	Total Score
Desert Sky Express/I-10 West RAPID	41	58	100
Deer Valley Express/I-17 RAPID	21	51	72
SR 51 Express/SR51 RAPID	0	24	24
Ahwatukee Express/I-10 East RAPID	-32	61	29
Surprise - Scottsdale Express	-20	-43	-63
Arrowhead – Downtown Phoenix Express	11	20	31
Northwest Valley Express	14	18	32
Papago Freeway Express	-22	7	-15
East Loop 101 Connector	-29	-1	-30
Red Mountain Express	-30	38	7

Two of the new express routes, the Arrowhead-Downtown Phoenix Express and the Northwest Valley Express, both have density scores comparable to the SR51 RAPID and the I-10 East RAPID. This suggests that those routes may experience the type of ridership found on the RAPID system. The Red Mountain Express has a positive density score overall, and may outperform the existing RAPID system in terms of ridership. Routes with a low density score include the two connector routes and the Papago Connector (which will operate as an express to downtown Phoenix). Ridership expectations for those routes should be lower.

This information, combined with the conclusions from the regression analysis in the previous section that suggest that increased trip frequency can capture latent demand for transit, implies that service levels approaching those of the RAPID service would be appropriate for the new express bus lines with high density scores. The project team suggests, however, that ridership data be obtained for the new RAPID-style express bus services before a decision is made on increasing trip frequencies.

2.4 Existing 500-Series Express Routes

The examination of the historic ridership information indicates that ridership on the existing 500-series express routes has remained flat over the past three years. This is striking compared with the continued ridership growth on the RAPID system. RAPID system planners from the City of Phoenix mentioned that prior to the implementation of the RAPID system in 2003, City of Phoenix express routes had operated similarly to the current 500-series express routes. (That is, routes operated on surface streets with “meandering” route structures before entering the freeway.) Ridership on these routes was similarly flat and only began to grow after the routes were streamlined and re-branded as RAPID.

Recommendation 1: Streamline Route Structures

If requested by the cities in which the routes operate, existing 500-series express routes should be restructured for more streamlined operations. Rather than “meandering” on surface streets, the routes should originate at park-and-ride lots and terminate at light rail lines and regional destinations not served by light rail. Rather than serving multiple destinations with one line,

these routes should connect to other express bus services and to light rail. Cities may wish to observe the first years of new express bus services before requesting changes to existing routes.

Recommendation 2: Outreach to Existing Ridership

While the existing 500-series buses have not experienced the growth in ridership that the RAPID system has, they carry a substantial number of people each day. Attempts should be made to include existing riders in route streamlining efforts to minimize any potential negative impacts of a change in operations. Involving existing riders in route planning and/or ensuring they are aware of all transit options – including access to streamlined express routes – should be a part of route streamlining. In addition, cities that wish to streamline routes may want to look at a phased approach in areas where more than one 500-series route exists so that current walk-to-transit passengers are given time to adapt to the new structure.

Recommendation 3: Emphasis on Transit Connectivity

Since a substantial portion of their route operates on neighborhood and/or arterial streets, the current 500-series express bus routes provide good access to transit for people without automobiles. If these route structures are streamlined to originate exclusively from park-and-ride lots, non-vehicular access to park-and-ride lots should be a part of the planning for route streamlining. Local trunk routes should be planned for timely transfers to express routes. Neighborhood circulators that serve park-and-ride lots during the commute hours could help deliver riders without a need for additional parking. Safe and secure bicycle and pedestrian access should also be emphasized during park-and-ride site selection and design. By recognizing the need to provide non-automobile means of access to the express bus system, transit planners can help ensure that express routes do not unwittingly become automobile-dependent systems.

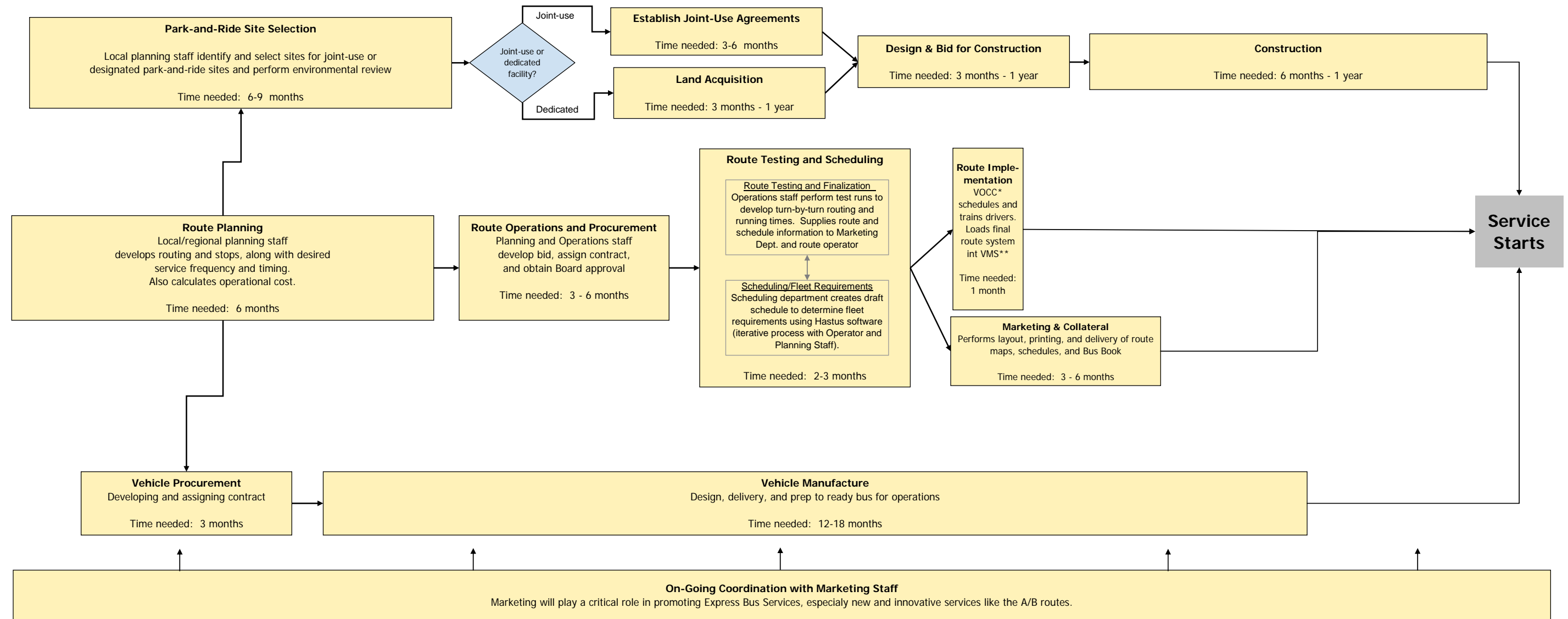
2.5 Implementation Timeline

Successful express bus implementation depends on vehicle, facility, operational readiness, and aggressive marketing of new transit services that are significantly different from current service types. Route planning and implementation must consider the time it takes to test routes and train drivers, not just identify the route structure. In addition, route implementation depends on identifying space for park-and-ride or transit center facilities and the time to order, manufacture, and deliver vehicles. Figure 6 shows a complete workflow and timeframe for all aspects of route planning. As the flowchart indicates, route planning and testing is the shortest task in route implementation. Planning and constructing a park-and-ride facility will take, at minimum, a year and a half; vehicle procurement takes almost as long. Effective coordination with RPTA and local transit agency marketing staffs will be critical to the success of the new express bus service.

Notes: Routes starting in July 2008 are, at this time, on track for implementation. Where dedicated park-and-ride facilities will not be in place, joint-use interim facilities are being identified. Vehicles have been ordered for these routes and will be ready in time for operations to commence.

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Figure 6 Express Bus Planning Timeline and Workflow



*Vehicle Operations Control Center
 **Vehicle Management System

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2.6 Express Bus Infrastructure

2.6.a Park-and-Ride Facilities

Park-and-ride facilities are a key component and a major success factor in the express bus network. Experience on other routes has shown that express bus patrons will park wherever they can at the route origin, even if parking is not designated for transit use. Therefore, if a dedicated park-and-ride facility is not ready by the time express bus operations start, interim facilities must be identified and formalized through agreements with property owners. If interim facilities cannot be arranged, service initiation to that location should be postponed as its effectiveness relies on a well-defined passenger gathering point.

When an express route will require an interim park-and-ride facility at start-up, this has been noted in the route description.

2.6.b HOV Lanes and HOV Construction

Ideally, express bus services operate in freeway high-occupancy (HOV) lanes to allow maximum speeds in otherwise congested corridors. However, since the Valley freeway system is still maturing, many freeways are currently without HOV lanes. Although the majority of the Valley's freeways are eventually planned to have HOV facilities, this HOV network will not be complete until 2024.

At TAG meetings and in discussion with stakeholders, it was agreed that a case-by-case approach should be taken to implement express bus services on corridors without HOV lanes. TAG members and other stakeholders were reluctant to delay route implementation until HOV lanes are in place and several stakeholders pointed out that express bus services could help alleviate congestion on corridors during construction. It should be noted that HOV construction may affect service levels and, therefore, ridership levels, and route evaluations should be performed with that in mind.

Bus-on-shoulder

Operating express bus service on the shoulder of the highways was suggested as an option, but ADOT does not allow roadway shoulders to be used for additional capacity because such use creates unsafe conditions at on- and off-ramps.

Construction routing

Re-routing bus service during construction is another option, but it should be recognized that all roadway users will be searching for less-congested routes as well. In other words, moving express bus operations off congested highways during construction may simply relocate them to congested surface streets.

2.7 Scheduling

Most of the express bus routes serve at least two "origination points" such as a park-and-ride or transit center before reaching the final destination. There is concern that buses may fill at an earlier facility with no room for people at a second park-and-ride later in the route. The City of Phoenix has approached this problem by serving each park-and-ride with dedicated trips if demand dictates. These are not ad-hoc trips, but are formally scheduled as part of route operations. In addition to demand, the design of a park-and-ride – that is, how easily the park-and-ride is accessed from freeway corridors – will affect the efficiency and viability of serving multiple park-and-rides along a single route. Park-and-ride site location is one key to access; in

addition, features such as direct freeway access through on-ramp connections and crossover lanes through interchanges provide facility to facility links. These design components should be discussed at every opportunity with local, state and federal representatives.

3. Recommendations for Follow-up Work

The Freeway Express Bus/BRT Operating Plan identified several items that are outside the scope of current project, but that would strengthen the express bus system overall. These items are included below as recommendations for future work.

3.1 Data Collection and Modeling

While most participants in the Operating Plan expect the new express routes to be successful in terms of ridership and public perception, there are many unknowns about the new system due to a lack of data and a lack of reliable modeling for transit. The ridership potential of each route and the effect that the new express routes will have on the existing RAPID and express routes is unclear. Although a recent survey of RAPID patrons revealed a great deal about RAPID riders and their travel behavior, little is known about the characteristics of the 500-series express riders. Finally, it is not clear what effect the express routes will have on each other and on the light rail system.

RPTA has initiated an Origins and Destinations (O&D) on-board transit survey that will allow for the recalibration of the MAG transit travel model. This data collection effort is due to be complete in late 2007 and will help transit planners answer questions about the effect of the new express routes on existing RAPID and 500-series express routes; about transit passenger origins and destinations; potential for transfers between express routes and between express routes and light rail; and many other questions. The O&D on-board survey effort will be supplemented by a second survey to be undertaken after the start of light rail transit (LRT), service which will provide additional data on express bus usage. In addition, MAG is in the process of migrating the travel demand model from the EMME/2 platform to TransCAD. This migration provides an opportunity to examine the modeling assumptions and improve modeling results.

3.2 Communications Technologies

Technology initiatives currently being implemented by highway planners in the Valley may make sense for transit, especially during HOV construction phases. For example, MAG is implementing a "Mobile Traffic Information Portal" to provide a means of accessing real-time freeway traffic information via mobile internet devices (such as cell phones or personal digital assistants). A similar system, Nextbus, is currently being implemented by Valley Metro, which will eventually communicate transit arrival and departure information to travelers via their mobile communication devices. The express bus system already has some communications infrastructure in place, since all vehicles are currently networked via automatic vehicle location systems. Additional infrastructure (such as a regional bus stop database with unique bus stop numbering) will be needed before the Nextbus system will be fully operational. Nextbus demonstrates the potential for automated transit communications and the integration of transit data in general into the regional Intelligent Transportation System (ITS) architecture.

3.3 Additional Express Route Needs

The Freeway Express Bus/BRT Operating Plan focused exclusively on the 24 new express routes described in the 2004 RTP. However, as the Valley grows and changes, needs for

express routes may also change. For example, the new State Route 801⁵ and the planned South Mountain Parkway (Loop 202 extension) currently have no regional transit improvements planned. In addition, the bulk of the express routes terminate in downtown Phoenix, but suburb-to-suburb travel is the fastest growing component of travel demand. The plans for the express route network should be regularly evaluated and refined to reflect the latest travel trends.

3.4 Additional Infrastructure Needs

The Freeway Express Bus/BRT Operating Plan based recommendations for express route operations on information about current, known plans for infrastructure in the Valley. However, additional infrastructure investments could further strengthen the express bus network by providing quicker travel times on new HOV lanes, better access to park-and-ride lots, and so on. The need for additional infrastructure to support transit should be studied further, including HOV access ramps and interchanges, direct access ramps to park-and-ride lots, and additional park-and-ride lots.

4. Conclusion

The Freeway Express Bus/BRT Operating Plan identified planning principles for route operations, provided detailed descriptions of each route (including stops and transfer locations), and identified steps to be taken for each route before implementation. The project identified needs for further work to strengthen the express route network and to create a more robust system of data collection and transit modeling.

One of the most valuable results of the project was the exchange of information between cities with a great deal of transit experience and those for whom the express routes will be the first example of transit in their community. Continued collaboration on express bus planning and operations will ensure consistent experiences throughout the Valley for transit passengers.

As experience with express bus services grows over time, Valley agencies should continue to explore opportunities for network expansion and further improvement on existing lines.

⁵ State Route 801 is a new east/west freeway that will connect SR 85 and Loop 202. Its exact alignment is currently under study.

APPENDICES

Appendix I: Express Bus Route Alignments

This section details route alignments and includes information on transit coordination, issues that must be addressed before route implementation, and any issues concerning the route in the long term, but that would not cause a delay to implementation.

Each section contains a list of other transit routes that intersect with the express route in question. Routes that should be timed for good transfers are underlined.

Note: all routes that serve Downtown Phoenix will stop at Central Station, which the following routes also serve:

- Local routes 0 (Central), 3 (Van Buren), 7 (7th Street), 8 (7th Avenue), 10 (Roosevelt/Grant), 12 (12th Street), 15 (15th Avenue); 29 (Thomas Road), Route39, & and Route 40; DASH downtown circulator
- In December 2008, the Central Phoenix/East Valley light rail (CP/EV LRT) will begin service and will also serve Central Station.

Each route description includes a map. Where changes have been made to the routing, both the original routing (as recommended in the TLCP Audit) and the revised routing are shown.

Desert Sky Express/I-10 West RAPID

Note: The “Desert Sky Express” is a regionally funded continuation of the I-10 West RAPID route. The route will continue to use the name I-10 West RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The Desert Sky Express/I-10 West RAPID route originates at the Desert Sky Mall transit center, where the following bus lines also operate:

- Local routes 17, 29, 41, 131
- Express route 560 (Avondale Express)

In the future, the Thomas Road Supergrid route (starts 2019) will likely intersect the Desert Sky Express/I-10 West RAPID. Route 560 will be replaced by the Avondale Express, which may not serve Desert Sky Transit Center.

Issues to address before implementation

The Desert Sky Express/I-10 West RAPID route is already in operation.

Long-term issues

- Consider extending route to Thomas Road/Loop 101 park-and-ride once it is constructed. The financial implications of extending the route should be considered at that time.
- Examine effect of plans to expand light rail service along I-10 to 79th Avenue; light rail service may replace the Desert Sky Express/I-10 West RAPID. Light rail may require a larger park-and-ride facility due to higher capacity and/or greater service frequency.

SR 51 Express/SR 51 RAPID

Note: The “SR 51 Express” is a regionally funded continuation of the SR-51 RAPID route. The route will continue to use the name SR-51 RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The SR 51 Express/SR-51 RAPID route originates at the SR51/Bell Road park-and-ride lot or at Paradise Valley Mall, and also serves the Shea Blvd/SR 51 park-and-ride. It connects with the following routes:

- Local routes 44, 106, 138 (at Paradise Valley Mall), 170
- Route 39 (at Paradise Valley Mall)
- Express route 512 (Scottsdale Express)

In the future, the SR51 RAPID will connect with light rail at the 12th Street station.

Issues to address before implementation

The SR 51 Express/SR51 RAPID route is already in operation.

Long-term issues

- Consider extending route to Desert Ridge Mall. The financial implications of extending the route should be considered at that time.
- Integration with light rail extension to Paradise Valley Mall (currently scheduled for 2025)

Deer Valley Express/I-17 RAPID

Note: The “Deer Valley Express” is a regionally funded continuation of the I-17 RAPID route. The route will continue to use the name I-17 RAPID.

Recommended routing

There are no changes to the current routing.

The Happy Valley/I-17 park-and-ride will open for service in late 2009. At that time, the I-17 RAPID will be extended northward to serve this new facility.

Transit coordination

The Deer Valley Express/I-17 RAPID route originates at the Bell Road/I-17 park-and-ride, and connects with the following routes:

- Local routes 29 (Thomas Road) & 170
- Express route 560 (Avondale Express)

Many routes use the MetroCenter transit center:

- Local routes 27, 35, 90, 106, and 122
- Express routes 581 and 582

As mentioned, the light rail line will be in operation in 2008. A potential place for transfers between the Deer Valley Express/I-17 RAPID and light rail is the 19th Avenue & Montebello transit center.

Issues to address before implementation

The Deer Valley Express/I-17 RAPID route is already in operation.

Long-term issues

- Integration with CP/EV light rail line on I-17.

Ahwatukee Express/I-10 East RAPID

Note: The “Ahwatukee Express” is a regionally funded continuation of the I-10 East RAPID route. The route will continue to use the name I-10 East RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The Ahwatukee/I-10 East RAPID originates at the Pecos/40th Street park-and-ride, where the following bus lines also operate:

- ALEX (Ahwatukee Local Express) Circulator

Issues to address before implementation

The Ahwatukee Express/I-10 East RAPID route is already in operation.

Long-term issues

- The construction of a park-and-ride at I-10 & Elliot is made difficult by lack of available land.
- The 40th Street/Pecos park-and-ride lot is slated for expansion in FY2008-09, which may help in alleviating some of the parking overcrowding currently experienced at that facility.

Surprise-Scottsdale Express (July 2007)*

*(formerly called North Loop 101 Connector)

Recommended routing

- West terminus: Surprise Park-and-ride lot
 - Interim: Joint-use park-and-ride lot at Surprise Aquatic Center (Bullard Rd. & Greenway Rd.)
- East terminus: Scottsdale Airpark (west side of Airport terminal, on Butherus)
- Stops:
 - Surprise City Hall
 - Sun City (Intersection of Bell Rd. and 99th Ave.)
 - Arrowhead Towne Center
 - Future Scottsdale Rd. & Loop 101 park-and-ride lot
 - Interim: No stop
 - Scottsdale Road at Mayo Boulevard
 - Scottsdale Road at Frank Lloyd Wright Boulevard
 - Dial Tech Center (73rd Street and Butherus)

The Valley Metro Operations department has determined the final schedule for the Surprise-Scottsdale Express, as follows:

Route 572 Final

Surprise-Scottsdale Express

Monday - Friday East Bound Schedule

Bullard Avenue Park & Ride	Surprise City Hall	Bell at 99th Ave	Arrowhead Transit Center	Scottsdale Rd at Mayo Blvd	Scottsdale Road at FLW	Dial PNR	Scottsdale Airpark
455a	504a	509a	516a	544a	547a	550a	555a
520a	529a	534a	541a	614a	617p	620a	625a
600a	611a	619a	628a	710a	713a	716a	721a
630a	641a	649a	658a	740a	743a	746a	751a
510p	521p	532p	542p	611p	614p	617p	620p
540p	550p	558p	607p	636p	639p	642p	645p

Monday - Friday West Bound Schedule

Scottsdale Airpark	Dial PNR	Scottsdale Rd at FLW	Scottsdale Rd at Mayo Blvd	Arrowhead Transit Center	Bell at 99th Ave	Surprise City Hall	Bullard Avenue Park & Ride
605a	608a	613a	616a	643a	651a	658a	710a
630a	635a	640a	643a	710a	718a	725a	737a
340p	345p	349p	353p	427p	436p	447p	459p
410p	415p	419p	423p	459p	514p	526p	538p
440p	443p	450p	452p	529p	543p	553p	605p
510p	513p	520p	522p	559p	611p	621p	633p

Source: Valley Metro Operations

Transit coordination

At implementation in July 2007, the Surprise-Scottsdale Express would make stops that would intersect or be near the following lines:

- At Surprise park-and-ride: Grand Avenue Limited (1 PM trip only), 571 Express (downtown Phoenix)
- At Sun City stop: SCAT dial-a-ride service
- At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); Arrowhead-Downtown Phoenix Express
- At Scottsdale Airpark: Local routes 72 (Scottsdale Road), 170 (Bell Road); Rural/Scottsdale Supergrid; 154 (Greenway)

Future routes that will likely intersection the Surprise-Scottsdale Express (and the year of implementation) are the following:

- At Surprise park-and-ride: Bell Road Supergrid (2018); Loop 303 Express (2022); Litchfield Road Supergrid (2023) – depending on location of park-and-ride
- At Sun City stop: 99th Avenue Supergrid (2020)
- At Arrowhead Towne Center: Northwest Valley Express (2008); Bell Road Supergrid (2018); 83rd/75th Avenue Supergrid (2022)
- At Scottsdale Airpark: East Loop 101 Connector (2008); Pima Express (2012); Scottsdale/Rural BRT (2010)

The City of Surprise may extend route 170 to downtown Surprise from Arrowhead Towne Center during the non-peak hours to provide service on Bell Road throughout the day. Although currently scheduled to operate during the peak hours only, the Surprise-Scottsdale Express is envisioned as an all-day service. Having additional local service on Bell Road during the day would eliminate the need for the Surprise-Scottsdale Express to operate during non-peak hours in this corridor.

Issues to address before implementation

- Route has been re-named “Surprise-Scottsdale Express”
- Parking capacity at Arrowhead Town Center
 - City of Glendale is negotiating with mall management
- Add bus stop amenities at Sun City stop (Bell Road and 99th Ave.)

Long-term issues

- Create dedicated, regional park-and-ride lot in Surprise at route origin
 - Park-and-ride lot programmed for funding in 2008, per TLCP Audit
- HOV lane construction
- Monitor transfers between Surprise-Scottsdale Express and Arrowhead-Downtown Phoenix Express; adjust timings, if needed
- Connections, if any, with I-17 or SR51 routes
 - City of Phoenix surveys show that many users of the park-and-ride lots at I-17/Bell and SR51/Bell come from outside of Phoenix. As the park-and-ride network is expanded, demand may ease at these lots (particularly at I-17/Bell, which has many users from Glendale and Peoria). Providing service at the I-17/Bell Rd. lot may become a consideration in the future.
- Location of permanent park-and-ride lot in north Glendale
 - Arrowhead Towne Center parking is constrained and may preclude additional express service
- Circulation within Scottsdale Airpark & location of transfer center at Scottsdale Airpark
- Service duplication along Bell Road (170, Supergrid) or Surprise-to-downtown PHX (571, Loop 303 service in 2023)



Arrowhead-Downtown Phoenix Express (July 2007)*

*(formerly called North Glendale Express)

Recommended routing

- North terminus: Future north Glendale park-and-ride
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)
- South terminus: State Capitol Complex
- Stops:
 - Arrowhead Towne Center (Transit Center)
 - Glendale Park-and-Ride at NW corner Glendale Ave & 99th Ave. (open for operations Dec. 2007)
 - Interim: 95th Avenue & Coyote Boulevard.
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Van Buren, near side of Central (Central Station)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)

The Valley Metro Operations department has determined the final schedule for the Arrowhead-Downtown Phoenix Express, as follows:

Route 573

Final

Arrowhead-Downtown Phoenix Express

Monday - Friday In-Bound Schedule

75th & Beardsley Park & Ride	Arrowhead Towne Center	Glendale Park & Ride	Central Station	17th Avenue & Jefferson
515a	521a	536a	611a	618a
545a	551a	606a	641a	648a
615a	621a	636a	715a	722a
640a	647a	704a	744a	751a
345p	351p	408p	441p	448p
415p	421p	438p	511p	518p

Monday - Friday Out-Bound Schedule

17th Avenue & Jefferson	Central Station	Glendale Park & Ride	Arrowhead Towne Center	75th & Beardsley Park & Ride
630a	637a	707a	722a	729a
700a	708a	738a	753a	800a
408p	418p	458p	515p	522p
438p	448p	528p	545p	552p
508p	518p	558p	615p	622p
538p	548p	628p	645p	652p

Transit coordination

At implementation in July 2007, the Arrowhead-Downtown Phoenix Express would make stops that would intersect or be near the following lines:

- o At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); Surprise-Scottsdale Express

Future routes that will likely intersect with the Arrowhead-Downtown Phoenix Express are the following:

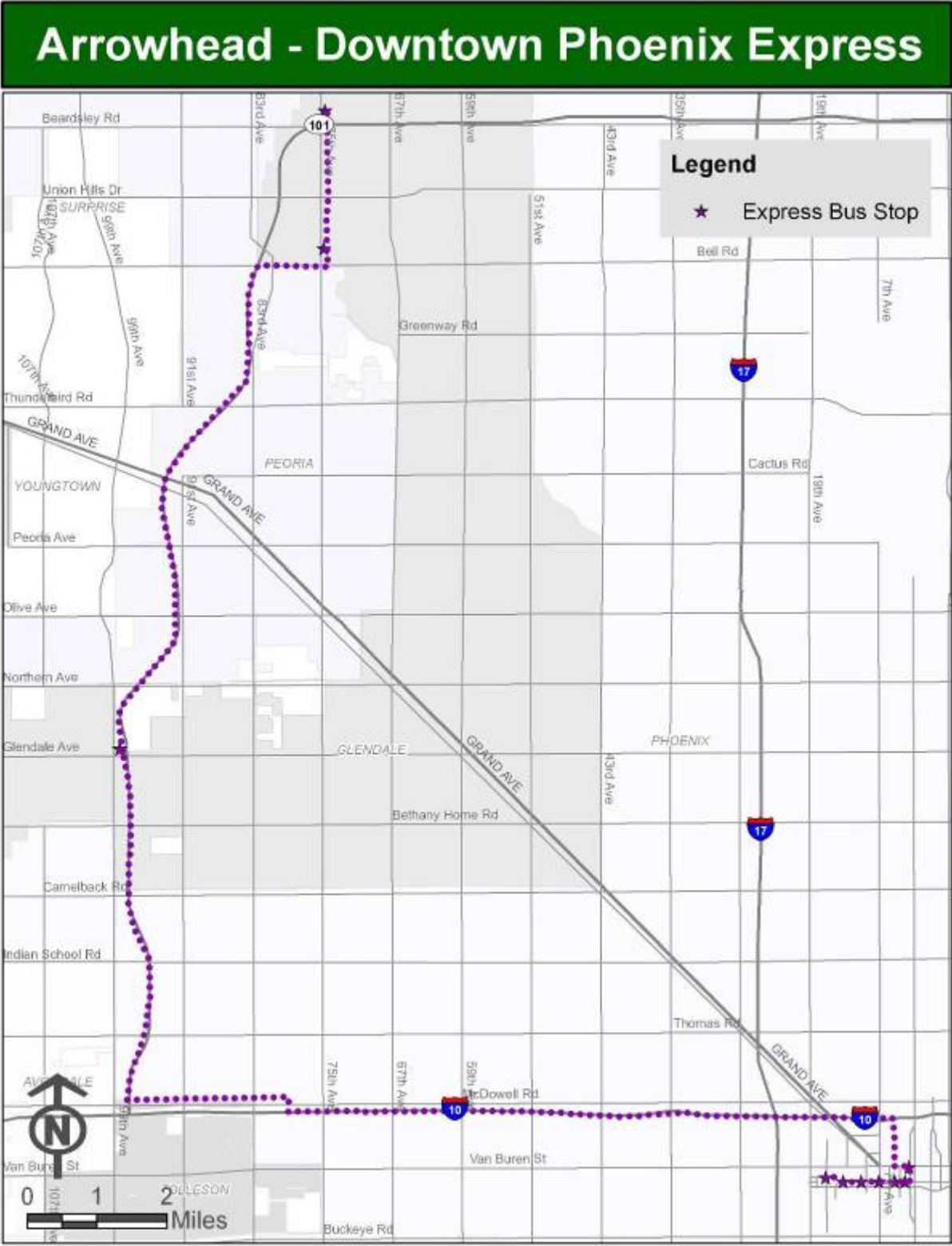
- o At Church of Joy joint-use park-and-ride: Northwest Valley Express (2008)
- o At Arrowhead Towne Center: Bell Road Supergrid (2018); 83rd/75th Ave Supergrid (2022)
- o At Loop 101/Maryland park-and-ride: Glendale Ave. Supergrid (2008); 99th Avenue Supergrid (2020);
- o Central station: Central Phoenix/East Valley light rail (December 2008)

Issues to address before implementation

- o Parking capacity at Arrowhead Town Center
 - o City of Glendale is negotiating with mall management

Long-term issues

- o HOV construction
- o Location of permanent park-and-ride lot in north Glendale
- o Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - o Observe results of “A/B” service on other routes to determine action for integration with light rail



Papago Freeway Express (July 2008)*

*(formerly called “Papago Freeway Connector)

Recommended routing

- Western terminus: Park-and-ride lot in East Buckeye
 - Interim: joint-use park-and-ride lot in downtown Buckeye
- Eastern terminus: State Capitol complex
- Stops
 - Future Goodyear park-and-ride at NW corner of Dysart & I-10 (scheduled for completion in 2009)
 - Interim: may have interim joint-use park-and-ride in place
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Van Buren, near side of Central (Central Station)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)

Transit coordination

At implementation, the Papago Freeway Express will intersect the following routes:

- At Goodyear Park-and-Ride: Rt. 131 (START Route)

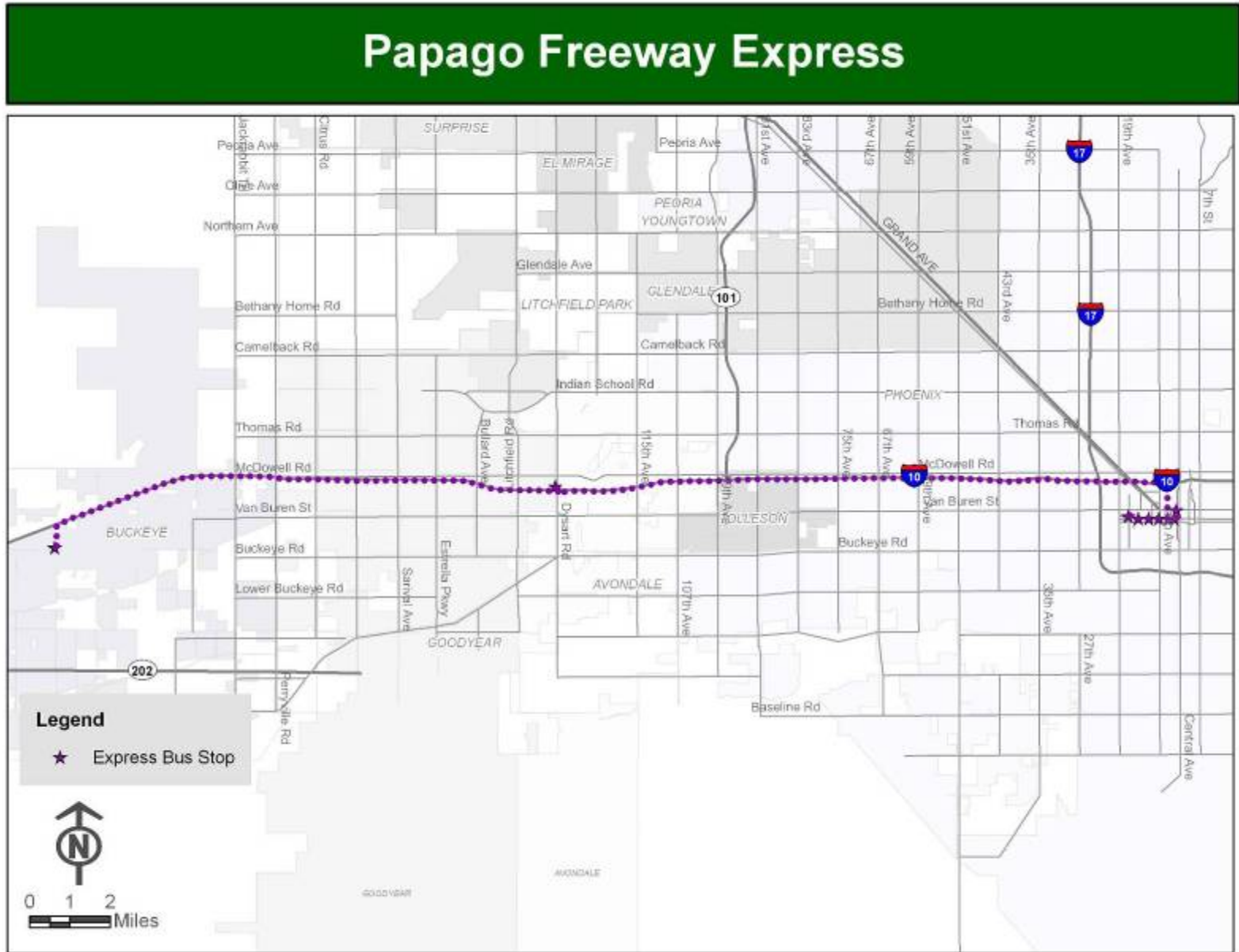
In the future, the Papago Freeway Express will serve the East Buckeye park-and-ride along with the Buckeye Express; at the Goodyear park-and-ride, the Papago Freeway Express will intersect the Buckeye Express and the Avondale Express. The Litchfield Road Supergrid (2023) may serve the Goodyear park-and-ride lot.

Issues to address before implementation

- Consider name change
 - Transit passengers may not be familiar with name of freeway
- Finalize location and arrangements for interim park-and-ride site in downtown Buckeye
- Finalize location for interim park-and-ride in Goodyear/Avondale area

Long-term issues

- Consider combining the Papago Freeway Express and Buckeye Express concepts into a single route
 - Two names for a similar route may be confusing
 - The two routes serve the same market & can serve same stops (like the I-17 RAPID (make stops at certain park-and-ride lots depending on trip))
 - Route would be implemented in July 2008, with service originating from east Buckeye park-and-ride lot
 - As development continues in west Buckeye, extend route origin to park-and-ride at Belmont, Tartesso, or Sun Valley Parkway
 - Buckeye Express scheduled for implementation in 2015; implementation could simply consist of increased frequencies on Papago Freeway Express
- HOV construction
- Development of dedicated park-and-ride site in downtown Buckeye
- Development of dedicated park-and-ride lot(s) in west Buckeye
 - Ideally, future development can dedicate space to park-and-ride lots
- Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - Observe results of “A/B” service on other routes to determine action for integration with light rail



Northwest Valley Express (July/December 2008)*

*(formerly called “West Loop 101 Connector”)

Recommended routing

- “A” service to downtown Phoenix (to start July 2008)
 - Northern terminus: Arrowhead Towne Center Transit Center
 - Southern terminus: Central Station (via State Capitol Complex)
 - Stops:
 - Future north Glendale park-and-ride lot at roughly Loop 101 & 51st Ave
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)
 - PM (pick-up only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
- “B” service to light rail (to start December 2008)
 - Northern terminus: Arrowhead Towne Center Transit Center
 - Southern terminus: Light rail transit center at 19th Ave/Montebello
 - Stops:
 - Future north Glendale park-and-ride lot at roughly Loop 101 & 75th Ave
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)

Transit coordination

At implementation in July 2008, the Northwest Valley Express would make stops that would intersect or be near the following lines:

- At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); Arrowhead-Downtown Phoenix Express; Surprise-Scottsdale Express
- At Church of Joy joint-use park-and-ride: Arrowhead-Downtown Phoenix Express

Future routes that will likely intersect with the Northwest Valley Express (and the year of implementation of each) are the following:

- At 19th Ave./Montebello TC: Light rail; 19th Avenue Supergrid

- At Arrowhead Towne Center: Bell Road Supergrid (2018); 83rd/75th Supergrid (2022)

Timing the “B” service with light rail at its terminus will be key to the success of the “A/B” concept. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that passengers can step off the bus and step on the light rail.

Level of service at implementation

The Northwest Valley Express will have the following number of trips:

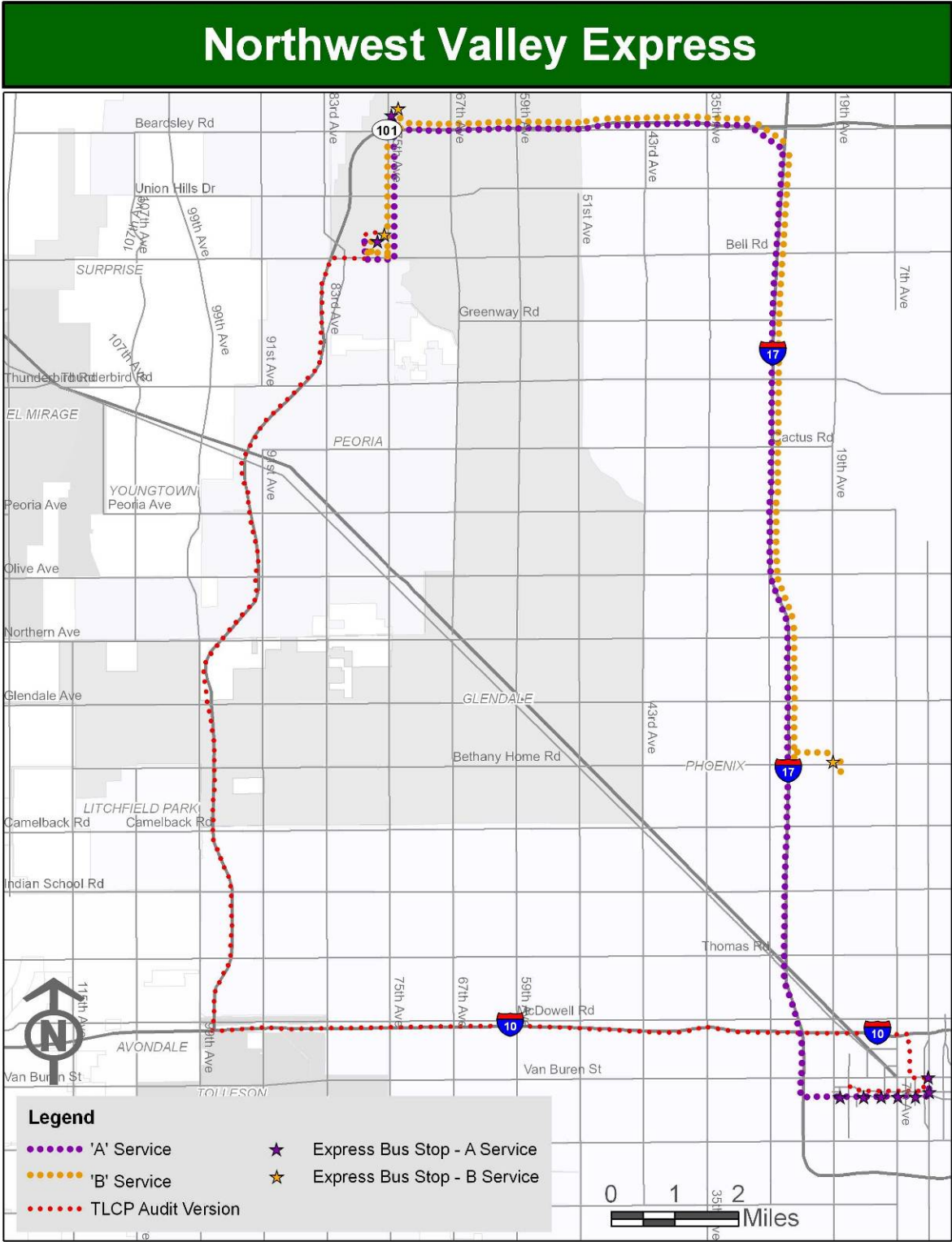
- Morning
 - 6 inbound trips (3 trips will terminate at light rail and 3 will terminate in downtown Phoenix)
 - 2 outbound trips, both of which originate at light rail
- Evening
 - 2 inbound trips, both of which terminate at light rail
 - 6 outbound trips (3 will originate at light rail and 3 will originate in downtown Phoenix)

Issues to address before implementation

- Parking capacity at Arrowhead Towne Center

Long-term issues

- HOV construction on 101
- Final policy of integration with light rail



East Loop 101 Connector (July 2008)*

*Due to HOV construction on 101, route implementation may be delayed until August 2008.

Recommended routing

- Northern terminus: Scottsdale Airpark (west side)
- Southern terminus: Chandler’s Tumbleweed park-and-ride (Germann and McQueen)
- Stops:
 - Dial Tech Center
 - Frank Lloyd Wright Blvd & Scottsdale Rd.
 - Loop 101/Scottsdale PNR (schedule for completion in 2013)
 - Interim location: no stop; route will travel east on Frank Lloyd Wright Boulevard to Loop 101 until PNR is in place
 - Mustang Transit Center & Park-and-Ride (scheduled to be operational in July 2008)
 - Scottsdale Community College (Loop 101 & Chaparral)
 - Apache/Price light rail station & park-and-ride
 - ASU research park (three stops)
 - South River Parkway at Research Park Drive
 - South River Parkway at Centennial Circle
 - South River Parkway at E. Innovation Circle (to be constructed)

Transit coordination

At implementation in July 2008, the East Loop 101 Connector would make stops that would intersect or be near the following lines:

- At Scottsdale Airpark: Rural/Scottsdale Supergrid; Local routes 72 (Scottsdale Road), 170 (Bell Road); Surprise-Scottsdale Express; 154 (Greenway)
- At Mustang Transit Center/Park-and-Ride: Local routes 81 (Hayden/McClintock), 106 (Peoria/Shea), 114 (Via Linda); express route 512 (Scottsdale Express)
- At Scottsdale Community College: Local routes 50 (Camelback), 76 (Miller), 84 (Granite Reef)
 - Route 76 provides connection to downtown Scottsdale/Loloma Station
- At Apache/Price light rail station: Local route 30 (University)
- At ASU Research Park: Local route 81 (Hayden/McClintock)
 - Route 81 provides connection to Chandler Regional Medical Center

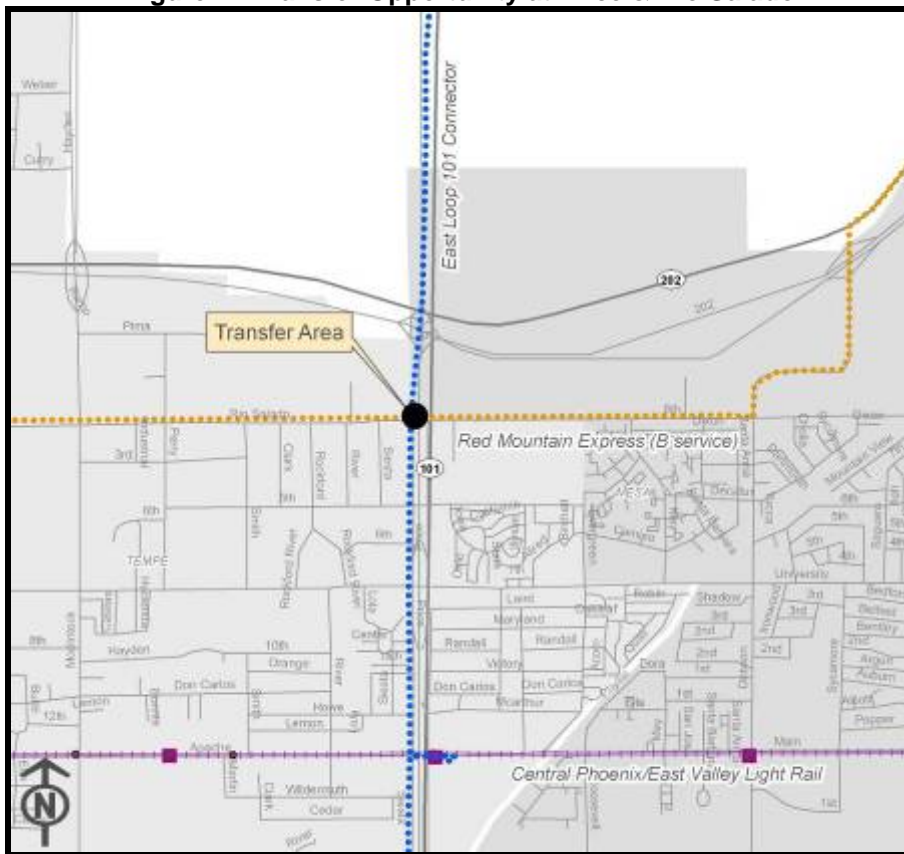
Future routes that will likely intersect with the East Loop 101 Connector (and the year of implementation) are the following:

- At Scottsdale Airpark: Hayden Road Supergrid (2014); Bell Supergrid (2018)
- At Scottsdale Community College: Camelback Supergrid (2012)
- At Mustang Transit Center/Park-and-ride: Pima Express (2012); Peoria/Shea Supergrid (2014)
- At Apache/Price light rail station: CP/EV light rail (December 2008); University Supergrid (2011)
 - Light rail provides connections to downtown Tempe, downtown Mesa, and downtown Phoenix
- At Chandler’s Tumbleweed park-and-ride: Arizona Avenue Supergrid (2009); Arizona Avenue dedicated BRT (2010); Santan Express (2017)

Issues to address before implementation

- Recommend equal number of trips in both directions on this two-way service
- Consider changing route name to clarify route destinations
- Circulation to/within Scottsdale Airpark
- Evaluate need for park-and-ride at Scottsdale Community College
- Verify status of Mustang park-and-ride
- Resolve issues at Apache/Price light rail station/park-and-ride facility
 - Identify bus access & circulation within park-and-ride
 - May need to construct bus loop; if so, need to identify funding
 - Identify local routes that will serve Apache/Price park-and-ride
- Consider a connection with the Red Mountain Express ‘B’ service if a safe location can be identified at Price & Rio Salado. See figure 7 below.

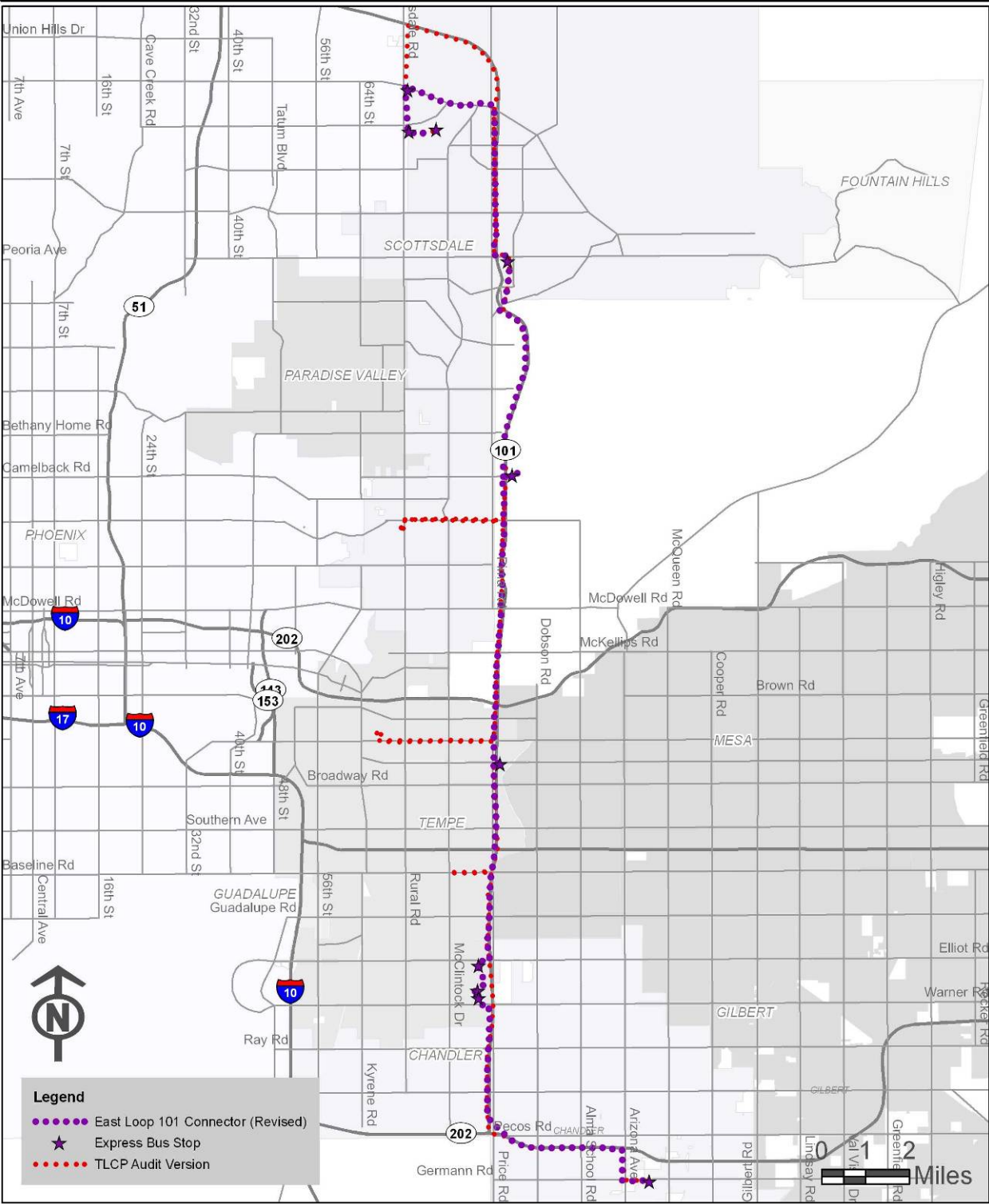
Figure 7: Transfer Opportunity at Price & Rio Salado



Long-term issues

- HOV construction
- Identify means of serving Chandler Fashion Center without causing parking conflict

East Loop 101 Connector



Red Mountain Express (July/December 2008)

Recommended routing

This route will operate as an “A/B” service.

- “A” service to downtown Phoenix (to start July 2008)
 - Eastern terminus: Park-and-ride lot at Power Road & Loop 202
 - Western terminus: State Capitol complex
 - Stops
 - Park-and-ride lot in vicinity of Greenfield or Gilbert and Loop 202
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)
- “B” service to downtown Tempe/light rail (starts December 2008)
 - Two route options have been identified for the “B” service
 - If final service option is not determined by the end of this project, the routing will be determined during operations testing
 - Option 1:
 - Eastern terminus: Park-and-ride lot at Power Road & Loop 202
 - Western terminus: Tempe Transportation Center via exit from 202 at Scottsdale/Rural
 - Stops
 - None
 - Option 2:
 - Eastern terminus: Park-and-ride lot at Power Road & Loop 202
 - Western terminus: Tempe Transportation Center via exit from 202 at Dobson Road
 - Stops
 - Mesa Riverview Mall
 - Tempe Marketplace

Transit coordination

At implementation in July 2008, the Red Mountain Express would make stops that would intersect or be near the following lines:

- At Power Road park-and-ride: Power Road Supergrid

Future routes that will likely intersect with the Red Mountain Express (and the year of implementation) are the following:

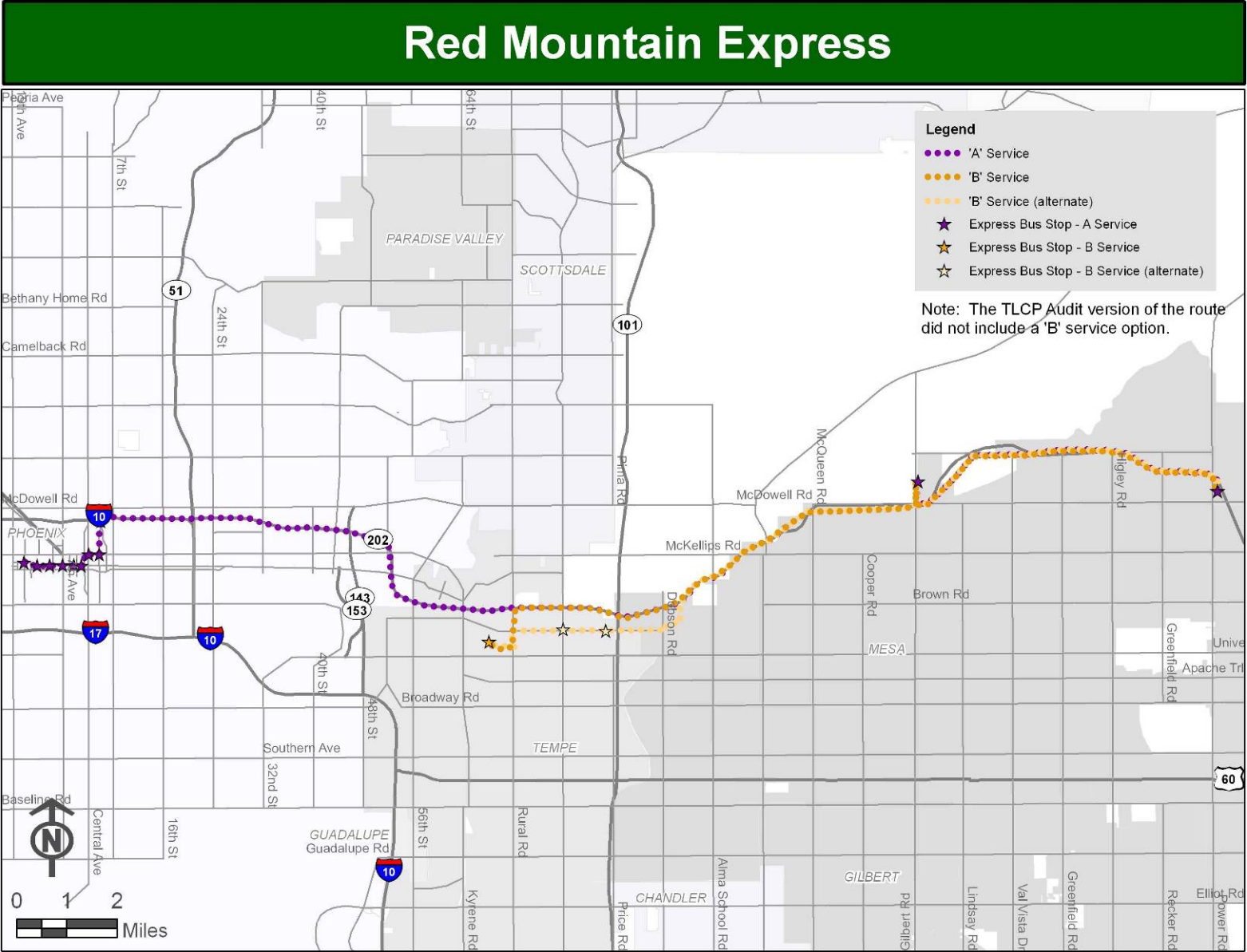
- At Power Road park-and-ride: Red Mountain Freeway Connector (2019)
- At Greenfield park-and-ride: Red Mountain Freeway Connector (2019); Greenfield Road Supergrid (2021)

Issues to address before implementation

- Verify status of Mesa park-and-ride facilities, including opening dates
 - Identify interim park-and-ride facilities, if needed
- The recommended “B” service routing assumes a large demand for travel to downtown Tempe. If information is obtained that shows otherwise, route may terminate at the end-of-line LRT station at Main/Sycamore in Mesa.
 - Evaluate demand to downtown Tempe through use of MAG “desire line” data
- Consider opportunities for transfers to East Loop 101 Connector (see East Loop 101 Connector analysis)

Long-term issues

- HOV construction



Apache Junction Express (July 2010)

Recommended routing

- Eastern terminus: Future park-and-ride lot at Signal Butte Road/US 60
- Western terminus: State Capitol complex
- Stops
 - Park-and-ride lot at Superstition Springs Mall
 - Future park-and-ride lot at US 60/Country Club Road
 - Interim location: unknown
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)

Transit coordination

At implementation in July 2010, the Apache Junction Express would make stops that would intersect or be near the following lines:

- At Superstition Springs park-and-ride: Power Road Supergrid; Local routes 30 (University), 45 (Broadway), 61 (Southern), 108 (Elliot Rd)
- At US 60/Country Club park-and-ride: Local route 61, Country Club/Arizona Supergrid

Future routes that will likely intersect with the Apache Junction Express (and the calendar year of implementation) are the following:

- At Superstition Springs park-and-ride: Superstition Freeway Connector (2011); Superstition Springs Express (2018)

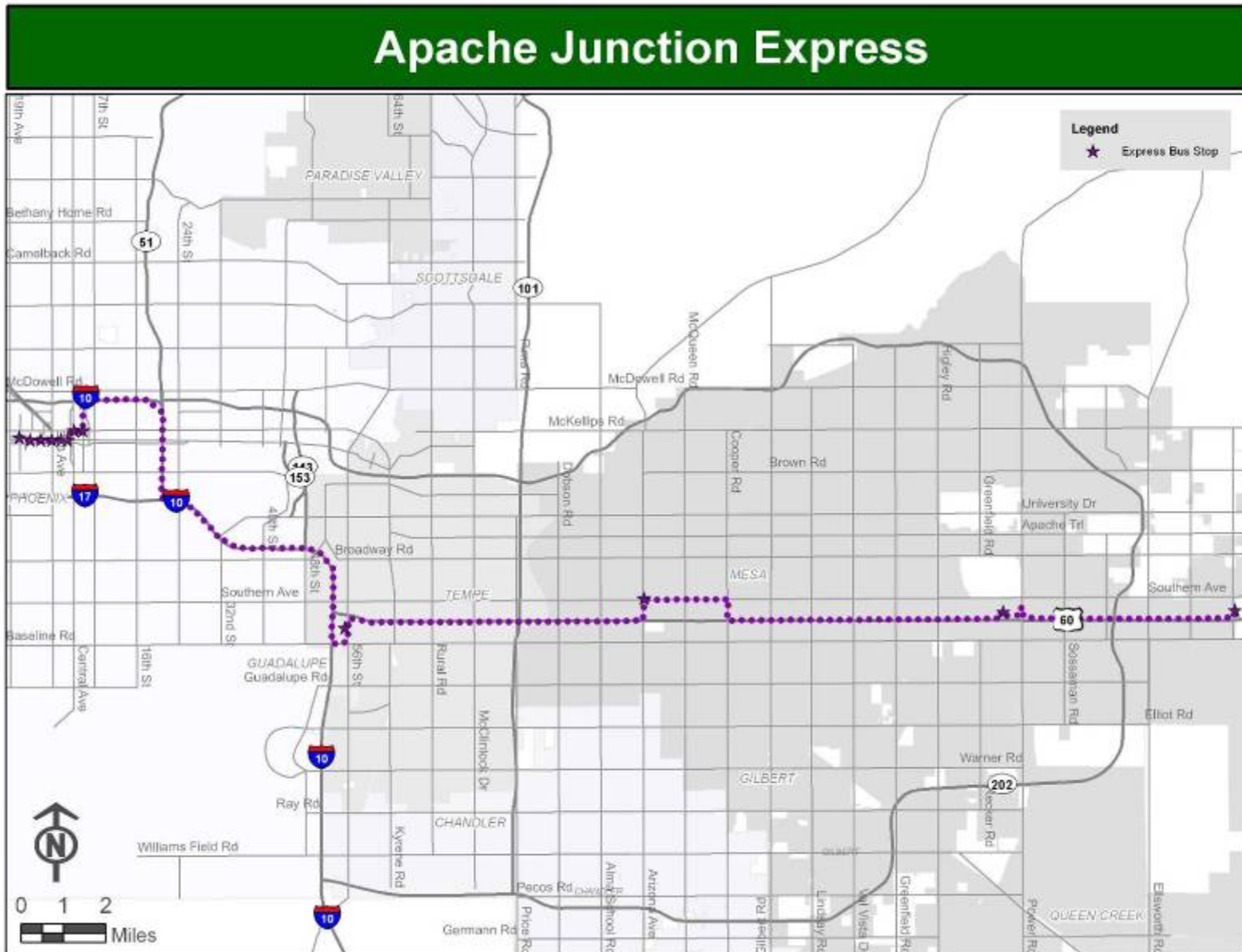
Issues to address before implementation

- Consider an A/B route structure to connect with light rail. Evaluate in light of experience with Red Mountain Express.
 - Suggested 'B' routing:
 - Eastern terminus: Future park-and-ride lot at Signal Butte Road/US 60
 - Western terminus: Apache/Price light rail station/park-and-ride
 - Stops

- Park-and-ride lot at Superstition Springs Mall
- Future park-and-ride lot at US 60/Country Club Road
- Status of US 60/Country Club park-and-ride lot

Long-term issues

- Timing and funding for Signal Butte Park & Ride lot.



Superstition Freeway Connector (July 2011)

Recommended routing

- Eastern terminus: Superstition Springs Transit Center/Park-and-Ride
- Western terminus: Arizona Mills Transit Center
- Stops
 - Future US60/Country Club park-and-ride
 - Fiesta Mall

Transit coordination

At implementation in July 2011, the Superstition Freeway Connector would make stops that would intersect or be near the following lines:

- At Superstition Springs transit center/park-and-ride: Power Road Supergrid, Local routes 30 (University), 45 (Broadway), 61 (Southern), 108 (Elliot Rd); Apache Junction Express
- At US 60/Country Club park-and-ride: Local route 61, Country Club/Arizona Supergrid; Apache Junction Express

Future routes that will likely intersect with the Superstition Springs Connector (and the calendar year of implementation) are the following:

- At Superstition Springs park-and-ride: Superstition Springs Express (2018)

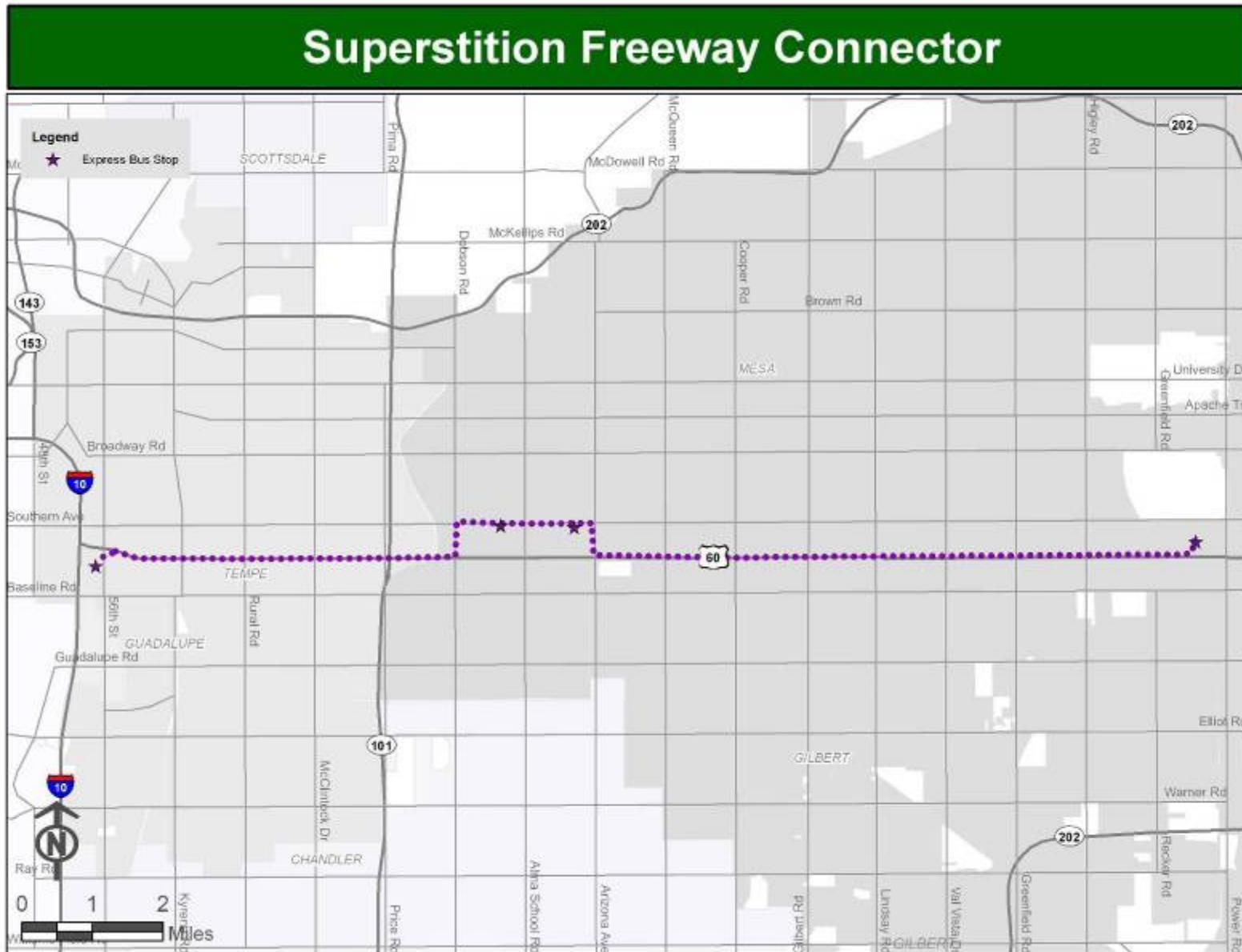
Timing the connector service with light rail at the terminus will be key to the success of this route. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that bus passengers can step off the bus and step on the light rail.

Issues to address before implementation

- Re-evaluate routing based on experience with Red Mountain Express “B” service
 - May terminate route at Apache/Price LRT station or Tempe Transportation Center to provide transfer to light rail
- The route is intended as a two-way route; consider implementing higher number of trips westbound in the morning and eastbound in the afternoon.
- Status of US 60/Country Club park-and-ride lot
- Layover location near western terminus
- Coordination of schedules and potential service redundancies between Superstition Springs Connector, route 531

Long-term issues

- None identified



Pima Express (July 2012)

Recommended routing

The recommended routing for the Pima Express is as follows:

- Northern terminus: Future Scottsdale Road & Loop 101 park-and-ride
 - Interim: unknown
 - Route may use Mustang Transit Center/park-and-ride as northern terminus
- Southern terminus: State Capitol Complex
- Stops
 - Scottsdale Airpark (Butherus/Greenway)
 - Mustang Transit Center/park-and-ride
 - Scottsdale Community College
 - Tempe Transportation Center
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams (State Capitol)
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue (State Capitol)
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren (Central Station)

Transit coordination

At implementation in July 2012, the Pima Express would make stops that would intersect or be near the following lines:

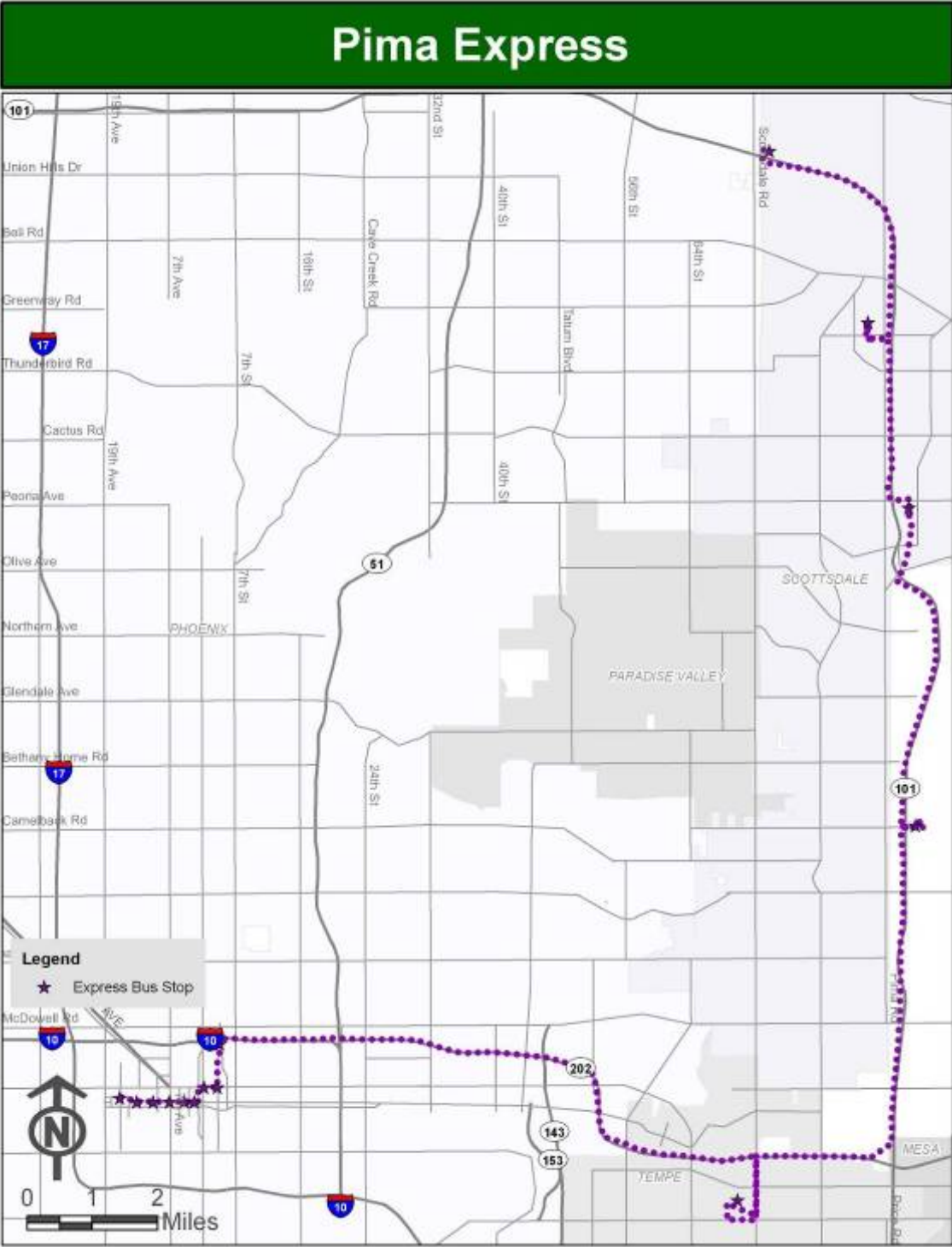
- At Scottsdale/101 park-and-ride: Scottsdale/Rural Road Supergrid
- At Mustang Transit Center/park-and-ride: Local routes 81 (Hayden/McClintock), 106 (Peoria/Shea), 114 (Via Linda); express route 512 (Scottsdale Express); East Loop 101 Connector
- At Tempe Transit Center: Rural/Scottsdale Supergrid, University Supergrid; Local routes 1 (Washington St), 44 (44th St), 62 (Hardy), 66 (Mill/68th St), 56, 65 (Mill/Kyrene), 72 (Scottsdale/Rural), 76 (Miller), 81 (McClintock/Hayden), 92; Express route 534 (Queen Creek); CP/EV light rail

Issues to address before implementation

- Status of Scottsdale Road/101 park-and-ride
- Consider name change to make routing/destinations clearer to potential patrons

Long-term issues

- Coordination with East Loop 101 Connector, which provides service to Tempe via connection



Peoria Express (July 2013)

Recommended routing

The recommended routing for the Peoria Express is as follows:

- North terminus: Future Peoria park-and-ride
 - Alternative: Glendale Park-and-Ride at Loop 101/Maryland
- Southern terminus: State Capitol Complex
- Stops
 - Glendale Park-and-Ride at Loop 101/Maryland
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

At implementation in July 2013, the Peoria Express would make stops that would intersect or be near the following lines:

- At Glendale Park-and-Ride at Loop 101/Maryland: Arrowhead-Downtown Phoenix Express; Glendale Avenue Supergrid

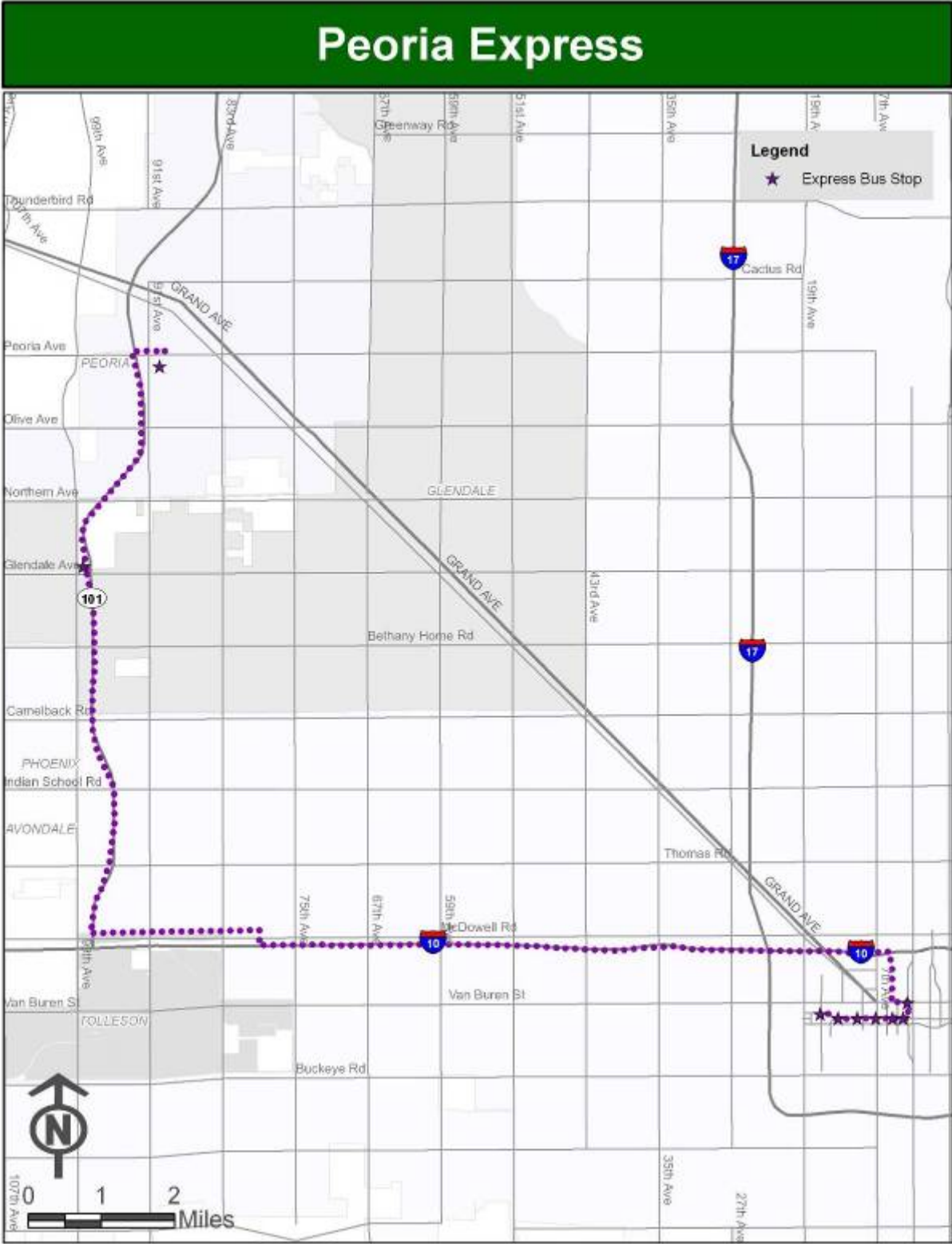
Depending on the eventual location of the Peoria park-and-ride, the route may also intersect with the Peoria/Shea Supergrid, which begins operations in July 2014, and the Grand Avenue BRT, which is scheduled to start service in 2012.

Issues to address before implementation

- Location of park-and-ride lot in Peoria (or, re-location of park-and-ride lot to another location)
 - Peoria may consider partnering with Glendale on a park & ride rather than building a separate lot on Loop 101 in order to space the lots more evenly.
- Consider name change to make the routing/destination clearer to potential passengers
- Depending on origination point, route will duplicate a portion of Arrowhead-Downtown Phoenix Express route. Evaluate demand on both routes to align frequencies at various park-and-ride lots.

Long-term issues

- Circulator may be needed to serve Westgate/University of Phoenix stadium area
- Integration with light rail on I-10 (currently scheduled for implementation in 2019)



Buckeye Express (July 2014)

Recommended routing

- Western terminus: Park-and-ride lot in West Buckeye
- Eastern terminus: State Capitol complex
- Stops
 - Future East Buckeye park-and-ride
 - Goodyear park-and-ride at NW corner of Dysart & I-10 (scheduled for completion in 2009)
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

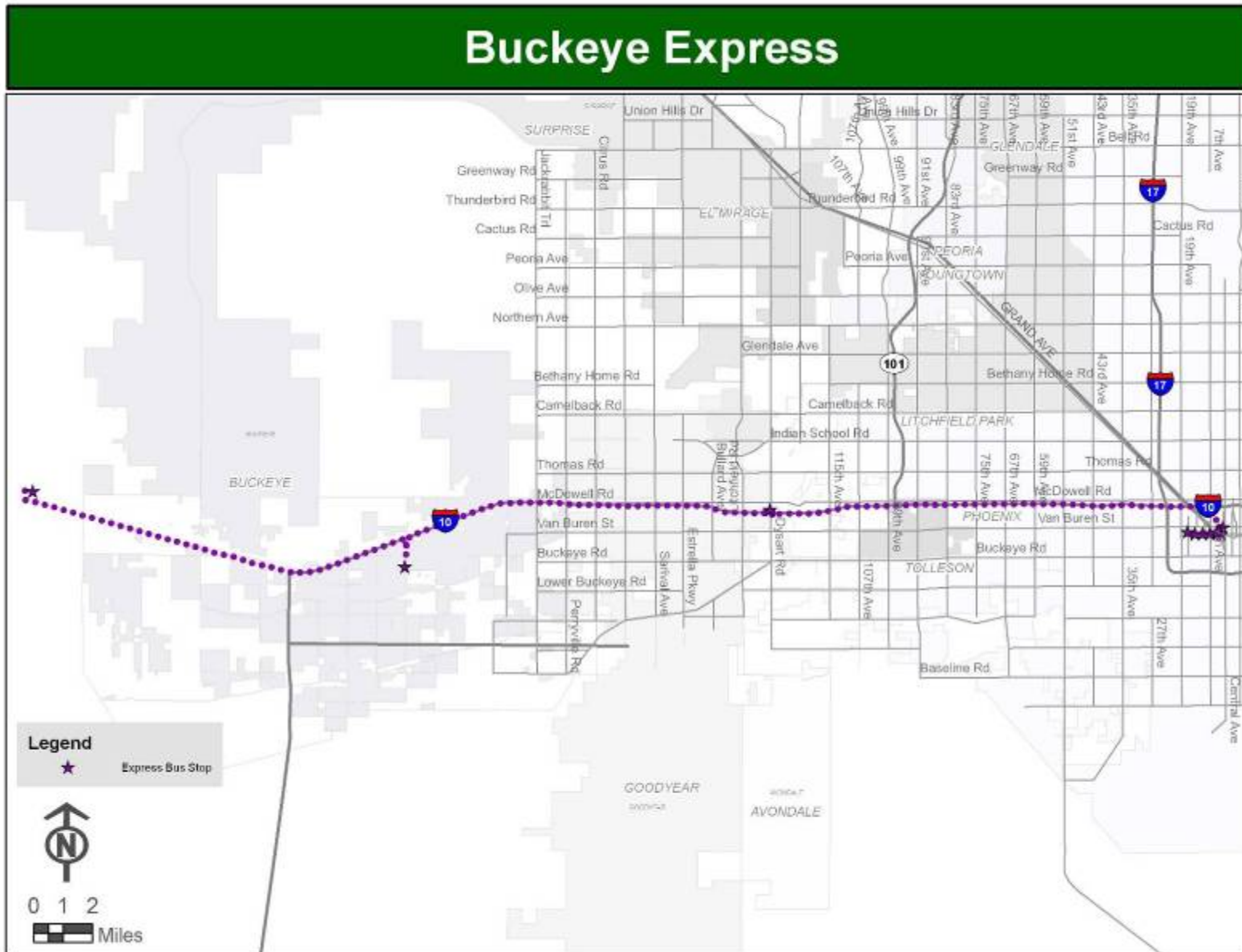
- Route will share facilities with Papago Connector at East Buckeye park-and-ride and Goodyear park-and-ride

Issues to address before implementation

- Consider combining the Papago Freeway Express and Buckeye Express concepts into a single route (see Papago Freeway Express analysis)
- Develop dedicated park-and-ride lots in west Buckeye
 - Ideally, private development can dedicate space to park-and-ride lots
- If not combined, align frequencies with demand at West Buckeye, East Buckeye, and Avondale park-and-ride facilities

Long-term issues

- Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - Observe results of “A/B” service on other routes to determine action for integration with light rail
 - Implications of future commuter rail service on parallel Union Pacific Railroad. (Although service is currently not anticipated before 2025, the current MAG Commuter Rail Study could result in time table being advanced to allow for implementation before 2025.)



Black Canyon Freeway Connector (July 2015)

Recommended routing

- North terminus: Park-and-ride at Carefree Highway and I-17 (southwest corner)
- South terminus: 19th Avenue/Montebello light rail station/transit center
- Stops
 - Happy Valley/I-17 park-and-ride

Transit coordination

At the Carefree Highway/I-17 park-and-ride, the Black Canyon Freeway Connector will intersect with the 19th Avenue Supergrid and the 35th Avenue Supergrid.

The Black Canyon Freeway Connector will share space at the Carefree/I-17 park-and-ride and the Happy Valley/I-17 park-and-ride with the North I-17 Express and possibly the Anthem Express.

At the 19th Avenue/Montebello light rail station, the Black Canyon Freeway Connector will need to be well-timed with light rail for quick, easy transfers.

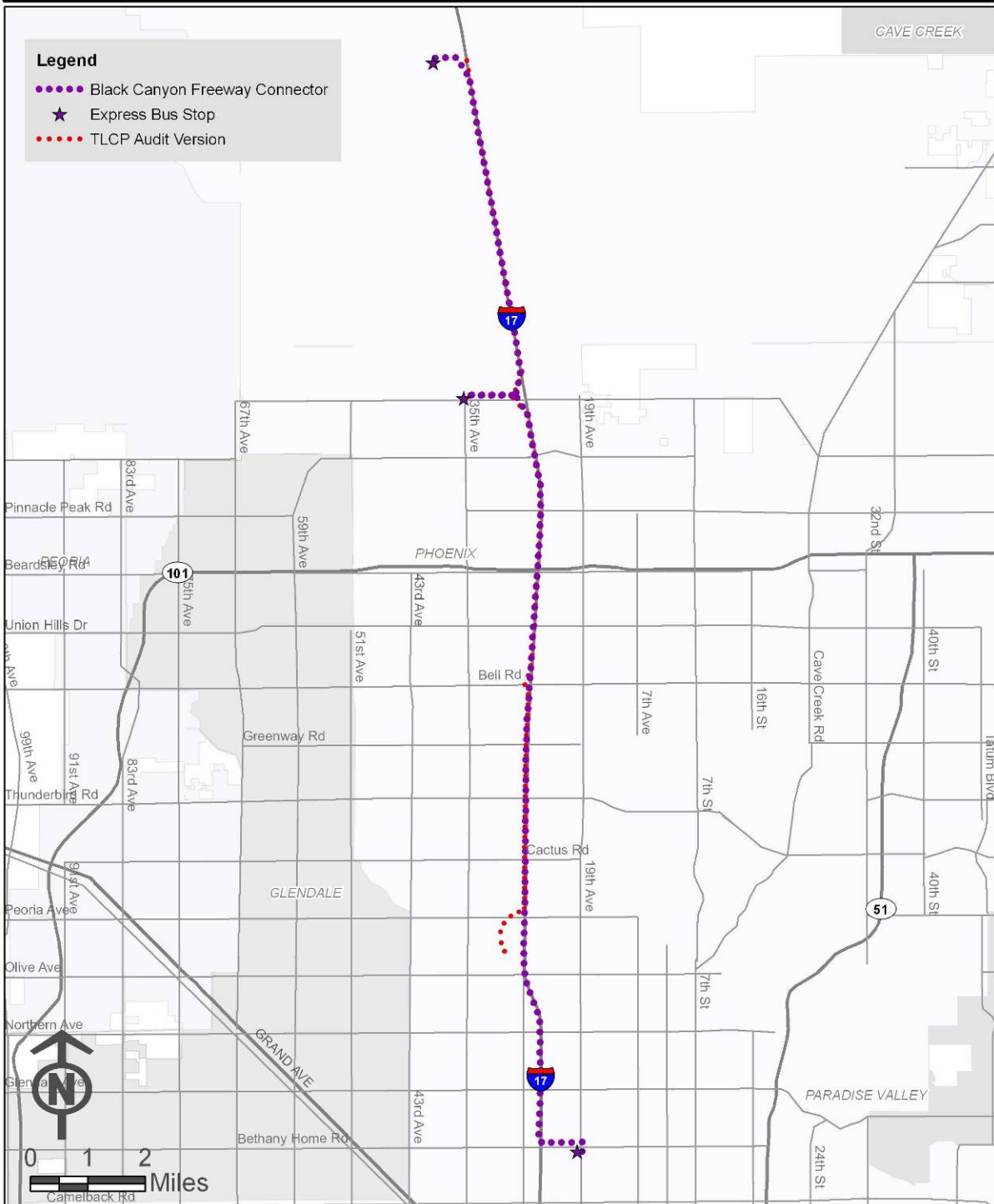
Issues to address before implementation

- Consider name change for consistency across express routes operating on I-17
 - Name conventions currently vary for routes operating on I-17: I-17 RAPID, North I-17 Express, and Black Canyon Freeway Connector

Long-term issues

- Potential duplication of service/competition with North I-17 Express, which connects to light rail
 - Need to align service levels for each route to match demand at the several park-and-rides served along I-17
- Modify southern terminus of route after completion of Northwest LRT extension.

Black Canyon Freeway Connector



Ahwatukee Connector (July 2016)

Recommended routing

The following is the recommended routing:

- South terminus: Pecos & 40th Street park-and-ride
- North terminus: Tempe Transportation Center (College Ave & Veterans Way)
- Stops
 - I-10/Elliott park-and-ride
 - Arizona Mills Transit Center

Transit coordination

The Ahwatukee Connector will intersect with the following bus lines:

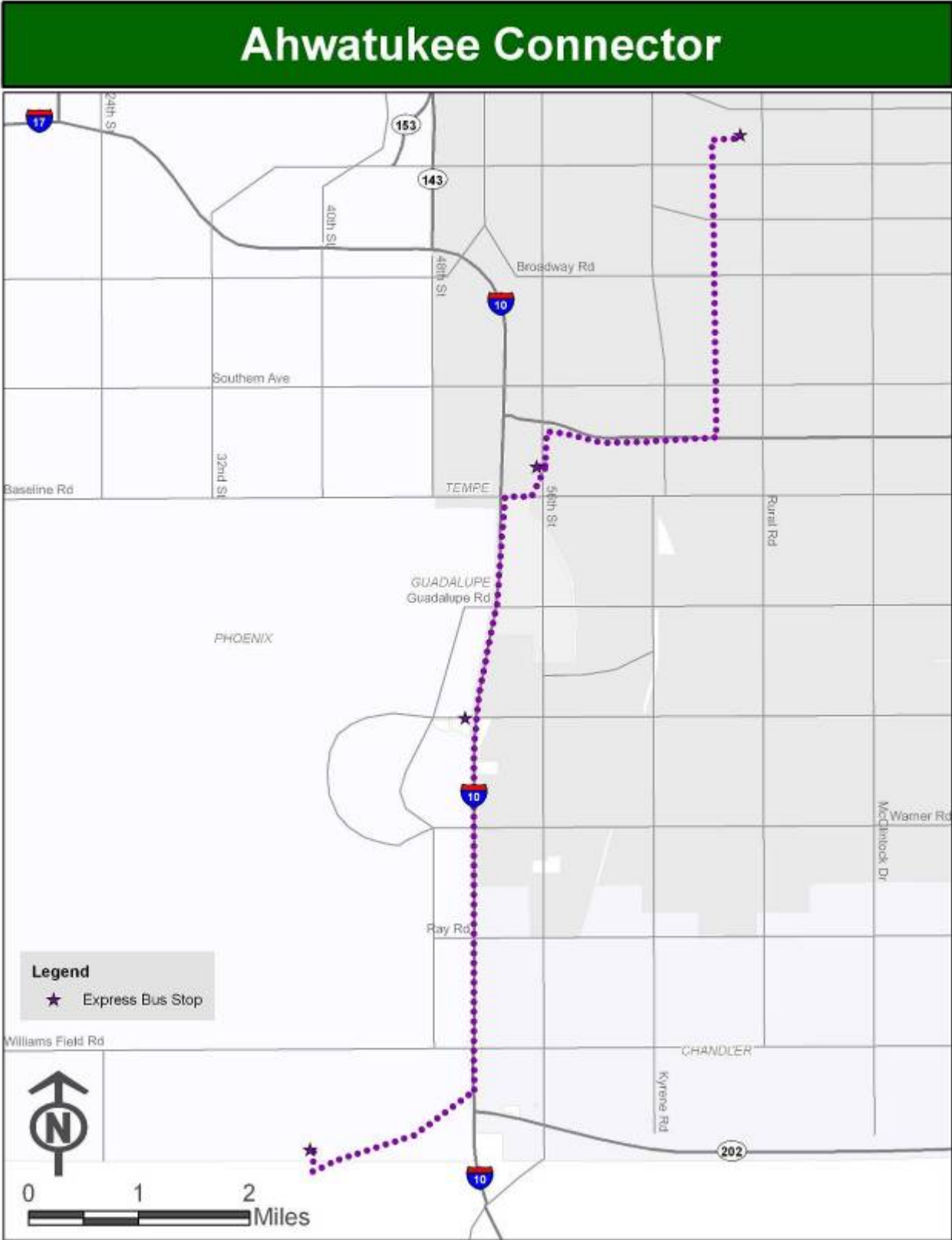
- At Pecos/40th Street park-and-ride & I-10/Elliott park-and-ride: Ahwatukee Express/I-10 RAPID; ALEX circulator
- At Arizona Mills Transit Center: Baseline Supergrid; Local routes 56 (Priest Dr.), 77 (Baseline), 92 (48th St/Guadalupe), 108 (Elliot Rd)
- At Tempe Transit Center: Rural/Scottsdale Supergrid, University Supergrid; Local routes 1 (Washington St), 44 (44th St), 62 (Hardy), 66 (Mill/68th St), 56, 65 (Mill/Kyrene), 72 (Scottsdale/Rural), 76 (Miller), 81 (McClintock/Hayden), 92; Express route 534 (Queen Creek); CP/EV light rail

Issues to address before implementation

- This is a two-way route; consider implementing greater frequency of service northbound direction in the morning and southbound in the evening.
- Evaluate route name to address issue of consistency across all routes that operate on I-10 from the Ahwatukee area
 - The I-10 East RAPID, Ahwatukee Connector, and Ahwatukee Express all operate in this corridor
- Establishment of I-10/Elliott park-and-ride facility
- Capacity at I-10/Pecos park-and-ride
- Circulation in I-10/Elliott Rd. area

Long-term issues

- The Ahwatukee Connector would duplicate a portion of local routes 56 and 92 (between Arizona Mills and Tempe Transit Center). The effect on ridership on all three routes should be examined.



Santan Express (July 2017)

Recommended routing

- East terminus: Williams Gateway/ASU Polytechnic Campus Campus
- West terminus: State Capitol Complex
- Stops:
 - Williams Field Road at Chandler Boulevard (bus will access Loop 202 via the TI at Williams Field Road. The route will not travel along the portion of Williams Field Road where it transitions to Chandler Boulevard).
 - Future park-and-ride in vicinity of Williams Field Road & Loop 202 (exact location TBD)
 - Chandler’s Tumbleweed park-and-ride (Germann & Hamilton)
 - Broadway/Priest (Tempe)
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

The Santan Express will intersect with the following transit lines:

- At Williams Gateway: Power Road Supergrid; Ray Road Supergrid
- future Loop 202 park-and-ride: Chandler Blvd Supergrid, Greenfield Supergrid
- At Tumbleweed park-and-ride (Hamilton & McQueen): Arizona Avenue BRT; Chandler Blvd BRT; East Loop 101 Connector; Arizona Ave Supergrid

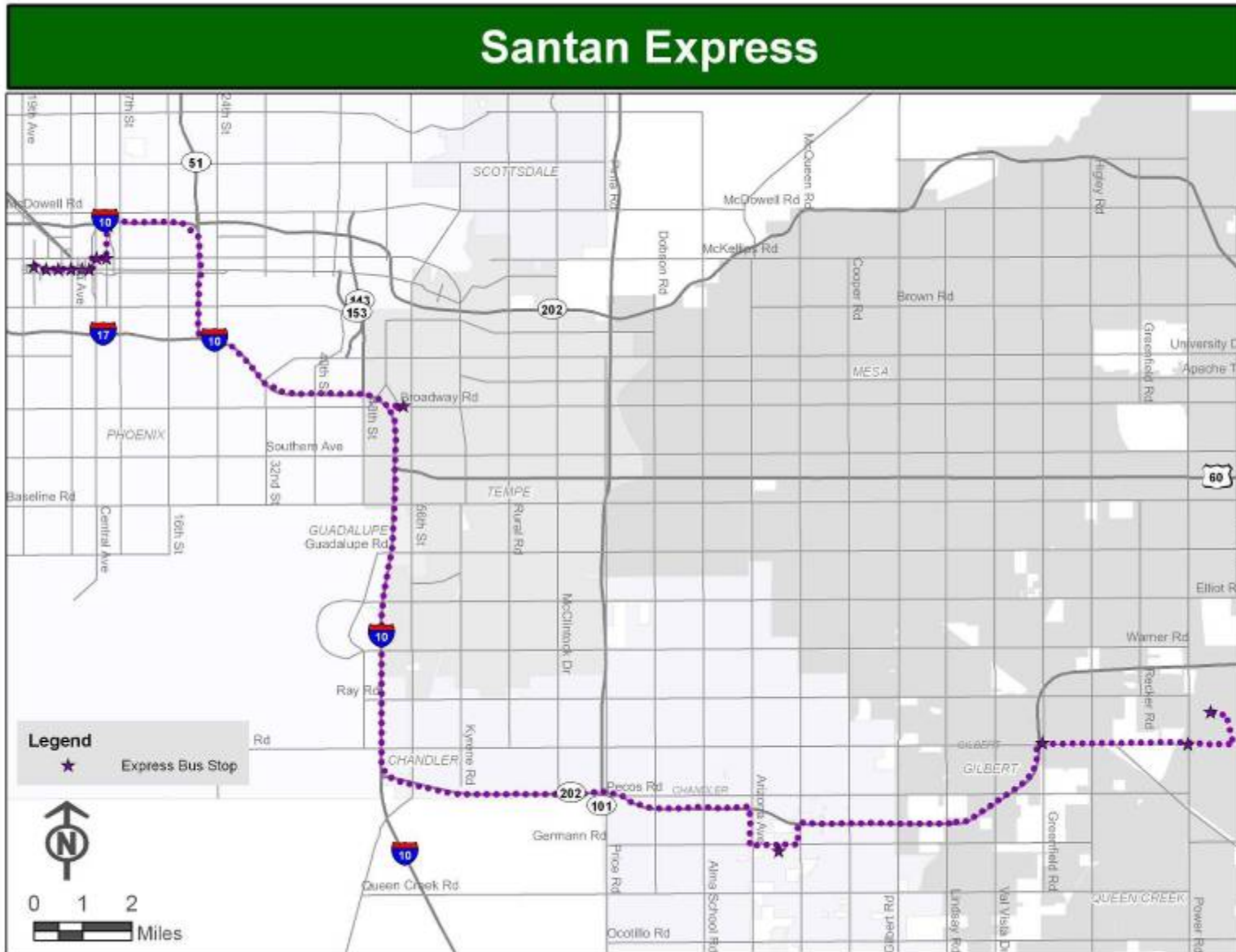
The Town of Gilbert will likely provide local service on Val Vista by the time of implementation.

Issues to address before implementation

- Consider A/B structure for this route, based on experience on Red Mountain Express and other routes
- Status of Loop 202/Val Vista park-and-ride
- This route is a two-way service; consider implementing more trips in the eastbound direction in the morning and westbound in the afternoon
- Consider eliminating Broadway/Priest stop for more efficient trip to downtown Phoenix

Long-term issues

- Local circulators needed to serve employment destinations in Chandler and Gilbert, (such as at Chandler Airpark and, Williams Gateway Center).



Anthem Express (July 2017)

Recommended routing

- North terminus: Anthem park-and-ride
- South terminus: Scottsdale Airpark
- Stops:
 - Future park-and-ride lot at I-17/Carefree Highway
 - Future park-and-ride lot at I-17/Happy Valley Road
 - Future Desert Ridge park-and-ride lot
 - Interim: No stop
 - Scottsdale Road at Mayo Boulevard
 - Scottsdale Road at Frank Lloyd Wright Boulevard
 - Dial Tech Center (73rd Street and Butherus)

Transit coordination

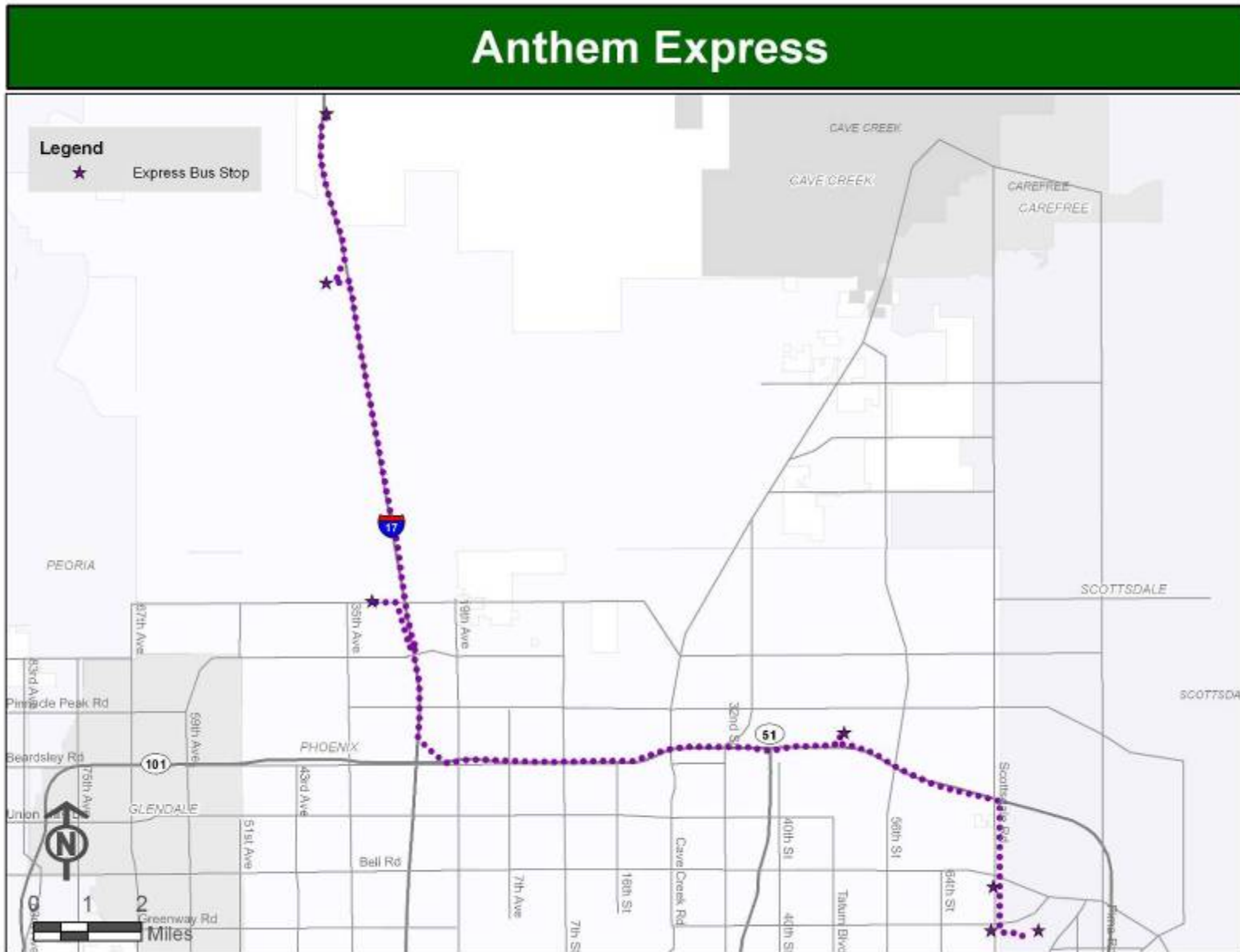
- This route shares the park-and-ride facilities at Anthem and I-17/Carefree Highway with the North I-17 Express and the Black Canyon Freeway Connector.
- The route would intersect with the following lines at implementation:
 - At I-17/Happy Valley park-and-ride: 35th Avenue Supergrid
 - At Scottsdale Airpark: Rural/Scottsdale Supergrid, Bell Road Supergrid; Rural/Scottsdale BRT; East Loop 101 Connector; 154 (Greenway)
 - Coordination with the East Loop 101 Connector would open up more destinations to Anthem residents via express service.
- At Scottsdale Airpark, the route will intersect with the Tatum/44th Supergrid in 2019.

Issues to address before implementation

- Status/capacity of Anthem park-and-ride

Long-term issues

- None identified



Red Mountain Freeway Connector (July 2018)

Recommended routing

- Eastern terminus: Future Power Road/Loop 202 park-and-ride
- Western terminus: Tempe Transit Center
- Stops:
 - McKellips/Country Club
 - Loop 202 park-and-ride (near Greenfield or Gilbert Road)

Transit coordination

The Red Mountain Freeway Connector will intersect with the following transit routes:

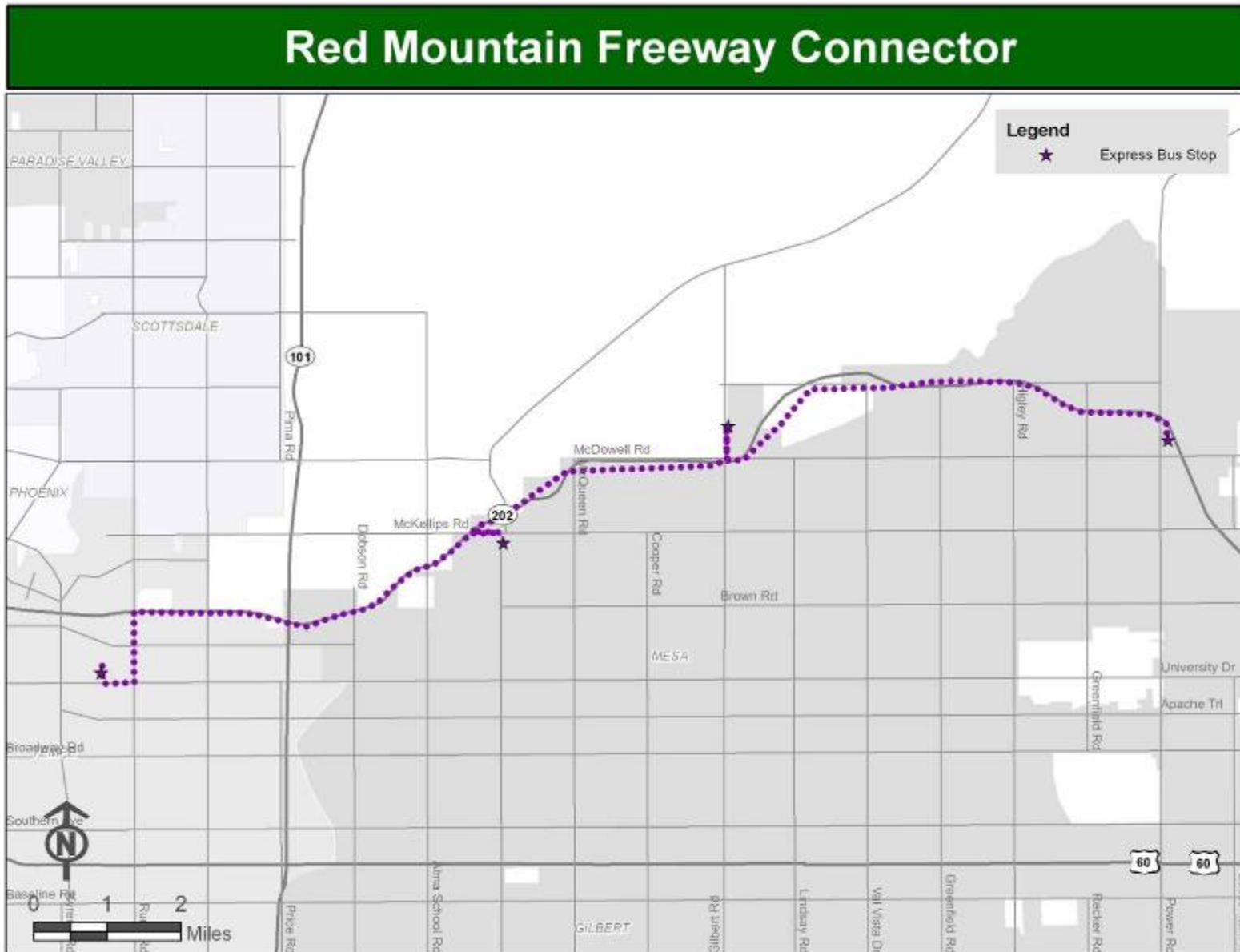
- At Power Road/Loop 202 park-and-ride: Power Road Supergrid; McDowell/McKellips Supergrid
- At Tempe Transit Center: Rural/Scottsdale Supergrid, University Supergrid; Local routes 1 (Washington St), 44 (44th St), 62 (Hardy), 66 (Mill/68th St), 56, 65 (Mill/Kyrene), 72 (Scottsdale/Rural), 76 (Miller), 81 (McClintock/Hayden), 92; Express route 534 (Queen Creek); CP/EV light rail

Issues to address before implementation

- Review success of Red Mountain Express “B” service to determine whether Connector should be routed in similar fashion
- Integrate Red Mountain Express and Red Mountain Freeway Connector services to provide optimum level of service in this corridor

Long-term issues

- None identified



Superstition Springs Express (July 2018)

Recommended routing

- Eastern terminus: Superstition Springs Transit Center/park-and-ride
- Western Terminus: State Capitol Complex
- Stops:
 - US60/Country Club park-and-ride
 - Fiesta Mall/Mesa Community College
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- At Superstition Springs Transit Center/park-and-ride: Superstition Freeway Connector, Apache Junction Express; Power Road Supergrid
- US60/Country Club park-and-ride: Arizona Avenue/Country Club Supergrid (2009); Arizona Ave. Dedicated BRT

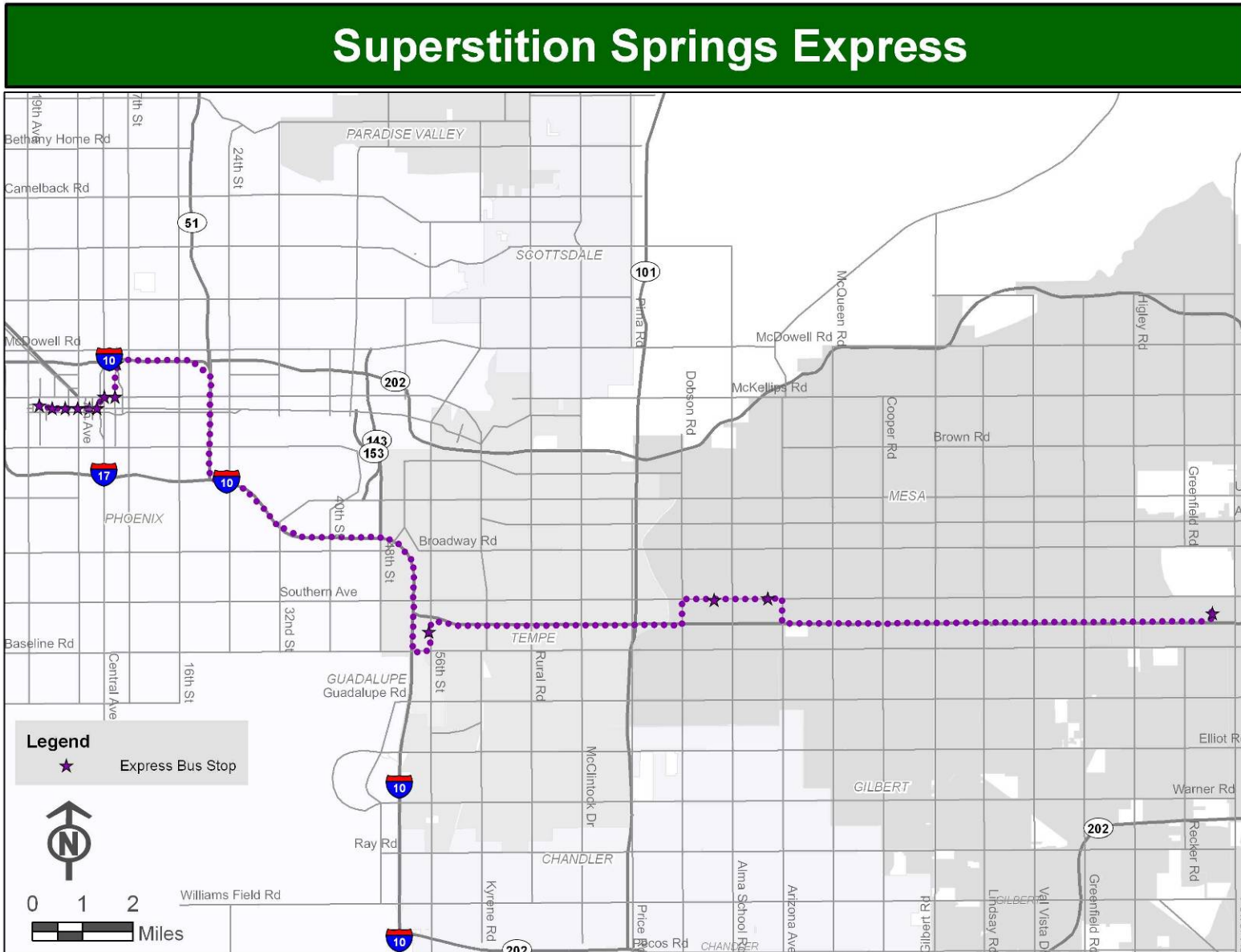
The 531 Express currently operates on Gilbert Road and may be re-routed to interact with the Superstition Springs Express to provide connections for people coming from Downtown Gilbert.

Issues to address before implementation

- By 2018, there should be a plethora of data on the success of the A/B service integration with light rail. In addition, there should be ample data on transit demand along the US60 corridor to Tempe and downtown Phoenix. The Superstition Springs Express, Superstition Freeway Connector, and Apache Junction Express should be aligned accordingly to provide appropriate levels of service for the demand at each park-and-ride lot along US60.
- The Superstition Springs Express is a two-way route; consider implementing a higher level of service in the westbound direction in the morning and eastbound in the evening.
- Status of US 60/Country Club park-and-ride facility (currently planned for implementation in 2011)
- Consistency in route names for express services operating on US 60 from the East Valley
 - Superstition Springs Express vs. Superstition Freeway Connector vs. Apache Junction Express (vs. using freeway numbers in other freeway corridors)

Long-term issues

- Potential overlap in service between the Superstition Springs Connector, the Apache Junction Express, the 531, and this route.
- Overall integration of routes in East Valley with light rail



Avondale Express (July 2019)

Recommended routing

- Western terminus: Goodyear park-and-ride at I-10/Dysart
- Eastern Terminus: State Capitol Complex
- Stops:
 - LRT Station at 43rd Ave/I-10
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- Goodyear park-and-ride at I-10/Dysart: shares facilities with Buckeye Express, Papago Connector
- Downtown Phoenix: coordinate transfer times with light rail

Issues to address before implementation

- This is a two-way route; consider implementing more trips in the eastbound direction in the morning and westbound in the evening.
- A circulator in Goodyear/Avondale would allow transit patrons to access destinations beyond the park-and-ride lot.
- Integration with Papago Connector, Buckeye Express, in terms of route name, timing of trips, etc.
- It may make sense to use the same name for all services in this corridor (the I-10 beyond Loop 101), just with different origination points or timing.

Long-term issues

- Integration with I-10 light rail
 - Evaluate experience with other express routes and the A/B service structure



North I-17 Express (July 2021)

Recommended routing

- Northern terminus: Park-and-ride at Anthem
- Southern terminus: Central Station (via State Capitol Complex)
- Stops:
 - Future park-and-ride facility at I-17 and Carefree Highway
 - Montebello/19th Ave LRT Station
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

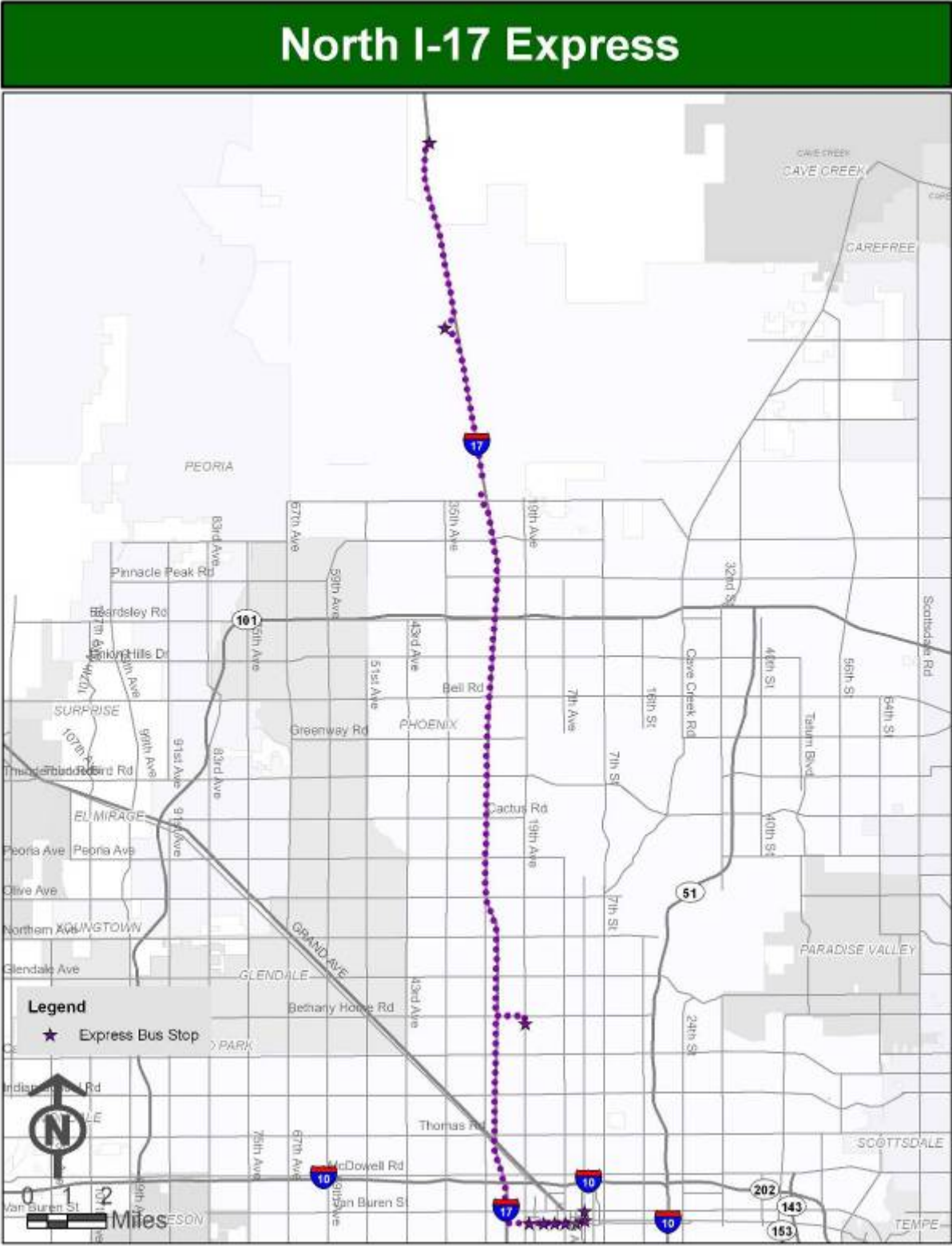
- At Anthem and I-17/Carefree Highway park-and-rides: shares facilities with Anthem Express and Black Canyon Freeway Connector

Issues to address before implementation

- Status of Anthem park-and-ride
 - Park & ride is already in place, bus bays and platforms would still need to be constructed prior to start of service.
- Status of I-17/Carefree Highway park-and-ride
- Integration of express bus and light rail
 - Evaluate experience on other express routes with A/B services & consider implementing A/B service structure on this route

Long-term issues

None identified



Loop 303 Express (July 2022)

Recommended routing

- Northern terminus: Arrowhead Transit Center
- Southern terminus: Central Station (via State Capitol Complex)
- Stops:
 - 99th/Bell Road (Sun City)
 - Surprise Municipal Complex
 - Surprise park-and-ride
 - Future development along Loop 303 corridor
 - Future park-and-ride facility at Loop 303 and Northern
 - Goodyear PNR
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

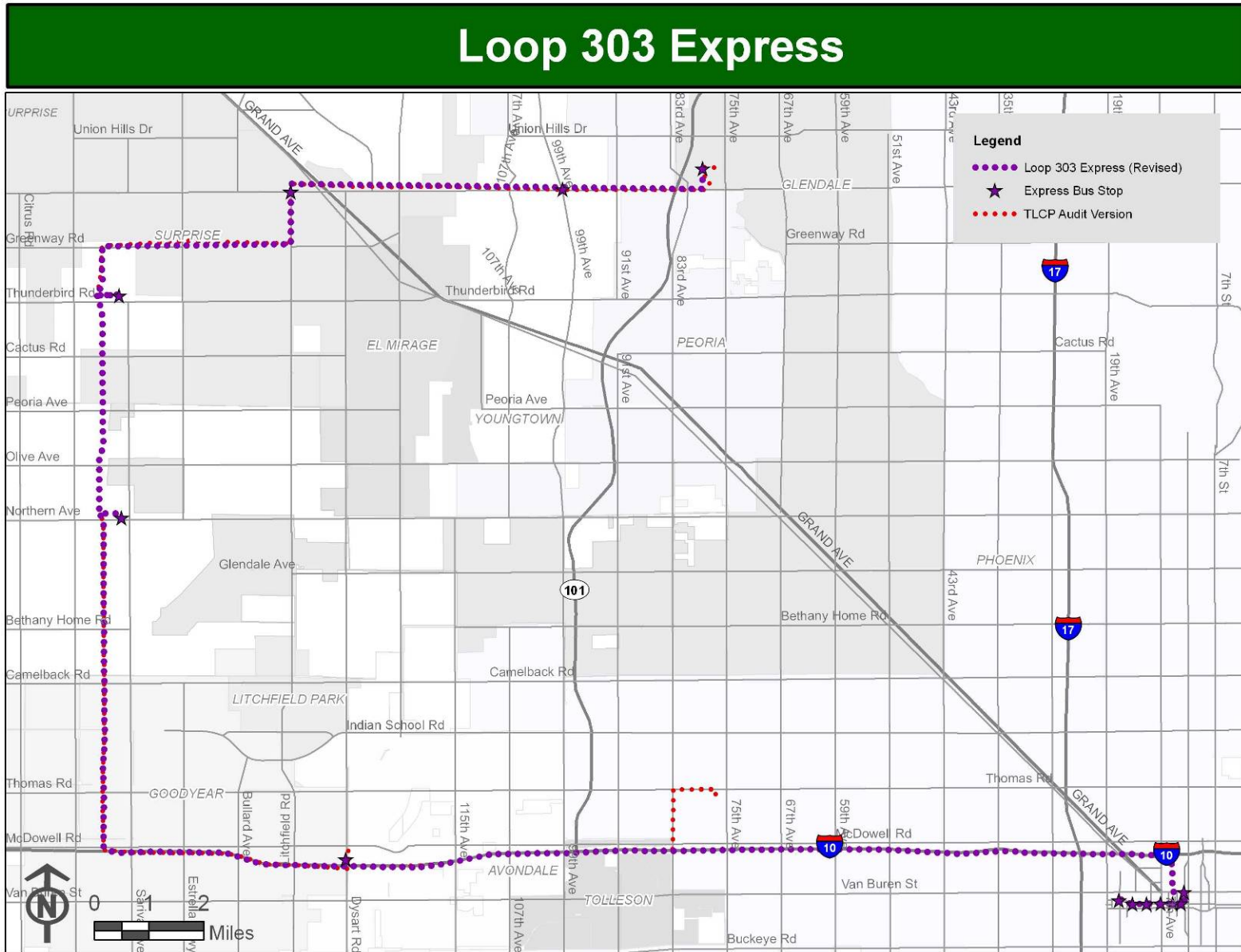
- Many routes connect at Arrowhead Transit Center.
- The Surprise-Scottsdale Express will operate out of the Surprise park-and-ride at Greenway/Bullard, but likely will not require transfer coordination with the Loop 303 Express.

Issues to address before implementation

- Status of Northern/Loop 303 park-and-ride
- Integration with I-10 light rail extension
 - Evaluate experience on other routes with A/B service structure

Long-term issues

- Evaluate need for HOV lanes in this corridor



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Appendix II: Summary of Route Recommendations

The tables on the following pages summarize the changes made to each of the express bus routes, the reasons for any changes, and other service information.

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Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
<i>*All routes assumed to be implemented in July of CY/start of FY unless otherwise noted</i>											
2007	2008	Desert Sky Express/I-10 West RAPID	Same as existing I-10 West RAPID	Desert Sky TC I-10/79th PNR Downtown Phoenix (incl. Central Station and State Capitol)	none		none		24.5	(maintain existing service levels)	
2007	2008	Deer Valley Express/I-17 RAPID	Same as existing I-17 RAPID	Bell/I-17 PNR Metro Center TC Downtown Phoenix (incl. Central Station and State Capitol)	none		none		22.5	(maintain existing service levels)	
2007	2008	SR 51 Express/SR51 RAPID	Same as existing SR 51 RAPID	SR51/Bell Rd PNR SR51/Shea Blvd PNR Central Station	none		none		22	(maintain existing service levels)	
2007	2008	Ahwatukee Express/I-10 East RAPID	Same as existing I-10 East RAPID	Pecos/40th St PNR Downtown Phoenix (incl. Central Station and State Capitol)	none		none		21	(maintain existing service levels)	
2007	2008	Surprise-Scottsdale Express (referred to as "North Loop 101 Connector" in RTP/TLCP Audit)	Surprise-to-Scottsdale Airpark via 101	Surprise PNR (Greenway/Bullard) Surprise City Hall 99th & Bell (Sun City) Arrowhead TC Mayo Blvd/Scottsdale Rd. Frank Lloyd Wright Blvd/Scottsdale Rd Dial Tech. Center Scottsdale Airpark	Changed route name	-Request from workshop including cities of Surprise, Glendale, Phoenix -Name recommendation from VM Marketing	none		34	AM peak: 4 trips eastbound; 2 trips westbound PM peak: 2 trips eastbound; 4 trips westbound	408
2007	2008	Arrowhead-Downtown Phoenix Express (referred to as "North Glendale Express" in RTP/TLCP Audit)	From North Glendale to downtown Phoenix along Loop 101 & I-10; travels east-to-west in downtown Phx	75th/Beardsley (Glendale) PNR Arrowhead TC Loop 101/Glendale PNR Downtown Phoenix (incl. Central Station and State Capitol)	-Changed route Name -Eliminated stop in Peoria	-Request from workshop including cities of Surprise, Glendale, Phoenix -Currently no park-and-ride in Peoria -Name recommendation from VM Marketing	none		30	AM peak: 4 inbound and 2 outbound trips PM peak: 2 inbound trips and 4 outbound trips	360

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2008	2009	Northwest Valley Express (referred to as "West Loop 101 Connector" in RTP/TLCP Audit)	North Glendale to downtown Phoenix along Loop 101 & I-17; travels west-to-east in downtown Phx ("B" service terminates at 19th Ave/Montebello LRT station)	"A" Service: Arrowhead TC 75th/Beardsley (Glendale) PNR Downtown Phoenix (incl. Central Station and State Capitol) "B" Service: Arrowhead TC 75th/Beardsley (Glendale) PNR 19th Ave/Montebello TC	-changed route name -changed route structure: -service routed on I-17 instead of Loop 101 -eliminated stop in Peoria -eliminated stop at Glendale/101 PNR -A/B service structure recommended -'B' service starts December 2009	-Request from workshop including cities of Surprise, Glendale, Phoenix -Currently no park-and-ride in Peoria -Route will test the A/B service structure in West/Central Valley	material change	Evaluate performance of A/B route structure after a year of service	"A" service - 26.8 "B" service - 20.2	AM peak: 6 inbound trips (3 trips will terminate at light rail and 3 will terminate in downtown Phoenix); 2 outbound trips, both of which originate at light rail PM peak: 2 inbound trips, both of which terminate at light rail; 6 outbound trips (3 will originate at light rail and 3 will originate in downtown Phoenix)	362.8
2008	2009	Papago Freeway Express (referred to as "Papago Freeway Connector" in RTP/TLCP Audit)	East Buckeye to downtown Phoenix on I-10; travels east-to-west in downtown Phx	East Buckeye PNR Goodyear PNR Downtown Phoenix (incl. Central Station and State Capitol)	changed route name	Route no longer acts as connector	none	Consider A/B service structure with LRT on I-10	31.2	8 one-way trips per day	249.6

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2008	2009	East Loop 101 Connector	Scottsdale Airpark to south Chandler via Loop 101	Scottsdale Airpark Dial Tech Center Frank Lloyd Wright Blvd/Scottsdale Rd Mayo Blvd/Scottsdale Rd Mustang PNR Scottsdale Community College Apache/Price LRT Station ASU Research Park Tumbleweed PNR	changed route structure: -no deviation to downtown Scottsdale -no deviation to downtown Tempe -added deviation to ASU Research Park -eliminated stop at Loloma TC -eliminated stop at Tempe TC -eliminated stop at South Tempe TC -eliminated stop at Chandler Fashion Center -added stop at Apache/Price LRT Station -Service may start August 2008 to avoid HOV construction	-Request from workshop including cities of Scottsdale, Chandler, Gilbert, Tempe, Mesa -Service deviations deemed too costly in terms of time -Stop at Chandler Fashion Center eliminated due to concerns over parking -Stop added at LRT for better integration -Stop at ASU Research park added since it is a major employment center	material change	Extend service to Scottsdale/ 101 PNR once constructed	33.9	10 one-way trips per day NOTE: service is bi-directional	271.2
2008	2009	Red Mountain Express	East Mesa to downtown Phoenix, via 202 ("B" service terminates at Tempe Transportation Center)	"A" Service: Power Road/Loop 202 PNR Greenfield Road/Loop 202 PNR Downtown Phoenix (incl. Central Station and State Capitol) "B" Service: Power Road/Loop 202 PNR Greenfield Road/Loop 202 PNR Tempe Transportation Center	changed route structure: -A/B service structure recommended -'B' service starts December 2009	-Requests from METRO, Mesa, Tempe -route will test integration with LRT in East Valley	material change	Evaluate performance of A/B route structure after a year of service	"A" service - 28.3 "B" service - 17.7	AM peak: 3 inbound "A" trips; 2 inbound "B" trips PM peak: 3 outbound "A" trips; 3 outbound "B" trips	258.3

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2010	2011	Apache Junction Express	Apache Junction to downtown Phoenix	Signal Butte/US60 PNR Superstition Springs Mall PNR US60/Country Club PNR Arizona Mills TC Downtown Phoenix (incl. Central Station and State Capitol)	None	n/a	none	Consider A/B route structure, depending on experience with Red Mountain Express (consistent with METRO & Apache Junction request to integrate express bus & LRT)	36.6	8 one-way trips per day	292.8
2011	2012	Superstition Freeway Connector	East Mesa to Arizona Mills TC, via US60	Superstition Springs PNR US60/Country Club PNR Fiesta Mall Arizona Mills TC	None	n/a	none	Consider terminus at Tempe Transportation Center, depending on experience with Red Mountain Express (consistent with METRO request to integrate express bus and LRT)	16.8	6 one-way trips per day NOTE: service is bi-directional	100.8
2012	2013	Pima Express	North Scottsdale to downtown Tempe and downtown Phoenix, via loop 101	Scottsdale Road/Loop 101 PNR Scottsdale Airpark (East Side) Mustang Transit Center & PNR Scottsdale Community College Tempe Transportation Center Downtown Phoenix (incl. Central Station and State Capitol)	None	n/a	none	Evaluate route structure depending on performance of East Loop 101 Connector; consider A/B structure to allow some non-stop service to downtown Phoenix	36.4	8 one-way trips per day	291.2

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2013	2014	Peoria Express	Peoria to downtown Phoenix	Peoria PNR Glendale Ave/Loop 101 PNR Downtown Phoenix (incl. Central Station and State Capitol)	None	n/a	none	Adjust route as needed to account for location of Peoria park-and-ride Coordinate with Arrowhead-Downtown Phoenix Express Coordinate with LRT on I-10	22.7	12 one-way trips per day	272.4
2014	2015	Buckeye Express	West Buckeye to downtown Phoenix	West Buckeye PNR East Buckeye PNR Goodyear PNR Downtown Phoenix (incl. Central Station and State Capitol)	None	n/a	none	Coordinate with LRT on I-10	45.4	6 one-way trips per day	272.4
2015	2016	Black Canyon Freeway Connector	North Phoenix to LRT, via I-17	Carefree Hwy/I-17 PNR Happy Valley/I-17 PNR 19th Ave/Montebello LRT station	Eliminated stop at I-17/Bell Rd. PNR Shifted terminus to LRT station	-Consistent with METRO request to integrate express bus & LRT -I-17/Bell Rd. PNR over capacity with current RAPID services	material change	If parking capacity at I-17/Bell Rd. PNR allows, add stop	22.5	16 one-way trips per day NOTE: service is bi-directional	360
2016	2017	Ahwatukee Connector	Ahwatukee to downtown Tempe, via I-10/202	Pecos/40th St PNR I-10/Elliot PNR Arizona Mills TC Tempe Transportation Center	Shifted route to US-60 instead of Baseline Road; operations testing should determine the more efficient route	Improve operating efficiency	minor		12.8	8 one-way trips per day NOTE: service is bi-directional	102.4

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2017	2018	Santan Express	Gilbert/Chandler to downtown Phoenix	Williams Gateway/ASU East Val Vista/Loop 202 PNR Tumbleweed PNR Downtown Phoenix (incl. Central Station and State Capitol)	Added stop at Williams Field/Loop 202 park-and-ride Eliminated stop at Pecos/40th park-and-ride	Request from Town of Gilbert based on updated information about park-and-ride Pecos/40th already served by express bus	minor	Consider A/B route structure, depending on experience with Red Mountain Express (consistent with METRO request to integrate express bus & LRT) Consider eliminating stop at Broadway/Priest (consistent with Gilbert/Chandler request for non-stop service to downtown Phoenix)	36.7	20 one-way trips per day NOTE: service is bi-directional	734
2017	2018	Anthem Express	Anthem to Scottsdale Airpark	Anthem PNR Carefree Hwy/I-17 PNR Happy Valley/I-17 PNR Desert Ridge PNR Mayo Blvd/Scottsdale Rd Frank Lloyd Wright Blvd/Scottsdale Rd Dial Tech Center Scottsdale Airpark TC	Added stop at Happy Valley/I-17 park-and-ride Suggest name change to clarify destination (e.g., "Anthem - Scottsdale Express")	Consistent with desire to connect more origins with Scottsdale Airpark	minor		28	10 one-way trips per day	280
2018	2019	Red Mountain Freeway Connector	East Mesa to downtown Tempe, via 202	Power Road/Loop 202 PNR Greenfield Road/Loop 202 PNR McKellips/Country Club Rd Tempe Transportation Center	None	n/a	none	Consider re-structuring route based on experience with Red Mountain Express 'B' service; align trip times with Red Mountain Express services for optimum schedules	18.9	16 one-way trips per day	302.4

Start Year (CY)*	Start Year (FY)*	Route	Revised routing	Stops	Major Recommendations (compared to TLCP Audit)	Reason(s) for change(s)	Implications of Changes (compared to TLCP Audit)	Long-term considerations	Approx. One-way Mileage	# of trips at implementation	Approximate total daily mileage
2018	2019	Superstition Springs Express	East Mesa to downtown Phoenix, along US60	Superstition Springs PNR US60/Country Club PNR Fiesta Mall Arizona Mills TC Downtown Phoenix (incl. Central Station and State Capitol)		n/a	none	May be appropriate for A/B service structure (Consistent with METRO request to integrate express bus and LRT and City of Mesa request for non-stop service to downtown Phoenix)	29.2	20 one-way trips per day NOTE: service is bi-directional	584
2019	2020	Avondale Express	Avondale to downtown Phoenix	Goodyear PNR I-10 LRT Station at 43rd Avenue Downtown Phoenix (incl. Central Station and State Capitol)	none	n/a	none		17.7	16 one-way trips NOTE: service is bi-directional	283.2
2021	2022	North I-17 express		Anthem PNR Carefree Hwy/I-17 PNR Downtown Phoenix (incl. Central Station and State Capitol)	Eliminated stop at I-17/Happy Valley park-and-ride Eliminated stop at I-17/Bell Rd Added stop at I-17/Carefree park-and-ride Added stop at 19th Ave/Montebello LRT station	I-17/Happy Valley & I-17 Bell Rd park-and-rides already served by RAPID to downtown Phoenix Added stop at LRT for consistency with METRO request for integration	minor	Consider A/B service structure, depending on experience with Northwest Valley Express (Consistent with METRO request to integrate express bus and LRT)	32	10 one-way trips per day	320
2022	2023	Loop 303 Express	Glendale to Surprise via Bell Rd; Surprise to downtown Phoenix, via 303	Arrowhead TC 99th Ave/Bell Rd (Sun City) Surprise City Hall Surprise PNR Loop 303/Northern PNR Goodyear PNR Downtown Phoenix (incl. Central Station and State Capitol)	Extended route to downtown Phoenix	Request from City of Surprise	material change	Consider terminating route at 43rd Avenue LRT station or an A/B service structure (Consistent with METRO request to integrate express bus and LRT)	47	8 one-way trips per day	376

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Appendix III: Express Bus/Light Rail Service to Critical Destinations

The tables below show transit access between various residential areas of the Valley and the critical destinations identified during the planning phase of the Freeway Express Bus/BRT project. (Residential areas are called “origins” in the tables.) For this exercise, the 2023 Express Bus Network is considered in-place. The exercise includes all high-capacity forms of transit, including express bus, bus rapid transit (BRT), and light rail.

Table A shows whether there is the possibility of a “one-seat ride” between origins and destinations (that is, whether a transit passenger can reach a destination without transferring). As the table shows, Downtown Phoenix is well served, with the possibility of a one-seat ride from almost every origin in the Valley. Scottsdale Airpark is served with a one-seat ride from eight origins in the Valley; and downtown Tempe is served by from four origins. Creating “B” services on more routes that originate in the east or southeast Valley would connect more origins to downtown Tempe with a one-seat trip.

Table A: “One-Seat” Service between Origins and Destinations

Origin	Destinations		
	Downtown Phoenix	Scottsdale Airpark	Downtown Tempe
Surprise	571 (depends on funding) Loop 303 Express Grand Avenue BRT	Surprise-Scottsdale Express	
North Glendale/Peoria	581, 590, 582 Arrowhead-Phoenix Express Northwest Valley Express	Surprise-Scottsdale Express	
Central Glendale/Peoria	Arrowhead-Phoenix Express Peoria Express		
West Buckeye	Buckeye Express		
East Buckeye	Papago Freeway Express		
Goodyear/Avondale	Papago Freeway Express Buckeye Express Avondale Express		
Anthem	North I-17 Express	Anthem Express	
North-west Phoenix (I-17 area, north of 101)	North I-17 Express	Anthem Express	
North-west Phoenix (I-17 area, south of 101)	I-17 RAPID		
North-east Phoenix (SR51 area, north of 101)		Surprise-Scottsdale Express	

Origin	Destinations		
	Downtown Phoenix	Scottsdale Airpark	Downtown Tempe
North-east Phoenix (SR51 area, south of 101)	SR-51 RAPID		
Fountain Hills	512		
North Scottsdale (north of Shea Blvd)	Pima Express*		Pima Express*
Central Scottsdale (south of Shea Blvd)	510	East Loop 101 Connector	Pima Express*
West Phoenix (I-10 west area)	I-10 West RAPID		
Mesa, Loop 202 area	Red Mountain Express "A" service		Red Mountain Express "B" service
Mesa, US 60 area	531 Superstition Springs Express CP/EV Light rail		
Chandler	Santan Express	East Loop 101 Connector	
Gilbert	531 Santan Express		
Northern Tempe (North of US 60)	CP/EV Light rail 520/521	East Loop 101 Connector	
Southern Tempe (South of US 60)	521 I-10 East RAPID		
Ahwatukee	I-10 East RAPID		Ahwatukee Connector
Apache Junction	Apache Junction Express		

Table B shows connections between residential areas and critical destinations based on the possibility of connecting between two high-capacity transit services. As the table shows, the addition of light rail to the Valley transit mix will enable a great deal of access to downtown Tempe from the west, northwest, and north Valley origins. The East Loop 101 Connector provides Mesa and Gilbert with connections to the Scottsdale Airpark.

Table B “Two-Seat” Service (single transfer to LRT, express bus, or dedicated BRT)

Origin	Destinations	
	Scottsdale Airpark	Downtown Tempe
Surprise	(served by one-seat trip)	Loop 303 Express + LRT
North Glendale/Peoria	(served by one-seat trip)	Northwest Valley Express + LRT Arrowhead-Phoenix Express + LRT
Central Glendale/Peoria	Arrowhead-Phoenix Express + Surprise-Scottsdale Express	Arrowhead-Phoenix Express + LRT
West Buckeye		Buckeye Express + LRT
East Buckeye		Papago Connector + LRT

Origin	Destinations	
	Scottsdale Airpark	Downtown Tempe
Goodyear/Avondale		Buckeye Express + LRT Papago Connector + LRT Avondale Express + LRT
Anthem	(served by one-seat trip)	Anthem Express + Pima Express*
North-west Phoenix (I-17 area, north of 101)		I-17 RAPID + LRT
North-west Phoenix (I-17 area, south of 101)		I-17 RAPID + LRT
North-east Phoenix (SR51 area, north of 101)		
North-east Phoenix (SR51 area, south of 101)		SR51 RAPID + LRT
Fountain Hills	512 + East Loop 101 Connector	
North Scottsdale (north of Shea Blvd)		
Central Scottsdale (south of Shea Blvd)	(served by one-seat trip)	
West Phoenix (I-10 west area)		
Mesa, Loop 202 area	Red Mountain Express + East Loop 101 Connector (if connection permitted in Price/Rio Salado area)	(served by one-seat trip)
Mesa, US 60 area	Superstition Springs Express + East Loop 101 Connector	(served by one-seat trip)
Chandler	(served by one-seat trip)	East Loop 101 Connector + LRT
Gilbert	Santan Express + East Loop 101 Connector	
Northern Tempe (North of US 60)	CP/EV LRT + East Loop 101 Connector Scottsdale/Rural Dedicated BRT	
Southern Tempe (South of US 60)	CP/EV LRT + East Loop 101 Connector Scottsdale/Rural Dedicated BRT	
Ahwatukee	Ahwatukee Connector + East Loop 101 Connector	
Apache Junction	Apache Junction Express + East Loop 101 Connector	Apache Junction Express + CP/EV LRT

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Appendix VI: Effects of Route Changes on Jurisdictional Equity

Table C shows the impacts of route changes on jurisdictional equity, versus the recommendations made in the TLCP Audit. All calculations are based on the recommended route structure and current operations costs, and will likely change as conditions change.

Table C Impacts of individual route changes on Jurisdictional Equity

Surprise-Scottsdale Express*			
	"A" Service	"B" Service	Net Impact on JE
Total one-way route mileage	33.99	n/a	
Surprise mileage	5.36		\$ 181,920
County mileage	2.5		\$ (197,291)
Peoria mileage	1.25		\$ (32,015)
Glendale mileage	7.95		\$ 337,364
Phoenix mileage	14.03		\$ (420,884)
Scottsdale mileage	2.9		\$ 852,140
Daily trips (one-way)	12		
Total daily rev miles	407.88		\$ 721,234
<i>*originally known as North Loop 101 Connector</i>			
Arrowhead-Downtown Phoenix Express*			
	"A" Service	"B" Service	Net Impact on JE
Total one-way route mileage	29.62	n/a	
Glendale mileage	5.26		\$ (687,836)
Peoria mileage	6.67		\$ (48,090)
County mileage	1.05		\$ 309,359
Phoenix mileage	16.64		\$ 292,591
Daily trips (one-way)	12		
Total daily rev miles	355.44		\$ (133,975)
<i>*originally known as North Glendale Express</i>			
<i>**West Loop 101 connector in PARs</i>			
Northwest Valley Express			
	"A" Service	"B" Service	Net Impact on JE
Total one-way route mileage	26.8	20.2	
Glendale mileage	6.1	6.1	\$ (295,007)
Phoenix mileage	20.7	14.1	\$ (2,812,863)
Peoria mileage			\$ -
Daily trips (one-way)	6	10	
Total daily rev miles	160.8	202	\$ (3,107,870)
<i>*originally known as West Loop 101 Connector</i>			

East Loop 101 Connector				
	"A" Service	"B" Service	Net Impact on JE	
Total one-way route mileage	36.39	n/a		
Scottsdale mileage	15.39			\$ (769,467)
Tempe mileage	11.06			\$ 181,662
Chandler mileage	9.94			\$ 767,658
Daily trips (one-way)	10			
Total daily rev miles	363.9			\$ 179,852
Red Mountain Express				
	"A" Service	"B" Service*	Net Impact on JE	
Total one-way route mileage	29.5	17.7		
Mesa mileage	16.7	14.3		\$1,124,044
Phoenix mileage	12.8	0		\$ (391,182)
Tempe mileage	0	3.4		\$ (952,134)
Daily trips (one-way)	5	6		
Total daily rev miles	147.5	106.2		\$ (219,272)
TOTAL				\$ (2,560,032)

Table D shows the net financial impact of all changes on each of the affected jurisdictions over the twenty-year life of the RTP. In addition, the table shows the impact in terms of jurisdictional equity overall. As a result of the changes shown in table C, some of the cities gain additional jurisdictional equity share; some will have their overall equity reduced. The total impact is a net savings of \$2.5 million to the RTP. However, some cities already have a relative "surplus" or deficit" of jurisdictional equity and table D also shows how the changes to express bus routings impact that overall share.

Table D Net Impact on Overall Jurisdictional Equity

Jurisdiction	Net Financial Impact of Changes	Impact on JE
Chandler	\$767,658	Increases JE surplus
County	\$112,069	Increases JE surplus
Glendale	-\$645,480	Decreases JE surplus
Mesa	\$1,124,044	Reduces JE deficit
Peoria	-\$80,105	Increases JE deficit
Phoenix	-\$3,332,337	Increases JE deficit
Scottsdale	\$82,673	Reduces JE deficit
Surprise	\$181,920	Increases JE surplus
Tempe	-\$770,472	Decreases JE surplus
Total	-\$2,560,032	

RPTA Freeway Express Bus / BRT Operating Plan

**Public Involvement/Agency
Coordination Program**

Prepared for
Regional Public Transportation Authority



Prepared by



June 2006

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1. Introduction

The Regional Public Transportation Authority (RPTA) has initiated this study to develop a detailed operating plan that will identify specific routes and infrastructure improvements to support express bus and bus rapid transit (BRT) routes on Valley freeways. These routes are included in the Regional Transportation Plan which is funded by Proposition 400 approved by voters in November 2004. The objectives of the study are to define the operational characteristics of the freeway- based regional Express Bus/BRT network identified in the Regional Transportation Plan. The study will also consider how operational characteristics may change as the regional network develops over the 20 year life of the transit program.

This document describes the Public Involvement/Agency Coordination Program (the Program) designed to involve and coordinate with RPTA member agencies, members of the public, transit riders, and other affected or interested parties.

2. Purpose of the Public Involvement/Agency Coordination Program

The benefits of involving stakeholders in a participatory process are multifold. First, it increases the prospects for agreement, or at a minimum, informed consent on a solution and the chances for ultimate implementation of a project. It enables identification of issues early in the process so that those issues may be adequately addressed. A program sincerely committed to involving stakeholders and taking action on their input yields a significantly more popular and sustainable result. In addition, federal requirements require meaningful citizen participation as a significant element in studies like this one.

The target audiences of public involvement, consultation, or outreach programs are referred to by many different terms with varying definitions. For this study, the term “stakeholder” will be used, referring to any interested individual or agency, including, but not limited to, members of the bus rider community, RPTA member cities affected by this study, interested federal or regional agencies, and members of the community at large.

The purpose of this program is to inform stakeholders about the study and to actively seek and incorporate their input into the decision-making process to assure that the project meets the needs of the community and is consistent with express bus/BRT service as described in the Regional Transportation Plan.

This Program is built on the following guiding principles:

- Activities are directly linked to project milestones, technical activities, and decision-making.

- Adequate opportunities for involvement and time for public review and comment are provided.
- Reasonable access to technical and policy information is provided.
- Explicit consideration and response to input obtained is demonstrated.
- The needs of those traditionally underserved by existing transportation systems is solicited and considered to ensure their involvement in decision-making, help prevent disproportionately high and adverse impacts upon these stakeholders, and assure they receive a proportionate share of benefits. Traditionally underserved populations include, but are not limited to, low income and minority households, Americans with Disabilities Act (ADA) populations, and Native American tribal members.
- Information is made accessible and/or provided in a timely manner.

3. Goals and Objectives of the Program

The first step is to define goals with objectives that produce meaningful, applicable information that, when incorporated into the study work products, appropriately implements the relevant elements of the Regional Transportation Plan and ensures efficient and equitable distribution of resources. The next step is to build the Program to meet those goals and objectives. Based on identified issues and experience from public involvement and agency coordination on previous studies, the goals for this Program and the objectives for meeting those goals are as follows:

1. Inform, educate, and engage stakeholders early and continuously throughout the study.

Objectives:

- Provide information about the study and project issues through meetings, workshops, web site, exhibits, and other techniques.
- Use outside reviewers (e.g., RPTA staff, city public information officers) to evaluate public information materials for effectiveness and ease of understanding prior to release to the public.
- Create meaningful agendas for meetings and workshops in order to respect participants' time and produce valuable results.
- Assist the RPTA's public information officer by providing information for press releases and/or other media distribution.

2. Provide a variety of opportunities for participation in the decision-making process to encourage participation.

Objectives:

- Develop comprehensive list of stakeholders with RPTA. Categorize and determine best method(s) of communication for each category.
- Provide timely and regular notice of program activities and study progress.

3. Respond to participant issues and concerns clearly and understandably and integrate them into the study as appropriate.

Objectives:

- Respond to comments and inquiries in a timely, helpful manner.
- Provide clear documentation (e.g., minutes, summaries) of milestone activities (e.g., public meetings, workshops), including a record of discussion, issues raised, and resolution reached.

4. Structure of the Program

Although the scope of this study will not require a detailed breakdown of stakeholder types, it will be important to structure the activities to solicit participation from those directly affected by the study. A Technical Advisors Committee (TAC) will be formed and will meet periodically throughout the course of the study. TAC members will review and provide input on study products. The TAC will consist of representatives from:

- Arizona Department of Transportation (ADOT)
- City of Avondale
- City of Chandler
- City of El Mirage
- City of Glendale
- City of Mesa
- City of Peoria
- City of Phoenix
- City of Scottsdale
- City of Surprise
- City of Tempe
- Maricopa County
- Maricopa Association of Governments (MAG)
- RPTA/Valley Metro

- Town of Gilbert
- Valley Metro Rail

5. Program Activities

So that stakeholder and community input is meaningful and contributes to the project’s objectives described in Section 3, consultation activities will be closely linked and integrated with study milestones¹. The overall study schedule, showing how key public involvement/agency coordination activities correspond with study milestones, is provided as **Figure 1** on page 8. Each activity is specifically designed to meet one or more of the Program objectives (See **Table 1**).

Table 1: Activities/Goals Matrix

Consultation Activities	Public Involvement Program Goals		
	Goal 1: Inform, Educate, Engage	Goal 2: Provide Opportunities for Participation	Goal 3: Consider and Incorporate Comments
ProjectSolve2 Site	●	●	
Technical Advisors Committee Meetings	●	●	●
Public Open House Meeting	●	●	●
Stakeholder Meetings	●	●	●
Website	●	●	
Program Summary Report	●		

Activities have been tied to key study milestones and arranged into three phases to be appropriately matched to the chronology of the study and the work tasks listed below:

Task 1: Refine Scope of Services

Task 2: Develop Public and Agency Involvement Plan

Task 3: Review Prior and Ongoing Studies

Task 4: Analyze Current Transit Networks

Task 5: Peer City Review

Task 6: Refine Route Operating Characteristics and Model Revised Routes

Task 7: Develop BRT Recommendations and Performance Criteria

5.1 Phase 1: Tasks 1 and 2

During this phase, stakeholders will be identified and the Technical Advisors Committee (TAC) will be formed. Outreach and participation are extremely important during this phase because

¹ A significant point in the development of the study.

requesting input early in the process ensures that the planned implementation of the study considers all alternatives and sources of information. A secure website dedicated to the project will be developed using PB's ProjectSolve2 software during this phase. The ProjectSolve2 site will provide TAC members, project team members, and other stakeholders continual access to project information including project scope, schedule, working papers, summary reports, and meeting schedules.

Phase 1 Activities:

- Create Technical Advisors Committee (TAC) and conduct **TAC Meeting #1**. The meeting agenda will include:
 - Introduction to Study
 - Review Project Schedule
- Prepare **summary report** of TAC meeting #1.
- Conduct **TAC Meeting #2**. The meeting agenda will include:
 - Review Project Schedule
 - Review Public/Agency Involvement Plan (Task 2)
 - Methodology for Task 3 (Review Prior & Ongoing Studies)
 - Methodology for Task 4 (Analyze Current Transit Networks and User Characteristics)
 - Review List of Peer Cities to be used in Task 5 (Peer City Review)
- Prepare **summary report** of TAC Meeting #2
- Design structure and set up ProjectSolve2 site to facilitate information sharing among project team, TAC members, and other stakeholders.
- Support RPTA in **media relations**, i.e., provide information and graphics as requested.
- **Website:** provide information and graphics as needed to include on RPTA's Valley Metro website.

5.2 Phase 2: Task 3, 4, 5

During this phase of the project, the study team will review previous and ongoing related studies and analyze existing transit networks and user characteristics, which may include conducting interviews with current transit providers in the Valley. Additionally, a peer city review will be conducted to understand best practices and glean lessons from cities that have already implemented freeway express bus/BRT systems. Working papers for each task performed in this phase will be provided to the TAC for review and TAC comments will be addressed.

Phase 3 Activities

- Conduct **TAC Meeting #3**. The meeting agenda will include:
 - Comments on working papers from Tasks 3, 4, and 5.
- Prepare a **summary report** of the TAC meeting #3.
- Maintain ProjectSolve2 site.
- Support RPTA in **media relations**, i.e., provide information and graphics as requested.

- Provide information and graphics as needed to include on RPTA's Valley Metro **website**.
- Prepare **Public Involvement/Agency Coordination Program Summary** for inclusion in the final report.

5.3 Phase 3: Tasks 6 and 7

In Phase 4, the operating characteristics of the routes will be developed and the revised routes modeled. To conclude the study a final working paper describing BRT recommendations and performance criteria will be produced. Working papers for each task performed in this phase will be provided to the TAC for review and TAC comments will be addressed.

Phase 3 Activities

- Conduct **TAC Meeting #4**. The meeting agenda will include:
 - Comments on working papers from Tasks 6 and 7
- Prepare a **summary report** of the TAC meeting #4.
- Maintain ProjectSolve2 site.
- Support RPTA in **media relations**, i.e., provide information and graphics as requested.
- Provide information and graphics as needed to include on RPTA's Valley Metro **website**.
- Prepare **Public Involvement/Agency Coordination Program Summary** for inclusion in the final report.

Two sets of station area workshops to elicit community input concerning issues related to LRT system development. The project corridor will be segmented into geographic subareas so that the public in those areas can identify and provide input on issues particular to their area. Each set of station area workshops will consist of one workshop in each subarea. The first set of workshops will provide information on successful station area planning in other communities, define general goals and objectives relative to station area development and identify:

The second workshop in each subarea will focus on:

6. Consideration of Special Needs

If a public meeting is conducted in the course of this study, meeting advertisements will indicate that reasonable accommodations are available for all persons with disabilities or those persons needing language assistance and will request a 72-hour notification to accommodate specialized needs. Accommodation will be made in accordance with RPTA policies. All meetings will be conducted in accordance with Americans with Disabilities Act guidelines.

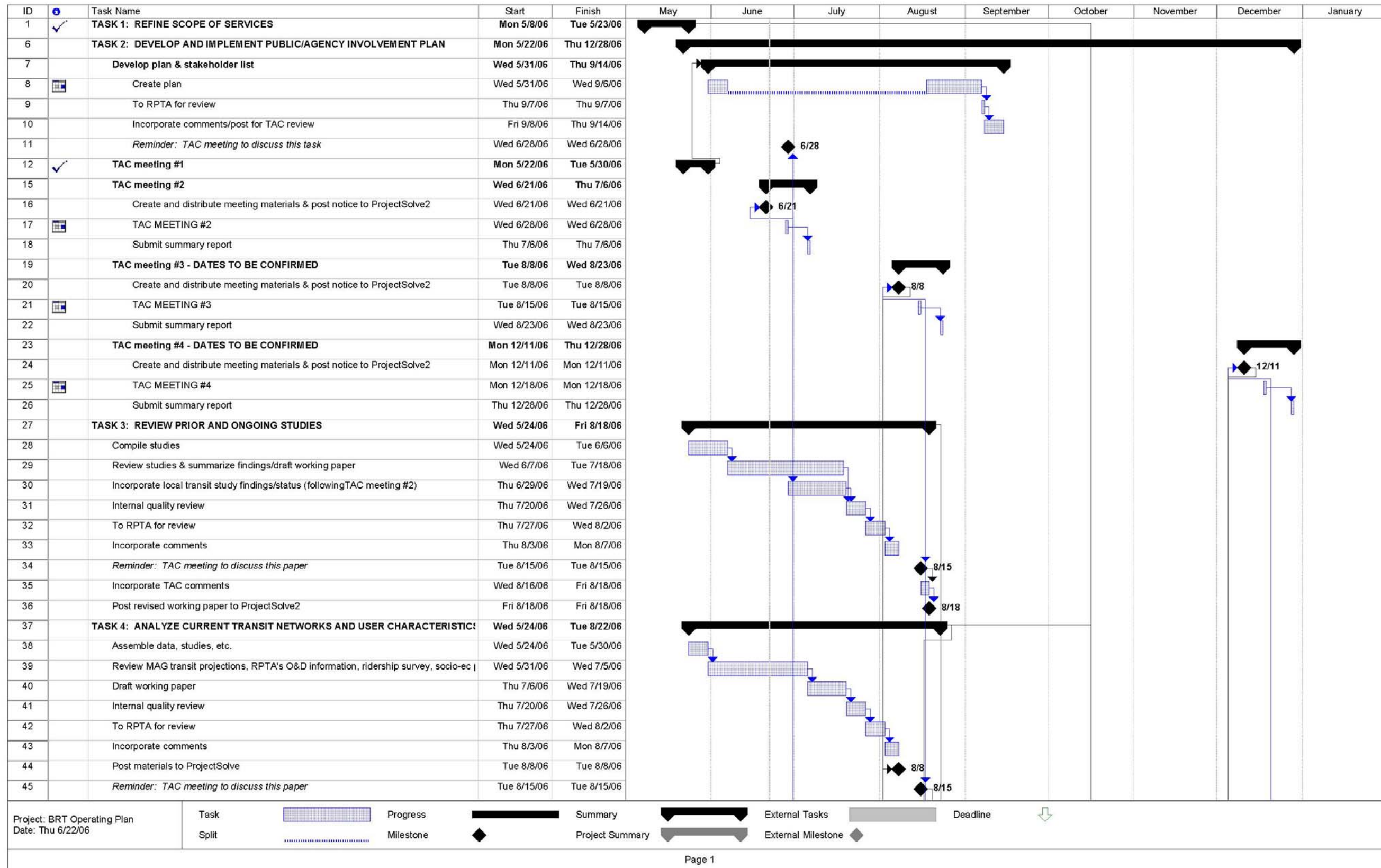
7. Documenting and Incorporating Information from Stakeholders and the Public

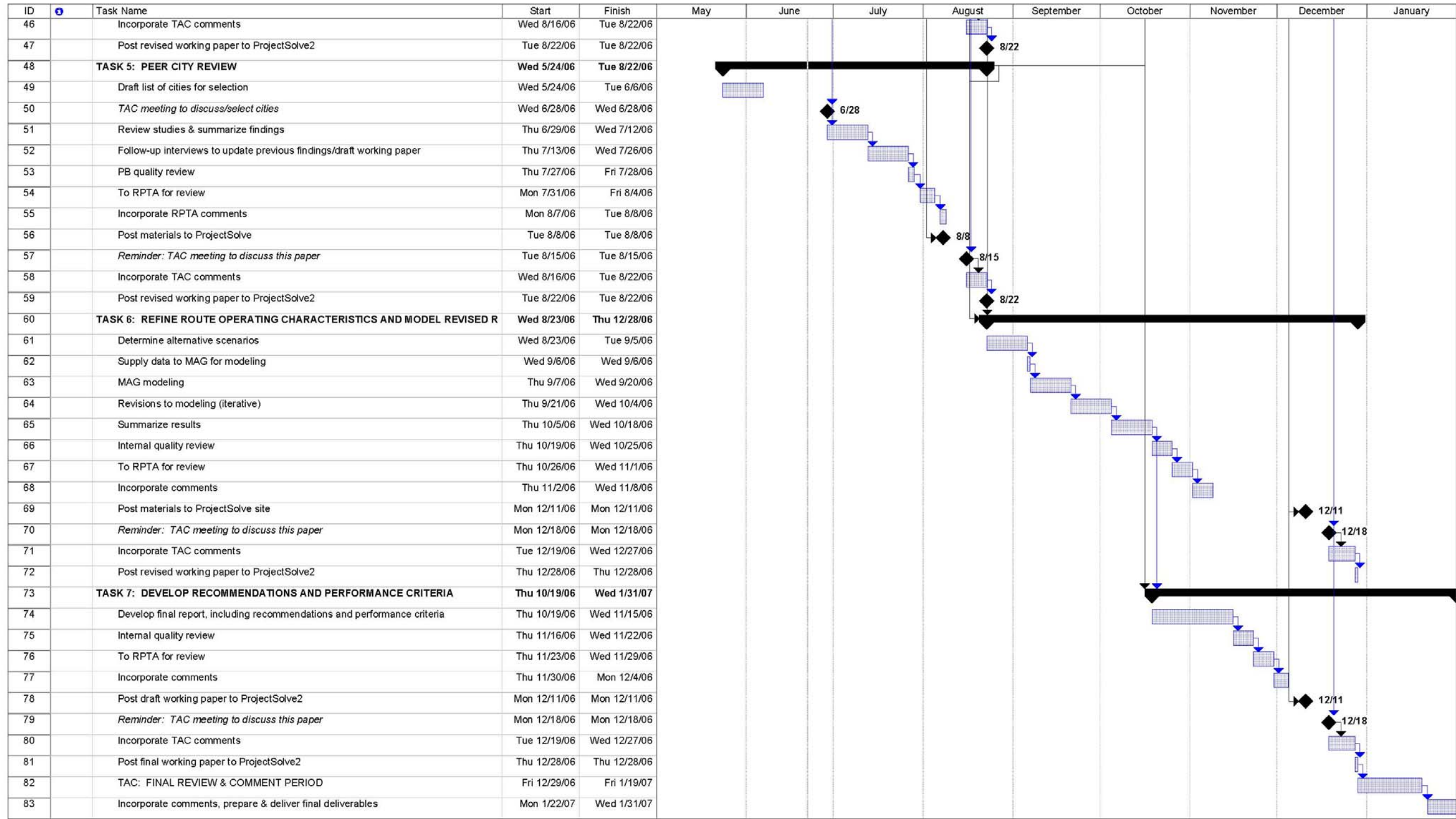
The Program will include consistent procedures for recording and responding to public/agency comment and for relaying public/agency comment to key project team members and decision-makers. Summaries of meetings will be distributed to study staff for consideration and incorporation of public/agency comments as appropriate. Follow-up action (e.g., response to questions) to comments or questions will be taken when appropriate.

All comments resulting from the Public Involvement/Agency Coordination Program will be summarized, analyzed, and included in the Public Involvement/Agency Coordination Summary included in the final study recommendations report.

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Figure 1: Overall Study Schedule





Project: BRT Operating Plan
 Date: Thu 6/22/06

Task: [Hatched Box] Progress
 Split: [Dotted Box] Milestone
 Summary: [Thick Line] Summary
 Project Summary: [Thick Arrow] Project Summary
 External Tasks: [Thin Arrow] External Tasks
 External Milestone: [Thin Diamond] External Milestone
 Deadline: [Thin Arrow] Deadline

RPTA Freeway Express Bus / BRT Operating Plan

Working Paper
**Task 3: Review of Prior & Ongoing
Studies**

Prepared for
Regional Public Transportation Authority



Prepared by



January 2007

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A. INTRODUCTION

This working paper reviews previous and current studies whose findings and recommendations have either helped define the freeway express bus network in the Valley or may affect the implementation and operations of freeway express bus. Reviewing these studies helps to understand the intent and structure of the freeway express bus system and ensures coordination with related ongoing efforts.

This paper is divided into three sections. Section one provides an overview of the evolution of the freeway express bus system as various studies have defined it over the past ten years. Section two reviews studies on infrastructure and service that are related to freeway express bus services. Finally, section three reviews local transit studies for findings on local policy related to freeway express bus.

A note on terminology: The terms for high-quality, rapid bus services have been evolving in recent years as new forms are tested and refined. For the purposes of this study, bus transit terminology used will reflect the definitions from Valley Metro's online transit glossary. Valley Metro definitions for "express bus service" and "bus rapid transit (BRT)" are as follows:

Express bus service - Scheduled bus service operating on a fixed route that provides higher speeds and fewer stops than found on other portions of the bus system or on the same route in local service. Pick ups are made at or near an express route's point of origin and the bus does not stop to pick up or discharge passengers until it reaches its scheduled destination. Express bus service usually uses freeways or busways where they are available. An example is Phoenix's RAPID bus service, which operates from regional park & ride lots to central city destinations via the regional freeway system.

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

B. REVIEW OF PRIOR AND ONGOING STUDIES

1. Evolution of the Regional Express Bus System

1.1 MAG Long-Range Transportation Plan Summary and Updates (1997, 2000, 2002)

The Long-Range Transportation Plan of the Maricopa Association of Governments (MAG) and its subsequent updates outlined plans for a freeway express bus system that was focused on meeting peak-period demand. Services were planned to operate on the existing freeway system and would extend to outlying communities such as Carefree and Cave Creek. Commuter bus service would provide peak period service on weekdays to the communities of Buckeye, Gila Bend and Wickenburg. As described in the updates, the system would include nearly 30 park-and-ride lots and five on-line stations to incorporate express bus, local bus, light rail transit, and shuttle services. The map on the following page shows the Express Bus Plan.

1.2 High-Capacity Transit Study (2003)

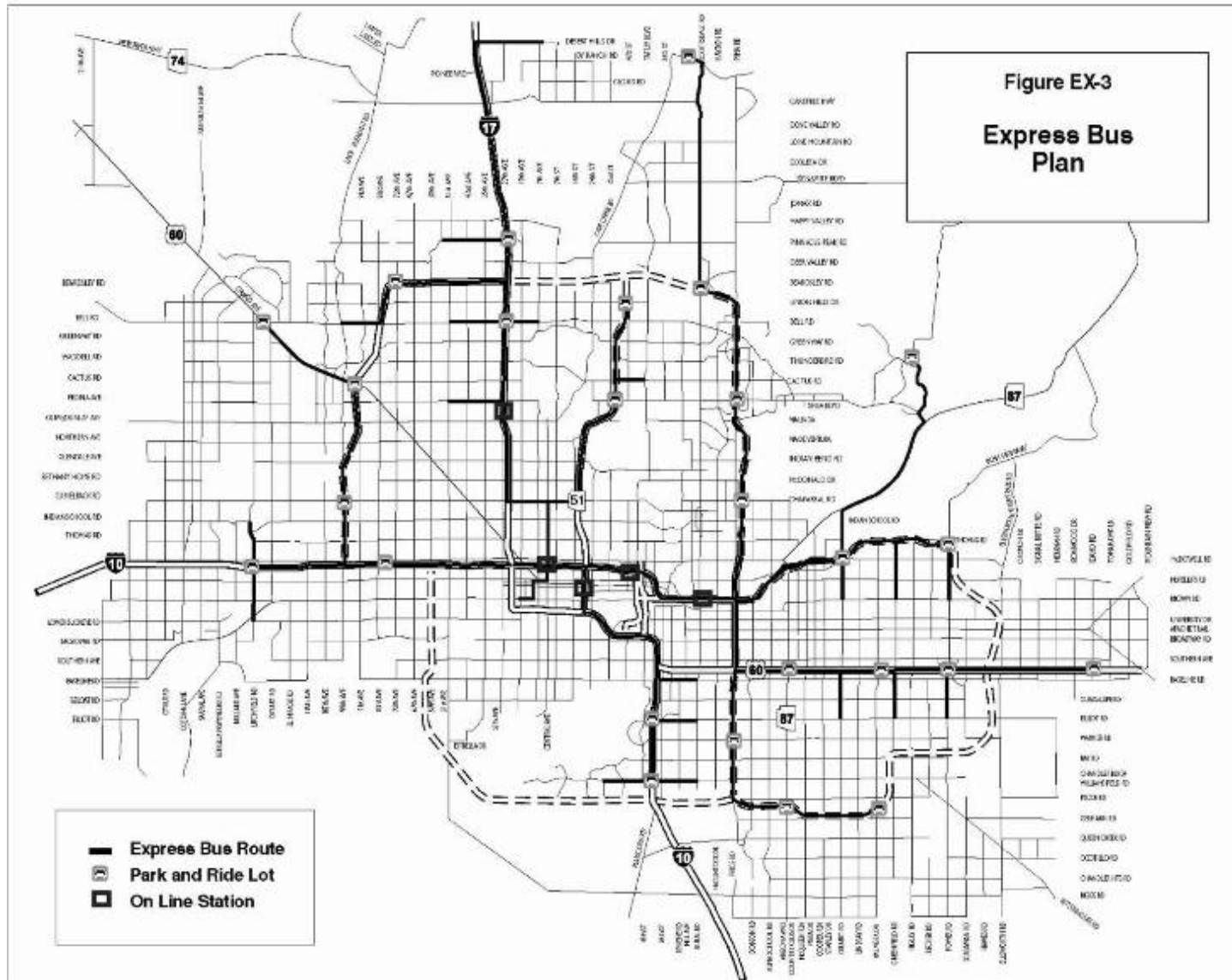
This study from MAG considered projected travel demand in the MAG region through 2040. The study focused on identifying “proven” transit technologies that would be able to meet the level of demand and would also be able to serve both long and short distance trips in order to provide input into the future Regional Transportation Plan.

The study focused on services that would become part of a major investment study; as a result, the study considered commuter rail, light rail transit, and bus rapid transit technologies. Due to the very different operating characteristics and capital costs of express bus versus commuter rail, light rail, and bus rapid transit, the study specifically left the detailed consideration of express bus services to the Regional Transit System Study. Nonetheless, the High-Capacity Transit Study recognized benefits of express bus, including low capital cost and simple implementation, and identified several express bus corridors:

- I-10 Far West – Loop 101 to Loop 303
- I-17 – Loop 101 to Anthem Way
- Loop 101 East – I-17 to Queen Creek Road
- Loop 101 West – I-17 to Baseline Road (via 91st Avenue)
- Loop 202 – I-10/SR-51/Loop 202 Interchange to I-10 South Interchange
- Loop 303 – I-10 to Grand Avenue
- US-60 – I-10 to Idaho Road

The study suggested that high-capacity corridors be implemented in the following timeframes:

Figure 1: Express Bus Plan from 1997 MAG LRTP Update



Source: MAG Long Range Transportation Plan (1999 Update)

Short-term	Medium term	Long term
<ul style="list-style-type: none"> • Camelback Road • Glendale Avenue • I-10 West • Main Street • Metrocenter/I-17 • Scottsdale Road/UP Tempe Branch (Downtown Scottsdale to CP/EV LRT) • SR-51 (Central Avenue to Cactus Avenue) • Commuter Rail corridors – begin negotiations with freight operators and MIS work. 	<ul style="list-style-type: none"> • 59th Avenue (Glendale Avenue to I-10 West) • Bell Road (Scottsdale Road to 59th Avenue) • BNSF (Start-up Phase) • Central Avenue South • Scottsdale Road/Union Pacific (UP) Tempe Branch (North of Downtown Scottsdale and South of CP/EV LRT) • SR-51 (Cactus Avenue to Loop 101) • UP Chandler Branch • UP Southeast (Start-up with reverse commute to Williams Gateway) • UP Yuma (Start-up) 	<ul style="list-style-type: none"> • 59th Avenue (Bell Road to Glendale Avenue and I-10 West to Baseline Road) • Bell Road (59th Avenue to Loop 303) • BNSF (Ultimate to Loop 303) • Chandler Boulevard • Power Road • UP Southeast (Ultimate) • UP Yuma (Ultimate)

A map of the Study’s recommended high-capacity transit network is shown on the next page. (The map includes freeway express bus service.)

1.3 Regional Transit System Study (July 2003)

The Regional Transit System Study (RTS), another MAG study, also developed recommended projects for the 2004 Regional Transportation Plan. The RTS looked at all forms of transit not considered under the HCT Study or the Central Phoenix/East Valley Light Rail project. (Only recommendations relevant to freeway express bus/BRT services are included in this summary.) Most important to the current study, the RTS laid out the system of expressway bus routes that were included in the Regional Transportation Plan.

The RTS Study defined expressway regional routes as services that use existing and proposed high occupancy vehicle (HOV) facilities to connect regional park-and-ride lots with major activity centers, both in central Phoenix and in emerging suburban employment nodes. The routes were designed to replace the existing Valley Metro express routes (500-number routes) and the planned Phoenix RAPID service. According to the study, expressway routes may operate only during peak periods, but can operate all day if needed. Expressway regional routes may also provide suburb-to-suburb connections using loop expressways and intermediate stops, but they do not provide local service other than to circulate around their activity center destinations. The RTS stipulated that transfers from expressway routes would be only to other express routes or to light rail transit.

Figure 2: High Capacity Transit Network from 2003 HCT Study



Source: High Capacity Transit Study

To develop the expressway regional connections services, the RTS identified major activity centers and existing and proposed infrastructure. After considering a variety of criteria, the RTS concluded that downtown Phoenix and downtown Tempe were major activity centers with large enough employment and limited parking to support express regional routes; and Scottsdale Airpark was considered an emerging activity center. Infrastructure necessary for effective regional express services was listed as expressway facilities, HOV facilities (to make service competitive with the single-occupancy vehicle), and sufficient parking capacity at commuter route origins.

The RTS Study made the following recommendations about regional expressway service routes:

- From downtown Phoenix or downtown Tempe, express routes were assumed on all connecting expressways, with more extensive service on those corridors with HOV lanes and multiple park & ride lots.
- During peak hours, non-stop service is provided to downtown Phoenix from all corridors. During off peak hours, non-stop or one-transfer commuter service is provided to downtown Phoenix from all corridors.
- During peak hours, non-stop service is provided to downtown Tempe from corridors with projected high travel patterns to downtown Tempe. During off peak hours, service is either non-stop or one-transfer service via express route or LRT transit.
- Peak period express service is provided along the two most significant commuter travel corridors to the Scottsdale Airpark area, the North and East Loop 101.

Expressway regional routes were anticipated to cost \$4.76/revenue mile (in 2002 dollars). Commuter transit buses were the recommended vehicle for expressway services.

The RTS Study listed 25 potential Routes to be implemented by 2030. The table on the next page shows those routes, along with recommended year of implementation. (Expressway route timing was scheduled to match implementation of park-and-ride lots.) A map of the system follows the table.

1.4 Regional Transportation Plan (2004) and Annual Updates (2005 and 2006)

The 2004 Regional Transportation Plan (RTP) was a MAG document that incorporated the findings of several previous studies. The goal was to provide a list of projects that would be funded by revenues from Proposition 400, which was passed in November 2004. The RTP listed projects for roadways, highways, and all types of transit; only findings and recommendations relevant to freeway express/BRT service are included in this summary. An annual update of the RTP is published each year to report any changes made to the RTP projects as well as to discuss progress made on project implementation and to document expenditures.

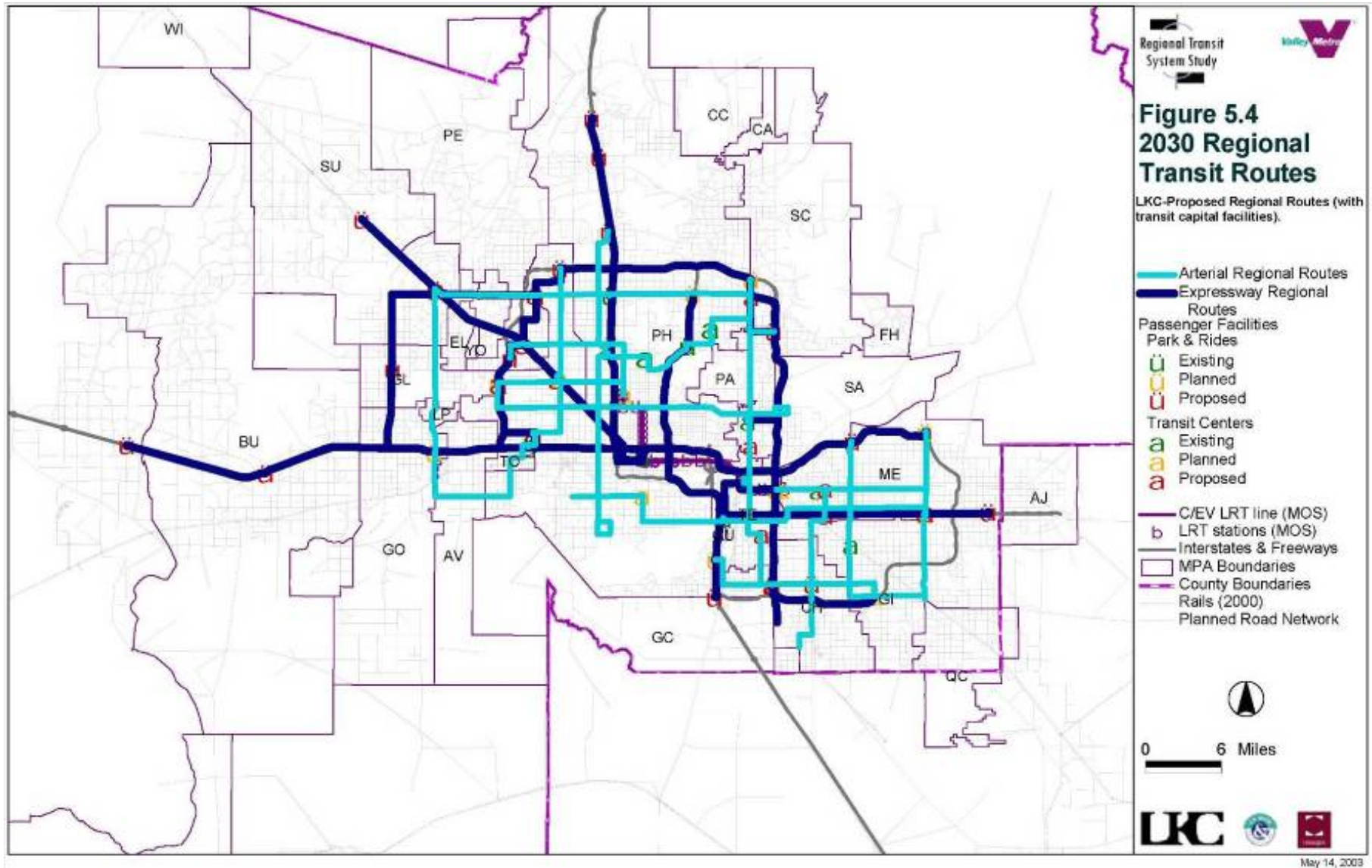
After discussions with local jurisdictions, regional agencies, and ADOT, MAG refined the recommendations from the RTS Study to develop a list of freeway express/BRT projects and the implementation schedule listed in the RTP. The RTP used essentially the same definition of Freeway BRT services as the RTS, that is, routes that use existing and proposed high occupancy vehicle (HOV) facilities to connect remote park-and-ride lots with major activity centers, including core downtown areas. However, the RTP did not limit service only to three major activity centers, stating:

Freeway Corridor	Route Name	Primary Destination	Time Period	Transit Nodes	Year of Implementation
Black Canyon Freeway	Deer Valley Express	Downtown Phoenix	Peak	Deer Valley P&R, MetroCenter	2003
	North Glendale Express	Downtown Phoenix	Peak	Arrowhead TC, North Glendale P&R, MetroCenter	2004
	North I-17 Express	Downtown Phoenix	Peak	Carefree P&R, Happy Valley P&R, MetroCenter	2013
	Anthem Express	Downtown Phoenix	Peak	Anthem P&R, MetroCenter	2020
	Black Canyon Connector	Metro Center (Downtown via LRT)	Off-peak	Happy Valley P&R, Carefree P&R, Deer Valley P&R, MetroCenter	2013
East Loop 101 (Pima Frwy, Price Frwy)	Pima Express	Downtown Phoenix	Peak	Airpark P&R, Airpark TC, Scottsdale P&R	2005 (to Scottsdale P&R) 2006 (to Scottsdale Airpark P&R)
	East Loop 101 Connector	Downtown Phoenix or Tempe via LRT, Airpark	All day	Chandler TC-P&R, Ahwatukee P&R, Tempe P&R-LRT, Airpark TC, Airpark P&R	2006
Grand Avenue (US60 West)	Grand Avenue Limited	Downtown Phoenix	All day; Saturdays	Grand/Jomax P&R, Surprise P&R, Peoria TC, Glendale TC/P&R	2005 (to Glendale) 2017 (to Surprise) 2025 (to Jomax)
Maricopa Freeway	Ahwatukee Express	Downtown Phoenix	Peak	Desert Foothills P&R, Ahwatukee P&R	2003 2008 (to Desert Foothills P&R)
	Ahwatukee Connector	Downtown Tempe (PHX via LRT)	All day	Desert Foothills P&R, Ahwatukee P&R, Arizona Mills TC, Tempe TC-LRT	2008 (to Desert Foothills P&R)
North Loop 101 (Pima Frwy, Agua Fria Frwy.)	North Loop 101 Connector	Airpark	Peak	Surprise P&R, Arrowhead TC, North Glendale P&R, Airpark P&R, Airpark TC, Scottsdale P&R	2006 (North Glendale P&R to Scottsdale P&R) 2016 (Surprise P&R – Scottsdale P&R)

Freeway Corridor	Route Name	Primary Destination	Time Period	Transit Nodes	Year of Implementation
Papago Freeway	Desert Sky Express	Downtown Phoenix	All day	Desert Sky TC, 79 th Ave. P&R	2003
	Avondale Express	Downtown Phoenix	Peak	Avondale P&R	2006
	Buckeye Express	Downtown Phoenix	Peak	East Buckeye P&R, West Buckeye P&R	2023 (to East Buckeye P&R) 2024 (to West Buckeye P&R)
	Loop 303 Express	Downtown Phoenix	Peak	Surprise P&R, 303/Northern P&R, Avondale P&R	2016
	Peoria Express	Downtown Phoenix	Peak	Peoria P&R, Peoria TC, 101/Glendale TC-P&R	2007 (from 101/Glendale P&R) 2017 (from Peoria P&R)
	Papago Connector	Downtown Phoenix via Desert Sky Express	All day	East Buckeye P&R, West Buckeye P&R, Avondale P&R, Desert Sky TC	2006 (from Avondale P&R) 2023 (from East Buckeye P&R) 2024 (from West Buckeye P&R)
Red Mountain Frwy	Red Mountain Express	Downtown Phoenix	Peak	202/Power P&R, 202/Gilbert P&R	
	Red Mountain Connector	Downtown Tempe (PHX via LRT)	All day	202/Power P&R, 202/Gilbert P&R, Tempe P&R-LRT, Tempe TC-LRT	2006
Santan Frwy	Santan Express	Downtown Phoenix	Peak	Gilbert P&R, Chandler TC-P&R	2004
State Route 51	SR51 Express	Downtown Phoenix	All day	SR51/Bell P&R, Dreamy Draw P&R	2004
Superstition Frwy	Apache Junction Express	Downtown Phoenix	Peak	Apache Junction P&R, Superstition Springs TC	2021
	Superstition Springs Express	Downtown Phoenix	Peak	Superstition Springs P&R, Superstition Springs TC, Mesa P&R	2003
	Superstition Connector	Downtown Tempe (PHX via LRT)	All day	Superstition Springs P&R, Superstition Springs TC, Mesa P&R, Tempe P&R-LRT, Tempe TC-LRT	2006
West Loop 101 (Agua Fria Frwy)	West Loop 101 Connector	Downtown PHX (via Desert Sky Express)	All day	Arrowhead TC, Peoria TC, Peoria P&R, 101/Glendale TC-P&R, Desert Sky TC, 79 th Ave P&R	2007 (from 101/Glendale P&R)

Source: 2003 Regional Transit System Study

Figure 3: Regional Transit System as defined in 2003 Regional Transit System Study



Source: 2003 Regional Transit System Study

The freeway BRT system serves two functions: providing connections between the suburbs and the central city, and suburb-to-suburb connections. The latter reflects the evolution of land use in the region, from a central Phoenix focus to a more amorphous development pattern featuring multiple employment and activity centers.

The table below (which continues to the next page) shows the list of Freeway Express/BRT projects listed in the RTP. Phasing as well as expected operating cost is included. Specific service start dates shown in the table are from the 2005 Annual Update.

Segment	Phase	Service Start Date	Operating Cost	Operating Cost by Phase			
				Phase I	Phase II	Phase III	Phase IV
North Loop 101 Connector (Surprise to Scottsdale P&R)	I	2007	4.5	1	1.1	1.1	1.2
North Glendale Express	I	2007	9.4	1.7	2.5	2.5	2.7
Papago Fwy Connector (to West Buckeye P&R)	I	2008	3.3	0.6	0.9	0.9	1
Buckeye Express (to West Buckeye P&R)	I	2010	1.7	0.1	0.5	0.5	0.6
West Loop 101 Connector (to North Glendale P&R)	I	2008	5	0.9	1.3	1.3	1.5
East Loop 101 Connector	I	2008	3.2	0.4	0.9	0.9	1
Red Mountain Express	I	2008	14.2	2	4	4	4.4
Desert Sky Express	I	2009	8.8	0.8	2.6	2.6	2.8
Apache Junction Express	I	2010	3.5	0.3	1	1	1.1
Superstition Fwy Connector	II	2011	0.8	-	0.2	0.3	0.3
Pima Express (To Airpark P&R)	II	2012	3.2	-	0.8	1.1	1.2
Segment	Phase	Service Start Date	Operating Cost	Operating Cost by Phase			
				Phase I	Phase II	Phase III	Phase IV
Peoria Express (to Peoria P&R)	II	2013	7.6	-	0.9	3.1	3.5
Black Canyon Freeway Corridor	II	2015	4.8	-	0.2	2.2	2.4
Ahwatukee Connector	III	2016	1.1	-	-	0.5	0.6
Santan Express	III	2017	9.1	-	-	2.8	6.2
Anthem Express	III	2017	2.4	-	-	0.5	1.9
Red Mountain Fwy Connector	III	2018	2.3	-	-	0.5	1.8
Superstition Springs Express	III	2018	15.5	-	-	3.3	12.2
Deer Valley Express	III	2018	9.4	-	-	0.8	8.6
Avondale Express	III	2019	6.6	-	-	0.5	6
North I-17 Express	IV	2022	0.7	-	-	-	0.7
Loop 303 Express	IV	2022	3.7	-	-	-	3.7
SR. 51 Express	IV	2023	5.4	-	-	-	5.4
Ahwatukee Express	IV	2022	12	-	-	-	12
Subtotal			138.2	7.8	16.9	30.4	82.8

Cost estimates are in millions; 2002 dollars

Source: Regional Transportation Plan and 2005 Update

The 2006 Annual Update specified that the routes planned for implementation from FY2006 through FY2010 would operate in the peak direction at 30-minute intervals, during the three-hour morning and afternoon commute periods. Specific routing information was provided for several of the routes:

- **North Loop 101 Connector (Surprise to Scottsdale Road)** – The east terminus of this route is located at Scottsdale Road. From this area, bus service is generally routed along Loop 101 to Arrowhead Towne Center Transit Center, then west on Bell Road to the Surprise Park-and-Ride facility, which is the west terminus of the route.
- **North Glendale Express** – The north terminus of this route is the Arrowhead Transit Center. From this area, bus service is generally routed on Bell Road to Loop 101, along Loop 101 to Grand Avenue, along Grand through Peoria, Glendale and Phoenix, then on 19th Avenue, then to the Capitol Complex, and to Central Station in Downtown Phoenix, which is the south terminus of the route.
- **Papago Freeway Connector (To West Buckeye Park and Ride)** – The west terminus of this route is the future Buckeye Park-and-Ride facility in the vicinity of Miller and Lower Buckeye roads. From this area, bus service is generally routed along I-10 to 83rd Avenue, then on 83rd Avenue to Thomas Road, to the Desert Sky Transit Center. From this area, the bus service extends to the High Occupancy Vehicle (HOV) ramp at 79th Avenue/I-10, then on I-10 to 19th Avenue; then to the Capitol Complex, and to the Phoenix Downtown Central Station, which is the east terminus of the route.
- **West Loop 101 Connector (To North Glendale Park and Ride)** – The north terminus of this route is the Arrowhead Transit Center. From this area, bus service is generally routed on Bell Road to Loop 101, along Loop 101 to Bethany Home Road and the University of Phoenix Stadium complex, to Thomas Road, then to the Desert Sky Transit Center. The route extends to the Park-and-Ride facility at 79th Avenue/I-10, which is the south terminus of the route.
- **East Loop 101 Connector** – The north terminus of this route is located at the Scottsdale Airpark. From this area, bus service is generally routed along Loop 101 to Chaparral Road and Scottsdale Community College. From that point, the bus service continues on Loop 101 to University Drive, then to the College Avenue Transit Center. The route then extends back to and along Loop 101 to the Chandler Fashion Mall Transit Center, which is the south terminus of the route.
- **Red Mountain Express** – The east terminus of this route is located at the Park-and-Ride facility on Power Road and Loop 202 (Red Mountain Freeway). From this area, bus service is generally routed along Loop 202 to Scottsdale Road, then to ASU and Rural Road. From that area, the bus service returns to Loop 202, extending to the Phoenix Downtown Central Station, which is the west terminus of the route.
- **Desert Sky Express** – The west terminus of this route is the Desert Sky Transit Center. From this area, bus service generally extends along 79th Avenue to I-10, continues on I-10 to 19th Avenue, the Capitol Complex, and the Downtown Phoenix Central Station, which is the east terminus of the route.
- **Apache Junction Express** – The east terminus of this route is the future Park-and-Ride lot at Signal Butte Road and US 60. From this area, bus service extends generally along US 60 (Superstition Freeway) to I-10, then along I-10 to the Downtown Phoenix Central Station, which is the west terminus of the route.
- **Buckeye Express (To West Buckeye Park and Ride)** – The west terminus of this route is located in the vicinity of Sun Valley Parkway and I-10. From this area, bus service generally extends along I-10 to 19th Avenue, then along 19th Avenue to the Capitol Complex, and to the Downtown Phoenix Central Station, which is the east terminus of the route.

A map of the updated Freeway Express Bus/BRT system from the 2006 Annual Report is shown on the following page.

Some of the express routes are located in eligible high-capacity corridors, as shown in the map on page 14. Location of a route in a future high-capacity corridor may influence how those routes develop over time, and will be taken into consideration in short-term implementation plans.

2. Related Infrastructure and Transit Projects

2.1 Regional Park-and-Ride Study (January 2001)

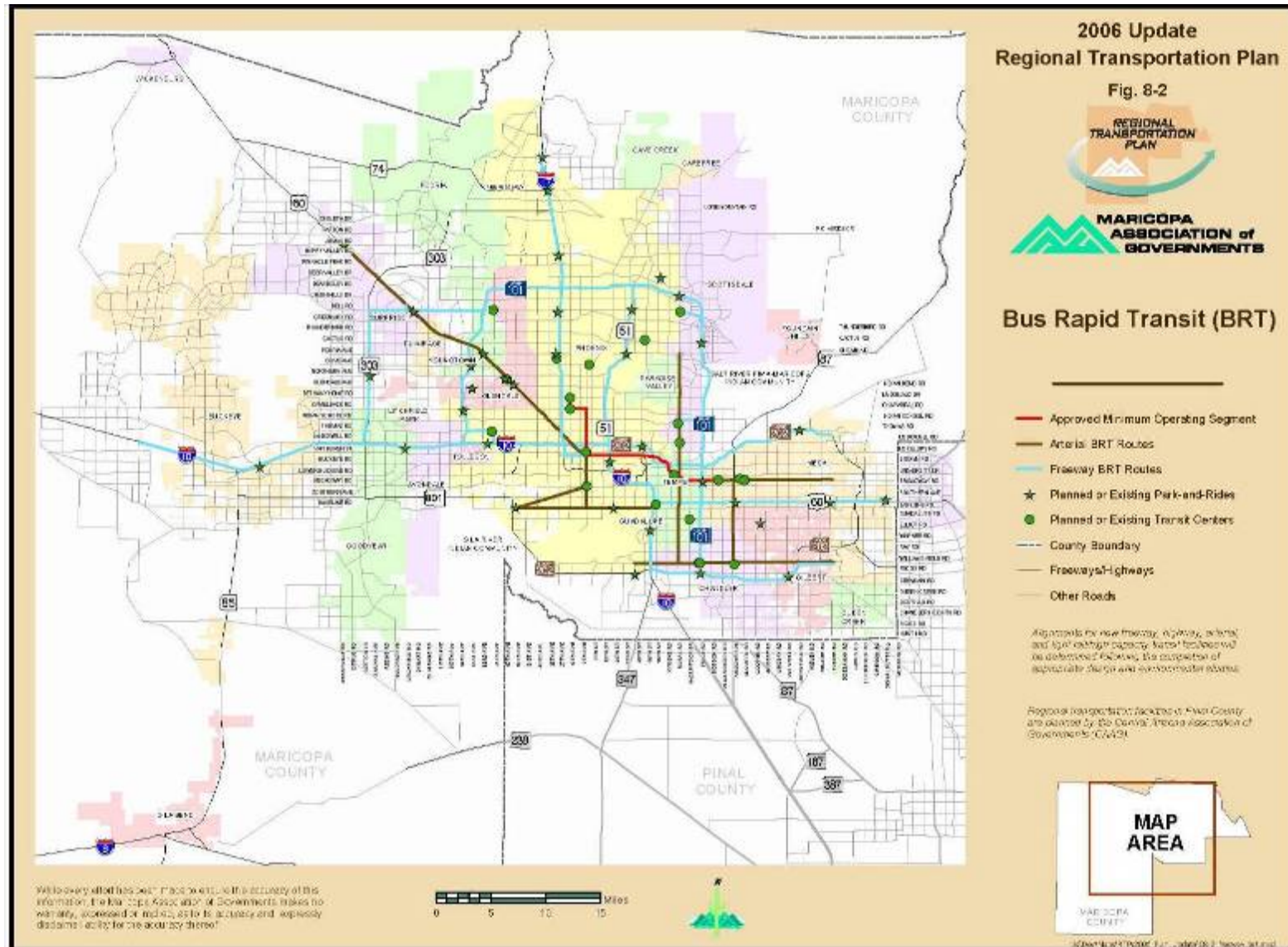
This MAG study identified a system of regional park-and-ride lots designed to serve commuters as part of a regional express bus system. This comprehensive report reviewed site selection and design considerations and provided extensive research on target areas for park-and-ride sites around the valley.

Through a literature review and other research, the study identified characteristics of successful park-and-ride lots, which may affect or be affected by express bus services:

- High level of express bus service (service every 15 minutes or less during peak periods);
- Location close to a freeway or light rail line (1 mile or less);
- Access to HOV lanes for at least a portion of the bus trip to the final destination;
- Express transit service available over at least a three hour period in morning and evening peak periods;
- Visible from adjacent arterials (to facilitate marketing and patron safety); and
- Parking costs at the destination(s) served by lot are substantially higher than the round trip bus fare.

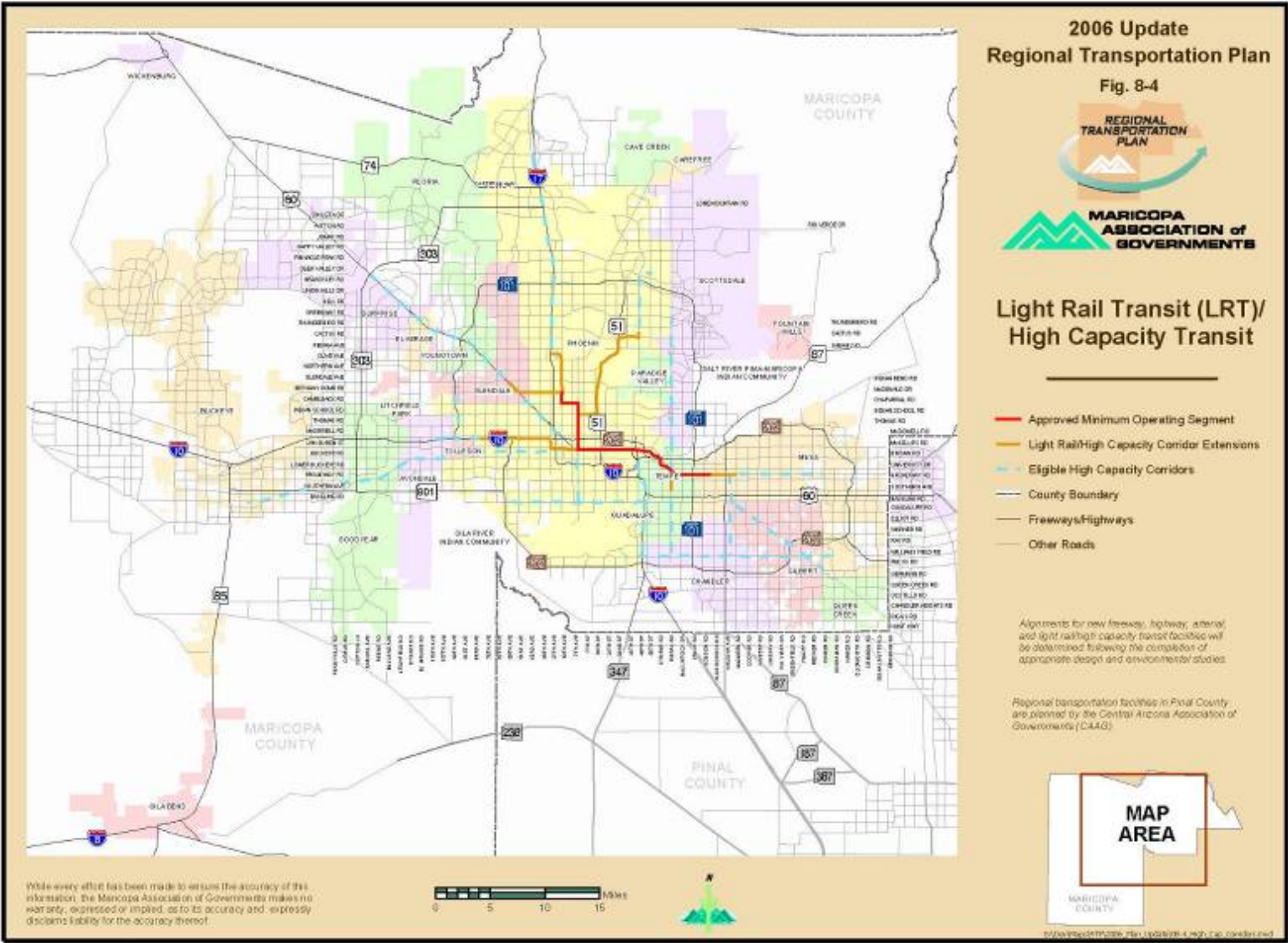
The 2001 Park-and-Ride Study identified funding for ten near-term target areas for park-and-ride lots. The Study also identified ten long-term target areas, which, at the time, were not programmed for funding. The charts on the following pages list the recommended sites, and the map that follows shows the locations.

Figure 4: BRT System from 2006 RTP Update



Source: Regional Transportation Plan 2006 Update

Figure 5: High Capacity Transit System from 2006 Regional Transportation Plan



Source: Regional Transportation Plan 2006 Update

Recommended Prioritization of Park-and-Ride Lot Locations Long-Term

Priority	Target Area	Jurisdiction	Recommended Site (For Programming Purposes)	Capital Budget (Up to 250 Stalls)**	Capital Budget (To meet 2020 Demand)**
11	18 – Loop 101 in Tempe	Tempe	18.1 – Loop 101/ Apache/Broadway	\$3,218,000	\$1,368,000; total of 402 stalls
12	4 – I-10 near Elliott Road, or 5 – I-10 near Chandler Boulevard	Phoenix	4.3 – Warner Road/I-10 SE	\$4,193,000	\$1,143,000; total of 377 stalls
13	15 – Loop 101, near Scottsdale Road or 16 – Loop 101 near Shea Boulevard	Scottsdale	15.2 – Loop 101/Scottsdale NW	\$4,903,000	\$2,250,000; total of 500 stalls
14	28 – US 60 near Country Club Road	Mesa	28.3 – Mesa Drive/Javelina NE/SE	\$4,013,000	\$3,150,000; total of 600 stalls
15	20/21 – Loop 202 near Arizona Avenue/ Val Vista	Chandler	20.5 – Frye/Price Frontage Road	\$3,543,000	\$1,332,000; total of 398 stalls
16	10 – Loop 101 near Camelback	Phoenix, Glendale	10.3 – Loop 101/Camelback SW	\$3,698,000	\$2,295,000; total of 505 stalls
17	8 – I-17 near Deer Valley Road	Phoenix	8.1 – Happy Valley Road/I-17 SW	\$4,043,000	\$2,565,000; total of 535 stalls
18	22 – Loop 202 near Power Road	Gilbert	22.5 – Val Vista/Germann NW	\$3,348,000	\$0; demand less than 250 stalls, to be reevaluated as demand warrants
19	31 – Grand Avenue near Litchfield	Surprise	31.4 – Bell Road/Dysart SW	\$3,543,000	\$0; demand less than 250 stalls, to be reevaluated as demand warrants
20	32 – Grand Avenue near 67 th Avenue	Glendale	11.6 – Myrtle/59 th Avenue SW	\$3,263,000	\$2,700,000; total of 613 spaces (including 70 existing spaces)
Sub-total				\$37,765,000	\$16,803,000
Total				\$79,945,000	\$39,678,000

** Cost estimates are in Year 2000 dollars and are subject to revisions during pre-design and design processes.

- Footnotes:
- Prior to construction of the ultimate facilities, demand estimates should be revisited.
 - The final programming will differ depending on sponsorship commitments, updated cost estimates, and local jurisdiction funding that allows for advance design and construction in some cases. Costs include land acquisition (where applicable), design including necessary environmental document preparation, and construction.
 - Exact lot locations may change following the consideration of alternative sites in the detailed environmental analysis required for each lot. The final location for each lot should, however, be within the same target area that contained the original recommended lot.
 - Additional lots may be added to the regional system in the future as needs are identified and funding becomes available.

Source: MAG Park-and-Ride Study (2001)

Recommended Prioritization of Park-and-Ride Lot Locations Near-Term

Priority	Target Area	Jurisdiction	Recommended Site (For Programming Purposes)	Capital Budget (Up to 250 Stalls)**	Capital Budget (To meet 2020 Demand)**
1*	30 – US 60 near Power Road	Mesa	30.1 – Superstition Springs Mall	\$3,273,000	Capacity reached in Phase 1, second surface lot for budgeting purposes, \$4,950,000; total of 800 stalls
2*	12/13 – Loop 101 near 67 th Avenue	Glendale	13.2 – Loop 101 Frontage Road and 59 th SE	\$5,973,000	\$4,950,000; total of 800 stalls
3	4 – I-10 near Elliott Road or 5 – I-10 near Chandler Boulevard	Phoenix	5.5 – 50 th Street, 1/4 mile north of Chandler Boulevard	\$4,243,000	\$1,539,000; total of 421 stalls
4	29 – US 60 near ValVista	Gilbert	29.4 – Page/Ash SW	\$3,638,000	\$2,250,000; total of 500 stalls, estimate
5	14/27 – SR 51 near Bell Road	Phoenix	14.3 – 36 th and Bell SW	\$5,133,000	\$3,150,000; total of 600 stalls, maximum on site
6	15 – Loop 101 near Scottsdale Road, or 16 – Loop 101 near Shea Boulevard	Scottsdale	16.2 – Loop 101/Cactus NE	\$5,048,000	\$1,260,000; total of 390 stalls
7	11/32 – Loop 101 near Grand Avenue	Peoria	11.3 – 91 st Avenue/Olive SW	\$4,133,000	\$1,728,000; total of 442 stalls
8*	7 – I-17 near Peoria Avenue	Phoenix	7.1 – (Decked Lot) Metrocenter	\$3,153,000	\$330,000; total of 283 stalls***
9	23/24 Loop 202 near Power/Gilbert	Mesa	23.6 – Gilbert/McDowell NE	\$3,573,000	\$1,647,000; total of 433 stalls
10	2 – I-10 near Litchfield	Avondale Goodyear	2.4 – I-10/Litchfield Road NW	\$4,013,000	\$1,071,000; total of 369 stalls
Sub-total				\$42,180,000	\$22,875,000

* Potential joint use development lot—An emphasis was placed on identifying potential locations of joint use or joint development lots. In these highlighted target areas, the preferred site provides such an opportunity. Potential joint use/joint development sites have been identified in other target areas and are included in the Task 5/6 Report: Site Evaluations.

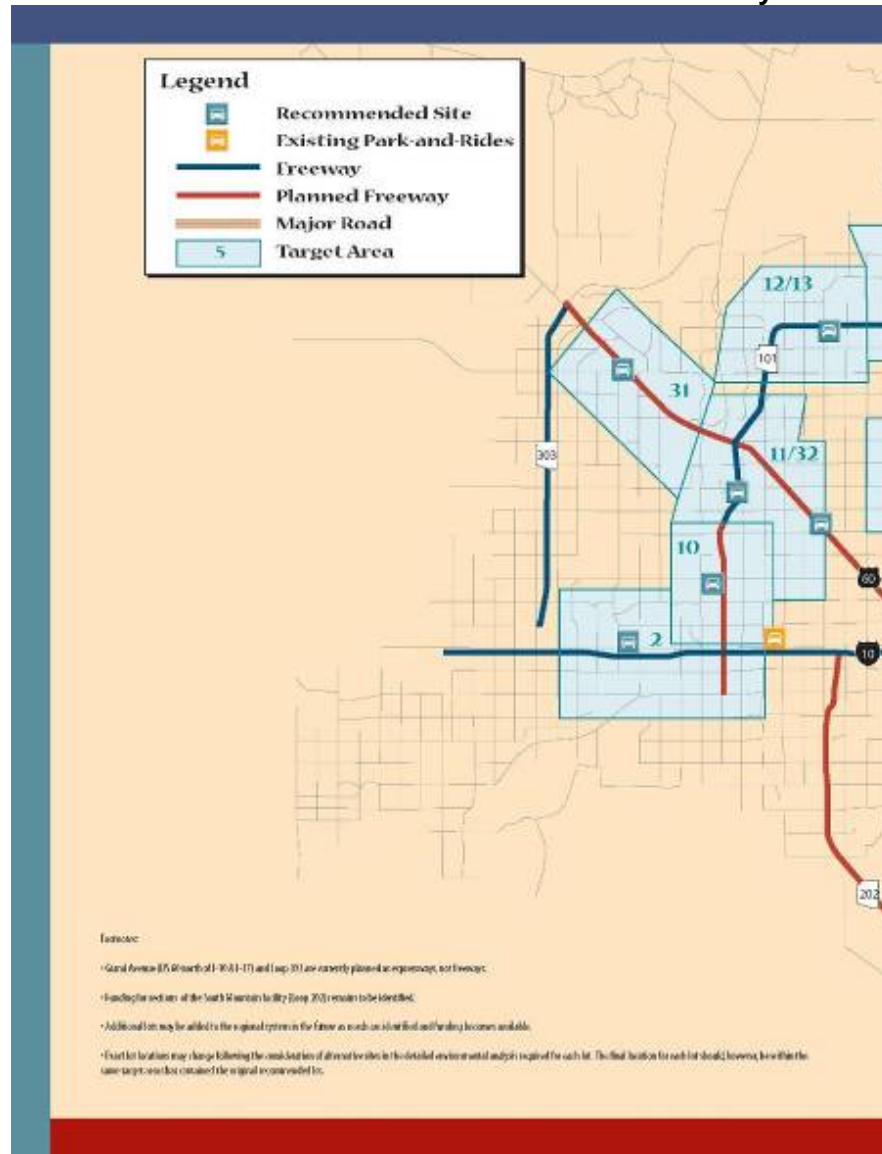
** Cost estimates are in Year 2000 dollars and are subject to revisions during the pre-design and design processes. Costs include: land acquisition, design and construction.

*** May be built as part of Phase 1.

Footnotes: • Near-term: expected to be scheduled or programmed for construction over the next five years.
• Long-term: beyond the current program but in the 20-year timeframe of the regional Long Range Transportation Plan.

Source: MAG Park-and-Ride Study (2001)

Figure 6: Recommended Park-and-Ride Sites from 2001 MAG Park-and-Ride Study





Source: MAG Park-and-Ride Study (2001)

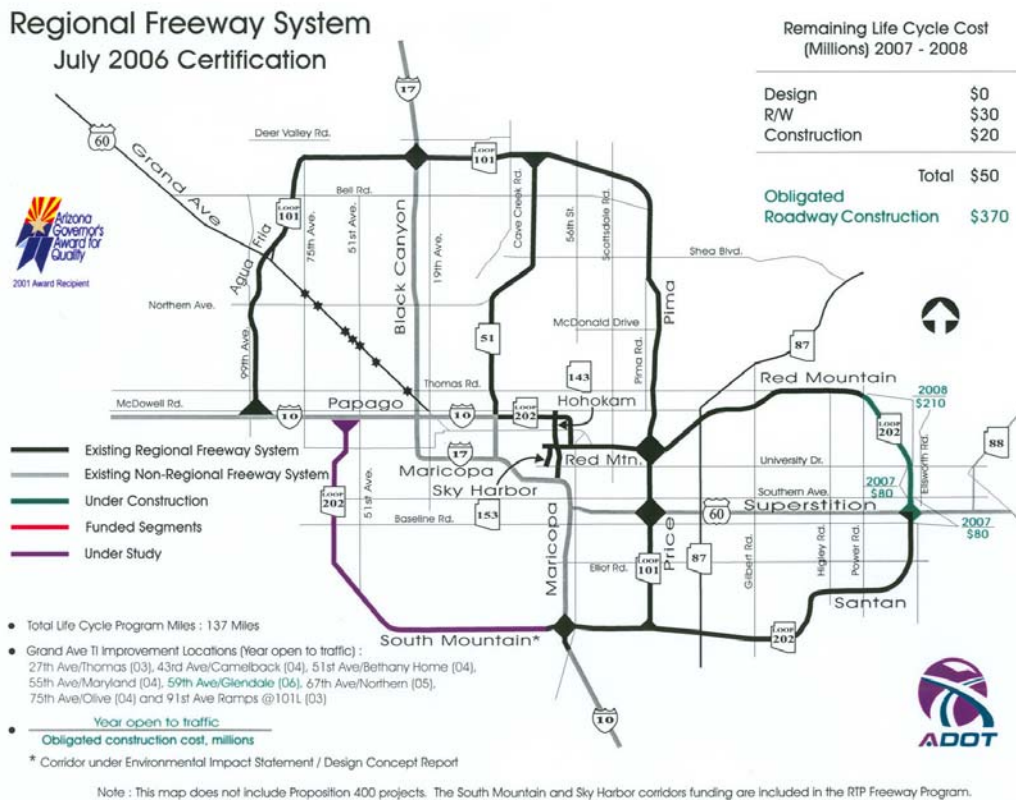
2.2 RPTA Park-and-Ride Reprioritization Study (on-going)

The ongoing Park-and-Ride Reprioritization Study is an effort by the RPTA to identify the implementation timeline for 13 regional park-and-ride lots identified in the RTP and funded by Proposition 400 sales tax revenues. (These 13 park-and-ride lots are those identified as the ten “long-term” lots in the 2001 MAG Park-and-Ride Study, along with three additional lots.) Some study goals include ensuring that the implementation of each park-and-ride lot is timed to coincide with its corresponding express bus service and identifying opportunities for early land acquisition.

Preliminary findings have established the current status of park-and-ride lots in the Valley. The map on the following page shows the status of existing park-and-ride lots, including joint-use lots; lots that are programmed for funding in the TIP; and lots that are funded with RTP funding. Also shown are lots for which no funding is currently identified but which have been suggested as possible locations.

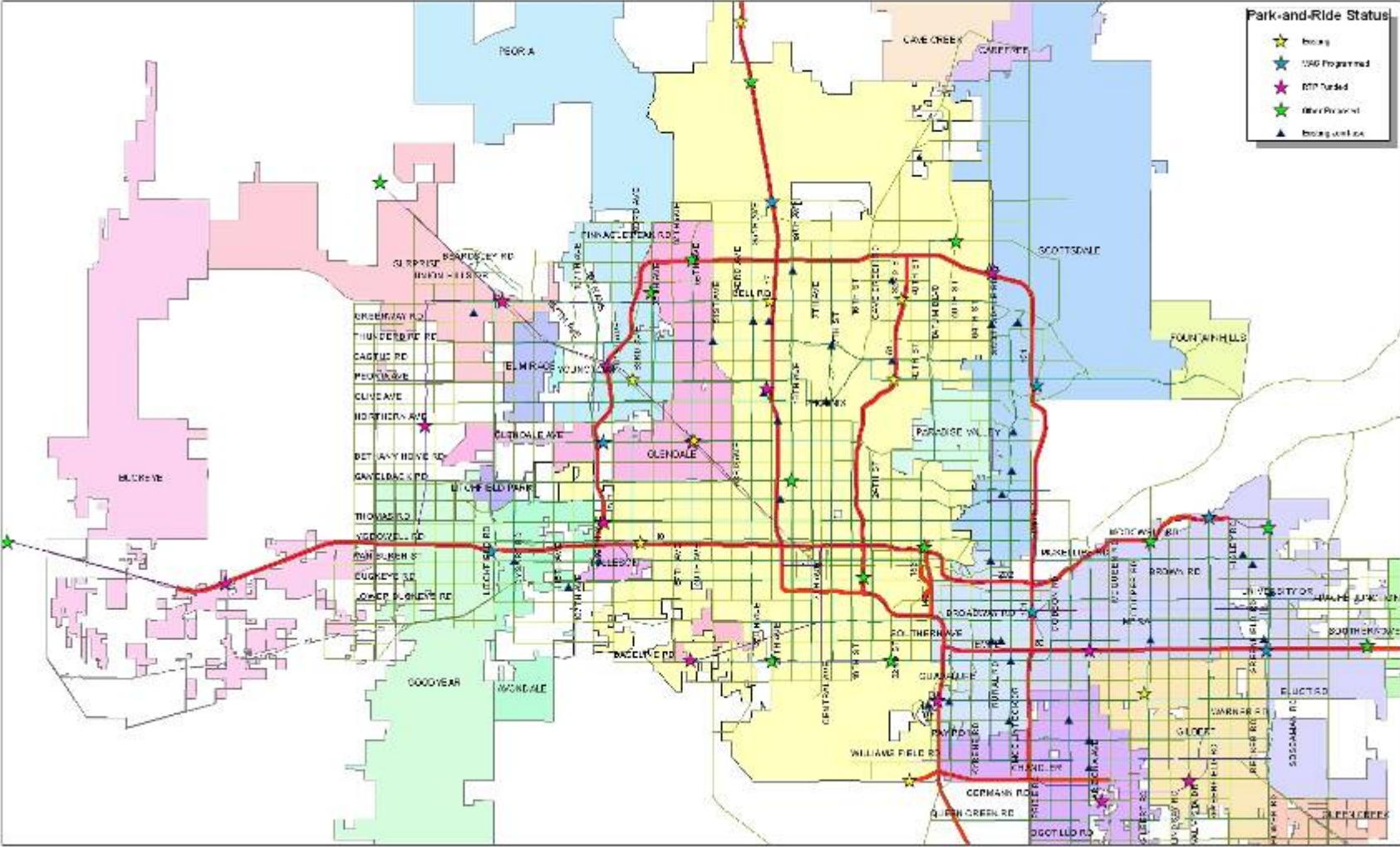
2.3 Freeway Construction and Acceleration

The Regional Transportation Plan listed arterial and freeway improvement projects. Recently, the state legislature approved using surplus funding to accelerate some projects due to tremendous growth in the Valley and resulting strain on the transportation system. As of late 2006, the acceleration schedule had not yet been determined. The most updated plan for freeway construction is shown in the graphic below.



Source: ADOT website (2006)

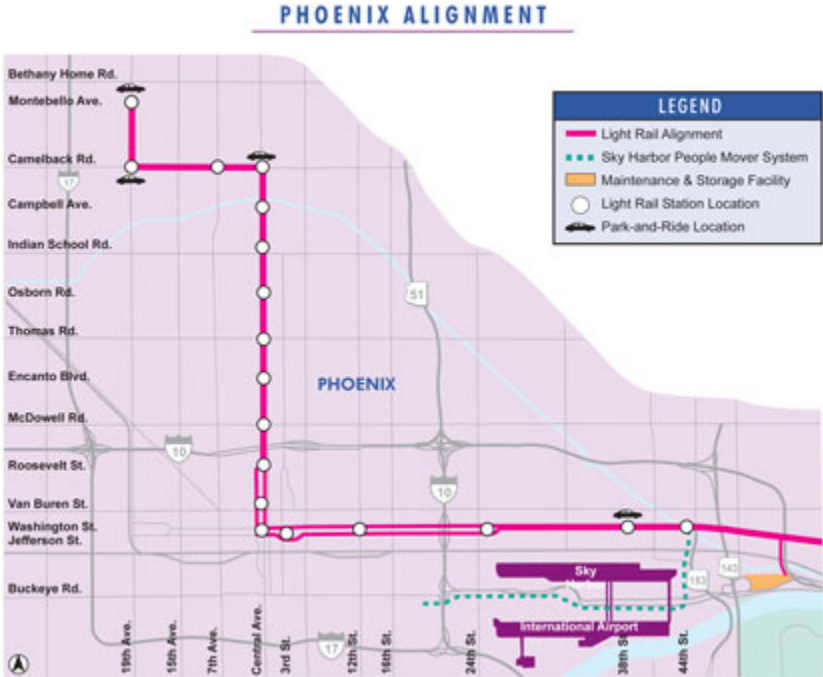
Phoenix Metro Park-and-Ride Lots



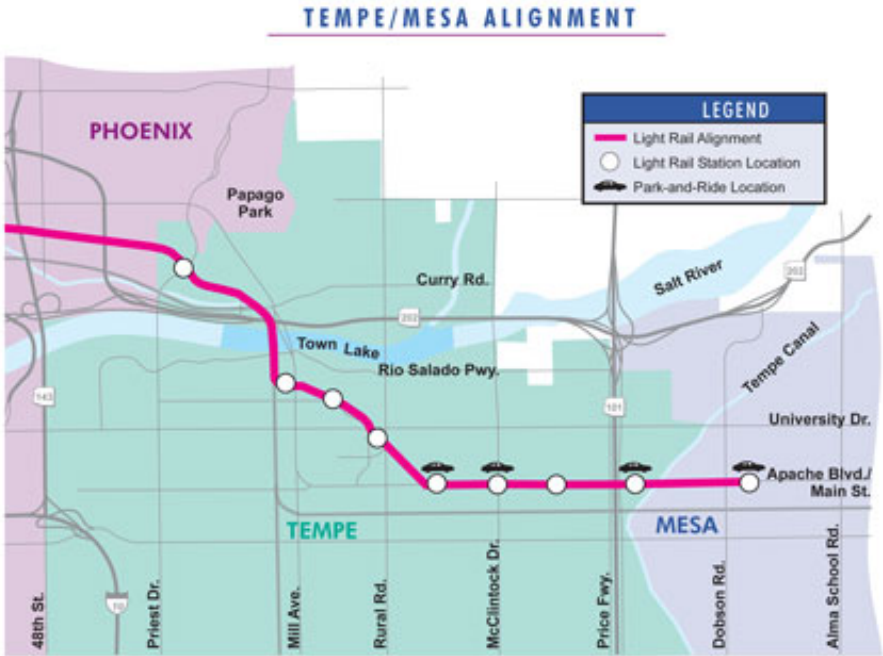
Source: Park-and-Ride Re-prioritization Study, draft documents (2006)

2.4 Metro Light Rail Transit

After a series of planning studies, environmental reviews, and funding initiatives, construction of a 20-mile light rail transit line is currently underway in the Valley. The initial line of the light rail extends from 19th Avenue and Bethany Home Road in Phoenix to Main Street and Sycamore Road (just past Dobson Road) in Mesa, and is scheduled to be operational in December 2008. The maps below show the alignment of the initial light rail line, including station and park-and-ride locations.

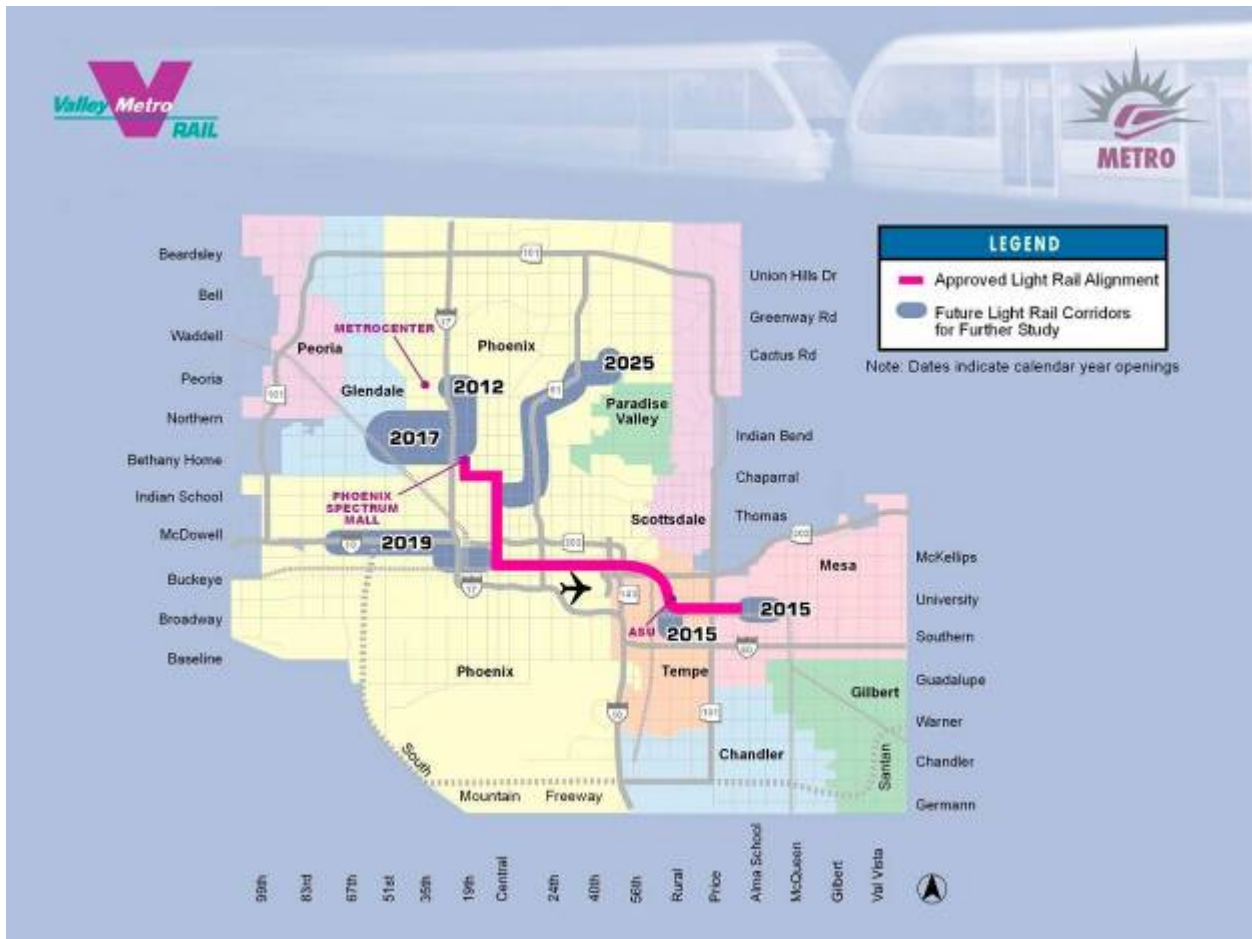


Source: valleymetro.org online fact sheets (2006)



Source: valleymetro.org online fact sheets (2006)

Additional studies are underway to examine the potential for light rail extensions to other areas of the Valley. The map below shows the corridors that will be studied.



Source: valleymetro.org online fact sheets (2006)

Coordination of the freeway express bus routes with light rail station locations and service will be an important consideration in the operations plan.

2.5 Commuter Rail Study

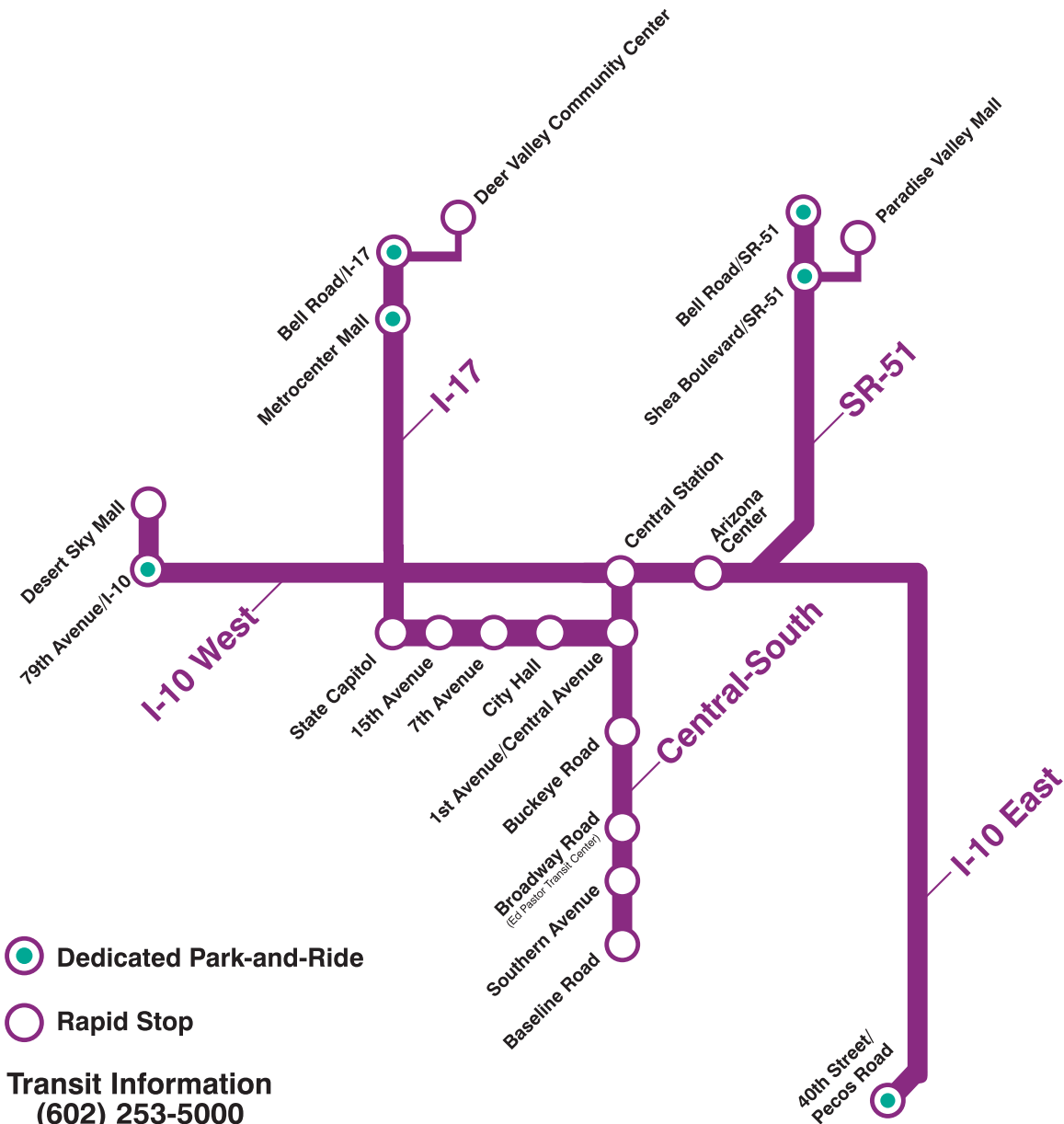
MAG and ADOT are jointly embarking on a strategic planning process to assess the feasibility and to develop an implementation strategy for commuter rail service in the Phoenix metropolitan area and adjacent areas, including northern Pinal County. The study is not yet underway, but the potential to integrate express bus and commuter rail will be a long-term consideration.

3. Sub-Regional and Local Transportation/Transit Studies

3.1 Preliminary BRT Operations Concepts (April 2003)

This City of Phoenix planning document outlined the preliminary operations plan for the City's *RAPID* service, which began operating in July 2003. The new *RAPID* bus routes replaced Valley Metro routes 500, 501, 561, 591, and 592. A map of the service is below.

RAPID MAP



Source: City of Phoenix Preliminary BRT Operations Concepts DRAFT

The City of Phoenix identified several qualities of good express bus services:

- **Exclusive travel lanes.** Grade-separated busways or HOV or bus-only lanes.
- **Frequent service.** *RAPID* frequencies are higher than current express service and will operate from about 5 am to 9 am and from about 3 pm to 7 pm.
- **Simplified routes.** *RAPID* routes have simple end-to-end routes and operating patterns.
- **Limited stops.** Fewer stops result in faster trips.
- **Pleasant passenger waiting areas.**
- **High quality vehicles.** Such as over-the-road coaches.
- **Special equipment.** This includes traffic signal priority for buses when possible and real-time passenger information displays at *RAPID* bus shelters.
- **Connections to other transit services.** Connections can easily be made to local bus service at park-and-ride lots or intermodal stations.

3.2 Southeast Maricopa/Northern Pinal County Area Transportation Study (September 2003)

This study was jointly sponsored by MAG, the Central Arizona Association of Governments (CAAG), and the Arizona Department of Transportation (ADOT). The purposes of the study were to document the transportation relationships between Maricopa and Pinal Counties, examine the long-range transportation needs of the study area, and identify realistic projects to address the area needs. For the transit, the study extracted recommendations from the RTS and HCT studies that were relevant to the area. The study divided transportation improvements into three groups based on local priorities, with group I comprising the earliest set of improvements and group three the later priorities (see table below). Express bus services fall into the second group of priorities.

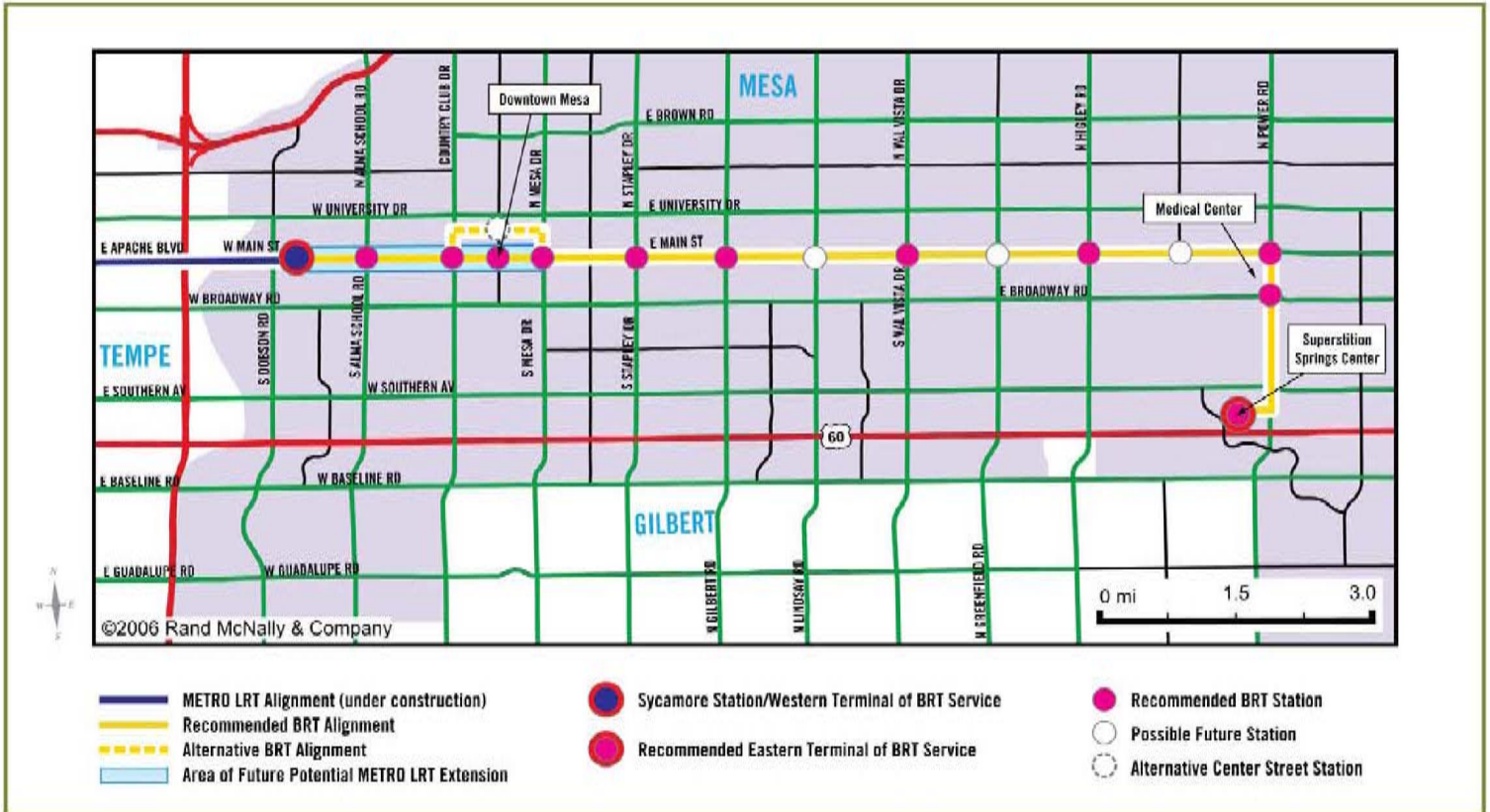
Group I	Group II	Group III
<ul style="list-style-type: none"> • MAG/CAAG/State lands coordination • Future Transportation Funding • Arterial improvements • Local bus expansion • Freeway and highway widening • William Gateway Freeway • Superstition Freeway Extension (US 60 Bypass) 	<ul style="list-style-type: none"> • East Valley Corridor • Price Freeway Connection • BRT/Express Bus Expansion • Rural Bus Service • Apache Junction/Coolidge Corridor • Non-motorized System 	<ul style="list-style-type: none"> • High Capacity Transit • New Arterial Links

3.3 RPTA Mesa Main Street BRT Corridor Study (ongoing)

This study by the RPTA examines service on Main Street in Mesa, the first arterial BRT corridor identified in the RTP. This service is scheduled to begin no later than December 2008. The purpose of the Mesa Main Street BRT Corridor Study is to develop the configuration and conceptual design to enable early implementation of the proposed Mesa Main Street BRT line from Sycamore (the east end of the Central Phoenix/East Valley light rail transit line) to Power Road.

Service frequency is still to be determined. There would be a connection between the freeway express service and the BRT at the Superstition Springs shopping center.

The map below shows the potential routing of the Main Street BRT line, including a possible extension along Power Road to Superstition Springs Mall and potential station locations.



Source: Mesa Main Street BRT Study, draft documents (2006)

3.4 Local Transportation Plans

Several cities in the region have recently updated their transportation plans (Avondale), are currently doing so (Scottsdale, Surprise, Peoria), or plan to do so in the near future (Chandler, Glendale). Many localities are putting emphasis on transit as part of an overall multi-modal transportation system and are integrating RTP projects into their transit systems. Regionally funded express bus service plans should be coordinated with locally funded efforts to ensure efficient, high-quality service.

C. CONCLUSIONS

The freeway-based express bus service has evolved over time through a series of regional plans. Although they were initially envisioned to serve primarily downtown Phoenix and Tempe, express bus routes are now conceived as both downtown-serving and suburb-to-suburb connectors. The express bus system makes use of regional park-and-ride facilities and the freeway and HOV lane network to connect outlying areas with regional activity centers. Supporting infrastructure projects are being constructed at the same time that the express bus network is being planned, and ensuring coordination between express bus service initiation and the underlying infrastructure will be an important part of the planning process. In addition, the express bus service will need to be integrated with local transportation plans and other related transit projects and services.

In the next phase of the Freeway Express Bus/BRT Operating Plan project, the project team, together with Technical Advisory Group members, will examine each recommended express bus route in detail. By combining this analysis with the recommendations from previous plans, the group will recommend an operating plan for each route in order to implement the regional express bus route system that best serves Valley transit patrons

RPTA Freeway Express Bus / BRT Operating Plan

Working Paper

**Task 4: Analyze Current Transit
Networks and User Characteristics**

Prepared for
Regional Public Transportation Authority



Prepared by



June 2007

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1. INTRODUCTION

The objective of the Freeway Express Bus/BRT Operating Plan is to define the operational characteristics of the freeway-based regional Express Bus/BRT network identified in the Regional Transportation Plan and funded through Proposition 400. The study also considers how operational characteristics may change as the regional network develops over the 20 year life of the transit program.

The purpose of Task 4, “Analyze Current Transit Networks and User Characteristics,” is to assemble information on existing system characteristics and performance to inform recommendations on the alignments and implementation of the new freeway-based express bus routes. This working paper contains an examination of the current express bus network, a look at current and projected population and employment characteristics each of the corridors around the new express bus routes, and information on infrastructure that affects express bus route implementation. Also included is a discussion of how each of the freeway express bus routes will interact with the planned light rail system. (Information on local and supergrid routes that interact with each route will be included in the route analysis Task 6 working paper, which details route alignments.) A summary of the responses from Valley Metro’s recently completed Phoenix 2007 RAPID Survey is included to provide information about current express bus riders.¹

Using this information, in Task 6, the project team will define alignments for each of the 24 express bus routes under consideration in the Operations Plan, estimate ridership based on comparisons to peer lines, and recommend implementation steps – including infrastructure needs – required to successfully implement each of the lines.

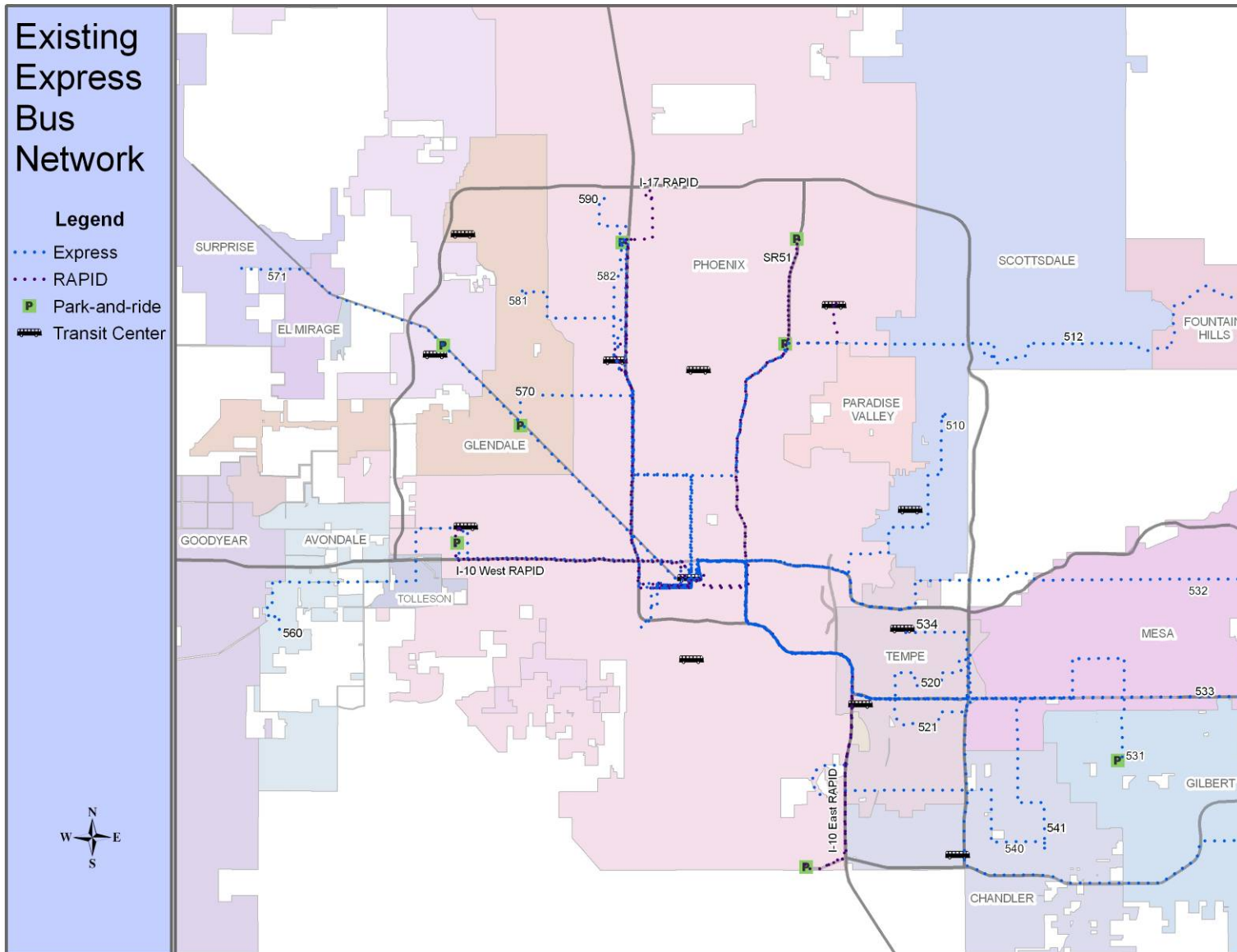
1.1 Existing Express Bus Network

Two types of express bus services are currently provided in the Valley: RAPID service, operated by the City of Phoenix, and Express services, operated by Valley Metro. (Express services have 500-series route numbers.) Both services are aimed at carrying passengers from and to outlying areas during weekday peak commute times primarily by traveling on freeways. RAPID services rely heavily on a system of park-and-ride lots placed near freeway exits; Express services use park-and-ride lots, too, but also pick up passengers along local streets.

Apart from the Queen Creek Express (route 534), which terminates in downtown Tempe, all current RAPID and Express routes terminate in downtown Phoenix in the morning, and originate from downtown Phoenix in the afternoon. Figure 1 on the next page shows the existing express bus network.

¹ Note: Reference materials for this working paper are included in a separate document called “Task 4 Reference Materials,” available upon request.

Figure 1 Existing Express Bus Network



Service frequency

According to Valley Metro's Bus Book, express and RAPID buses operate during the weekday peak commute periods. Inbound routes operate from approximately 5 am to 9 am, and outbound buses operate from approximately 3 pm to 7 pm. During peak times of operation, RAPID pickup times are as frequent as every 10 minutes and are not bound to a timetable schedule.

Table 1 Service frequency on express routes

Route	Number of trips (inbound/outbound)
I-10 West RAPID	12/13
I-17 RAPID	17/22
SR-51 RAPID	12/13
I-10 East RAPID	14/14
510	2/2
512	2/2
520	4/5
521	6/6
531	8/7
532	1/1
533	5/5
534	1/1
540	4/4
541	8/8
560	2/2
570	2/2
571	2/2
581	3/3
582	4/4
590	4/4

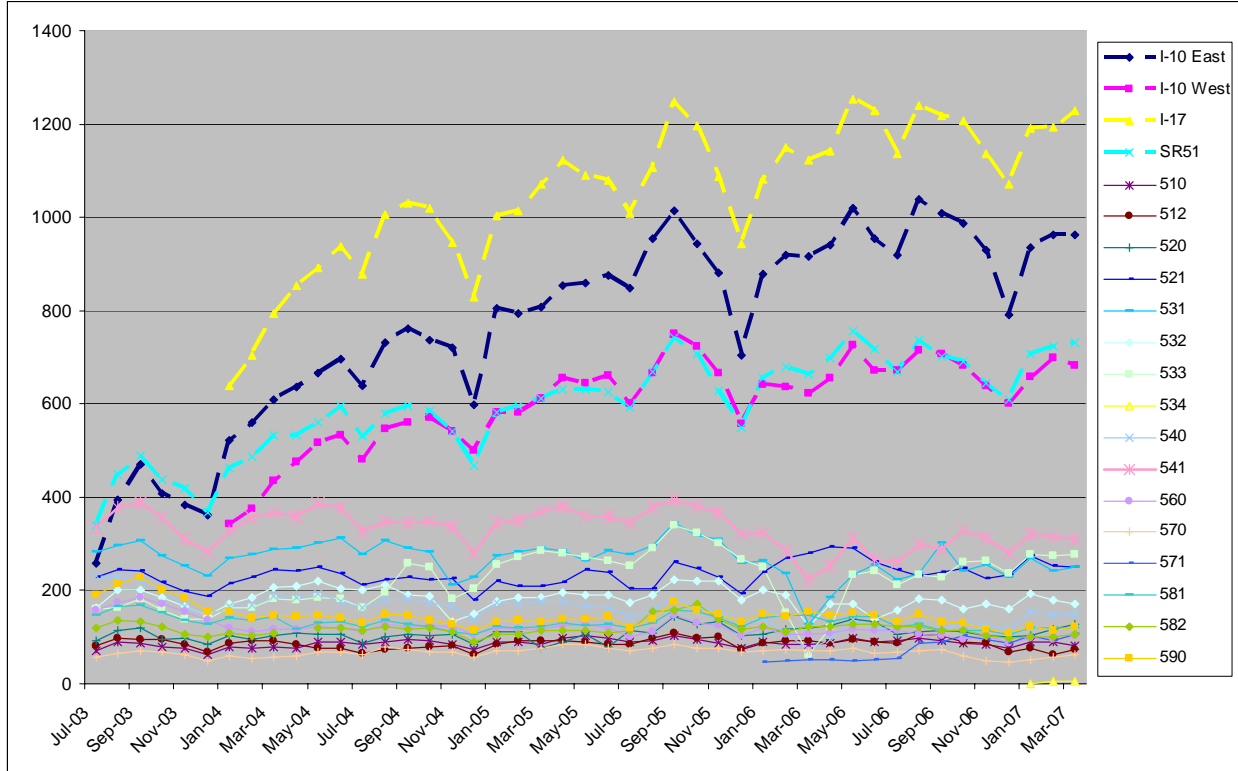
Source: Valley Metro Bus Book

There is a noticeable difference in the service levels between RAPID and express bus routes. All four RAPID routes have 12 or more trips in each peak. Express bus service frequencies vary from one to eight trips in the peak period (depending on the route); most routes have five or fewer trips in the peak.

Ridership

Ridership trends on existing express bus lines (i.e., 500-series Express and RAPID lines) were evaluated using historic boarding data. Figure 2 shows the number of boardings on RAPID and Express services for the past four years.

Figure 2 RAPID and Express Ridership, July 2003 through March 2007



Source: Valley Metro

As the graph demonstrates, ridership on even the busiest 500-series express line (the 541) is much lower than on the least-busy RAPID line. This could be explained by the fact that several 500-series express buses often serve the same area, whereas RAPID services are geographically distinct. What is more striking is the difference in the rate of growth between the two types of express services: ridership on the RAPID lines has increased steadily over the last few years while ridership on the 500-series Express lines has remained flat or – in some cases – decreased. Figure 2 also shows seasonal trends to be consistent across all lines: the number of boardings always dips in July, November, and December; and grows (or bounces back) in January and August. The remaining months show no consistent trend.

Table 2 shows another way of comparing the change in ridership on the express bus system. The first column of data shows the difference in ridership between the earliest month for which data are available, February 2003, and the most recent comparable month, February 2007. This comparison shows that ridership in February 2007 was 68% higher on the RAPID system than it was in February 2003; in addition, ridership grew on all RAPID routes. On the 500-series express lines, ridership was 1% lower; however, ridership grew on some routes and declined on others.

Table 2 Change in Ridership on RAPID and Express Routes

Route	One Month Comparison			12 Months Ending		
	Feb-04	Feb-07	Diff	Feb-04	Feb-07	Diff
RAPID						
I-10 East	561	962	71%	10,538	11,398	8%
I-10 West	374	700	87%	7,814	8,043	3%
I-17	704	1,194	70%	13,191	14,139	7%
SR51	487	722	48%	7,716	8,313	8%
Total RAPID	2,126	3,578	68%	39,259	41,893	7%
Express Bus						
510	75	89	19%	1,102	1,066	-3%
512	93	62	-33%	1,102	1,040	-6%
520	96	118	23%	1,308	1,386	6%
521	229	254	11%	2,757	3,077	12%
531	277	241	-13%	3,431	2,797	-18%
532	184	180	-2%	2,356	1,994	-15%
533	164	275	68%	3,281	2,648	-19%
540	169	147	-13%	1,874	1,463	-22%
541	356	316	-11%	4,261	3,463	-19%
560	111	95	-14%	1,429	1,250	-13%
570	55	58	5%	915	761	-17%
571	0	93	-		917	-
581	136	120	-12%	1,617	1,505	-7%
582	104	101	-3%	1,539	1,376	-11%
590	142	115	-19%	1,727	1,611	-7%
Total Express Bus	2,191	2,264	3%	28,699	26,354	-8%
Total RAPID & Express	4,317	5,842	35%	67,958	68,247	0%

The second set of data (“12 Months Ending”) shows this same trend, although it shows that growth on the RAPID system was extremely high during the first year of service. While February 2007 to February 2004 comparisons show 68% growth on the RAPID system, the comparison for the years ending those same months shows growth at a much lower rate. The same comparison on the 500-series express lines shows a slow, steady decrease in ridership, although the 520 and 521 lines show growth over the time period.

Looking more closely at the ridership data for the RAPID system emphasizes that growth, while steady, has not been constant. Table 3 shows growth in ridership on RAPID services for each of the past three years.

Table 3 Annual Ridership Growth on RAPID Routes

	Year-by-year increase		
	Feb 04-05	Feb 05-06	Feb 06-07
I-10 East	41%	16%	5%
I-10 West	55%	9%	10%
I-17	44%	14%	4%
SR51	22%	14%	6%

As the table shows, ridership grew very rapidly in the year after the RAPID services were introduced – even the route with the lowest growth grew by more than 20% in the first year.

Ridership has continued to increase each year since, but at a lower rate as base ridership grows. (The I-10 West RAPID is a slight exception; ridership grew by 10% from February 2006 to 2007 versus 9% a year earlier.)

The trends on these historic ridership data imply that the service differential between RAPID and 500-series express lines has been a critical factor in enticing new riders to the RAPID system. Looking ahead, new express routes should expect a rapid increase in ridership in the first year and steady growth in the years that follow if they emulate the RAPID model. (Factors influencing ridership will be examined in more depth in the Task 6 working paper.)

1.2 Planned Express Bus Network

The 2003 Regional Transit System Study (RTSS) explained the concept behind the new express bus network:

Expressway regional connections routes operate as park & ride routes. They connect directly from remote park & ride lots to major activity centers utilizing expressways and (where available) HOV lanes...In some cases, expressway regional connections routes operate all day from remote park & ride lots to downtown Phoenix. In other cases, during off-peak hours routes stop at an interim location and passengers must transfer to complete their trip downtown.

The result of the RTSS planning was a network of routes called either “express” or “connector” routes. The express routes served destinations, while the connector routes served interim locations (such as transit centers and park-and-rides).

The RTSS explained that the new “expressway regional connections services” would replace existing Valley Metro 500-series express routes and the (at that time) proposed Phoenix Bus Rapid Transit service, now known as RAPID. However, the 500-series bus routes will not be replaced wholesale by the new express services. Some are planned to remain in place through 2027. In addition, as the discussion on ridership showed, the RAPID service has had tremendous success in attracting riders and that brand will be preserved on existing RAPID routes. Currently, there are no plans to extend the RAPID brand to other express routes.

1.3 Express Bus User Information

The Phoenix 2007 RAPID Survey gathered travel and demographic information from almost 1,000 riders of the RAPID system during the morning and evening commute periods. Information was collected tabulated for all respondents and also broken down by RAPID route. Key information from the survey is summarized below.

- Most riders (97%) use the RAPID bus routes to get to work, although a small number use RAPID to get to school or college.
- Most riders (84%) access RAPID by driving to a park-and-ride lot; however, a surprising number (8%) walk to catch their bus. The next most popular means of accessing the RAPID routes was kiss-and-ride (4%). 90% of the survey respondents walk from RAPID to their final destination in the morning peak.
 - Almost all of the survey respondents were “choice” riders; 98% had access to a car at home
- Fewer than half the respondents would have to pay for parking at their destination.
- Ninety percent of the survey respondents had a fare subsidized by their employer.

- Forty-eight percent of respondents indicated their combined annual household income was more than \$75,000.
 - There was a clear difference in income among the RAPID routes. I-10 East and SR51 survey respondents had higher income than survey respondents on the I-10 West and I-17 routes
- The average age among survey respondents is 46. The average age was similar across all four RAPID lines.
- A majority (59%) of respondents were female. Female survey respondents outnumbered male respondents on all lines.

The survey results imply that access to park-and-ride lots at trip origins is an important component of the express bus system. However, good pedestrian access to and from express bus stops is also important, especially at destination points.

2. TRENDS IN STUDY AREA

During the operations planning phase, several themes emerged regarding the operational characteristics of the future express bus routes. These themes are described in this section and are the basis of general principles upon which each route was analyzed and structured.

2.1 Critical Destinations

The express bus network was set up to connect remote park-and-ride sites to major activity centers in the region. The project team identified several critical destination and coordination points:

- Downtown Phoenix, downtown Tempe, and Scottsdale Airpark are the major employment destinations in the Valley
- Scottsdale Airpark is a critical destination/transfer point in the East Valley.
- Arrowhead Towne Center (including the Transit Center) is a critical transfer point in the West Valley.
- Light rail stations provide opportunities for transfer points in Central Phoenix and the Southeast Valley.
 - The Apache/Price light rail station could be a key transfer point in the southeast Valley.

These destinations and coordination points provided a basis for express bus route operations. (The destination points and transfer centers reflect the current situation and will likely change over time. Route performance and structure should be re-evaluated periodically to ensure the express bus network reflects changing travel patterns.)

2.2 Applicability of Connector Routes

During the operations planning workshops, it became clear that the connector concept applied more readily in some parts of the Valley than others. In the West Valley, connectors were originally routed through Desert Sky transit center to allow transfers to express bus services traveling north on Loop 101 to Peoria, Glendale, and Surprise, or east on I-10 to downtown Phoenix. However, the TAG and stakeholders felt that there is not currently enough demand to Glendale, Peoria, and Surprise to justify the connector system (Desert Sky was not considered a destination point, either). With downtown Phoenix left as the sole destination to be served by express bus from the West Valley, stakeholders preferred a direct route, and the network was recommended to be restructured accordingly.

Connectors in East Valley were encouraged, however, because downtown Tempe and Scottsdale Airpark are also key regional employment destinations. Therefore, although a great deal of direct service to downtown Phoenix is provided, routes were also structured to provide connections to other East Valley destinations. Connections in the East Valley were generally routed through Scottsdale Airpark or the Apache/Price light rail station.

There was general support to connect express bus services with light rail, although a wholesale policy to structure the express bus network exclusively to feed into light rail was not endorsed at this time. (Integrating light rail and express bus is discussed in detail in Section 2.6.)

2.3 Park-and-Ride Facilities

Park-and-ride facilities are a key component and a major success factor in the express bus network. Transit patrons “self-aggregate” by driving themselves to the park-and-ride lot, allowing the bus trip to be almost exclusively on freeways, rather than meandering through local streets to pick up passengers. Experience on other routes has shown that express bus patrons will park wherever they can at the route origin, even if parking is not designated for transit use. Therefore, if a dedicated park-and-ride facility is not ready by the time express bus operations start, interim facilities must be identified and formalized through agreements with property owners. If interim facilities cannot be arranged, service initiation to that location should be postponed.

2.4 Routing in Downtown Phoenix

All new express bus routes with downtown Phoenix as a destination will be routed to serve both Central Station and the State Capitol Complex, with several on-street stops between these two points. Express buses operated by Valley Metro will not, at this time, use City of Phoenix RAPID stops in the downtown area. Instead, the express buses will use local stops, which are generally located in the vicinity of RAPID stops. (Table 4 compares the location of local and RAPID stops.) These are the same stops that the current 500-series express buses use.

Table 4 Location of Local Stops vs. RAPID stops

Downtown local stops	Downtown RAPID stops
<i>Eastbound</i>	<i>Eastbound</i>
Jefferson, near side of 17th Avenue	Jefferson far side of 18th Avenue
Jefferson, far side of 15th Avenue	Jefferson near side of 15th Avenue
Jefferson, far side of 12th Avenue	Jefferson far side of 11th Avenue
Jefferson, far side of 7th Avenue	Jefferson far side of 7th Avenue
Jefferson, far side of 3rd Avenue	Jefferson far side of 3rd Avenue
Central, far side of Jefferson	Central near side of Washington
Central, near side of Adams	Central near side of Van Buren
Central, near side of Van Buren	5th Street far side of Van Buren
<i>Westbound</i>	<i>Westbound</i>
Washington, far side of 1st Avenue	3rd Street near side of Van Buren
Washington, near side of 3rd Avenue	Van Buren near side of Central
Washington, far side of 5th Avenue	Washington near side of 2nd Avenue

Washington, far side of 7th Avenue	Washington near side of 4th Avenue
Washington, far side of 10th Avenue	Washington far side of 7th Avenue
Washington, far side of 13th Avenue	Washington far side of 11th Avenue
Washington, far side of 15th Avenue	Washington far side of 15th Avenue
17th Avenue, far side of Adams	Adams far side of 17th Avenue

Ideally, these existing local stops can be upgraded to provide the same level of information about bus arrivals and departures currently displayed at RAPID stops.

2.5 HOV Lanes and HOV Construction

Ideally, express bus services operate in freeway high-occupancy (HOV) lanes to allow maximum speeds in otherwise congested corridors. However, since the Valley freeway system is still maturing, many freeways are currently without HOV lanes. Although the majority of the Valley’s freeways are eventually planned to have HOV facilities, this HOV network will not be complete until 2024. Figure 3 (on the next page) shows the current and planned system of HOV lanes.

At TAG meetings and in discussion with stakeholders, it was agreed that a case-by-case approach should be taken to implementing express bus services on corridors without HOV lanes. TAG members and other stakeholders were reluctant to delay route implementation until HOV lanes are in place and several stakeholders pointed out that express bus services could help alleviate congestion on corridors under construction.

Table 5 shows new express bus routes that will be affected by construction after their scheduled implementation year. (HOV construction usually applies to a portion of the route rather than along the whole route.) Details on HOV construction for each route are documented in the route analyses in Section 3.

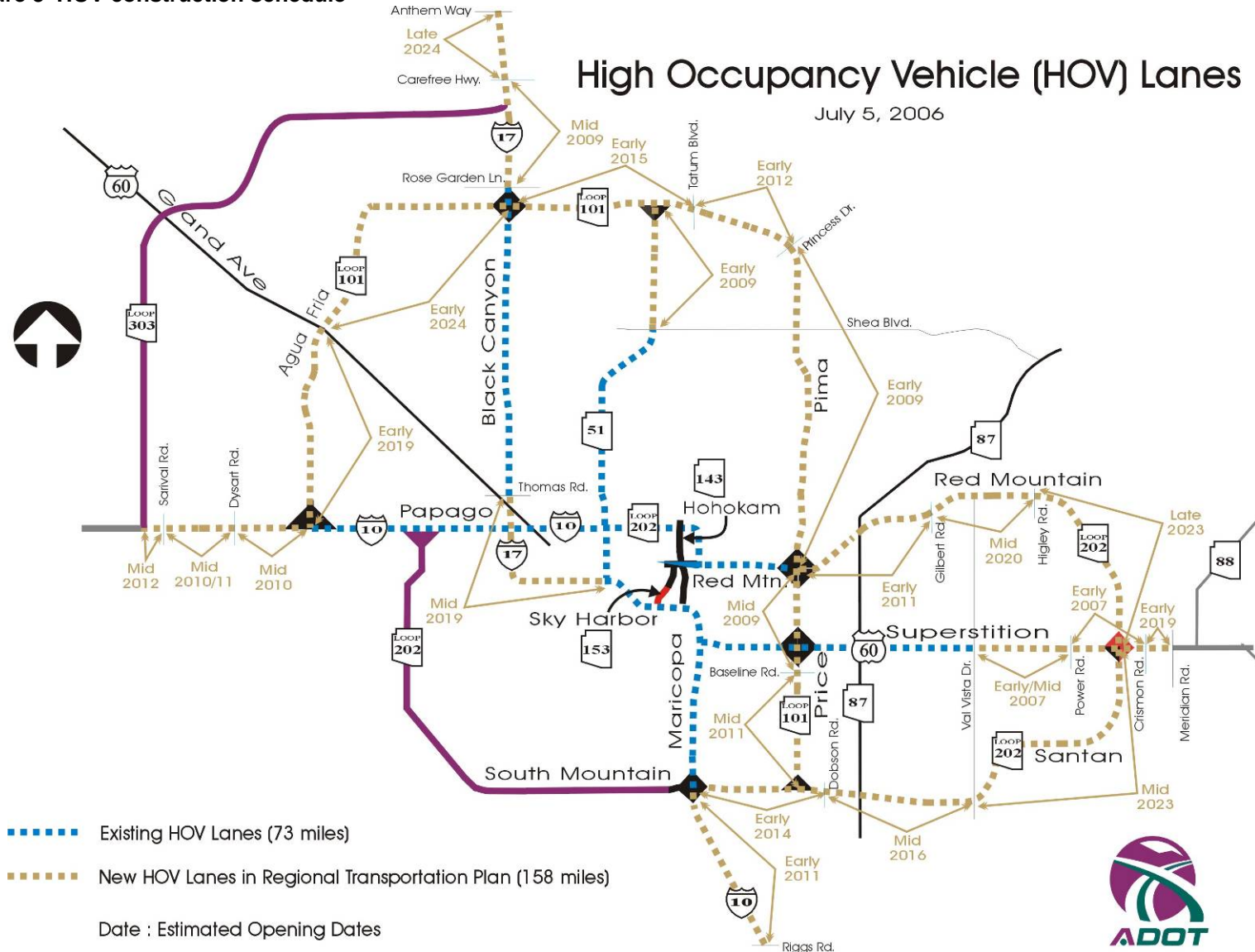
Table 5 HOV Construction affecting Express Bus Corridors

Route	Construction years
Surprise-Scottsdale Express	2012, 2015, 2024
North Glendale Express (operates on West Loop 101)	2019, 2024
Papago Freeway Connector	2010, 2011
West Loop 101 Connector (operates on North Loop 101, I-17)	2024
East Loop 101 Connector	2009, 2012, 2014, 2016
Red Mountain Express	2011, 2020
Apache Junction Express	2019
Pima Express	2012
Peoria Express	2019
Santan Express	2023
Anthem Express	2024
North I-17 Express	2024

Bus-on-shoulder

Operating express bus service on the shoulder of the highways was suggested as an option, but ADOT does not allow roadway shoulders to be used for additional capacity because such use creates unsafe conditions at on- and off-ramps.

Figure 3 HOV construction schedule



Construction routing

Re-routing bus service during construction is another option, but it should be recognized that all roadway users will be searching for less-congested routes as well. In other words, moving express bus operations off congested highways during construction may simply relocate them to congested surface streets.

ITS Communications

Some information technology initiatives on the highway side may make sense for transit, especially during HOV construction phases. The Maricopa Association of Governments is implementing a “Mobile Traffic Information Portal” to provide a means of accessing real-time freeway traffic information via mobile internet devices (such as cell phones or personal digital assistants). (More information on MAG’s Mobile Traffic Info Portal can be found at <http://www.mag.maricopa.gov/project.cms?item=7401>).

A similar system could be established for express bus service that would communicate transit arrival and departure information to travelers via their mobile communication devices. The express bus system already has some communications infrastructure in place, since all vehicles are currently networked via automatic vehicle location systems. Additional infrastructure (such as communications equipment), data (such as a regional bus stop numbering system), and software would need to be established before such a system could be operational, but the potential for automated transit communications should be studied further.

2.6 Express Bus Integration with Light Rail

In December 2008, the Central Phoenix/East Valley light rail (CP/EV LRT) is scheduled to begin operations and there are plans to extend light rail to other Valley destinations. There is some concern that, without proper integration, express bus and light rail will create competing systems and redundant services that lead to a less efficient network. The integration of express bus services and light rail is an important issue because the two systems do not function independently; rather, they each act as part of an integrated public transit network to transport Valley residents and visitors from one place to another.

There are several ways of approaching express bus-light rail integration:

1. Maintain two independent systems, where transfers happen only coincidentally
2. Create a completely integrated system with no overlap in service (in this case, express bus would feed light rail wherever available, as in Denver)
3. Blend the services by providing some feeder service and some non-stop, destination oriented service.

Table 6 presents some advantages and disadvantages of integrating the express bus and light rail systems.

Table 6 Pros and Cons of Integration

Advantages	Disadvantages
Access to more destinations, such as Central Corridor, Camelback Corridor	Loss of one-seat service/transfer required to reach destination
Potential for more reliable service	Potential for longer trip times
Potential for greater service frequency	
Efficiency through elimination of redundant service	

Table 7 shows a comparison of travel times on a “one-seat” express bus trip versus express bus and a transfer to light rail. For this exercise, we assumed that the average express bus speed is 35 miles per hour, and the average light rail speed is 21 miles per hour. The assumed origin point was a park-and-ride at the route’s origin, and the assumed destination was Central & Van Buren in Downtown Phoenix. The estimated transfer time between express bus and light rail was three minutes. (Complete calculations are shown in the reference materials.)

Table 7 Travel times on Express Bus vs. Light Rail

Market	Total travel time (in minutes)
Apache Junction - Downtown Phoenix	
Express bus only	57
Express bus + light rail <i>(transfer at Apache/Price)</i>	71
Mesa (202 & Gilbert Rd) - Downtown Phoenix	
Express bus only	35
Express bus + light rail <i>(transfer at Washington/Priest)</i>	44
North Glendale - Downtown Phoenix	
Express bus only	41
Express bus + light rail <i>(transfer at 19th Ave/Montebello)</i>	52

Note: these travel times are estimates only, and should be updated with actual times once both systems are operational.

Denver’s Regional Transportation District (RTD) is an example of a transit system that made an across-the-board policy to feed express bus routes into outlying light rail stations when it opened its Southwest Corridor line in 2000 and again, in 2006, when the Southeast Corridor line opened. The decision to feed light rail with express bus was based on several findings:

- In its 2001 Customer Satisfaction Survey, the RTD found that 50.3% of all transit trips involved at least one transfer (13% two or more). 24.8% of light rail riders used the Mall Shuttle [circulator service] to complete their trip.
- Light rail has the highest rate of all types of service for multiple (two or more) transfers.
- Timed transfers and grid transfers between routes with frequent service that are physically convenient offer more opportunities to get easily to a variety of places.
- Consolidated routes have increased frequency that attracts additional ridership without additional resources.
- Because it operates on its own guideway, light rail can be more reliable than bus service, which operates in mixed traffic.
- The budget, fleet size, and capacity of transit infrastructure should be calculated as one system. Maintaining two complete systems (i.e., a complete express bus system independent of a complete light rail system) is not economically prudent.
- Configuring express bus to feed light rail results in improved service for most people, and results in inconvenience – such as the loss of a one-seat ride or increase in travel time – for relatively few.

- Allows the provision of a more complete service for the same or reduced resource requirements. Allows the development of a timed-transfer bus network, with connections at major LRT stations to short distance shuttle transit.
- Minimize delay for customers.
 - Eliminate unjustified out-of-direction movements
 - Establish through routing for high volume travel patterns to avoid unnecessary transfers.
- Rationalize services to provide the maximum utility from available resources. Basically focus service on the highly productive corridors with highly efficient service wherever feasible.
- Eliminate underutilized route segments. The combination of poorly patronized segments and service duplication can result in low utilization of services, usually to the detriment of corridors that require improved frequencies.
- Provide high inter-route connectivity at the major hubs to reduce inefficient point-to-point routes.

When planning for the Southeast Corridor, the RTD applied the following principles:

- As each Light Rail Line opens, it becomes the trunk service in that corridor of the metropolitan region, and surrounding Express and Regional routes are restructured to become feeder/circulator services to the Light Rail system.
- The resources saved by truncating these Express and Regional routes are utilized to enhance the frequency and span of service of the Local feeder/circulator routes.
- Focus long distance journeys on LRT by truncating services from outer areas at LRT stations.
- Establish minimum base frequencies and frequencies to match the LRT operating schedule for routes serving as feeders into the LRT stations.
 - For the majority of the feeder routes a minimum frequency of 30 minutes has been proposed.
 - Clock-face headways will ensure good connectivity with both LRT and connecting bus routes
- Provide improved access to major activity centers and population growth areas.
- Avoid multiple transfers or offer excellent connections.

(The Southeast Corridor planning document can be found online:

http://www.rtd-denver.com/Service/Proposals/Documents/SE_Corridor_Service_Plan.pdf.)

Although the experience in Denver provides some insight into the issue, the project team recommends a blended approach in the Valley for now. Since not all express bus services are being introduced in the opening year of light rail, there is opportunity to experiment with early implementation express routes to gather information about local travel behavior. After this integrated service has been operating for a year or so, the project team recommends an in-depth study of the markets being served by express bus and light rail to better understand Valley travel patterns and create a transit network tailored to local travel behavior.

Routes that are introduced earlier and which provide good opportunities for integration should be introduced in a blended fashion, in what is referred to as an "A/B service." "A" express bus service would travel to the final destination without stopping at light rail; "B" service would terminate at the most reasonable light rail stop. Two routes that are introduced in 2008 for which it makes sense to operate an A/B service are the West Loop 101 Connector (which will operate on I-17) and the Red Mountain Express. (The East Loop 101 Connector, which will also

begin operations in 2008 is designed to provide transfer opportunities, including transfers to light rail, rather than to serve destinations. Therefore, an A/B service structure is not necessary.)

Table 8 shows how many one-way trips that some of the express bus routes could provide if they were structured as direct, feeder, or blended routes. (The trip numbers are based on the length of each route in either its A or B configuration and the daily mileage allotment for each route as found in the TLCP Audit recommendations.)

Table 8 Numbers of trips

Route name	Trip combinations			
	All 'A' service	All 'B' service	Four 'A', max 'B'	Four 'B,' max 'A'
West Loop 101 Connector - A service*	14	0	4	11
West Loop 101 Connector - B service	0	19	13	4
Red Mountain Express - A service	9	0	4	7
Red Mountain Express - B service	0	14	8	4
Apache Junction Express - A service	8	0	4	6
Apache Junction Express - B service	0	15	8	4
North I-17 Express - A service	11	0	4	8
North I-17 Express - B service	0	14	9	4

*Operates on I-17 to downtown Phoenix

For example, the West Loop 101 Connector service could provide 14 daily trips to downtown Phoenix if operated without regard to light rail, or 19 trips to connect to light rail if used exclusively as a feeder service. If an A/B configuration is chosen, and four daily non-stop trips to downtown Phoenix were desired, the mileage allotment would cover 13 trips to light rail. If four daily trips to light rail were desired, then 11 one-way trips to downtown Phoenix would be allowed.

Where there is potential for integration with light rail (that is, where out-of-direction travel would be minimal), A/B service is described for each of the future express routes in Section 3.

2.7 Scheduling

Most of the express bus routes serve at least two “origination points” such as a park-and-ride or transit center before reaching the final destination. There is concern that buses may fill at an earlier facility with no room for people at a second park-and-ride later in the route. The City of Phoenix has approached this problem by serving each park-and-ride with dedicated trips if demand dictates. These are not ad-hoc trips, but are formally scheduled as part of route operations.

In addition to demand, the design of a park-and-ride will affect the efficiency and viability of serving multiple park-and-rides along a single route. For example, the SR51 RAPID route serves both park-and-ride lots on SR 51 because the bus-friendly design of the interchange at Dreamy Draw park-and-ride lot allows for efficient service. By contrast, the I-17 RAPID serves both the I-17 & Bell and MetroCenter park-and-ride lots during early morning service, but serves each park-and-ride lot with independent trips during the rest of the morning due to the time it takes to serve MetroCenter.

3. ROUTE ANALYSIS

Through the planning workshops held around the Valley, the project team gained a great deal of input and information about specific conditions that influence the bus routes. Based on this input and on information on projected population and employment trends from the regional travel demand model, the team put together the following analyses for the new express bus routes.

Each route analysis contains a brief evaluation of trends in the service area, providing information on growth and development in the route corridor based on socio-economic projections from MAG and feedback at planning workshops. Information about the status of supporting infrastructure, including HOV lanes, HOV ramps, and park-and-ride facilities, is also listed. (Detailed maps showing information on population and employment development and infrastructure are included in the reference materials.)

3.1 Desert Sky Express/I-10 West RAPID

Brief analysis of trends in service area

Note: The “Desert Sky Express” is a regionally funded continuation of the I-10 West RAPID route. The route will continue to use the name I-10 West RAPID.

I-10 West RAPID services currently comprise 12 inbound trips per day and 13 outbound. Ridership on the I-10 West RAPID grew by 57% between March 2004 and March 2007, to an average of 681 daily trips in 2007, and further growth may simply be constrained by the number of park-and-ride spaces available at the 79th Avenue & I-10 Park-and-Ride.

City of Phoenix surveys show that a majority of riders originates within about six miles of the facility. The area of Phoenix that surrounds this park-and-ride facility is already completely developed, and it is not expected to change significantly in the coming years in terms of residential and employment density. However, changes farther to the north and west have certainly affected demand on this route and will continue to do so. Riders come from all over the West Valley, including as far west as Buckeye and as far north as Surprise. A high number of riders comes from the Avondale/Goodyear/Litchfield Park area. As the network of park-and-ride lots and express buses is completed in the next few years, pressure may ease on this line as passengers from the outlying areas of the Valley are able to begin their transit trips closer to home. The effect of the new North Glendale Express will be seen in 2007 and the Papago Freeway Express in 2008.

As originally planned, several express bus routes were expected to feed into the Desert Sky Express/I-10 West RAPID. However, capacity constraints on the route and the desire to avoid bus-to-bus transfers led to a restructuring of the west Valley express routes into non-stop routes.

Supporting infrastructure

- There are HOV lanes on the entire route, and an HOV ramp at 79th Avenue.
- The Desert Sky Transit Center is operational.
- The 79th Avenue & I-10 Park-and-Ride is operational, but may be at capacity.
- The Thomas Road & Loop 101 Park-and-Ride is currently scheduled to be operational in 2014.

3.2 SR 51 Express/SR 51 RAPID

Brief analysis of trends in service area

Note: The “SR 51 Express” is a regionally funded continuation of the SR-51 RAPID route. The route will continue to use the name SR-51 RAPID.

SR51 services currently comprise 12 inbound trips per day and 13 outbound. Ridership on the SR51 RAPID grew by 37% between March 2004 and March 2007, to an average of 720 daily trips in the first three months of 2007.

A City of Phoenix survey at the Bell Road/SR51 park-and-ride lot showed that a majority of riders originates within about three miles of the facility. The area of Phoenix that surrounds this park-and-ride facility is already completely developed, and it is not expected to change a great deal in the coming years in terms of residential and employment density. However, changes to the north, in the Carefree and Cave Creek areas, have affected demand on this route and may continue to do so. (Information on rider origination at the Shea Blvd/SR51 park-and-ride or Paradise Valley Mall Transit Center is not available.) Currently, there are no additional express routes planned to serve the SR-51 corridor; however, SR51 RAPID service may eventually originate farther north, from the Desert Ridge Mall, if parking can be identified.

Supporting infrastructure

- HOV lanes are currently in place on the SR51 between Shea Blvd and the I-10; plans call for HOV lanes north of Shea Blvd. to the Loop 101 to be constructed in early 2009.
- The Bell Road/SR 51 and Shea Blvd/SR51 park-and-ride lots are already operational.

3.3 Deer Valley Express/I-17 RAPID

Brief analysis of trends in service area

Note: The “Deer Valley Express” is a regionally funded continuation of the I-17 RAPID route. The route will continue to use the name I-17 RAPID.

I-17 RAPID services currently comprise 17 inbound trips per day and 22 outbound. (Some outbound trips skip or terminate at MetroCenter.) Ridership on the I-17 RAPID grew by 54% between March 2004 and March 2007, to an average of 1,204 daily passengers in the first three months of 2007.

A City of Phoenix survey at the Bell/I-17 park-and-ride lot showed that almost all patrons originated from areas west of the facility. (No information on patrons of the MetroCenter transit center is available.) The area of Phoenix that surrounds this park-and-ride facility is already completely developed, and it is not expected to change a great deal in the coming years in terms of residential and employment density. However, changes farther to the west have certainly affected demand on this route and will continue to do so. A great many current riders come from Glendale and Peoria. As the network of park-and-ride lots and express buses is completed in the next few years, pressure may ease on this line as passengers from the outlying areas of the Valley are able to begin their transit trips closer to home. The North Glendale Express route begins in 2007 and the West Loop 101 Connector (which will operate on I-17) begins in 2008; both routes will likely have an effect on ridership of the I-17 RAPID. In addition, several more routes are planned for this corridor: the Anthem Express, North I-17 Express, and Black Canyon Connector will all capture transit patrons farther to the north.

Finally, the Central Phoenix/East Valley light rail will begin operations in 2008 and interaction between bus routes on I-17 and the light rail should be examined in depth.

Supporting infrastructure

- There are HOV lanes on the entire route, and HOV ramps at 79th Avenue/I-10, 5th Ave/I-10, and 3rd Ave/I-10.
- The park-and-ride at Bell Rd/I-17 is operational; there is a small park-and-ride at MetroCenter.

3.4 Ahwatukee Express/I-10 East RAPID

Brief analysis of trends in service area

Note: The “Ahwatukee Express” is a regionally funded continuation of the I-10 East RAPID route. The route will continue to use the name I-10 East RAPID.

I-10 East RAPID services currently comprise 14 inbound trips per day and 14 outbound. Ridership on the I-10 East RAPID grew by 57% between March 2004 and March 2007, to an average of 953 daily trips in the first three months of 2007. Further ridership growth may simply be constrained by the number of park-and-ride spaces available at the Pecos and 40th Street park-and-ride facility.

City of Phoenix surveys show that most of the park-and-ride patrons come from the Ahwatukee area, west of I-10, but a substantial number come from east of I-10, mostly from the City of Chandler. Some riders come from as far south as Sun Lakes and Maricopa/Casa Grande. The future Santan Express route from Gilbert/Chandler is scheduled to begin in 2017, and may ease demand on this route by picking up I-10 East RAPID patrons closer to home.

The area surrounding the Pecos & 40th park-and-ride facility is generally developed, although population density is expected to increase in the Ahwatukee area by 2026. Employment is already fairly dense in the area, and further densification is expected in the I-10/Elliot Road area.

Supporting infrastructure

- There are HOV lanes on the entire route, and an HOV ramp at 3rd St/I-10.
- The park-and-ride at Pecos Road & 40th Street is operational.
- There are plans to construct another park-and-ride at Elliot Road/I-10 in 2017.

3.5 Surprise-Scottsdale Express

Brief analysis of trends in service area

The Surprise-Scottsdale Express route serves the highway 101 corridor between downtown Surprise and the Scottsdale Airpark. (This route was previously referred to as the North Loop 101 Connector.) It is designed to provide two-way service between the Scottsdale Airpark and downtown Surprise, with connections at Arrowhead Towne Center.

Tremendous growth is forecast for this area over the next 20 years, with residential growth primarily spreading northward rather than becoming denser in existing populated areas. Some pockets of denser residential development is predicted for Surprise, just south of Grand Avenue, and around the SR51-Loop 101 interchange (including the Desert Sky Mall area).

Currently, employment in this corridor is clustered around the I-17 & 101 interchange and the Scottsdale Airpark. Arrowhead Towne Center is a slightly less dense employment area. By 2015, the Desert Ridge Marketplace area becomes a denser employment destination, and some employment in Surprise, clustered around the planned Prasada development (located at Loop 303, between Greenway and Cactus). The current estimated directional split in traffic in the morning is 70% heading east and 30% heading west. Given these trends, the following are possible major activity centers:

- Scottsdale Airpark
- Desert Ridge Marketplace
- Arrowhead Towne Center
- Downtown Surprise
- I-17/Loop 101
- Surprise - Prasada development (future)

There is currently a shortage of parking for transit patrons at both Desert Ridge and the I-17/Bell Road park-and-ride, although both may be examined for future service implementation. There is some concern about parking capacity at Arrowhead Towne Center, but, since it currently functions as a transit center, it is anticipated that passengers may use local bus routes to access the express bus system. In addition, Sun City's dial-a-ride service, SCAT, receives many requests for service to Arrowhead Towne Center; a stop in Sun City was also added to gauge whether this route could satisfy that demand.

Timing connections with the other express services will be critical for this route's success. At implementation, Surprise residents are very likely to use the Surprise-Scottsdale Express to transfer to the North Glendale Express to reach downtown Phoenix. In the future, timing transfers with the East Loop 101 Connector and Pima Express will provide additional connections.

The City of Surprise would like a connection with the I-17 corridor. This will be satisfied by connecting the Surprise-Scottsdale Express with the West Loop 101 Connector (which will be re-routed to I-17) rather than by connecting with the I-17 RAPID.

Supporting infrastructure

- Currently, there are no HOV lanes present along this route and will not be fully implemented until 2024.
- HOV lanes will be implemented on Loop 101 from Princess Dr. to Tatum Blvd in 2012; from Tatum Blvd. to I-17 in 2015; and from I-17 to Grand Ave. in 2024.
- The park-and-ride lot at Greenway/Bullard (in Surprise) is already operational; the Arrowhead Towne Center transit center is an existing transit center but has little to no parking for transit patrons.
- The Scottsdale Road/101 park-and-ride lot is scheduled to be operational in 2009.

3.6 North Glendale Express

Brief analysis of trends in service area

This route serves a corridor between north Glendale and downtown Phoenix via the West Loop 101 and I-10. It is designed to provide "two-way" service in this corridor so that not only can Glendale residents access downtown Phoenix, residents from other parts of the Valley can access employment areas in Glendale. At implementation, demand for travel is expected to be higher for service into downtown Phoenix in the morning.

This area already has a large residential population and several potential employment draws, including Arrowhead Towne Center. In the future, the University of Phoenix Stadium area is expected to become a very dense employment area, and may provide another destination within this corridor. The Banner Hospital complex is better served by local routes than express service.

A north Glendale-downtown Phoenix route is expected to have high demand given residential growth in North Glendale and Peoria and current travel trends to downtown Phoenix. Surveys by the City of Phoenix show that many commuters from north Glendale/Peoria currently travel to the I-17/Bell Road park-and-ride to utilize the I-17 RAPID service to downtown Phoenix. The City of Glendale has begun construction on a park-and-ride lot at Loop 101/Maryland Avenue. However, there is currently no service on the west loop of the 101; therefore, the North Glendale Express route should be re-routed to provide service in this corridor. It should be noted that the routing of the future light rail to/within Glendale will have a major impact on this route.

Because demand on this route is expected to be very high, the North Glendale Express will not serve the Desert Sky Transit Center. (There may be an exception for very early morning and late afternoon frequencies, so this recommendation may be re-visited after implementation.) In addition, there is concern about promoting additional demand at the Desert Sky park-and-ride lot due to limited parking spaces.

Supporting infrastructure

- Currently, there are no HOV lanes along the western loop of the 101. Construction of HOV lanes will be in two phases, the first completed in 2019 and the second in 2024.
- There is currently no HOV-to-HOV ramp on the 101/I-10 interchange; the HOV ramp is scheduled for construction in 2025. At implementation, the North Glendale Express route will exit the 101 at McDowell to access the HOV ramp onto I-10 at 79th Avenue.
- Glendale is planning for a dedicated park-and-ride in North Glendale in the vicinity of 75th Avenue & Loop 101; currently, there is no park-and-ride in this location
 - The Glendale stadium park-and-ride at Maryland & 99th Ave will be operational in December 2007; in interim site will be located so that bus operations can start as planned in July 2007.

3.7 Papago Freeway Connector

Brief analysis of trends in service area

This route is designed to provide services from the southwest Valley to downtown Phoenix. The southwest Valley is growing quickly, evidenced by eastbound traffic that is already heavy by 7am.

In Buckeye area, the bulk of population growth is currently expected to occur east of SR 85, but some growth west of Sun Valley parkway is also expected. Population is expected to rapidly outpace employment development. Farther east, in the Goodyear/Avondale areas, population growth is a combination of new development and some densification of existing development. Employment is expected to grow around the I-10/Loop 303 interchange and along the I-10 in the Litchfield Road area, although it is not as dense as employment closer to the urban core.

Supporting infrastructure

- Currently, there are no HOV lanes past the Loop 101 on I-10. Construction of HOV lanes to the Loop 303 will be in two phases, with the first completed in 2010 and the second in 2011.
- There are currently no plans for HOV lanes on I-10 beyond the Loop 303.
- The Avondale/Goodyear park-and-ride lot is scheduled to be completed by 2009.
- A park-and-ride lot is scheduled to be completed by 2011 in Buckeye (at Miller Road and Lower Buckeye).

3.8 West Loop 101 Connector

Brief analysis of trends in service area

This route was originally intended to provide service from North Glendale to the Desert Sky Transit Center at 79th Avenue & Thomas, thereby providing connecting express bus service to downtown Phoenix as well as other destinations served by local routes. However, bus-to-bus connections were not considered compatible with the level of service expected for quality express bus service.

Therefore, the West Loop 101 Connector service has become an additional route to connect North Glendale and downtown Phoenix. As mentioned in the analysis for the North Glendale Express, this is a market expected to have high demand for transit. While the North Glendale Express would serve riders along the western loop of the 101 and terminate at the State Capitol Complex, the West Loop 101 Connector would provide service along I-17 and terminate at Central Station. (The West Loop 101 Connector will be re-named before service is implemented.)

Preliminary modeling suggested that the North Glendale Express and West Loop 101 Connector would compete for riders. In addition, there was concern that the express service on I-17 would also compete for riders with the light rail (scheduled to begin operations in December 2008). As a result, the City of Glendale, Metro, and RPTA agreed to implement an “A/B” service, with some of the West Loop 101 Connector trips terminating in downtown Phoenix (“A” service) and some trips terminating at the light rail stop at 19th Ave/Montebello (“B” service). Depending on the results of the first year of service, the A/B service would be modified to reflect where demand was greater.

The West Loop 101 Connector is a bi-directional service. At implementation, demand for travel is expected to be higher for service into the Central Corridor and downtown Phoenix in the morning.

Supporting infrastructure

- There are no HOV lanes on the north loop 101 (west of I-17) until 2024. However, HOV lanes are already present on I-17.
- A joint-use park-and-ride lot north of Loop 101 should be in place by the time the route is implemented; a dedicated park-and-ride lot is still being identified.
- A light rail station/transit at 19th Avenue and Montebello should be in place by December 2008.

3.9 East Loop 101 Connector

Brief analysis of trends in service area

The East Loop 101 Connector is designed to provide connections between population and employment centers along Loop 101 in the East Valley; equally important are connections to other transit lines, including light rail. This route serves Scottsdale, Mesa, and Tempe, which are already well-established (although still evolving) and rapidly growing Chandler. Thus, while the route will at first be primarily bringing residents of Chandler into high-employment areas in other cities, it will need to be examined over time to determine whether growing employment destinations in Chandler could also be effectively served by the route, while maintaining its function as a connector. This route has potential to function as a “typical” bus rapid transit route, with multiple origins and destinations along the route (as opposed to a suburb-to-central business district express line). Timed connections between key transit routes will be critical to this function.

Currently, the highest concentrations of employment near the East Loop 101 Connector include the following:

- Scottsdale Airpark
- Scottsdale Healthcare North campus (Shea Blvd. and 101) and surroundings
- Downtown Scottsdale
- Downtown Tempe
- Downtown Mesa
- Fiesta Mall area
- ASU Research Park

It should be noted that some of these destinations will be served by transit connections, rather than directly, to preserve the timing and function of the East Loop 101 Connector overall.

Over time, Chandler’s Fashion Center area is likely to become a denser employment zone. However, parking for transit patrons is currently limited at Chandler Fashion Center, so it will not be served at this time. Non-residential growth along the Loop 101 in the Salt River Pima-Maricopa Indian Community may also provide future potential destinations.

The trends, along with connections to the Scottsdale Airpark, the Phoenix/East Valley light rail and major employers such as Intel in Chandler, suggest this is likely to be a well-used route from its inception.

Supporting infrastructure

- Currently, there are no HOV lanes along this route
 - HOV lanes will be phased in on Loop 101 starting in 2009 through 2011
 - HOV lanes will be constructed on south Loop 202 in 2016
 - HOV-to-HOV connection from Loop 101 to southern Loop 202 will not be constructed until 2017
- The Mustang Park-and-ride lot is scheduled for completion in July 2008.
- Chandler’s Tumbleweed park-and-ride is scheduled for completion in February 2008.

3.10 Red Mountain Express

Brief analysis of trends in service area

The Red Mountain Express is designed to bring passengers from residential Mesa & east Mesa into the Valley’s employment core. The route originates in east Mesa, a rapidly growing area of primarily residential development. The residential development of Mesa is projected to remain at a similar density as today, but to continue to spread geographically. Some employment growth is predicted along the loop 202 between Power Road and Val Vista. However, the area remains generally residential.

As originally designed, the route is focused on replacing the current express route 532, which originates in east Mesa, makes intermediate stops in southern Scottsdale, and then travels to downtown Phoenix. Route 532 is currently operating at full capacity with four trips in each peak; it is to be phased out in 2014. The Red Mountain Express can serve a similar function by making an intermediate stop the Tempe Transit Center or at a light rail station, or may be used to provide non-stop service to downtown Phoenix only. It may also do both by operating as an “A/B” service. An A/B service would minimize out-of-direction travel to Tempe.

There is concern about traffic on Rural Road in Tempe causing to great a delay to overall operations, but some sort of integration with light rail would allow passengers to access many employment destinations, although it would delay the trip for those who wish to go directly to downtown Phoenix. The Red Mountain Connector, which will connect to light rail, does not begin operating until 2019.

Supporting infrastructure

- Currently, HOV lanes are present on Loop 202 only as far east as Loop 101. HOV lanes will be extended to Gilbert Road by 2011, but will not extend to Higley Road until 2020, or to Power Road until 2023.
- The City of Mesa is constructing park-and-ride lots at Loop 202/Gilbert Road and Loop 202/Power Road.

3.11 Apache Junction Express

Brief analysis of trends in service area

The Apache Junction Express connects western Apache Junction and central Mesa with downtown Phoenix. It is designed to replace the current express route 533.

Apache Junction has experienced the rapid growth that many of the Valley’s outlying communities have recently seen. Growth is generally residential, meaning new residents will need to travel into the metropolitan core for employment, and traffic will increase commensurately. Apache Junction’s growth is generally predicted to happen south of US 60, although a denser pattern of residential development is expected north of US 60. Whether the bulk of Apache Junction residents travel to downtown Phoenix for their employment or instead to closer employment sites in Tempe is not known. The Apache Junction Express may operate as a non-stop service to downtown Phoenix, or it could terminate at a light rail station farther east. An “A/B” service could capture both potential transit markets. Experience on earlier routes that have A/B service will help determine how the Apache Junction Express should be structured.

Supporting infrastructure

- HOV lanes are in place to Crismon Road but will not be extended as far east as Meridian Road until 2019.
- The Superstition Springs park-and-ride will open by May 2007. It is located on the frontage road, requiring very little time to deviate to pick up passengers.
- The park-and-ride lot at Country Club/US60 is planned to be operational by 2011.

3.12 Superstition Freeway Connector

Brief analysis of trends in service area

The Superstition Springs Connector is designed to connect central east Mesa and Tempe with transit connections and bi-directional service. This area is completely developed and little change in the density of residential and employment is predicted in the future. East central Mesa consists almost entirely of residential development; however, the area around Superstition Springs Mall is a dense employment center. Two-way service may be justified to serve this employment site as well as the densely concentrated employment center in downtown Tempe.

Although this route is similar to the 531 express, the two routes will both operate through 2027.

Supporting infrastructure

- HOV lanes are in place as far as Crismon Road.
- The Superstition Springs park-and-ride will open by May 2007. It is located on the frontage road, requiring very little time to deviate to pick up passengers.
- The park-and-ride lot at Country Club/US60 is planned to be operational by 2011.

3.13 Pima Express

Brief analysis of trends in service area

The Pima Express is designed to connect north and central Scottsdale with Tempe and downtown Phoenix. Both Tempe and downtown Phoenix are already dense employment cores but, since the East Loop 101 Connector service will already provide service from North Scottsdale to Tempe via a connection with light rail, it is recommended that the Pima Express provide service to downtown Phoenix non-stop.

The area north of the Loop 101 on the border of Scottsdale and Phoenix is expected to develop greatly in the coming years, yet no additional transit service on the SR51 is currently planned. The Pima Express may relieve pressure on the SR51 RAPID by providing transit patrons an alternative park-and-ride in Scottsdale.

Supporting infrastructure

- HOV lanes should be in place along the entire route by the time service is implemented
- The Mustang park-and-ride will be operational by the time service is implemented.
- The Scottsdale/101 park-and-ride should be operational by 2009.

3.14 Peoria Express

Brief analysis of trends in service area

The Peoria Express is designed to connect southern Peoria and western Glendale with downtown Phoenix. East of the Loop 101, this area of the Valley is already developed and is expected to become only slightly denser in terms of population. However, employment along the Loop 101 is expected to intensify, especially in the area around the University of Phoenix Stadium in Glendale. Additional residential development is expected in the area west of Loop 101 and east of Luke Air Force Base.

Both Glendale and Peoria personnel have expressed concern over the spacing of park-and-ride lots on the West Loop 101. The concern is that park-and-rides are too closely spaced for efficient service. The cities have discussed the possibility of relocating the planned Peoria park-

and-ride to another location on the Loop 101. At this time, no decision has been made. Depending on the location of the park-and-ride lot, the Peoria Express may end up duplicating all or a portion of the North Glendale Express/Arrowhead-to-Downtown Phoenix Express route. This route may also compete for riders with the Arrowhead-to-Downtown Phoenix Express or the West Loop 101 Connector; therefore, it is recommended that the route originate no farther north than downtown Peoria so that the focus is on a market of transit riders west of the Loop 101 rather than north of Loop 101 (which is already well served).

Depending on service frequencies and demand, the Peoria Express may also be used to serve the Desert Sky Transit Center/park-and-ride.

Supporting infrastructure

- Currently, there are no HOV lanes present along to west Loop 101.
- Lanes are timed for implementation in 2019
- There is currently no HOV-to-HOV ramp on the 101/I-10 interchange; the HOV ramp is scheduled for construction in 2025. At implementation, the Peoria Express route will exit the 101 at McDowell to access the HOV ramp at 79th Avenue.

3.15 Buckeye Express

Brief analysis of trends in service area

As originally conceived, the Buckeye Express was designed to provide service from west Buckeye to the Desert Sky Transit Center, where connections to other destinations would be made. Concerns over transit patron reactions to bus-to-bus transfers and the over-capacity status of the I-10 West RAPID led to the decision to make the Buckeye Express a non-stop service to downtown Phoenix.

As mentioned in the analysis for the Papago Freeway Connector, the southwest Valley is growing quickly, evidenced by eastbound traffic that is already heavy by 7am. In Buckeye area, the bulk of population growth is currently expected to occur east of SR 85, but some growth west of Sun Valley parkway is also expected. Population is expected to rapidly outpace employment development. Farther east, in the Goodyear/Avondale areas, population growth is a combination of new development and some densification of existing development. Employment is expected to grow around the I-10/Loop 303 interchange and along the I-10 in the Litchfield Road area, although it is not as dense as employment closer to the urban core.

Supporting infrastructure

- Construction of HOV lanes on I-10 as far west as Loop 303 should be completed by 2011. There are currently no plans for HOV lanes on I-10 beyond the Loop 303.
- The Avondale/Goodyear park-and-ride lot is scheduled to be completed by 2009.
- A park-and-ride lot is scheduled to be completed by 2011 in Buckeye (at Miller Road and Lower Buckeye).

3.16 Black Canyon Freeway Connector

Brief analysis of trends in service area

The Black Canyon Freeway Connector was designed to connect north Phoenix (north of Loop 101) to the MetroCenter transit center for connections to various destinations around the valley. Although this area of north Phoenix still sparsely developed today, rapid growth is expected in the coming years. In particular, residential development is expected both east and west of I-17,

and especially around the I-17/Loop 303 interchange. This residential development is expected to be denser by 2026. Some employment in these same areas is also expected, but residential development generally outpaces employment.

Although originally envisioned as a bus-to-bus connector via MetroCenter, the Black Canyon Freeway Connector may make more sense as a bus-to-light rail connector via the 19th Avenue & Montebello transit center.

Supporting infrastructure

- HOV lanes are present on I-17 between Loop 101 and Thomas Road, and should be completed as far north as Carefree Highway by 2009. HOV lanes between Carefree Highway and Anthem way are scheduled for completion in 2024.
- A park-and-ride lot at I-17 & Happy Valley Road is scheduled for completion in 2009.

3.17 Ahwatukee Connector

Brief analysis of trends in service area

The Ahwatukee Connector was designed to connect Ahwatukee (in southeast Phoenix) to the Arrowhead Mills transit center and Tempe Transit Center for connections to various destinations around Tempe and the valley.

As mentioned in the analysis for the Ahwatukee Express/I-10 East RAPID, ridership on the I-10 East RAPID experienced an average of 953 daily trips in the first three months of 2007. Further ridership growth may simply be constrained by the number of park-and-ride spaces available at the Pecos and 40th Street park-and-ride facility.

The area surrounding the Pecos & 40th park-and-ride facility is generally developed, although population density is expected to increase in the Ahwatukee area by 2026. Employment is already fairly dense in the area, and further densification is expected in the I-10/Elliot Road area. The status of the I-10/Elliot park-and-ride facility is uncertain, due to the very high cost of land and lack of vacant land. However, since the Ahwatukee Connector is planned as two-way service, it will provide a means of bringing employees to the employment-rich I-10 corridor and circulation in this area should be a consideration, even without a park-and-ride.

Supporting infrastructure

- HOV lanes are in place along the entire route.
- The Pecos Rd/40th Street park-and-ride is currently at capacity, and may be expanded.
- The I-10/Elliot Rd park-and-ride is scheduled to open in 2017 if available land can be located.

3.18 Santan Express

Brief analysis of trends in service area

The Santan Express is designed to connect southern Gilbert and Chandler with employment destinations in Tempe and Phoenix, and vice-versa (since it is a two-way route). This area of southern Chandler is generally developed today, but growth is expected for southern Gilbert, especially in the Williams Gateway area; the area's residential density is expected to increase as well by 2015. Employment density is expected to increase in Southern Chandler over time; in southern Gilbert, new employment is project in the Val Vista/Loop 202 area and at Williams Gateway, which is the site of an ASU East campus.

The route is considered bi-directional and although the Williams Gateway area is predicted to develop, it will not provide as dense an employment center as downtown Phoenix or downtown Tempe. Therefore, it is assumed that travel demand will be greater westbound in the morning, and service levels should reflect this level of demand.

Since the Pecos/40th park-and-ride is not a destination, and is already served by the I-10 East RAPID, this stop was eliminated from the Santan Express route. In addition, it was thought more important to serve downtown Phoenix quickly than to divert to the Arizona Mills transit center, so this stop was also eliminated from the route.

Supporting infrastructure

- HOV lanes should be in place by 2016 on the southern Loop 202
- The park-and-ride at Val Vista/Loop 202 is scheduled to be operational by 2018.
- The Tumbleweed park-and-ride will be operational by 2008.

3.19 Anthem Express

Brief analysis of trends in service area

The Anthem Express serves Phoenix's northernmost areas, including Anthem and Carefree, connecting them to the Scottsdale Airpark. The Anthem/Carefree area is growing rapidly, with some areas of dense residential development projected by 2026. Some employment in these same areas is also expected, but residential development generally outpaces employment.

Supporting infrastructure

- HOV lanes are present on I-17 between Loop 101 and Thomas Road, and should be completed as far north as Carefree Highway by 2009. HOV lanes between Carefree Highway and Anthem way are scheduled for completion in 2024.
- A park-and-ride lot at I-17 & Happy Valley Road is scheduled for completion in 2009.
- A joint-use park-and-ride lot in Anthem is currently in place; the status of a dedicated park-and-ride lot is not certain.

3.20 Red Mountain Freeway Connector

Brief analysis of trends in service area

The Red Mountain Freeway Connector is designed to bring passengers from north-central Mesa & northeast Mesa to transit services in the Tempe area. As the analysis for the Red Mountain Express explained, east Mesa is a rapidly growing area of primarily residential development. The residential development of Mesa is projected to remain at a similar density as today, but to continue to spread geographically. Some employment growth is predicted along the loop 202 between Power Road and Val Vista. However, the area is projected to remain generally residential.

The Red Mountain Freeway Connector was originally set up to be a bus-to-bus connector, with its eastern terminus at the Tempe Transit Center. This service is retained but a stop at light rail is added to provide greater connectivity. The Red Mountain Express (which will begin operating in 2008) may also operate as an "A/B" service; in this case, the Red Mountain Freeway Connector would essentially add frequency to the "B" service.

Supporting infrastructure

- Currently, HOV lanes are present on Loop 202 only as far east as Loop 101. HOV lanes will be extended to Gilbert Road by 2011, but will not extend to Higley Road until 2020, or to Power Road until 2023.
- The City of Mesa is constructing park-and-ride lots at Loop 202/Gilbert Road and Loop 202/Power Road.

3.21 Superstition Springs Express

Brief analysis of trends in service area

The Superstition Springs Express connects central Mesa to downtown Phoenix via US 60. As originally structured, the route stops at Arizona Mills Transit Center, as well, to allow transit connections to southern Tempe and southern Phoenix. However, City of Mesa planning staff believe that demand is higher to downtown Phoenix, and therefore the detour to Arizona Mills was eliminated. Since the Superstition Springs Connector will be in place by 2011, this area will already be connected to light rail service in Tempe. Therefore, an “A/B” route structure has not been created for this route. However, by 2018, the light rail will have been operating for ten years, and a policy decision about integrating express buses and light rail will likely have been made which may affect how this route is structured.

This area of Mesa is generally developed, although development is denser north of US 60. Development is primarily residential and is expected to remain so, although the Superstition Springs Mall area is a concentrated employment site, as is the area around Fiesta Mall.

Supporting infrastructure

- HOV lanes are already in place along the US 60 between I-10 and Val Vista Drive. HOV lanes are currently being constructed from Val Vista Drive to Crismon Road and should be complete by the end of 2007.
- The Superstition Springs park-and-ride will open by May 2007. It is located on the frontage road, requiring very little time to deviate to pick up passengers.
- The park-and-ride lot at Country Club/US60 is planned to be operational by 2011.

3.22 Avondale Express

Brief analysis of trends in service area

The bi-directional Avondale Express is designed to connect Avondale/Goodyear residents with the Valley employment core in downtown Phoenix, and also to bring people to growing economic areas in Avondale/Goodyear along the I-10. It was originally planned to have stop at Desert Sky transit center, but this was eliminated in favor of faster service to downtown Phoenix.

This area of the Valley is growing rapidly and is expected to have a great deal of residential growth both north and south of the I-10 in coming years. Although the growth is primarily residential, economic development is also anticipated along the I-10 and to the south of I-10. The area around the future I-10/Loop 202 interchange is expected to have heavily concentrated employment and may be a potential destination for this route, although the downtown Phoenix and central corridor remain the dominant employment areas.

HOV lanes and park-and-ride lots should be in place well before this route is implemented. The Papago Connector & Buckeye Express services will be implemented several years ahead of Avondale Express and will serve the Goodyear/Avondale park-and-ride. This will provide a

good indicator of ridership potential on the Avondale Express. The future of light rail along the I-10 corridor is still in the planning phase, but a light rail line to 79th Avenue may be in place by 2019 and would affect the structure of this route. By 2019, the light rail will have been operating for ten years, and a policy decision about integrating express buses and light rail will likely have been made which may affect how this route is structured.

Supporting infrastructure

- Currently, there are no HOV lanes past the Loop 101 on I-10. Construction of HOV lanes to the Loop 303 will be in two phases, with the first completed in 2010 and the second in 2011.
- There are currently no plans for HOV lanes on I-10 beyond the Loop 303.
- The Avondale/Goodyear park-and-ride lot is scheduled to be completed by 2009.

3.23 North I-17 Express

Brief analysis of trends in service area

The North I-17 Express serves Phoenix's northernmost areas, including Anthem and Carefree. As its name implies, the route connects these areas with the Phoenix employment core via I-17. This area is growing rapidly, with some areas of dense residential development projected by 2026. Some employment in these same areas is also expected, but residential development generally outpaces employment.

The North I-17 Express was originally designed to serve MetroCenter and downtown Phoenix, but would likely make more sense as an "A/B" service integrated with light rail. (By the time the service is introduced in 2021, there will be much more information about successful express bus - light rail integration.)

Supporting infrastructure

- HOV lanes are present on I-17 between Loop 101 and Thomas Road, and should be completed as far north as Carefree Highway by 2009. HOV lanes between Carefree Highway and Anthem way are scheduled for completion in 2024.
- A park-and-ride lot at I-17 & Happy Valley Road is scheduled for completion in 2009.
- A joint-use park-and-ride lot in Anthem is currently in place; the status of a dedicated park-and-ride lot is not certain.

3.24 Loop 303 Express

Brief analysis of trends in service area

As originally conceived, the Loop 303 Express acted as a connector route between Arrowhead Towne Center and the Desert Sky transit center, via Loop 303. However, residential growth in the west Valley/Surprise area is projected to far outpace employment growth, and the Loop 303 was re-configured to connect the growing west Valley/Surprise area with the downtown Phoenix employment core. By the time the Loop 303 is implemented, the I-10 light rail line should be operating, and there will be a great deal of experience in the Valley with integrating express bus and light rail services. Therefore, an "A/B" service is a possibility for the Loop 303.

Supporting infrastructure

- No NOV lanes are currently planned for Loop 303
- The Greenway/Bullard park-and-ride is already in place
- The Northern/Loop 303 park-and-ride is planned to be operational by 2023.

RPTA Freeway Express Bus / BRT Operating Plan

Working Paper
Task 5: Peer City Review

Prepared for
Regional Public Transportation Authority



Prepared by
**PB PARSONS
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September 2006

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PEER CITY REVIEW – PRELIMINARY FINDINGS

1. Introduction

The objectives of the study are to define the operational and capital characteristics of the freeway-based regional Express Bus/BRT network identified in the Regional Transportation Plan and funded through Proposition 400. The study will also consider how operational characteristics may change as the regional network develops over the 20 year life of the transit program.

This section presents a review of freeway-based express bus/BRT systems in four urban centers comparable to the Phoenix metropolitan region. The urban areas examined all have similar travel and growth patterns, with central business districts and suburban residential communities. The comparison examines the operational and administrative characteristics of the peer networks. The analysis will include a description of the peer networks' operational structure, funding, equipment/ technological resources, performance, routing, and fare structure.

While all of the cities examined had multiple types of transit, only the Express Bus/BRT routes are summarized in this report. The four cities examined are:

- Houston, Texas;
- Ottawa, Ontario, Canada;
- Los Angeles, California; and
- San Diego, California.

The growth patterns and layout of the metropolitan area for each of these cities is comparable to that of Phoenix, generally characterized by low-density, spread-out development with multiple urban centers. In addition, each has local bus service and light rail transit (LRT) that supplement the Express Bus/BRT system.

Specific information on the Express Bus/BRT systems is in the body of this report. Characteristics of each urban area are summarized in the Appendix.

2. Overview of Systems

2.1 Houston, Texas

The Houston BRT system operates in a network of HOV lanes. The HOV lanes consist of a single lane in the median of existing freeways, between the two directions of traffic, as shown in Figure 1. The HOV lanes are a hub-and-spoke system, with 5 branches feeding into the central business district (CBD). A map of the transit network in the CBD is shown in



Figure 1: Houston Reversible HOV Lane

Source: Atlanta Regional Commission

Figure 2. The blue routes indicate the HOV BRT Express Lanes into the downtown. The median HOV lane is reversible, flowing into the city center in the AM peak hours and out of the city center in the PM peak hours. The HOV lanes allow use by buses as well as motorcycles, emergency vehicles, and carpools of three or more people.

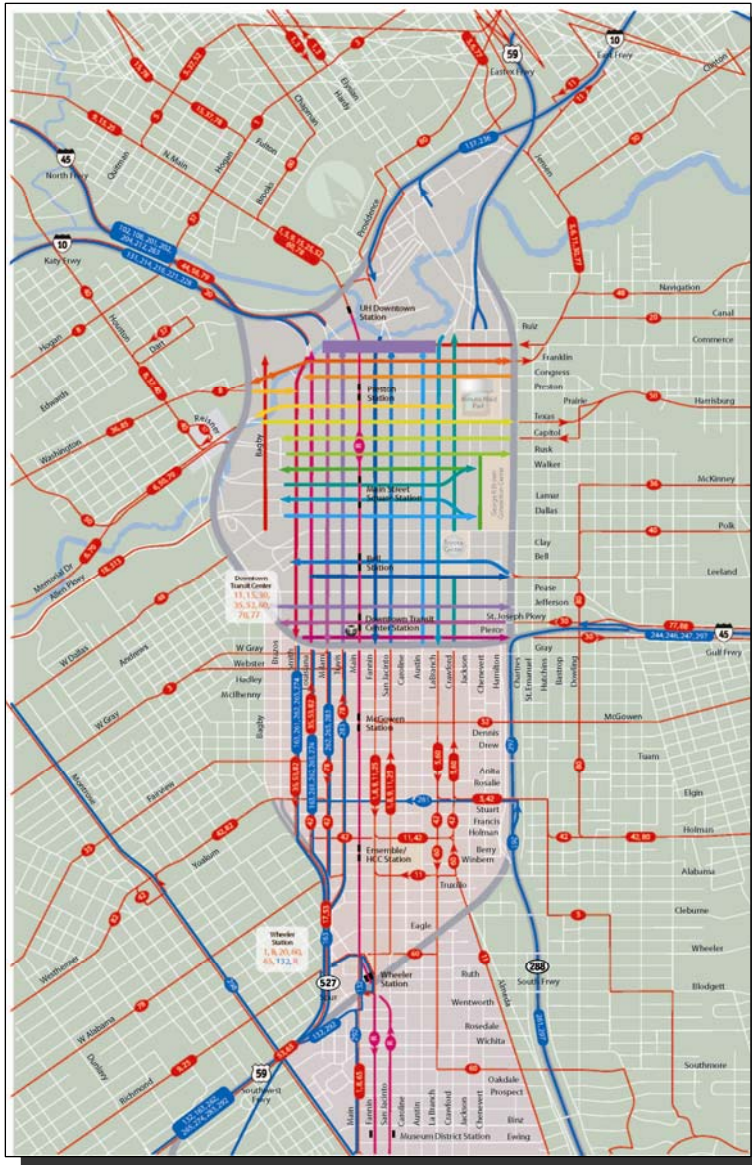


Figure 2: Houston CBD/Downtown Bus Routes

Source: Houston Metro

independent of the roadway network, and behave very much like a rail system, with online stations and extensive retail development around the stations. Being a rubber-tire system, however, the Transitway can still be used by buses from local circulator routes to transport commuters to downtown. Once downtown, the buses circulate at-grade in bus-only lanes. The Transitway is also complemented by Ottawa’s “OTrain” LRT system.

Fares, collected onboard, are variable depending on origin and destination zone. A majority of the ridership for the Express HOV routes is between the suburbs and the CBD during the morning and evening peak hour commute time periods. Of the 150,000 employees in the CBD, 28% use public transportation.

An extensive network of park-and-ride lots and transit centers supports the system, with all transit centers and many of the park-and-ride lots having direct access ramps from the HOV lanes. For the future, Houston will look toward bi-directional HOV lanes that can permit all-day service and enhance the transit identity in major corridors. While park-and-rides are being developed in the Phoenix metro area, there has not been a related investment in direct access HOV ramps on the regional freeway system.

2.2 Ottawa, Ontario

The Ottawa BRT system, shown in Figures 3 and 4, is a hub-and-spoke system of Transitways feeding into the downtown area. The

Transitways are exclusive busways,

independent of the roadway network, and behave very much like a rail system, with online stations and extensive retail development around the stations. Being a rubber-tire system, however, the Transitway can still be used by buses from local circulator routes to transport commuters to downtown. Once downtown, the buses circulate at-grade in bus-only lanes. The Transitway is also complemented by Ottawa’s “OTrain” LRT system.

The express buses operate at 4-6 minute frequencies during the day, with 25-30 minute frequency during the night. They also have real-time status updates at the stations as well as via telephone and internet.

Since it is the national capital, much of the employment of downtown Ottawa is government-related. Strict parking policies and fees for parking in the downtown area combined with free transit passes for government employees have helped to increase ridership of the BRT system. Of the 84,500 people employed in the CBD area of Ottawa, 70% use transit to travel to work.



Figure 3: Ottawa Transitway (1998)

Source: Tramways & Urban Transit, "Ottawa's BRT Transitway"

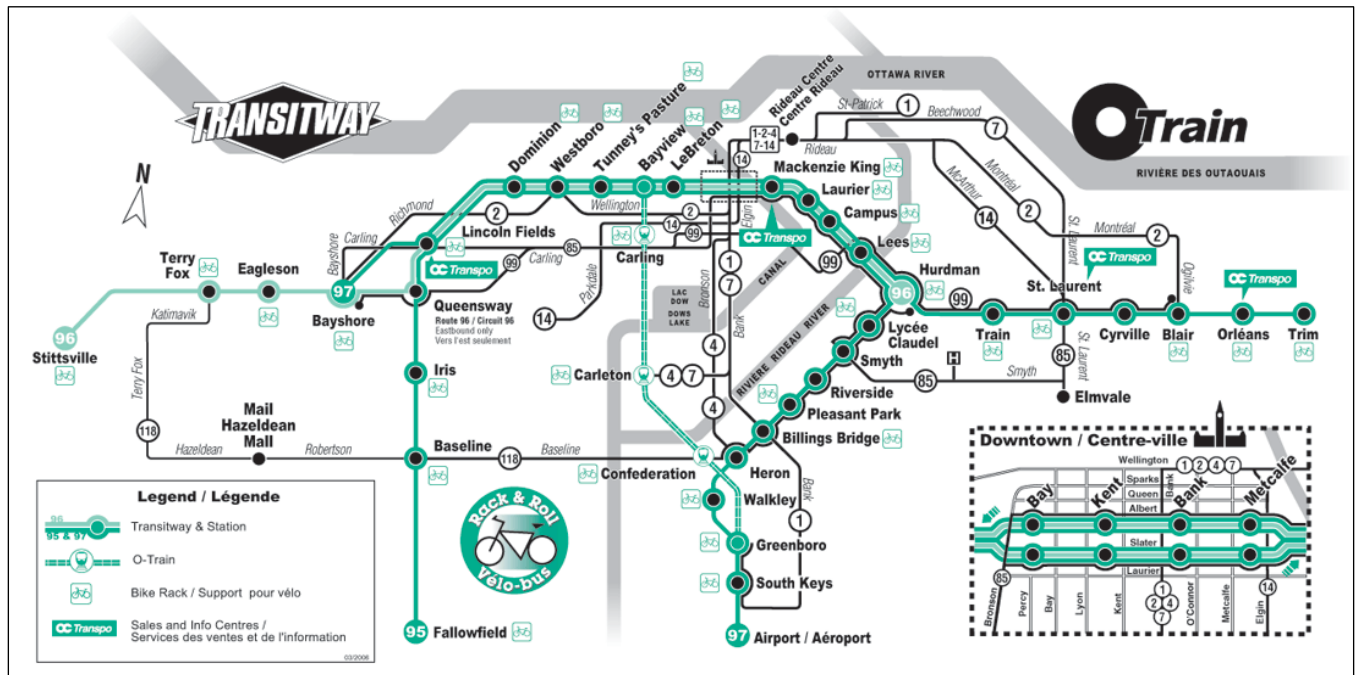


Figure 4: O-Transpo Network Source: www.octranspo.com

2.3 Los Angeles, California

The El Monte Busway, opened in 1976, is one of the earliest BRT projects and carries upward of 45,000 passengers daily (Figure 5). The Busway extends along a 12-mile segment on the San Bernardino Freeway (Interstate 10) that connects the San Gabriel Valley in eastern Los Angeles County with Downtown Los Angeles, shown in Figure 7. Depending on location, the transitway operates in a separate right-of-way, the freeway median, and a one-mile arterial extension into downtown. The downtown extension (figure 6) operates on an existing arterial with one contra-flow lane separated by striping and stanchion. All other traffic operates northbound except for the single bus lane. Southbound buses run on the bus exclusive lane; northbound buses operate in mixed-traffic.



Figure 5: El Monte Busway Separated Section

Source: US Department of Transportation

While the transitway opened initially as an exclusive busway, it is currently shared by HOV vehicles with three or more passengers. An experimental run that allowed HOV users with only two passengers resulted in significant congestion and delays in the busway, without improving conditions on the regular roadway. The busway is utilized by two agencies and three service types: Foothill Transit operates both Local Plus and Commuter Express and Metro operates the Metro Express. Local and Metro service allows greater flexibility for boarding and alighting; commuter service usage is limited to four stations. Fares range from \$1.25 to \$3.00 depending on agency and distance (based on zones).

The El Monte Transit Center includes a 2,018-space park-and-ride lot, connections to 19 bus lines, and a bus-only ramp onto the freeway. Average daily parking utilization is 950 spaces, a number that has remained relatively stable for the last five years. Plans are currently under consideration to allow MTA to construct a transportation building on the site thereby removing 350 of the spaces.

While the transitway opened initially as an exclusive busway, it is currently shared by HOV vehicles with three or more passengers. An experimental run that allowed HOV users with only two passengers resulted in significant



Figure 6: Spring Street Contra-flow Bus lane

Source: <http://www.transit-rider.com>

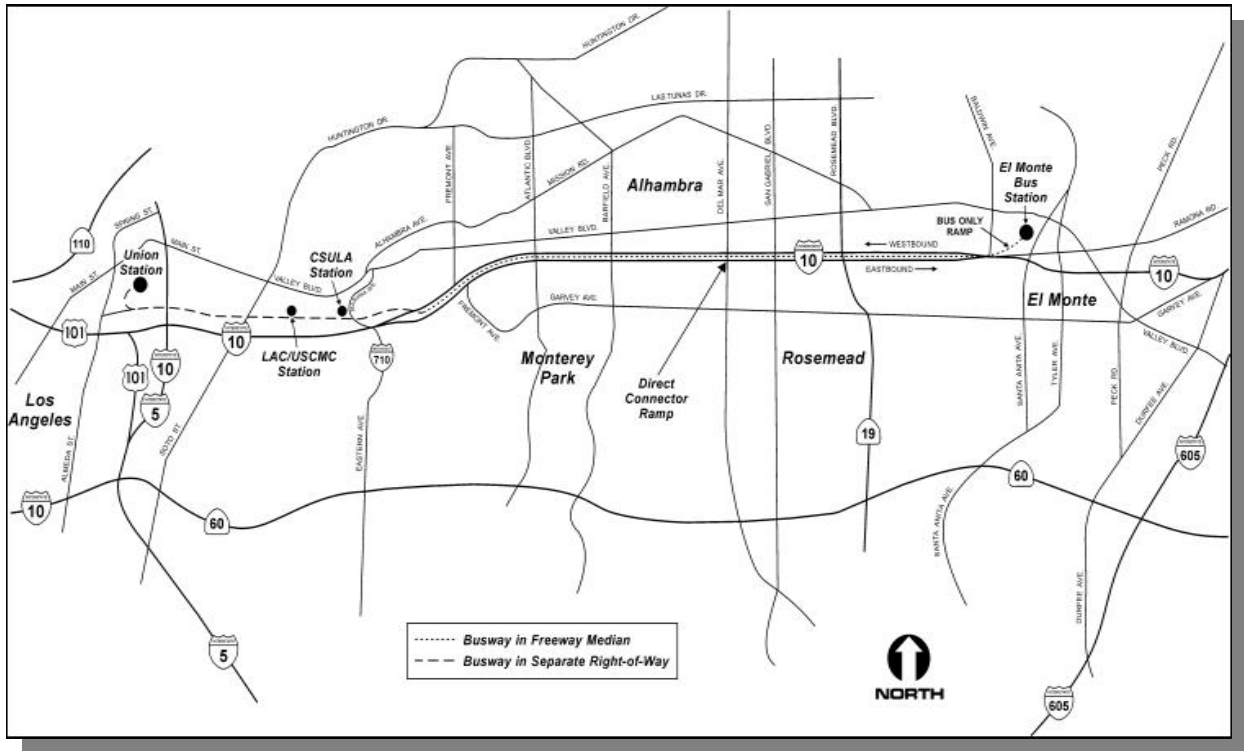


Figure 7: Elements of El Monte Busway. Source: US Department of Transportation

2.4 San Diego, California

The Inland Breeze Express (Routes 980/990 in Figures 8 & 9) operates on an eight-mile shared HOT (high-occupancy/toll) lane from Rancho Bernardo to Downtown San Diego. There is a project underway to extend the roadway to 20 miles with an expansion to four lanes from the current two. The completed system will have three contra-flow lanes and a moveable barrier, reserving one lane for reverse traffic. Upon completion, it will support a BRT service in addition to its current express bus lines. Construction completion will be phased in between 2008 and 2012.



Figure 8: Entrance to the Facility. Source: SANDAG

The current system allows automobiles with two or more passengers, vanpools, and other emergency vehicles to use the lane for free, and charges single occupancy vehicles to use it at a market toll rate. The toll rate changes dynamically based on roadway traffic conditions on the main roadway, and typically range from \$0.50 to \$4.00, though the rate can go as high as \$8.00 during periods of high congestion. A transponder attached to each vehicle deducts fees from an established account based on prevailing rates at the time the lane is used. The revenue from the user fee funds the Inland Breeze Express system.

The toll collection system, called FasTrak, was developed in response to underutilization of the I-15 HOV lanes and lack of transit service along the corridor. A study conducted in 2001 for the San Diego Association of Governments found that the FasTrak system both increased transit ridership and had a positive effect on congestion along the main roadway.

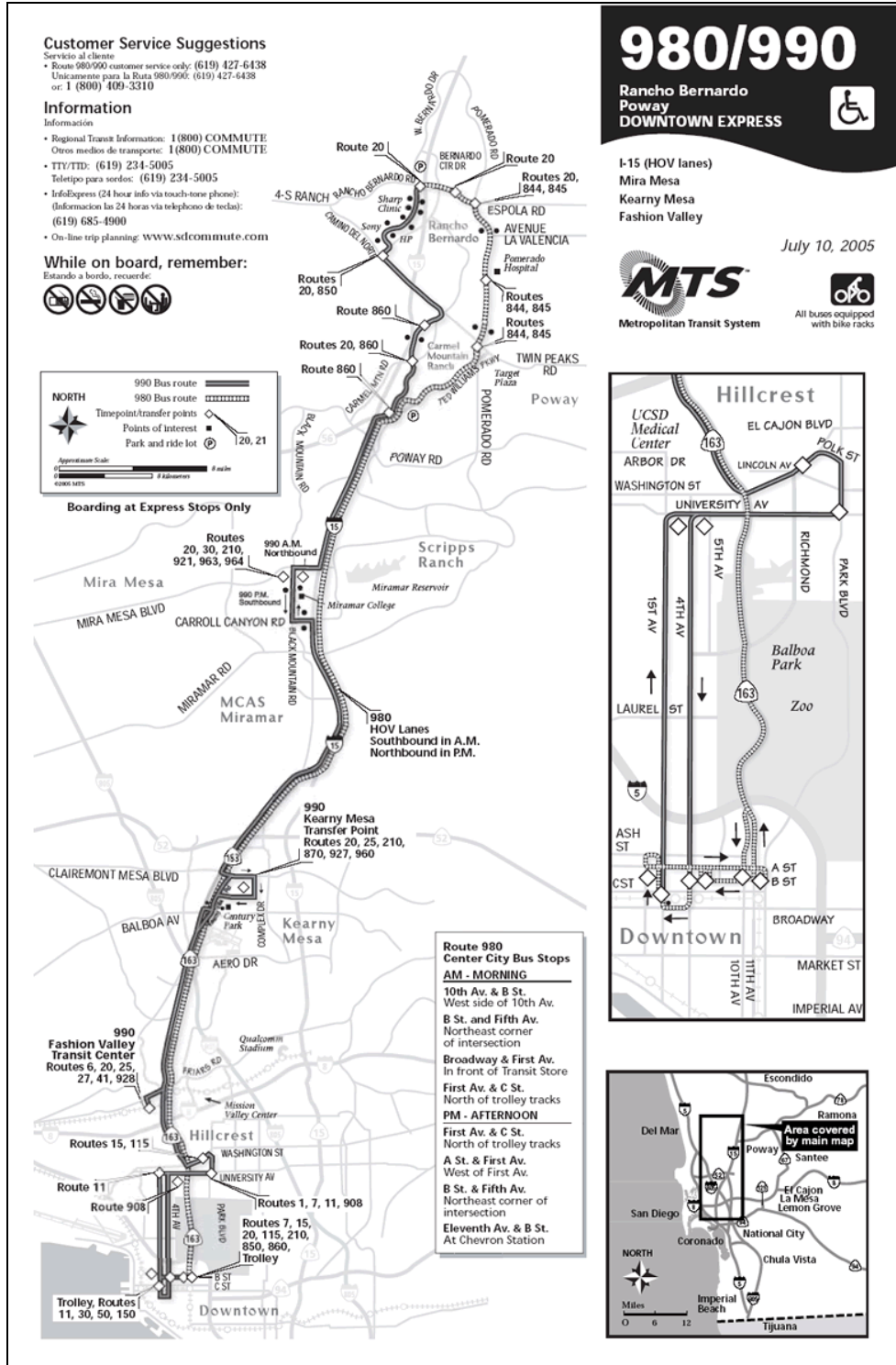


Figure 9: Inland Breeze Express route. Source: Metropolitan Transit System

3. Key Characteristics

This section compares the key characteristics of the BRT/Express Bus system in each of the previously discussed cities. As the cities have various types and lengths of service this is not intended as a contrast, instead simply information about each service.

The two key elements to the success of express bus routes are that the commute must take the same amount of time or less than using a personal vehicle, and the route(s) also must connect near where people are originating and where people are going without the need to travel too far out of the way or require time-consuming transfers.

The peer cities with the highest ridership (as a percentage of population), Houston and Ottawa, also have the highest travel speeds and the most extensive route network, as shown in Table 1. In both of these cities, the routes have many branches bring commuters from the suburbs into the CBD, which directly connect riders to their destination. Parking availability in the CBD may also affect the decision to use the express bus commuter service. Ottawa has strict parking policies which make parking difficult and expensive. Houston, on the other hand, does not have official parking policies but the downtown does suffer from a shortage of parking which results in expensive and inconvenient use of the personal vehicle.

“The case studies indicate that most urban areas with BRT have more than a million residents and CBD employment of at least 75,000. In these areas, sufficient ridership demand enables frequent service as part of a full-featured BRT application in at least one corridor.”

“In most North American applications, the BRT service patterns that work best feature all-stop service at all times of day complemented by an “overlay” of integrated express services for specific markets during peak periods such as major park-and-ride stations to the CBD. This service pattern is found in Miami, Ottawa, and Pittsburgh. In Pittsburgh, more than half of the East Busway neighborhood’s riders come from beyond the busway limits.”

TCRP Report 90- Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit

Table 1: Key Characteristics

<i>City</i>	<i>Ridership (Riders/ Day)</i>	<i>Length (Miles)</i>	<i>Average Speed (mph)</i>	<i>Capital Cost (In 2000 dollars)</i>	<i>Fare Structure</i>	<i>User Cost</i>
Houston	330,000	98	54	\$540 million	Zones	\$1.50-\$3.00
Ottawa	200,000	37	50	\$435 million	Various flat rates, discounted for prepaid	\$1.60-\$5.00 (Canadian)
Los Angeles	43,000	12	44	\$127 million	Zones	\$1.50 + \$0.50 per zone
San Diego	7,000	8	24	\$42 million	Flat rate, discounted for monthly passes	\$2.50

Table 2: Financial Data. Fiscal Year 2004*

<i>City</i>	<i>Revenue Vehicles</i>	<i>Fare Revenue (in millions)</i>	<i>Operating Expenses (in millions)</i>	<i>Fare Box Recovery (percentage)</i>
Houston	1,434	\$49.5	\$244.6	20.2%
Ottawa				
Los Angeles*	2,872	\$199.8	\$768.3	26.0%
San Diego	275	\$22.5	\$75.5	29.8%

* Data compiled from Foothill Transit and Los Angeles County Metropolitan Agency

4. Conclusions

While each of the cities examined utilized a different type of BRT/Express Route system, they each presented key lessons learned that can be applied in the Valley. Other systems were also looked at, but did not bear as close a resemblance to the Valley.

Lessons learned that can be applied in the Valley are:

- Reversible single BRT/HOV lane is not ideal but may be a good short-term solution.
- The most successful BRT/Freeway Express Systems have easy access to Park and Rides and online stations.
- If available right-of-way dictates that lanes need to be shared with other high occupancy vehicles, charging for the use of the lane can raise revenue for the transit system.
- Prepaid passes that are discounted (and/or linked to an employer) help to encourage use by commuters.
- High frequency and real-time updates facilitate ease of use for rider.
- (Any lessons regarding affectively working with state DOTs, state police and local street departments on planning and implementation of service?)

APPENDIX I: BACKGROUND INFORMATION

	<i>2000 Population of Metropolitan Area</i>	<i>Size of Metropolitan Area in Square Miles</i>	<i>Number of Employed People in CBD</i>
Phoenix	3.1 million	1,871	26,800
Houston	3.8 million	145	150,000
Ottawa	700,00	1,295	84,500
Los Angeles	11.8 million	1,663	200,000
San Diego	2.6 million	782	110,000

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APPENDIX II: RESOURCES

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RPTA Freeway Express Bus / BRT Operating Plan

Working Paper
Task 6: Define Operations and Model

Prepared for
Regional Public Transportation Authority



Prepared by
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June 2007

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1. INTRODUCTION

The objectives of the Freeway Express Bus/BRT Operating Plan are to define the operational characteristics of the freeway-based regional Express Bus/BRT network identified in the Regional Transportation Plan and funded through Proposition 400. The study also considers how operational characteristics may change as the regional network develops over the 20 year life of the regional transportation funding program.

The purpose of Task 6, “Refine Route Operating Characteristics and Model Revised Routes,” is to define the alignment and the operating and capital requirements of the proposed freeway express bus/BRT routes. This working paper documents the operational characteristics of each route, including route termini, stop locations, and steps required before implementation can occur. A discussion of ridership modeling is included as an appendix to this working paper.

2. EXPRESS BUS ROUTE ALIGNMENTS

The working paper for Task 4, “Analyze Current Transit Networks and User Characteristics,” presented a brief analysis of trend in the service area for each of the new express bus routes. Changes in population and employment characteristics in each of the route service areas was evaluated, along with information on the status of infrastructure that supports express bus routes. Based on this information, the alignment for each express bus route was determined, including route termini and intermediate stops.

This section details route alignments and includes information on transit coordination, issues that must be addressed before route implementation, and any issues concerning the route in the long term, but that would not cause a delay to implementation. A summary table is provided at the end of this section.

Each section contains a list of other transit routes that intersect with the express route in question. Routes that should be timed for good transfers are underlined.

Note: all routes that serve Downtown Phoenix will stop at Central Station, which the following routes also serve:

- Local routes 0 (Central), 3 (Van Buren), 7 (7th Street), 8 (7th Avenue), 10 (Roosevelt/Grant), 12 (12th Street), 15 (15th Avenue); RED, BLUE, GREEN lines; DASH downtown circulator
- In December 2003, the Central Phoenix/East Valley light rail (CP/EV LRT) will begin service and will also serve central station.

2.1 Desert Sky Express/I-10 West RAPID

Note: The “Desert Sky Express” is a regionally funded continuation of the I-10 West RAPID route. The route will continue to use the name I-10 West RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The Desert Sky Express/I-10 West RAPID route originates at the Desert Sky Mall transit center, where the following bus lines also operate:

- Local routes 17, 41, 131
- GREEN (Thomas Road) and GREEN (Avondale) routes
- Express route 560 (Avondale Express)

In the future, the Thomas Road Supergrid route will likely intersect the Desert Sky Express/I-10 West RAPID. Route 560 will be replaced by the Avondale Express, which may not serve Desert Sky Transit Center.

Issues to address before implementation

The Desert Sky Express/I-10 West RAPID route is already in operation.

Long-term issues

- Consider extending route to Thomas Road/Loop 101 park-and-ride once it is constructed. The financial implications of extending the route should be considered at that time.
- Examine effect of plans to expand light rail service along I-10 to 79th Avenue; light rail service may replace the Desert Sky Express/I-10 West RAPID. Light rail may require a larger park-and-ride facility due to higher capacity and/or greater service frequency.

2.2 SR 51 Express/SR 51 RAPID

Note: The “SR 51 Express” is a regionally funded continuation of the SR-51 RAPID route. The route will continue to use the name SR-51 RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The SR 51 Express/SR-51 RAPID route originates at the SR51/Bell Road park-and-ride lot or at Paradise Valley Mall, and also serves the Shea Blvd/SR 51 park-and-ride. It connects with the following routes:

- Local routes 44, 106, 138 (at Paradise Valley Mall), 170
- BLUE route (at Paradise Valley Mall)
- Express route 512 (Scottsdale Express)

In the future, the SR51 RAPID will connect with light rail at the 12th Street station.

Issues to address before implementation

The SR 51 Express/SR51 RAPID route is already in operation.

Long-term issues

- Consider extending route to Desert Ridge Mall. The financial implications of extending the route should be considered at that time.
- Integration with light rail extension to Paradise Valley Mall (currently scheduled for 2025).

2.3 Deer Valley Express/I-17 RAPID

Note: The “Deer Valley Express” is a regionally funded continuation of the I-17 RAPID route. The route will continue to use the name I-17 RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The Deer Valley Express/I-17 RAPID route originates at the Bell Road/I-17 park-and-ride, and connects with the following routes:

- Local routes 170
- GREEN (Thomas Road) and GREEN (Avondale) routes
- Express route 560 (Avondale Express)

Many routes use the MetroCenter transit center:

- Local routes 27, 35, 90, 106, and 122
- RED route
- Express routes 581 and 582

As mentioned, the light rail line will be in operation in 2008. A potential place for transfers between the Deer Valley Express/I-17 RAPID and light rail is the 19th Avenue & Montebello transit center.

Issues to address before implementation

The Deer Valley Express/I-17 RAPID route is already in operation.

Long-term issues

- Integration with CP/EV light rail line on I-17.

2.4 Ahwatukee Express/I-10 East RAPID

Note: The “Ahwatukee Express” is a regionally funded continuation of the I-10 East RAPID route. The route will continue to use the name I-10 East RAPID.

Recommended routing

There are no changes to the current routing.

Transit coordination

The Ahwatukee/I-10 East RAPID originates at the Pecos/40th Street park-and-ride, where the following bus lines also operate:

- ALEX (Ahwatukee Local Express) Circulator

Issues to address before implementation

The Ahwatukee Express/I-10 East RAPID route is already in operation.

Long-term issues

- The construction of a park-and-ride at I-10 & Elliot is made difficult by lack of available land. This may continue the pressure to expand the Pecos & 40th Street park-and-ride.

2.5 Surprise-Scottsdale Express (July 2007)

Recommended routing

- West terminus: Surprise park-and-ride lot at Bullard Rd. & Greenway Rd.
- East terminus: Scottsdale Airpark (west side of Airport terminal, on Butherus)
- Stops:
 - Surprise City Hall
 - Sun City (Intersection of Bell Rd. and 99th Ave.)
 - Arrowhead Towne Center
 - Future Scottsdale Rd. & Loop 101 park-and-ride lot
 - Interim: No stop
 - Scottsdale Road at Mayo Boulevard
 - Scottsdale Road at Frank Lloyd Wright Boulevard
 - Dial Tech Center (73rd Street and Butherus)

The Valley Metro Operations department has determined the final schedule for the Surprise-Scottsdale Express, as follows:

Route 572 **Final** **Surprise-Scottsdale Express**

Monday - Friday East Bound Schedule

Bullard Avenue Park & Ride	Surprise City Hall	Bell at 99th Ave	Arrowhead Transit Center	Scottsdale Rd at Mayo Blvd	Scottsdale Road at FLW	Dial PNR	Scottsdale Airpark
455a	504a	509a	516a	544a	547a	550a	555a
520a	529a	534a	541a	614a	617p	620a	625a
600a	611a	619a	628a	710a	713a	716a	721a
630a	641a	649a	658a	740a	743a	746a	751a
510p	521p	532p	542p	611p	614p	617p	620p
540p	550p	558p	607p	636p	639p	642p	645p

Monday - Friday West Bound Schedule

Scottsdale Airpark	Dial PNR	Scottsdale Rd at FLW	Scottsdale Rd at Mayo Blvd	Arrowhead Transit Center	Bell at 99th Ave	Surprise City Hall	Bullard Avenue Park & Ride
605a	608a	613a	616a	643a	651a	658a	710a
630a	635a	640a	643a	710a	718a	725a	737a
340p	345p	349p	353p	427p	436p	447p	459p
410p	415p	419p	423p	459p	514p	526p	538p
440p	443p	450p	452p	529p	543p	553p	605p
510p	513p	520p	522p	559p	611p	621p	633p

Source: Valley Metro Operations

Transit coordination

At implementation in July 2007, the Surprise-Scottsdale Express would make stops that would intersect or be near the following lines:

- At Surprise park-and-ride: Grand Avenue Limited, 571 Express (downtown Phoenix)

- At Sun City stop: SCAT dial-a-ride service
- At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); North Glendale Express
- At Scottsdale Airpark: Local routes 72 (Scottsdale Road), 170 (Bell Road)

Future routes that will likely intersection the Surprise-Scottsdale Express (and the year of implementation) are the following:

- At Surprise park-and-ride: Loop 303 Express (2022)
- At Sun City stop: 99th Avenue Supergrid
- At Arrowhead Towne Center: West Loop 101 Connector (2008); Bell Road Supergrid (2018); 83rd/75th Avenue Supergrid
- At Scottsdale Airpark: East Loop 101 Connector (2008); Pima Express (2012); Scottsdale/Rural BRT (2010)

The City of Surprise may extend route 170 to downtown Surprise from Arrowhead Towne Center during the non-peak hours to provide service on Bell Road throughout the day. Although currently scheduled to operate during the peak hours only, the Surprise-Scottsdale Express is envisioned as an all-day service. Having additional local service on Bell Road during the day would eliminate the need for the Surprise-Scottsdale Express to operate during non-peak hours in this corridor.

Issues to address before implementation

- Consider route name change
 - Route has been re-named to “Surprise-Scottsdale Express”
- Parking capacity at Arrowhead Town Center
 - City of Glendale is negotiating with mall management
- Add bus stop amenities at Sun City stop (Bell Road and 99th Ave.)

Long-term issues

- HOV lane construction
- Monitor transfers between Surprise-Scottsdale Express and North Glendale Express; adjust timings, if needed
- Connections, if any, with I-17 or SR51 routes
 - City of Phoenix surveys show that many users of the park-and-ride lots at I-17/Bell and SR51/Bell come from outside of Phoenix. As the park-and-ride network is expanded, demand may ease at these lots (particularly at I-17/Bell, which has many users from Glendale and Peoria). Providing service at the I-17/Bell Rd. lot may become a consideration in the future.
- Location of permanent park-and-ride lot in north Glendale
- Circulation within Scottsdale Airpark & location of transfer center at Scottsdale Airpark
- Service duplication along Bell Road (170, Supergrid) or Surprise-to-downtown PHX (571, Loop 303 service in 2023)

2.6 North Glendale Express (July 2007)

Recommended routing

- North terminus: Future north Glendale park-and-ride
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)
- South terminus: State Capitol Complex
- Stops:
 - Arrowhead Towne Center (Transit Center)

- Glendale Park-and-Ride at Loop 101/Maryland (open for operations Dec. 2007)
 - Interim: 95th Avenue & Coyote Blvd.
- Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Van Buren, near side of Central
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren

The Valley Metro Operations department has determined the final schedule for the North Glendale Express, as follows:

Route 573 Final

North Glendale Express

Monday - Friday In-Bound Schedule

75th & Beardsley Park & Ride	Arrowhead Transit Center	Glendale Park & Ride	Central Station	17th Avenue & Jefferson
515a	521a	536a	611a	618a
545a	551a	606a	641a	648a
615a	621a	636a	715a	722a
640a	647a	704a	744a	751a
345p	351p	408p	441p	448p
415p	421p	438p	511p	518p

Monday - Friday Out-Bound Schedule

17th Avenue & Jefferson	Central Station	Glendale Park & Ride	Arrowhead Transit Center	75th & Beardsley Park & Ride
630a	637a	707a	722a	729a
700a	708a	738a	753a	800a
408p	418p	458p	515p	522p
438p	448p	528p	545p	552p
508p	518p	558p	615p	622p
538p	548p	628p	645p	652p

Transit coordination

At implementation in July 2007, the North Glendale Express would make stops that would intersect or be near the following lines:

- At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); Surprise-Scottsdale Connector

Future routes that will likely intersect with the North Glendale Express are the following:

- At Church of Joy joint-use park-and-ride: West Loop 101 Connector (2008); Glendale Ave. Supergrid
- Central station: Central Phoenix/East Valley light rail (December 2008)

Issues to address before implementation

- Parking capacity at Arrowhead Town Center
 - City of Glendale is negotiating with mall management
- Agreement with Church of Joy for interim park-and-ride site
 - City of Glendale has is in negotiations

Long-term issues

- HOV construction
- Location of permanent park-and-ride lot in north Glendale
- Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - Observe results of “A/B” service on other routes to determine action for integration with light rail

2.7 Papago Freeway Connector (July 2008)Recommended routing

- Western terminus: Park-and-ride lot in East Buckeye
 - Interim: joint-use park-and-ride lot in downtown Buckeye (must identify exact location)
- Eastern terminus: State Capitol complex
- Stops
 - Future Goodyear park-and-ride at NW corner of Dysart & I-10 (scheduled for completion in 2009)
 - Interim: may have interim joint-use park-and-ride in place
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Van Buren, near side of Central
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue

- Jefferson, far side of 12th Avenue
- Jefferson, far side of 7th Avenue
- Jefferson, far side of 3rd Avenue
- Central, far side of Jefferson
- Central, near side of Adams
- Central, near side of Van Buren

Transit coordination

- At Goodyear park-and-ride: Dysart Supergrid

In the future, the Papago Freeway Connector will serve the East Buckeye park-and-ride along with the Buckeye Express; and the Goodyear park-and-ride with the Buckeye Express and the Avondale Express.

Issues to address before implementation

- Consider name change
 - Route does not act as a connector
 - Transit passengers may not be familiar with name of freeway
- Finalize location and arrangements for interim park-and-ride site in downtown Buckeye (estimated for mapping at Watson & Yuma)
- Finalize location for interim park-and-ride in Goodyear/Avondale area

Long-term issues

- Consider combining the Papago Freeway Connector and Buckeye Express concepts into a single route
 - Two names for a similar route may be confusing
 - The two routes serve the same market & can serve same stops (like the I-17 RAPID (make stops at certain park-and-ride lots depending on trip))
 - Route would be implemented in July 2008, with service originating from east Buckeye park-and-ride lot
 - As development continues in west Buckeye, extend route origin to park-and-ride at Belmont, Tartesso, or Sun Valley Parkway
 - Buckeye Express scheduled for implementation in 2015; implementation could simply consist of increased frequencies on Papago Freeway Connector
- HOV construction
- Development of dedicated park-and-ride site in downtown Buckeye
- Development of dedicated park-and-ride lot(s) in west Buckeye
 - Ideally, future development can dedicate space to park-and-ride lots
- Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - Observe results of “A/B” service on other routes to determine action for integration with light rail

2.8 West Loop 101 Connector (July 2008)

Recommended routing

- “A” service to downtown Phoenix
 - Northern terminus: Arrowhead Towne Center Transit Center
 - Southern terminus: Central Station (via State Capitol Complex)

- Stops:
 - Future north Glendale park-and-ride lot at roughly Loop 101 & 51st Ave
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren
 - PM (pick-up only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams
 - “B” service to light rail (to start December 2008)
 - Northern terminus: Arrowhead Towne Center Transit Center
 - Southern terminus: Light rail transit center at 19th Ave/Montebello
 - Stops:
 - Future north Glendale park-and-ride lot at roughly Loop 101 & 75th Ave
 - Interim: Church of Joy joint-use park-and-ride lot (75th Ave. & Beardsley)

Transit coordination

At implementation in July 2008, the West Loop 101 Connector would make stops that would intersect or be near the following lines:

- At Arrowhead Towne Center: Local routes 186 (Union Hills Road), 170 (Bell Road), 67 (67th Avenue); North Glendale Express; Surprise-Scottsdale Express
- At Church of Joy joint-use park-and-ride: North Glendale Express

Future routes that will likely intersect with the West Loop 101 Connector (and the year of implementation of each) are the following:

- At 19th Ave./Montebello TC: Light rail; 19th Avenue Supergrid
- At Arrowhead Towne Center: Bell Road Supergrid (2018); 83rd/75th Supergrid

Timing the “B” service with light rail at its terminus will be key to the success of the “A/B” concept. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that bus passengers can step off the bus and step on the light rail.

Issues to address before implementation

- This is a two-way service; recommend implementing higher number of trips traveling southbound in morning and northbound in the afternoon.
- Parking capacity at Arrowhead Transit Center

Long-term issues

- HOV construction
- Final policy of integration with light rail

2.9 East Loop 101 Connector (July 2008)Recommended routing

- Northern terminus: Scottsdale Airpark
- Southern terminus: Chandler's Tumbleweed park-and-ride (Germann and Hamilton)
- Stops:
 - Mustang Transit Center & Park-and-Ride (scheduled to be operational in July 2008)
 - Scottsdale Community College (Loop 101 & Chaparral)
 - Apache/Price light rail station & park-and-ride
 - ASU research park

Transit coordination

At implementation in July 2008, the East Loop 101 Connector would make stops that would intersect or be near the following lines:

- At Scottsdale Airpark: Local routes 72 (Scottsdale Road), 170 (Bell Road); North Loop 101 Connector
- At Mustang Transit Center/Park-and-Ride: Local routes 81 (Hayden/McClintock), 106 (Peoria/Shea), 114 (Via Linda); express route 512 (Scottsdale Express)
- At Scottsdale Community College: Local routes 50 (Camelback), 76 (Miller), 84 (Granite Reef)
 - Route 76 provides connection to downtown Scottsdale/Loloma Station
- At Apache/Price light rail station: Local route 30 (University)
- At ASU Research Park: Local route 81 (Hayden/McClintock)
 - Route 81 provides connection to Chandler Regional Medical Center

Future routes that will likely intersect with the East Loop 101 Connector (and the year of implementation) are the following:

- At Scottsdale Airpark: Hayden Road Supergrid (2014); Rural/Scottsdale Supergrid
- At Scottsdale Community College: Camelback Road Supergrid (2012);
- At Mustang Transit Center/Park-and-ride: Pima Express (2012); Shea Supergrid
- At Apache/Price light rail station: CP/EV light rail (December 2008); University Supergrid (2011)
 - Light rail provides connections to downtown Tempe, downtown Mesa, and downtown Phoenix
- At Chandler's Tumbleweed park-and-ride: Arizona Avenue Supergrid (2009); Arizona Avenue dedicated BRT (2010); Santan Express (2017)

Issues to address before implementation

- Recommend equal number of trips in both directions on this two-way service
- Consider changing route name

- Circulation to/within Scottsdale Airpark
- Evaluate need for park-and-ride at Scottsdale Community College
- Verify status of Mustang park-and-ride
- Resolve issues at Apache/Price light rail station/park-and-ride facility
 - Identify bus access & circulation within park-and-ride
 - May need to construct bus loop; if so, need to identify funding
 - Identify local routes that will serve Apache/Price park-and-ride

Long-term issues

- HOV construction
- Identify means of serving Chandler Fashion Center without causing parking conflict

2.10 Red Mountain Express (July 2008)

Recommended routing

This routing assumes a stop at a light rail station along the way to downtown Phoenix.

- Eastern terminus: Park-and-ride lot at Power Road & Loop 202
- Western terminus: State Capitol complex
- Stops
 - Park-and-ride lot at Greenfield Road & Loop 202
 - Light rail station at Washington & Priest
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren

This routing assumes an “A/B” service.

- “A” service to downtown Phoenix
 - Same routing as above, skipping stop at Washington/Priest light rail station
- “B” service to light rail
 - Eastern terminus: Park-and-ride lot at Power Road & Loop 202
 - Western terminus: Apache/Price light rail station/park-and-ride
 - Stops
 - Park-and-ride lot at Greenfield Road & Loop 202

Transit coordination

At implementation in July 2008, the Red Mountain Express would make stops that would intersect or be near the following lines:

- At Greenfield park-and-ride: local route 136 (Gilbert Road)
- At Washington/Priest light rail station: local routes 1 (Washington /Jefferson/ASU), 56 (Priest Drive); CP/EV light rail
- At Apache/Price light rail station ('B' service): East Loop 101 Connector

Future routes that will likely intersect with the Red Mountain Express (and the year of implementation) are the following:

- At Power Road park-and-ride: Power Road Supergrid (2014); Red Mountain Freeway Connector (2019)
- At Greenfield park-and-ride: Greenfield Road Supergrid (2009); Red Mountain Freeway Connector (2019)
- At Washington/Priest light rail station: Central Phoenix/East Valley light rail (December 2008)

Issues to address before implementation

- Verify status of Mesa park-and-ride facilities, including opening dates

Long-term issues

- HOV construction

2.11 Apache Junction Express (July 2010)Recommended routing

This routing assumes an "A/B" service.

- "A" service to downtown Phoenix
 - Eastern terminus: Future park-and-ride lot at Signal Butte Road/US 60
 - Western terminus: State Capitol complex
 - Stops
 - Park-and-ride lot at Superstition Springs Mall
 - Future park-and-ride lot at US 60/Country Club Road
 - Interim location: unknown
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue
 - 17th Avenue, far side of Adams
 - PM (pick-up only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue

- Central, far side of Jefferson
- Central, near side of Adams
- Central, near side of Van Buren
- “B” service to light rail
 - Eastern terminus: Future park-and-ride lot at Signal Butte Road/US 60
 - Western terminus: Apache/Price light rail station/park-and-ride
 - Stops
 - Park-and-ride lot at Superstition Springs Mall
 - Future park-and-ride lot at US 60/Country Club Road
 - Interim location: unknown

Transit coordination

At implementation in July 2010, the Apache Junction Express would make stops that would intersect or be near the following lines:

- At Superstition Springs park-and-ride: Local routes 30 (University), 45 (Broadway), 61 (Southern), 108 (Elliot Rd)
- At US 60/Country Club park-and-ride: Local route 61, Country Club/Arizona Supergrid
- At Apache/Price light rail station: CP/EV light rail; East Loop 101 Connector

Timing the “B” service with light rail at its terminus will be key to the success of the “A/B” concept. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that bus passengers can step off the bus and step on the light rail.

Future routes that will likely intersect with the Apache Junction Express (and the calendar year of implementation) are the following:

- At Superstition Springs park-and-ride: Superstition Freeway Connector (2011); Power Road Supergrid (2014); Superstition Springs Express (2018)

Issues to address before implementation

- Circulation at Apache/Price light rail station/park-and-ride lot
- Status of US 60/Country Club park-and-ride lot

Long-term issues

- Once Superstition Springs Connector is in place, Apache Junction Express “B” service to light rail will be redundant for patrons of the Superstition Springs park-and-ride; at the same time, ridership may justify the more frequent service. This issue should be examined at the time of implementation of Superstition Springs Connector service in 2011.

2.12 Superstition Freeway Connector (July 2011)

Recommended routing

- Eastern terminus: Superstition Springs Transit Center/Park-and-Ride
- Western terminus: Main/Sycamore light rail station
- Stops
 - Future US60/Country Club park-and-ride
 - Interim: unknown
 - Fiesta Mall Transit Center

Transit coordination

At implementation in July 2011, the Superstition Springs Connector would make stops that would intersect or be near the following lines:

- At Superstition Springs transit center/park-and-ride: Local routes 30 (University), 45 (Broadway), 61 (Southern), 108 (Elliot Rd); Apache Junction Express
- At US 60/Country Club park-and-ride: Local route 61, Country Club/Arizona Supergrid; Apache Junction Express
- At Main/Sycamore light rail station: Central Phoenix/East Valley light rail; Main Street BRT

Future routes that will likely intersect with the Superstition Springs Connector (and the calendar year of implementation) are the following:

- At Superstition Springs park-and-ride: Power Road Supergrid (2014); Superstition Springs Express (2018)

Timing the connector service with light rail at the terminus will be key to the success of this route. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that bus passengers can step off the bus and step on the light rail.

Issues to address before implementation

- The route is intended as a two-way route, consider implementing higher number of trips westbound in the morning and eastbound in the afternoon.
- Circulation at Main/Sycamore light rail station
- Status of US 60/Country Club park-and-ride lot
- Layover location near western terminus
- Coordination of schedules and potential service redundancies between Superstition Springs Connector, route 531, and Apache Junction Express “B” service to light rail

Long-term issues

- None identified

2.13 Pima Express (July 2012)Recommended routing

The recommended routing for the Pima Express is as follows:

- Northern terminus: Future Scottsdale Road & Loop 101 park-and-ride
 - Interim: unknown
 - Route may use Mustang Transit Center/park-and-ride as northern terminus
- Southern terminus: State Capitol Complex
- Stops
 - Scottsdale Airpark (Butherus/Greenway)
 - Mustang Transit Center/park-and-ride
 - Downtown Phoenix stops (assumes use of existing local stops)
 - AM (drop-off only)
 - Washington, far side of 1st Avenue
 - Washington, near side of 3rd Avenue
 - Washington, far side of 5th Avenue
 - Washington, far side of 7th Avenue
 - Washington, far side of 10th Avenue
 - Washington, far side of 13th Avenue
 - Washington, far side of 15th Avenue

- 17th Avenue, far side of Adams
- PM (pick-up only)
 - Jefferson, near side of 17th Avenue
 - Jefferson, far side of 15th Avenue
 - Jefferson, far side of 12th Avenue
 - Jefferson, far side of 7th Avenue
 - Jefferson, far side of 3rd Avenue
 - Central, far side of Jefferson
 - Central, near side of Adams
 - Central, near side of Van Buren

Transit coordination

At implementation in July 2012, the Pima Express would make stops that would intersect or be near the following lines:

- At Scottsdale/101 park-and-ride: Scottsdale/Rural Road Supergrid
- At Mustang Transit Center/park-and-ride: Local routes 81 (Hayden/McClintock), 106 (Peoria/Shea), 114 (Via Linda); express route 512 (Scottsdale Express); East Loop 101 Connector
- Future routes that will likely intersect with the Pima Express are the following:
- None identified

Issues to address before implementation

- Status of Scottsdale Road/101 park-and-ride
- Consider name change to make routing/destinations clearer to potential patrons

Long-term issues

- Integration, if any, with Central Phoenix/East Valley light rail (prior to downtown)

2.14 Peoria Express (July 2013)

Recommended routing

The recommended routing for the Peoria Express is as follows:

- North terminus: Future Peoria park-and-ride
 - Alternative: Glendale Park-and-Ride at Loop 101/Maryland
- Southern terminus: State Capitol Complex
- Stops
 - Glendale Park-and-Ride at Loop 101/Maryland
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

At implementation in July 2013, the Peoria Express would make stops that would intersect or be near the following lines:

- At Glendale Park-and-Ride at Loop 101/Maryland: North Glendale Express; Glendale Avenue Supergrid
- At Central Station: Local routes 0 (Central), 3 (Van Buren), 7 (7th Street), 8 (7th Avenue), 10 (Roosevelt/Grant), 12 (12th Street), 15 (15th Avenue); RED, BLUE, GREEN lines; DASH downtown circulator; Central Phoenix/East Valley light rail

Issues to address before implementation

- Location of park-and-ride lot in Peoria (or, re-location of park-and-ride lot to another location)
- Consider name change to make the routing/destination clearer to potential passengers
- Depending on origination point, route will duplicate a portion of North Glendale Express route. Evaluate demand on both routes to align frequencies at various park-and-ride lots

Long-term issues

- Circulator may be needed to serve Westgate/University of Phoenix stadium area
- Integration with light rail on I-10 (currently scheduled for implementation in 2019)

2.15 Buckeye Express (July 2014)Recommended routing

- Western terminus: Park-and-ride lot in West Buckeye
- Eastern terminus: State Capitol complex
- Stops
 - Future East Buckeye park-and-ride
 - Goodyear park-and-ride at NW corner of Dysart & I-10 (scheduled for completion in 2009)
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- Route will share facilities with Papago Connector at East Buckeye park-and-ride and Goodyear park-and-ride

Issues to address before implementation

- Consider combining the Papago Freeway Connector and Buckeye Express concepts into a single route
 - See Papago Freeway Connector analysis
- Develop dedicated park-and-ride lots in west Buckeye
 - Ideally, private development can dedicate space to park-and-ride lots
- If not combined, align frequencies with demand at West Buckeye, East Buckeye, and Avondale park-and-ride facilities

Long-term issues

- Duplication of service once I-10 light rail line is in place (anticipated for 2019)
 - Observe results of "A/B" service on other routes to determine action for integration with light rail

2.16 Black Canyon Freeway Connector (July 2015)Recommended routing

- North terminus: Park-and-ride at Carefree Highway and I-17 (southwest corner)
- South terminus: 19th Avenue/Montebello light rail station/transit center
- Stops
 - Happy Valley/I-17 park-and-ride

Transit coordination

The only transit connection is with the light rail at its southern terminus. The Black Canyon Freeway Connector will share space at the Carefree/I-17 park-and-ride and the Happy Valley/I-17 park-and-ride with the North I-17 Express and possibly the Anthem Express.

Issues to address before implementation

- Consider name change for consistency across express routes operating on I-17
 - Routes operating on I-17 include I-17 RAPID, North I-17 Express, and Black Canyon Freeway Connector

Long-term issues

- Potential duplication of service/competition with North I-17 Express “B” service
 - Need to align service levels for each route to match demand at the several park-and-rides served

2.17 Ahwatukee Connector (July 2016)Recommended routing

The following is the recommended routing:

- South terminus: Pecos & 40th Street park-and-ride
- North terminus: Tempe Transportation Center (College Ave & Veterans Way)
- Stops
 - I-10/Elliott park-and-ride
 - Arizona Mills Transit Center

Transit coordination

The Ahwatukee Connector will intersect with the following bus lines:

- At Pecos/40th Street park-and-ride & I-10/Elliott park-and-ride: Ahwatukee Express/I-10 RAPID; ALEX circulator
- At Arizona Mills Transit Center: Local routes 56 (Priest Dr.), 77 (Baseline), 92 (48th St/Guadalupe), 108 (Elliot Rd)
- At Tempe Transit Center: Local routes 1 (Washington St), 44 (44th St), 62 (Hardy), 66 (Mill/68th St), 56, 65 (Mill/Kyrene), 72 (Scottsdale/Rural), 76 (Miller), 81 (McClintock/Hayden), 92; Express route 534 (Queen Creek); CP/EV light rail

Issues to address before implementation

- This is a two-way route; consider implementing greater frequency of service northbound direction in the morning and southbound in the evening.
- Evaluate route name to address issue of consistency across all routes that operate on I-10 from the Ahwatukee area
 - The I-10 East RAPID, Ahwatukee Connector, and Ahwatukee Express all operate in this corridor
- Establishment of I-10/Elliott park-and-ride facility
- Capacity at I-10/Pecos park-and-ride
- Circulation in I-10/Elliott Rd. area

Long-term issues

- The Ahwatukee Connector would duplicate a portion of local routes 56 and 92 (between Arizona Mills and Tempe Transit Center). The effect on ridership on both routes should be examined.

2.18 Santan Express (July 2017)

Recommended routing

- East terminus: Williams Gateway/ASU East Campus
- West terminus: State Capitol Complex
- Stops:
 - Williams Field Road at Chandler Boulevard
 - Future park-and-ride in vicinity of Val Vista & Loop 202 (exact location TBD)
 - Chandler's Tumbleweed park-and-ride (Germann & Hamilton)
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

The Santan Express will intersect with the following transit lines:

- At Tumbleweed park-and-ride (Hamilton & McQueen): Arizona Avenue BRT; Chandler Blvd BRT; East Loop 101 Connector

The Town of Gilbert will likely provide local service on Val Vista by the time of implementation.

Issues to address before implementation

- Status of Loop 202/Val Vista park-and-ride
- This route is a two-way service; consider implementing more trips in the eastbound direction in the morning and westbound in the afternoon.

Long-term issues

- In order to serve employment destinations in Chandler and Gilbert, will need local circulators (such as at Chandler Airpark and, Williams Gateway Center).

2.19 Anthem Express (July 2017)

Recommended routing

- North terminus: Anthem park-and-ride
- South terminus: Scottsdale Airpark
- Stops:
 - Future park-and-ride lot at I-17/Carefree Highway
 - Future park-and-ride lot at I-17/Happy Valley Road
 - Future Desert Ridge park-and-ride lot
 - Interim: No stop
 - Scottsdale Road at Mayo Boulevard
 - Scottsdale Road at Frank Lloyd Wright Boulevard
 - Dial Tech Center (73rd Street and Butherus)

Transit coordination

- This route shares the park-and-ride facilities at Anthem and I-17/Carefree Highway with the North I-17 Express and the Black Canyon Freeway Connector.
- At Scottsdale Airpark, coordination with the East Loop 101 Connector would open up more destinations to Anthem residents.

Issues to address before implementation

- Status/capacity of Anthem park-and-ride

Long-term issues

- None identified.

2.20 Red Mountain Freeway Connector (July 2018)Recommended routing

- Eastern terminus: Power Road/Loop 202 park-and-ride
- Western terminus: Tempe Transit Center
- Stops:
 - Greenfield/Loop 202 park-and-ride
 - Apache/Price light rail station

Transit coordination

Timing the connector service with light rail at its terminus will be key to the route's success. Although light rail service will be very frequent in the peak, bus service should be scheduled and routed such that bus passengers can step off the bus and step on the light rail.

Issues to address before implementation

- Review success of Red Mountain Express "B" service to determine whether Connector should be routed in similar fashion
- Integrate Red Mountain Express and Red Mountain Freeway Connector services to provide optimum level of service in this corridor

Long-term issues

- None identified

2.21 Superstition Springs Express (July 2018)Recommended routing

- Eastern terminus: Superstition Springs Transit Center/park-and-ride
- Western Terminus: State Capitol Complex
- Stops:
 - US60/Country Club park-and-ride
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- At Superstition Springs Transit Center/park-and-ride: Superstition Freeway Connector, Apache Junction Express; Power Road Supergrid
- US60/Country Club park-and-ride: Arizona Avenue/Country Club Supergrid (2009); Arizona Ave. Dedicated BRT

The 531 Express currently operates on Gilbert Road and may be re-routed to interact with the Superstition Springs Express to provide connections for people coming from Downtown Gilbert.

Issues to address before implementation

- By 2018, there should be a plethora of data on the success of the A/B service integration with light rail. In addition, there should be ample data on transit demand along the US60 corridor to Tempe and downtown Phoenix. The Superstition Springs Express, Superstition Freeway Connector, and Apache Junction Express should be aligned accordingly to provide appropriate levels of service for the demand at each park-and-ride lot along US60.
- The Superstition Springs Express is a two-way route; consider implementing a higher level of service in the westbound direction in the morning and eastbound in the evening.
- Status of US 60/Country Club park-and-ride facility (currently planned for implementation in 2011)
- Consistency in route names for express services operating on US 60 from the East Valley
 - Superstition Springs Express vs. Superstition Freeway Connector vs. Apache Junction Express (vs. using freeway numbers in other freeway corridors)

Long-term issues

- Potential overlap in service between the Superstition Springs Connector, the Apache Junction Express, the 531, and this route.
- Overall integration of routes in East Valley with light rail

2.22 Avondale Express (July 2019)Recommended routing

- Western terminus: Goodyear/Avondale park-and-ride at I-10/Litchfield
- Eastern Terminus: State Capitol Complex
- Stops:
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- Goodyear/Avondale park-and-ride at I-10/Litchfield: shares facilities with Buckeye Express, Papago Connector
- Downtown Phoenix: coordinate transfer times with light rail

Issues to address before implementation

- This is a two-way route; consider implementing more trips in the eastbound direction in the morning and westbound in the evening.
- A circulator in Goodyear/Avondale would allow transit patrons to access destinations beyond the park-and-ride lot.
- Integration with Papago Connector, Buckeye Express, in terms of route name, timing of trips, etc.
- It may make sense to use the same name for all services in this corridor (the I-10 beyond Loop 101), just with different origination points or timing.

Long-term issues

- Integration with I-10 light rail
 - Evaluate experience with other express routes and the A/B service structure

2.23 North I-17 Express (July 2021)

Recommended routing

- “A” service to downtown Phoenix
 - Northern terminus: Future park-and-ride at Anthem
 - Southern terminus: Central Station (via State Capitol Complex)
 - Stops:
 - Future park-and-ride facility at I-17 and Carefree Highway
 - Downtown Phoenix stops (assumes use of existing local stops)
- “B” service to light rail
 - Northern terminus: Future park-and-ride at Anthem
 - Southern terminus: Light rail transit center at 19th Ave/Montebello
 - Stops:
 - Future park-and-ride facility at I-17 and Carefree Highway

Transit coordination

- At Anthem and I-17/Carefree Highway park-and-rides: shares facilities with Anthem Express and Black Canyon Freeway Connector

Issues to address before implementation

- Status of Anthem park-and-ride
- Status of I-17/Carefree Highway park-and-ride
- Integration of express bus and light rail
 - Evaluate experience on other express routes with A/B services

Long-term issues

None identified

2.24 Loop 303 Express (July 2022)

Recommended routing

- “A” service to downtown Phoenix
 - Northern terminus: Surprise park-and-ride (at Greenway/Bullard)
 - Southern terminus: Central Station (via State Capitol Complex)
 - Stops:
 - Future park-and-ride facility at Loop 303 and Northern
 - Downtown Phoenix stops (assumes use of existing local stops)

Transit coordination

- The Surprise-Scottsdale Express will operate out of the Surprise park-and-ride at Greenway/Bullard, but may not require transfer coordination with the Loop 303 Express.

Issues to address before implementation

- Status of Northern/Loop 303 park-and-ride
- Integration with I-10 light rail extension
 - Evaluate experience on other routes with A/B service structure

Long-term issues

- Evaluate need for HOV lanes in this corridor

3. APPENDIX: RIDERSHIP PROJECTIONS

An important component of the Freeway Express Bus/BRT Operating Plan is to understand whether the planned express bus network will be sufficient to meet ridership demand. This section provides information on the inferences that can be made at this time about future express bus ridership.

Ideally, ridership estimates could be generated based on the regional travel demand model, which uses information on land use, socio-economic information, and travel behavior to predict where, when, and how people will travel. Unfortunately, after extensive efforts on the part of the project team and the MAG modeling staff, the ridership results produced by the MAG model were not sufficiently refined to use in this analysis. However, a discussion of the results from the regional travel demand model is included in this section to detail the efforts made and the results (even if poor), and to suggest possible reasons for the coarse results.

In order to infer from what is currently known about express bus ridership, two additional discussions are included following an evaluation of regional travel demand model results. First, there is an analysis of historic ridership figures to determine factors contributing to ridership growth. Second, a density scale analysis of the region provides a means of gauging the ridership potential of each new express bus route.

Regional Travel Demand Model

Methodology

The Valley's regional travel demand model is created, updated, and operated by MAG. The MAG regional travel demand model extends throughout the Phoenix Metropolitan Planning area and is used for travel forecasting on the major routes in the region, for light rail ridership forecasts, and for air quality conformity analysis. Currently, the model is calibrated to the year 2004; with 2002 as a validation year. MAG currently uses the EMME/2 software platform and external programs to facilitate the model runs.

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Implementation Year - Calendar Year	Implementation Year - Fiscal Year	Route	Duplicative with LRT? (i.e., requires no/minimal out-of-direction service to meet up with LRT)	One-way or two-way service	# of One-Way Trips Covered by PTF	Routing (as of March 2007 - subject to change)	Park-and-ride lots and Transit Centers served
				source: TLCP Audit Draft PAR documents			
2007	2008****	Desert Sky Express/I-10 West RAPID	long-term, I-10	One-way	20	Same as existing I-10 West RAPID	Desert Sky TC I-10/79th PNR Central Station
2007	2008****	Deer Valley Express/I-17 RAPID	yes, I-17, at implementation	One-way	24	Same as existing I-17 RAPID	Bell/I-17 PNR Metro Center TC Central Station
2007	2008****	SR 51 Express/SR51 RAPID	no	One-way	20	Same as existing SR 51 RAPID	SR51/Bell Rd PNR SR51/Shea Blvd PNR Central Station
2007	2008****	Ahwatukee Express/I-10 East RAPID	no	One-way	20	Same as existing I-10 East RAPID	Pecos/40th St PNR Central Station
2007	2008	Surprise-Scottsdale Express (formerly North Loop 101 Connector)	no	Two-way	12	Surprise-to-Scottsdale along 101	Surprise PNR (Greenway/Bullard) Arrowhead TC Scottsdale Airpark
2007***	2008	North Glendale Express (will operate on Loop 101)	long-term, I-10	Two-way	12	From North Glendale to downtown Phoenix along Loop 101 & I-10; travels east-to-west in downtown Phx	75th/Beardsley (Glendale) PNR Arrowhead TC Loop 101/Glendale PNR Central Station
2008***	2009	West Loop 101 Connector (will operate on I-17)	yes, I-17, at implementation	Two-way	16	North Glendale to downtown Phoenix along Loop 101 & I-17; travels west-to-east in downtown Phx	Arrowhead TC 75th/Beardsley (Glendale) PNR Central Station
2008	2009	Papago Freeway Connector	long-term, I-10	One-way	8	East Buckeye to downtown Phoenix on I-10; travels east-to-west in downtown Phx	East Buckeye PNR Avondale/Goodyear PNR Centra
2008	2009	East Loop 101 Connector	no	Two-way	8	North Scottsdale to south Chandler along Loop 101	Loop 101/Scottsdale Rd PNR Mustang PNR
2008	2009	Red Mountain Express	yes, East Valley, at implementation	One-way	8	East Mesa to downtown Phoenix, along 202; with stop at light rail	Power Road/Loop 202 PNR Greenfield Road/Loop 202 PNR Washington/Priest LRT Station
2010	2011	Apache Junction Express	yes, East Valley, at implementation	One-way	8	Apache Junction to downtown Phoenix	Signal Butte/US60 PNR Superstition Springs Mall PNR US60/Country Club PNR
2011	2012	Superstition Freeway Connector	no	Two-way	6	East Mesa to LRT, along US60	Superstition Springs PNR US60/Country Club PNR Main/Sycamore LRT station
2012	2013	Pima Express	maybe	One-way	8	North Scottsdale to downtown Phoenix, along loop 101	Scottsdale Road/Loop 101 PNR Scottsdale Airpark TC Mustang Transit Center & PNR

Implementation Year - Calendar Year	Implementation Year - Fiscal Year	Route	Duplicative with LRT? (i.e., requires no/minimal out-of-direction service to meet up with LRT)	One-way or two-way service	# of One-Way Trips Covered by PTF	Routing (as of March 2007 - subject to change)	Park-and-ride lots and Transit Centers served
2013	2014	Peoria Express	long-term, I-10	One-way	12	Peoria to downtown Phoenix	Peoria PNR Glendale Ave/Loop 101 PNR
2014*	2015	Buckeye Express	long-term, I-10	One-way	6	West Buckeye to downtown Phoenix	West Buckeye PNR East Buckeye PNR Goodyear PNR
2015	2016	Black Canyon Freeway Connector	yes, I-17, at implementation	Two-way	16	North Phoenix to LRT, via I-17	Carefree Hwy/I-17 PNR Happy Valley/I-17 PNR 19th Ave/Montebello LRT station
2016	2017	Ahwatukee Connector	no	Two-way	8	Ahwatukee to LRT, via I-10/202	Pecos/40th St PNR I-10/Elliott PNR Arizona Mills TC Tempe Transit Center
2017	2018	Santan Express	no	Two-way	8	Gilbert/Chandler to downtown Phoenix	Williams Gateway/ASU East Val Vista/Loop 202 PNR Tumbleweed PNR
2017	2018	Anthem Express	no	One-way	10	Anthem to Scottsdale Airpark	Anthem PNR Carefree Hwy/I-17 PNR Happy Valley/I-17 PNR Desert Ridge PNR Scottsdale Airpark TC
2018	2019	Red Mountain Freeway Connector	no	One-way	16	East Mesa to LRT, along 202	Power Road/Loop 202 PNR Greenfield Road/Loop 202 PNR Apache/Price LRT Station Tempe Transit Center
2018	2019	Superstition Springs Express	maybe	Two-way	20	East Mesa to downtown Phoenix, along US60	Superstition Springs PNR US60/Country Club PNR
2019	2020	Avondale Express	long-term, I-10	Two-way	16	Avondale to downtown Phoenix	Goodyear PNR
2021	2022	North I-17 express	yes, I-17, at implementation	One-way	10		Anthem PNR Carefree Hwy/I-17 PNR
2022	2023	Loop 303 Express	long-term, I-10	One-way	8	Surprise to downtown Phoenix, along 303	Surprise PNR (Greenway/Bullard) Loop 303/Northern PNR

*Buckeye Express originally scheduled for CY2010

**all routes assumed to be implemented in July of CY/start of FY

***Routing of West Loop 101 Connector & North Glendale Express switched out due to infrastructure preparedness

****Funding replacement for existing RAPID services only; no changes made to route; route name remains the same

The purpose of the MAG regional traffic demand model is to estimate future year travel. The model enables the forecasting of future travel demand on a regional scale and is based on two major input components: socioeconomic data (demand) representing residents, employment, and other relevant input variables; and the transportation network (supply) representing the actual street and transit systems. The socioeconomic data is usually based on the General Plans of MAG's member jurisdictions. In the model, the socioeconomic data is allocated to spatial units called traffic analysis zones. (An extensive discussion of travel demand modeling in general and in the MAG region is included in the Task 6 reference materials.)

In order to generate ridership projections for the new express bus routes, the project team used GIS (geographic information software) to create shapefiles for each new route, including its stops. These shapefiles were sent to MAG for coding into the MAG model. In addition, the most recent information about park-and-ride lot locations and capacity and recent ridership information were supplied. MAG modeling staff updated the transit network to reflect the latest information on transit lines and development. Once the model was updated with the most recent information, ridership projections were generated.

Analysis

Validity of Ridership Projections (Existing Express Bus Lines)

In order to assess the validity of the results from the MAG model, the project team compared the projections for existing express bus lines against known (historic) ridership figures. Table 1 presents this information. (The information is listed according to the percentage difference between projected and actual daily boardings.)

Table 1 Ridership Modeling Results for Existing Lines

Route	# Trips (am/pm)	Model Results		Actual		Difference	
		All day	Per-bus	Daily Avg	Per-bus	Pax	%
I-17 RAPID	17/22	2	0	1,178	30	-1,176	-100%
SR51 RAPID	12/13	36	1	693	28	-657	-95%
I-10 E RAPID	14/14	82	3	950	34	-867	-91%
582	4/4	24	3	115	14	-91	-79%
521	6/6	55	5	256	21	-201	-78%
I-10 W RAPID	12/13	214	9	670	27	-457	-68%
520	4/5	40	4	116	13	-76	-66%
533	5/5	126	13	221	22	-94	-43%
541	8/8	166	10	289	18	-123	-43%
532	4/4	150	19	166	21	-17	-10%
531	8/7	226	15	233	16	-7	-3%
540	4/4	126	16	122	15	4	3%
581	3/3	243	40	125	21	117	94%
560	2/2	220	55	104	26	116	111%
510	2/2	262	66	89	22	173	195%
590	4/4	468	58	134	17	333	248%
571	2/2	273	68	76	19	196	257%
570	2/2	237	59	63	16	174	274%
512	2/2	426	107	87	22	340	392%

The last column in the table (labeled "Difference") shows the comparison of the modeled results against actual ridership for the twelve months average ending February 2007. (These were the most current ridership data available.) As this column shows, the models estimates varied in

accuracy from -100% to +392% of actual ridership. Only three lines were accurate within $\pm 10\%$; all others were inaccurate by significantly higher deviations.

Ridership levels on all RAPID lines were significantly under predicted, and typically by greater percentages than the Express routes. There was no consistent pattern to explain why the model tended to over- or under-predict boardings, although there appeared to be some relationship with bus frequency: higher frequency lines were generally under-predicted, while lower frequency lines were over-predicted. This did not hold true across all lines, however.

Usefulness of Ridership Projections (New Express Bus Lines)

Although these results immediately called into question the validity of the ridership projects in an absolute sense, the project team also looked at the projected ridership figures for the new express bus lines to determine whether any useful inferences could be made.

Table 2 shows modeling results for the new lines at headways ranging from 10 to 60 minutes. The predicted daily ridership levels seem unreasonably low when compared to RAPID ridership, especially given local knowledge of the unmet demand for RAPID style service. On a per-bus basis, the results also seem suspect. One would typically expect ridership per bus to vary at different service levels- for example, as headway decreases, per-bus ridership would increase; but this was not the case in the modeled results.

Table 2 MAG Model Ridership Projections, based on Service Frequency

Route name	10 minutes Boardings		20 minutes Boardings		30 minutes Boardings		60 minutes Boardings	
	All day	Per-bus	All day	Per-bus	All day	Per-bus	All day	Per-bus
Surprise-Scottsdale Express	195	11	121	13	93	16	32	11
	16	1	9	1	5	1	2	1
North Glendale Express (on Loop 101)	325	18	182	20	120	13	56	6
	60	3	33	4	19	2	9	1
Papago Express	77	4	51	6	38	6	19	6
	19	1	13	1	9	2	4	1
West Loop 101 Connector (on I-17)	99	6	80	9	66	11	29	10
	10	1	6	1	4	1	1	0
East Loop 101 Connector	25	1	12	1	7	1	1	0
	13	1	7	1	1	0	0	0
Red Mountain Express ('A' service)	70	4	39	4	21	4	10	3
	93	5	41	5	17	3	3	1
Desert Sky Express	282	16	170	19	123	21	66	22
	41	2	18	2	5	1	1	0
Apache Junction Express ('A' service)	26	1	14	2	3	1	1	0
	100	6	48	5	27	5	10	3
Buckeye Express	77	4	51	6	38	6	19	6
	19	1	13	1	9	2	4	1

Improving Model Results

Several potential reasons were identified for the unexpected modeling results for express bus services:

1. The recent RAPID passenger survey found that a substantial majority of RAPID bus riders are "choice" riders (that is, people who have the option of using their own vehicle,

but choose to take the bus). The MAG model tends to assume transit riders are largely drawn from a transit dependent audience.

2. The MAG mode choice model was last validated and calibrated before RAPID services were in place, and does not reflect the most updated ridership figures and trends.
3. The model also did not have the most updated information on transit infrastructure, such as park-and-ride facilities and transit centers.

MAG is in the process of migrating the travel demand model from the EMME/2 platform to TransCAD. This migration provides an opportunity to examine the modeling assumptions and improve modeling results.

Although the model did not produce reliable ridership projections, it did provide some information useful to the route planning process. For example, the model identified situations where transit patrons might tend to make transfers (such as between the Surprise-Scottsdale Express and the North Glendale Express, at Arrowhead) or where lines might compete for the same riders (an example is the North Glendale Express and the West Loop 101 Connector). This information was considered and included, where applicable, in the Task 4 Analysis for each line.

Factors Contributing to High Ridership

Given the impressive ridership gains on the RAPID services, ridership on the RAPID routes was analyzed to understand how ridership levels have responded when additional trips were added to the route. This section presents an analysis of the RAPID ridership alone to discover factors that are associated with improved RAPID utilization. (A comparison of the trends in ridership on 500-series express routes versus RAPID service was presented in the Task 4 working paper.)

Methodology

To evaluate several different factors over time, linear regression was used to analyze the effect of several factors on ridership. Recognizing that the price of fuel would have an impact on transit ridership, the cost of fuel (i.e., gas prices) in the Valley was used as a control variable. Factors representing economic robustness, construction, and labor force, were initially examined but found to be insignificant. The final model evaluated total passenger boardings on a route over time and service level changes while controlling for gas prices. (A more detailed explanation of the methodology and results can be found in the reference materials.)

Results

The number of boardings on the RAPID routes has historically responded positively to increases in service. All four RAPID routes experienced and maintained ridership increases ranging from 38 to 41 riders with the implementation of every additional trip. While increasing gasoline prices was also associated with higher ridership, the boarding increase due to more frequent service was independent of the effect of the price of gasoline.

Conclusion

Although it should not be assumed that the same scale of increases will continue without limit, we can theorize from the results that there is unmet demand for RAPID-type service, at least in the four geographic regions served by the existing system. The increase from each route is roughly equivalent to the full seated capacity of a 40-foot bus. Some of the new boardings could be attributed to improved service levels. These types of boardings may not be realized in a new route with lower frequency.

Density Scale Analysis

Density Scale Analysis¹ was recommended in the recent TLCP Audit project as a means of developing performance measures for existing and new bus routes. For the Express Bus Operating Plan, the project team used the Density Scale analysis to help identify future express routes which may experience higher demand and may require increased service levels.

Methodology

The Density Scale compares the transit service area population and employment density to the service area population and employment density of the planned bus route. The service area is determined by a 0.25 mile buffer around the existing transit system network for local and express bus service independently. Express buses are compared to existing express (excluding RAPID) service area densities. One point is assigned to every percentage point difference from the system average. Scores below zero indicate routes that are likely to perform below system averages for ridership. Density scores above zero indicate routes that are likely to perform above system averages for ridership. The value indicates a propensity of an area to have a higher or lower demand for transit, rather than an absolute indication of the number of riders.

Results

The Density Scale for each of the new express bus routes to be implemented in the next two years is shown below.

Route	Density Score (from TLCP Audit)		
	Population density, compared to existing express system	Employment density, compared to existing express system	Total score
Desert Sky Express/I-10 West RAPID	41	58	100
Deer Valley Express/I-17 RAPID	21	51	72
SR 51 Express/SR51 RAPID	0	24	24
Ahwatukee Express/I-10 East RAPID	-32	61	29
North Loop 101 Connector	-20	-43	-63
North Glendale Express	11	20	31
West Loop 101 Connector (operates on I-17)	14	18	32
Papago Freeway Connector	-22	7	-15
East Loop 101 Connector	-29	-1	-30
Red Mountain Express	-30	38	7

¹ The Density Scale Analysis was developed by HDR | S.R. Beard & Associates based on research that has successfully shown an empirical link between density and transit performance.

The scores show that the existing RAPID routes all have higher combined densities in their service areas than the existing 500-series express system. This is not surprising, given the high ridership on the RAPID system compared with the other express routes. As the table shows, two of the new express routes, the North Glendale Express and the West Loop 101 Connector, both have density scores on order of the SR51 RAPID and the I-10 East RAPID. This suggests that those routes may experience the type of ridership found on the RAPID system. The Red Mountain Express has a positive density score overall, and may outperform the existing RAPID system in terms of ridership. Routes with a low density score include the two true connector routes and the Papago Connector (which will operate as an express to downtown Phoenix). Ridership expectations for those routes should be low.

This information, combined with the conclusions from the regression analysis in the previous section that suggested that increased trip frequency can capture latent demand for transit, implies that service levels approaching that of the RAPID service would be appropriate for the new express bus lines with high density scores. The project team suggests, however, that evidence be obtained during the first three years of new express bus services before a decision is made on increasing trip frequencies.