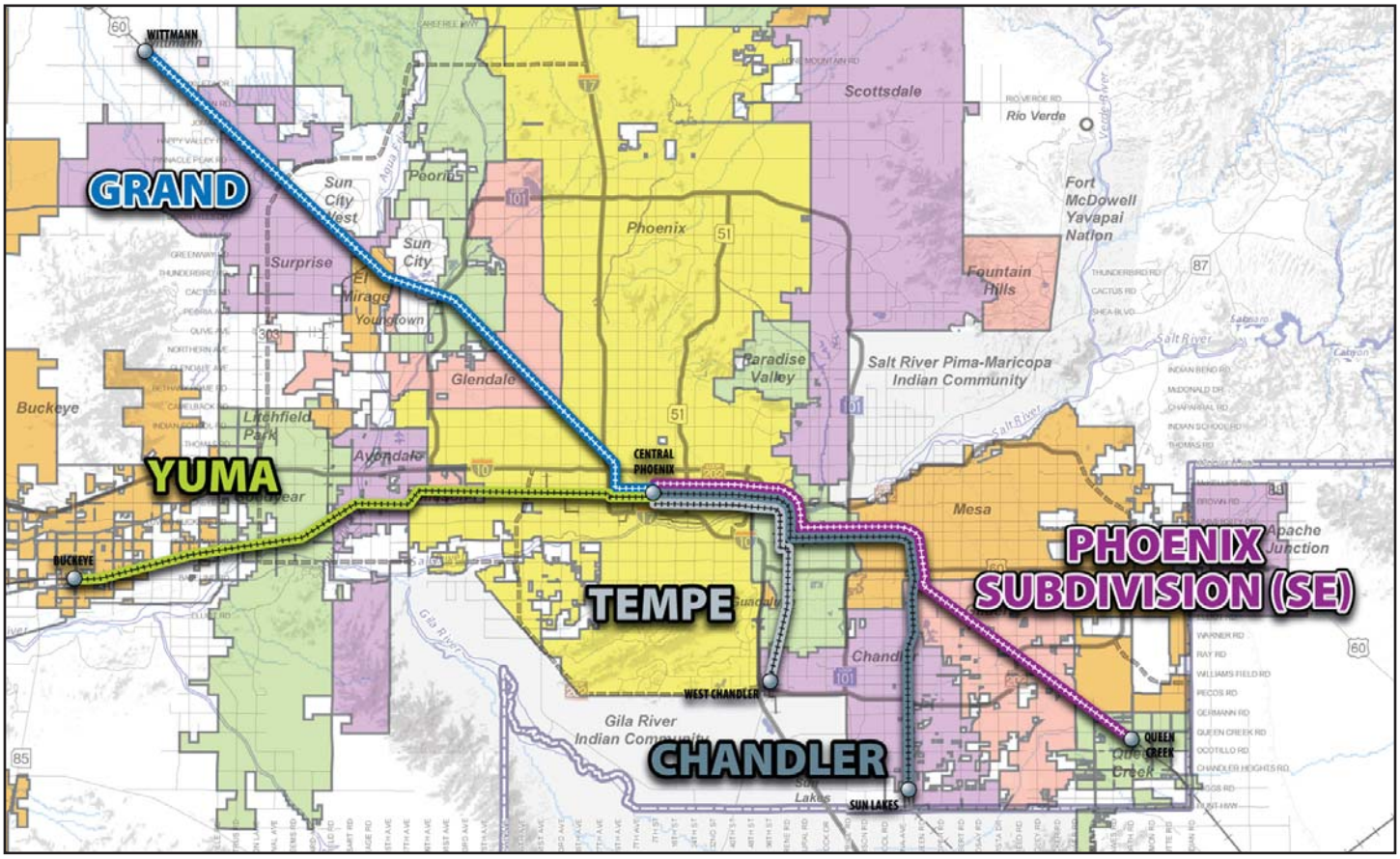
MAG COMMUTER RAIL SYSTEM STUDY

EXECUTIVE SUMMARY 2010

COMMUTER RAIL SYSTEM STUDY OVERVIEW

The purpose of this Commuter Rail System Study is to define an optimized network of commuter rail corridors and the elements needed to implement a regional commuter rail system. As envisioned, a commuter rail system would radiate from downtown Phoenix and would share existing freight track along five corridors. The System Study provides a detailed evaluation of potential commuter rail links to the East Valley (including the Tempe, Chandler, and Southeast Corridors) and links to the West Valley by incorporating the findings of the Grand Avenue (Grand) and Yuma West (Yuma) Corridor Development Plans, both of which are being produced in conjunction with this System Study.

Potential commuter rail corridors along existing railroad lines are shown below.



Source: URS Corp, 2009

DESCRIPTION OF COMMUTER RAIL

WHY IS THERE A NEED FOR A COMMUTER RAIL SYSTEM?

Commuter rail systems are generally used in congested urban areas to improve travel time, mitigate congestion, add convenience, and provide an alternative means of travel – particularly in times of increasing energy prices. Commuter rail trains typically provide service between suburbs to urban centers for the purpose of reaching activity centers, such as employment, special events, and intermodal connections. Designed to primarily meet the needs of regional commuters in the AM and PM peak travel times, commuter rail service typically occurs at lower frequency than light rail transit. The distance of most commuter rail corridors is also longer than that of light rail, ranging from 30 to 40 miles, with passenger stations generally spaced 5 to 10 miles apart. A number of cities throughout the US operate commuter rail service, including Seattle, Salt Lake City and Dallas-Fort Worth.

Rail Runner Express Commuter Train; Albuquerque, NM
Source: MRCOG/HDR.

Sounder Commuter Train; Seattle, WA
Source: MAG.

DESCRIPTION OF SYSTEM STUDY ALTERNATIVES

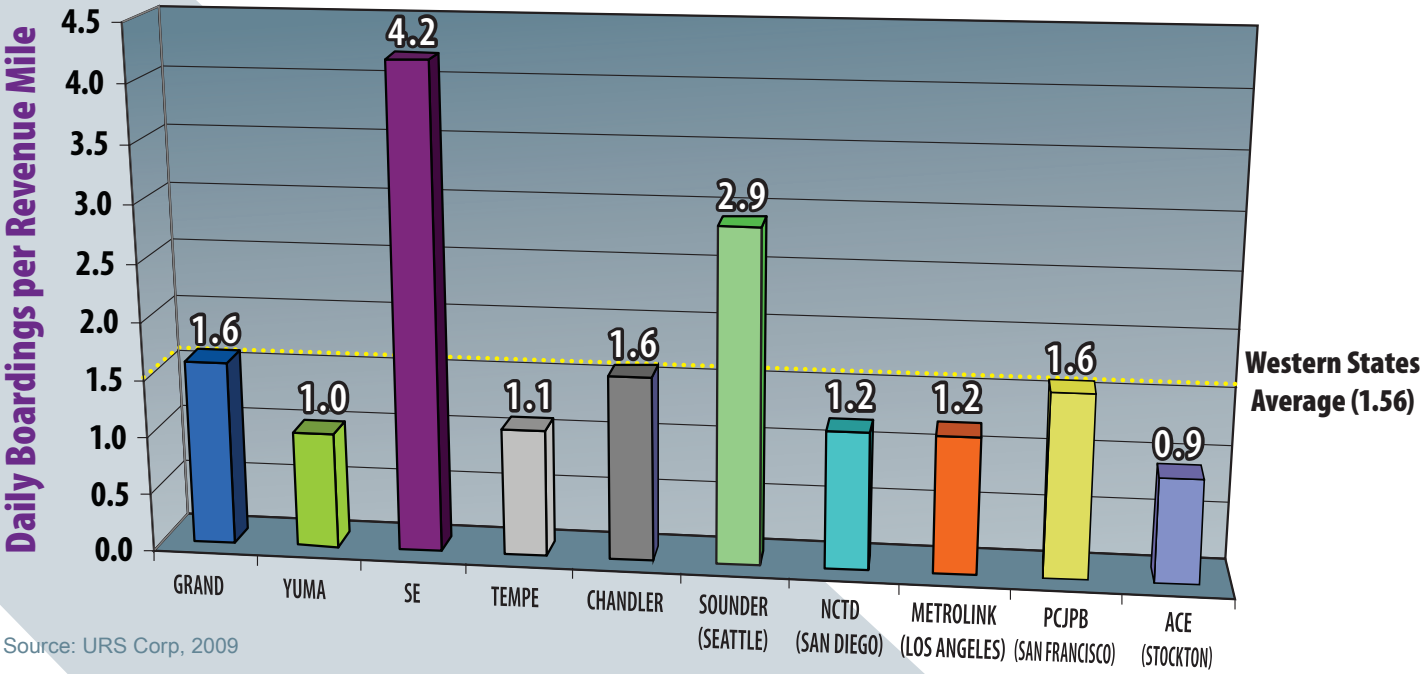
WHAT STAND-ALONE ALTERNATIVES WERE CONSIDERED?

The Project Team developed Stand-Alone Alternatives as single commuter rail lines, each with 30-minute peak and 60-minute off-peak frequency and specified travel times. The table below lists the characteristics of each Stand-Alone Alternative.

CORRIDOR	ROUTE DESCRIPTION	DISTANCE	TRAVEL TIME	2030 DAILY BOARDINGS
Grand	Service between Central Phoenix and Downtown Wittmann	36 miles	43 min.	2,830
Yuma	Service between Central Phoenix and Downtown Buckeye	31 miles	47 min.	1,420
SE	Service between Central Phoenix and Downtown Queen Creek	34 miles	46 min.	6,450
Tempe	Service between Central Phoenix and West Chandler	18 miles	29 min.	950
Chandler	Service between Central Phoenix and Sun Lakes	31 miles	49 min.	2,240

Source: URS Corp., 2009.

HOW DO THE STAND-ALONE ALTERNATIVES PERFORM COMPARED TO PEER CITIES?



Source: URS Corp, 2009

WHAT IS THE COST OF THE STAND-ALONE ALTERNATIVES AND HOW DO THEY COMPARE TO PEER CITIES?

STAND-ALONE ALTERNATIVE	CAPITAL COST/MILES	CAPITAL COST PER MILE
Grand	$600 M/36 miles	$16.7 M/mile
Yuma	$365 M/31 miles	$11.8 M/mile
SE	$477 M/33.5 miles	$14.9 M/mile
Tempe	$372 M18 miles	$20.7 M/mile
Chandler	$449 M/31 miles	$15.5 M/mile
PEER CITY COMMUTER RAIL SYSTEMS		
Sounder (Seattle)	$1.4 M/83 miles	$17.2 M/mile
North Star (Minneapolis)	$289 M/40 miles	$7.2 M/mile
Front Runner (Salt Lake City)	$954 M/44 miles	$21.7 M/mile
Westside Express (Portland)	$166 M/14.7 miles	$11.3 M/mile

STAND-ALONE ALTERNATIVE	ANNUAL OPERATION & MAINTENANCE (O&M) COST	O&M COST PER PASSENGER TRIP*
Grand	$11 M	$13/rider
Yuma	$12 M	$28/rider
SE	$18 M	$9/rider
Tempe	$5 M	$16/rider
Chandler	$11 M	$17/rider
PEER CITY COMMUTER RAIL SYSTEMS		
Western States Average	–	$11/rider

* The "O&M Cost Per Passenger Trip" does not include the application of commuter rail industry average farebox recovery of 40%-44%.
Source: Gannett Fleming and URS Corp., 2009.

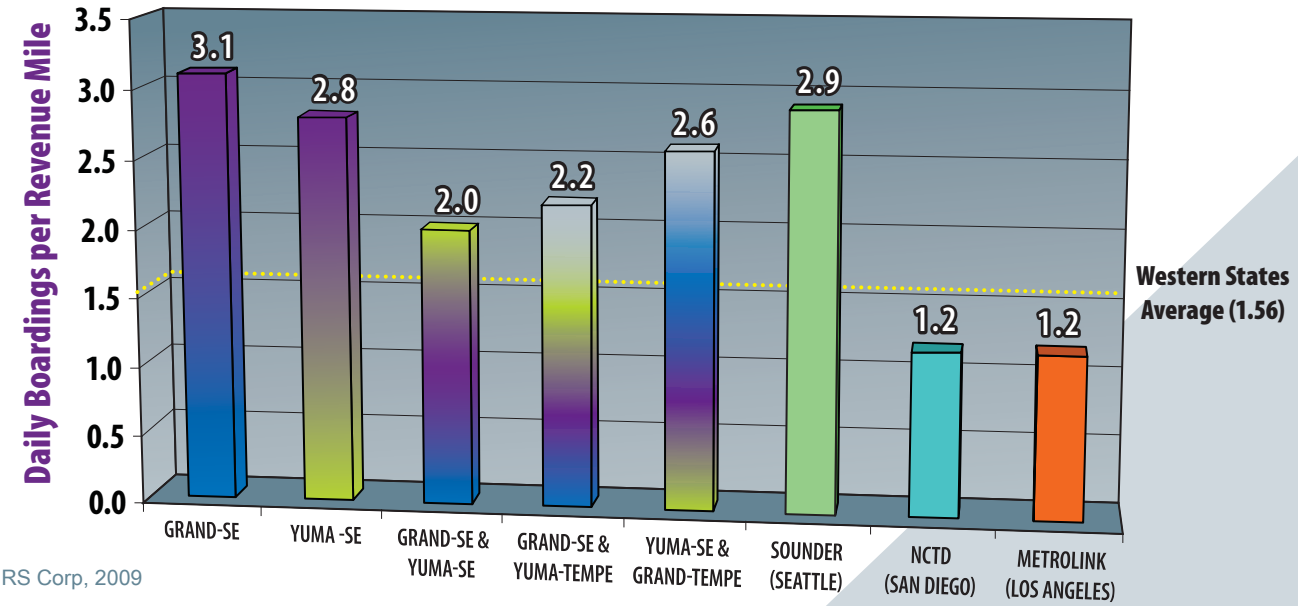
WHAT INTERLINED ALTERNATIVES WERE CONSIDERED?

The Project Team developed Interlined Alternatives by connecting two or more corridors together into several series of continues routes. Interlined Alternatives would provide a one-seat ride between corridors. The table below lists the characteristics of each Interlined Alternative.

CORRIDORS	ROUTE DESCRIPTION	DISTANCE	TRAVEL TIME	2030 DAILY BOARDINGS
2-Corridor Interlined Alternatives				
Grand Interlined with SE	Service between Downtown Wittmann and Downtown Queen Creek with a stop in Central Phoenix	68 miles	89 min.	9,980
Yuma Interlined with SE	Service between Downtown Buckeye and Downtown Queen Creek with a stop in Central Phoenix	63 miles	93 min.	8,530
3-Corridor Interlined Alternatives*				
Grand Interlined With SE and Yuma Interlined With SE	Service between Downtown Wittmann and Downtown Queen Creek with a stop in Central Phoenix	68 miles	89 min.	11,290
	Service between Downtown Buckeye and Downtown Queen Creek with a stop in Central Phoenix	63 miles	93 min.	
4-Corridor Interlined Alternatives*				
Yuma Interlined with SE and Grand Interlined with Tempe	Service between Downtown Buckeye and Downtown Queen Creek with a stop in Central Phoenix	63 miles	93 min.	17,960
	Service between Downtown Wittmann and West Chandler with a stop in Central Phoenix	54 miles	72 min.	
Grand Interlined with SE and Yuma Interlined with Tempe	Service between Downtown Wittmann and Downtown Queen Creek with a stop in Central Phoenix	68 miles	89 min.	15,100
	Service between Downtown Buckeye and West Chandler with a stop in Central Phoenix	48 miles	76 min.	

*The Project Team developed ridership forecasts that substituted the Chandler Corridor for the SE Corridor in the 3-Corridor and 4-Corridor Alternatives. Ridership forecasting results however indicated that substituting the Chandler Corridor for the SE Corridor would result in significantly fewer daily boardings, (62 percent to 74 percent of those estimated for the SE Corridor in 2030), and were therefore not carried forward for further consideration.
Source: URS Corp., 2009.

HOW DO THE INTERLINED ALTERNATIVES PERFORM COMPARED TO PEER CITIES?



Source: URS Corp, 2009

WHAT IS THE COST OF EACH INTERLINED ALTERNATIVE?

INTERLINED ALTERNATIVE	CAPITAL COST	CAPITAL COST PER MILE	ANNUAL O&M COST	ANNUAL O&M COST PER PASSENGER TRIP*
2-Corridor Interlined Alternatives				
Grand Interlined with SE	$1.1 B	$15.7M/mile	$56.4 M	$19/passenger
Yuma Interlined with SE	$834.4 M	$13.2M/mile	$52.1 M	$20/passenger
3-Corridor Interlined Alternative				
Grand Interlined with SE and Yuma Interlined with SE	$1.4 B	$14.4M/mile	$98.2 M	$29/passenger
4-Corridor Interlined Alternatives				
Yuma Interlined with SE and Grand Interlined with Tempe	$1.6 B	$14.8M/mile	$104.5 M	$23/passenger
Grand Interlined with SE and Yuma Interlined with Tempe	$1.6 B	$14.8M/mile	$102.6 M	$19/passenger

* The "Annual O&M Cost Per Passenger Trip" does not include the application of commuter rail industry average farebox recovery of 40%-44%.
Source: Gannett Fleming and URS Corp., 2009.

COMPARISON OF SYSTEM STUDY ALTERNATIVES

HOW DID THE STAND-ALONE ALTERNATIVES RANK IN COMPARISON TO EACH OTHER?

The comparison of alternatives revealed three distinct tiers of Study System alternatives – top, middle and lower – based on their performance relative to a set of evaluation factors. The evaluation factors that proved to be major discriminators consisted of Ridership; Travel Time Savings; Cost Effectiveness; and Implementation/Constructability. The table below is a summary of Stand-Alone Alternatives rankings and discriminators.

STAND-ALONE ALTERNATIVE	RANKING	MAJOR DISCRIMINATORS
SE	Top Tier	• 2 to 4 times the number of boardings per revenue mile as all other corridors • 18 minute end-to-end travel time savings* • Second lowest capital cost per mile • Lowest O&M cost per passenger trip
Grand	Middle Tier	• Boardings per revenue mile are close to Western States average • 24 minute end-to-end travel time savings* • Moderate capital cost per mile • Second lowest O&M cost per passenger trip
Tempe & Chandler	Middle Tier	• Low to moderate boardings per mile • Moderate to high capital cost per mile • High O&M cost per passenger trip
Yuma	Lower Tier	• Lowest capital cost per mile due to relatively few infrastructure improvements, but lowest boardings per revenue mile • Minimal travel time savings • Highest O&M cost per passenger trip

*Compared to travel time for single-occupancy vehicle.
Source: URS Corp., 2009.

HOW DID THE INTERLINED ALTERNATIVES RANK IN COMPARISON TO EACH OTHER?

Interlined Alternative	Ranking	Major Discriminators
Grand-SE	Top Tier	• Highest boardings per mile • High capital cost per mile • Lowest O&M cost per passenger trip
Yuma-SE	Top Tier	• Moderate boardings per mile • Lowest capital cost per mile • Moderate O&M cost per passenger trip
Grand-SE & Yuma-Tempe and Yuma-SE & Grand-Tempe	Middle Tier	• Low to moderate boardings per mile • Moderate capital cost per mile • Moderate O&M cost per passenger trip
Grand-SE and Yuma-SE	Lower Tier	• Lowest boardings per mile • Moderate capital cost per mile • Highest O&M cost per passenger trip

Source: URS Corp., 2009.

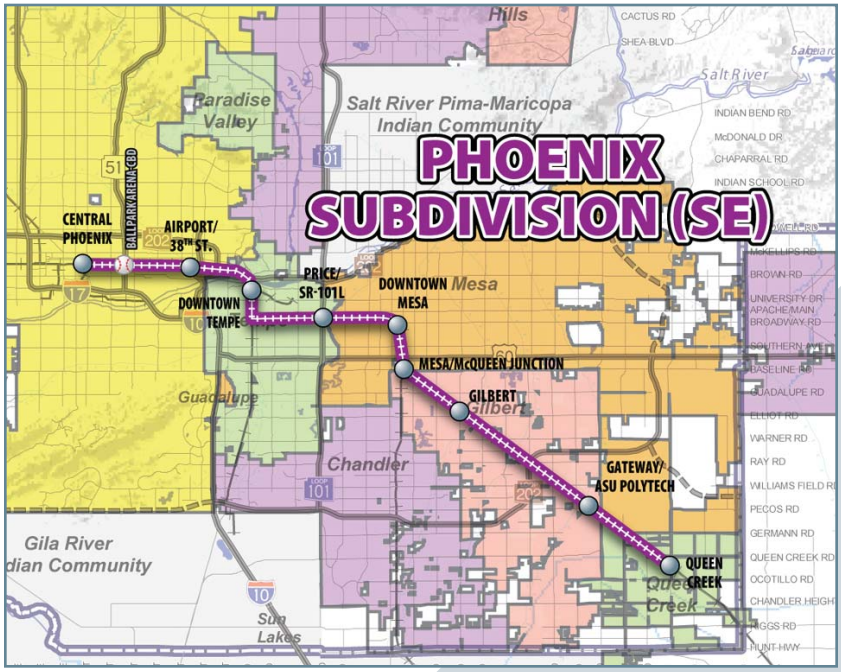
SYSTEM STUDY ALTERNATIVES PHASING RECOMMENDATIONS

WHICH SEGMENT OF THE COMMUTER RAIL SYSTEM SHOULD BE IMPLEMENTED FIRST?

START-UP SERVICE SCENARIO 1:

Build the SE Corridor.

The SE Corridor would offer the highest ridership by a significant margin, substantial travel time savings, and would be cost-effective.



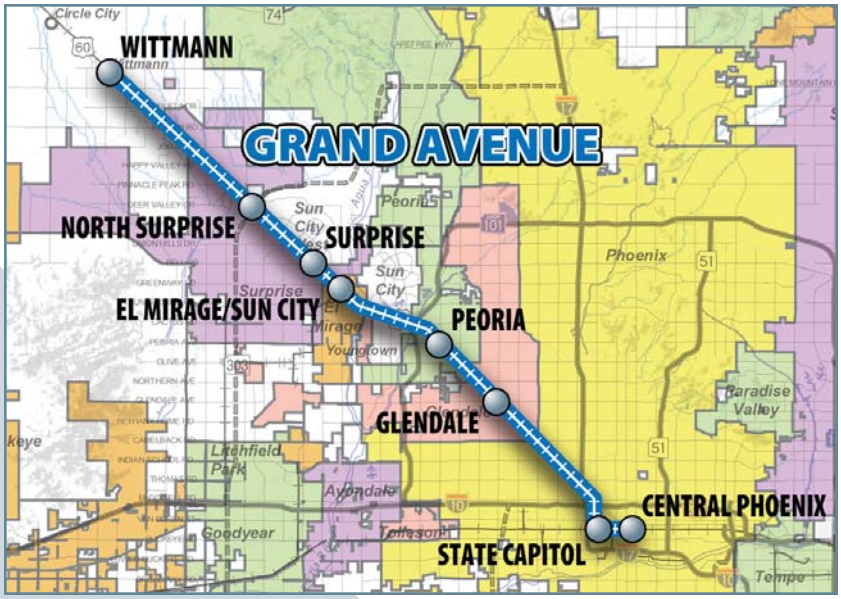
Source: URS Corp., 2009.

While the SE Corridor ranking far exceeded those of the other corridors, if use of all or a portion of the Union Pacific Railroad right-of-way is a fatal flaw due to costs and/or agreements to get through rail yards in Central Phoenix, then alternative options for the first segment of the regional commuter rail system should be considered. Alternative start-up service scenarios include the following:

START-UP SERVICE SCENARIO 1A:

Build the Grand Avenue Corridor.

Grand Avenue Corridor would offer ridership that is on par with other commuter rail systems in operation throughout the Western US, substantial travel time savings, and would be moderately cost-effective. Implementation of commuter rail may result in the relocation of some freight facilities, consistent with BNSF Railway long-range plans.

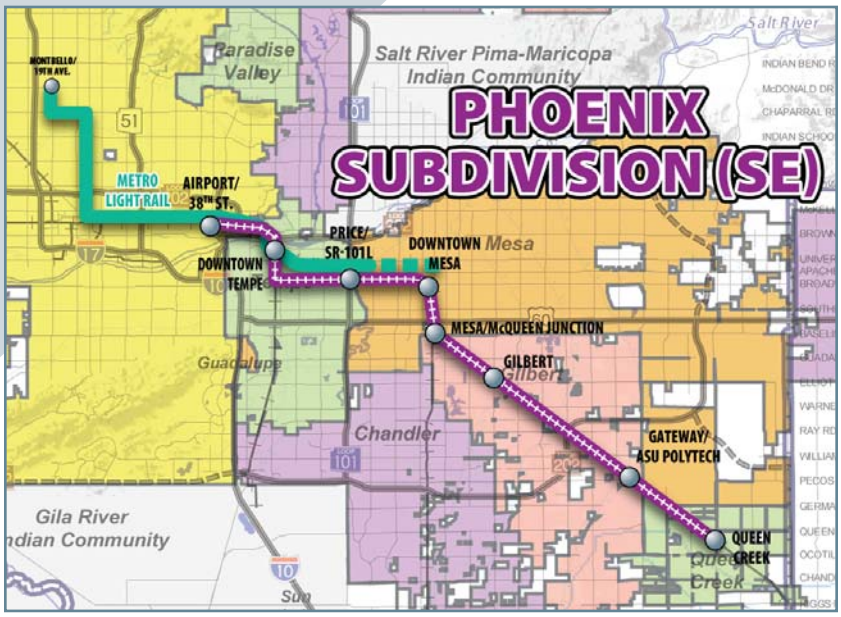


Source: URS Corp., 2009.

START-UP SERVICE SCENARIO 1B:

Build SE Corridor segment between Queen Creek and downtown Mesa/downtown Tempe/Airport & 38th St.

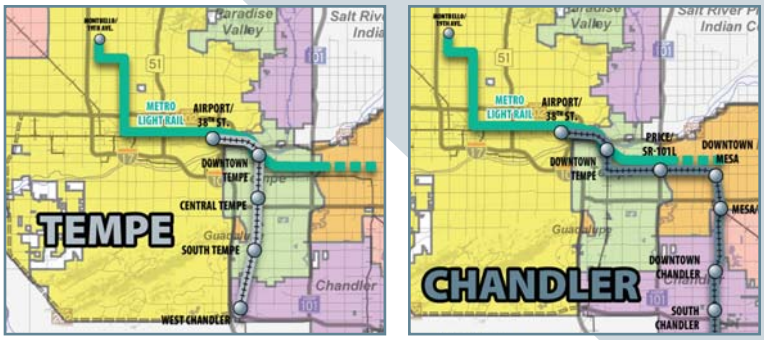
This scenario would require a transfer to LRT in either downtown Mesa, downtown Tempe, or the vicinity of the airport. Ridership forecasting shows large origin-destination traffic in Tempe and the airport is generally considered an emerging employment hub. A Future LRT station in downtown Mesa may also provide a possible connection to commuter rail. Either one of these options would improve mobility in the East Valley while avoiding some of the more challenging operational and right-of-way constraints in downtown Phoenix. However, Scenario 1B would require a forced transfer for many riders, which would increase travel times and decrease overall ridership.



Source: URS Corp., 2009.

START-UP SERVICE SCENARIO 1C:

Build Tempe Corridor segment between West Chandler and downtown Tempe/Airport & 38th St.
- or -
Build Chandler Corridor segment between Sun Lakes and downtown Mesa/downtown Tempe/ Airport& 38th St.



Source: URS Corp., 2009.

Like Scenario 1B, this scenario would require a transfer to LRT either in downtown Mesa (for the Chandler Corridor), downtown Tempe, or the vicinity of the airport. While ridership on these corridors is not as strong as on the SE corridor, if (1) right-of-way constraints limit use of the SE Corridor, or (2) inter-city rail plans suggest these corridors are suitable for passenger service between Phoenix and Tucson, the Tempe or Chandler may become higher priority commuter rail corridors.

WHICH SEGMENT OF THE COMMUTER RAIL SYSTEM SHOULD BE IMPLEMENTED SECOND?

The ranking of Interlined Alternatives could help to determine which combination of corridors would be most effective and should therefore be considered first for interlining with the Start-Up Corridor. If, as in Scenario 1A, the SE Corridor is built first, then the Project Team recommends the following:

INTERLINED SERVICE SCENARIO 1:

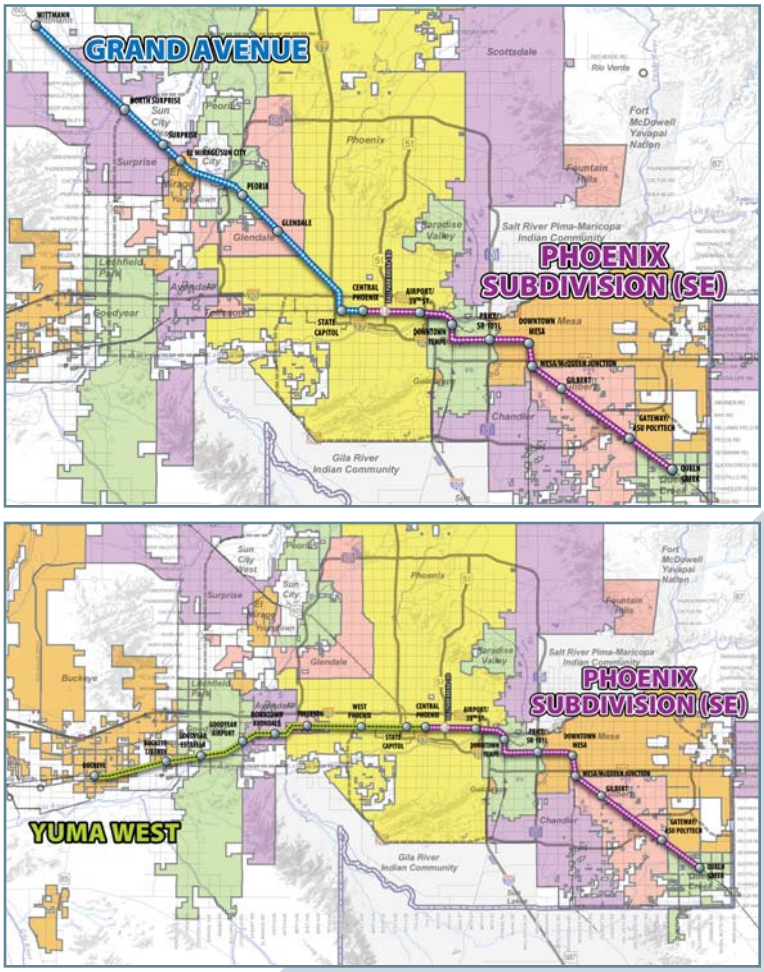
Build the Grand Avenue Corridor (interline with the SE Corridor).

Ridership would be greatest when the most productive East Valley and West Valley Corridors, which are Grand Avenue and SE, are combined.

INTERLINED SERVICE SCENARIO 2:

Build the Yuma West Corridor (interline with the SE Corridor)

These two corridors have the lowest capital cost per mile and good ridership when combined.



Source: URS Corp., 2009.

IN WHAT ORDER SHOULD THE REMAINING SEGMENTS OF THE COMMUTER RAIL SYSTEM BE IMPLEMENTED?

Phased implementation of the remainder of the corridors will be highly dependent on a number of factors. The alternatives evaluation revealed no single outstanding performer among the Tempe, Chandler, and Yuma Corridors. Therefore, considerations for future phasing to achieve build-out of the regional commuter rail system will include such factors as:

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

IMPLEMENTATION STEPS

WHAT NEAR-TERM IMPLEMENTATION STEPS ARE NEEDED?

ITEM	RESPONSIBLE PARTY	PARTNERS	TIMEFRAME
1) Periodic Ridership Forecasting Updates ➔ Re-run MAG ridership forecasting model with latest socioeconomic data.	MAG	Local jurisdictions	Ongoing
2) Coordination with UPRR and BNSF Railway ➔ Maintain points of contact and communication protocols. ➔ Develop partnership to investigate options for determining compensation, capacity improvements, and level of service. ➔ Advance design and operating concepts. Plan drawings should be further developed in coordination with the UPRR and BNSF Railway to form the basis for any long-term agreement with railroads.	ADOT MAG UPRR BNSF Railway	Local jurisdictions METRO RPTA	Ongoing
3) Address Enabling Legislation regarding Liability and Indemnification. ➔ Progress on this issue may facilitate more effective coordination with railroads.	ADOT (as a statewide issue)	MAG UPRR BNSF Railway	2010-2013

CONTINUED »

ITEM	RESPONSIBLE PARTY	PARTNERS	TIMEFRAME
4) Coordination of Infrastructure Improvements with the Railroads, ADOT and Local Jurisdictions. ➔ BNSF Railway is planning freight rail infrastructure improvements that would reduce freight activity into downtown Phoenix and thereby free up space on the rail mainline. ➔ ADOT and local jurisdictions are planning for extensive roadway upgrades throughout the region that may improve the viability and safety of corridors for both freight and passenger rail service.	MAG Local jurisdictions ADOT	UPRR BNSF Railway METRO RPTA	Ongoing
5) Identify Funding Commitments. ➔ Define new revenue streams that would be dedicated to development and ongoing operation of the commuter rail system. ➔ A phased approach and cost-sharing agreements may segment or defer expenditures.	MAG ADOT Legislature	Local jurisdictions	2010-2015
6) Initiate Process for Federal Funding. ➔ Conduct required Alternatives Analysis and NEPA compliance to meet requirements for federal funding. ➔ Local match funding should be identified prior to initiating this process with FTA.	MAG	Local jurisdictions	Following identification of local funding commitments
7) Develop and Implement Governance Plan. Most likely approaches include: ➔ Formation of a new Commuter Rail Authority, ➔ Designation of an existing agency as the Commuter Rail Authority (RPTA, METRO, MAG, ADOT), or ➔ Establishment of a new Joint Powers Authority (JPA) with a provision for representation appropriate to the corridor or system to be implemented.	MAG ADOT	METRO RPTA Local jurisdictions	Following identification of local funding commitments
8) Preserve Future Options. ➔ System Study commuter rail corridors are assumed to occur within the existing railroad right-of-way; however right-of-way preservation of future commuter rail extensions may reduce the costs for growing a future regional system.	Commuter Rail Authority or JPA	Local jurisdictions UPRR BNSF Railway MAG CAAG ADOT	Ongoing

ITEM	RESPONSIBLE PARTY	PARTNERS	TIMEFRAME
9) Local Planning Efforts. Prior to securing project financing, local governments can take steps to lay the foundation for commuter rail implementation, including: ➔ Partner with the UPRR, BNSF Railway Company, and ADOT to upgrade existing at-grade railroad crossings along System Study corridors. ➔ Control regulatory actions within station areas, including the planning, zoning, and development permitting process, to facilitate the development of commuter rail stations. ➔ Use other implementation tools such as infrastructure construction (for example, streets and utilities), land purchase and assembly, and creation of urban design guidelines to facilitate transit-supportive development.	Local jurisdictions	MAG ADOT	Ongoing

Source: URS Corp., 2009.

WHAT LONG TERM IMPLEMENTATION STEPS ARE NEEDED?

The identification of funding commitments and determination of the appropriate governance structure for commuter rail, which are likely to influence each other, will set the stage for moving into the next level of investment in commuter rail within the MAG region. With progress on these key steps, the region will be in a position to move forward on other recommendations described below.

- ➔ Formalize partnership with the railroads.
- ➔ Secure sources of funding including federal, state, regional and local public funding, as well as private sector participation.
- ➔ Design, construct, and operate initial commuter rail system.
- ➔ Continue planning to develop seamless transportation system and meet regional sustainability goals.

CONCEPTUAL PHOTO SIMULATION OF MAG REGION COMMUTER RAIL SYSTEM.

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