MAG 2018

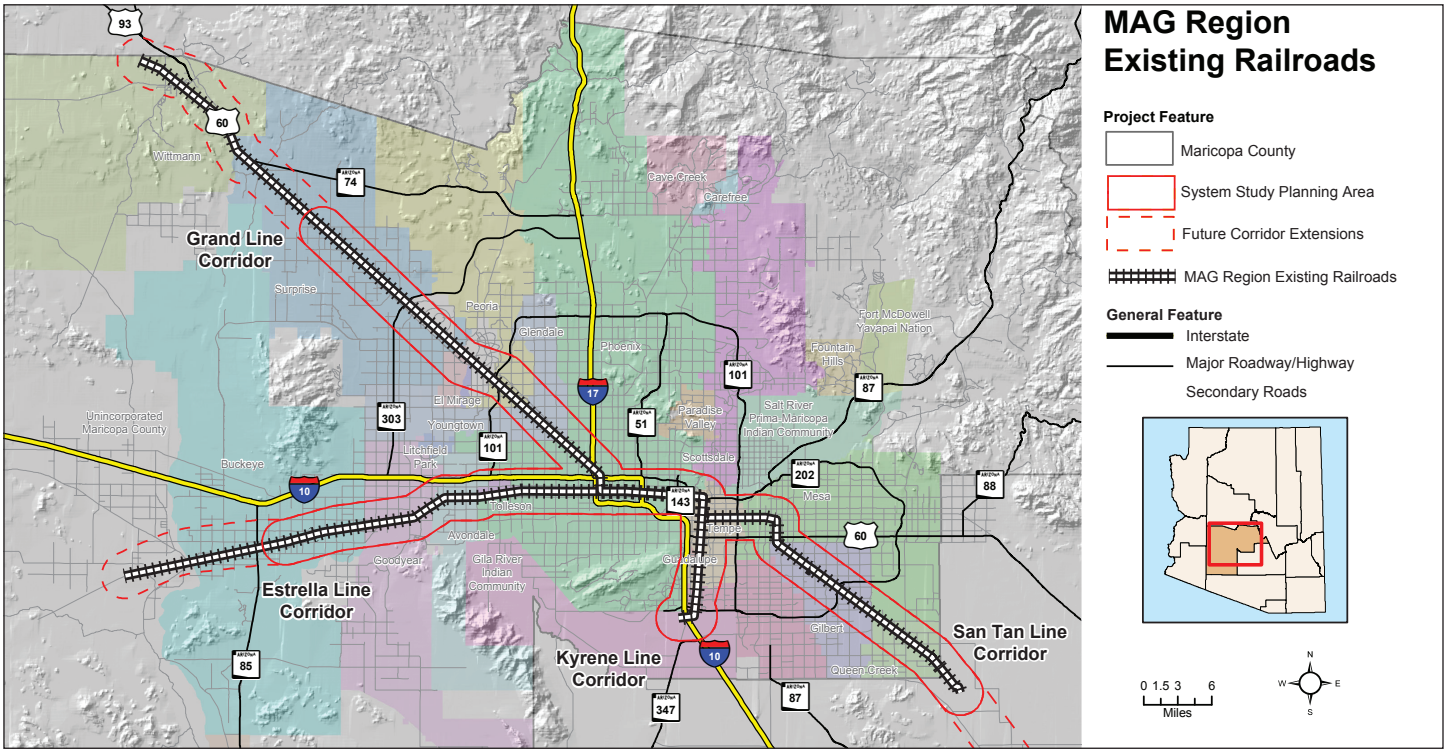
REGIONAL COMMUTER RAIL SYSTEM STUDY UPDATE

EXECUTIVE SUMMARY 2018

COMMUTER RAIL SYSTEM STUDY OVERVIEW

The purpose of the Regional Commuter Rail System Study Update is to revise the results of the original study that took place in 2010. The 2010 Study evaluated a network of existing railroad corridors and the necessary elements needed to implement a regional commuter rail system.

This System Study update further analyzes a set of two cross-region commuter rail corridors that were initially evaluated in the 2010 Study. The documentation in the System Study Update considered various factors including demographic forecasts, ridership forecasts, operations, governance, and implementation requirements. The System Study Update concludes with recommendations for the implementation of a regional commuter rail system.



CHANGES SINCE THE 2010 STUDY

Since the 2010 Study, several important changes have occurred in the MAG region that may affect the timing, coverage, operations, and the implementation of a potential commuter rail system. These include: changes in socioeconomic and land use projections; the removal of the Chandler Corridor, and the results of the ADOT Arizona Passenger Rail Corridor Study: Tucson to Phoenix (APRCS).

DESCRIPTION OF COMMUTER RAIL

The Project Team evaluated Locomotive Hauled Coaches (LHC) and Diesel Multiple Unit (DMU) technologies to determine which type of commuter rail vehicles would be most appropriate for the MAG commuter rail system. An "off-the-shelf" Federal Railroad Administration (FRA)-compliant DMU was not widely available in 2010. However, U.S. Railcar (formerly Colorado Railcar), Nippon Sharyo, and Stadler Rail Group now manufacture DMUs for the U.S. market. U.S. Railcar supplied vehicles to TriMet for its Westside Express Service (WES) in Portland; Nippon Sharyo supplied vehicles for Sonoma-Marin Area rail Transit (SMART) commuter rail corridor between the Sonoma County Airport and San Rafael California; and Stadler Rail Group is supplying vehicles to the Trinity Metro (Fort Worth) for its TEX Rail corridor between downtown Fort Worth and DFW Airport. These vehicles now meet structural requirements of the FRA and are able to operate in mixed traffic with freight trains.

The San Diego Coaster (left) LHCs connect downtown San Diego to Oceanside, CA. Seattle's Sounder (right) connects Everett and Lakewood to downtown Seattle. Both lines use a locomotive (left) for power in both directions and a cab control car (right) for operations in the reverse direction. Source: NCTD (left), Sound Transit (right).

The SMART DMUs connecting Santa Rosa and downtown San Rafael, CA (left) operate two-car trainsets, which can be expanded. The TEX Rail DMUs (right) will be operated in four-car consists between downtown Fort Worth and Dallas/Fort Worth International Airport. Source: SMART (left), TEX Rail (right).

OPERATIONS OF THE PROPOSED SERVICE

Commuter rail service differs from light rail (LRT) service, which focuses on shorter corridors and more frequent service throughout the day. Commuter rail corridors are typically longer than LRT lines, which traditionally are fewer than 20 miles in length. In the Phoenix region, the two commuter rail cross-region corridors have total distances of 53.7 miles (Grand/Kyrene Line) and 61.4 miles (Estrella/San Tan Line).

Another difference is that commuter rail focuses on peak period service. The commuter rail program proposed for the MAG region would have trains departing every 30-minutes during peak periods (5:00-7:30 AM and 3:30-6:30 PM) with three mid-day trains (at 10:00 AM, 12:00 PM, and 2:00 PM) and one evening train (8:00 PM). It is assumed that trains would leave from both ends of both corridors at these times, with the focus of providing service from the suburban stations to downtown Phoenix during the morning commute and from downtown Phoenix back to the suburbs during the evening commute.It should be noted that schedules will be refined in future phases of the study, as scheduling at this level of analysis is used to determine the number of trains that are required to operate the service, and to begin to understand how passenger traffic would fit in with freight traffic on the proposed alignments.

DESCRIPTION OF THE PROPOSED COMMUTER RAIL SYSTEM

For the System Study Update, the Project Team focused only on two cross-region corridors that were first evaluated in the 2010 Study. Based on the results of the 2010 Study, the Grand Line was interlined with the Kyrene Line and the Estrella Line was interlined with the San Tan Line. These combinations showed very good ridership potential during the 2010 Study. Interlined alternatives would provide a one-seat ride through each entire corridor. Both corridors proposed as part of the commuter rail program were developed with 30-minute peak headways and 120-minute off-peak headways. The table below shows the characteristics of the proposed commuter rail system.

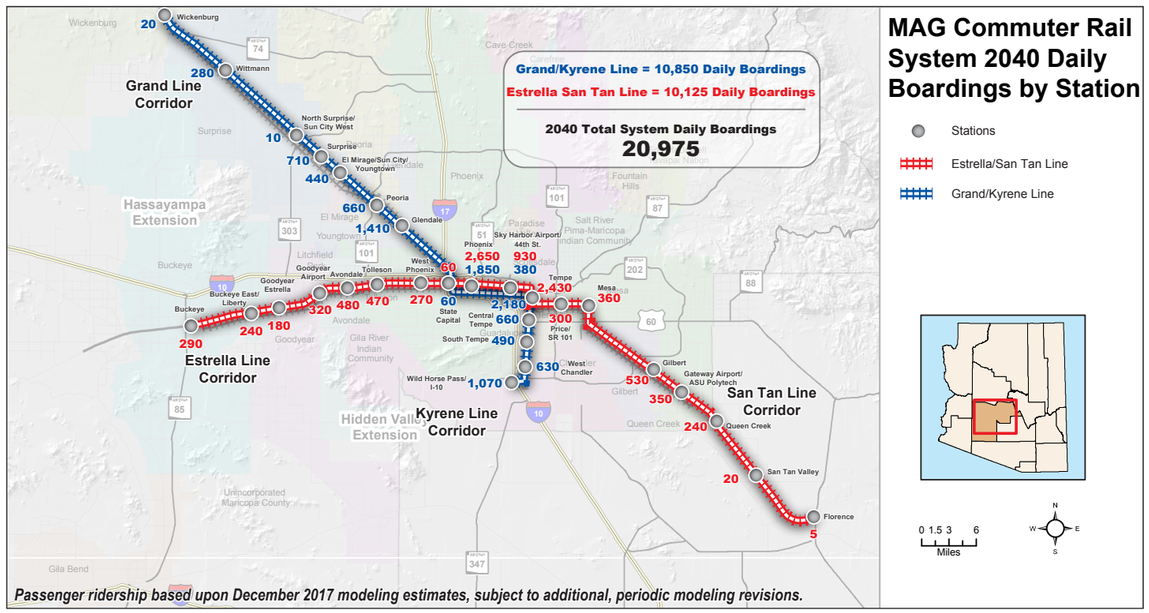
CHARACTERISTICS OF PROPOSED COMMUTER RAIL SYSTEM

ALTERNATIVES	DESCRIPTION	DISTANCE	PEAK SERVICE	OFF-PEAK SERVICE	NO. OF STATIONS	TRAVEL TIME
INDIVIDUAL CORRIDORS						
Grand Line	Service between Wittmann and downtown Phoenix	35.8 mi.	30 min.	120 min.	8	38-42 min.
Kyrene Line	Service between Wild Horse Pass/I-10 and downtown Phoenix	18.0 mi.	30 min.	120 min.	7	26-29 min.
Estrella Line	Service between Buckeye and downtown Phoenix	30.4 mi.	30 min.	120 min.	9	34-39 min.
San Tan Line	Service between Queen Creek and downtown Phoenix	31.0 mi.	30 min.	120 min.	8	37-41 min.
COMBINED CORRIDORS						
Grand/ Kyrene Line	Service between Wittmann and Wild Horse Pass/I-10 with a stop in Phoenix	53.8 mi.	30 min.	120 min.	14	66-73 min.
Estrella/ San Tan Line	Service between Buckeye and Queen Creek with a stop in Phoenix	61.4 mi.	30 min.	120 min.	16	74-82 min.

Source: AECOM, 2018

PROJECTED RIDERSHIP

There were numerous modeling runs completed during the 2010 Study which helped the project team understand how best to combine corridors for this System Study Update. Ridership results from 2017 for the two cross-region lines, forecast approximately 10,830 riders in 2040 for the Grand/Kyrene Line and 10,100 riders in 2040 for the Estrella/San Tan Line. The total system ridership is projected to be nearly 21,000 for the system in 2040. The Figure below shows projected boardings by station for the System Study Update. It also includes potential extensions to Wickenburg and San Tan Valley.



Passenger ridership based upon December 2017 modeling estimates, subject to additional, periodic modeling revisions.

PROJECTED CAPITAL AND OPERATING COSTS

In general, capital costs estimates assume the sharing of the existing freight rail tracks in each corridor with a second track being constructed within the central portions of the system to accommodate both freight and passenger trains. Stations would be double tracked or constructed to allow for future double tracking, depending on the operational needs. Locations of possible passing sidings are also identified as needed in places along the corridors where there is not a proposed double track and meets do not occur at stations. It is assumed that all track would be upgraded to Class 4 track to allow for 80 mph train speeds throughout the system. The cost estimates do not include the purchase of right of way, or payments to the freight railroads for operating rights.

Current BNSF Railway Grand Avenue Line in downtown Glendale, AZ. Source: MAG.

CAPITAL COSTS OF PROPOSED COMMUTER RAIL SYSTEM

INTERLINED ALTERNATIVE	CAPITAL COST	
	DMU	LHC
Grand/Kyrene Line Corridor (same for both vehicle types)	$1.075 B ($23.4 Million/mile)	$1.075 B ($23.4 Million/mile)
Estrella/San Tan Line Corridor (same for both vehicle types)	$1.160 B ($16.2 Million/mile)	$1.160 B ($16.2 Million/mile)
System Elements (includes Union Station and Commuter Rail Maintenance Facility)	$152 Million	$152 M
Vehicles (15 trainsets)	$180 M	$135 M
SYSTEM TOTAL	**$2.566 B**	**$2.521 B**

Source: AECOM, 2018

Operations and maintenance (O&M) costs are the annual costs to operate commuter rail service in the MAG region based on the service plans developed for the project. Costs are based on the hours and miles of service developed in the operating plan, and the average costs of similar systems. The table below presents the annual O&M costs for the proposed commuter rail system. It is likely that commuter rail in the MAG region would cost somewhere between the cost per train mile and train hour, as actual costs include a mix of both measures. It is likely that commuter rail in the MAG region would cost somewhere between the cost per train mile and train hour, as actual costs include a mix of both measures (i.e. fuel costs for train miles and operator salaries for train hours).

ANNUAL O&M COSTS OF PROPOSED COMMUTER RAIL SYSTEM

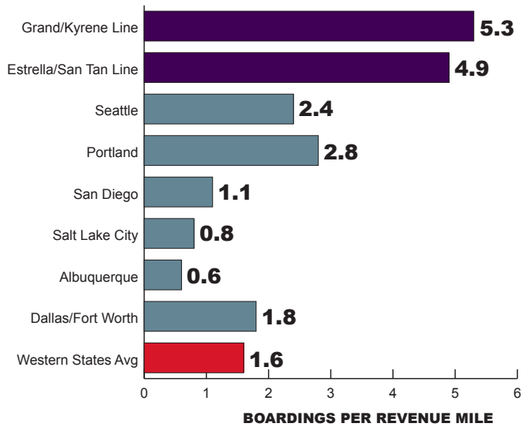
INTERLINED ALTERNATIVE	DMU		LHC	
	Train Miles	Train Hours	Train Miles	Train Hours
Annual Weekday Train Miles and Hours	465,579	20,910	465,579	20,910
Annual Weekend Train Miles and Hours	35,442	1,210	35,442	1,210
Total Annual Train Miles and Hours	501,021	22,120	501,021	22,120
Average Peer City Cost per Mile and Hour	$38.72	$901.54	$20.93	$683.54
Grand/Kyrene Line Corridor Total Cost	**$19.4 M**	**$19.9 M**	**$10.5 M**	**$15.1 M**
Annual Weekday Train Miles and Hours	532,338	20,910	532,338	20,910
Annual Weekend Train Miles and Hours	40,524	1,210	40,524	1,210
Total Annual Train Miles and Hours	572,862	22,120	572,862	22,120
Average Peer City Cost per Mile and Hour	$38.72	$901.54	$20.93	$683.54
Estrella/San Tan Line Corridor	**$22.2 M**	**$19.9 M**	**$12.0 M**	**$15.1 M**

Source: AECOM, 2018

PEER CITY COMPARISONS

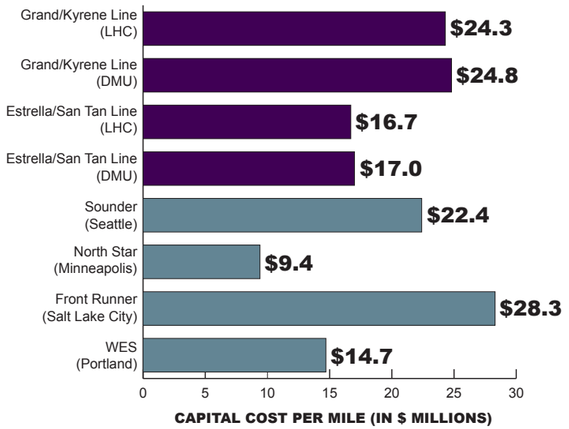
COMPARING BOARDINGS PER REVENUE MILE:

With approximately 10,100 daily riders forecast for 2040, the Grand/Kyrene Line would have approximately 5.3 weekday boardings per revenue mile while the Estrella/San Tan Line is expected see approximately 10,830 riders per day or approximately 4.9 weekday boardings per revenue mile. As shown these figures are higher than other Western U.S. cities based on statistics from 2016. However, it should be noted that these represent 2040 ridership projections. These numbers would likely be similar to the other systems for the first few years of service. Additionally, as the other systems continue to grow, their numbers would likely increase as well.



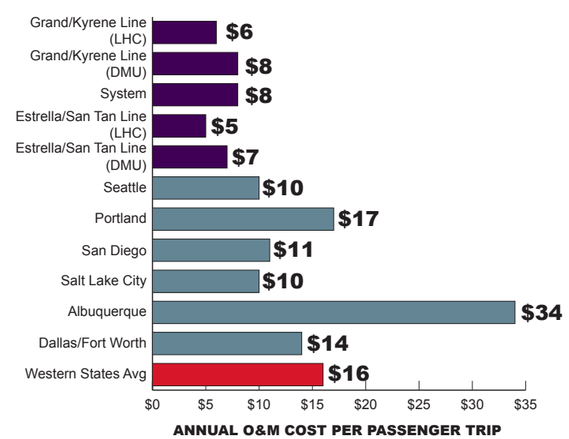
COMPARING COST PER CAPITAL MILE:

The capital cost per mile for the proposed MAG commuter rail system ranges from $15.9 million per mile for the Estrella/San Tan Line to $22.8 million per mile for the Grand/Kyrene Line. The cost to build either line would be comparable to other systems around the county.



COMPARING ANNUAL O&M COST PER PASSENGER TRIP:

According the National Transit Database, Transit Profiles 2016, the average annual O&M cost per passenger trip for commuter rail systems in the Western states is approximately $16 per passenger trip. Strong ridership forecasted for the MAG commuter rail system would result in lower O&M cost per passenger trip for both technologies under consideration (LHC and DMU) as compared to peer cities.



Source: AECOM, 2018

IMPLEMENTATION STEPS

For implementation of the commuter rail corridors recommended for the MAG region, a number of action items related to future coordination with the railroads, system governance and funding acquisition are required.

REQUIRED RAILROAD AGREEMENTS

As envisioned, commuter rail service in the MAG region would share right of way currently owned by the Union Pacific Railroad (UPRR) and BNSF Railway (BNSF), utilizing the same track where possible. To enable this, a rail access agreement of some type would be required. Unless conditions change, a Capacity Rights Agreement is expected to be the likely avenue for implementing commuter rail service in the MAG region. Capacity Rights Agreements may be a real estate interest such as a lease or easement, or a contractual or license right. The purchaser is not acquiring the line, but rather is only acquiring the right to operate a specified number of trains. Further coordination with the UPRR and BNSF is critical to determining the appropriate approach to contractual relationships to operate commuter rail.

Current Union Pacific Railroad Estrella Line over the Agua Fria Bridge in Avondale, AZ. Source: MAG.

WHO WOULD OPERATE THE COMMUTER RAIL SERVICE?

One option for the operation of commuter rail service would be to contract with a private operator. Operations could be contracted to an independent contractor, such as Amtrak or a private contractor like Herzog, which operates several commuter rail systems throughout the U.S., including the New Mexico Railrunner, TRE in Dallas/Fort Worth, and the San Diego Coaster. An owner railroad – the BNSF or UPRR – could also operate passenger rail service under the terms of a Capacity Rights or other agreement. As of 2017, BNSF operates passenger service for three commuter rail systems, including the Metra Chicago-Aurora Line in Illinois, the Sounder in Seattle, and the Northstar in Minnesota.

HOW WOULD REGIONAL COMMUTER RAIL SERVICE BE GOVERNED?

One of the most significant issues to be resolved for the implementation of commuter rail in the MAG region is the question of who would be the responsible party for managing, designing, constructing, and operating the system. Implementation of a commuter rail system will require a governance structure that reflects the financial, political, and representational patterns of the areas served by commuter rail.

WHAT FUNDING OPTIONS ARE AVAILABLE TO IMPLEMENT COMMUTER RAIL?

The initial step to develop a funding implementation strategy is to gauge possible or probable funding options at the federal, state, and local levels. The policy positions of the involved agencies and possible implementation responsibilities should be thoroughly considered, as should those of other partners included in the project area. Frequently, the focus is on funding sources for the capital investment needs to implement service. Ultimately, however, the more critical financial issue at the local level is the annual requirement for ongoing O&M costs.

Current Union Pacific Railroad San Tan Line in Gilbert, AZ. Source: MAG.

WHAT NEAR-TERM IMPLEMENTATION STEPS ARE NEEDED?

The table below summarizes the near-term implementation steps required to implement a commuter rail program in the MAG region, including the potential responsible parties, partners, and timeframe.

SUMMARY OF NEAR-TERM IMPLEMENTATION STEPS

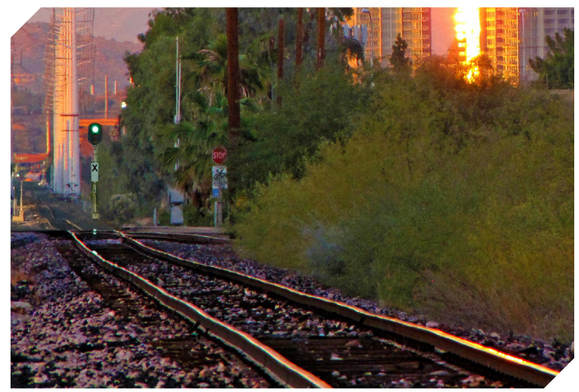
ITEM	RESPONSIBLE PARTY	PARTNERS	TIMEFRAME
1| Periodic Ridership Forecasting Updates	• MAG	• Local Jurisdictions	Ongoing
2| Coordination with Railroads	• ADOT • MAG • Railroad(s)	• Local Jurisdictions • Valley Metro	Ongoing
3| Local Planning Efforts	• Local Jurisdictions	• MAG • ADOT	Ongoing
4| Address Enabling Legislation regarding Liability and Indemnification	• ADOT • MAG	• Railroad(s)	2018-2022
5| Coordination of Infrastructure Improvements with the Railroads, ADOT and Local Jurisdictions	• MAG • Local Jurisdictions • ADOT	• Railroads(s) • Valley Metro	Ongoing
6| Identify Funding Commitments	• MAG • ADOT • Legislature	• Local Jurisdictions	2018-2022
7| Develop and Implement Governance Plan	• MAG • ADOT	• Local Jurisdictions • Valley Metro	Following identification of local funding commitments
8| Initiate Process for Federal Funding	• MAG	• Local Jurisdictions	Following identification of local funding commitments
9| Preserve Future Options	• MAG • ADOT • Local Jurisdictions • Regional • Joint Powers Authority	• Local Jurisdictions • Railroad(s) • MAG • CAG • ADOT	Ongoing

Source: AECOM, 2018

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 in the region. With progress on these key steps, the region will be in a position to move forward on other recommendations from the System Study Update, as 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.



Current Union Pacific Railroad Kyrene Line in Tempe, AZ. Source: MAG.

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MAG CONCEPTUAL VEHICLES

Conceptual illustration of a bi-level passenger coach for proposed regional commuter rail system. Source: MAG.

Conceptual illustration of a diesel locomotive for proposed regional commuter rail system. Source: MAG.

Conceptual illustration of a DMU for proposed regional commuter rail system. Source: MAG.