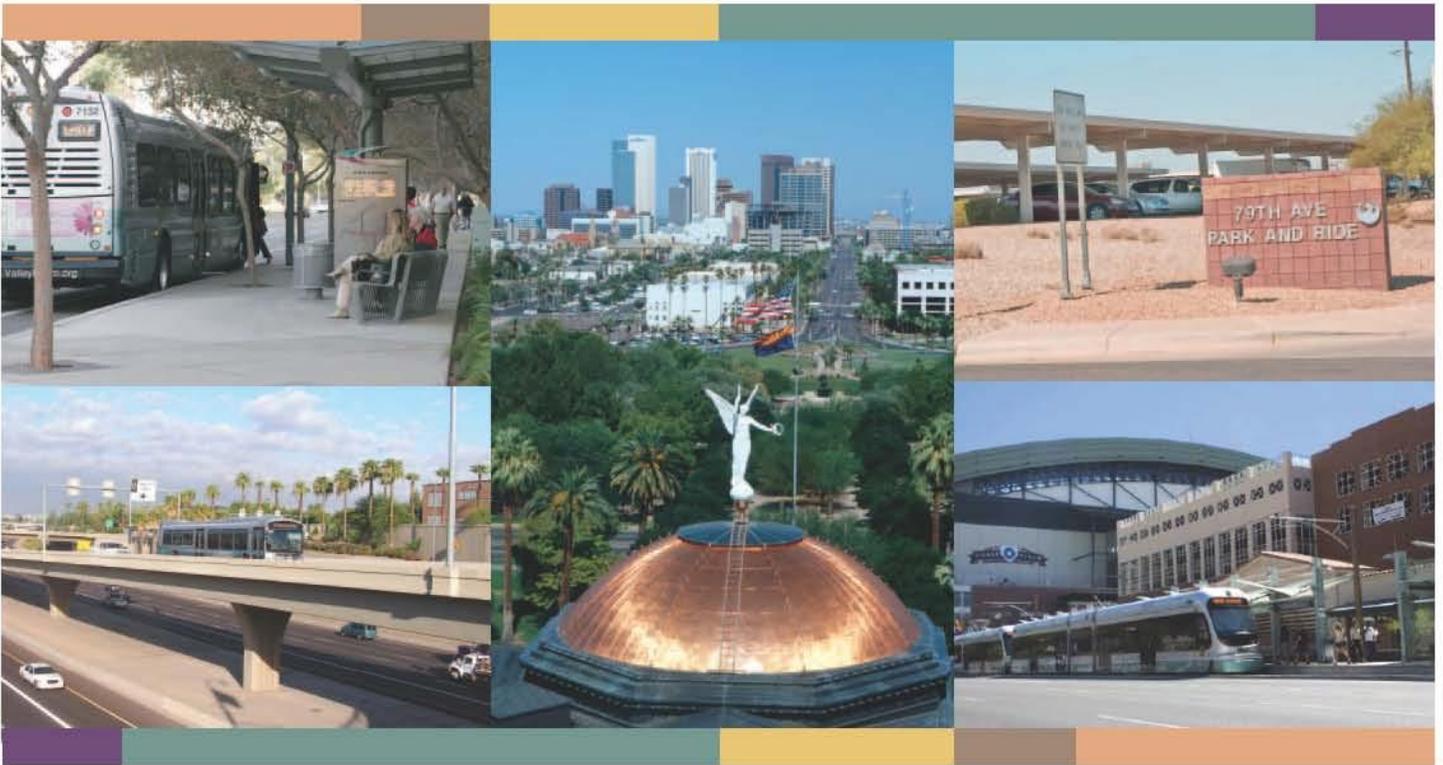


PHOENIX WEST EXTENSION



DRAFT LOCALLY PREFERRED ALTERNATIVE REPORT

June 2012





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LIST OF ACRONYMS

AA	Alternatives Analysis
ADOT	Arizona Department of Transportation
BNSF	BNSF Railway
BRT	Bus Rapid Transit
CATO	Corridor Advanced Transit Opportunities
FTA	Federal Transit Administration
HCT	High Capacity Transit
HOV	High Occupancy Vehicle
I-10	Interstate 10
I-17	Interstate 17
LOS	Level of Service
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
MAG	Maricopa Association of Governments
METRO	Valley Metro Rail, Inc.
NEPA	National Environmental Policy Act
NOI	Notice of Intent
ROW	Right-of-Way
RTP	Regional Transportation Plan
YOE	Year of Expenditure

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1.0 SUMMARY

This document summarizes the Phoenix West Extension Alternatives Analysis (AA) Study and includes the Recommendations and Locally Preferred Alternative Report. The purpose of the Phoenix West Extension AA Study is to identify high capacity transit (HCT) improvements that respond to transportation needs in an 11-mile corridor approved by Maricopa County voters in 2004. The AA study was conducted by Valley Metro Rail, Inc. (METRO) and complies with the Federal Transit Administration (FTA) New Starts project development process. As a result of this planning effort, a recommended alignment and transit mode, or Locally Preferred Alternative (LPA), was developed for further evaluation under the National Environmental Policy Act (NEPA). This document describes the planning process that occurred and the build alternative recommended as a result of the study. The LPA was approved by the Phoenix City Council in May 2012.

In 2008, METRO conducted the I-10 West Transportation Assessment to better quantify the projected future transportation needs in the corridor. The results of this study indicated that the I-10 West study corridor is expected to face substantial transportation demand in the future. Driving this demand is the high population growth over the next 25 years in areas surrounding the I-10 study area. I-10 will be one of the main east/west facilities providing a direct connection for this population into and out of the larger Phoenix region. The following summarizes this assessment effort:

- Vehicle miles and hours traveled are predicted to grow substantially in the Southwest Valley, nearly twice as much as the region overall.
- System average speeds are predicted to be slower on all facilities by 2030, but most dramatically on the freeway system.
- Traffic volumes are expected to increase most dramatically on the west end of the corridor.
- High occupancy vehicle (HOV) volumes will more than double by 2030 at the west end of the corridor.
- I-10 is currently operating at highly congested conditions (Level of Service [LOS] E-F) in both the AM and PM peak periods for the primary travel movement (eastbound in the AM and westbound in the PM).
- I-10 levels of service are expected to become worse by 2030, with congestion in both the AM and PM peak periods in both directions.
- Travel times are projected to increase by 2030, most dramatically for transit trips.
- Existing transit ridership is growing within the study area, which is being served by some of the highest ranked routes in terms of ridership.
- Existing transit is experiencing overcrowding on various routes, indicating additional transit capacity is needed.
- Unrestrained 2030 model runs indicate a significant amount of additional (and unmet) travel demand within the I-10 corridor.

METRO examined alternatives for light rail transit (LRT), bus rapid transit (BRT), and enhanced local bus. A comparison summary of these modes is provided in Table 1. BRT alternatives were



considered through the Tier 1 and Tier 2 processes and assumed key features including off-line fare payment, specialized vehicles, stations with improved amenities (over existing bus stations), and branded service. The BRT alternatives considered assumed mix-traffic operation in downtown Phoenix with exclusive guideway along I-10. As noted in this report, several BRT alternatives were considered through Tier 1 and Tier 2. Following a lengthy evaluation, METRO selected LRT as the preferred transit mode for the Phoenix West study area. LRT was selected based on the following key considerations:

1. Provides a direct integration with the existing LRT service and a one seat ride for passengers traveling between West Phoenix and central Phoenix
2. Lower long-term operating costs compared to BRT
3. Higher ridership potential compared to BRT
4. Higher passenger capacity compared to buses
5. Provides a faster travel time compared to bus travel

Table 1. Comparison of LRT and BRT Alternatives

Issue	LRT	BRT
Capital Costs	\$1 Billion*	\$496 Million
Total Cost per Boarding (Annualized Capital + Operating Costs)/ Annualized Boardings	\$16.2*	\$40.8
Ridership Potential (2030 Average Daily Boardings)	32,900*	9,200
Hourly Capacity in One Direction (number of passengers per hour per direction)	5,000	1,000
Travel Times (from 79 th Avenue to Central Avenue/Washington)	19 Minutes	26 Minutes

Source: METRO 2012

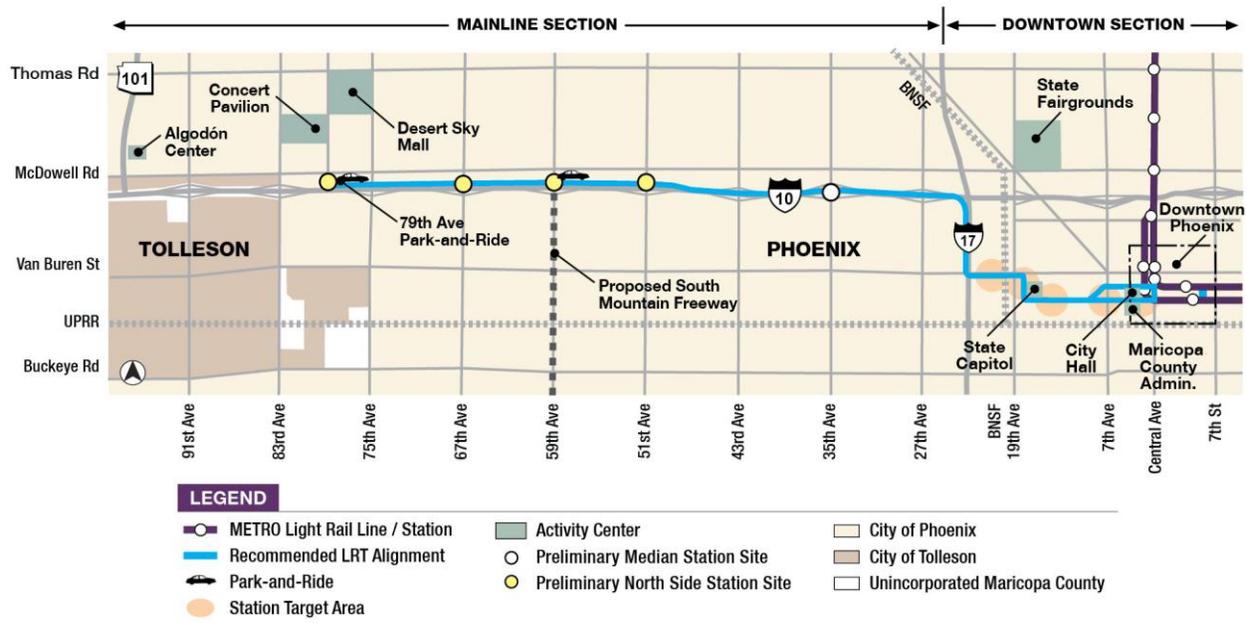
*Based on 2010 Evaluation.

The AA process also resulted in a recommended alignment for the LRT guideway within the Phoenix West study area. The recommended alignment would connect with the existing LRT system along Washington and Jefferson Streets in the downtown Phoenix core as shown in Figure 1. The new corridor would extend west along Washington and Jefferson Streets, and converge to one guideway along Jefferson Street at approximately 8th Avenue, continuing through the State Capitol area to 18th Avenue where it would turn north to Van Buren Street. The guideway would run along the south side of Van Buren Street and transition to the I-17 corridor where it would parallel Interstate 17 (I-17) using the southbound frontage road north to Interstate 10 (I-10). West of I-17, the LRT guideway would utilize a 50-foot freeway median, originally preserved for high-capacity transit along I-10, to approximately 47th Avenue. From this point, the guideway would transition to the north of I-10 and parallel an open-drainage channel along an unimproved access road. The extension would follow this alignment until connecting to the 79th Avenue park-and-ride. In addition, a turnaround at 5th Street between Washington and Jefferson in the downtown area is recommended for operational flexibility. LRT would generally operate at or below posted speed limits at an average of about 32 miles per hour.

METRO has identified preliminary station sites along the I-10 portion of the Phoenix West Extension at 35th Avenue, 51st Avenue, 59th Avenue, 67th Avenue and 79th Avenue. METRO proposes a new park-and-ride at 59th Avenue as well as expansion of the 79th Avenue Park-and-Ride to increase parking capacity in support of the HCT transit investment.



Figure 1. Phoenix West LPA Recommendation



Source: METRO 2012

Although this document signifies the close of the AA planning phase, the recommended HCT alternative would be subject to further refinement and evaluation during the upcoming environmental planning phase that will proceed in compliance with the FTA New Starts Process and NEPA. In addition to the LPA, METRO is recommending a priority set of projects known as the Corridor Advanced Transit Opportunities (CATO) Program. These projects would support current and future high capacity transit in the I-10 corridor and would each be able to operate with independent utility. These projects are described further in Chapter 5.

Chapter 2 provides background information on the study area. Chapter 3 describes the transportation needs in the study area and the purpose and need for the Phoenix West extension that guided the AA process and ultimate selection of the recommended alternative. Chapter 4 summarizes the Tier 1 and Tier 2 evaluation phases of the study as well as the Post-Tier 2 and Final Definition of Alternatives work that was conducted based on public input during the process. Chapter 5 details the recommended HCT alternative including a physical description of the alternative, justification for selection of the recommended alternative, and outstanding issues to be considered during the next phase of study. Finally, Chapter 6 outlines the full set of recommendations including projects recommended for early action and an improved feeder bus system as well as the next steps METRO will take to advance the recommended alternative for formal acceptance by the FTA.

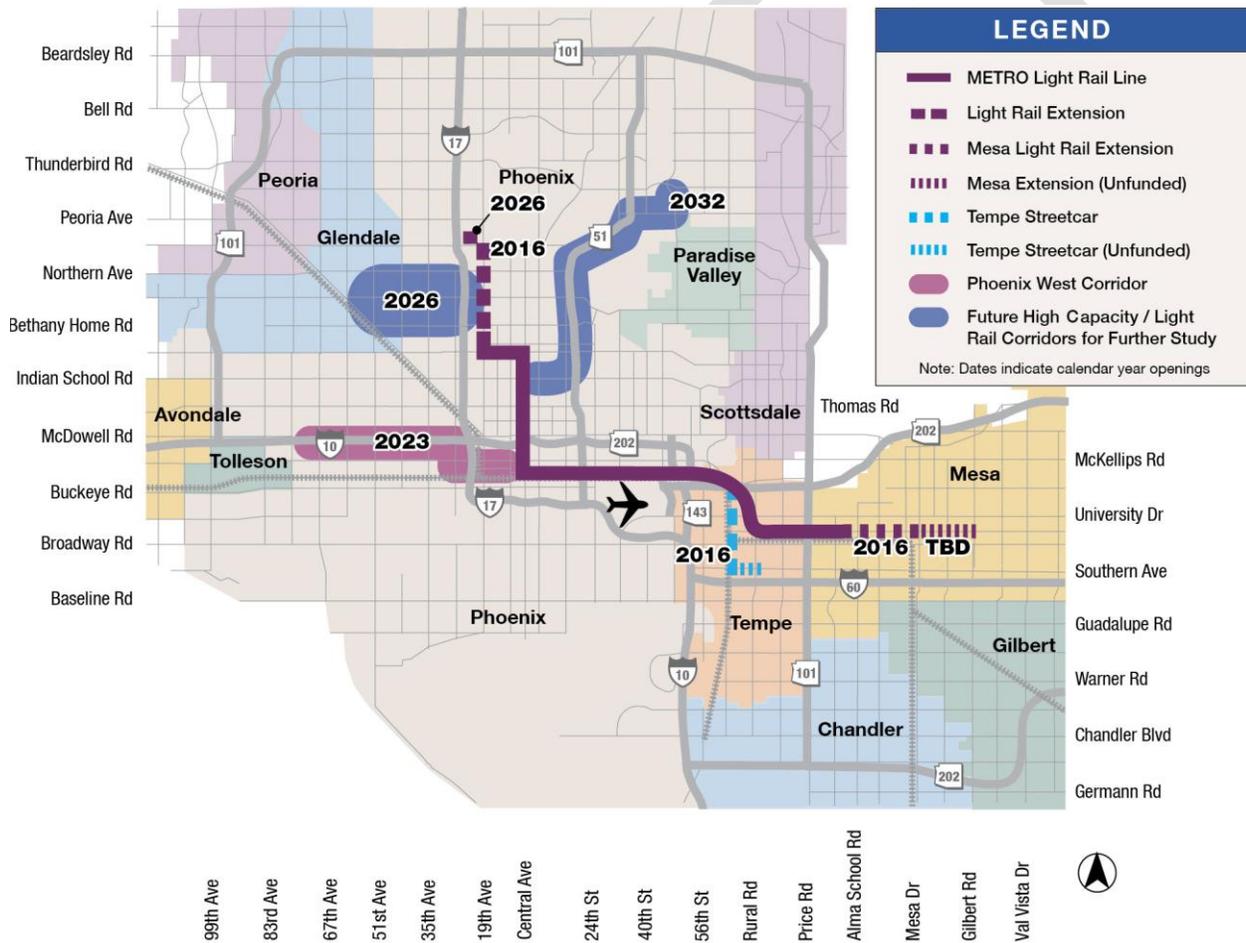


2.0 PROJECT BACKGROUND

Funds from the Proposition 400 one-half-cent transportation sales tax extension were allocated toward the 57.7-mile HCT/LRT system identified in the 2003 Maricopa Association of Governments (MAG) Regional Transportation Plan (RTP). MAG is the designated Metropolitan Planning Organization for approving proposed HCT corridors in Maricopa County.

The existing regional LRT system that serves the cities of Phoenix, Tempe, and west Mesa opened for passenger service in December 2008. The MAG RTP identified an 11-mile extension along I-10, from downtown Phoenix to the vicinity of 79th Avenue, as one of six additional HCT/LRT corridors within Maricopa County. This segment of I-10, referred to as the Phoenix West Extension, is scheduled to be in operation by 2023 with the remaining system to be operational by 2031. Figure 2 shows the proposed 57.7-mile system.

Figure 2. High Capacity Transit/Light Rail Transit Corridors

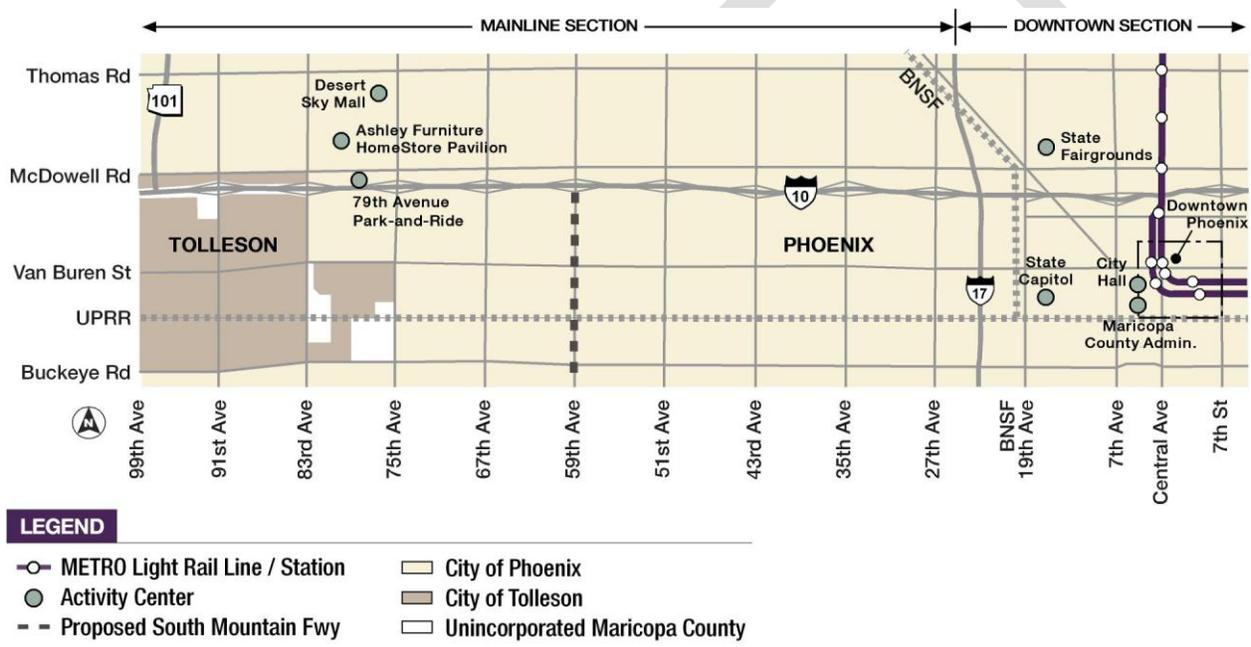




The Phoenix West study area is bounded on the north by Thomas Road, on the south by Buckeye Road, on the west by State Route 101 (Loop 101), and on the east by 7th Street, as depicted in Figure 3. For the purposes of alternatives development and analysis, the corridor was divided into two sections that have different characteristics in terms of alignment opportunities, station needs, key types of impact, and transit service needs.

- The portion east of I-17 is referred to as the **Downtown Section**. The Downtown Section contains most of the employment destinations in the corridor and is also where Phoenix West would connect to the existing system.
- The portion west of I-17 is referred to as the **Mainline Section**. This section would generally operate at a higher speed with greater station spacing than other portions of the system currently in operation.

Figure 3. Phoenix West AA Study Area



Source: METRO 2012



3.0 PURPOSE AND NEED FOR THE PROJECT

The purpose of the proposed HCT improvements in the Phoenix West study area is to provide a dependable, efficient, and cost-effective HCT option that connects central Phoenix and the southwest valley in support of regional plans and policies outlined in the MAG RTP. The implementation of transit improvements within the Phoenix West study area would meet the following objectives:

- Offer a viable transportation alternative that will facilitate the safe and efficient movements of people, particularly commuters, through and within the Phoenix West study area;
- Provide more reliable travel times through the project corridor;
- Help to alleviate AM and PM peak period traffic conditions along I-10 in the Southwest Valley that are currently operating at LOS E-F and are anticipated to steadily deteriorate by providing additional capacity as part of a “shared solution” incorporating transit, highway improvements, and existing service such as HOV lanes and bus service;
- Enhance economic development potential within the corridor by improving access to existing and planned employment and activity centers throughout the Phoenix West corridor;
- Support regional plans and policies that reinforce an efficient transit system; and
- Support regional air quality goals.

The recommended Phoenix West Extension project would provide an HCT option that addresses regional growth, increased travel demand, changes in land use patterns, access to activity centers, and regional planning goals. The major employment concentrations served include downtown Phoenix and the State Capitol. The project would help to satisfy the four primary needs within the corridor:

- 1) **A need for added peak period travel capacity and a more reliable mode as part of a balanced transportation system.** According to the *I-10 West Transportation Assessment* (METRO 2008), congestion during both the AM and PM peak periods along I-10 within the Study Area is expected to become worse by 2030, with HOV volumes expected to more than double. Transit improvements are needed to address the future demands as part of a “shared solution” to facilitate the reliable, safe, and efficient movement through and within the study area, specifically along I-10.
- 2) **A need for increased transit system connectivity.** Transit service coverage in the study area is limited, especially for longer peak period commute trips. Improved services and connections are needed among the destinations within and connected to the study area to improve the functionality of the system to better meet travel demands.

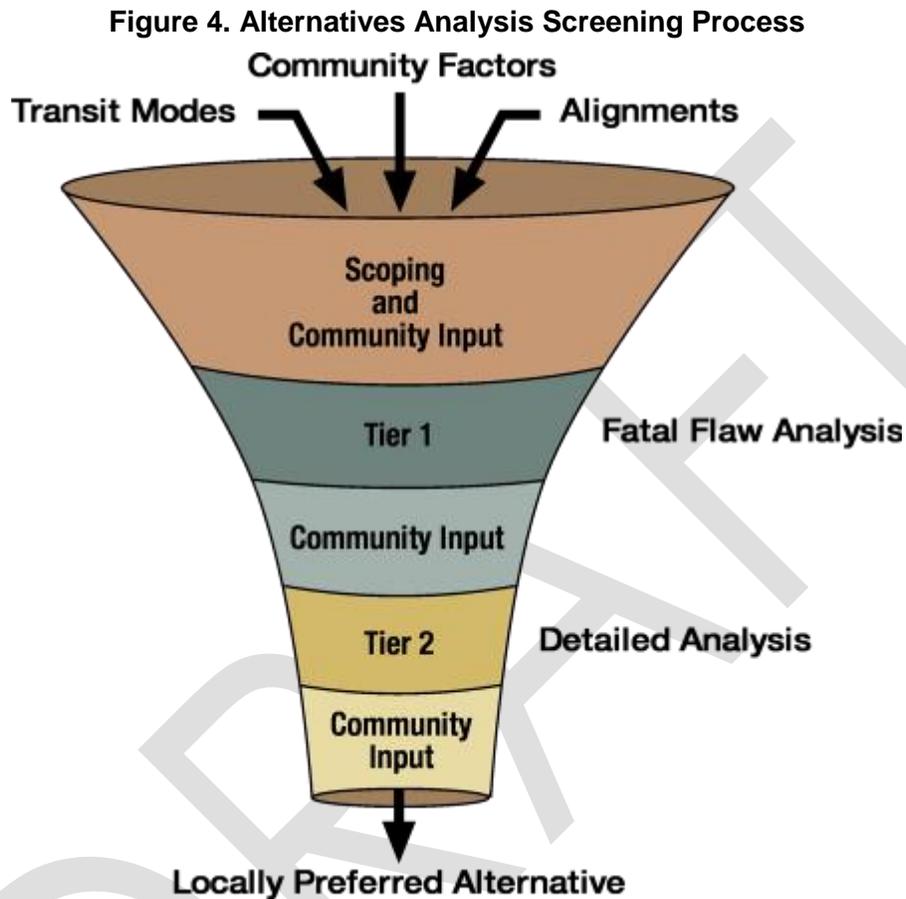


- 3) **A need for improved mobility and access to corridor destinations.** Improved transit service should be implemented to provide safe and efficient access to numerous local and regional employment destinations within and adjacent to the Phoenix West study area including the State Capitol, the City of Phoenix/Maricopa County Government Center, Phoenix Governmental Mall, and entertainment destinations including downtown Phoenix sports and arts venues and the Ashley Furniture HomeStore Pavilion. In addition, a substantial reverse-commute travel pattern also needs to be served by transit in this corridor.
- 4) **A need to reinforce economic development opportunities.** Investments in HCT should be leveraged to encourage more intensive transit-oriented development in the study area consistent with local policies and plans.

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4.0 ALTERNATIVES ANALYSIS PROCESS

A multi-level screening process was applied during the AA to develop an LPA, as illustrated in Figure 4.



Source: METRO 2012

The full list of alignment alternatives considered for all modes for the Phoenix West AA Study is provided in Figure 5. Each phase of analysis is described in detail in the subsequent sections.



Figure 5. Phoenix West AA Alignment Alternative Screening

ALIGNMENT ALTERNATIVE	Pre-Tier 1 Screening	Tier 1 Screening	Tier 2 Screening		Final Definition of Alternatives	Post Tier 2/ Final Def. of Alternatives	Locally Preferred Alternative
			Conceptual	Detailed			
Mainline Section							
I-10							●
Thomas Road	■						
McDowell Road	■						
Van Buren Street	■						
Buckeye Road	■						
Downtown Section (East-West Alignment Alternatives)							
Thomas Road	■						
McDowell Road	■						
I-10 (BRT)			■				
I-10 (LRT)		■					
Van Buren Street				■			
Adams Street					■		
Jefferson Street (2-Track)						■	
Madison Street*			■				
Jackson Street*			■				
Buckeye Road	■						
Van Buren Street/ Jefferson Street							●
Downtown Section (North-South Alignment Alternatives)							
27th Avenue	■	■					
I-17 Southbound Frontage Road							●
19th Avenue					■		
17th Avenue				■			
Grand Avenue			■				
15th Avenue (via Grand Avenue)					■		
7th Avenue	■	■					
5th Avenue	■	■					
3rd Avenue	■	■					

■ = Removed from consideration ▶ = Carried forward for further evaluation ● = LPA

*Subsequent to the completion of Tier 1 Screening, community stakeholders requested that HCT options along Madison and Jackson Streets be analyzed as downtown Phoenix east-west alignments.
Source: METRO 2012

4.1 PRE-TIER 1 AND TIER 1 ALTERNATIVES EVALUATION AND SCREENING

The AA process was initiated with the “Pre-Tier 1 Screening” phase, which assessed the broad range of HCT modes including LRT and BRT, and possible alignments within the study area based on minimal constraints. The “Universe of Alternatives” examined during the Pre-Tier 1 Screening phase was developed based on an examination of existing physical characteristics in the study area (e.g., potential connections to the METRO system and rights-of-way that could accommodate HCT alignments, etc.) with input from METRO, members of the public,



stakeholders, and agency representatives. During this Pre-Tier 1 Screening phase, transportation deficiencies and constraints in the study area were clarified and factored into the Purpose and Need.

A key decision that emerged from the Pre-Tier 1 Screening phase was the selection of the I-10 freeway right-of-way (ROW) as the recommended HCT option within the Mainline Section of the Phoenix West corridor. The I-10 alignment between 27th and 83rd Avenues is:

- consistent with the 1978 Interstate 10-91st Avenue to Junction I-10 Final Environmental Impact Statement and Section 4(f) Statement that addressed the preservation of the freeway ROW for future transit;
- consistent with the MAG RTP alignment approved by voters in 2004;
- the alignment that provides a competitive service compared to automobile travel in terms of providing a reliable option that travels at a higher speed and has a greater passenger capacity;
- the lowest overall cost since construction within some portion of the existing freeway ROW would minimize property acquisition, require minimal street construction, and result in minimal utility relocations. In comparison, utilization of arterial street options would result in significant property impacts.

As an important step early in the Phoenix West Extension study process, the MAG Regional Council endorsed this recommendation west of I-17 within the Phoenix West study area in July 2008.

As part of the project scoping process, METRO invited representatives from the City of Phoenix, Maricopa County, and State of Arizona departments and agencies to gather preliminary feedback about potential high-capacity corridors and identify areas of interest or potential projects that may influence the study. The workshop was focused specifically on the downtown Phoenix area between 27th Avenue and Central Avenue to the west and east, respectively, and Grant Street to McDowell Road to the south and north, respectively. Early coordination during the AA in the downtown area was considered a significant requirement in the planning process since downtown Phoenix is a dynamic area where a variety of development and planning projects are ongoing and diverse constraints and opportunities exist. Each of the six breakout groups identified HCT corridors that could connect an alignment along I-10 to the existing light rail along Central Avenue. The corridors that were identified followed existing roadway alignments and are shown in Figure 6. Workshop participants felt HCT could serve several destinations in the downtown area. Buildings associated with the Capitol Mall Corridor located along Washington and Jefferson Streets between 19th and Central Avenues were identified as a potential source of riders due to the large number of employees projected for the area. Other areas identified that should be served by the HCT service included the downtown Arizona State University Campus, residential communities, the Arts and Entertainment Districts, and the Arizona State Fairgrounds. Several north-south corridors were suggested from I-10 including 27th Avenue, I-17, 19th Avenue, 17th Avenue, Grand Avenue, and 15th Avenue.

Figure 6 illustrates the alternatives considered in the complex downtown portion of the study area. During the Pre-Tier 1 and Tier 1 analysis phases, each alignment alternative shown in Figure 6 was analyzed as an individual segment to determine the feasibility of implementing either LRT or BRT using the existing ROWs.



Alternatives within the Downtown Section were categorized as either north-south or east-west alignment alternatives based on their directional orientation. The Tier 1 Evaluation eliminated some segments through a “fatal flaw” analysis, designed to efficiently screen alternatives based on criteria that are consistent with project goals. The evaluation criteria used during the Pre-Tier 1 and Tier 1 Evaluation, along with the associated goals, are listed in Table 2. A summary of the alignments considered and the rationale for removing them from further consideration during Pre-Tier 1 and Tier 1 evaluations is provided in Table 3. Table 3 also lists where in the AA process alternative alignments were removed from, which corresponds with the Alternatives Progression flowchart shown in Figure 5.

Table 2. Pre-Tier 1 and Tier 1 Fatal Flaw Analysis and Evaluation Criteria

Phoenix West Extension Goal	Evaluation Criteria
Increase Regional Travel and Mobility	Transit Patron Travel Time Savings
Connect Local and Express Bus and LRT System with the West Valley	Populations Served
Provide Cost-Effective Transit Improvements	Technical Feasibility
Support Economic Development and Serve Major Employment Centers, including the State Capitol. Also, Enhance Connectivity among Existing and Planned Regional and Local Activity Centers and Attractions	Consistency with Existing Plans and Studies and Connections to Existing and Planned Activity Centers, including the State Capitol
Minimize Environmental Impacts	Irresolvable Environmental Impacts on Cultural Resources/Environmental Justice Populations

Source: METRO 2008

Table 3. Summary of Pre-Tier 1 and Tier 1 HCT Alignments Considered

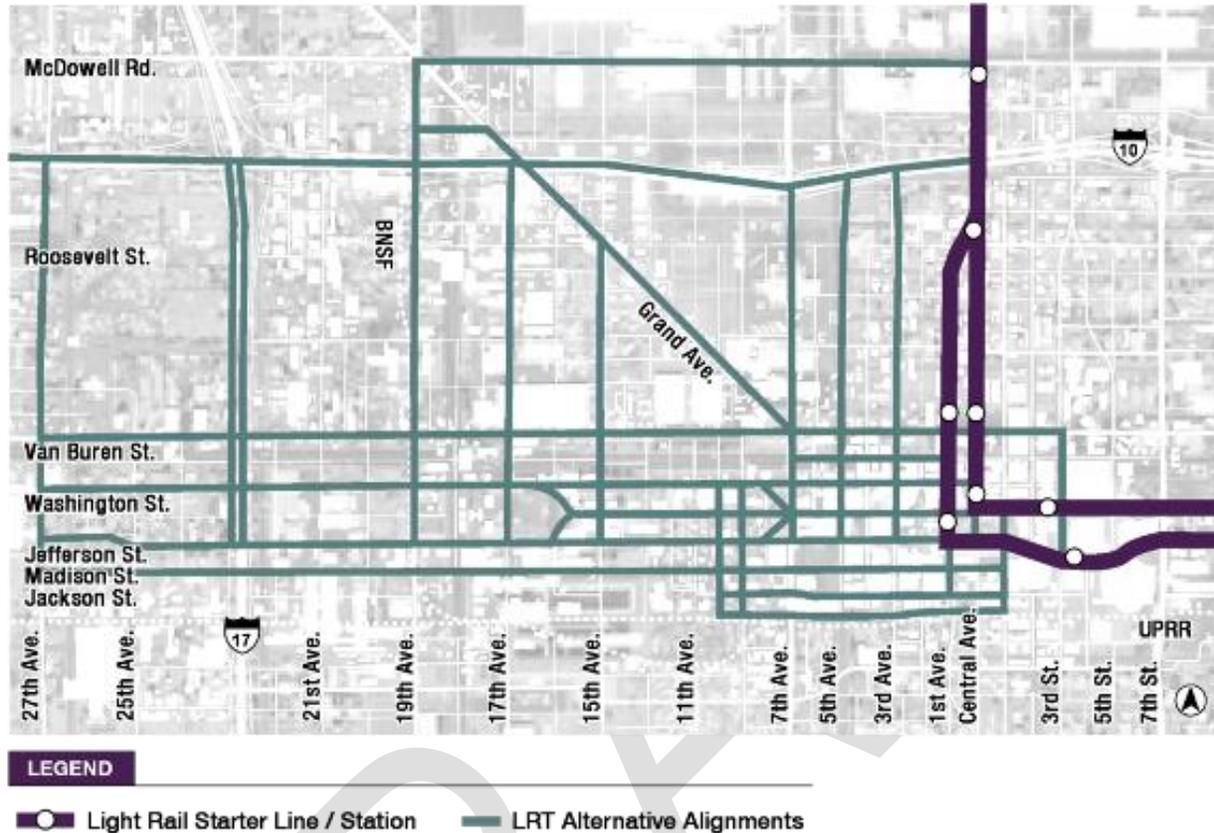
Alignment Alternative	Mode	Rationale for Removal from Further Consideration
PRE-TIER 1		
Mainline Section		
- Thomas Road - McDowell Road - Van Buren Street - Buckeye Road	LRT	<ul style="list-style-type: none"> • Difficult crossings of Grand Avenue and the BNSF railroad tracks would be required along both McDowell and Thomas Roads. • Operations are constrained by lower posted speed limits compared to the freeway. • Travel time savings would be reduced by about 5 minutes due to lower operating speeds and signalized intersections along the arterials compared to the I-10 alignment. • Construction of a LRT guideway would result in numerous impacts to existing rights-of-way and adjacent land uses. • Increased costs resulting from utility impacts compared to the I-10 alignment.
- Thomas Road - McDowell Road - Van Buren Street - Buckeye Road	BRT	<ul style="list-style-type: none"> • Operations are constrained by lower posted speed limits compared to the freeway. • Travel time savings would be reduced due to lower operating speeds, signalized intersections, and increased number of stations required compared to I-10.
Downtown Section (East-West)		
Thomas Road	LRT/BRT	<ul style="list-style-type: none"> • Would not provide direct access to the primary ridership base in downtown Phoenix, including major employment centers such as the State Capitol. • Extensive ROW required for LRT Option



Alignment Alternative	Mode	Rationale for Removal from Further Consideration
McDowell Road	LRT/BRT	<ul style="list-style-type: none"> • Would not provide direct access to the primary ridership base in downtown Phoenix, including major employment centers such as the State Capitol. • Extensive ROW required for LRT Option
Buckeye Road	LRT/BRT	<ul style="list-style-type: none"> • Would not provide direct access to the primary ridership base in downtown Phoenix, including major employment centers such as the State Capitol. • Extensive ROW required for LRT Option
Downtown Section (North-South)		
7 th Avenue	LRT/BRT	<ul style="list-style-type: none"> • Does not provide either a single trip (no transfer) or direct access to the primary ridership base in downtown Phoenix major employment centers and the State Capitol. • Inadequate space for a new guideway without reconstruction of the I-10 mainline and 7th Avenue interchange.
5 th Avenue	LRT/BRT	<ul style="list-style-type: none"> • Does not provide either a single trip (no transfer) or direct access to the primary ridership base in downtown Phoenix major employment centers and the State Capitol. • Inadequate space for a new guideway without reconstruction of the I-10 mainline and 5th/3rd Avenue HOV direct access ramp.
3 rd Avenue	LRT/BRT	<ul style="list-style-type: none"> • Does not provide either a single trip (no transfer) or direct access to the primary ridership base in downtown Phoenix major employment centers and the State Capitol. • Inadequate space for a new guideway without reconstruction of the I-10 mainline and 5th/3rd Avenue HOV direct access ramp.
TIER 1 SCREENING		
Mainline Section		
<i>Note: No alternatives were screened for the Mainline Section in Tier 1 since the I-10 ROW recommended by METRO was approved for HCT by MAG Regional Council</i>		
Downtown Section (East-West)		
I-10	LRT	<ul style="list-style-type: none"> • Use of I-10 would not provide a direct connection with the existing LRT line, which crosses above the I-10 freeway. • The design of the Hance Park Transit Facility, located within the median of the I-10 freeway and originally constructed to accommodate HCT, does not meet the dimensions necessary to operate LRT. • I-10 would not serve the State Capitol.
Downtown Section (North-South)		
27 th Avenue	LRT/BRT	<ul style="list-style-type: none"> • Implementation of LRT would require substantial reconstruction of existing infrastructure (i.e., the direct access from the I-10 ROW) and expansion of existing ROW along 27th Avenue and the selected East-West alignment. • The alignment would result in increased travel time due to lower operating speeds and signalized intersections on arterials.
Grand Avenue	LRT/BRT	<ul style="list-style-type: none"> • Would not provide a direct connection to the existing LRT system. • Would not serve the State Capitol. • Would require extensive right-of-way acquisition.

Source: METRO 2012

Figure 6. Tier 1 Universe of Alignment Alternatives



Source: METRO 2008

4.1.1 Alternatives Moving forward in the Process following Pre-Tier 1 and Tier 1 Screening

Based on the analysis of alternatives performed during the Pre-Tier 1 and Tier 1 screening process, the following alternatives were advanced to Tier 2:

Mainline:

- I-10 between I-17 and 83rd Avenue – moved forward because of the projected travel time savings, consistency with future plans, and overall cost savings due to the ROW preservation that has already occurred.



Downtown Section (East-West Alignment Alternatives):

The alternatives that moved forward beyond Tier 1 provide a direct connection to the existing LRT system in downtown and serve the most key activity and employment centers.

- Van Buren Street
- Adams Street
- Jefferson Street 2-Track to Washington/Jefferson Street Couplet
- I-10 (for BRT only, because the constraints associated with the connection to downtown at Hance Park are more pronounced for LRT)

Subsequent to the completion of Tier 1 screening, community stakeholders requested that HCT options along Madison and Jackson Streets be analyzed as downtown Phoenix east-west alignments.

Downtown Section (North-South Alignment Alternatives):

The alternatives that moved forward beyond Tier 1 would provide a direct connection to the existing LRT system, serve the most activity centers, and fewer potential infrastructure conflicts.

- I-17
- 19th Avenue
- 17th Avenue
- 15th Avenue (via Grand Avenue)

4.2 TIER 2 ALTERNATIVES AND FINAL DEFINITION OF ALTERNATIVES EVALUATION AND SCREENING

The Tier 2 and Final Definition of Alternatives evaluation and screening process resulted in further examination of potential Mainline Section station locations and downtown alignment alternatives remaining after the Tier 1 evaluation. The downtown alignment alternatives were subjected to a qualitative conceptual analysis, followed by a more detailed quantitative analysis during the Tier 2 Evaluation and Screening phase. With the I-10 ROW selected and approved by MAG as the HCT alternative for the Mainline Section, the Tier 2 evaluation and screening focused on analysis of the station locations along the I-10 freeway.

4.2.1 Tier 2 Mainline Station Area Evaluation Results

Early in the AA planning process, METRO identified and evaluated several station target areas along the I-10 Mainline Section. Station target areas were generally identified at intersections along I-10 that provide logical access to a potential HCT system. Through discussions with local stakeholders and a Community Working Group formed specifically for the Mainline Section (described further in Section 5.2), station target areas listed in Table 4 were recommended for the I-10 Mainline Section.



Table 4. Recommended Mainline Station Target Areas

Station Target Area	Justification
35 th Avenue	<ul style="list-style-type: none"> • 35th Avenue connects north Phoenix to the South Mountain and Laveen areas. • Commercial uses buffer residential neighborhoods. • Provides connectivity and mobility to high school and middle school students in close proximity.
51 st Avenue	<ul style="list-style-type: none"> • Provides a connection to the Maryvale Secondary Village Core to the north. • 51st Avenue, one of the longest north-south arterials in west Phoenix, has the potential to attract high ridership.
59 th Avenue	<ul style="list-style-type: none"> • Provides a connection to the Estrella Secondary Urban Village Core to the south. • Provides a connection for passenger of Valley Metro Route 59, which currently experiences high ridership. • Includes vacant parcels that could potential serve as park-and-ride locations. • Placement of a park-and-ride at 59th Avenue serves as a potentially high demand station with the proposed direct connection for passenger vehicle users of the South Mountain Freeway.
67 th Avenue	<ul style="list-style-type: none"> • Preferred by local stakeholders based on the proximity to planned development activity and access to local activity centers. • Similar to 51st Avenue, 67th Avenue is also one of the longest north-south arterials in west Phoenix and has the potential to attract high ridership.
79 th Avenue	<ul style="list-style-type: none"> • Currently an existing park-and-ride facility, this location serves as the Phoenix West Extension terminus. To support anticipated HCT ridership, METRO would proposes expanding capacity of the facility through either site expansion or construction of a garage structure.

Source: METRO 2012

4.2.2 Tier 2 Downtown Evaluation Results

The Tier 2 Detailed Evaluation examined downtown HCT alternatives based on a comprehensive quantitative evaluation that focused on the following criteria:

- Traffic Issues
- Population and Employment Served
- Design and Constructability
- Costs
- Impacts to Designated Historic Resources
- Potential Property Impacts
- Available ROW
- Community Support

Ultimately, the alignment alternatives in the Downtown Section were narrowed to two north-south options (I-17 southbound frontage road and 19th Avenue) and three east-west options (Adams Street, Jefferson Street, and a couplet option using both Washington and Jefferson Streets). This section provides a summary of the comparison among the remaining alignment alternatives.



North-South Alternatives Comparison

The I-17 southbound frontage road alternative compared more favorably to the 19th Avenue alternative in terms of travel time, property acquisition requirements, environmental impacts, and necessary coordination with Arizona Department of Transportation (ADOT) and other stakeholders, notably BNSF Railway (BNSF), to connect to the east-west alignment alternative. Table 5 summarizes the results of the evaluation of the two remaining north-south Alternatives.

Table 5. I-17 Southbound Frontage Road/19th Avenue Comparison

Issue	I-17 Southbound Frontage Road	19 th Avenue
Capital Costs (in Year of Expenditure)	\$90 - \$95 Million	\$195 - \$210 Million
Designated Historical Properties Impacted	1	8
Railroad Interaction	Grade Separation	Grade Separation; Pedestrian Separation
Property Impacts (Estimated)	6	51
Travel Speeds	Better travel time due to being adjacent to the freeway and able to abide by higher posted speed limits.	Slower travel time resulting from vehicles operating within an elevated structure north of I-10 that turns to connect via a clover-leaf structure at-grade to 19 th Avenue via Grand Avenue. Additionally, trains would be subject to a lower posted speed limit along 19 th Avenue.
Economic Development Opportunity	Limited	Greater

Source: METRO 2012

Subsequent to the completion of the *I-17 and 19th Avenue – Final Definition of Alternatives Technical Evaluation*, METRO further evaluated the southbound frontage road option based on its relatively higher performance compared to the other connections. The Federal Highway Administration requested that METRO complete a report to document the change in access to the federal interstate highway system. This work included a comparison of traffic counts along the I-17 southbound frontage road, assessment of future impacts to nearby intersection LOS, potential operational conflicts caused by closing the roadway to vehicle traffic, and impacts to adjacent properties.

Initial findings of the report indicated existing and forecasted traffic counts along the section of the I-17 southbound frontage road were relatively low and the LOS at nearby intersections would be unaffected as a result of closing the I-17 southbound frontage road to vehicular traffic. METRO is considering the termination of the current access to the I-17 southbound frontage road from gated access points from the Beth El Greenwood and Memory Lawn cemeteries, located directly west of the section of the I-17 frontage road that would be used for the LRT guideway. METRO will continue working with representatives from the cemeteries to further explore potential property impacts.



East-West Alternatives Comparison

The downtown east-west alternative is identified as the Washington Street/Jefferson Street Couplet between Central Avenue and 8th Avenue and transitions to a two track alignment along Jefferson Street west of 8th Avenue. This alternative is considered as the favorable option for LRT for several reasons:

- The direct connection to the existing LRT system would result in fewer ROW impacts and would reduce travel time compared to options requiring out-of-direction travel.
- The wide ROWs on Washington and Jefferson Streets would result in fewer impacts to curbs, landscaping, and adjacent properties, compared to narrow ROWs associated with Monroe, Adams, and Jackson Streets.
- The Washington Street/Jefferson Street Couplet option serves several downtown Phoenix destinations and employment centers, including Phoenix City Hall, that were not served by the Jefferson Street (two-track) or Adams Street (via Jackson Street) options.
- Stakeholders, the local community, and decision makers view this option as the favorable alternative based on the direct connection to key activity centers and minimal impacts to adjacent properties compared to other alternatives.

4.3 SUMMARY OF ALTERNATIVES ALIGNMENT ANALYSIS

Table 6 provides a summary of the AA evaluation and screening results for individual alignments considered as HCT options within the Phoenix West study area as part of the Tier 2 and Final Definition of Alternatives Analysis. Alignments are described in terms of the arterial location and transit mode considered. Table 6 also lists where in the AA process alternative alignments were removed from, which corresponds with the alternatives progression flowchart shown in Figure 5.

Table 6. Summary of Tier 2 and Final Definition of Alternatives HCT Alignments Considered

Alignment Alternative	Mode	Rationale for Removal from Further Consideration
CONCEPTUAL TIER 2 SCREENING		
Mainline Section		
<i>Note: No Alternatives were screened for the Mainline Section in Tier 2 since the I-10 ROW recommended by METRO was approved for HCT by the MAG Regional Council</i>		
Downtown Section (East-West)		
I-10	BRT	<ul style="list-style-type: none"> • Would not provide a direct connection to the CP/EV Starter Line, which crosses above the I-10 freeway. • Would result in a low cost-effectiveness rating due to capital costs necessary to upgrade the Hance Park Transit Facility and modify the I-10 freeway lanes to accommodate freeway BRT service. • Costly challenges associated with Hance Park Transit Facility's suitability for HCT use.



Alignment Alternative	Mode	Rationale for Removal from Further Consideration
Madison Street	LRT/BRT	<ul style="list-style-type: none"> • Would not provide direct access to downtown Phoenix major employment and entertainment centers. • Would result in substantial impacts to property and travel lanes along Madison Street with LRT transit mode. • Future plans for modification along Madison Street, near the new County government complex, are not compatible with a HCT investment due to the ROW needed and the access to the future facility.
Jackson Street	LRT/BRT	<ul style="list-style-type: none"> • Would not provide direct access to downtown Phoenix major employment and entertainment centers. • Jackson Street is not a continuous street in the downtown/Capitol area due the presence of cemeteries located between 15th and 13th Avenues. • Would require substantial property impacts to preserve the existing travel lane configuration if LRT were implemented.
Downtown Section (North-South)		
17 th Avenue	LRT/BRT	<ul style="list-style-type: none"> • Narrow right-of-way would require substantial property acquisition to accommodate a transit guideway. • Vehicle travel along 17th Avenue north of Van Buren requires travel speeds lower than adjacent roadways due to heavy truck volume, narrow right-of-way, and proximity to an elementary school. • Capitol Elementary is located along 17th Avenue between Van Buren and Polk Streets, and transit traffic would bisect an important walk-to-school route. • Numerous properties along 17th Avenue south of Fillmore Street would be impacted that are part of the Oakland Historic District
DETAILED TIER 2 SCREENING		
Mainline Section		
<i>Note: No alternatives were screened for the Mainline Section in Tier 2 since the I-10 ROW recommended by METRO was approved for HCT by the MAG Regional Council</i>		
Downtown Section (East-West)		
Van Buren Street	LRT/BRT	<ul style="list-style-type: none"> • Would result in a greater number of traffic lane conflicts. • LRT would result in a higher number of property acquisitions due to narrow right-of-way. • LRT has the potential to impact individual historic properties and the Oakland and Woodland Historic Districts adjacent to Van Buren Street. • Compared to the other East-West alignment alternatives, Van Buren Street does not directly serve the State Capitol area.
Downtown Section (North-South)		
15 th Avenue (via Grand Avenue)	LRT/BRT	<ul style="list-style-type: none"> • Does not directly serve the State Capitol. • An LRT guideway would result in greater traffic issues and a higher number of utility conflicts. • LRT was not a favorable option with local stakeholders due to potential impacts along Grand Avenue to existing businesses.



Alignment Alternative	Mode	Rationale for Removal from Further Consideration
FINAL DEFINITION OF ALTERNATIVES		
Mainline Section		
<i>Note: During the Final Definition of Alternatives planning phase, METRO worked with the City of Phoenix, ADOT, and MAG to refine the Mainline Section alignment</i>		
Downtown Section (East-West)		
Adams Street	LRT	<ul style="list-style-type: none"> • Arizona Department of Administration has voiced concern about the use of the abandoned right-of-way between 17th Avenue and 15th Avenue along Adams Street as this space is currently used as public open space. • Vibration resulting from LRT could impact sensitive monitoring equipment in government buildings along Adams Street. • LRT would result in the removal of on-street parking along Adams Street. • Narrow right-of-way along Adams Street would adversely impact City Hall and Comerica Theater loading docks and Orpheum Lofts' on-street parking. • Would result in access impacts to parking garages at state buildings.
Downtown Section (North-South)		
19 th Avenue	LRT/BRT	<ul style="list-style-type: none"> • Maintaining existing traffic configuration along 19th Avenue would result in a higher number of property acquisitions compared to the I-17 alignment, including within the Oakland Historic District. • Representatives of the BNSF Railyard, which is located directly adjacent to 19th Avenue, have expressed concerns over safety of the proximity of an LRT guideway along 19th Avenue. • The grade-separation structure required from the I-10/I-17 interchange to 17th Avenue would result in a higher overall cost compared to the I-17 alternative. • The sharp turn required to transition from the I-10 freeway to 19th Avenue would result in a slower travel time to access downtown Phoenix compared to the I-17 alternative.

Source: METRO 2012

Ultimately, the recommended HCT investment in the Downtown Section for both the LRT Alternative includes the use of the I-17 southbound frontage road with a connection to Washington and Jefferson Streets as a couplet near 7th Avenue.

4.3.1 Alternatives Moving forward in the Process following Tier 2 and Final Definition of Alternatives Screening

Based on the analysis of alternatives performed during the Tier 2 and Final Definition of Alternatives screening process, the following alternatives were advanced:

Mainline:

- I-10 between I-17 and 83rd Avenue – moved forward because of the projected travel time savings; consistency with future plans; and overall cost savings due to the ROW preservation that has already occurred.

Downtown Section (East –West Alignment Alternatives):

- Jefferson Street 2-Track to Washington/Jefferson Street Couplet – moved forward based on stakeholder input and because wider ROW on these streets will allow for greater avoidance or mitigation of potential adverse impacts on traffic, parking, vibration, and ROW requirements on adjacent properties.

Downtown Section (North-South Alignment Alternatives):

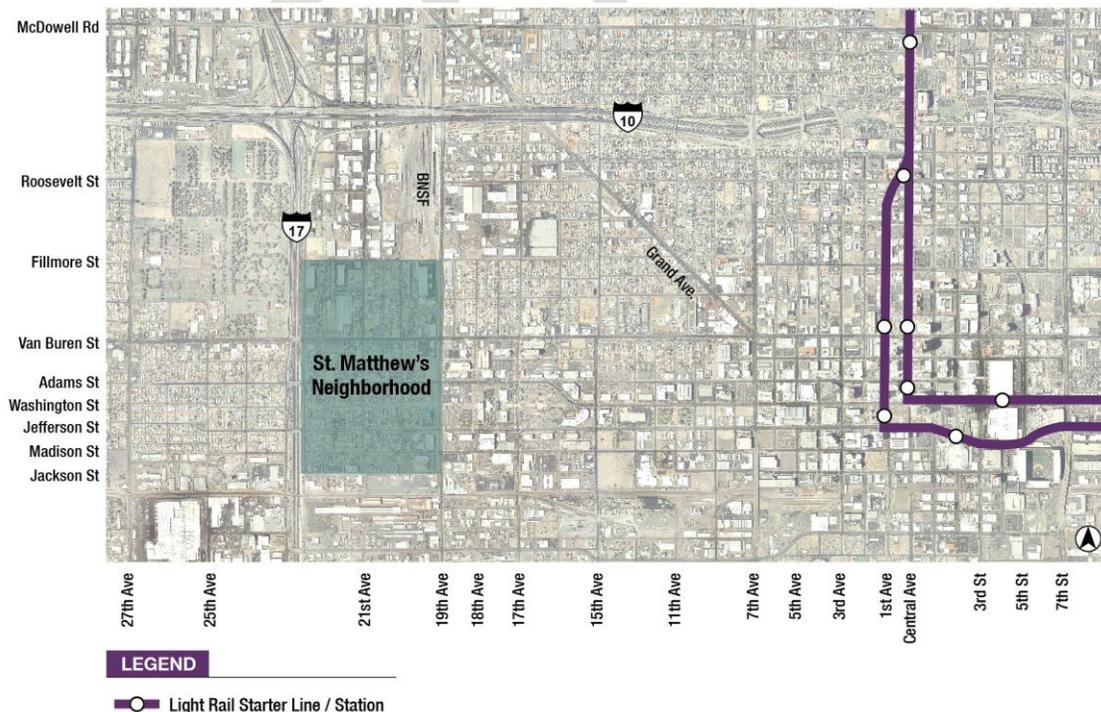
- I-17 – moved forward based on stakeholder input and this alignment provides fewer potential adverse impacts on adjacent properties and communities.

4.4 POST TIER-2 AND FINAL DEFINITION OF ALTERNATIVES ANALYSIS

4.4.1 Background

As discussed in previous sections of this report, METRO conducted a full evaluation of all of the project alternative alignments and documented Jefferson Street as the preferred alignment following the Tier 2 evaluation and subsequent Final Definition of Alternatives. The analysis was conducted based on several criteria documented in the study, but specifically focused on meeting the Purpose and Need for the project. One of the needs identified for the Phoenix West Extension was to serve the state employment hub and the state capitol located in downtown Phoenix. In order to complete a viable alignment that serves this area, a connection is necessary across the nearby St. Matthew’s neighborhood, shown in Figure 7.

Figure 7. St. Matthew’s Neighborhood Boundaries



Source: METRO 2012



4.4.2 Neighborhood Concern Regarding the Jefferson Street Alignment

Although a thorough evaluation was conducted with public input, crossing the St. Matthew's neighborhood presented continuing concerns from residents. The alignment of concern was specifically noted between 19th Avenue and I-17 along Jefferson Street, particularly the crossing of the BNSF railroad at 19th Avenue. Concerns raised by the community included impacts to their neighborhood character which they considered to be potentially historic; noise; vibration; and bifurcation of the neighborhood. Initially, the Phoenix City Council expressed concerns with neighborhood reaction to a potential Jefferson Street alignment, instructing staff at the May 3, 2011 City Council Policy meeting to perform additional neighborhood outreach and technical review of alignments for the State Capitol area, specifically between 19th Avenue to I-17 and from Van Buren to Jefferson Street.

The team worked closely with the neighborhood and met with as many homeowners as possible to discuss the alternatives. In addition, METRO worked with the St. Matthew's Community Action Group as well as a newly formed Light Rail Working Group. During these meetings, additional concern was raised regarding the Jefferson Street alternative and the proximity of the rail line to adjacent homes.

METRO undertook additional analysis of the potential connections from downtown to I-17 to try to locate any additional feasible alternatives that would still meet the purpose of and need for the project. This was done in conjunction with meetings with the stakeholders and public that occurred on an almost weekly basis. Over the course of 10 months, staff coordinated and/or participated in 25 community meetings involving over 300 residents.

In the initial Tier 1 analysis, the project team worked to minimize the need for purchase of additional ROW in order to maintain the viability of the project as a candidate for federal funds. Due to this criterion in the initial review of alternatives, the Van Buren Street alignment (originally between I-17 and the connection to the LRT on Central Avenue) was dismissed. The Tier 2 Evaluation conducted in 2009 concluded that Van Buren Street did not perform well due to its distance from employment destinations along Washington and Jefferson Streets, potential adverse traffic impacts, and relative inefficiency in connecting to existing LRT service.

The community's stated concerns included the close proximity between the light rail line and adjacent homes and the potential for bifurcation of the neighborhood both from the rail line and the grade-separated crossing over the BNSF railroad at 19th Avenue. In general, the community did support light rail and transit, but did not support a rail line, station, or railroad crossing along Jefferson Street west of 19th Avenue. Knowing that crossing St. Matthew's neighborhood in some location was a necessity for the project, the project team reconsidered all of the arterial streets in additional evaluation between 19th Avenue and I-17. As Van Buren Street was the most commercial of all of the east-west alignments and posed the least amount of potential residential impacts, the project team reviewed this alternative but added in a consideration to take ROW in approximately 1/2 mile span between the crossing of the BNSF railroad and I-17. The community also stated their preference for Van Buren Street due to its economic development potential as well as the potential for revitalization.



4.4.3 North-South Connections and State Concerns

The project team also considered several potential north-south options for reconnecting with Jefferson Street so that the project alignment could still meet the Purpose and Need for the project of serving the State Capitol and nearby employment centers. These north-south options included 15th, 17th, 18th, and 19th Avenues plus variations of each. Of these options, 18th Avenue was preferred due to lack of significant engineering constraints.

A key stakeholder in the study area is the State of Arizona which includes a variety of departments: Governor's Office, Department of Administration and Department of Public Safety. Like the neighborhoods regarding the Jefferson alignment, the State has concerns and considerations regarding a potential Van Buren/18th Avenue alignment. In essence, the State has identified that any light rail alignment near their facilities could be subject to closures during protest or other public activities held at the State Capitol. Other issues include having a light rail system in close proximity to the Executive Tower along with access to the secure garage under the Executive Tower.

4.4.4 Preferred Alignment

Based on continuing coordination with stakeholders, an LPA for the Phoenix West corridor was refined. The recommended alignment would extend west along Washington and Jefferson Streets, and converge to one guideway along Jefferson Street at approximately 8th Avenue, continuing through the State Capitol area to 18th Avenue where it would turn north to Van Buren Street. The guideway would run along Van Buren Street and transition to the I-17 corridor where it would parallel I-17 using the southbound frontage road north to I-10. West of I-17, the LRT guideway would utilize a 50-foot freeway median, originally preserved for high-capacity transit along I-10, to approximately 47th Avenue. From this point, the guideway would transition to the north of I-10 and travel parallel to an open-drainage channel along an unimproved access road. The extension would follow this alignment until connecting to the 79th Avenue Park-and-Ride. In addition, a turnaround at 5th Street between Washington and Jefferson is recommended for operational flexibility.

This recommendation is a preliminary alignment option. METRO staff will continue to analyze and refine the 18th Avenue alignment with a clear understanding of issues involving the proximity to the State Capitol. If during the environmental phase of the project, METRO and the City of Phoenix are unable to mitigate the State's issues as they relate to the alignment, the project team will address other feasible alignments in this vicinity.



5.0 RECOMMENDED ALTERNATIVE

5.1 ALTERNATIVE DEFINITION

This section outlines the transit mode and physical location of the LPA within the Phoenix West study area, the operational characteristics of the LPA, and the policies referenced throughout the Phoenix West AA supporting the selection of the recommended LPA.

5.1.1 *Transit Mode*

Based on the results of the AA study process, METRO recommends that LRT technology is selected for the Phoenix West corridor. It was concluded that LRT would best meet the purpose and need for the project by meeting the travel demands of more riders. In addition, the LRT fixed guideway investment has the potential to promote economic development opportunities in coordination with transit-supportive City of Phoenix policies and investments. LRT presents a favorable option over the BRT option based on the comparison of transit modes listed in Table 1 under the Summary (Section 1.0) of this document.

5.1.2 *Physical Location*

As described in Section 2.0, for planning purposes the Phoenix West study area was divided into two distinct areas for evaluation: the Mainline and Downtown Sections. Each is described separately below. The physical location of the guideway described below is based on preliminary conceptual design as presented in Appendix A; the specific track location is subject to modification within the recommended alignment during the NEPA or Preliminary Engineering phases.

Downtown Section

The LPA would operate approximately 3 miles in the Downtown Section of the Phoenix West study area. The recommended alignment would connect with the existing LRT system at 1st Avenue at both Jefferson and Washington Streets, and operate as a single-track along Washington Street (westbound) and Jefferson Street (eastbound) for approximately 0.5 mile to 7th Avenue. In addition, a turnaround at 5th Street between Washington and Jefferson is recommended for operational flexibility. Just west of 8th Avenue, the westbound LRT trackway would divert southwest across a vacant parcel owned by the City of Phoenix and continue to operate westbound along Jefferson Street. This would effectively create a double-track, two-way operation in a single guideway for the remainder of the Phoenix West Extension. The guideway would be exclusively reserved for light rail vehicles, physically separated from automobile traffic through use of a barrier such as a trackway curb. Preliminary design efforts concluded that modification of Jefferson Street, currently a four-lane one-way arterial road for eastbound traffic, to accommodate the LRT guideway could result in the preservation of two lanes for general traffic with a frontage road for local access.

At approximately 18th Avenue, the LRT alignment would turn north to Van Buren Street, and west along the south side of Van Buren where new ROW would be acquired to I-17. One of the major issues the LRT guideway would face in this area is crossing the BNSF railroad tracks along 19th Avenue. BNSF operates freight along a railroad track that parallels 19th Avenue on the west side of the road. A grade separation structure would be required to cross the tracks at 19th Avenue. METRO is evaluating whether an overpass or underpass would be constructed to



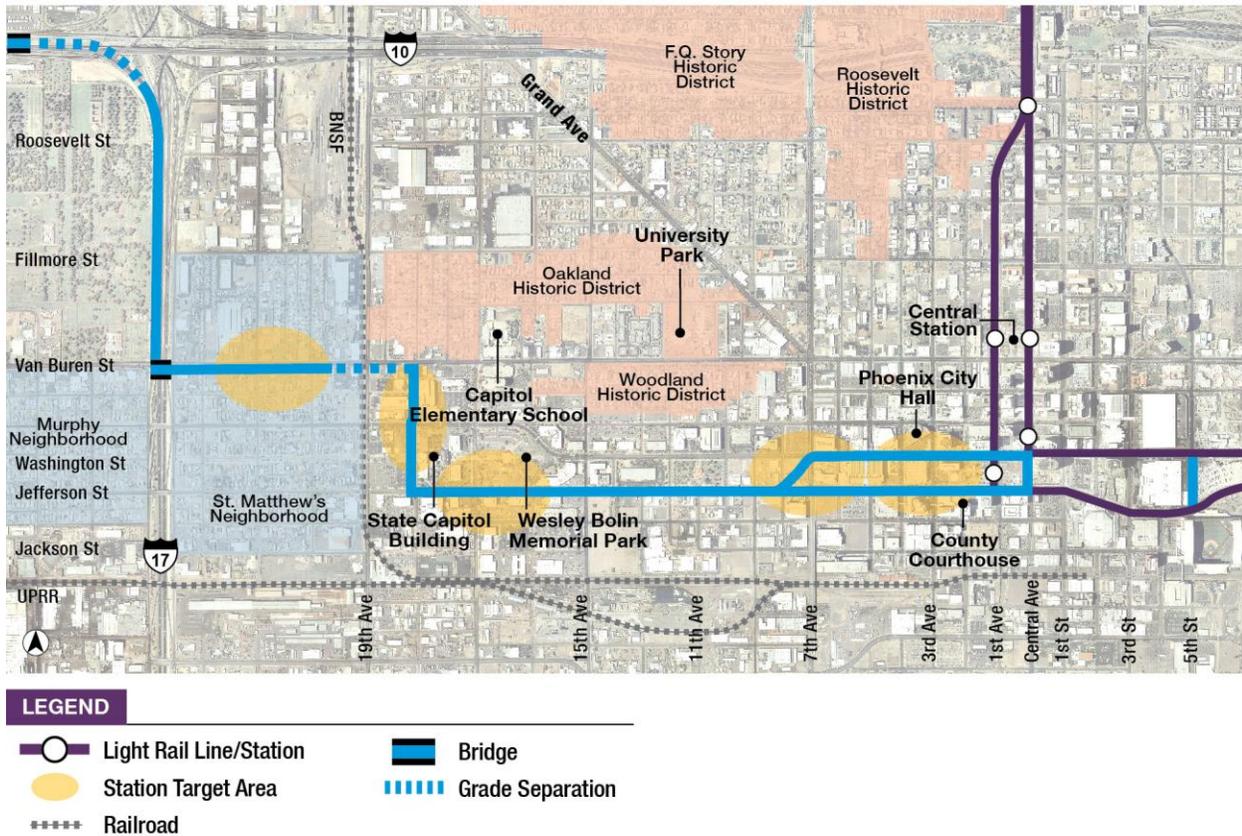
accommodate the railroad crossing. Issues associated with construction of an overpass at this location include the visual intrusion a structure of this magnitude would have on the surrounding neighborhood. Additionally, construction of an underpass would encounter constraints due to utility, drainage, and stormwater considerations.

As the LRT alignment heads west of downtown Phoenix, the two-way LRT guideway would cross over I-17 along the south side of Van Buren Street by either using the existing arterial bridge crossing or constructing a new freeway overpass structure to accommodate the guideway. METRO is coordinating with ADOT regarding the appropriate design. After the LRT guideway crosses the freeway, it would continue north along the I-17 southbound frontage road before operating within the I-10 ROW.

The I-17 southbound frontage road, which currently accommodates southbound automobile traffic, would be modified to accommodate the LRT guideway. The I-17 southbound frontage road would be converted to a transit-only ROW between the access point at McDowell Road and Van Buren Street. This option has support from ADOT, MAG, and Federal Highway Administration staff. North of Van Buren Street, the frontage road would be converted to an exclusive LRT guideway, removing all other traffic from this section of road.

METRO has identified preliminary station areas within the Downtown Section based on their proximity to downtown activity centers and residential neighborhoods, as shown in Figure 8. Generally, station target areas are identified to serve the State Capitol, city and county government buildings, high-rise employment buildings, and entertainment venues. METRO will continue planning and stakeholder coordination efforts to select specific station sites throughout the NEPA phase of the Phoenix West Extension Study.

Figure 8. Downtown LRT LPA Recommendation



04-24-12

Source: METRO 2012

Mainline Section

From the Phoenix West Downtown Section, the Mainline Section guideway would connect directly from the I-17 southbound frontage road to the I-10 median via a direct access ramp constructed west of the I-17/I-10 confluence, commonly known as the “Stack Interchange.” Between I-17 and 83rd Avenue, the 50-foot freeway median is currently vacant, preserved for HCT when the I-10 freeway was originally designed and constructed. The recommended LPA guideway would operate within the freeway median for approximately 3 miles before transitioning near 47th Avenue via grade separation over the westbound freeway traffic lanes to the north side of I-10, as shown in Figure 9. METRO is working with ADOT, the City of Phoenix, and other stakeholders to identify the specific location of the north side transition within the freeway.

The guideway would be placed on the south side of a drainage channel that parallels I-10 to the north, within the ADOT freeway ROW. From approximately 47th Avenue, the LRT guideway would parallel the drainage channel to connect with the 79th Avenue Park-and-Ride. Preliminary analysis shows that the access road on the south side of the drainage channel could accommodate the light rail guideway.



Along the Phoenix West Mainline Section, the LPA would require crossing of several arterials along the north side of the freeway. METRO is working with ADOT, the City of Phoenix, and other stakeholders to identify appropriate crossing mechanisms including elevated trackway crossings and at-grade crossings.

Figure 9. Proposed Median to North Side Transition along I-10



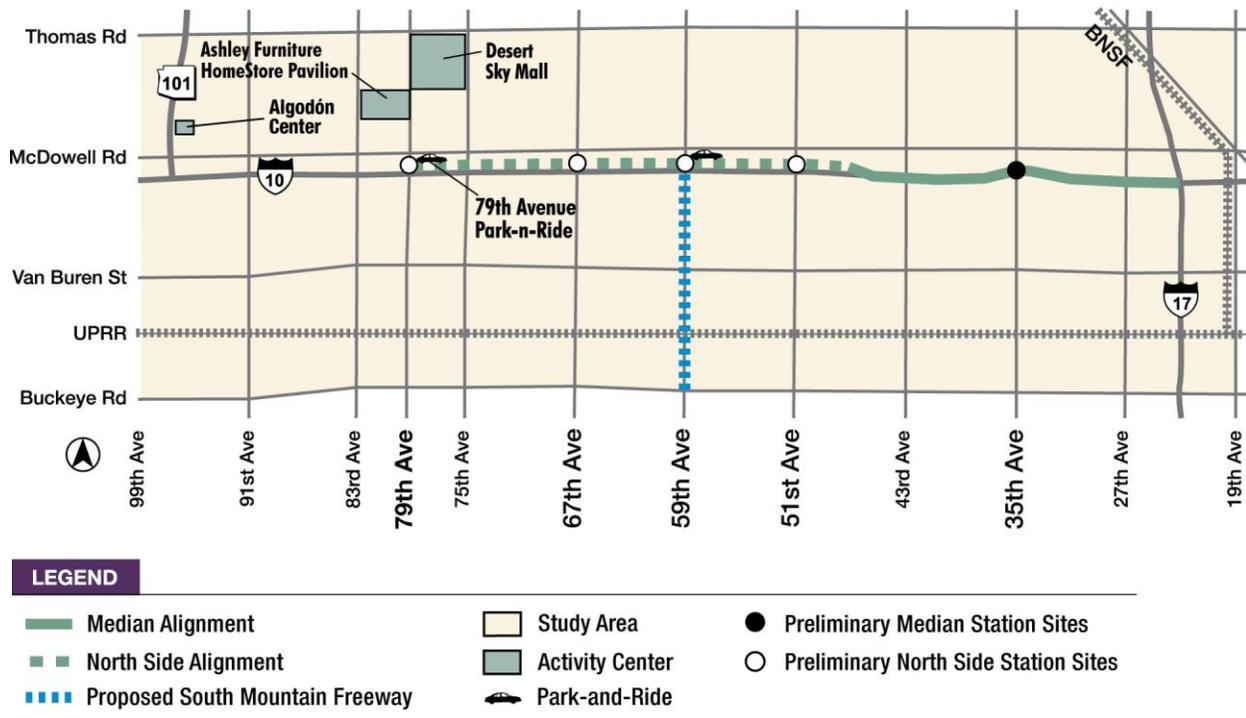
Source: METRO 2012

METRO has worked with local stakeholders in an effort to identify preliminary station sites along the Mainline Section, shown in Figure 10. The number of stations along the Mainline Section, in addition to the general location, present favorable ridership numbers based on travel forecasting results. These station sites are located where arterials intersect with I-10, and local bus routes currently operate along these streets.

The only freeway median station would be located at 35th Avenue, with the remaining new stations at 51st, 59th, and 67th Avenues located directly north of the I-10 westbound freeway lanes. A new park-and-ride facility is proposed at 59th Avenue to enhance the numbers of potential HCT passengers from the South Mountain Freeway connection. METRO also recommends increasing the capacity of the existing park-and-ride at 79th Avenue to support future transit use within the Phoenix West Extension study area. The route is planned to be designed with the potential to extend either west and/or northwest from 79th Avenue.



Figure 10. Proposed Median to North Side Transition along I-10



Source: METRO 2012

5.1.3 Operational Characteristics

Light rail service within the Phoenix West corridor would operate daily service consistent with the METRO system in place in the year 2023. It is also assumed that METRO vehicles would resume the original operating frequency of 10-minute service upon inception of the Phoenix West Extension. Currently, METRO is considering interlining the Phoenix West Extension with existing LRT service on Central/1st Avenue in downtown Phoenix. This system connection would result in light rail vehicles offering 5-minute service along Central and 1st Avenues, improving transit service in the central Phoenix core.

The recommended LRT alignment is intended to support and enhance systemwide ridership through connections to existing and planned bus routes. Additionally, METRO recommends implementation of several new local bus circulators and feeder routes to enhance and support transit connections in the West Valley to the Phoenix West Extension. Table 7 lists the new bus service enhancements proposed to support the Phoenix West Extension. METRO would work with regional agencies to facilitate additional transit service to improve ridership in the West Valley. More analysis will be needed at the local and regional level to determine the most appropriate bus routing. This effort will be on-going until LRT is implemented in this corridor.



It is assumed that current express bus service would be modified so that a number of West Valley routes terminate at the 79th Avenue Park-and-Ride. Table 7 summarizes the operational characteristics of the Phoenix West LRT system and modifications to express and local bus service. Figure 11 shows the bus routes and potential station locations that are recommended to serve the Phoenix West study area in conjunction with the LPA.

Table 7. LPA Proposed LRT and Bus Headways, Opening Year

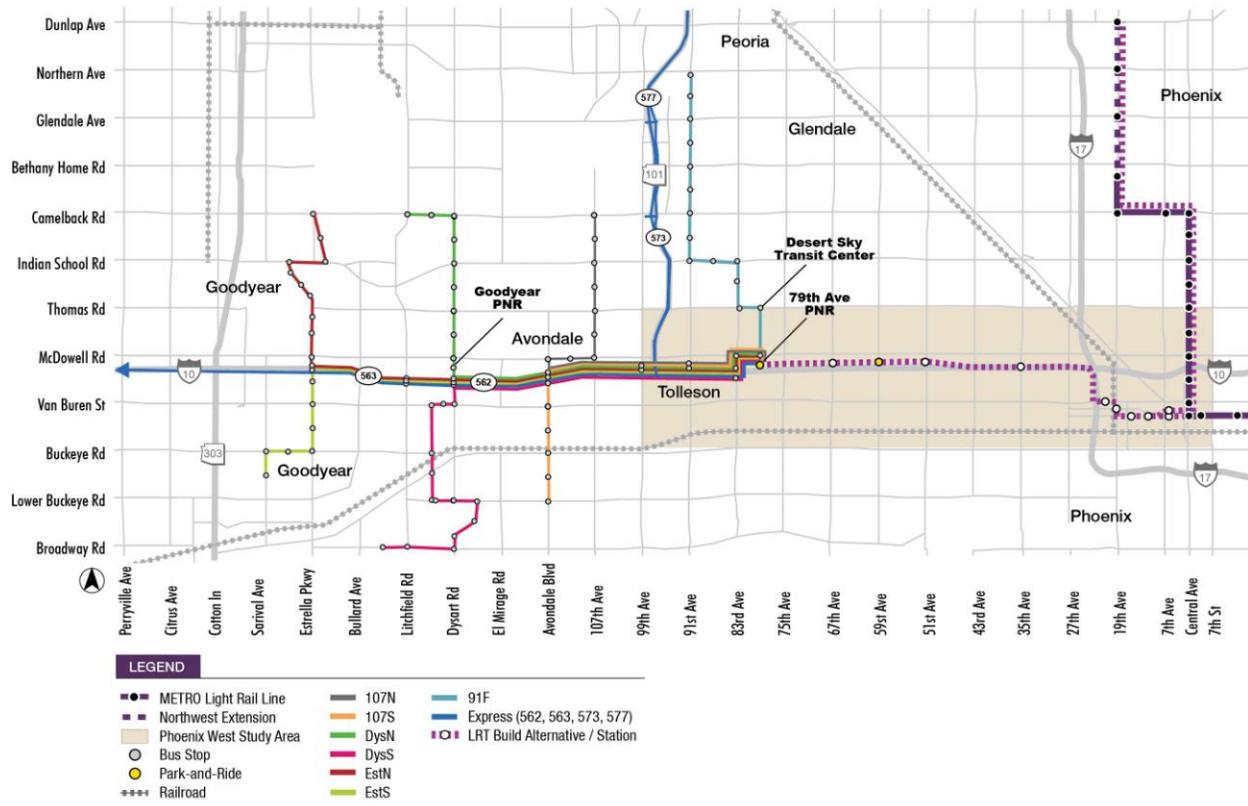
Route No.	Description	Headways (minutes)	
		Peak	Off-peak
Light Rail			
-	CP/EV Starter Line	10	10
NEW	New 79 th Avenue Park-and-Ride to State Capitol to Downtown Phoenix north to 19 th Avenue and Dunlap Avenue	10	10
Express Bus			
460	Removed I-10 West RAPID	N/A	N/A
563	Buckeye Express	30	N/A
562	Goodyear/Downtown Express	30	N/A
573	Arrowhead-Downtown Phoenix	30	N/A
577	Peoria Express	30	N/A
579	Removed Loop 303 Express	N/A	N/A
Local Bus/Supergrid			
1	Washington Street	30	30
3	Van Buren Street	15	30
8	7 th Avenue	30	30
10	Roosevelt Street	30	30
13	Buckeye Road	30	30
15	15 th Avenue	30	30
17	McDowell/McKellips Road	15	30
19	19 th Avenue	30	30
27	27 th Avenue	30	30
29	Thomas Road	20	30
35	35 th Avenue	20	30
43	43 rd Avenue	30	30
51	51 st Avenue	35	35
59	59 th Avenue	30	30
67	67 th Avenue	30	30
685	Gila Bend Connector	180	180
Circulators			
DASH-G	DASH – Government Loop	12	12
MARY	Maryvale Circulator	30	30
Feeder Bus Service (Suggested)*			
91	New Service	15	30
107N	New Service	15	30
107S	New Service	15	30
DysN	New Service	15	30
DysS	New Service	15	30
EstN	New Service	15	30
EstS	New Service	15	30

Source: METRO 2012

* *Bold text indicates proposed new bus service for the Phoenix West Extension not currently identified in MAG's Regional Transportation Plan*



Figure 11. Phoenix West LPA and Bus Routes



Source: METRO 2012

5.1.4 Travel Forecasting Estimates

Daily boardings for the LPA are estimated to be 18,900 by 2031 for the project segment extending from 79th Avenue to downtown Phoenix. For travel forecasting purposes, the LPA was interlined with existing LRT service on Central Avenue to travel north along Central Avenue to 19th Avenue and Dunlap Road. The daily boardings estimate for the entire interlined alternative is 39,900. This ridership forecast assumes a bus feeder and circulator system is developed to provide access to travel markets in the West Valley and south of the I-10 corridor as discussed in Section 5.1.3. The feeders coming to and from the West Valley provide access to expanding population and employment centers. Table 8 illustrates forecasted boardings on the recommended LRT alternative.

Table 8. Daily Boarding Estimates for the Recommended LRT Alternative

Daily Boardings Estimate	Phoenix West LRT (2031) (79 th Ave to Downtown Phoenix) 9.85 Track Miles	Phoenix West LRT (2031) (79 th Ave to 19 th Ave/Dunlap) 19.55 Track Miles
Average Daily Boardings	18,900	39,900
Boardings Per Mile	1,918	2,040

Source: METRO 2010



5.1.5 Fiscal Impact of the Locally Preferred Alternative

The draft 2012 Transit Life Cycle Report identifies a capital budget for the Phoenix West project of \$1,101 million, in year of expenditure (YOE) dollars. The capital cost estimate for the Phoenix West project is estimated to be between \$1,224 million and \$1,248 million in YOE dollars. The range of capital cost estimates is a result of uncertainty in project elements such as stations, grade separations, placement of underground utilities, etc. A standard cost category workbook, corresponding to the average of this cost estimate range, is included as Appendix B. METRO will refine the cost estimates during the environmental documentation and project development phases of the study to narrow the estimated cost range. As shown in Table 9, funding is programmed through a combination of federal funding through the FTA Section 5309 New Starts program and CMAQ, with a local match to be provided through the regional Public Transportation Funds and the City of Phoenix. Depending on the availability of federal funding, a phased implementation of the project may also be considered.

Table 9. Capital Funding Sources for the Phoenix West Extension LRT Project (YOE\$ millions)

Funding Source	Amount (YOE \$ million)
Public Transportation Fund	\$183.6 – \$194.5
T-2000 (City of Phoenix)	\$220.3 – \$233.4
Congestion Mitigation Air Quality (CMAQ)	\$208.1
FTA Section 5309 New Starts	\$612.0
Total	\$1,224-\$1,248

Source: METRO 2012

The cost estimate in Table 9 includes 55 conventional buses and 27 light rail vehicles. The additional fleet of 55 buses is included in the capital costs towards additional feeder connections to the light rail end-of-line station. The capital costs assume Phoenix West light rail interlining with the existing 20-mile system and therefore require 27 additional light rail vehicles. The capital costs also include spare parts for all of the buses and light rail vehicles.

The operating costs cover the same service as the capital costs which includes bus feeder connections to the light rail end-of-line station and interlining with the existing 20-mile system. The annual opening year operating costs, in 2023 dollars, are:

79th Avenue to Downtown Phoenix – \$17.0 Million

79th Avenue to 19th Avenue/Dunlap – \$29.3 Million

Opening year operating costs are estimated at \$24,891,555 annually provided in 2023 dollars. These expenses will be paid through fare box revenue and City of Phoenix funds and assumes extension of the City of Phoenix Transit 2000 tax.

5.1.6 Consistency with Policies Related to the Phoenix West Extension

At the onset of the Phoenix West AA Study, METRO identified certain physical, operational, and policy level criteria as guiding principles for development of alternatives. The LPA presented in this document is consistent with those objectives as presented in Table 10.



Table 10. Policy Objectives for the Recommended Alternative

	Objectives
Physical Location	<ul style="list-style-type: none"> • Where feasible, the HCT alternative would utilize existing ROW to minimize property impacts. • Along the I-10 ROW within the Mainline Section, stations are to be spaced no closer than 1 mile apart in an effort to provide an efficient level of service and reduce delay time. • In the Downtown Section, it is assumed that the proposed HCT investment along the Phoenix West Extension would connect to the existing LRT service in Downtown Phoenix, generally between I-10 and Buckeye Road, based on the existing and planned LRT/HCT corridors identified in the Public Transit chapter of the <i>MAG RTP 2010 Update</i>.
Operational Characteristics	<ul style="list-style-type: none"> • 10 minute all day headways are assumed for the HCT alternative in an effort to provide high levels of service. • For the LPA, it was assumed that introduced local/ circulator bus routes would connect to an LRT system and express bus routes would be truncated at the 79th Avenue Park-and-Ride to connect with the LRT system. • The LPA should interline with existing LRT service to reduce the transfer connection time with the Phoenix West Extension.
Supporting Policies	<ul style="list-style-type: none"> • All alternatives identified assume implementation of the most cost-effective feeder bus service. • Where feasible, the proposed alternatives should not duplicate existing HCT service.

Source: METRO 2012

5.2 PUBLIC PROCESS

METRO prepared a Public Involvement Plan for the study. The overall goal was to inform the residents, stakeholder interest groups, and involved agencies about the Phoenix West Extension Study and to present the alternatives and issues for public and agency review. During the course of the study, the public involvement team conducted 12 public meetings with more than 300 people attending; over 70 presentations to advisory committees, neighborhood associations and civic organizations; and continuous updates via website, e-mails, newsletters and fact sheets. Additional public meetings were conducted in the St. Matthew's neighborhood from July 2011 to May 2012. Throughout the planning process, METRO also convened two Community Working Groups to meet regularly and provide input on the alternatives development and screening.

Through the public outreach program, general themes have emerged through feedback from the community, as follows:

- Provide enhanced mobility options connecting to the regional transit system, accommodating the current and future travel demand that exists within the study area;
- Connect residents and employment to the destination points within their community and to other regional centers;
- Promote integration of fixed guideway and land use planning to support sustainability and livable community initiatives as well as economic development;



- Pay close attention to the fabric of the neighborhood, including potential or existing historic properties/neighborhood elements;
- Conduct detailed analysis of the BNSF overpass/underpass area and work very closely with the surrounding community to make decisions regarding that element of the project; and
- Approach and communicate about the project from a holistic perspective; that is, consider all related opportunities of implementing this light rail transit system that may be desired by the community, e.g., landscaping, economic development, and street improvements.

Several community organizations, businesses, and residents have supported the Phoenix West AA study recommendations. In response to specific issues with the alignment between 18th Avenue and I-17, METRO canvassed all homes along Jefferson Street, where the initial project alignment was proposed and then met with both the St. Matthew's Community Action Group and St. Matthew's Light Rail Working Group on a monthly basis to discuss the project process. As a result of this process and other public and stakeholder input, the alignment of the LPA was moved to Van Buren Street. Additional outreach was conducted to all properties along Van Buren that could be impacted by the proposed alignment.

To date, the project has received 57 comments in support of the extension including letters of support from the following community organizations:

- St. Matthew's Church
- Downtown Phoenix Partnership
- Phoenix Community Alliance
- Greater Phoenix Chamber of Commerce Board
- Greater Phoenix Chamber of Commerce Transportation Committee
- Greater Phoenix Chamber of Commerce Economic Development Committee
- Friends of Transit
- Phoenix Union High School District
- Carl Hayden High School
- Phoenix Elementary School District
- Isaac Middle School

The study recommendations have also received official approval from local and regional governing bodies, including:

- City of Phoenix Citizen Transit Commission
- Central City Village Planning Committee
- Maryvale Village Planning Committee
- Estrella Village Planning Committee
- City of Phoenix Planning Commission
- City of Phoenix Transportation and Infrastructure Subcommittee
- City of Phoenix Council



METRO plans to present the study recommendations to the following governing bodies in 2012.

- MAG Transit Committee
- MAG Transportation Review Committee
- MAG Management Committee
- MAG Transportation Policy Committee
- MAG Regional Council

5.3 RATIONALE FOR RECOMMENDED ALTERNATIVE

Table 11 summarizes the rationale for selecting LRT as the recommended alternative for the Phoenix West Extension.

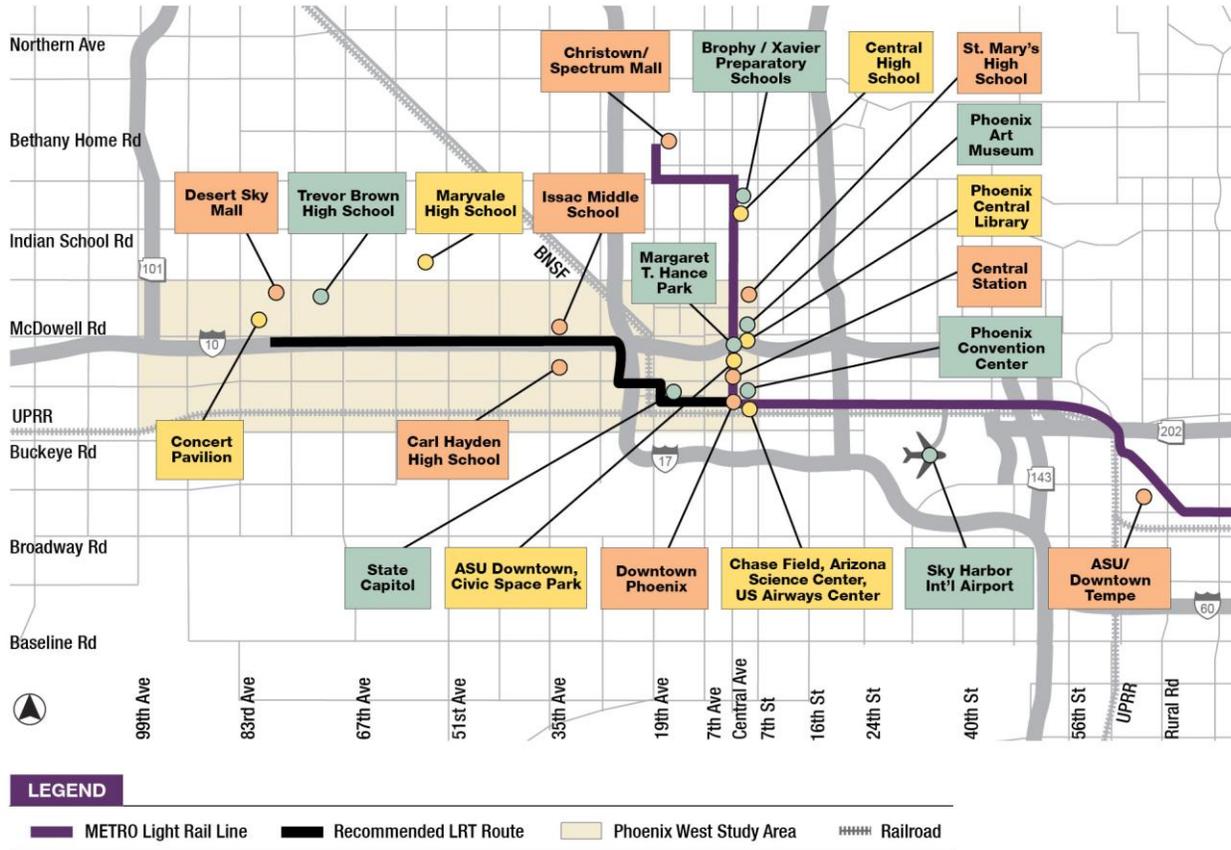
Table 11. Benefits Associated with the Recommended LPA

	Benefits
Transportation Benefits	<ul style="list-style-type: none"> • Offers a more reliable travel time than automobiles, which are subject to delays as a result of rush hour traffic congestion and accidents. • Provides West Valley residents with improved access to the entire transit network. • Results in overall travel time savings for travelers in this part of the region. • Provides an additional travel option, giving commuters a choice between their automobiles and transit. • Offers an additional travel option for special events. • This project is the only major east/west transit project planned that would improve travel conditions in the West Valley along the I-10 corridor.
Community and Economic Development Benefits	<ul style="list-style-type: none"> • Generates economic development interest in the central Phoenix core. • Provides opportunities for community enhancement and Transit Oriented Development at light rail stations adjacent to I-10, within the St. Matthew's Neighborhood and near 7th Avenue. • Promotes a renewed sense of place affiliated with the State Capitol Mall through implementation of a regional transit connection.
Social Benefits	<ul style="list-style-type: none"> • Provides an additional and improved transit option for residents who depend on public transportation. • Provides a reliable transportation option for households with one or no automobiles. • Provides a regional transit connection to major designations as shown in Figure 12.
Light Rail System Benefits	<ul style="list-style-type: none"> • Paves the way for possible future extensions to serve more West Valley cities. • Connects the West Valley to the East Valley and all points along the existing light rail line.

Source: METRO 2012



Figure 12. Activity Centers Accessible by the Phoenix West LPA



Source: METRO 2012

5.4 CORRIDOR ADVANCED TRANSIT OPPORTUNITIES PROGRAM

5.4.1 Purpose

The CATO Program consists of a set of near term improvements and investments to improve existing mobility, enhance transit service and to lay the groundwork for future HCT service within the Phoenix West study area. During the development of the LPA, transit improvements were identified that could be implemented now to benefit the current bus service along the alignment. These projects would also be utilized for the service that light rail would ultimately provide; serving to provide both near-term and future access and service improvements for a relatively modest cost. These enhancements are not part of the LPA but rather are intended to be included in the regional plan such that future funding opportunities may be pursued.

These improvements could potentially be eligible for near-term federal funding opportunities. The CATO Program is intended to capitalize on opportunities within the study area at strategic locations. The objectives of the CATO Program include:

- ROW Coordination and Preservation
- Improved Mobility



- Investment for the Future
- Multi-modal Coordination
- Enhanced Connectivity to the State Capitol

Right-of-Way Coordination and Preservation

ADOT has plans for projects within the Phoenix West study area, including improvements to I-10 and I-17, and development of the South Mountain Freeway (Loop 202). These projects may require land acquisition to create the needed ROW for the projects and could present opportunities for efficiencies with the Phoenix West Extension. One of the objectives of the CATO Program for Phoenix West is to coordinate with ADOT and the Federal Highway Administration to find opportunities to identify land or ROW that would be beneficial to the Phoenix West project during the development of these ADOT projects. This ROW would likely be associated with future HCT station locations.

Improved Mobility

Congestion on the freeway results in longer travel times for transit patrons. An objective of the CATO Program is to improve mobility within the corridor. Currently the express/RAPID buses utilize HOV lanes during peak travel periods to make trips to the State Capitol and downtown Phoenix. Improving bus access to and from the HOV lanes will improve transit service by reducing travel times as well as reduce the impact on freeway traffic flows by eliminating merging/crossing movements by buses to entering and exiting the freeway.

Investment for the Future

Another objective of the CATO Program is to make investments that will support the implementation of HCT in the future. These investments are intended to improve transit ridership through system improvements and improved access. Expanding the 79th Avenue park and ride and developing a new facility at 59th Avenue are elements of the CATO Program. The intent is to take advantage of potential ROW opportunities to minimize costs. Prioritizing these projects would also help to build transit ridership and gain familiarity with I-10 as a major transit corridor. The proposed 59th Avenue station would also provide a benefit to populations within the study area by improving access to transit.

Once HCT is built there will be established ridership patterns, and a set of transit riders in place to take advantage of HCT. These early investments will be developed so that they can be easily transitioned and used by different technologies and support transit-oriented development policies set forth in City of Phoenix adopted plans.

Multi-modal Coordination

The coordination between highways and transit is a key objective of the CATO Program. The intent is to help position the region for future funding opportunities within the study area for all users. As ADOT continues to invest in improvements to I-10, I-17, and Loop 202 this program provides a strategic guideline for coordinated transit investments.

Enhanced Connectivity to the State Capital Complex

Another key objective of this program is to provide a faster connection to the State Capitol complex by using an exclusive ramp from I-10 to I-17 as well as an associated transit-only bus



lane along the southbound frontage road. The State Capitol complex is an important employment destination as well as the center of government for the State of Arizona.

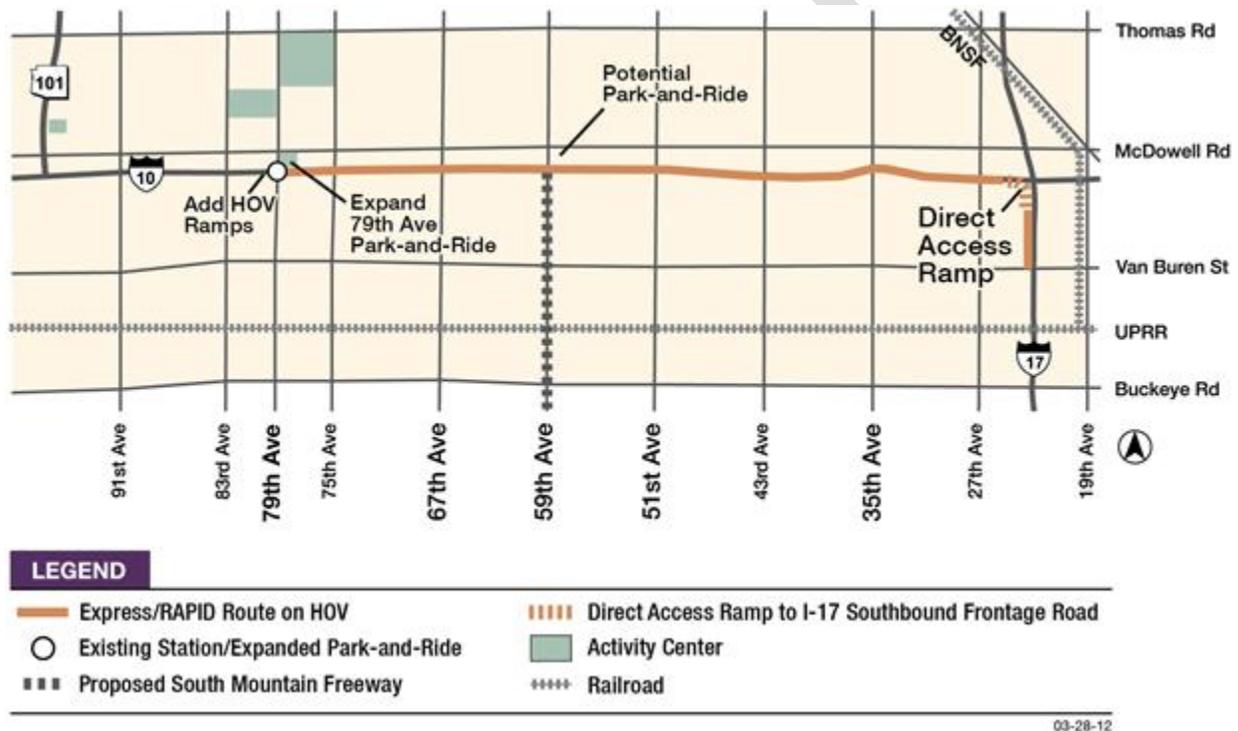
5.4.2 CATO Program Elements

The CATO Program consists of a set of proposed projects to achieve the objectives mentioned in Section 5.4.1 and include:

- Construction of direct access ramps from I-10 to I-17
- Expanding the 79th Avenue Park and Ride
- Identifying and developing a new park and ride station at 59th Avenue
- Construction of direct connection I-10 HOV ramps on the west side of 79th Avenue and north of I-10

Figure 13 shows the location of these proposed projects in relation to the overall study area.

Figure 13: Overview Map of the Corridor Advanced Transit Opportunities



Source: METRO 2012

5.5 OUTSTANDING ISSUES

Although METRO has recommended a transit technology and alignment for the LPA as described in this document, several issues will continue to be evaluated with input from local stakeholders, agency officials, and decision-makers during the NEPA process. These issues include:



Mainline Section

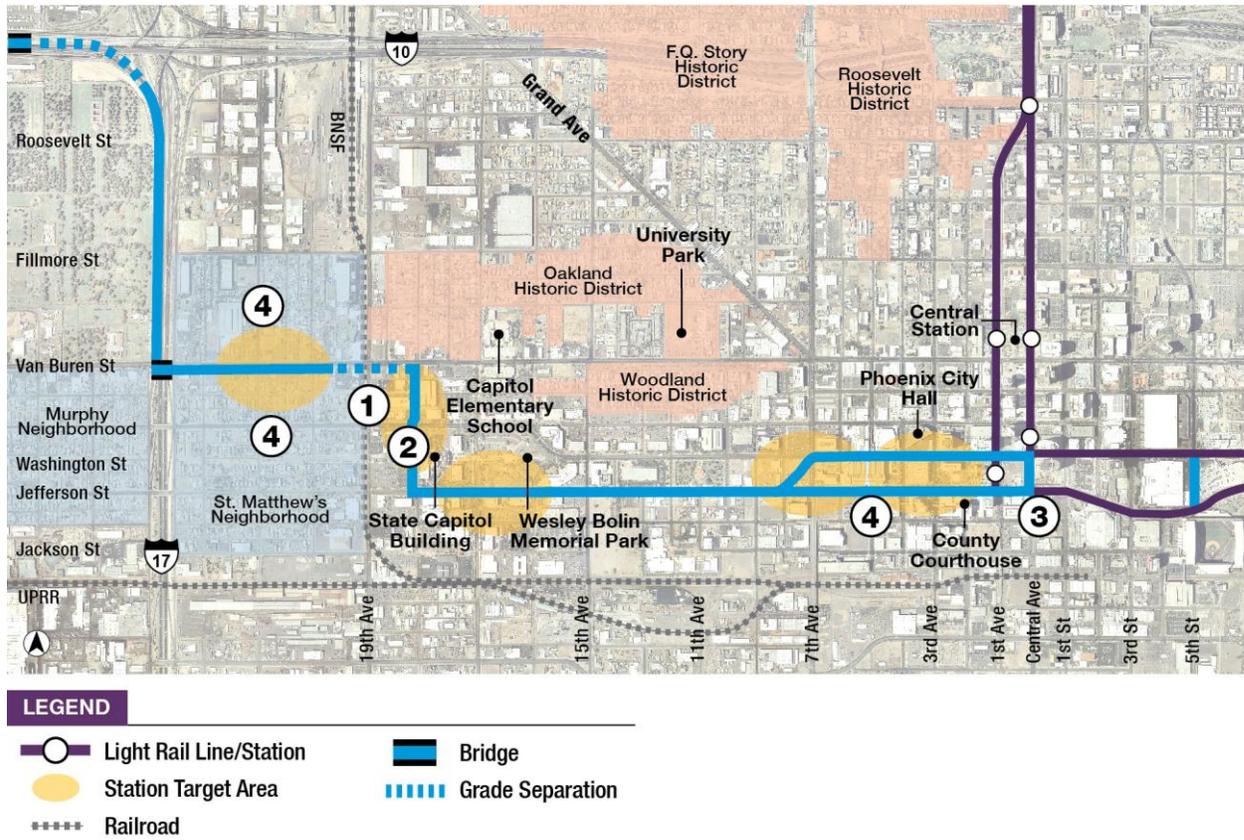
- Determine specific location between 43rd and 51st Avenues where LRT guideway would transition from the I-10 freeway median to the north side of the freeway, parallel to the drainage channel. A traffic study was completed to determine an appropriate approach to meeting grade separation requirements to accommodate the physical transition of the guideway.
- Further analysis of the need for grade separation at interchanges along I-10.
- Select station locations and designs that would maximize ridership potential.
- Evaluate the capacity and potential future expansion of the 79th Avenue Park-and-Ride to meet future transit demands.
- Allow for future extensions into the West Valley.

Downtown Section

The following issues listed numerically correspond to the labels shown in Figure 14.

- (1) METRO will evaluate the grade separation required at 19th Avenue for the LRT crossing of the BNSF railroad in greater detail. This area is one of the most significant design challenges along the alignment.
- (2) Consider security concerns expressed by the State regarding the 18th Avenue alignment and determine potential mitigation measures or alternate connections between Jefferson and Van Buren Streets.
- (3) Determine how the Phoenix West Extension should connect to existing LRT service in downtown Phoenix.
- (4) Determine appropriate station locations and designs, with special attention to the sensitive residential environment of the St. Matthew's Neighborhood.

Figure 14. Areas for Further Study Following LPA Adoption



05-11-12

Source: METRO 2012

5.6 SUMMARY OF PHOENIX WEST EXTENSION STUDY RECOMMENDATIONS

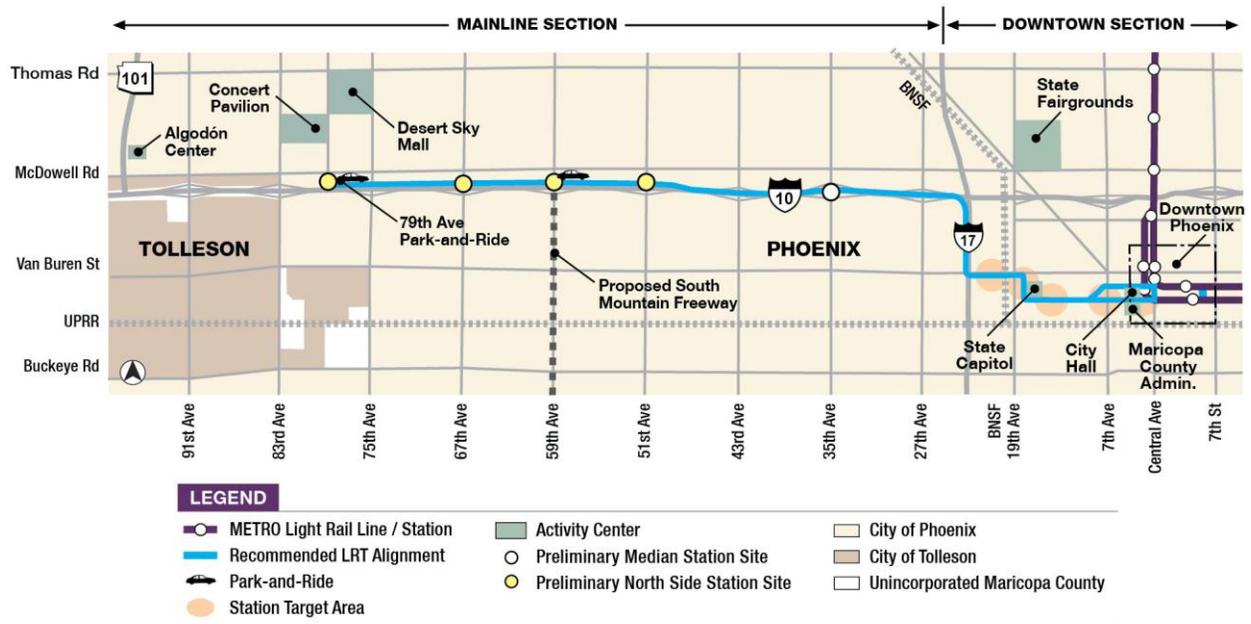
This section summarizes the preliminary METRO recommendations from the Phoenix West Extension AA Study.

1. A Locally Preferred Alternative (LPA) for the Phoenix West project (Figure 15), including a light rail alignment along I-10 from 79th Avenue to I-17; southbound along I-17 southbound frontage road; east along Van Buren Street to 18th Avenue; southbound along 18th Avenue to Jefferson Street and then east to downtown Phoenix along Jefferson Street.
2. Inclusion of the CATO Program that consists of near term improvements and investments to improve existing mobility, enhance transit service and lay the groundwork for future HCT service within the study area. The set of proposed projects, shown in Figure 13, include:
 - a. Construction of a direct HCT access ramp from I-10 to I-17
 - b. Expansion of the 79th Avenue Park-and-Ride
 - c. Identification and development of new park and ride stations



- d. Construction of direct connection I-10 HOV ramps on the west side of 79th Avenue
- 3. Future consideration for increased transit service for areas within and west of the study area, per the long range transit needs identified in MAG's Regional Transit Framework Study, through the regional transportation system planning process.

Figure 15. Phoenix West Locally Preferred Alternative



Source: METRO 2012



6.0 NEXT STEPS

6.1 PROJECT DEFINITION

As appropriate to respond to federal funding opportunities, METRO will explore opportunities to potentially phase the project construction and implementation in segments that have independent utility. Project definition will provide more detail on the ROW needs and street configuration as well as costs for the project. Operational characteristics will also be defined, especially in connecting with the existing system. In addition, further design and planning will be conducted to determine station locations; park and ride space requirements; traction power substation requirements, signal requirements, and utility relocations. During the project definition, in addition to defining the segments of potential independent utility, the early action projects will also be further defined.

6.2 ENGAGE IN NEPA

The purpose of the NEPA process is to explore, in a public setting, the effects of a proposed project and its alternatives on the physical, human, and natural environment. The FTA and METRO will evaluate all significant environmental, social, and economic impacts of the construction and operation of the LPA during the NEPA process. Measures to avoid, minimize, or mitigate any significant adverse impacts will be identified and evaluated. Disciplines to be evaluated during the NEPA process may include the following:

- Air Quality
- Community Disruption
- Consistency with Local Plans
- Construction
- Cultural Resources
- Development Potential
- Ecologically Sensitive Areas
- Endangered Species
- Economic Impacts
- Ecosystems
- Energy Requirements
- Title VI/Environmental Justice
- Existing and Planned Land Use
- Hazardous Materials
- Historic Properties/Archaeological Sites
- Land Acquisition and Relocation
- Noise and Vibration
- Parklands and Section 4(f) Resources
- Recreational Areas
- Safety and Security
- Secondary Development related to the project
- Traffic/Parking/Pedestrian/Bicycles
- Visual and Aesthetics
- Water Quality
- Wetlands/Floodplains

6.3 NOTICE OF INTENT

FTA issued a Notice of Intent (NOI) on October 2, 2007 stating that the FTA and METRO intended to prepare an AA on proposed HCT improvements in the Phoenix West Corridor. METRO will continue to coordinate with FTA on the NEPA process.

6.4 PUBLIC INVOLVEMENT AND SCOPING

METRO intends to continue working with groups identified in Section 5.2 as well as additional project stakeholders throughout the NEPA process for this project. METRO has remained committed to engaging numerous stakeholders throughout the planning process and will continue stakeholder and public outreach as the study progresses. As the project moves



forward into the NEPA phase, public involvement will shift to the evaluation and refinement of the LPA and potential impacts to the human environment, anticipated to commence in Summer/Fall 2012.

6.5 SCHEDULE

Table 12 outlines the estimated project schedule for the local, regional, and federal processes.

Table 12. Phoenix West Extension Project Schedule

Process	Timeline
Local / Regional	
Preliminary Engineering	Spring 2015 – Summer 2017
Final Design	Summer 2017 – Summer 2019
Construction/Testing	Spring 2019 – Summer 2023
Project Opening	2023
Federal	
Re-Publish NOI/Scoping	Summer 2012
Environmental Document	Summer 2012 – Spring 2015
FTA Approval to Enter Preliminary Engineering	Spring 2015
FTA Approval to Enter Final Design	Spring 2017

Source: METRO 2012



Appendix A

Conceptual Design of LPA – Phoenix West LRT

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Appendix B

Standard Cost Category Worksheet

Build Alternative

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