

# Southeast Corridor Major Investment Study

## EXECUTIVE SUMMARY

July 2012

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### INTRODUCTION

The Maricopa Association of Governments (MAG) has completed a comprehensive transportation study of southeast Maricopa County. The Southeast Corridor Major Investment Study (SE Corridor MIS) identifies compatible transportation elements designed to improve overall mobility within a portion of southeast Maricopa County. The Southeast Corridor (study area) is bounded by I-10 (Papago Freeway) and SR-202L (Red Mountain Freeway) on the north, SR-101L (Price Freeway) on the east, the Gila River Indian Community border on the south, and I-17 (Black Canyon Freeway) and the 23rd Avenue alignment on the west (Figure 1). The study area includes the Town of Guadalupe and parts of Phoenix, Tempe, and Chandler.

The transportation system within the study area provides connections between many of Maricopa County's major activity centers as well as access to regional, national and international destinations. At present, freeways and roadways in the study area experience recurring weekday congestion. The area's population is expected to double between 2010 and 2030, placing increased demand on its transportation infrastructure.

The SE Corridor MIS identifies multi-modal transportation investment options to the currently planned expansion of I-10 between the I-10/I-17 traffic interchange (TI) (referred to as "The Stack") and the I-10/SR-202L (Pecos Stack) TI, including the Broadway Curve. Transportation investment options were explored to address the projected increases in area employment and population and the resulting increase in roadway congestion



Figure 1 | Southeast Corridor MIS Study Area

levels as demonstrated by the following findings from previous studies:

- The 2006 MAG *Freeway Level of Service Study* indicates that every freeway within the study area currently experiences recurring congestion.
- A major increase in the number of congested intersections (level of service (LOS) E and F) will occur between 2012 and 2030, despite the construction of the arterial improvements identified in the current *Regional Transportation Plan (RTP)*.<sup>1</sup>

<sup>1</sup> Source: MAG TDM simulations of the traffic performance of the regional roadway network based on 2008 travel demand and 2030 travel demand forecasts prepared for the RTP.

## EXISTING AND PLANNED ROADWAY AND TRANSIT IMPROVEMENTS

### Roadways

The RTP identifies substantial free-way/highway improvements in the study area to be constructed over a 20-year period between 2010 and 2030; which include varying levels of improvement on nearly every free-way/highway. This includes corridor capacity improvements along I-10 and a new South Mountain Freeway along the southern border of the study area. New high occupancy vehicle (HOV) ramp connections are planned for the I-10/SR-202L and SR-101L/SR-202L system TIs. Additional general purpose (GP) and HOV lanes are planned along existing facilities.

Improvements to I-10 include reconfiguring the current facility to a local/express lane arrangement. The current RTP funds these improvements from 32nd Street to the Pecos Stack. This improvement provides additional GP and HOV lanes for through traffic. HOV lanes throughout the study area are typically one lane in each direction; however, two are planned in the same direction from the I-10/I-17 TI (The Split) on the southeast corner of downtown Phoenix to the I-10/US-60 TI. New multiple local lanes are planned to address local access to the arterial streets over the same approximate length. The South Mountain Freeway is a planned facility that will extend SR-202L (Santan Freeway) west from the Pecos Stack. The South Mountain Freeway will span along the southern border of the study area, and then turn north outside of the study area and connect to I-10, near 59th Avenue.

Also programmed in the RTP within the study area are additional GP and HOV lanes along I-17, from the I-10/I-17 TI on the northwest corner of downtown Phoenix, to the Split. Further, additional GP and HOV facilities, including direct ramp connections and additional lanes, are programmed for the SR-202L (Santan Freeway) from I-10 to east of the study area.

### Transit

The existing transit services in the study area consist of local bus, circulators, express bus, and light rail. A variety of transit service and capital infrastructure improvements are planned for the study area, which include local bus/supergrid, express bus, Arterial Bus Rapid Transit (Arterial BRT), and high capacity transit (HCT).

#### PLANNED FREEWAYS AND CAPACITY IMPROVEMENTS IN THE STUDY AREA

- GP and HOV lanes on sections of I-10, I-17, and SR-202L (Santan Freeway)
- Multiple local lanes along I-10
- South Mountain Freeway
- Five regionally funded arterial street projects (four intersection improvement projects and one new/improved arterial roadway)
- One illustrative roadway project which includes improving I-10 to a local/express lane configuration between the I-10/SR-51/SR-202L TI and 32nd Street

Three new Arterial BRT routes are identified in the study area. Arterial BRT is a branded, limited stop bus route that has enhanced stations and takes advantage of queue jumper lanes, signal priority, or other travel time saving methods. The planned Arterial BRT routes are designed to feed into existing or planned high capacity transit. Two of the routes have been postponed to a year beyond 2026.

Three HCT corridors are identified within the study area. The Tempe South corridor would provide service from downtown Tempe/ASU to the south. The Phoenix West corridor would provide service between downtown Phoenix and west Phoenix. The PHX Sky Train is an automated people mover that is planned to provide a transit connection between the 44th/Washington Street LRT Station and Phoenix Sky Harbor International Airport. The PHX Sky Train will be implemented in two phases,

#### PLANNED TRANSIT SERVICE IMPROVEMENTS IN THE STUDY AREA

- New local and express bus routes are planned within the study area; however, planned service levels are very modest
  - One new Supergrid route
  - One additional Express bus route by 2015
  - Seven additional Express bus routes after 2026
- Three new Arterial BRT routes, two after 2026
- Three planned HCT corridors: Tempe South corridor, Phoenix West corridor, and PHX Sky Train
- Three illustrative HCT corridors identified
  - Two potential HCT all day service corridors along Scottsdale Road/Rural Road and Central Avenue (south of Jefferson Street)
  - One HCT peak period service corridor near the Tempe Kyrene Branch freight rail line

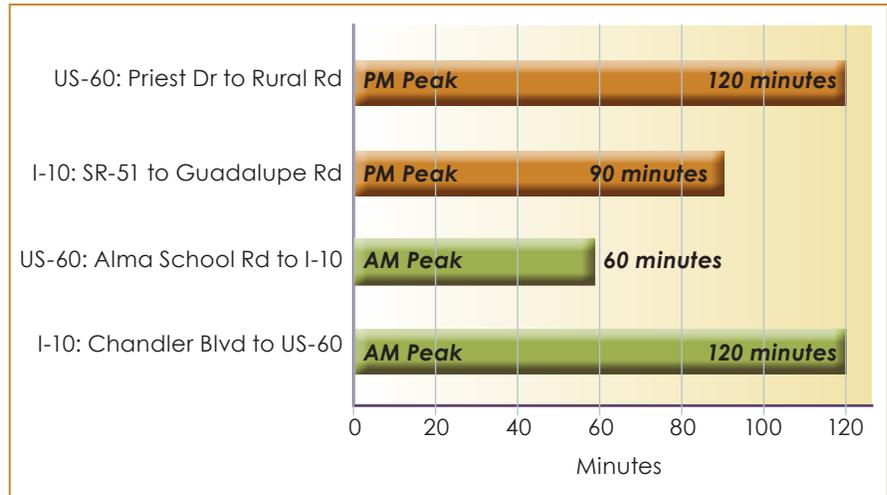
with the first phase connecting the 44th/Washington Street LRT Station to Phoenix Sky Harbor Terminal 4. By 2020, PHX Sky Train will have stations at the airport's Terminal 3, a future terminal, and the rental car center.

Implementation of many planned transit services in the study area have been delayed to after year 2026 due to recent economic conditions.

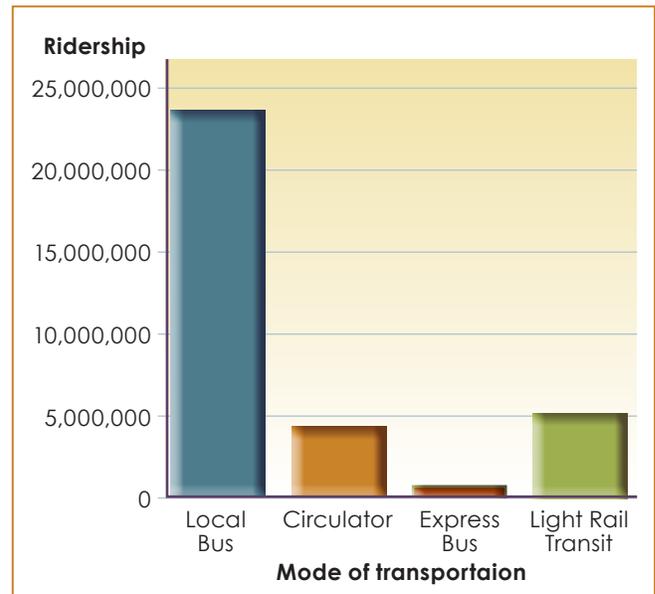
## TRANSPORTATION PERFORMANCE AND FORECASTED DEMAND KEY FINDINGS

Transportation performance measures including traffic congestion, travel speeds, and transit utilization indicate the general need for additional or alternative investment in transportation infrastructure and services. The key transportation performance findings documented in the MAG SE Corridor study include:

- Previous studies indicate that every freeway within the study area experiences some recurring congestion
- The most significant freeway delays are found on I-10 northbound between Chandler Boulevard and US-60 and on US-60 westbound between Mill Avenue and Priest Drive during the AM peak period. During the PM peak period, the most significant bottlenecks in the study area are on I-10 eastbound between I-17 and Guadalupe Road and on eastbound US-60 between I-10 and Rural Road (see Figure 2)
- Slightly higher average speeds are experienced on the HOV facilities than the general freeway lanes during peak hours
- Arterial congestion is primarily a peak-hour problem, where through traffic experiences significant delays at numerous intersections during the morning peak hours, and even more intersections during the afternoon peak hours
- Within the study area, local fixed route bus service carried more passengers than any other transit mode, followed by light rail, circulator bus and express bus in Fiscal Year (FY) 2009
- The local bus routes with the highest ridership in the study area operate within or through the central Phoenix area; however the south Phoenix and Tempe east-west crosstown routes (Broadway Road, Southern Avenue, and Baseline Road) have strong existing ridership (see Figure 3)
- The I-10 East RAPID (Ahwatukee to downtown Phoenix Express) accounts for more than one-



Source: 2007 MAG Regional Travel Time and Speed Study; ADOT FMS  
Figure 2 | Peak Period Freeway Bottleneck Duration



Source: Valley Metro Annual Ridership Report for Fiscal Year 2008-2009  
<sup>1</sup>Annual ridership for light rail is for January 2009 through June 2009  
Figure 3 | Study Area Annual Transit Ridership (Boardings) by Mode<sup>1</sup>

third (37 percent) of the express route ridership in the service area while the three Chandler Express routes (540, 541, and 542) account for approximately 24 percent of the express bus ridership

Travel demand projections provide a general indication of future travel patterns within and through the study area. Results from the MAG 2030 travel demand model indicate the following trends:

- The top general destinations for trips from the south Tempe, Chandler and Northern Pinal County area include:
  - Southeast and east valley areas (Mesa, Gilbert and Pinal County)
  - North Tempe (north of Baseline Road)
  - Central Phoenix north area (including Sky Harbor International Airport, Uptown Phoenix, and Camelback/Biltmore area)
- The areas of the region that generate the most trips destined to the south Tempe, Chandler and Northern Pinal County area include:
  - Southeast and east valley area (Mesa, Gilbert and Pinal County)
  - North Tempe (north of Baseline Road)
- Trips from the central Phoenix north area, which is considered a leading destination, represents only 6 percent of the total daily person trips; however, it should be noted that a significant number of trips, approximately two-thirds in 2010 and three-quarters in 2030, are from the southeast and east valley areas
- Approximately one-fifth (20.4 percent in 2010 and 19.5 percent in 2030) of the peak period trips destined for the downtown Tempe/ASU area are from the south Tempe, Chandler and Northern Pinal County area. Other areas that have a high level of trips destined for the downtown Tempe/ASU area include:
  - Southeast valley area (Mesa and Apache Junction)

Study Area Person Trips – Trips from Study Area		
Sub-Area	2010 Percent of Trips	2030 Percent of Trips
Southeast and East Valley Areas	43%	44%
North Tempe	25%	20%
Central Phoenix North Area	18%	17%
All Other Areas Combined	13%	19%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Study Area Person Trips – Trips to Study Area		
Sub-Area	2010 Percent of Trips	2030 Percent of Trips
Southeast and East Valley Areas	69%	75%
North Tempe	13%	10%
All Other Areas Combined	18%	16%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Source: MAG TDM, 2010

- Central Phoenix north area (including Sky Harbor Airport, Uptown Phoenix, and Camelback/Biltmore area)
- Nearly 40 percent of the trips destined for the downtown Phoenix area are from the Central Phoenix north area in both 2010 and 2030. Trips from the south Tempe, Chandler and Northern Pinal County area only comprise approximately 8 percent of the trips to downtown Phoenix. However, all east valley areas combined (excluding Scottsdale) comprise approximately 20 percent of the trips

## ALTERNATIVE TRANSPORTATION INVESTMENT OPTIONS

### BUNDLE EVALUATION CRITERIA

- Environmental Impacts
- Socioeconomic Conditions
- Capital Development Feasibility
- Operational Feasibility
- Performance
- Financial Feasibility
- Cost Effectiveness

The variety of activity centers located within the study area and the study area's overall size requires a comprehensive multi-modal approach to address the transportation performance issues and projected future travel demand needs identified through this MIS. The MIS identified a total of nine transportation investment bundles; three initial bun-

dles and six alternate bundles. The initial bundles (Bundle 1 through Bundle 3), which were developed through an interactive multi-agency Charrette process, identified the following transportation investment options:

- Freeway based managed lanes
- Direct High Occupancy Vehicle (DHOV) access ramps
- Exclusive guideway transit
- Bus rapid transit
- Commuter rail transit
- Modern streetcar
- Automated guideway transit
- Arterial roadway capacity enhancements

The freeway based managed lanes concept on I-10 and I-17 between the Stack TI and Pecos Stack TI was a key component of each of the three initial bundles. Based on a benefit cost analysis, the managed lanes were shown to produce benefits (measured in personal time and fuel savings) that exceed projected costs. In addition, MAG travel demand model results indicate that the managed lanes concept may increase travel speeds in the general purpose lanes; providing benefits to all users. Figure 4 depicts a similar concept to the proposed managed lanes/DHOV configuration, while Figures 5 and 6 illustrate the general configuration for the managed lanes concept including the incorporation of strategically located DHOV access ramps.



Figure 4 | Traffic Interchange in Bellevue, Washington depicting park-and-ride access, bus interface, and DHOV Access into managed lanes facility

The six alternate bundles (Bundle 3.2.A through Bundle 3.2.F) were developed to isolate the relative performance of the transportation investment options. A comprehensive evaluation of all nine bundles was

conducted based on the general criteria shown in the table on page 4. **Key findings from the evaluation include:**

- Managed lane operations in I-10 and I-17 between the Pecos Stack TI and the Stack TI, including the five identified DHOV access ramps, provides the

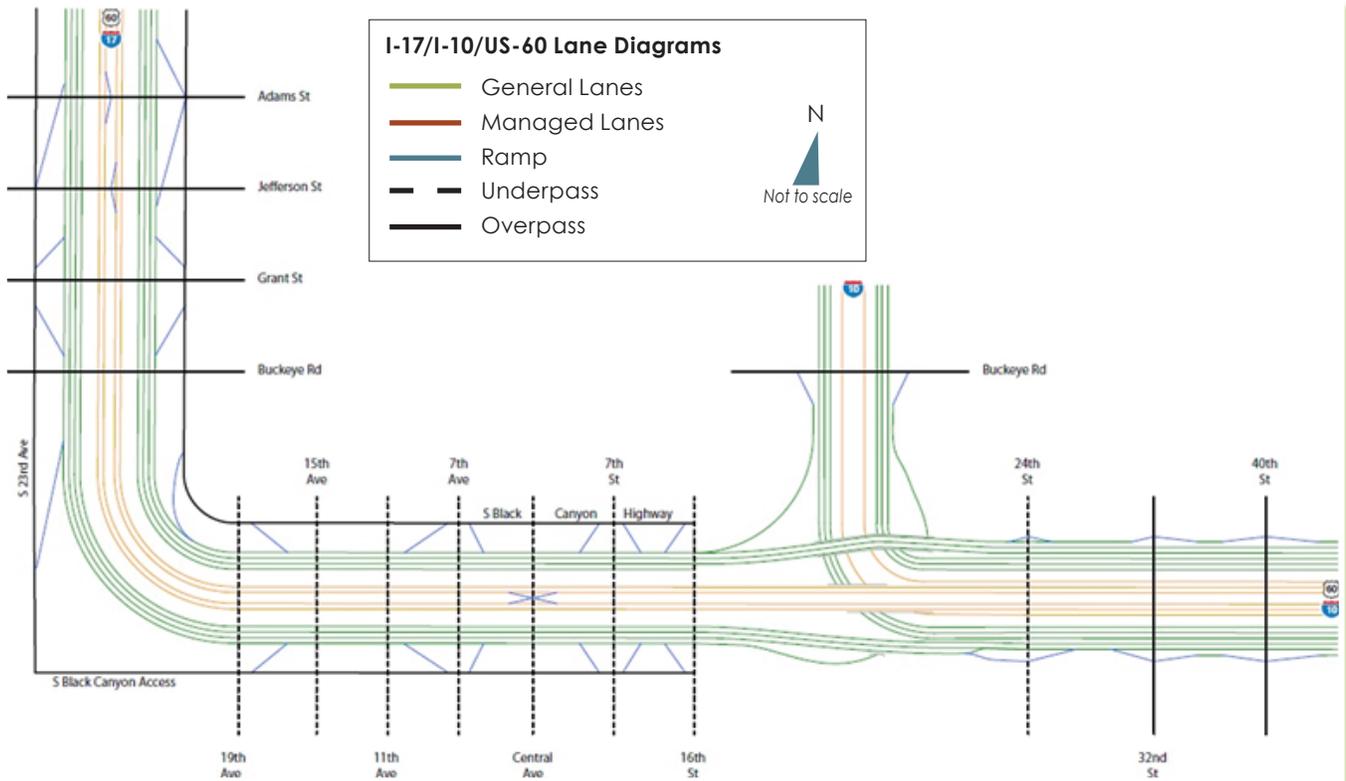


Figure 5 | Typical Lane Configuration of Managed and General Purpose Lanes on I-17/I-10

highest level of performance including increased peak period operating speeds, while accommodating increased traffic volumes (GP lanes volume + managed lanes volume) in the freeway corridor.

- A strategically focused network of high capacity transit services featuring exclusive guideway transit offers the most productive transit investment (highest system-wide ratio of boardings per revenue mile).
- An east/west transit connection between Central Avenue and the east valley in a corridor parallel to I-10 (including Southern Avenue or Baseline Road) and a north/south connection along either Rural Road or Arizona Avenue produces the highest number of new system-wide transit riders. This configuration improves direct transit access between central Phoenix (including south central Phoenix) and the southeast valley.
- Results of the MAG TDM indicates that an exclusive guideway transit investment in either the Rural Road or Arizona Avenue corridors will not have a significantly discernible impact on traffic volumes or speeds on I-10. Both corridors have attributes to potentially support a future exclusive guideway transit investment; however, additional study is necessary to determine if such an investment should be made in one or both of the corridors.

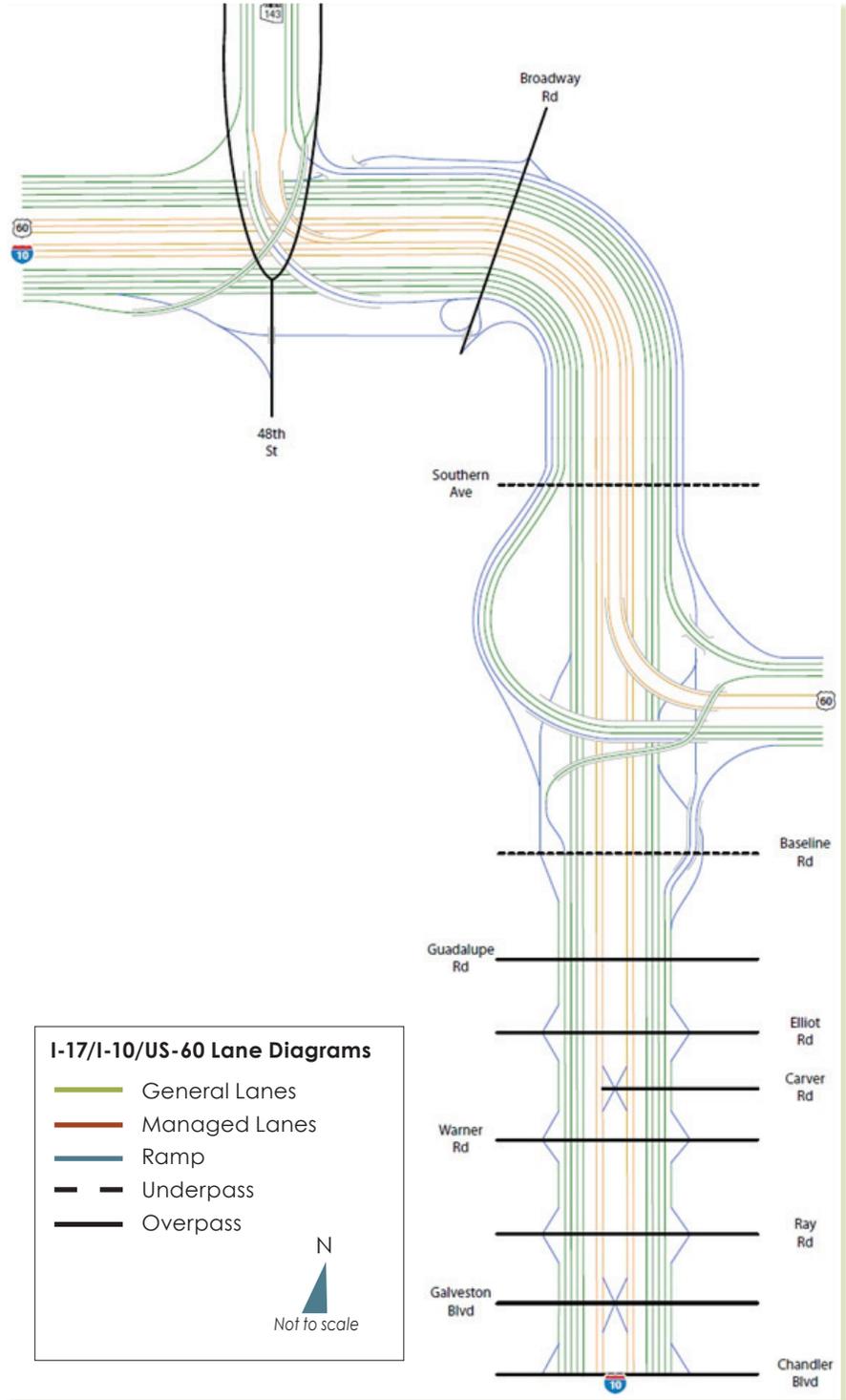


Figure 6 | Typical Lane Configuration of Managed and General Purpose Lanes on I-10

## RECOMMENDATIONS

The key findings of the MIS serve as an outline of the primary elements required to develop a recommended bundle of transportation investment options. The transportation improvement options included in the recommended bundle offer a relatively high level of performance (average freeway travel speeds, average freeway volumes, and new system-wide transit riders) and efficiency (benefit/cost and transit boarding per revenue mile) compared to the other transportation improvement options considered. In addition, they generally performed well under the evaluation criteria.

The recommended bundle includes the freeway managed lanes on I-10/I-17 (including DHOV ramps) and exclusive guideway transit service on Southern and Central Avenues between the Phoenix CBD and Rural Road. Other transportation improvement options proposed to be included in the recommended bundle include an extension of the Tempe modern streetcar

on Rio Salado Parkway and Southern Avenue, as well as potential exclusive guideway transit extensions to Chandler's CBD via Rural Road or Arizona Avenue.

Excluding the optional exclusive guideway transit extension on either Rural Road or Arizona Avenue, the total estimated capital and operating cost (operating cost for transit only) for the recommended bundle is \$2.96 billion. Approximately 75% of the total estimated cost is for public transit investments (\$2.23 billion) including 20-year operating costs. The total estimated capital cost per corridor mile constructed (managed lanes + transit) is approximately \$68.6 million.

The recommended transportation investment options will provide enhanced access to local and regional activity centers, provide expanded multi-modal transportation options, and offer potential user benefits based on personal time and fuel savings.

Recommended Bundle of Transportation Improvement Options		
Concept	Description	Length in Study Area (miles)
Managed Lanes	I-10 and I-17 - Pecos Stack TI to Stack TI	20.0
New DHOV Ramps	I-17/Washington Street I-17/Central Avenue I-10/SR-143 I-10/Carver Road I-10/Galveston Road	---
Exclusive Guideway Transit	Southern Avenue/Central Avenue – Phoenix CBD to Rural Road	11.5
Exclusive Guideway Transit	Rural Road – Southern Avenue to University Drive	2.0
Potential Exclusive Guideway Transit	Arizona Avenue – Chandler CBD to Rural Road and Southern Avenue via Arizona Avenue	2.0 <sup>A</sup>
Potential Exclusive Guideway Transit	Rural Road – Chandler CBD to Rural Road and Southern Avenue via Rural Road	8.0 <sup>A</sup>
Modern Streetcar	Rio Salado Parkway - Extension from Mill Avenue to SR-101L	3.5
Modern Streetcar	Southern Avenue - Extension from Mill Avenue to Rural Road	1.0

Source: HDR Engineering, 2011

<sup>A</sup>Total miles of extension (within study area + outside of study area) = ~11.0 miles

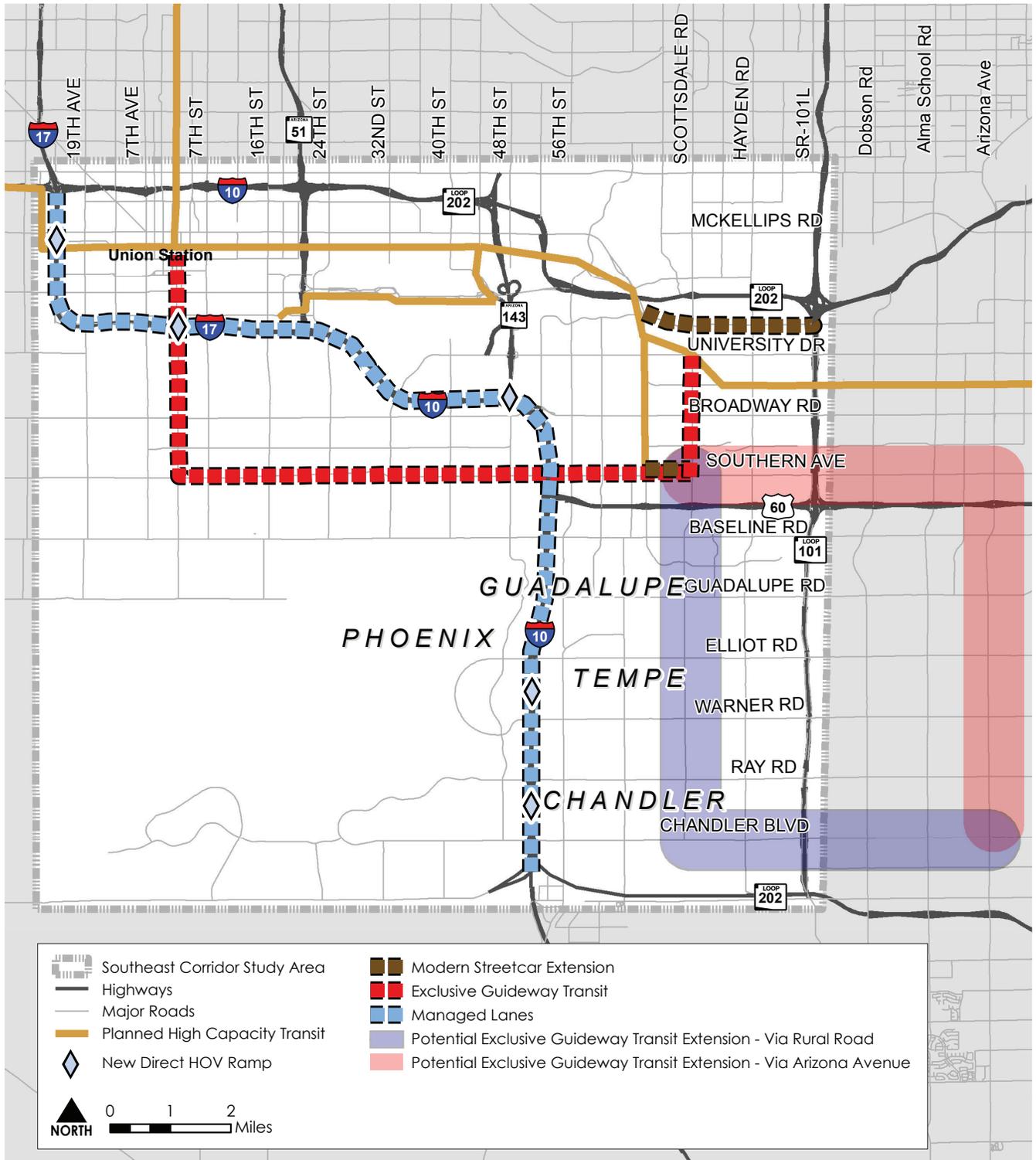


Figure 7 | Recommended Bundle