

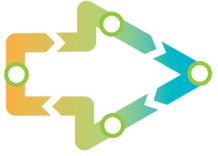
REGIONAL TRANSIT FRAMEWORK STUDY UPDATE FINDINGS AND NEXT STEPS



June 2019

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**REGIONAL TRANSIT FRAMEWORK
STUDY UPDATE**
Maricopa Association of Governments

1. INTRODUCTION

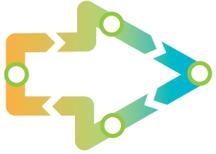
The Regional Transit Framework Study Update is an update to MAG's 2010 Regional Transit Framework Study (RTFS), which identified and prioritized needs for regional transit improvements through 2030. This study takes into account for the many changes that have occurred since that study was completed.

In more detail, the RTFSU consisted of a number of elements:

- The development of project goals and objectives and an evaluation framework
- A review of previous related plans and studies
- A review of significant changes that have occurred since 2010, including Great Recession-related changes to population and employment levels and projections, and to funding
- An examination of the underlying demand for High Capacity Transit throughout the MAG region
- The identification and evaluation of potential High Capacity Transit (HCT) corridors
- Findings on feasible HCT corridors

This report focuses on the identification and evaluation of potential HCT corridors. This Findings and Next Steps report presents:

- An overview of underlying demand for HCT throughout the MAG region
- An identification and evaluation of potential HCT corridors and modes
- A description of next steps that should be taken to further HCT development



WHAT IS HIGH CAPACITY TRANSIT?

High capacity transit (HCT) refers to faster, higher-volume transit services in busier, denser travel corridors. HCT services typically move more people faster and more efficiently than regular bus services and operate seven days a week from early morning until late night. Three forms of HCT were examined in this study: light rail, Bus Rapid Transit, and Enhanced Bus.

Light Rail Transit (LRT)

Light rail provides regional or local rail service that operates with one to three car trains in high volume corridors. Service typically operates in dedicated lanes in roadway medians, although underground and elevated service can also be provided. Vehicles are powered electrically, with power drawn from overhead wires. Light rail stations are usually spaced farther apart than those of local bus services. Cities implementing new light rail lines coordinate land use and development strategies to stimulate economic development, increase density, and improve walkability around new stations.

Bus Rapid Transit (BRT)

Bus Rapid Transit (BRT) is a high-quality bus service that operates much like light rail, including in dedicated transit lanes and fixed guideways as part of the right of way. When fully implemented, BRT can decrease travel times and spur economic development. Operational and design elements that set BRT apart from traditional local bus service include dedicated transit lanes, enhanced stations with prepayment and level boarding, wider stop spacing, transit signal priority, higher capacity vehicles, specialized branding, and more frequent service.

Enhanced Bus

Enhanced Bus is very similar to BRT, but does not operate in dedicated transit lanes, or does so only in limited areas. Instead, most service operates in mixed traffic with targeted measures to provide transit priority, such as queue jump lanes (short bus lanes to bypass backups at traffic signals) and signal priority.

Light Rail, Bus Rapid Transit, and Enhanced Bus

LIGHT RAIL

TYPICAL FEATURES

- Two car trains
- Service in exclusive rights of way
 - Center running in urban arterials
 - In own right-of way
 - Aerial and underground sections
- High quality stations with level boarding
- Very frequent service (at least every 10 minutes)
- Service from early morning to late night
- Limited stops
- Transit signal priority
- Special branding
- Off-board fare collection
- Real-time passenger information



Phoenix light rail service

BUS RAPID TRANSIT (BRT)

TYPICAL FEATURES

- 60' articulated buses
- Service in dedicated transit lanes
- High quality stations
- Very frequent service (at least every 10 minutes)
- Service from early morning to late night
- Limited stops
- Simple service design
- Limited stops
- Transit signal priority
- Special branding
- Off-board fare collection
- Real-time passenger information



Cleveland Healthline BRT service

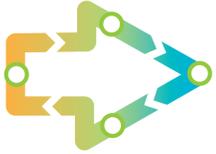
ENHANCED BUS

TYPICAL FEATURES

- Similar to BRT but without exclusive lanes, or only limited exclusive lanes
- 40' or 60' articulated coaches
- More limited forms of transit priority:
 - Transit signal priority
 - Queue jump lanes
- Frequent service, but less frequent than light rail or BRT
- Service from early morning to late night, but often shorter span than light rail or BRT



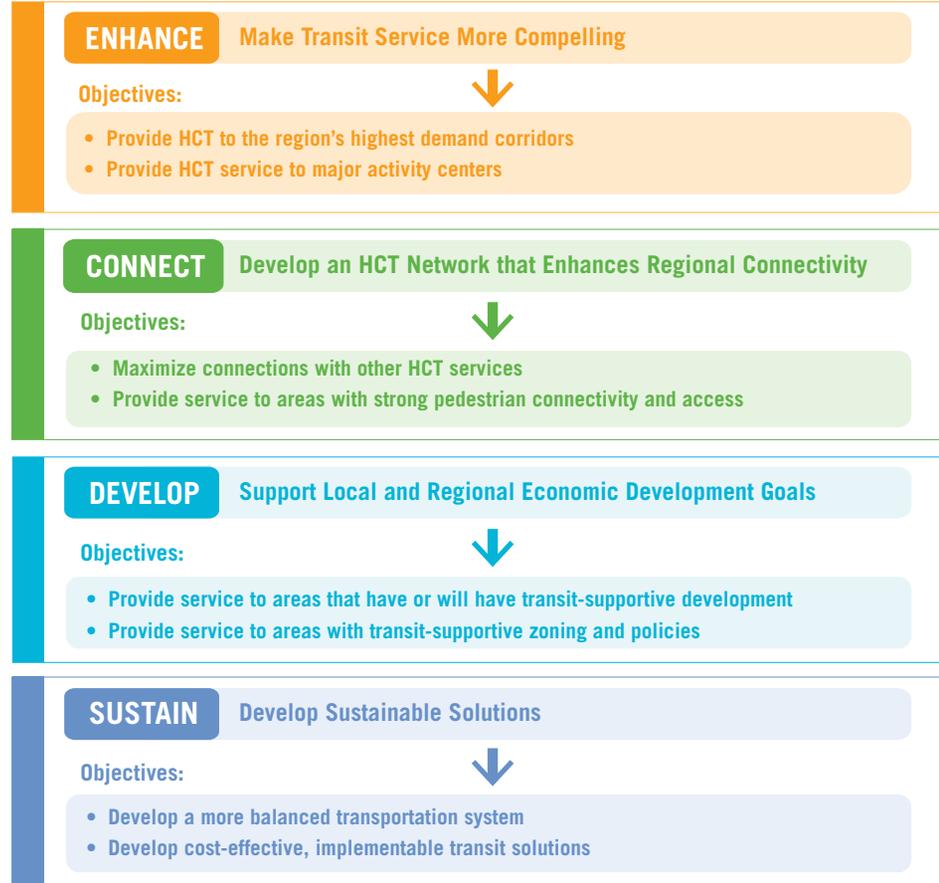
Los Angeles Metro Rapid service



GOALS AND OBJECTIVES

The goals and objective of this study were organized around four themes:

- Enhance
- Connect
- Develop
- Sustain



2. THE DEMAND FOR HIGH CAPACITY TRANSIT

High Capacity Transit (HCT), as the name implies, is designed to carry large volumes of people. The study's market analysis focused on identifying the areas that can now support HCT as well as those that will grow to be able to support HCT through 2040.

OVERVIEW OF TRANSIT DEMAND

A number of factors drive transit demand. The most important of these include:



Population and population density: Since transit relies on having more people in close proximity to service, higher population density makes it feasible to provide higher levels of service.



Socio-economic characteristics: Different people have different likelihood to use transit, with differences related to socio-economic characteristics. For example, households with many cars are much less likely to use transit than those with one or none.



Employment and employment density: The location and density of jobs is a second strong indicator of transit demand, as traveling to and from work often accounts for the most frequent type of transit trip.



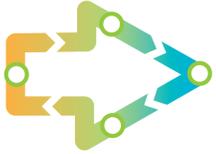
Development patterns: In all cities, there is a strong correlation between development patterns and transit ridership. In areas with denser development, mixed-use development, and a good pedestrian environment, transit can become very convenient, making it attractive and well used.



Major activity centers: Large employers, resorts, universities, tourism destinations, and other high-activity areas attract large volumes of people and can generate a large number of transit trips.



Travel Flows: People use transit to get from one place to another. Major transit lines such as HCT services are designed to serve corridors with high volume travel flows.

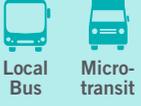


DENSITY AND TRANSIT DEMAND

More than any other factors, population and employment density will determine the underlying demand for transit. This is because:

- The reach of transit is generally limited to within one-quarter to one-half mile of the transit line or station. As a result, the size of the travel market is directly related to the density of development in that area.
- Transit service frequencies, in turn, are closely related to market size. Bigger markets support more frequent service, while smaller markets can support only less frequent service.
- To attract travelers who have other options, such as automobiles, transit must be frequent – preferably every 10 to 15 minutes.

Land Use, Densities, Transit Demand, and Transit Types

LAND USE				TRANSIT
Land Use Type	Example	Residents per Acre	Jobs per Acre	Appropriate Types of Transit
 Downtowns & High Density Corridors		>45	>25	 Light Rail BRT Enhanced Bus Local Bus
 Urban Mixed-Use		30-45	15-25	 BRT Enhanced Bus Local Bus
 Neighborhood & Suburban Mixed-Use		15-30	10-15	 Local Bus
 Mixed Neighborhoods		10-15	5-10	 Local Bus Micro-transit
 Single Family Neighborhoods		<10	<5	 Micro-transit Ride-share

SOCIOECONOMIC CHARACTERISTICS AND TRANSIT DEMAND

In addition to population and employment density, socioeconomic characteristics influence demand for transit. National research shows that many population groups have a higher propensity for transit use than the overall population. These populations include:

Low-income residents, who tend to use transit to a greater extent than those with higher incomes because transit provides significant cost savings over automobile ownership and use.

Auto-deficient households, which typically rely heavily on transit.

Minorities and Hispanic residents, who use transit more often than non-minorities because they tend to have more limited resources for transportation and live in denser neighborhoods closer to the urban core.

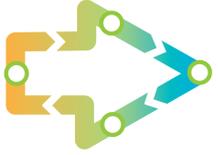
People with disabilities, many of whom may not be able to drive or have difficulty driving

When significant numbers of high-transit propensity residents cluster together, they can influence the underlying demand for transit to an extent that is not captured when only considering total population. In a given location, groups of people from transit-supportive demographic groups may be too small individually to indicate significant demand for transit service, but their clustering may result in potentially high levels of transit use. Similarly, in a location where transit-supportive demographic groups have low representation, the level of potential transit demand may actually be lower than total population alone would indicate.

Relative Propensity of Different Groups to Use Transit (Workers Age 16 and Older)

Demographic Group	Transit Propensity
Race and Ethnicity	
White Alone (Not Hispanic/Latino)	0.63
Black or African-American (Not Hispanic/Latino)	3.16
Asian (Not Hispanic/Latino)	1.04
Other Race (Not Hispanic/Latino)	1.77
Hispanic/Latino	1.33
Vehicle Ownership	
No Car	10.67
One or More Cars	0.67
Disability	
With a Disability	1.91
Without a Disability	0.98
Annual Income	
Less than \$10,000	2.0
\$10,000-\$15,000	1.75
\$15,000-\$25,000	1.49
\$25,000-\$35,000	0.90
\$35,000-\$50,000	0.64
\$50,000 or Higher	0.44

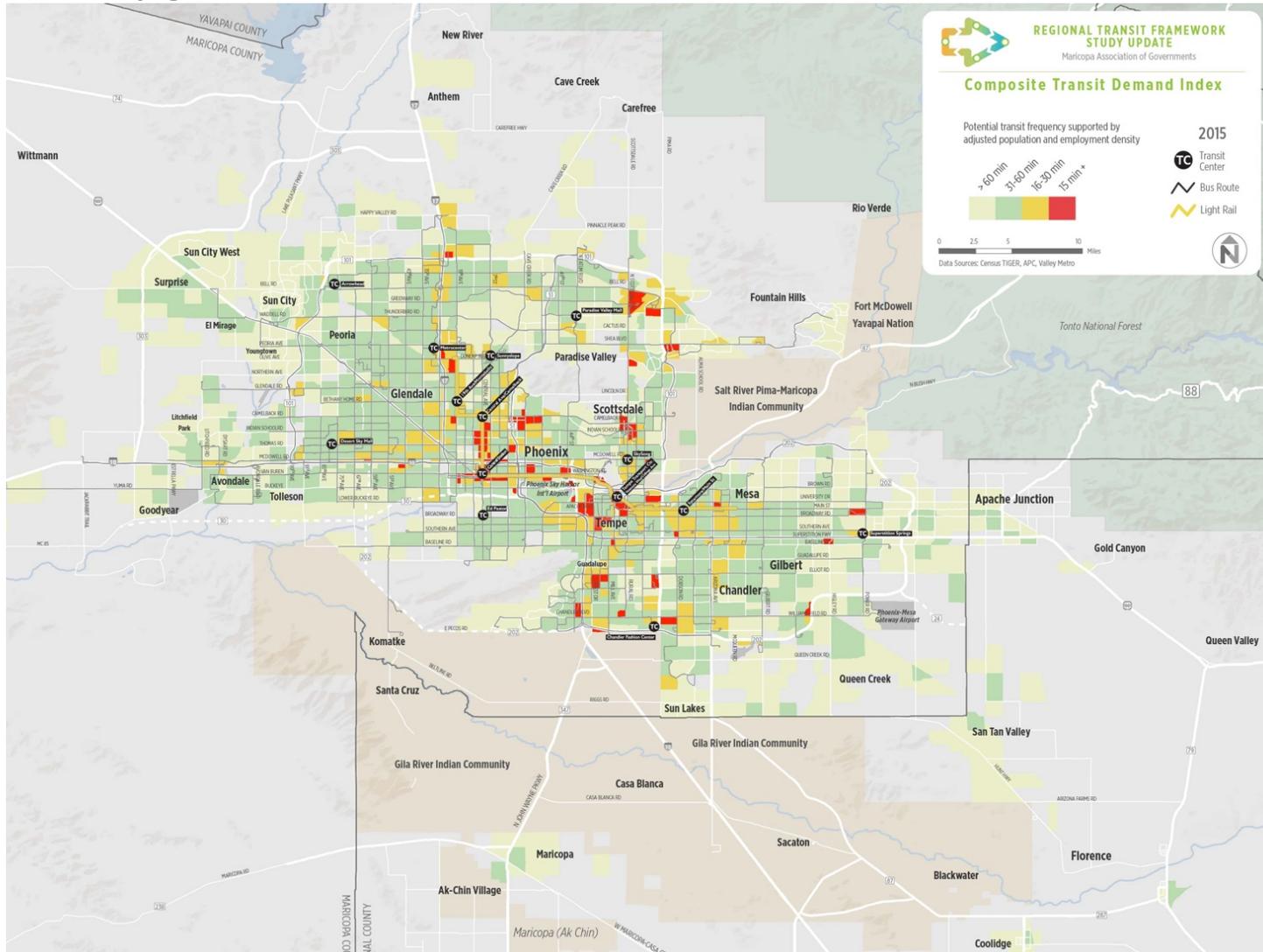
Source: Calculations developed using 2009-2014 American Community Survey 5-Year Estimates and 2015 US Census

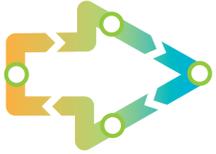


2015 UNDERLYING TRANSIT DEMAND

When population and employment density and socioeconomic factors are considered together, the potential for High Capacity Transit is highest in Phoenix, Tempe, Scottsdale, and Mesa.

2015 Underlying Transit Demand





2015 TRAVEL FLOWS

For transit to be effective, it must take people from where they are to where they want to go. People also travel for many reasons, including to and from work and school, and for shopping, medical, recreation, social, and other purposes. Transit serves all types of trips, but for all transit systems, work trips are particularly important. This is the case for a number of reasons, including public policy and because many work trips are concentrated around times and places that can be very effectively served by transit (for example, peak period trips to and from downtown Phoenix). Transit serves work trips throughout the day, but the highest numbers of trips are generally made during morning and late afternoon peak periods. Non-work trips typically comprise smaller volumes than work trips and typically occur during midday and evening hours, and these trips are generally made between more dispersed locations.

All Trips

The highest travel volumes are focused on a key areas:

- Within the core areas of Phoenix, especially between downtown Phoenix and the area just to the north close to the hospitals
- Within the western portions of Phoenix
- Between the core area of Tempe and Scottsdale
- Between Tempe and the eastern part of Chandler
- Within the town of Gilbert just east of Chandler

Additional notable flows with high daily trip volume (30,000-50,000 daily trips) include:

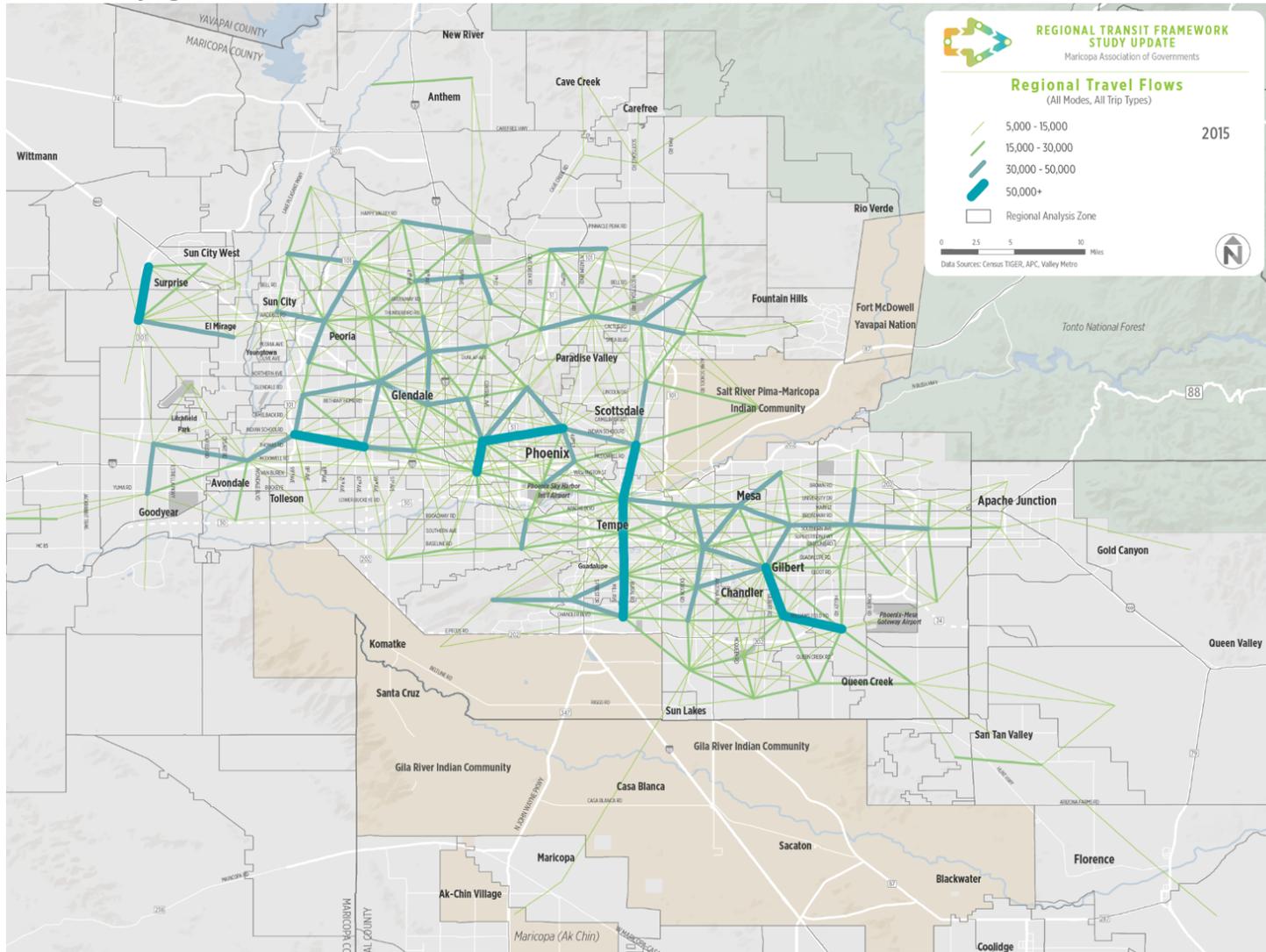
- Between Tempe and Mesa, and within Mesa
- Between Mesa and Chandler
- Within Glendale and between Glendale and western areas of Phoenix
- In parts of northeast Phoenix, including areas near Paradise Valley Mall and the Mayo Clinic Hospital

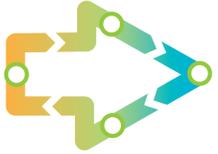
Home-Based Work Trips

The largest flows of home-based work trips in 2015 were focused on a few key links: between central and eastern areas of Phoenix, between Tempe and southern Scottsdale, and between Tempe and southwestern Chandler. Other notable trip flows include:

- Between the core areas of Phoenix and western portions of the city
- Between central Phoenix and southeast Glendale
- Between zones in Mesa, Chandler, and Gilbert

2015 Underlying Transit Demand

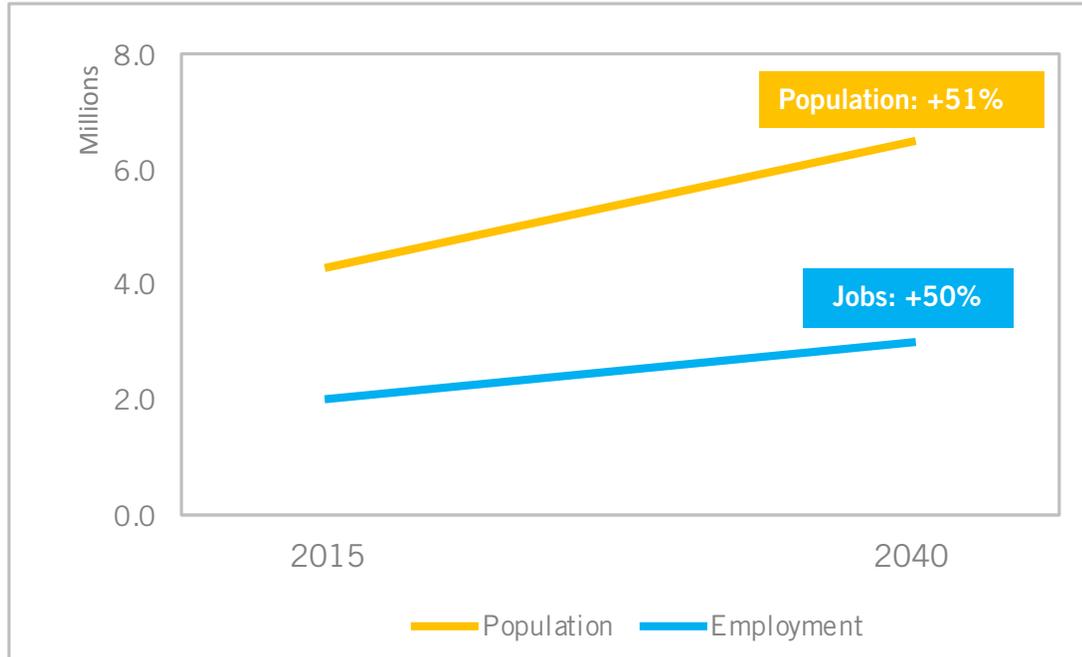




2040 UNDERLYING TRANSIT DEMAND

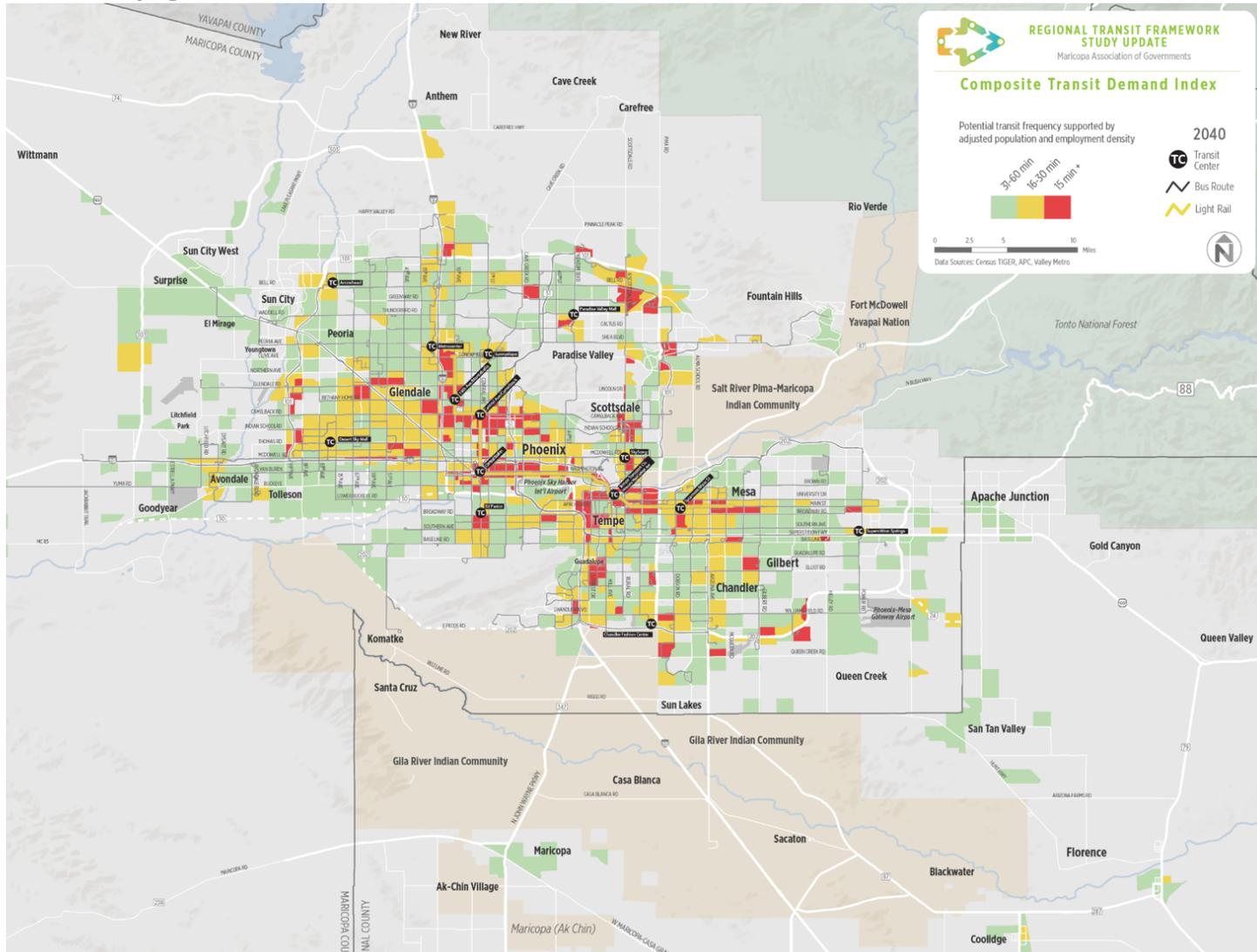
Between 2015 and 2040, population in the MAG region is projected to grow by 51% from 4.3 million to 6.5 million, and jobs are projected to grow by 50% from 2 million to 3 million. This growth will increase demand for HCT in areas where it now exists, and create new demand in emerging areas.

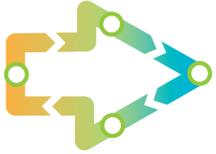
Population and Job Growth in the MAG Region



Overall, the underlying demand for transit will increase most significantly in the core areas of Phoenix and Tempe, as well as across Glendale and Mesa.

2040 Underlying Transit Demand





2040 TRAVEL FLOWS

Travel flows are projected to increase significantly, with more flows carrying upwards of 50,000 daily trips by 2040. The highest travel flows will continue to be focused around Phoenix and Tempe, with increasing daily trips around and across Glendale, Scottsdale, Mesa, and Chandler, with most of the largest trip flows located within Valley Metro's existing service area.

All Trips

The travel flows with the most daily trips (over 50,000) will be generally focused in the following areas:

- Within the core areas of Phoenix, especially between downtown Phoenix and the area just to the north (close to the hospitals)
- Within the western portions of Phoenix
- Between eastern Phoenix and Sky Harbor
- Between the core area of Tempe and Scottsdale
- Between Tempe and the eastern part of Chandler
- Between Tempe and Mesa, and within Mesa
- Between Mesa and Chandler
- Across Glendale and between Glendale and the core areas of Phoenix
- Between western Glendale and western areas of Phoenix
- In parts of northeast Phoenix, including areas near Paradise Valley Mall and the Mayo Clinic Hospital

Home-Based Work Trips

By 2040, the heaviest flows of home-based work trips are projected to be more dispersed across the study area. Several trip flows that carried 8,000 or more daily trips in 2015 will remain high in 2040, including travel flows between central and eastern areas of Phoenix, between Tempe and southern Scottsdale, and between Tempe and southwestern Chandler. Major travel flows will include:

- Between the core areas of Phoenix and western portions of the city
- Between central Phoenix and southeast Glendale
- Between zones in Mesa, Chandler, and Gilbert

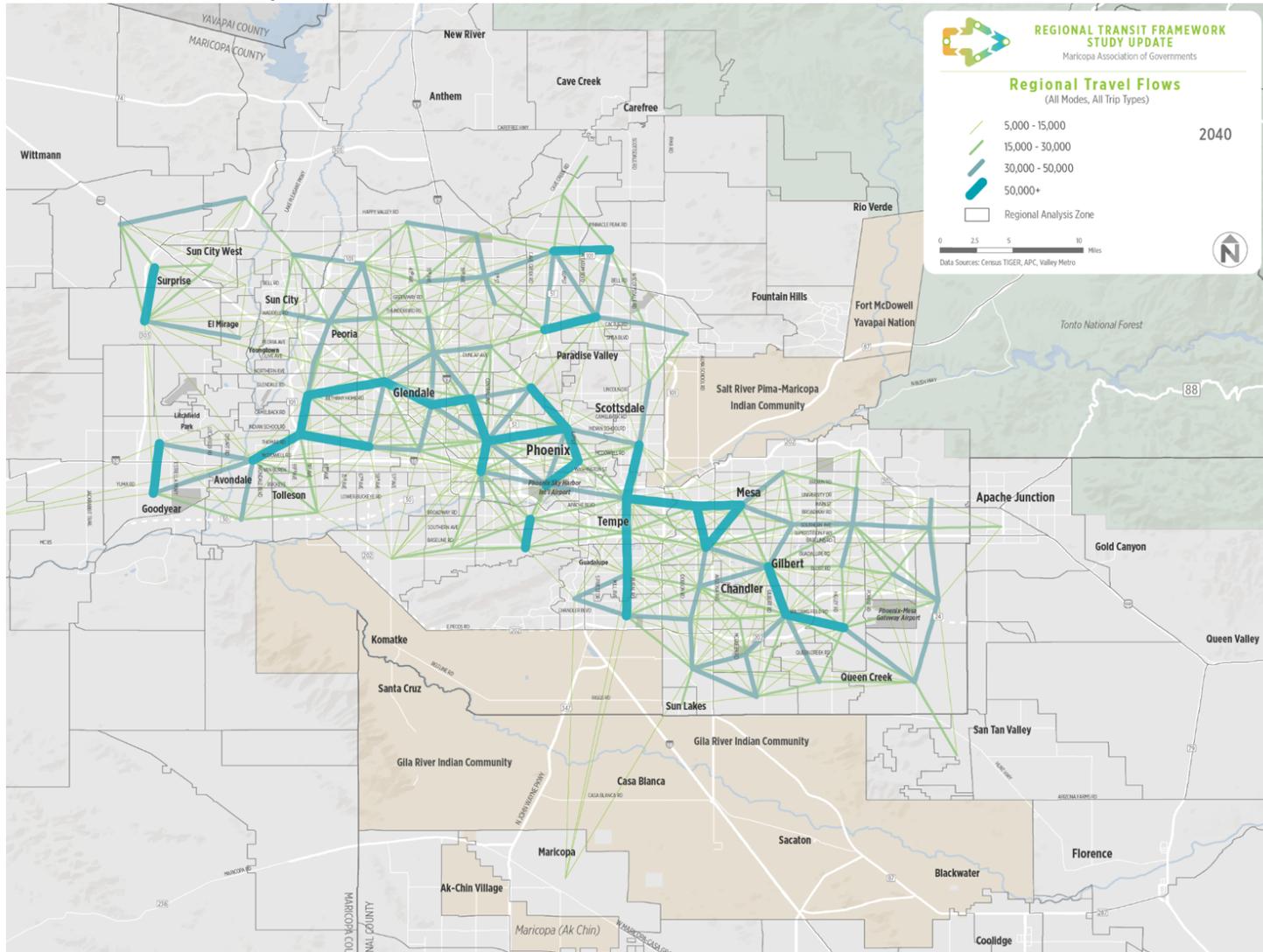
Home-based work travel is also projected to surpass 8,000 daily trips in the following areas:

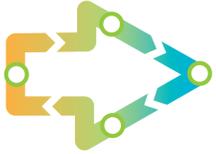
- Within core areas of Phoenix, including between downtown and zones just to the north
- Between western Phoenix and Scottsdale
- North-south trips across Scottsdale
- Across and between Chandler and Gilbert

High travel flows outside of the local transit service area will include:

- Between zones in northeast Phoenix
- West of U.S. Route 60, between zones in Surprise/Sun City West and Waddell

2040 Travel Flows: All Trips, All Modes





DEMAND FOR HCT

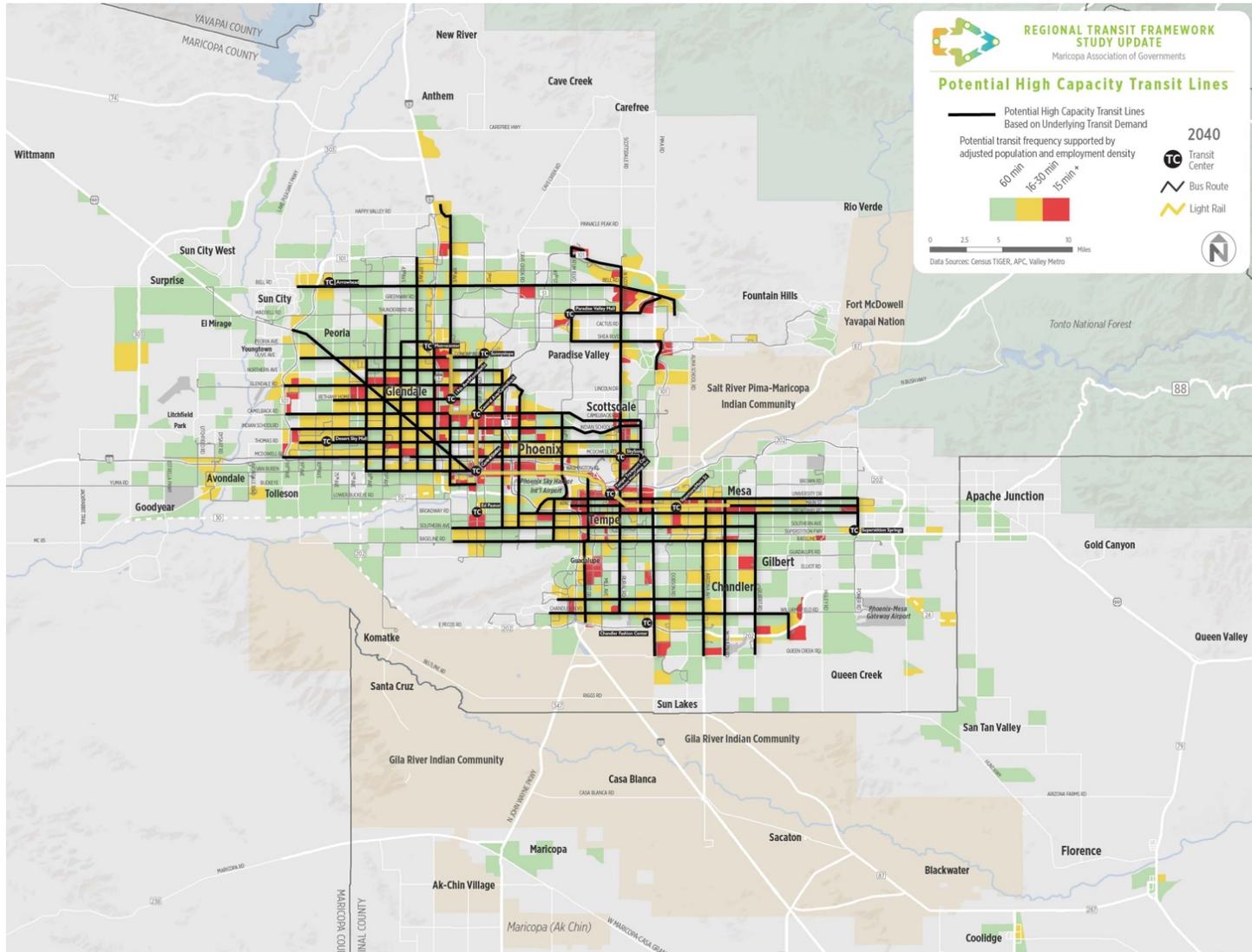
Looking forward to 2040, there will be more people and jobs in areas across the region, including significant growth in key areas and corridors that currently or will potentially support frequent transit service. Transit-supportive corridors are and will be located in and across several cities in the MAG region, providing the potential for a robust network of HCT that connects the MAG region.

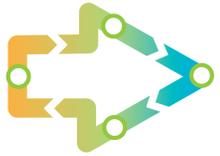
Demand will remain high in several areas of Phoenix, Tempe, Mesa, and Scottsdale. More areas that could support HCT will also emerge in Glendale, Scottsdale, Chandler, and Gilbert. Several corridors stand out with the highest underlying demand for transit service:

- In Phoenix, the highest demand will continue to be in the core areas of the city, along corridors that are already served by the existing light rail line, including 19th Avenue, Central Avenue, Camelback Road, and Washington Street
- Additional Phoenix corridors that can potentially support HCT in 2040 include Glendale Avenue, Indian School Road, Thomas Road, McDowell Road, 27th Avenue, 16th Street, and 24th Street
- Across Tempe and Mesa, demand for HCT is highest along Apache Boulevard/Main Street, which is served by the light rail line, as well as University Drive and Broadway Road
- North Scottsdale Road/Rural Road, which connects Tempe, Scottsdale, and northeast Phoenix, also stands out as a major corridor with very high transit demand in 2040

Travel flows across the MAG region are projected to increase significantly by 2040. The largest travel flows will continue to be focused around Phoenix and Tempe, with increasing daily trips around and across Glendale, Scottsdale, Mesa, and Chandler, with most of the largest trip flows located within Valley Metro's existing service area. Among home-based work trips, existing trip flows are projected to grow between central and eastern areas of Phoenix, between Tempe and southern Scottsdale, and between Tempe and southwestern Chandler.

2040 Corridors with Potential Demand for HCT





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3. FINDINGS AND NEXT STEPS

At present, the region's high volume transit services are either light rail or local bus. Other regions have been developing Bus Rapid Transit and a variety of enhanced bus services that fit in between light rail and local bus service. This study finds that there is very strong potential for the development of a robust HCT network throughout much of the region. It also identified the corridors that would best meet the study's goals and objectives and facilitated considerable technical analysis and modeling work to help inform future discussions on HCT corridors and potential modes.

However, there is still work that will need to be done before decisions can be made on which corridors or modes should be pursued. This includes:

- Community outreach to determine the level of support for individual corridor and additional issues that may need to be addressed.
- Additional work to select a preferred alignment in corridors where there are multiple options. While this study conducted scenario analyses to identify the strongest options based on this study's goals and objectives, there is flexibility in which corridors are ultimately pursued.
- More detailed analysis including the development of operating plans that would ensure effective integration of new HCT services with the rest of the network and how inter-jurisdictional services would operate.
- Conceptual design to determine which HCT modes would be physically feasible in each corridor.

The City of Phoenix has already begun to address the opportunity for new HCT services as part of its Transportation 2050 multimodal investment program efforts. Similar efforts will be needed to further the development of HCT outside of Phoenix. This could be accomplished through a single regional BRT study or individual efforts by communities desired to pursue HCT.

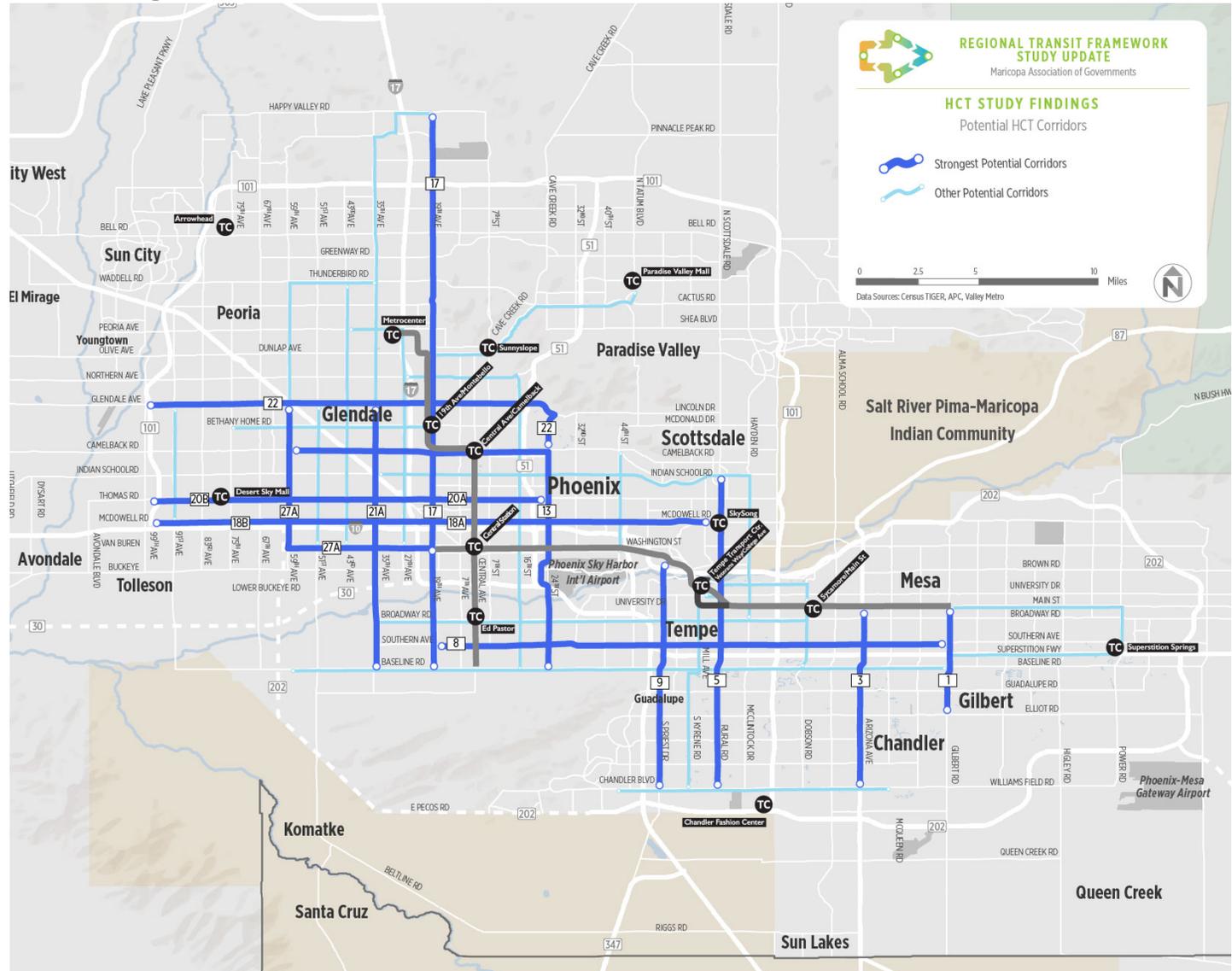
It should also be noted that some communities are currently studying the development of services that would go beyond what this study has found to have the highest potential for HCT. These efforts should continue, as more detailed feasibility analyses may reveal opportunities not otherwise identified in this high-level study. These opportunities could include the availability of special funding, successful efforts to focus development in defined areas, or changes in zoning and incentives to encourage Transit-Oriented Development (TOD).

Based on these considerations, the findings of this effort are presented in terms of which corridors would provide the strongest potential for future study. In addition to "other potential corridors." While additional work needs to be completed before final modes can be determined, all of the potential corridors shown on the map on the next page would attract sufficient ridership to support Enhanced Bus. Several could also support BRT or light rail, but not all.

Finally, it should also be noted that this study focused on high capacity transit. As the name implies, HCT services operate frequently and carry high numbers of passengers throughout the day; the services considered for this study



RTFSU Findings



were light rail, BRT, and Enhanced Bus. It did not examine commuter services that could carry high volumes of people but only during peak periods. MAG's Regional Commuter Rail System Study Update produced recommendations for the development of commuter rail, and there is also interest in a companion study effort to plan for the development of more robust express bus services throughout the region.

