SOUTHEAST VALLEY
TRANSIT SYSTEM STUDY

WORKING PAPER #6

TRANSIT NEEDS WITHIN THE SOUTHEAST VALLEY

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1.0 INTRODUCTION

This working paper analyzes transit needs within the Southeast Valley study area. Transit needs are defined as areas which may merit consideration for transit service based on their ability to support cost-effective ridership but currently lack existing service. The focus of this Working Paper is local and enhanced local bus service and express service; however vanpool, circulator or flex service, or other types of transit services may be considered as tools to meet some needs.

2.0 EVALUATION OF LOCAL AND LINK SERVICE

This analysis focuses on identifying local (local and key local) and enhanced local (LINK-style limited-stop) bus service needs in the study area. For this analysis, areas of need are defined as locations that deserve consideration for local or enhanced bus service based on land use, route connectivity, density, and other demographic characteristics. Basic local transit service is defined as 30-minute peak/30-minute off peak grid service for sixteen hours per day as currently defined in the Transit Standards and Performance Measures (TSPM) New Service Implementation Standards. The LINK services in the Southeast Valley are considered to be enhanced local services, which have limited stop service to connect to light rail transit (LRT), signal timing advantages, and specific branding.

Both services ought to support levels of productivity that promote the financial sustainability of the system. For the purposes of this analysis, productivity is defined in terms of the number of passengers per revenue hour of service because this metric relates the number of riders to the main driver of the actual cost of providing the service. Intervals defined for service productivity from Working Paper 4: Assessment of Existing Conditions were used for the thresholds for this analysis. This analysis does not assume fiscal constraints. Working Paper 9: Recommendations - will issue recommendations to meet the needs for future service considering real-world constraints and prioritization of service based on stakeholder input.

Three types of analyses were performed to determine areas of need, using the following data:

- population and employment density
- demographic indicators of transit dependency
- projected travel patterns

The initial analysis of population and employment density provided the basis for defining a general area that would be potentially supportive of local coverage. The analysis of transit dependent indicators was used to refine this area to include additional locations with concentrations of transit dependent households, and to identify potential priority areas for service implementation. Travel patterns were then reviewed to make sure no major trip interchanges were being overlooked.

Population and employment density is used to estimate effectiveness of potential transit investments regularly (Pushkarev and Zupan, 1977; ITE, 1989; TRB, 1996). Within the local

context, the MAG Sustainable Transportation and Land Use Integration Study found that the lower-end of population density desirable to serve with local transit service is between 15 to 30 persons/acre immediately along the corridor (9,600-19,200 persons/sq mi) with characteristics of urban form that easily orient residents to the street (MAG 2013).

Demographic characteristics are also commonly used to predict transit ridership because there is a strong correlation between low-automobile ownership rates and transit usage. Poverty is typically closely correlated with automobile ownership and is also used to predict transit usage. The TSPM effort is currently developing thresholds based on these characteristics to estimate the projected productivity of potential new routes. Travel patterns were used to confirm that major trip flows feasible to serve with transit were identified as needs.

Because this is a high-level analysis intended to create a desirable system coverage area based on density of population, employment, demographics and travel patterns, other localized characteristics such as urban form are not taken into account. These characteristics, however, significantly affect the successfulness of transit routes. The MAG Designing Transit Accessible Communities study provides a toolbox for addressing these urban form barriers to better connect potential markets to transit.

2.1 POPULATION AND EMPLOYMENT DENSITY ANALYSIS

Transit needs are defined as geographic areas that demonstrate land use and demographic qualities that merit consideration for transit investment. As previously discussed, population and employment density are strong indicators of whether or not an area will support productive local transit service. Thus, determining what level of density supports productive service in the local setting of the Southeast Valley is paramount to determining which currently unserved areas in the Southeast Valley may be able to support service.

To determine locally relevant thresholds for basic local (fixed route) transit, the study area was divided into four different zones shown in Figure 1. The zones are made up of TAZs that were grouped together based on the ridership productivity analysis (riders per revenue hour) performed in Working Paper 4 (shown in Table 1) and existing transit network configuration. These thresholds were developed based on previous professional experience of productivity ranges that would yield a reasonably cost-effective service with acceptable farebox recovery.

Table 1: Fixed Route Service Effectiveness by Productivity

Productivity in Boardings per Hour	Effectiveness of Service
0 – 15	Poor
15 – 30	Fair
30 – 45	Good
45 +	Very Good

SOURCE: Draft *Working Paper 4: Assessment of Existing Conditions*, October 2014

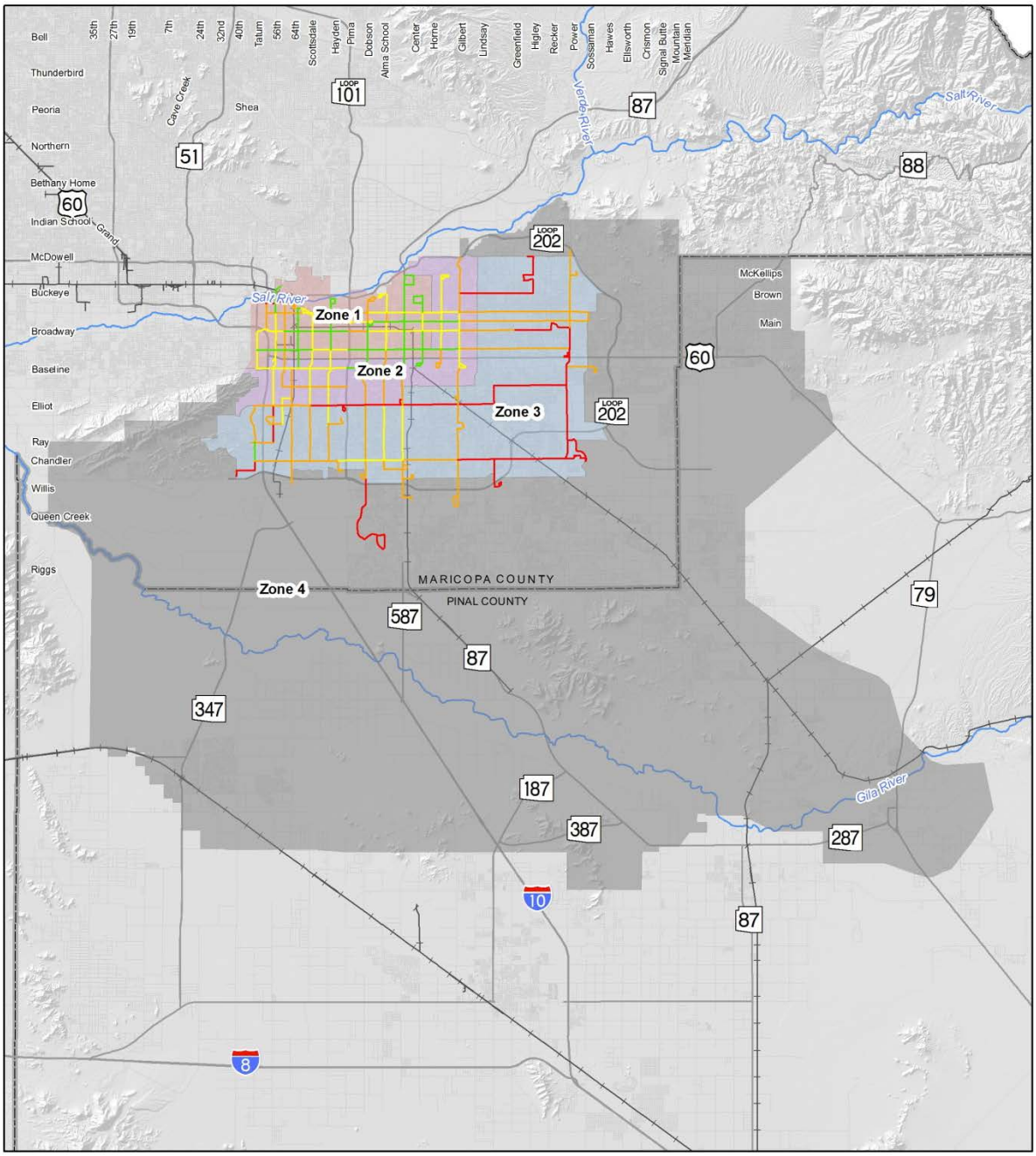
Zone 1 is made up of the the contiguous area with existing transit services performing primarily in the "Good" and "Very Good" classifications. This area has a near saturated network of grid routes, abundance of circulator services, enhanced local services, and high capacity transit. TAZs are almost always within a half mile of multiple north/south and east/west grid routes. The eastern boundary of the zone is roughly Horne Rd, the half-mile street between Mesa Dr. and Stapley Dr., and the southern boundary is approximately US 60.

Zone 2 is a transition area where "Fair" and "Good" performing segments are most common. In terms of network configuration this zone includes only TAZs that have regularly spaced grid routes within a half-mile. The grid is not always completely built out in this area nor is there a guarantee there are both east/west and north/south routes within a half-mile of a TAZ. Generally, however, there are transit services. This results in less network synergy than Zone 1, but some is still present. Lindsay Rd. is the eastern boundary of this zone. The southern boundary is Elliot Rd. west of Arizona Avenue and Guadalupe Rd. east of Arizona Avenue.

Zone 3 is the outlying area of existing transit coverage. Most segments within this area perform in the "Fair" range but "Poor" performing segments become more common. The only areas excluded in this zone with existing transit service are outlying route diversions. Zone 3 has coverage gaps so some areas have limited or no access to transit. For this reason network synergy is fairly low. The primary orientation of routes in the southwest portion of this zone is north/south while routes in the eastern part of this zone are primarily east/west oriented. This makes transfers to access the entire grid difficult and limits the practical destinations within the network. The eastern border of this zone is approximately Sossaman Rd. The southern border of this zone is approximately Pecos Rd.

Zone 4 is comprised of the remaining portion of the study area. This area has a wide range of population and employment densities from urbanized areas such as Apache Junction, to undeveloped areas of desert and rural communities such as portions of the Gila River Indian Community (GRIC). Some local transit exists within this area that includes outlying route diversions, turnarounds, demand response service, and the free-standing CART route in Florence and Coolidge. There is no network of services in this zone, and has relatively low amount of population and employment. Therefore, Zone 4 was not analyzed in the same manner as Zones 1, 2, and 3.

Figure 1: Needs Assessment Analysis Zones



Legend

Bus Boardings per Hour

- > 45 ~ Very Good Effectiveness
- 31 - 45 ~ Good Effectiveness
- 15 - 30 ~ Fair Effectiveness
- < 15 ~ Poor Effectiveness

- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary

Needs Analysis Zones

N

0 2.5 5

Miles

Source: Base Map: ALRIS 1997 - 2014, ADOT 2014.

Southeast Valley Transit System Study

2.1.1 Comparison of Zone Densities

A basic model was created to predict productive transit service based on the observed correlation between transit performance and population + employment density. Initially the relationship between productive transit service and population density was solely examined. The existing value for population density in the SEV which mainly supported "Good" service (Zone 1) was about 4,530 persons per sq mi, as shown in Table 2. All TAZs were examined within the SEV to see which met or fell beneath this threshold. Many of the TAZs within the study area, including many outside of Zone 1, met this threshold which suggests that the extent of area that could support productive transit is larger than the area that is currently served. However, the low productivity of route segments within many of these outlying TAZs demonstrates that population density alone is an insufficient predictor of productive transit.

Table 2: Population and Employment Density by Analysis Zone

Analysis Extent	2010 Pop Density	2030 Pop Density	2010 Emp Density	2030 Emp Density	2010 Pop + Emp Density	2030 Pop + Emp Density
Zone 1	4,530	5,813	3,727	5,295	8,257	11,108
Zone 2	4,741	5,245	2,276	2,831	7,017	8,075
Zone 3	3,661	4,368	1,658	2,359	5,319	6,726
Zone 4	454	750	93	242	547	992

SOURCE DATA: MAG 2013

Employment density was then evaluated as a sole predictor for transit productivity. Similar to the evaluation of population, TAZs with a value equal to or lesser than Zone 1's average, 3,727 per sq mi, were identified in GIS. In this instance the extent of the study area that was predicted to generate productive ridership was much smaller than the actual extent of route segments that currently support productive service. This suggests employment density on its own is also an insufficient predictor of transit productivity.

Finally, population and employment density were combined and compared to the existing study area densities. The average density for Zone 1 is 8,257 employees or residents per sq mi. When the study area TAZs were reviewed using these threshold values, they strongly corresponded to the TAZs through which productive route segments run (shown in Figure 2).

Since Zone 1 had the population and employment density necessary to support "Good" and "Very Good" transit service per the ridership effectiveness analysis, its average population + employment density (~8,250 per sq mi) was assumed to be the threshold density necessary to support "Very Good" and "Good" transit service throughout the Southeast Valley. Similarly, Zone 2 supported "Good" and "Fair" service (~7,000 per sq mi) and Zone 3 supported "Fair" and "Poor" (~5,300 per sq mi). As defined in Table 2, the overall demographics of Zone 4 are such that this portion of the SEV study area would not support productive all-day fixed route transit service (<600 per sq mi). However, there are concentrations of population located within this zone, like the City of Maricopa, that could support some level of transit service.

To determine future areas of need the study team used the same density thresholds with projected, year 2030 population and employment density. Figure 3 shows the combined density of population and employment by TAZ boundaries for 2030 with the 2035 RTP transit network which helps to identify a reasonable extent for supporting different levels of transit performance. Further evaluation of individual corridors in or near areas that appear to support transit service may be evaluated using the TSPM route analysis tool as study recommendations are developed.

Figure 2: Effective Service Area as Predicted by Population + Employment Density

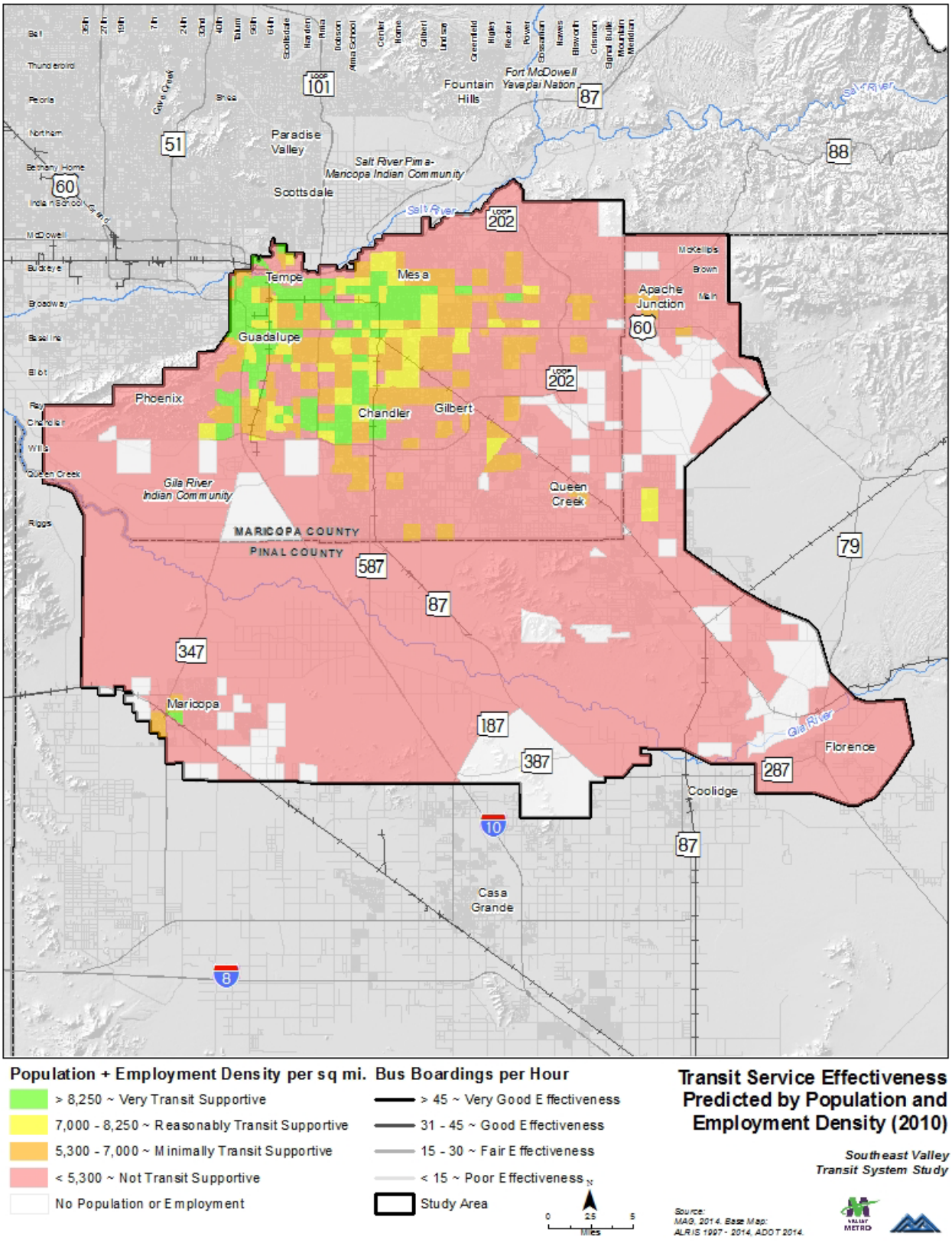
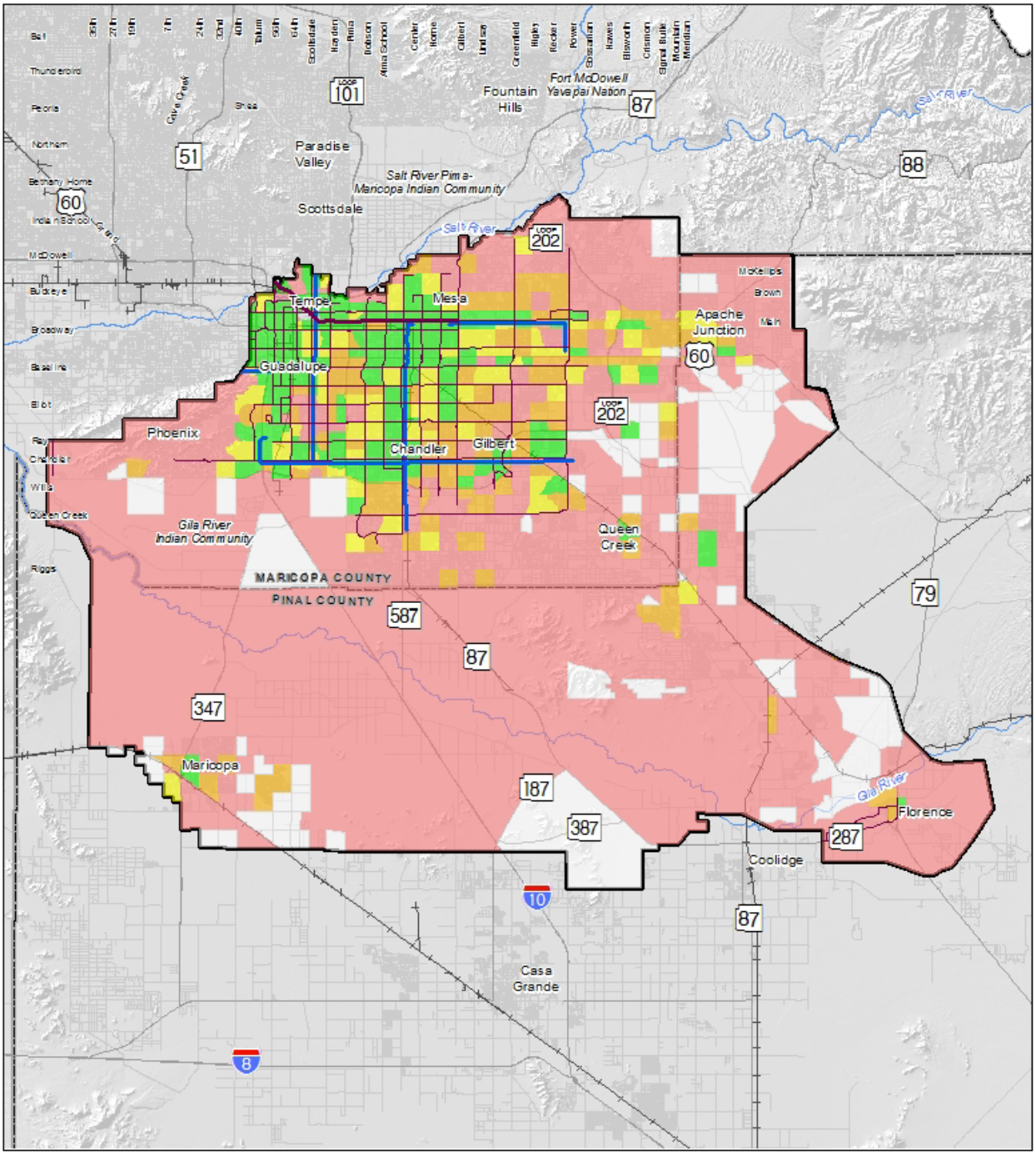


Figure 3: Study Area 2030 Combined Population and Employment Density (by TAZ)



Population + Employment Density per sq mi.
- > 8,250 ~ Very Transit Supportive
- 7,000 - 8,250 ~ Resonably Transit Supportive
- 5,300 - 7,000 ~ Minimally Transit Supportive
- < 5,300 ~ Not Transit Supportive
- No Population or Employment

Future Transit Network
- Light Rail
- LINK
- Local
- Study Area

- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary

Transit Service Effectiveness Predicted by Population and Employment Density (2030)

N
0 2.5 5 Miles

Southeast Valley Transit System Study

Source: MAG, 2014. Base Map: ALRIS 1997 - 2014, ADOT 2014.

2.1.2 Near Term Areas of Need

Near-term areas of need primarily include filling-in the grid within the extent of existing transit. East/west roads in the southern portion of the study area such as Baseline Rd, Elliot Rd, Warner Rd, and Ray Road all deserve further consideration for service expansion. At first glance Ray Rd and Baseline Rd seem the most promising for expansion due to serving more areas that would appear to support "fair" to "good" service. Elliot Rd and Warner Rd do not appear to support productive ridership, however, filling gaps within the existing grid coverage area will result in stronger network synergy even if segments of routes do not strongly perform on their own. Country Club Dr/Arizona Ave is being considered as a potential future HCT corridor. Recommendations from the Arizona Avenue High Capacity Transit Long Range Study suggest to become a viable HCT corridor further densification of the corridor in addition to expanded connecting local bus coverage and frequency is required (Valley Metro 2012). At this time, implementation of additional services east of Gilbert Rd. appears premature. Population and employment densities are not yet high enough to support effective service.

2.1.3 Future Areas of Need

By the early 2030s there appears to be a fairly strong match between planned transit services and areas with densities projected to support fair to good effectiveness. An exception to this is Queen Creek Road which seems to serve areas with densities that would result in poor effectiveness. As its implementation date approaches, this corridor should be evaluated using more nuanced tools such as the TSPM route analysis tool to determine if densities and demographics actually are supportive of effective transit service.

Areas that do not have service planned in the 2035 transit network that ought to be considered for transit service include a short, focused section of Lindsay (roughly Brown to Baseline) and extension of Main St, University Dr and/or Broadway Rd eastward into Apache Junction. Based on projected densities, extension of existing services to Apache Junction is anticipated to result in "fair" ridership, however as will be further discussed later, when demographic considerations such as income and zero vehicle households are included the likelihood of developing an effective corridor are greater. Furthermore, previous studies that have evaluated transit feasibility in Apache Junction have already championed connectivity to the regional grid along this corridor (ADOT 2012).

2.2 DEMOGRAPHIC ANALYSIS

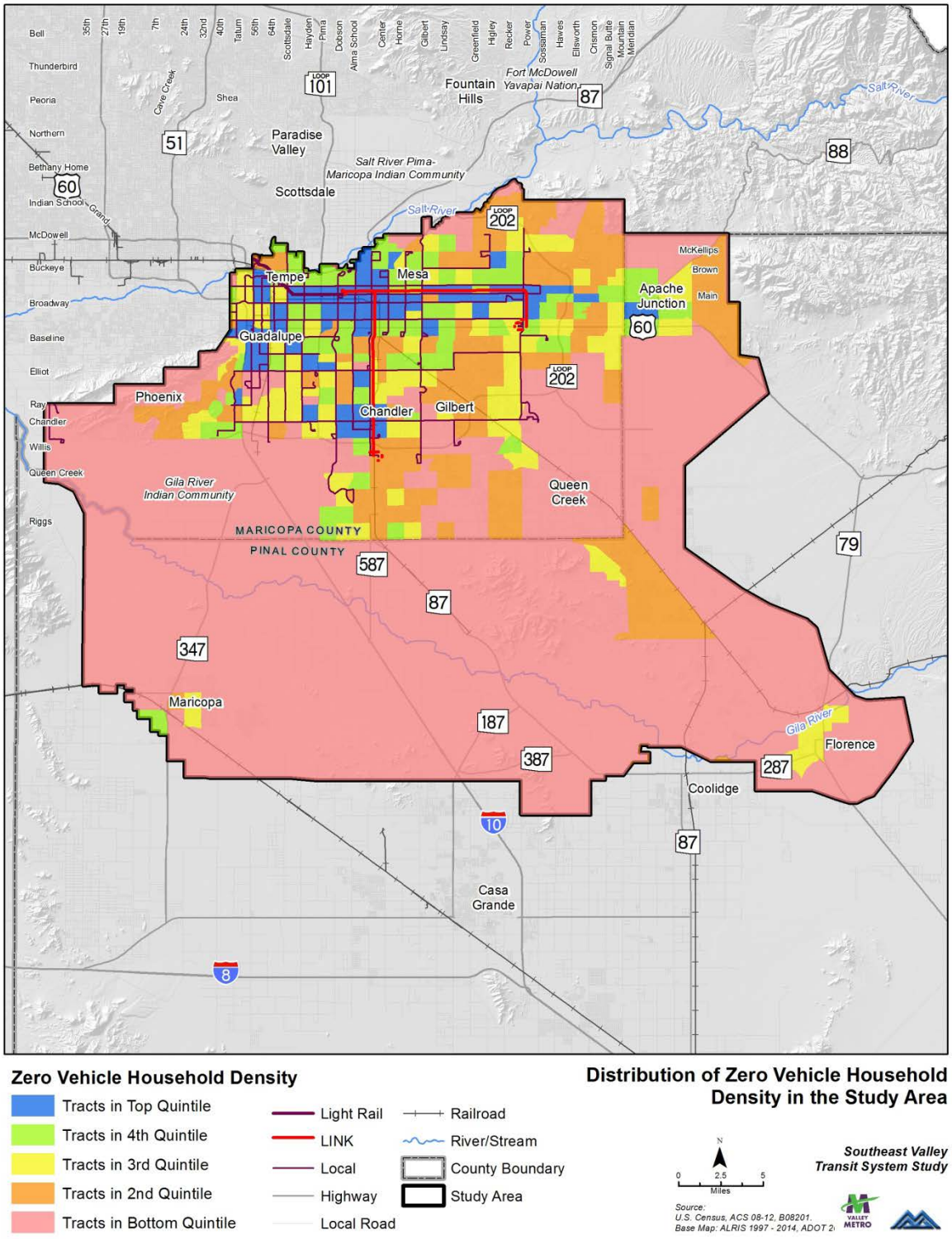
Demographic characteristics contribute significantly to the likelihood an individual will use public transportation. As discussed in Working Paper 2 and Working Paper 5, low-income persons and households with limited or no access to personal vehicles are very strongly correlated with transit dependency. U.S. Census data on this topic are often used to predict areas that will support transit in the near-term. The current TSPM project has developed a tool to analyze potential corridors' demographics and determine their suitability for transit implementation based on population density, zero vehicle household density, and population in poverty density. The tool was calibrated by correlating current route ridership with adjacent census tracts, and will be recalibrated annually. This tool may be used to further evaluate corridors under consideration for implementation in Working Paper 9: Recommendations.

In this needs assessment, however, demographic data such as zero vehicle households and low-income population are used as one component to verify whether or not serving areas with high population density and employment density still sufficiently serves transit dependent populations. Figure 4, Figure 5, and Figure 6 show the relative concentrations of transit dependents by quintiles. As can be seen, concentrations of zero vehicle households correlate very strongly with population in poverty while age has slightly more variability.

Of census tracts in the study area, the tracts with the greatest densities of transit dependents are mostly within the existing transit service area. Apache Junction, county islands, and eastern portions of Mesa on the Main St. and Broadway Rd corridors have some tracts within the top tier of density of transit dependency indicators for study area tracts but do not currently have transit service. Otherwise, the communities with the greatest concentrations of population with transit dependent characteristics are served. As stated in Working Paper 5, there are significant numbers of persons with transit dependent characteristics within the GRIC, however, the large size of analysis units (typically census tracts) cause densities to appear low. A more detailed analysis of the GRIC would need to be conducted to determine how densely concentrated population with transit dependents characteristics is within the community.

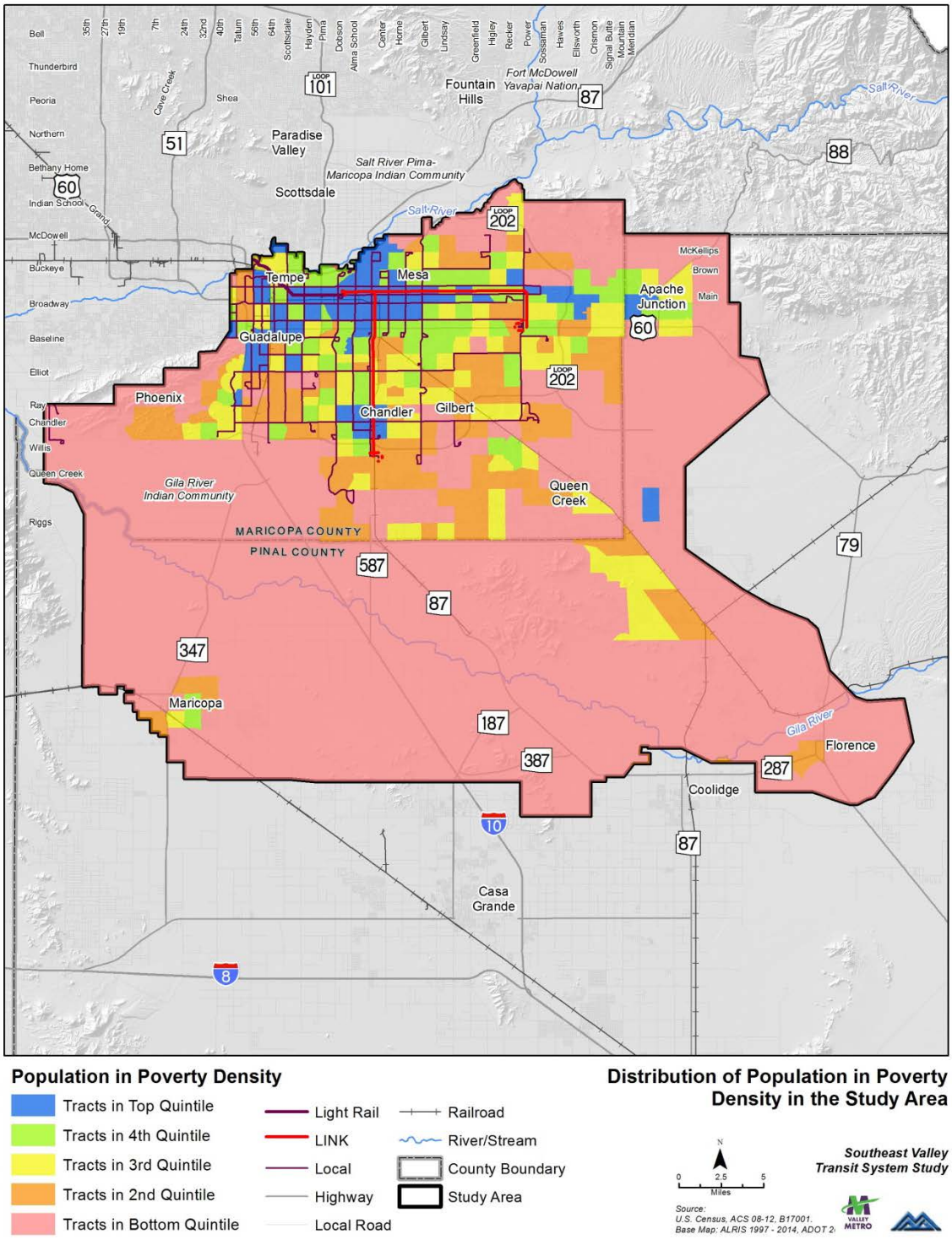
One area that may merit consideration for additional transit service based on its high concentration of transit dependents is the downtown Chandler area. This part of the study area has relatively high concentrations of people with characteristics of transit dependency but limited transit service. Three north/south routes serve the area (two of them on Arizona Avenue) and one east/west route. Extension of Mesa Drive south (called McQueen Rd in Chandler) and new service on Ray Rd. should be further evaluated as priorities for near- to mid-term future network expansion in Working Paper 9 based on potentially acceptable densities and transit dependents to serve. More long-term considerations may be given to extension of local routes to serve Apache Junction.

Figure 4: Zero Vehicle Household Density Shown in Quintiles



Source: U.S. Census, American Community Survey (08-12), Table B08201

Figure 5: Population in Poverty Density Shown in Quintiles



Population in Poverty Density

- Tracts in Top Quintile
- Tracts in 4th Quintile
- Tracts in 3rd Quintile
- Tracts in 2nd Quintile
- Tracts in Bottom Quintile

- Light Rail
- LINK
- Local
- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary
- Study Area

Distribution of Population in Poverty Density in the Study Area

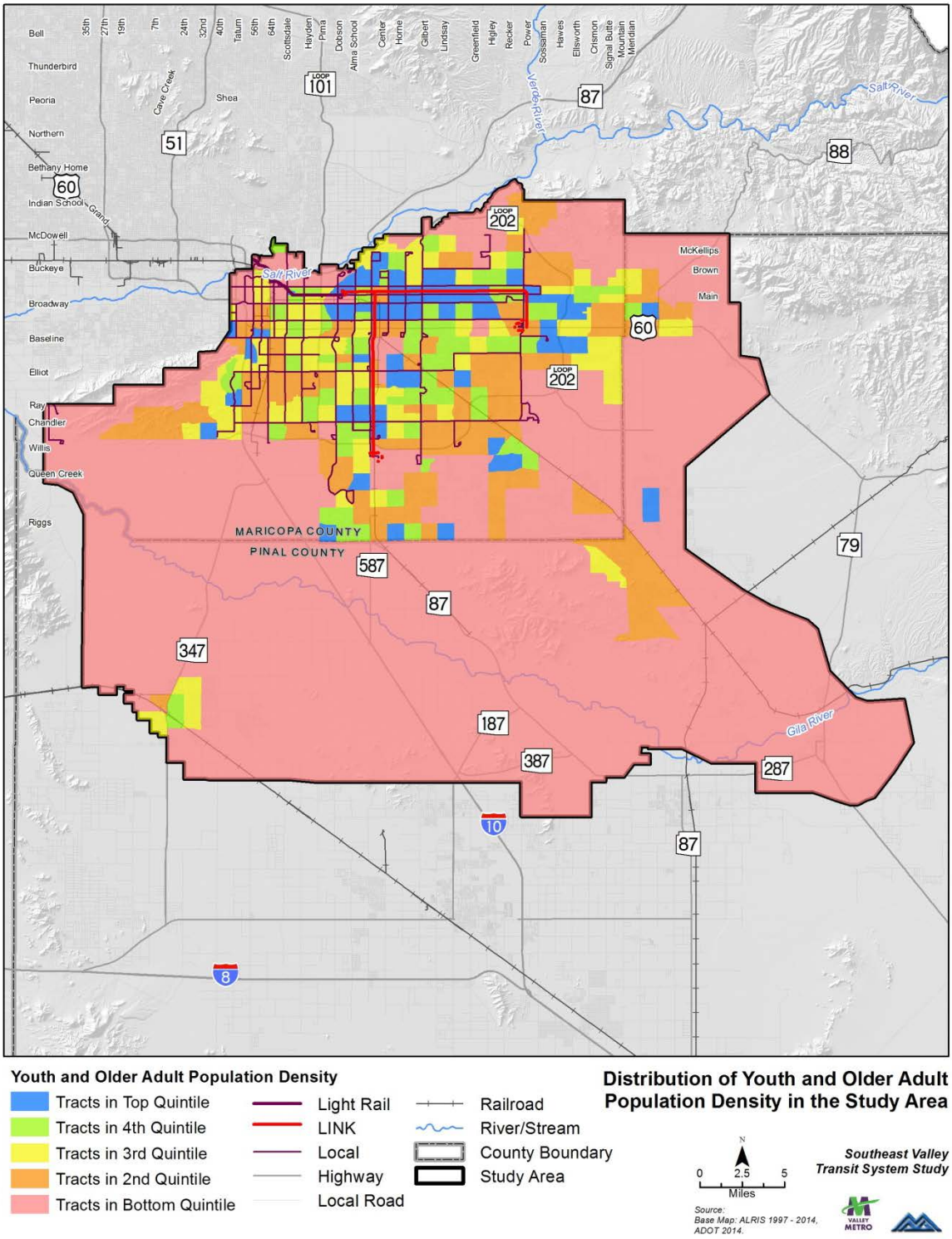
N
0 2.5 5 Miles

Southeast Valley Transit System Study

Source:
U.S. Census, ACS 08-12, B17001.
Base Map: ALRIS 1997 - 2014, ADOT 2

Source: U.S. Census, American Community Survey (08-12), Table B17001

Figure 6: Distribution of Youth and Older Adult Population Density in the Study Area



Source: U.S. Census, American Community Survey (08-12), Table B18101

2.3 TRAVEL PATTERNS ANALYSIS

Building on previous work completed in Working Paper 5: Travel Patterns, the volume of trips within study area districts and between neighboring study area districts were evaluated to examine the strength of trips interchanges and identify areas of greatest need. In this evaluation the *density* of trips were analyzed to determine which districts had the greatest internal trip generation and exchange between neighboring districts on a per sq mi basis. The more trips a sq mi produced or attracted, the more competitive and feasible the area is to serve with transit. Figure 7 and Figure 8 show the existing and future density of internal trips by study area district, respectively.

Currently, the areas with highest densities of district trips that are satisfied internally are in the northwest portion of the study area. The density of trips tends to decay as one heads south and southeast from north Tempe. This is still projected to be the case by 2035. North Tempe will grow the most in terms of density of trips but other suburban study area districts in Chandler, Gilbert and Mesa (notably districts 7-11) are expected to have significant increases in internal trip density, especially the Mesa Gateway district (11). This corroborates the findings of the population + employment density analysis. Districts 8, 14, and 15 have the best performing transit service, highest population + employment densities, greatest concentrations of transit dependents, and as can be seen in Figure 7 and Figure 8, the highest density of trips internal to the district. Matrices showing the density of trips between districts for 2012 and 2035 are in Appendix A.

Taken altogether the analysis of travel patterns and density of trips attracted/produced does not suggest there are additional areas of unmet need beyond what was identified through the population and employment density analysis. In fact the analysis further reinforces that the areas with greatest population + employment density and population with indicators of transit dependency are the areas that also have the greatest number of trips produced and attracted on a per sq mi basis.

Figure 7: Density of Trip Flows Within Study Area Districts (Existing)

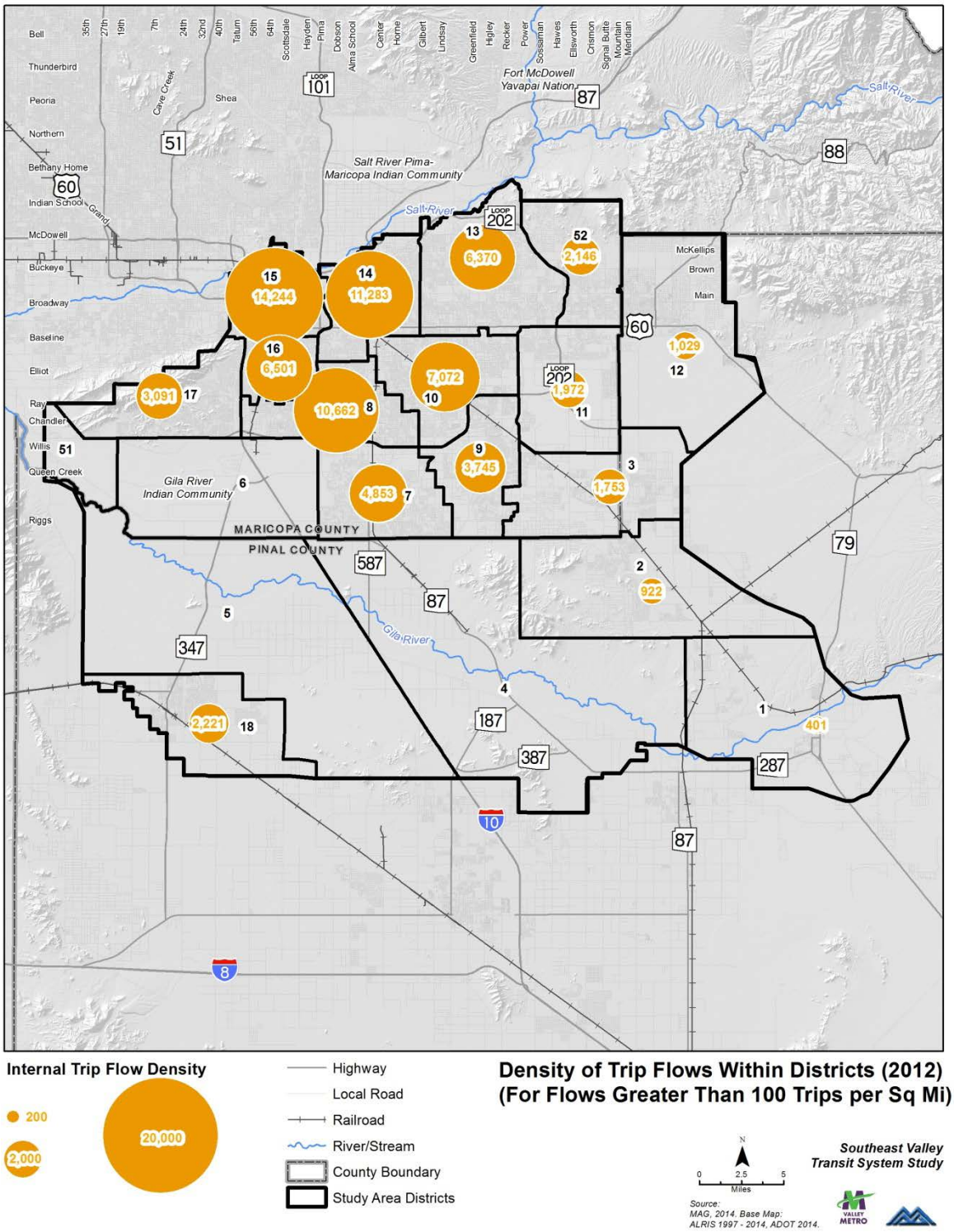


Figure 8: Density of Trip Flows Within Study Area Districts (Future)

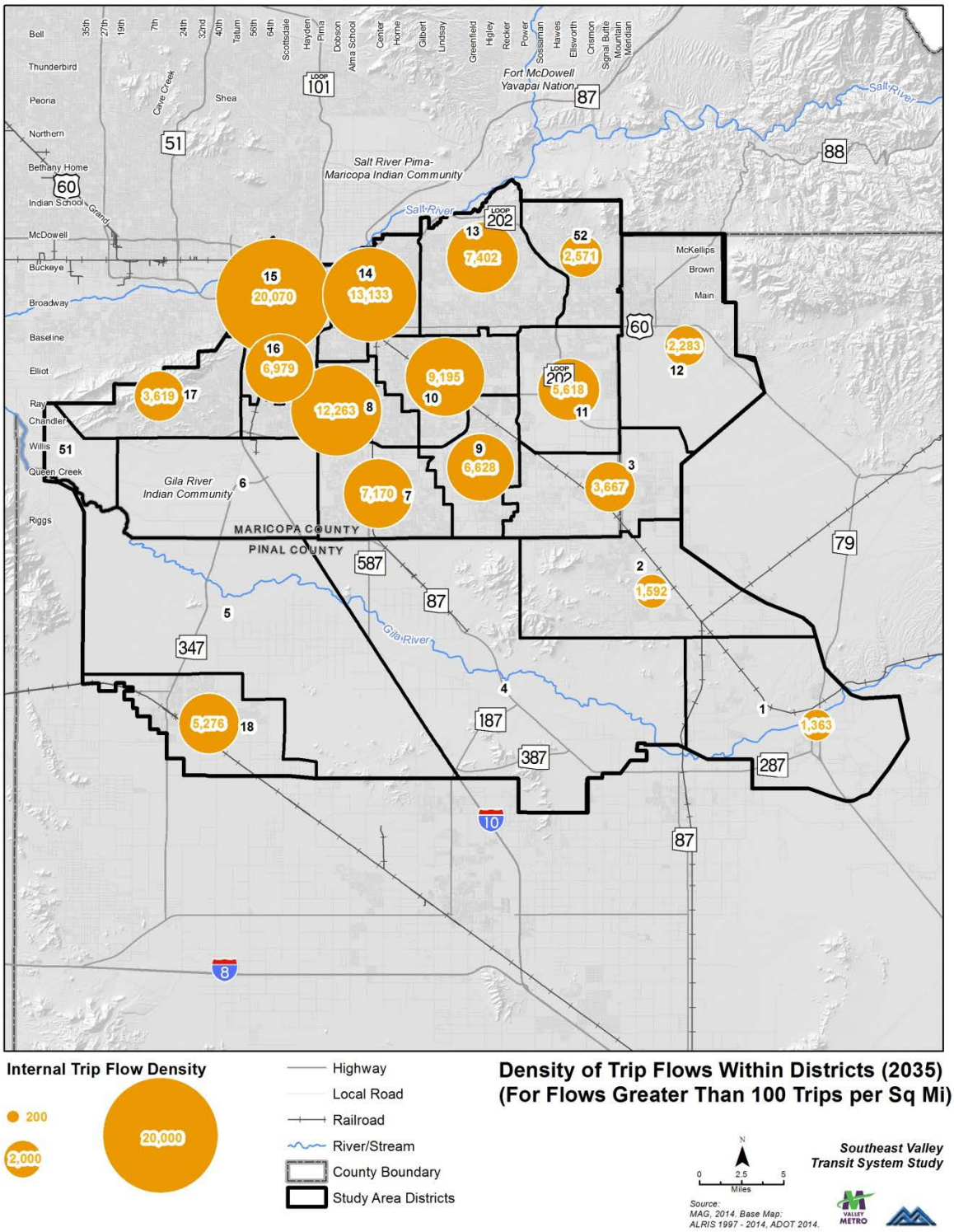
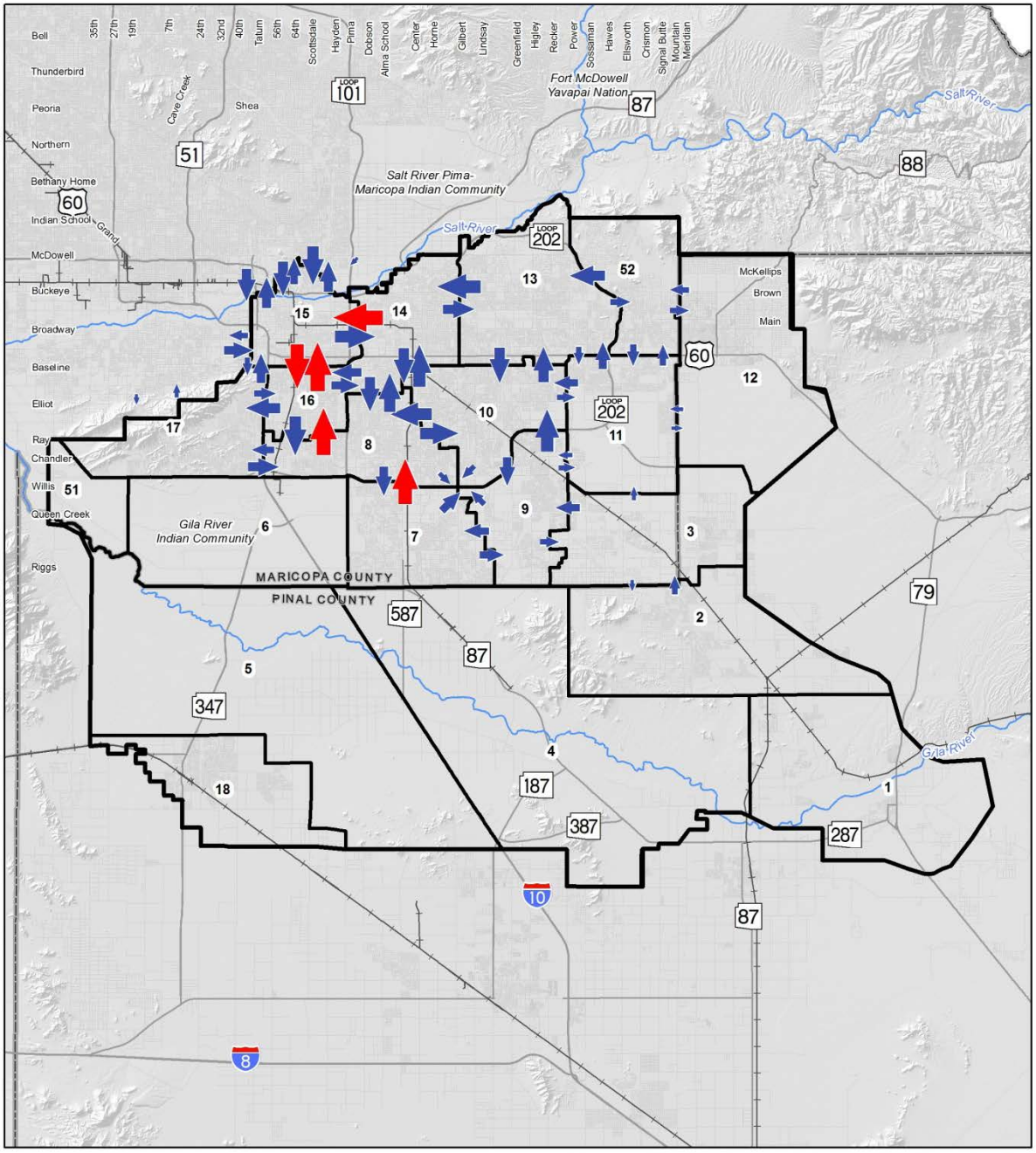


Figure 9: Density of Trip Flows Between Study Area Districts (Existing)



External Trip Flow Density

- 100
- 500
- 1,000
- Top Five Flows

- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary
- Study Area Districts

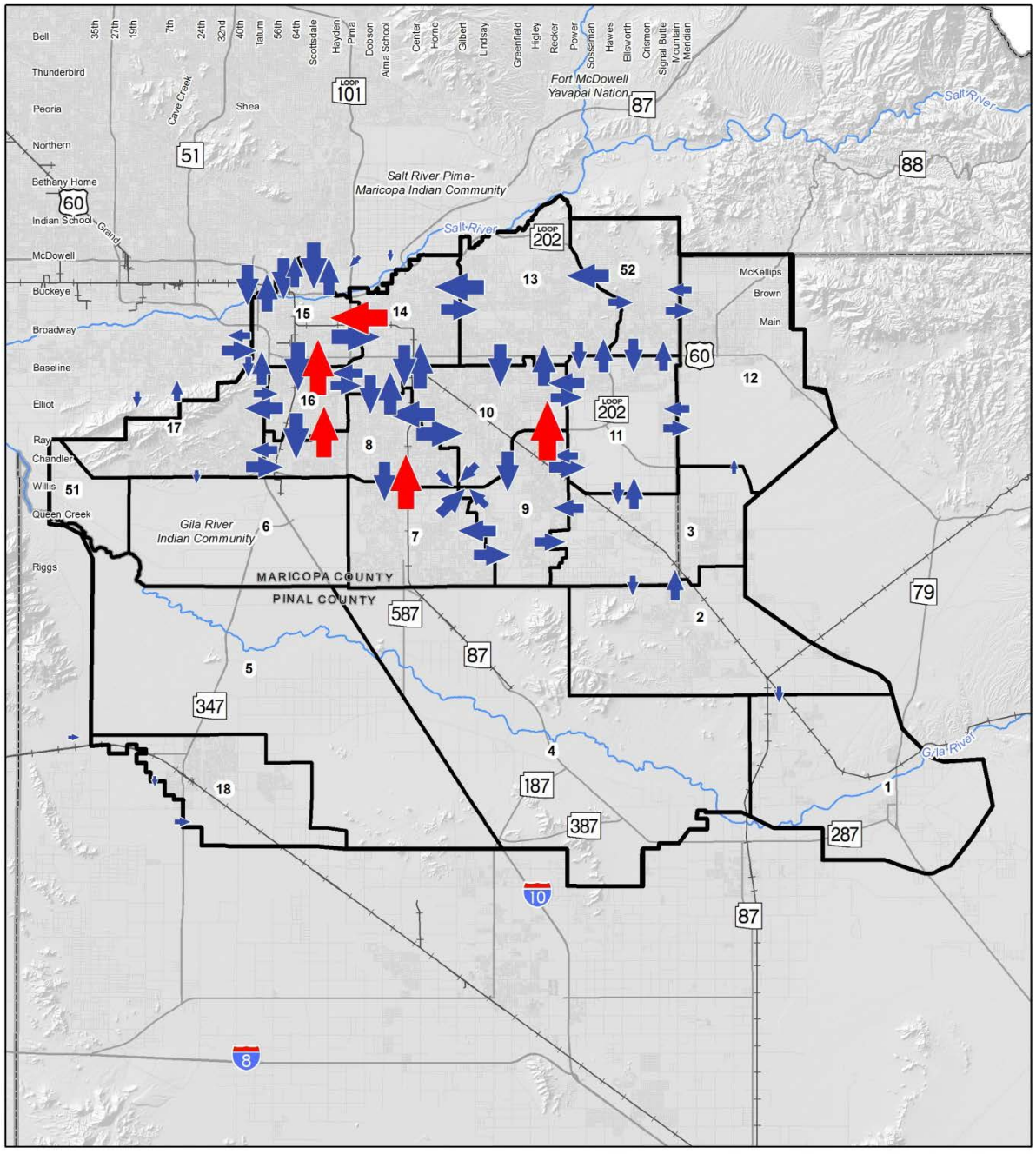
Density of Trip Flows Between Districts (2012)
(For Flows Greater Than 50 Trips per Sq Mi)

N
0 2.5 5
Miles

Source: MAG, 2014. Base Map: ALRIS 1997 - 2014, ADOT 2014.

Southeast Valley Transit System Study

Figure 10: Density of Trip Flows Between Study Area Districts (Future)



External Trip Flow Density

100
500
1,000
Top Five Flows

Highway
Local Road
Railroad
River/Stream
County Boundary
Study Area Districts

Density of Trip Flows Between Districts (2035)
(For Flows Greater Than 50 Trips per Sq Mi)

N
0 2.5 5
Miles

Southeast Valley Transit System Study

Source: MAG, 2014. Base Map: ALRIS 1997 - 2014, ADOT 2014.

2.4 NEEDS IDENTIFIED IN OTHER PLANS AND STUDIES

Potential transit needs identified by stakeholder communities and jurisdictions are shown in Appendix B. Mesa's recently adopted plan identifies route expansion of existing east/west routes as a long term goal. Some routes are extended beyond the eastern extent of the Loop 202. Potential further investment in the Power Road corridor includes the possibility of HCT. Chandler and Gilbert's plans primarily call for coordinated extension of existing routes into and between their jurisdictions or implementation of new services within the existing local transit coverage area. New services on Val Vista Drive, Ray Road, McQueen Road, and perhaps Queen Creek Road are all identified. Potential long-term HCT investments on Williams Field Road/Chandler Boulevard and Arizona Avenue are also identified.

The City of Tempe adopted an update to its transportation master plan in December 2014. This plan recommends Rural Rd. and Southern Ave. for enhanced bus services and transit service improvements on local routes 45, 48, 56, 61, 72, and 77. Longer term recommendations include new high capacity transit on Rural Road and a streetcar system in the downtown area.

Other outlying communities such as Queen Creek, Apache Junction, and Pinal County have evaluated the feasibility of implementing future transit service. Recent studies identify a need to connect Apache Junction to the existing grid along Broadway Rd or Main St./Apache Trail and also recommend the development of internal transit circulation within the community. As identified in the Draft Queen Creek Transit Study, current travel demand and patterns within Queen Creek are not yet supportive of fixed-route service so subsidized vanpool is suggested for the short-term. Due to the existing rural and undeveloped nature of Pinal County, the Pinal County Transit Feasibility Study's focus is mainly placed on regional connectivity of the noncontiguous communities in Pinal County with each other and Maricopa County communities. Needs identified include express transit services to serve commuter markets including the airport and downtown Phoenix from the City of Maricopa and feeding the grid network with express services connecting San Tan Valley and Queen Creek to the Superstition Springs Transit Center. Regional routes are suggested for implementation between Florence, Coolidge, Eloy and City of Maricopa to a central hub in Casa Grande.

Appendix B includes relevant maps from these plans of future transit service.

3.0 EXPRESS SERVICE ANALYSIS

Express services are designed to serve commuter markets (i.e. work trips). Express services are typically peak commute period, peak commute direction oriented. Certain characteristics are necessary to support this type of service effectively. Typically, the destination has to be a regional center or sub-center with a very high concentration of employment. This employment typically needs to be oriented to typical work periods such as 8 AM – 5 PM. For this reason, office-based work, especially government jobs, tend to be practically served with express services.

Other important characteristics necessary to support Express include low availability/high cost of parking at the work place and distance commuted. Commuters to places with constraints on parking, especially limited availability or high cost, are more likely to view Express service as attractive . Commuters to areas with these constraints are more likely to commute by transit because of the additional time and/or monetary cost of using a personal auto.

Express service typically also needs to serve residences far enough away from the employment center that savings are experienced by the rider in exchange for the inconvenience of using a bus instead of his/her personal auto. The Draft TSPM New Service Implementation Standards suggest at least eight miles. A challenge for effective express service is that the more distance the service travels between its origin and destination, the more operating cost and subsidy per passenger needed to operate the service. Hence the further the distance the express service travels, the more competitive it is for the customer but also the more cost borne by the service provider.

A list of reasonable destinations that may be able meet these criteria in the Phoenix metropolitan area includes:

- Downtown Phoenix (already supports express service)
- Sky Harbor International Airport
- Downtown Tempe/ASU Main Campus

All three of these locations have parking costs in addition to being significant trip attractors. Currently, downtown Phoenix is the only of the three that currently supports express services. Three express services, one from Queen Creek, one from the City of Maricopa, and one from Scottsdale Airpark, previously served downtown Tempe but were canceled due to low demand or funding shortfalls.

An *Employment Analysis Memorandum* (June 2012) was prepared as part of MAG's Sustainable Transportation and Land Use Integration Study (ST LUIS) and provides additional information on transit supportive industries that may be suitable for Express service.

3.1 METHODOLOGY FOR DETERMINING EXPRESS SERVICE SUPPORTIVE CONDITIONS

Similar to the analysis of local services, characteristics that support express service within the local context of the study area were evaluated. To maintain compatibility and transferability with TSPM Implementation Standards for New Service, Trip Reduction Program (TRP) data, origin-destination data available for residence and employer through the U.S. Census Bureau (Longitudinal Employer-Household Dynamics Survey [LEHDS]), and existing express route ridership/performance data were initially used to determine what characteristics support express service in the study area.

Since express services are designed to serve long distance origin-destination pairs (connect one or a few residential areas and one or two major employment center[s]), there must be sufficient work trip travel demand during the travel period the service operates. Generally, a nine square mile area enlarging in a tear-drop shape away from the pick-up location (typically a park and ride near a freeway on-ramp) is considered a reasonable catchment area for express service assuming there is parking available at the pick-up location. TRP, LEHDS data, MAG travel demand model data, the MAG employer database, and Valley Metro historical ridership data were all used to estimate this. TRP data is local survey data collected by the Maricopa County Air Quality Department. Employees at organizations with 50 or more employees are required to fill out the survey which asks questions about travel behavior for an average week. The LEHDS data provides origin-destination pairs at the census block level between employer address and residential address for employees. The MAG employer database is a spatial dataset of employers with more than five employees for the whole region. It includes NAICS code and number of employees employed.

Once areas are identified that have significant trip interchanges with the major employment center in question, a reasonable mode share for trips to the major employment center must be determined. Typical transit mode share at the national level *for commute trips* is just under 5%, however, mode share for commute trips to major employers may have different transit mode shares because of qualities unique to that destination (AASHTO, 2013).

To determine a reasonable mode share for commuters within the context of the study area, Valley Metro average weekday ridership for express services was calculated. In FY13, on average, 7,146 boardings were made on express/RAPID bus routes to downtown Phoenix on a typical weekday throughout the MAG region. This results in approximately 3,600 persons per day each making a round trip. Compartively, the SEV accounts for approimatley 35% of the total region-wide express/RAPID trips totally roughly 2,500 round trips per weekday. The number of Downtown Phoenix employees, including the State Capitol Complex, which is also served by express/RAPID bus, was estimated to be approximately 48,000 employees for 2010 using demographic data from the MAG travel demand model (MAG 2013). The MAG model predicts nearly 50,000 daily home based work trips in the peak period to this same geographic area for 2012. Almost 8,000 of these originate from the study area. Assuming approximately 3,600 round trips out of the 50,000 made per day to downtown Phoenix yields a 7.2% express/RAPID mode share. Because express/RAPID service does not serve

everywhere in the region, the mode share from the origin areas it currently serves must be greater than 7.2%.

Contrasting this data is the TRP survey which is required to be filled out by all employees for firms with 50 or more employees. According to the MAG employer database this includes about 38,300 employees in downtown Phoenix. Twenty-five thousand survey responses were received for employers in the downtown Phoenix area. Respondents of this survey indicated how frequently per week they used various modes to access their workplace. Based on these survey results, the bus mode share of commute trips to downtown Phoenix is 15.6% (the survey does not distinguish between local or express/RAPID services). Discrepancy between these two highly different mode shares can possibly stem from inclusion of local transit riders in the TRP data and sample bias. TRP data is only collected for organizations enrolled in the TRP which is only a portion of employers. In addition, enrolled organizations are required to provide subsidized transit passes to their employees which makes employees more likely to use transit services.

In general, a viable express service would complete at least four trips each peak direction (AM and PM) that are at least ¾ full. This means a service must be able to attract an estimated 140 daily commuters (each making a roundtrip) from a reasonable catchment area. Based on previous park and ride planning experience, a nine sq mi catchment area is generally assumed to be reasonable. Assuming these conditions, this means a viable express service to downtown Phoenix or other employment destination would need 820 (assuming TRP mode share) to 1,900 (assuming ridership and MAG model mode share) work trips in the peak period headed to the employment destination within the reasonable catchment area. The TSPM thresholds stipulate that new Express services must serve one of the top 10 employment districts in the region as well as an existing commuter-based market on a freeway corridor, which is defined as an estimate 6,400 person trips in the market and a corridor greater than 8 miles in length.

3.2 EXPRESS NEEDS IN THE STUDY AREA

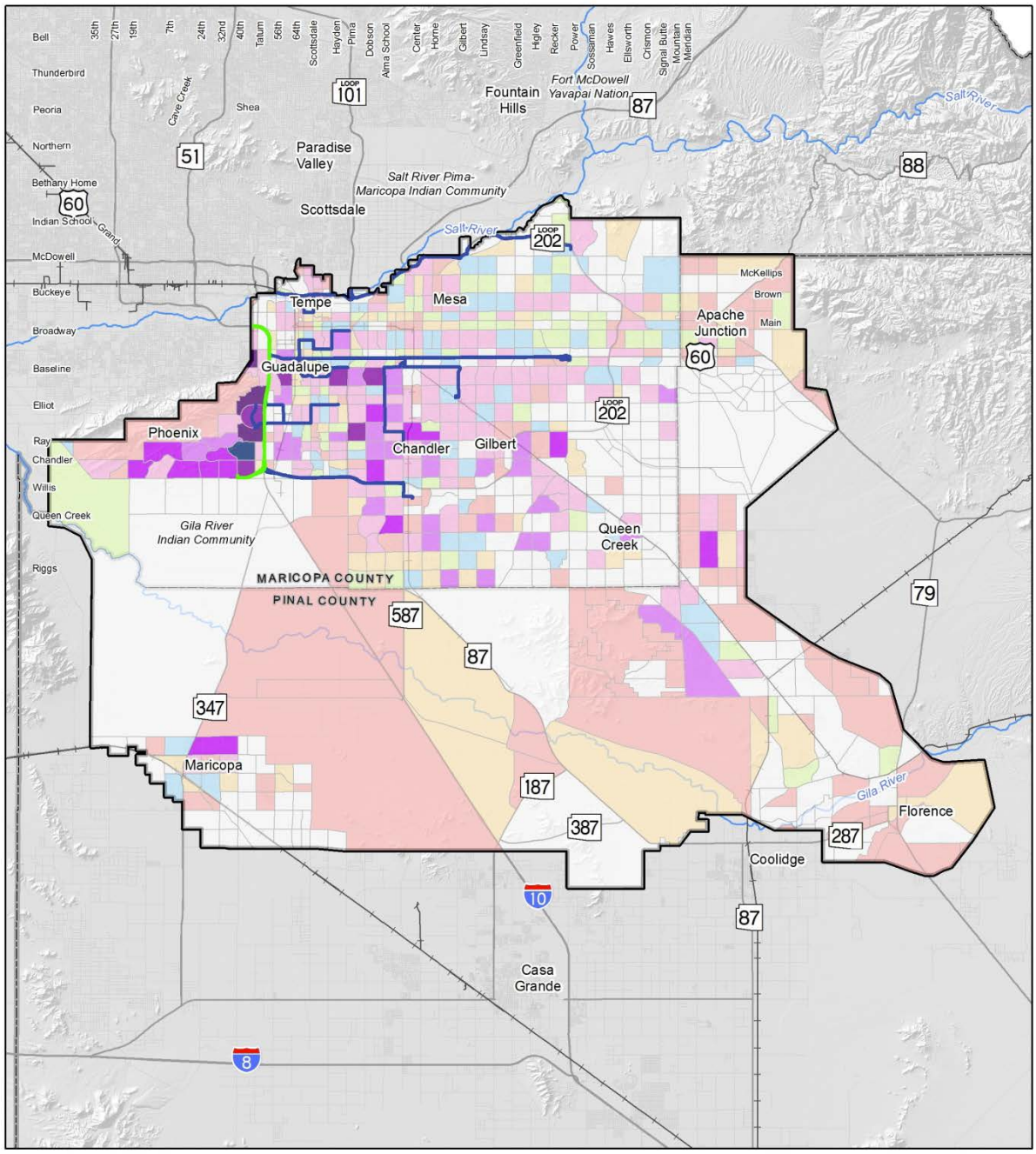
Figure 11 shows where downtown Phoenix employees live using LEHDS data. Figure 12 and Figure 13 show the projected number of home based work trips to downtown Phoenix for 2012 and 2035 from the MAG travel demand model, respectively. All three figures corroborate that the areas with highest concentrations of downtown Phoenix commuters are already currently served by express/RAPID service. TAZs in Ahwatukee and south of the US 60 in Tempe and Chandler have the most significant concentrations of downtown Phoenix bound commuters and also have the highest level of investment in express services. At the current level of evaluation, further expansion of express services beyond the current extent seems unwarranted. Exceptions to this include Queen Creek and the City of Maricopa, however, express services both previously served these communities but were canceled. Service in the City of Maricopa was canceled because the service was too costly while a pilot service in Queen Creek served downtown Tempe instead of downtown Phoenix and had poor ridership.

Solely based on comparison to characteristics of downtown Phoenix, both Phoenix Sky Harbor airport and Tempe/ASU are unlikely at this time to support effective express service. The amount of employment in both locations is significantly smaller than downtown Phoenix. Phoenix Sky Harbor airport and downtown Tempe attract 34% and 38% as many home based work, peak period trips as downtown Phoenix, respectively. By 2035 both are projected to still only attract around 50% as many peak home based work trips as downtown Phoenix does today. This results in lower densities of home based work trips on the origin end to downtown Tempe/ASU and Phoenix Sky Harbor airport which means less potential ridership per catchment area. Furthermore, since downtown Tempe/ASU and Phoenix Sky Harbor are both closer to study area TAZs than downtown Phoenix, the TAZs of the study area that are sufficiently far enough away from the destinations to experience substantial time saving/cost saving benefits to the user are much fewer- especially for downtown.

In addition, much of the employment at Phoenix Sky Harbor and downtown Tempe/ASU may not appropriate to serve with express. “Nine to five” office/professional services make up a relatively small composition of the airport’s employment mix. Employees are arriving at and egressing from the airport throughout the whole day. Similarly, downtown Tempe has a temporal split for its employment. Some employment has typical daytime shifts but a substantial portion of its employment is entertainment/service-related so many employees work in the evenings/nights. The dispersed temporal nature of work shifts at these locations makes serving them with express less practical, however, serving them with local and HCT transit investments is very practical. Both downtown Tempe and the airport are well connected with local and HCT services.

In light of the preceding constraints on effectively implementing express service at the airport or downtown Tempe, there are no identified needs for express service to either of these locations at this time. Future conditions may warrant further evaluation if the volume of “nine-to-five” employment increases.

Figure 11: Commuters to Downtown Phoenix by TAZ



Number of Workers

- 201 - 300 Workers
- 151 - 200 Workers
- 126 - 150 Workers
- 101 - 125 Workers
- 76 - 100 Workers
- 41 - 75 Workers
- 31 - 40 Workers
- 21 - 30 Workers
- 11 - 20 Workers
- 1 - 10 Workers
- No Workers
- Express
- RAPID
- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary
- Study Area

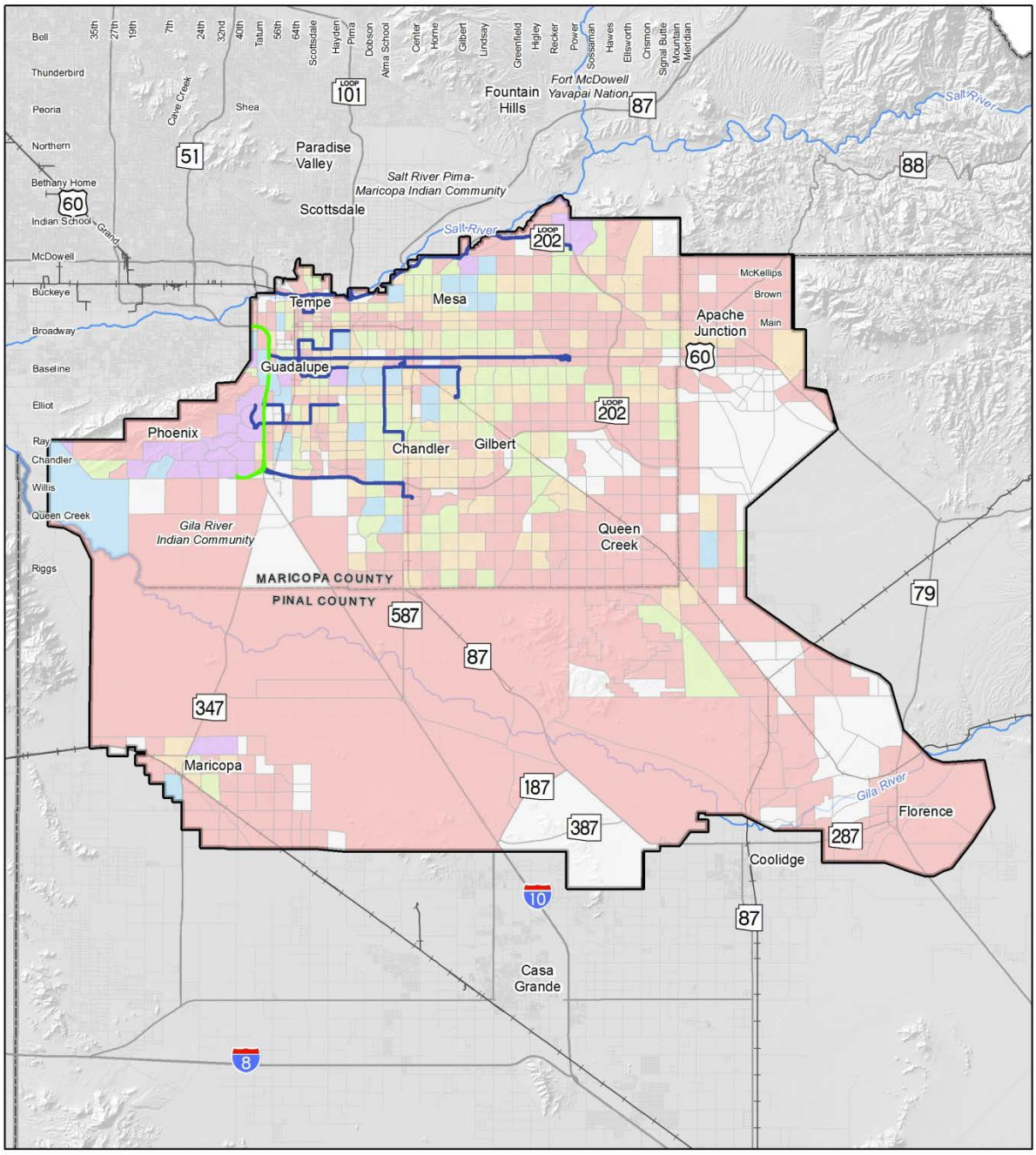
Where Downtown Phoenix Workers Live

0 2.5 5 Miles

Source: LEHD 2011
Base Map: ALRIS 1997 - 2014, ADOT 2014.

Southeast Valley Transit System Study

Figure 12: Home Based Work Trips to Downtown Phoenix (MAG Model 2012)



Commute Trips to Downtown Phoenix

- > 40 Trips
- 31 - 40 Trips
- 21 - 30 Trips
- 11 - 20 Trips
- 1 - 10 Trips
- No Trips

- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary
- Study Area

- Express
- RAPID

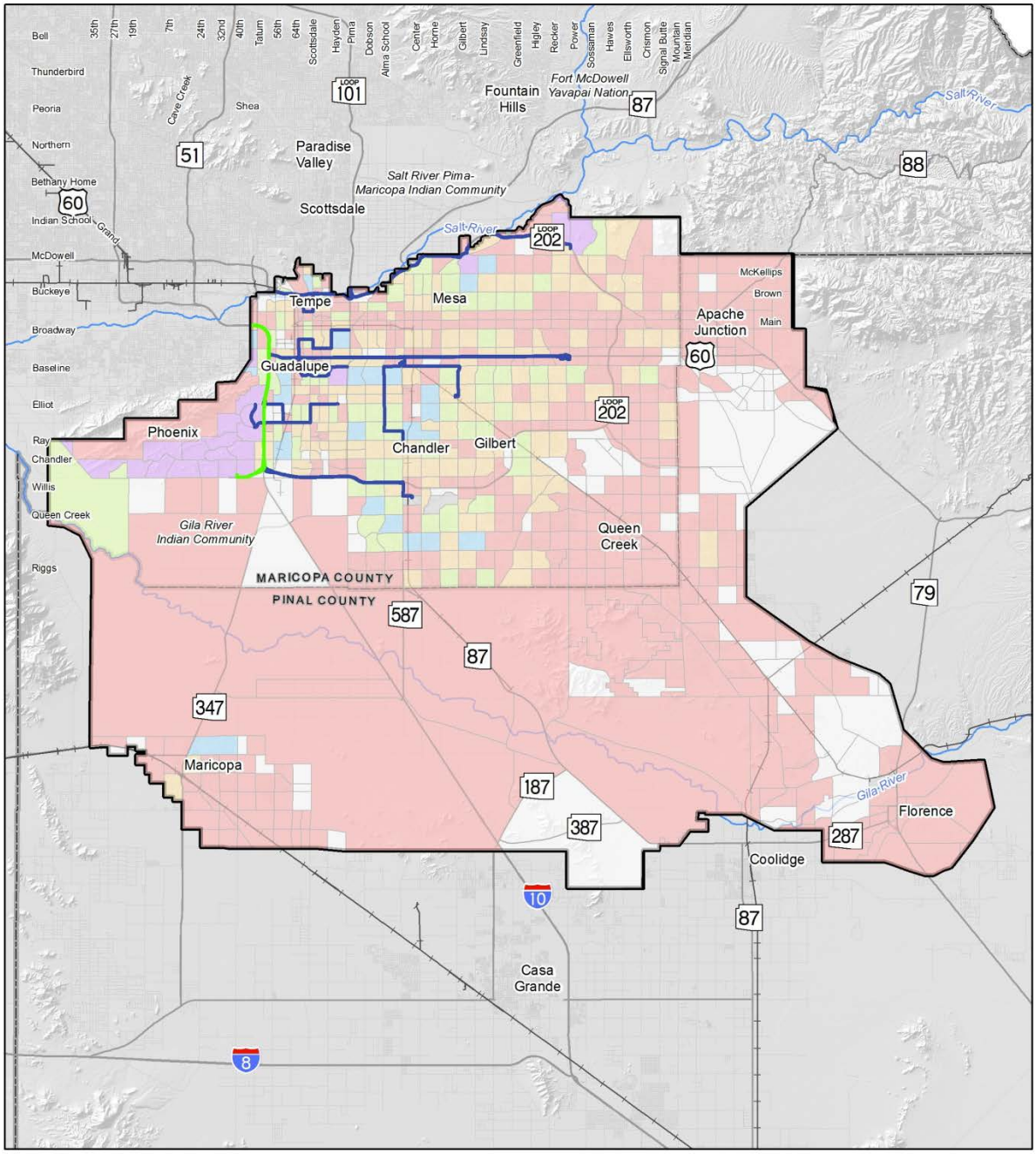
Downtown Phoenix Home Based Work Trips (MAG Model) for 2012

N
0 2.5 5
Miles

Source: MAG 2014.
Base Map: ALRIS 1997 - 2014, ADOT 2014.

Southeast Valley Transit System Study

Figure 13: Home Based Work Trips to Downtown Phoenix (MAG Model 2035)



Commute Trips to Downtown Phoenix

- > 40 Trips
- 31 - 40 Trips
- 21 - 30 Trips
- 11 - 20 Trips
- 1 - 10 Trips
- No Trips

- Highway
- Local Road
- Railroad
- River/Stream
- County Boundary
- Study Area

- Express
- RAPID

Downtown Phoenix Home Based Work Trips (MAG Model) for 2035

N

0 2.5 5 Miles

Source: MAG 2014.
Base Map: ALRIS 1997 - 2014, ADOT 2014.

Southeast Valley Transit System Study

4.0 CIRCULATORS AND FLEX SERVICES

Circulators are designed to serve important local destinations that would typically require transfers on the local bus system. Circulators are usually reserved for two types of application:

1. Dense areas with high concentrations of transit dependents and important "neighborhood" destinations, and;
2. Within small communities that lack local service to reach activity centers of major importance within the community (ie. hospitals, grocery stores, public facilities, etc.).

Flex services typically operate on the fringe of the local transit network, providing basic mobility to transit dependents living near the grid extent. Flex services typically follow a basic route at low frequencies and deviate up to a certain distance from the route to better serve rider origins and destinations. Flex services are often used to meet senior mobility needs in a more cost-effective manner than paratransit type services. They are also often used as a forerunner to full-fledged local service in areas that may not yet have the characteristics to support local service.

Because of the highly localized nature of circulator services, identifying specific routes for circulator service is too granular for this analysis of the entire Southeast Valley study area transit system. However, areas of need can be identified for further evaluation based on general characteristics of the areas. Potential applications of flex services, however, may be formulated during the development of recommendations.

Outlying communities such as Florence, Queen Creek, Apache Junction, City of Maricopa, and the GRIC should all be considered and evaluated for circulator services to help meet the most basic mobility needs of transit dependents within the respective communities. Florence currently has some basic internal circulation through the CART and the City of Maricopa has the COMET system, and plans for both Apache Junction and the GRIC recommend the adoption of at least one circulator route in each community. Apache Junction, Maricopa County islands, and portions of eastern Mesa that abut those areas deserve additional consideration for preliminary flex services considering their older adult demographic and pockets of population/employment density. A forerunner flex service on Apache Trail (Main St) or Broadway Rd may be the appropriate level of near-term investment to eventually build enough ridership for a future, full-fledged local extension.

5.0 SUMMARY AND NEXT STEPS

This assessment of needs within the Southeast Valley study area addressed the potential coverage area for current and future transit service based on an analysis of population and employment density, transit dependent populations, and travel patterns in the context of the performance of the existing system. The current and planned transit service coverage area is reasonably correlated with these factors, however some observations on potential needs include the following:

Near-term or Mid-Term Considerations

- Potential expansion of east-west local bus service in the southern part of the existing coverage area to serve higher areas of population and employment density (Baseline and Ray Roads to serve higher density areas, or Elliot and Warner Roads to improve network connectivity).
- Improved bus service on Country Club Ave/Arizona Ave as densification occurs.
- Improved service to transit dependent populations in Apache Junction, east Mesa (e.g., Main Street and Broadway); tools such as circulator or flex service may be suitable to meet needs initially. Further evaluate GRIC to identify community nodes for this type of service.
- Improved connections to downtown Chandler, which may include Mesa Drive/McQueen bus extensions or new service on Ray Road.

Long-term Considerations

- Monitor population and employment densification to respond to needs.
    - Examine Lindsay between Brown and Baseline
    - Extend bus service on Main Street, University, or Broadway east to connect Apache Junction
    - Improve/expand service to respond to expected intensification in north Tempe, Chandler, Gilbert, and Mesa, particularly in the vicinity of the Phoenix Mesa Gateway airport and ASU East.
- Continue to monitor factors influencing express service demand to identify new needs as densification and development occurs.

The next step of the Southeast Valley Transit System Study is to formulate concepts and recommendations to meet these needs. This effort will bring together the needs identified in this working paper, the findings of the Transit Optimization Analysis, and input from stakeholders. A financial analysis will also be conducted to bound the range of potential recommendations to financial constraints.

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Appendix A: Density of MAG Model Trips

Table 3: Existing Density of MAG Model District to District Daily Trip Flows

Destinations

Origins		Study Area Districts	Florence	San Tan Valley	Queen Creek	GRIC E. Pinal	GRIC W. Pinal	GRIC E. Maricopa	Vee Quiva	South Chandler	North Chandler	South Gilbert	North Gilbert	Mesa Gateway	Apache Junction	East Mesa	Central Mesa	West Mesa	North Tempe	South Tempe	Ahwatukee	City of Maricopa	Collar Districts	Gold Canyon	San Manuel	Coolidge	Casa Grande	Ak-Chin	Stanfield	Gila Bend	Goodyear	South Phoenix	Sky Harbor	Camelback	South Scottsdale	SRPMIC	Superstitions North	Downtown Phoenix
			1	2	3	4	5	6	51	7	8	9	10	11	12	52	13	14	15	16	17	18		19	22	25	27	28	29	49	39	46	42	45	43	36	48	47
Study Area Districts		*Trip Density (Trip Volumes per Total Square Miles of Originating and Terminating District(s))*																																				
Florence	1		401	16	6	1	0	0	0	2	1	3	2	1	1	1	1	1	1	0	0	0		0	0	12	2	0	0	0	0	0	0	0	0	0	0	0
San Tan Valley	2		29	922	175	1	0	1	0	45	40	60	47	30	15	10	30	20	17	12	5	0		1	0	6	1	0	0	0	0	3	4	3	5	1	0	4
Queen Creek	3		5	60	1,753	1	0	2	0	87	95	271	127	82	29	26	70	47	43	27	10	0		1	0	1	0	0	0	0	0	6	11	7	11	2	0	10
GRIC E. Pinal	4		1	1	1	22	0	0	0	13	6	3	4	0	0	0	1	1	2	2	2	1		0	0	4	3	0	0	0	0	0	0	0	0	0	0	0
GRIC W. Pinal	5		0	0	0	0	3	0	0	2	1	0	0	0	0	0	0	0	1	1	1	2		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRIC E. Maricopa	6		0	0	0	0	0	18	0	4	25	1	2	0	0	0	1	4	9	12	19	0		0	0	0	0	0	0	0	0	1	2	2	1	0	0	2
Vee Quiva	51		0	0	0	0	0	0	24	1	1	0	0	0	0	0	0	1	3	1	1	0		0	0	0	0	0	0	0	2	16	1	2	0	0	0	4
South Chandler	7		0	4	30	2	0	14	1	4,853	943	274	327	25	4	8	45	172	206	190	76	3		0	0	0	1	0	0	0	1	27	49	37	49	5	0	47
North Chandler	8		0	1	7	0	0	24	0	406	10,662	115	689	25	3	8	72	675	511	1,003	237	1		0	0	0	0	0	0	0	1	48	104	79	102	11	0	96
South Gilbert	9		0	8	179	1	0	5	0	289	331	3,745	812	132	10	25	117	99	110	88	29	1		0	0	0	0	0	0	0	0	13	30	20	28	3	0	28
North Gilbert	10		0	1	18	0	0	5	0	148	797	368	7,072	157	14	37	569	804	285	172	34	0		0	0	0	0	0	0	0	1	31	66	47	69	9	0	60
Mesa Gateway	11		0	2	27	0	0	1	0	26	68	99	269	1,972	64	207	341	124	85	31	8	0		0	0	0	0	0	0	0	0	10	19	14	20	3	0	18
Apache Junction	12		1	2	8	0	0	0	0	7	21	15	58	82	1,029	173	126	55	39	12	3	0		5	0	0	0	0	0	0	0	5	8	6	11	2	0	7
East Mesa	52		0	1	10	0	0	1	0	16	49	34	135	227	170	2,146	574	150	112	36	6	0		0	0	0	0	0	0	0	0	11	34	26	39	5	0	28
Central Mesa	13		0	1	8	0	0	2	0	24	123	45	580	156	37	181	6,370	879	261	80	16	0		0	0	0	0	0	0	0	1	27	58	53	89	18	0	48
West Mesa	14		0	0	2	0	0	4	0	48	541	18	578	28	6	18	482	11,283	1,119	389	43	0		0	0	0	0	0	0	0	1	49	143	123	230	30	0	116
North Tempe	15		0	0	1	0	0	5	0	34	246	9	88	26	2	6	53	763	14,244	901	139	1		0	0	0	0	0	0	0	2	172	457	316	451	19	0	305
South Tempe	16		0	0	1	0	0	8	0	46	731	11	83	8	1	3	28	347	1,092	6,501	212	1		0	0	0	0	0	0	0	1	53	145	93	73	5	0	132
Ahwatukee	17		0	0	1	0	0	29	1	49	453	11	36	4	1	1	13	84	399	535	3,091	1		0	0	0	0	0	0	0	1	84	94	78	37	3	0	89
City of Maricopa	18		0	0	1	2	1	8	1	28	55	3	6	1	0	0	2	12	47	40	22	2,221		0	0	0	10	18	2	0	0	12	17	11	6	1	0	15
Collar Districts		*Trip Density (Trip Volumes per Total Square Miles of Originating and Terminating District(s))*																																				
Gold Canyon	19		1	1	1	0	0	0	0	0	1	1	2	2	10	2	3	1	1	0	0	0		13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Manuel	22		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	22	0	0	0	0	0	0	0	0	0	0	0	0	0
Coolidge	25		10	1	1	1	0	0	0	3	2	1	1	0	0	0	0	0	1	1	1	0		0	0	203	12	0	0	0	0	0	0	0	0	0	0	0
Casa Grande	27		2	0	0	3	0	2	0	9	10	1	1	0	0	0	0	2	7	6	5	6		0	0	6	803	1	1	0	0	2	2	1	1	0	0	1
Ak-Chin	28		0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	1	2	2	1	36		0	0	0	2	27	2	0	0	1	1	1	0	0	0	1
Stanfield	29		0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	2	1	1	23		0	0	0	5	6	42	0	0	1	0	0	0	0	0	0
Gila Bend	49		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Goodyear	39		0	0	0	0	0	0	1	0	2	0	1	0	0	0	1	3	20	3	2	0		0	0	0	0	0	0	0	1,673	91	13	21	7	2	0	34
South Phoenix	46		0	0	0	0	0	2	6	7	44	2	14	2	0	1	10	54	367	89	58	0		0	0	0	0	0	0	0	91	4,005	176	177	48	5	0	537
Sky Harbor	42		0	0	0	0	0	1	0	4	29	1	10	2	0	1	8	50	487	66	18	0		0	0	0	0	0	0	0	1	64	3,105	594	93	2	0	786
Camelback	45		0	0	0	0	0	2	0	7	48	2	16	3	0	2	13	86	558	86	29	0		0	0	0	0	0	0	0	4	100	837	8,807	601	16	0	1,001
South Scottsdale	43		0	0	0	0	0	1	0	13	71	3	31	6	1	3	28	185	679	83	16	0		0	0	0	0	0	0	0	2	41	178	580	7,393	162	0	142
SRPMIC	36		0	0	0	0	0	0	0	2	13	1	9	1	1	1	17	46	58	11	3	0		0	0	0	0	0	0	0	1	9	13	30	161	1,418	0	14
Superstitions North	48		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Downtown Phoenix	47		0	0	0	0	0	1	0	3	20	1	7	1	0	1	4	29	255	46	12	0		0	0	0	0	0	0	0	3	139	534	522	43	2	0	11,558

Trip Densities (per Sq Mi) of Over 500 and 1,000 Involving a Study Area District Are Shown in Red and Yellow, Respectively.

Source: MAG 2013

Table 4: Density of 2035 MAG Model District to District Daily Trip Flows

Destinations

Origins		Study Area Districts	Florence	San Tan Valley	Queen Creek	GRIC E. Pinal	GRIC W. Pinal	GRIC E. Maricopa	Vee Quiva	South Chandler	North Chandler	South Gilbert	North Gilbert	Mesa Gateway	Apache Junction	East Mesa	Central Mesa	West Mesa	North Tempe	South Tempe	Ahwatukee	City of Maricopa	Collar Districts	Gold Canyon	San Manuel	Coolidge	Casa Grande	Ak-Chin	Stanfield	Gila Bend	Goodyear	South Phoenix	Sky Harbor	Camelback	South Scottsdale	SRPMIC	Superstitions North	Downtown Phoenix
			1	2	3	4	5	6	51	7	8	9	10	11	12	52	13	14	15	16	17	18		19	22	25	27	28	29	49	39	46	42	45	43	36	48	47
Study Area Districts			*Trip Density (Trip Volumes per Total Square Miles of Originating and Terminating District(s))*																																			
Florence	1		1,363	39	18	3	0	0	0	3	1	5	3	7	4	1	2	1	1	0	0	0		2	0	47	7	0	0	0	0	0	0	0	0	0	0
San Tan Valley	2		103	1,592	379	3	0	1	0	44	24	75	46	100	36	11	31	18	12	6	2	0		8	0	17	4	0	0	0	0	2	2	1	2	1	0	2
Queen Creek	3		23	158	3,667	2	0	3	0	121	90	378	181	402	79	32	89	53	41	22	8	1		4	0	5	1	0	0	0	0	5	8	5	8	2	0	7
GRIC E. Pinal	4		3	1	2	41	0	1	0	15	5	5	3	1	0	0	1	1	2	2	2	2		0	0	8	5	0	0	0	0	1	0	0	0	0	0	0
GRIC W. Pinal	5		0	0	0	0	5	0	0	2	1	0	0	0	0	0	0	0	1	1	1	4		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
GRIC E. Maricopa	6		0	0	0	0	0	74	0	12	45	2	4	2	0	0	1	5	14	19	31	1		0	0	0	0	0	0	0	0	4	3	3	2	0	0	3
Vee Quiva	51		0	0	0	0	0	0	16	1	2	0	0	0	0	0	0	0	1	1	3	0		0	0	0	0	0	0	0	3	23	1	1	0	0	0	3
South Chandler	7		2	10	74	7	0	35	0	7,170	1,193	544	527	91	11	13	58	210	245	201	84	9		0	0	2	4	1	0	0	2	37	53	36	47	6	0	54
North Chandler	8		0	1	14	1	0	49	0	621	12,263	175	870	82	8	10	81	727	571	1,047	289	4		0	0	0	1	0	0	0	2	54	101	71	90	12	0	99
South Gilbert	9		5	22	384	4	0	12	0	563	442	6,628	1,414	534	33	37	157	126	134	98	33	2		0	0	1	1	0	0	0	1	16	31	19	28	4	0	29
North Gilbert	10		1	3	46	1	0	9	0	232	861	639	9,195	409	39	53	664	855	303	169	34	1		0	0	0	0	0	0	0	1	31	57	38	56	9	0	58
Mesa Gateway	11		4	15	200	0	0	3	0	68	122	261	530	5,618	306	357	451	167	107	38	11	0		1	0	1	0	0	0	0	0	10	18	12	18	3	0	17
Apache Junction	12		4	7	40	0	0	1	0	16	29	37	99	272	2,283	232	163	66	44	12	3	0		11	0	0	0	0	0	0	0	5	7	6	9	3	0	7
East Mesa	52		1	3	24	0	0	1	0	23	47	53	170	449	309	2,571	697	154	109	28	5	0		1	0	0	0	0	0	0	0	9	30	21	32	6	0	25
Central Mesa	13		1	3	23	0	0	3	0	38	133	79	730	311	85	250	7,402	990	281	73	15	0		1	0	0	0	0	0	0	1	24	53	46	79	20	0	46
West Mesa	14		0	1	6	0	0	7	0	89	609	36	689	79	15	25	556	13,133	1,290	393	42	1		0	0	0	0	0	0	0	2	46	136	109	212	38	0	114
North Tempe	15		1	0	3	0	0	11	0	69	322	20	125	108	6	9	76	947	20,070	957	158	3		0	0	0	1	0	0	0	3	202	583	360	533	31	0	358
South Tempe	16		0	0	2	0	0	18	0	74	840	20	107	27	2	4	32	378	1,245	6,979	243	2		0	0	0	0	0	0	0	1	58	143	86	66	7	0	143
Ahwatukee	17		0	0	3	1	0	73	2	80	556	20	50	16	2	2	15	95	460	593	3,619	4		0	0	0	1	0	0	0	10	181	99	75	32	4	0	103
City of Maricopa	18		2	0	1	6	4	13	0	34	51	4	7	2	0	0	2	11	42	32	19	5,276		0	0	3	49	50	16	0	1	9	13	8	4	1	0	12
Collar Districts			*Trip Density (Trip Volumes per Total Square Miles of Originating and Terminating District(s))*																																			
Gold Canyon	19		7	6	5	0	0	0	0	1	1	1	3	5	28	3	5	2	1	0	0	0		47	0	1	0	0	0	0	0	0	0	0	0	0	0	0
San Manuel	22		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	40	0	0	0	0	0	0	0	0	0	0	0	0	0
Coolidge	25		40	2	2	8	0	0	0	2	1	1	0	1	0	0	0	0	0	0	0	1		0	0	574	41	0	0	0	0	0	0	0	0	0	0	0
Casa Grande	27		8	0	0	6	1	2	0	6	6	1	1	0	0	0	0	1	3	3	3	20		0	0	24	1,719	4	6	0	0	1	1	1	0	0	0	1
Ak-Chin	28		0	0	0	0	0	1	0	3	4	0	1	0	0	0	0	1	3	2	2	98		0	0	0	7	100	12	0	0	2	1	1	0	0	0	1
Stanfield	29		0	0	0	0	0	1	0	2	3	0	0	0	0	0	0	1	2	1	1	56		0	0	1	21	27	244	0	0	1	1	0	0	0	0	0
Gila Bend	49		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
Goodyear	39		0	0	0	0	0	2	1	3	9	0	2	0	0	0	1	6	35	6	7	5		0	0	0	0	1	0	1	3,977	174	20	27	9	3	0	51
South Phoenix	46		0	0	1	0	0	13	7	23	88	5	22	7	1	1	13	68	464	107	102	1		0	0	0	0	0	0	0	205	6,870	238	208	47	7	0	739
Sky Harbor	42		0	0	1	0	0	2	0	9	38	3	14	5	1	2	11	62	662	64	20	1		0	0	0	0	0	0	0	2	83	5,112	750	102	4	0	1,149
Camelback	45		0	0	1	0	0	4	0	13	56	3	19	10	1	2	17	99	675	77	29	1		0	0	0	1	0	0	0	7	112	1,098	10,145	653	23	0	1,149
South Scottsdale	43		0	0	1	0	0	3	0	23	85	7	39	17	2	5	37	224	892	84	16	0		0	0	0	0	0	0	0	3	44	210	652	8,738	222	0	160
SRPMIC	36		0	0	0	0	0	1	0	4	15	1	12	4	2	2	24	58	79	12	3	0		0	0	0	0	0	0	0	2	12	16	35	178	1,970	0	18
Superstitions North	48		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Downtown Phoenix	47		0	0	1	0	0	3	0	10	39	3	13	8	1	2	8	44	348	66	19	2		0	0	0	1	0	0	0	7	214	936	692	49	3	0	18,995

Trip Densities (per Sq Mi) of Over 500 and 1,000 Involving a Study Area District Are Shown in Red and Yellow, Respectively.

Source: MAG 2013

Appendix B: Needs Identified in Other Transit Studies and Plans

List of Included Maps:

Pinal County Transit Feasibility Study:

- Figure 14: Pinal County Transit Feasibility Study: Short Term Improvements
- Figure 15: Pinal County Transit Feasibility Study: Long Term Improvements

Apache Junction Transit Feasibility Update:

- Figure 16: Apache Junction Transit Feasibility Study: Service Concept for Short-Term
- Figure 17: Apache Junction: Transit Feasibility Study: Service Concept for Long-Term

Mesa Transit Plan:

- Figure 18: Mesa Transit Plan 2040: Short Term Transit Scenario
- Figure 19: Mesa Transit Plan 2040: Mid Term Transit Scenario 1
- Figure 20: Mesa Transit Plan 2040: Mid Term Scenario 2
- Figure 21: Mesa Transit Plan 2040: Long Term Scenario 1
- Figure 22: Mesa Transit Plan 2040: Long Term Scenario 2

Town of Gilbert Transit Plan:

- Figure 23: Gilbert Plan Option 1
- Figure 24: Gilbert Plan Option 2

Coolidge-Florence Regional Transportation Plan:

- Figure 25: Coolidge-Florence Regional Transportation Study

GRIC Transit Feasibility Study:

- Figure 26: GRIC Feasibility Study Regional Route
- Figure 27: GRIC Feasibility Plan Circulator

Figure 14: Pinal County Transit Feasibility Study: Short Term Improvements

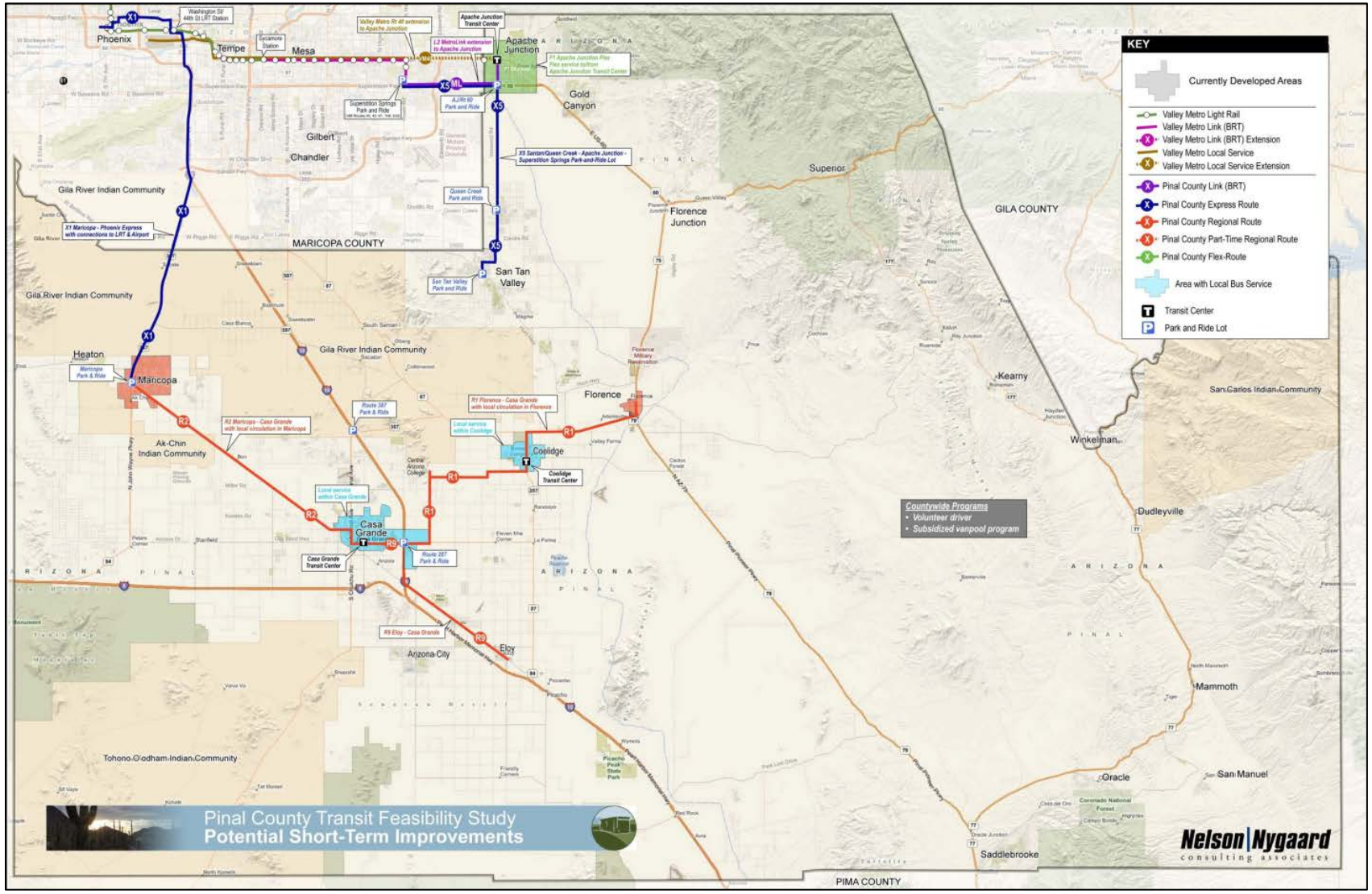

Figure 15: Pinal County Transit Feasibility Study: Long Term Improvements

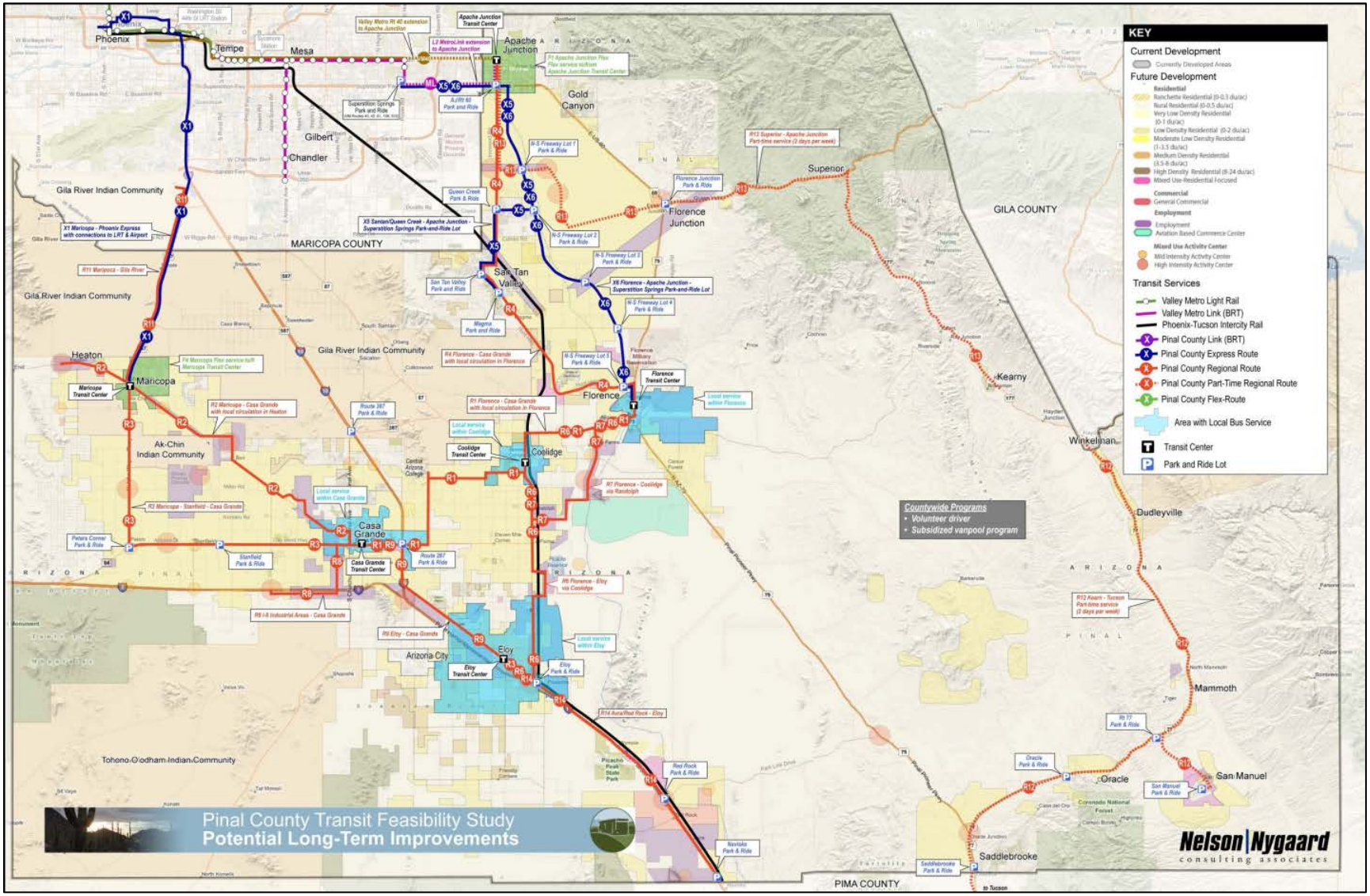

Figure 16: Apache Junction Transit Feasibility Study: Service Concept for Short-Term

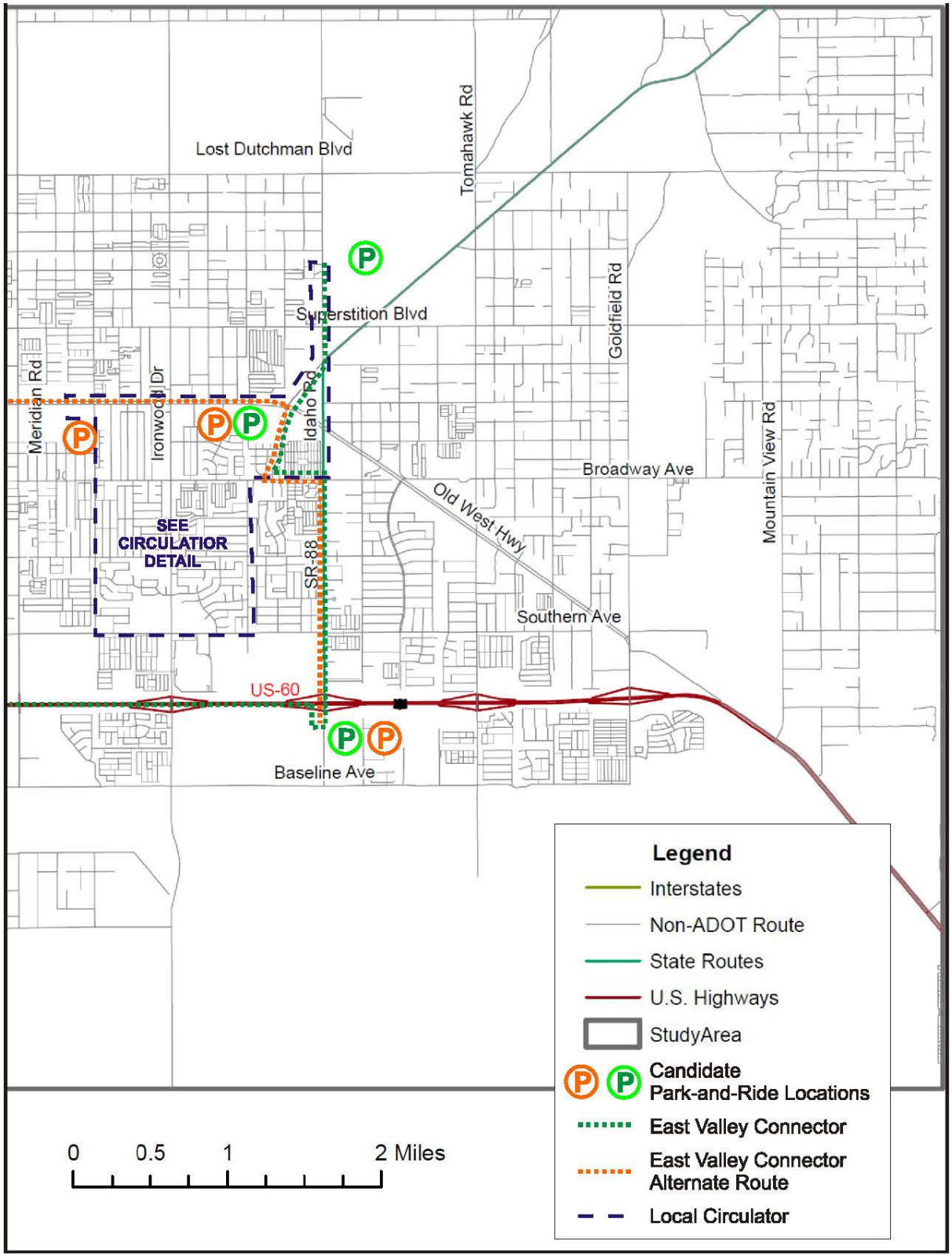

Figure 17: Apache Junction: Transit Feasibility Study: Service Concept for Long-Term

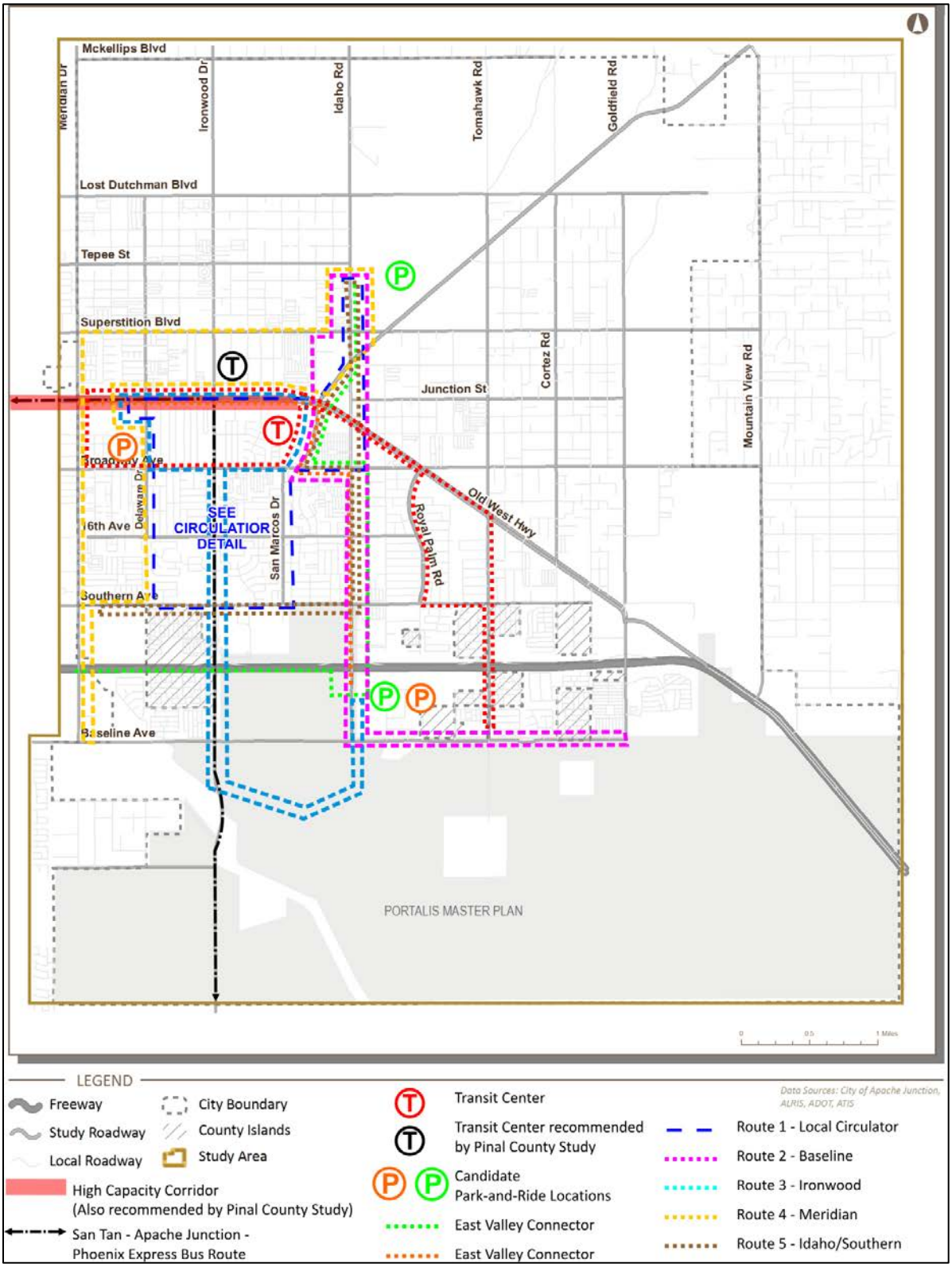

Figure 18: Mesa Transit Plan 2040: Short Term Transit Scenario

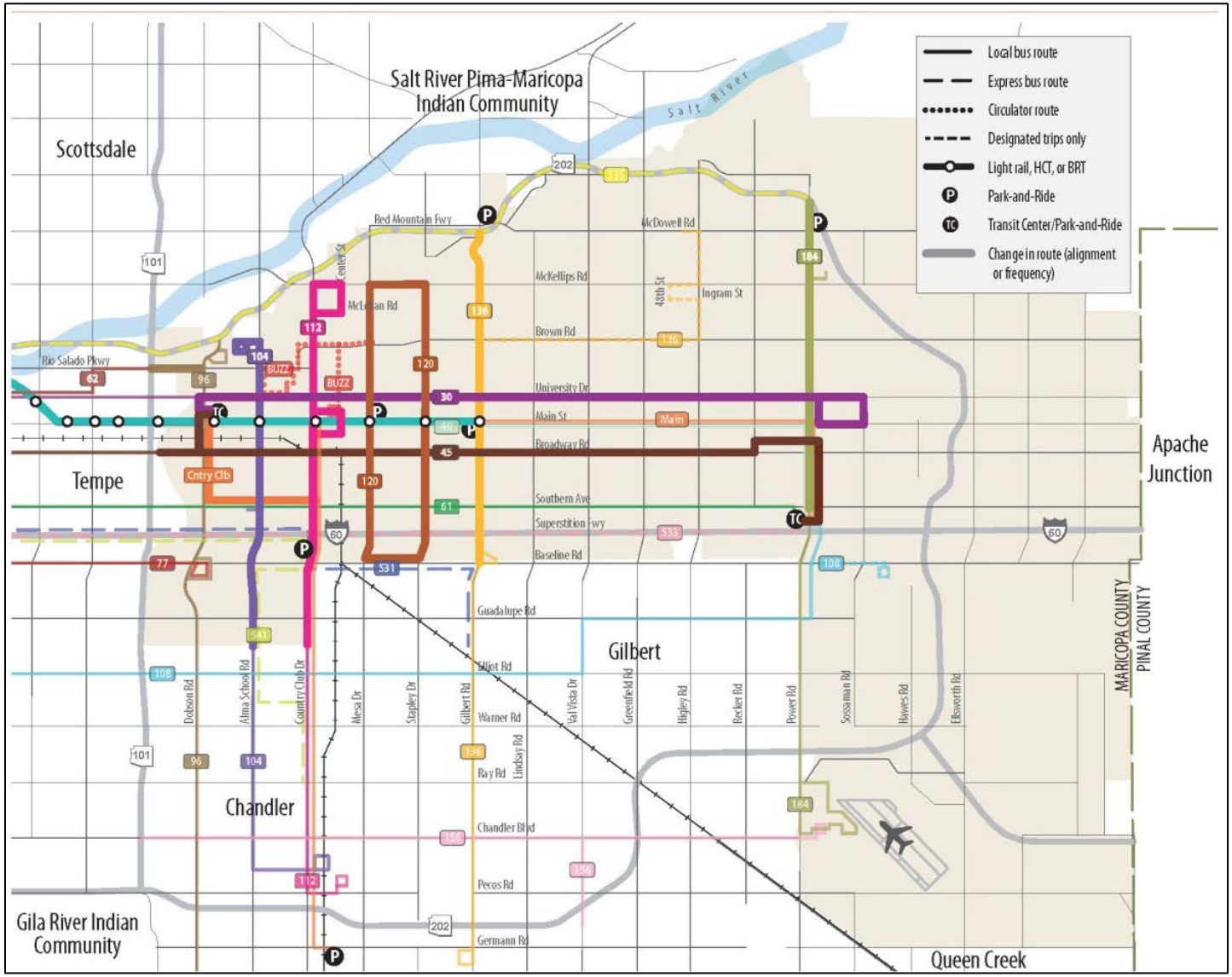

Figure 19: Mesa Transit Plan 2040: Mid Term Transit Scenario 1

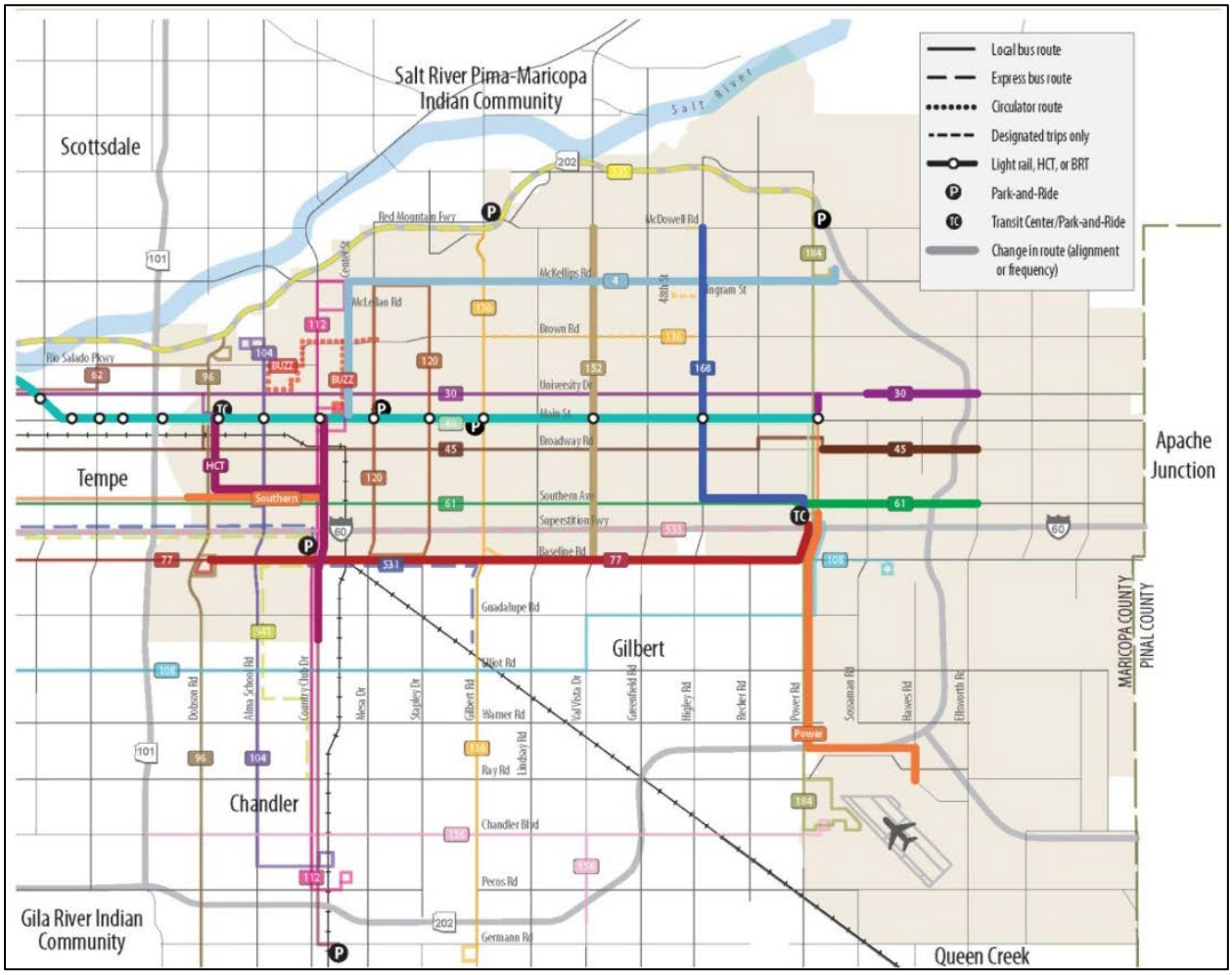

Figure 20: Mesa Transit Plan 2040: Mid Term Scenario 2

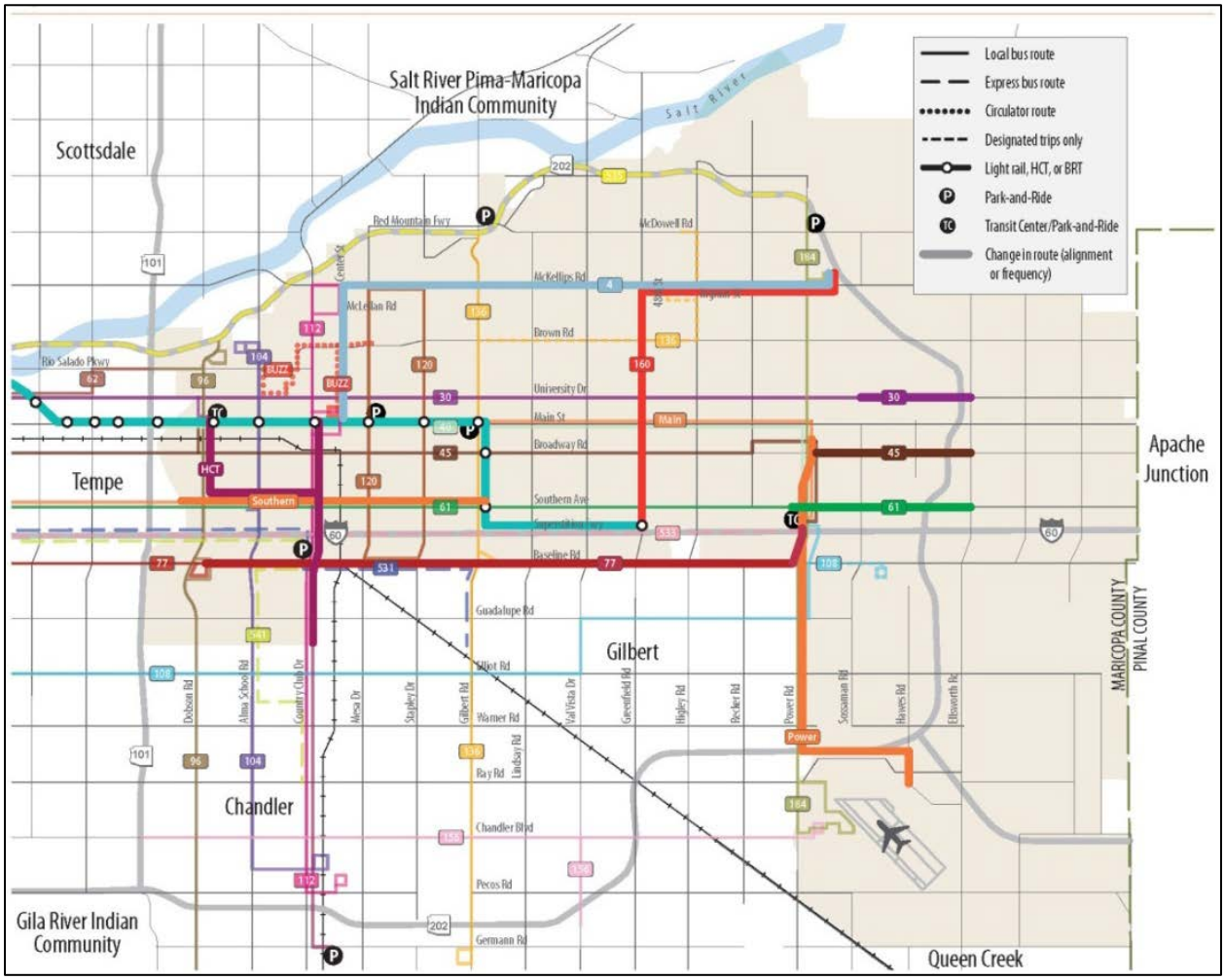

Figure 21: Mesa Transit Plan 2040: Long Term Scenario 1

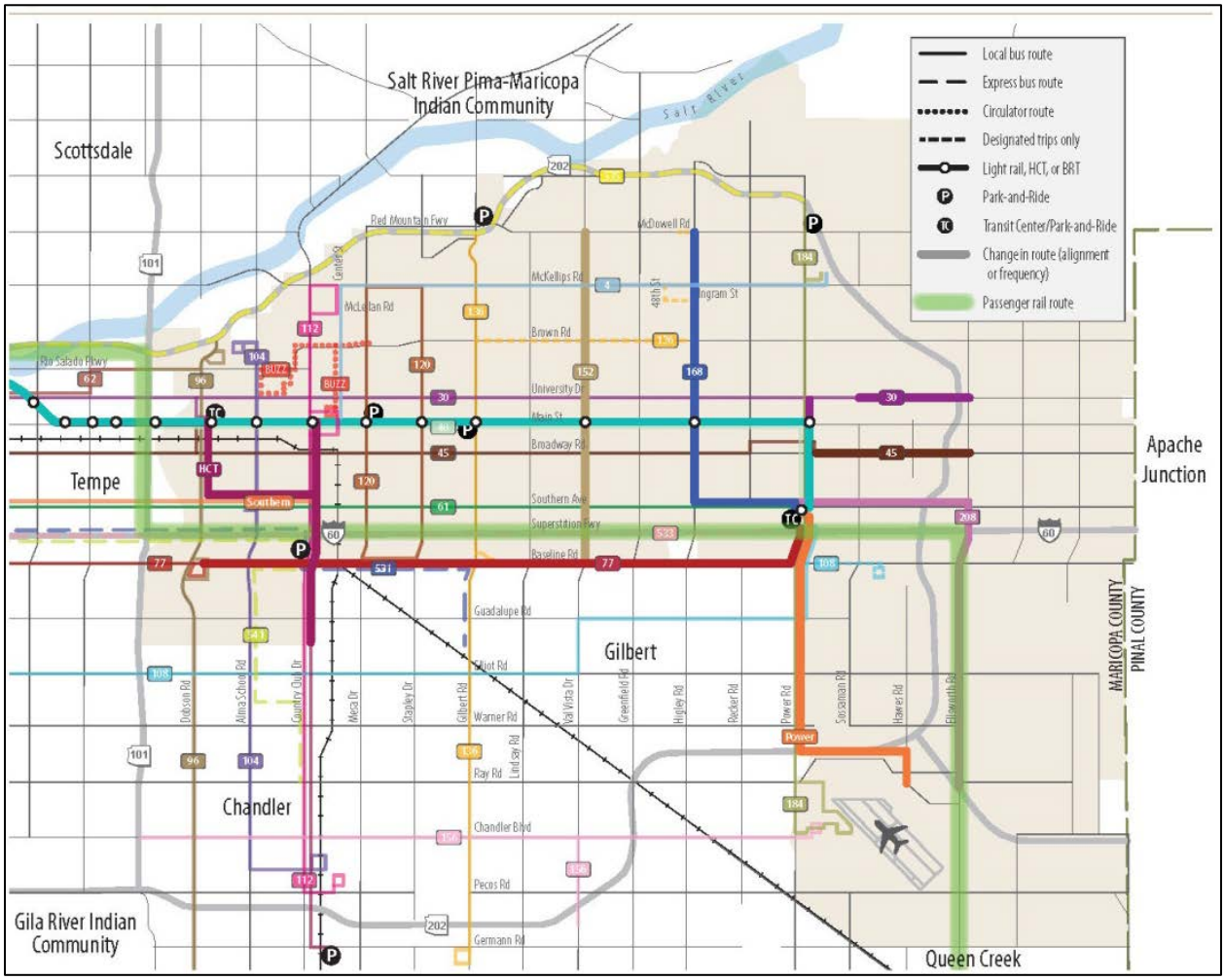

Figure 22: Mesa Transit Plan 2040: Long Term Scenario 2

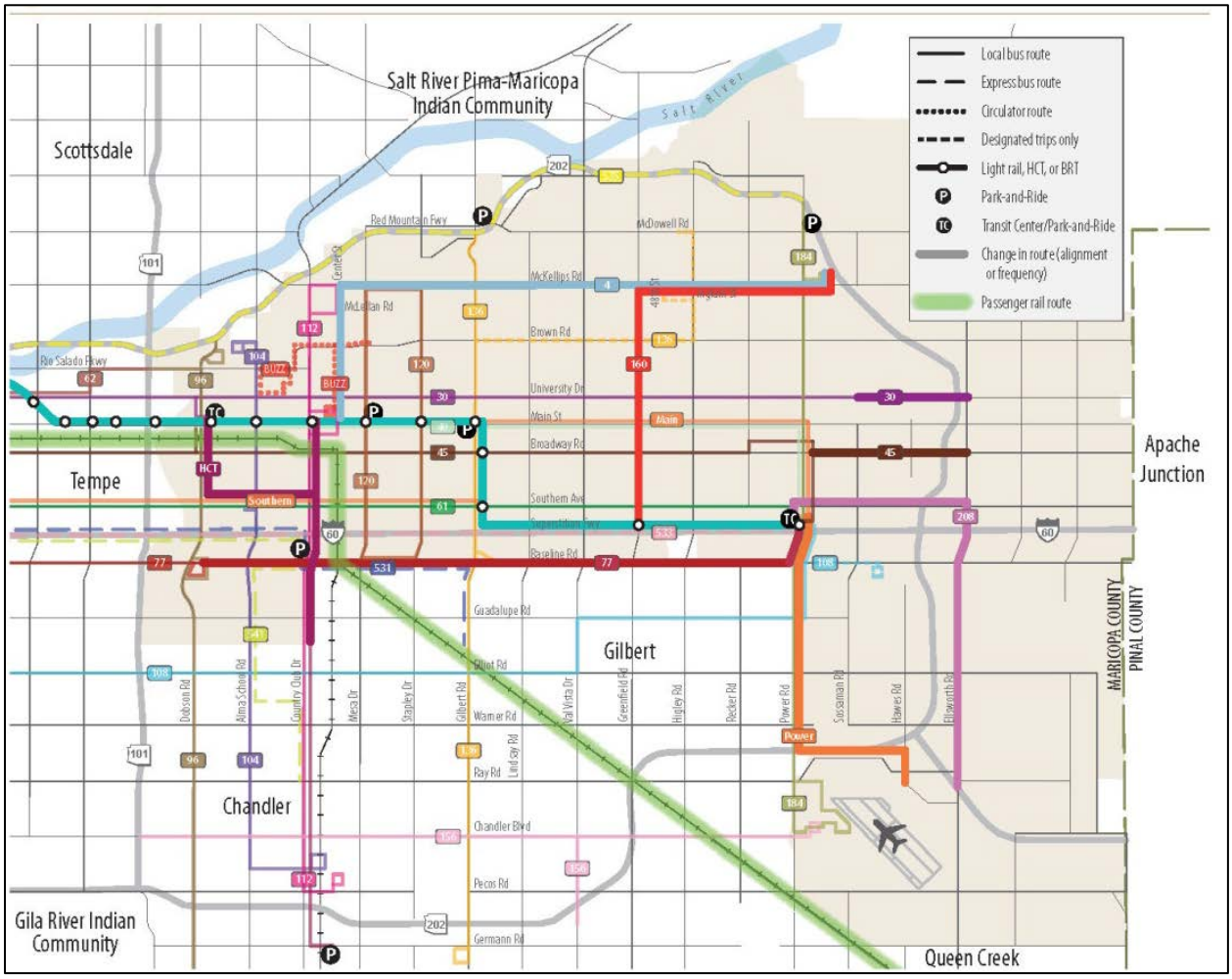

Figure 23: Chandler Transportation Plan Near-Term Transit Improvements

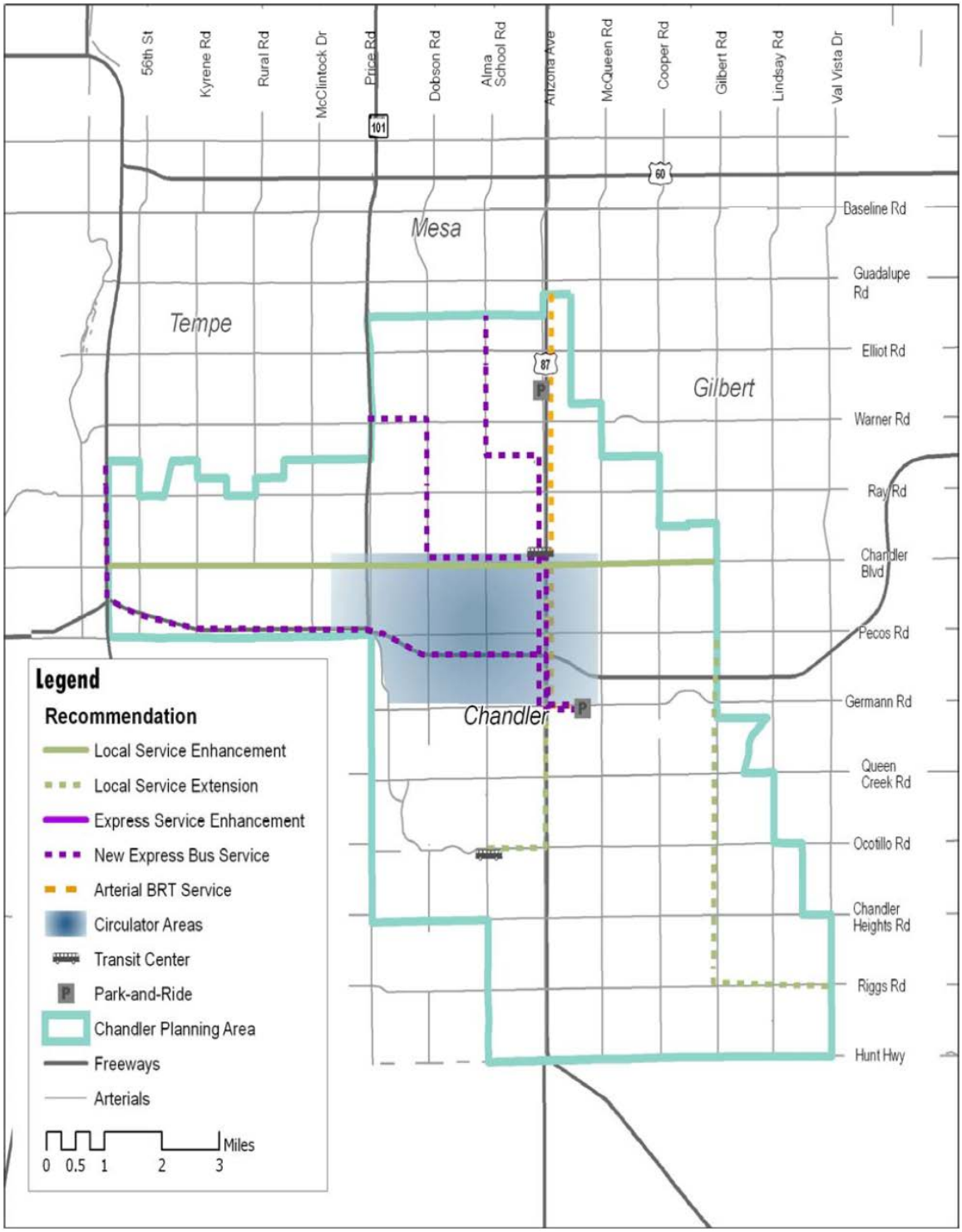

Figure 24: Chandler Transportation Plan Mid-Term Transit Improvements

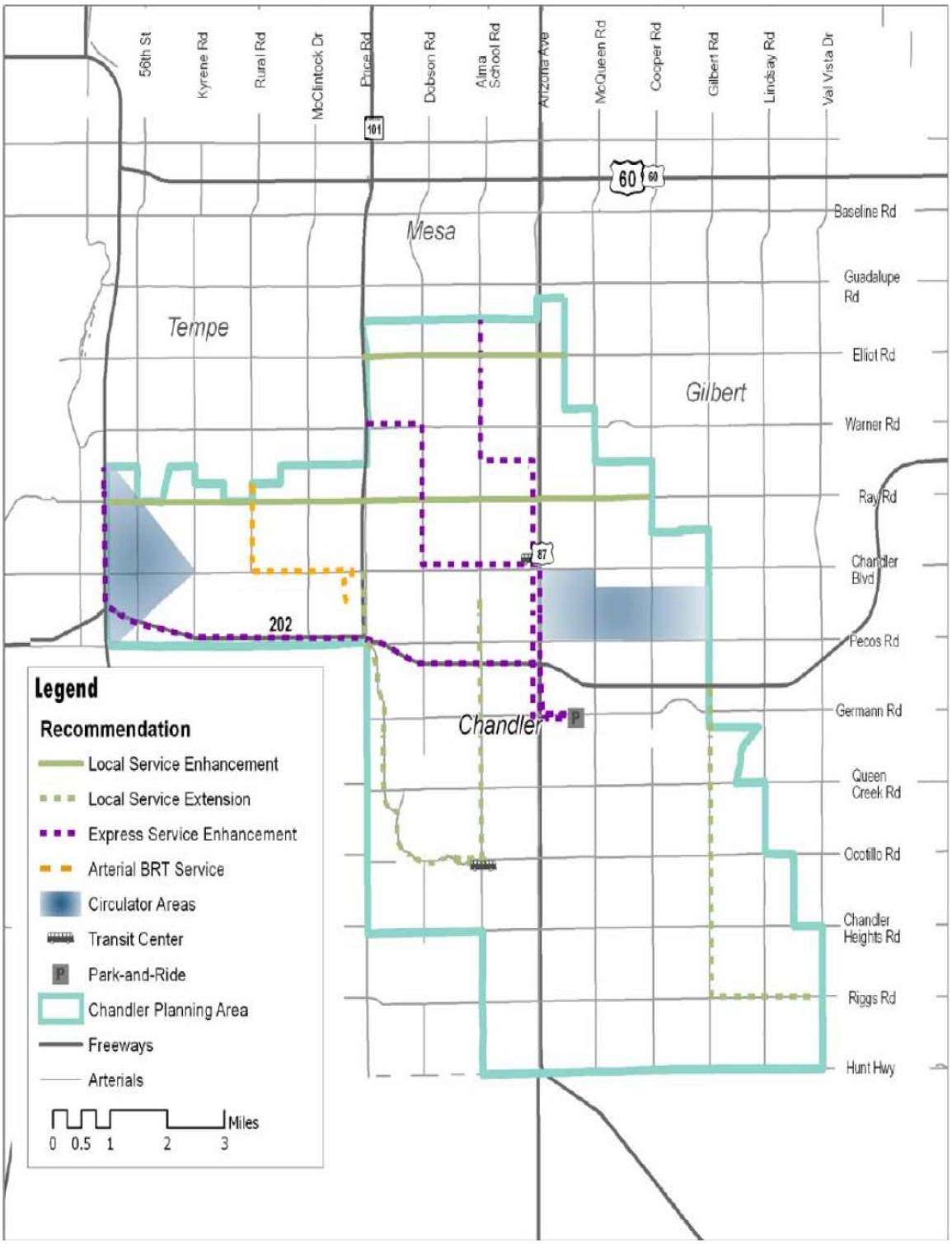

Figure 25: Chandler Transportation Plan Long-Term Transit Improvements

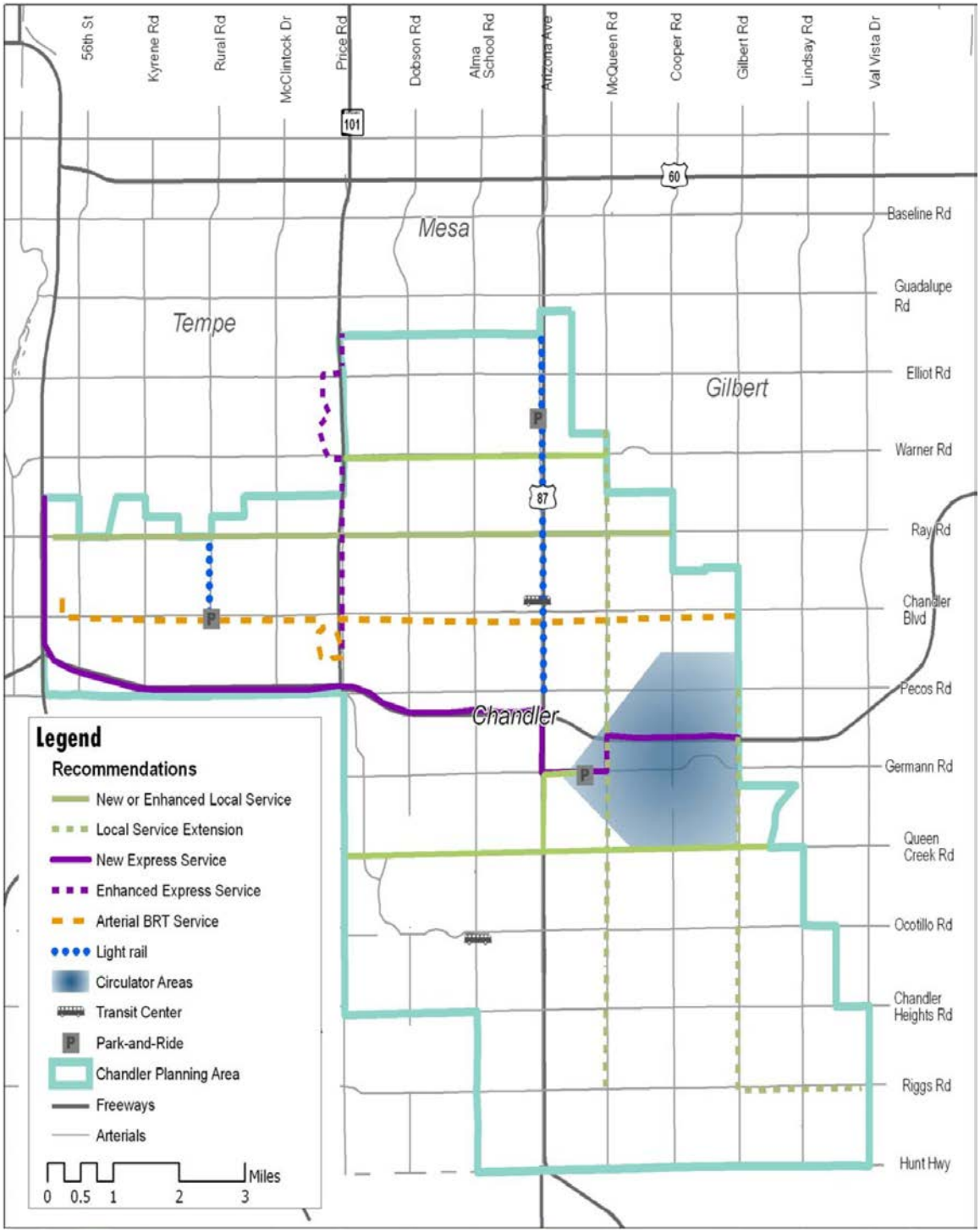

Figure 26: Gilbert Plan Option 1

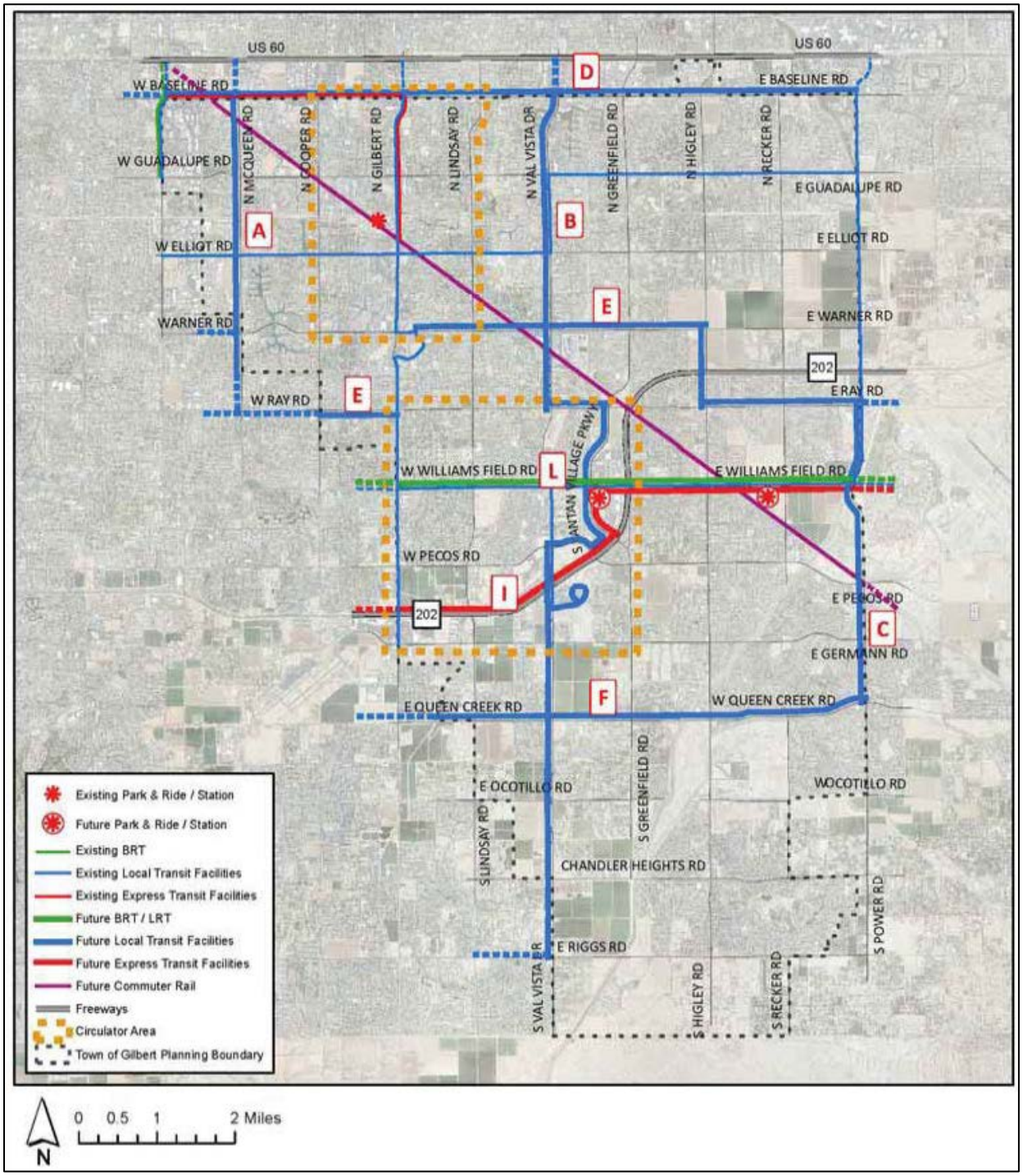

Figure 27: Gilbert Plan Option 2

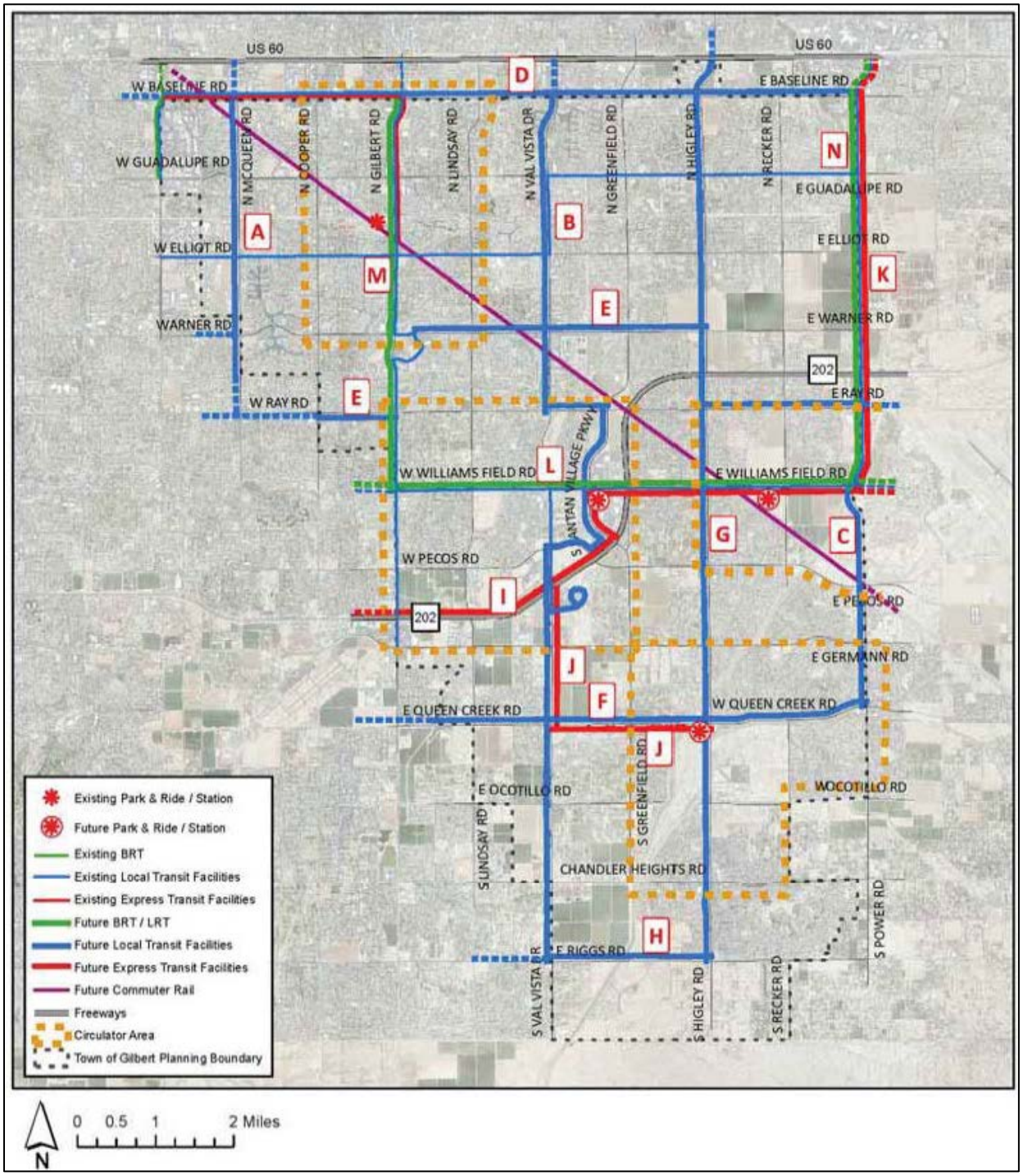

Figure 28: Coolidge-Florence Regional Transportation Study

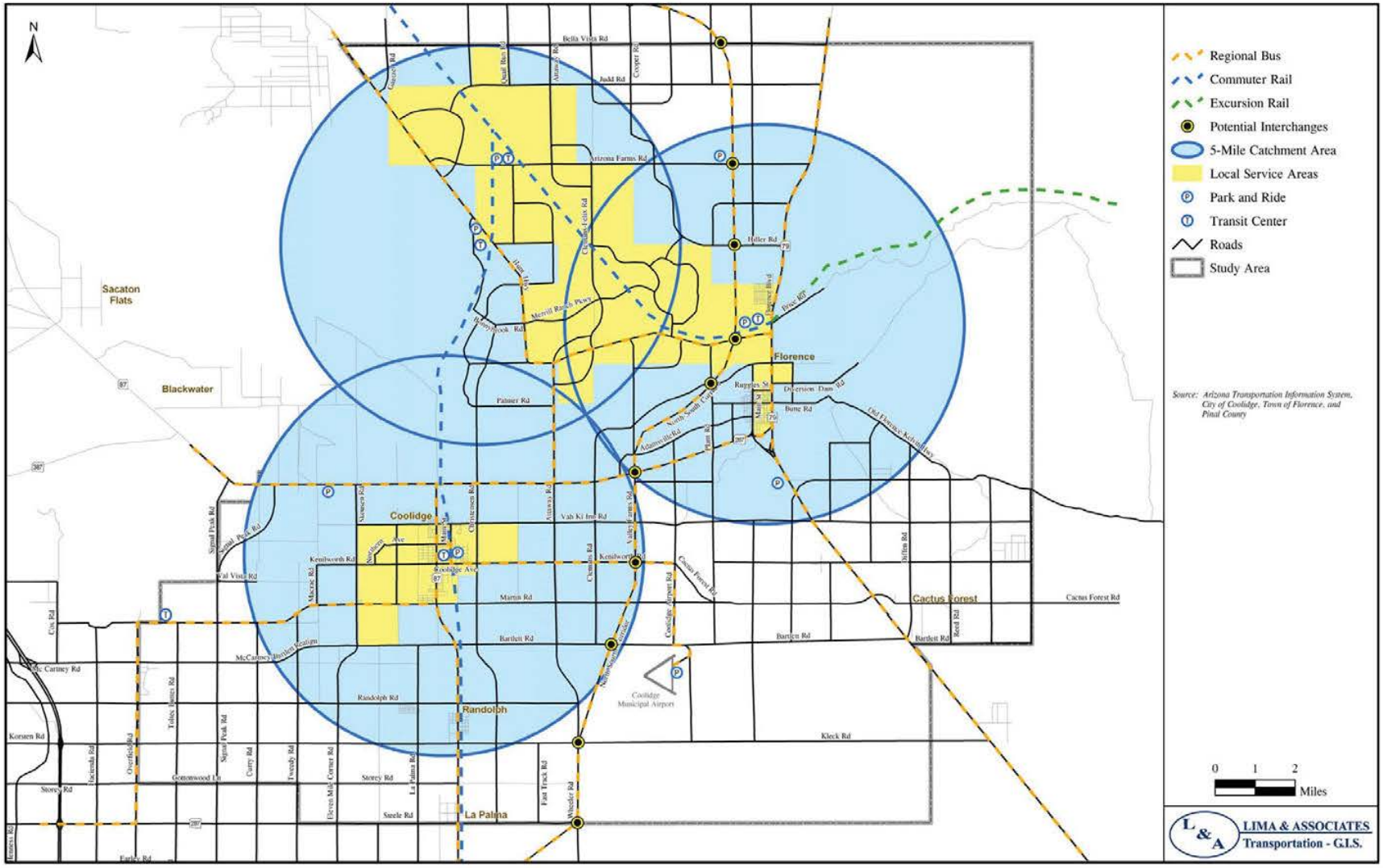

Figure 29: GRIC Feasibility Study Regional Route

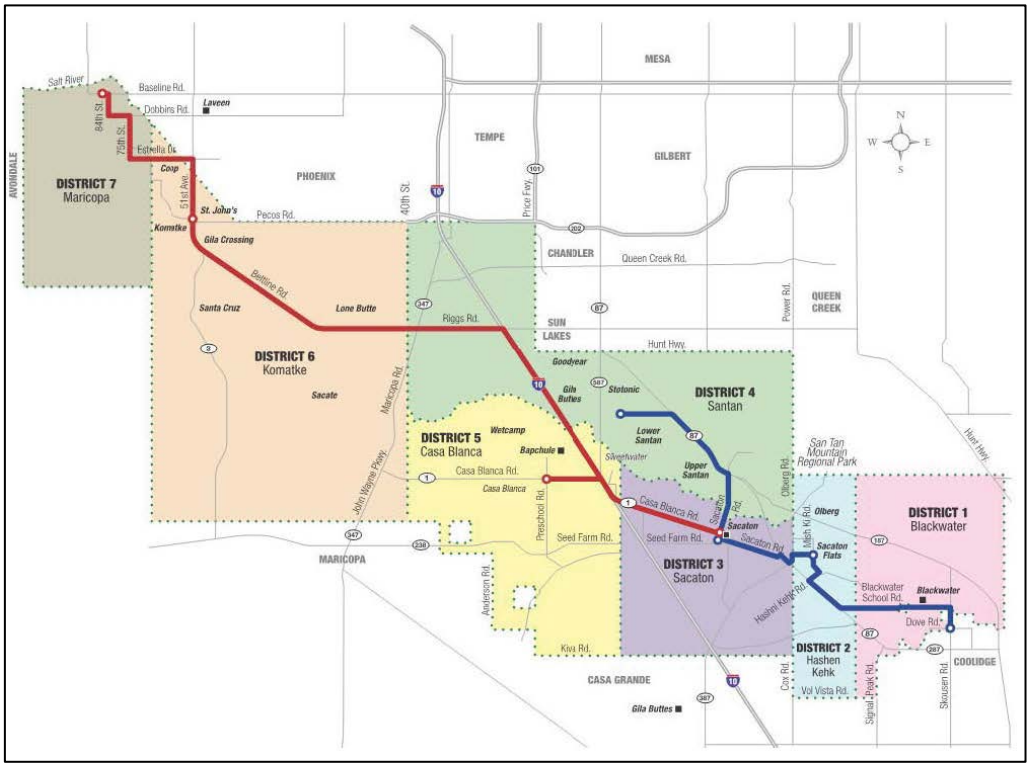

Figure 30: GRIC Feasibility Plan Circulator