TOWN OF QUEEN CREEK

BETTER ROADS AHEAD

MULTIMODAL TRANSPORTATION MASTER PLAN

FINAL REPORT

Prepared for

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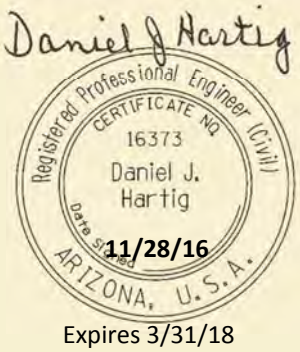

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Table of Contents

List of Figures

List of Tables

I. INTRODUCTION

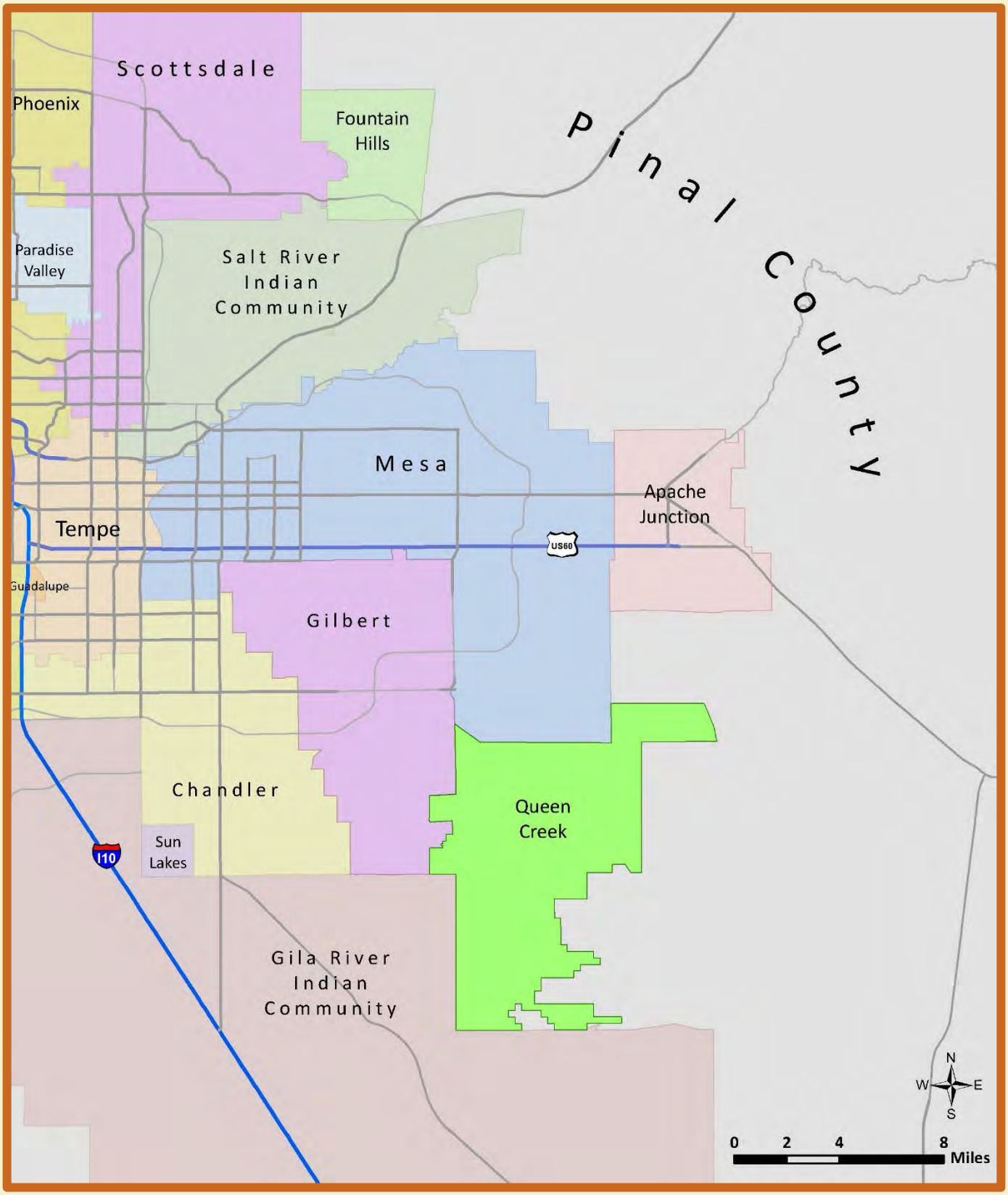
The Town of Queen Creek, incorporated in 1989, was founded on deep-rooted history and has grown to an innovatively planned, family friendly, vibrant community in Arizona. Prior to incorporation, the Town was known as Rittenhouse because of the railroad stop located near Rittenhouse and Ellsworth Roads. Queen Creek is located in the southeast portion of the Phoenix metropolitan area, encompassing approximately 27.5 square miles in the incorporated area and 69 square miles in the Municipal Planning Area (MPA). The population has grown from an estimated 2,700 people in 1990 to 33,649 in 2015 in the incorporated area based on the Town's special census. According to MAG projections and Town estimates, the population in the entire planning area could reach more than 109,000 by 2035 with an additional 110,000 population in the San Tan Valley. The Town strives to honors its agricultural heritage while becoming an economically diverse community in the Southeast Valley.

It is widely acknowledged that by utilizing all transportation modes —vehicles, public transit, rail, walking and bicycling; and through strategies such as transportation demand management and telecommuting -- communities can use resources more efficiently and achieve a sustainable future.

According to the Federal Highway Administration (FHWA), Americans are driving less than they did a decade ago; and younger adults are driving much less, particularly in urban areas. In 2009, Americans between the ages of 18 and 34 drove 21 percent fewer miles than those in that age group did in 2001. Fewer young adults are getting their driver's licenses. The total number of licensed drivers under the age of 34 actually declined between 2001 and 2012, despite an increasing population. Many are choosing to live in urban areas where they can bike, walk, and take public transit to work or school.

As a result, transportation planning is shifting away from the singular goal of moving vehicular traffic, particularly single occupant, towards an approach that looks at all transportation modes and takes into consideration quality of life, economic development, and the environment. The transportation planning process is a cycle that involves several steps and results in a Transportation Master Plan (TMP) that provides a long-range blueprint for travel and mobility. A TMP needs to provide mobility and access in a way that is safe and convenient; while preserving quality of life considerations by minimizing congestion, air pollution, and noise.

FIGURE I-1: REGIONAL LOCATION



A. Study Area

The study area, which is the Queen Creek planning area, is shown in Figure I-2. The Queen Creek planning area includes all the incorporated areas of the Town as well as unincorporated Maricopa and Pinal County land within the Queen Creek planning area. The Town of Queen Creek is bounded on the west by the town of Gilbert; on the north by the city of Mesa; and on the east and south by Pinal County. The Town of Queen Creek has a street system comprised of a section line (mile) arterial street grid complimented by a limited number of mid-section collector streets. There are no regional freeways within the Town limits, however, SR 24 which connects to SR 202 is three miles north on Ellsworth Road. The Town's street system presents unique challenges because of how the Town has developed and because of the UPRR which extends diagonally through the Town. As a result, the Town must take full advantage of technology enhancements to support the transportation system.

B. Study Purpose

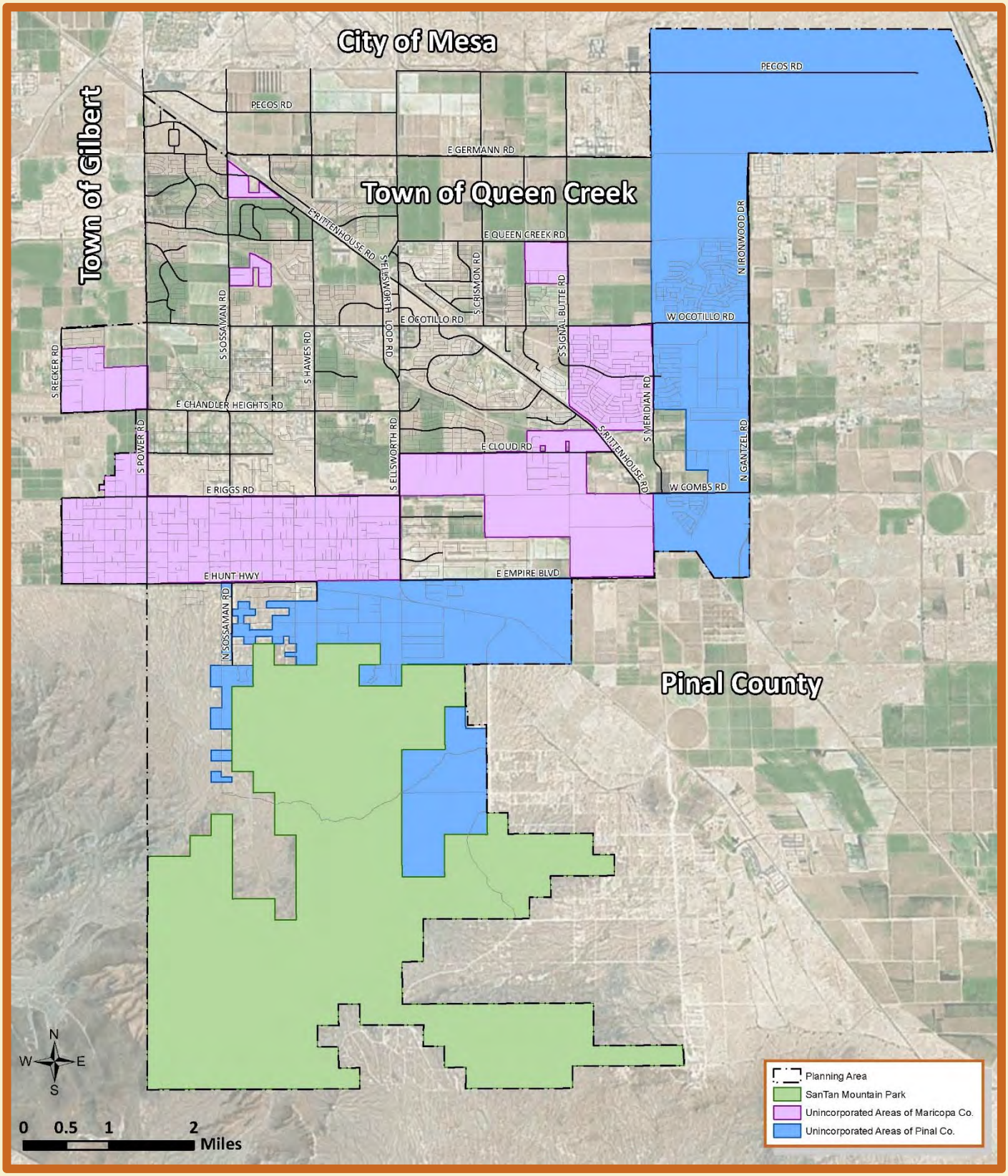
This study and resulting transportation plan will provide a multi-modal transportation master plan for the Town. The Queen Creek Small Area Transportation Study completed in 2007 primarily addressed roadway needs with minimal discussion on transit and non-motorized modes. This plan will address issues related to all modes of transportation within Queen Creek and incorporate recommendations from previous studies as appropriate. Several previous studies were reviewed as part of the process and the recommendations were summarized.

This transportation plan is based on future estimates and projections of growth in the Town as well as the surrounding area. It is important for the Town staff to review the growth estimates periodically to determine when adjustments are needed in the plan.

A number of key issues, which are summarized below, were instrumental in developing the goals and objectives; and in formulating the elements of the transportation plan.

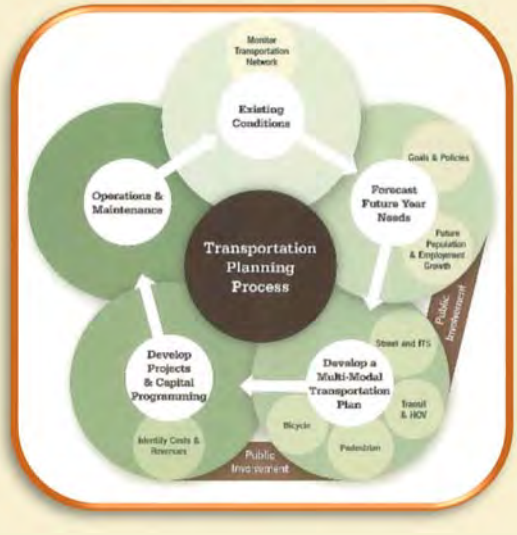
- Create a balanced transportation system
- Improve mobility and accessibility for all users
- Coordinate with surrounding communities
- Construct street widening and intersection improvements
- Manage traffic congestion
- Improve public transit
- Consider the inter-relationship between land use and transportation
- Address the needs of bicyclists and pedestrians
- Provide adequate transportation funding
- Improve air quality
- Accommodate freight movement
- Include emerging technologies
- Promote transportation demand management

FIGURE I-2: STUDY AREA



II. PLAN DEVELOPMENT

The development of a transportation master plan is a process that involves many steps. The process involves identifying the vision and goals that guide the development of the plan, documenting existing conditions, forecasting future conditions, developing the plan elements and recommendations, and then monitoring the implementation of the plan.



A. Vision and Goals

The following are the goals included in the circulation element of the 2008 General Plan. These have been incorporated into the Transportation Master Plan goals.

- Maintain arterial, collector and local street design standards which reflect their functional classifications and anticipated traffic volumes.
- Develop standards for evaluating the traffic impact of additional development on the existing and proposed transportation network.
- Develop a multi-use transportation system including arterial, collector and local streets as well as facilities for non-motorized vehicle and public transit adequate to serve both current and projected travel demands.
- Promote multi-jurisdictional transportation planning involving the Town, adjacent municipalities, Maricopa and Pinal Counties which share a common transportation system and face common transportation issues.

The development of the Queen Creek Transportation Master Plan was guided by the following vision and goals intended to achieve the overall vision for transportation in Queen Creek.

Vision:

Develop a multimodal transportation system for all users that promotes and enhances mobility, safety, efficiency, quality of life; is sustainable; and encourages economic development

The goals are statements concerning desirable long-range achievements for the transportation system.

Goal 1: Foster economic development through an integrated multi-modal transportation system that connects major generators to the region, each other and to neighborhoods and facilitates the movement of people and goods between different modes of travel.

Goal 2: Implement a transportation system that is compatible with adjacent land uses and preserves scenic, aesthetic, historic and environmental resources while balancing safety, mobility, and access.

Goal 3: Develop a safe, continuous arterial street network that can accommodate all modes, minimize congestion, and connect to arterial street networks of neighboring communities.

Goal 4: Develop a safe network of collector and local streets that connects neighborhoods to the arterial street network, encourages bicycling and walking, and incorporates traffic calming strategies.

Goal 5: Provide for non-motorized modes of transportation through construction of bicycle, pedestrian, multi-use and equestrian paths/trails in the right-of-way in coordination with existing paths/trails and facilities in adjacent properties.

Goal 6: Promote expansion of local or regional public transportation service to areas where unmet transportation needs exist.

Goal 7: Identify transportation projects that protect the existing system and address identified needs for expansion of the system in line with the Town's goals, priorities, design standards and available funds.

Goal 8: Support and promote technology enhancements to the transportation system such as electric vehicles and charging stations; vehicle to vehicle and vehicle to infrastructure communication; and autonomous vehicles.

Goal 9: Promote multi-jurisdictional transportation planning involving the Town, adjacent municipalities, and counties which share a common transportation system and face common transportation issues.

B. Multimodal Considerations

There are several land use characteristics that affect travel behavior including density, type and mix of land use, access to roadways and parking, and site design. Similarly, the transportation system affects land value, sustainability, community development, and land use patterns. Land use and transportation have a reciprocal relationship that must be balanced to achieve vibrant communities. Coordinating land use, transportation planning and development are considered one facet of "smart

growth" and sustainable development, which are relatively new concepts in regional planning. Land use and transportation can work in unison to support and guide development that encourages all transportation modes in their design. Sustainable development needs a balanced transportation system to serve the users. More importantly, a multimodal system provides options for users and helps to maintain a vibrant community such as Queen Creek.

Multimodal transportation promotes healthy and sustainable communities and provides options for all users

The U.S. Department of Transportation, the Department of Housing and Urban Development, and the Environmental Protection Agency are working in partnership to promote livable and sustainable communities. Federal programs sponsored by these agencies are focused on projects that link transportation, housing, transit, neighborhood vitality, and fiscal management. Successful communities meet the needs of their residents and visitors by providing community mobility and supporting regional mobility. Investing in mobility is recognized as a critical requirement for communities to become sustainable by creating an integrated multimodal transportation system with walkable, bikeable mixed-use neighborhoods, offering choices in transportation modes, linking regional activity centers, and revitalizing neighborhoods and downtown areas.

Emerging strategies that link transportation and development recognize that regional mobility is more than adding capacity to the transportation system. Important aspects of regional mobility include the integration of transportation systems and modes and recognizing the interdependence of neighborhoods and activity centers. Using transportation to promote healthy and sustainable communities also promotes reduced motor vehicle use, air quality improvements, less roadway congestion, and improved safety.

Complete streets are designed and operated to enable safe access for all users. A complete streets policy ensures that streets work for drivers, transit riders, pedestrians and bicyclists; as well as for the elderly, children, and people with disabilities. The concept of complete streets, while a relatively new term, is not new in practice. The Town of Queen Creek has been implementing complete streets for many years by including accommodations for cars, bicycles, and pedestrians in their engineering standards. Complete streets make Queen Creek more walkable and bikeable, support investments in all modes, encourage social interaction and community pride, boost the local economy and property values, and improve the livability and long-term sustainability of the Town.

Complete streets make Queen Creek more walkable and bikeable

A multimodal transportation plan needs to consider and address a number of factors to meet the vision and goals of the plan.

- **Safety** - All areas of design, operations, and maintenance of the transportation system should minimize hazards and emphasize safety for all modes of travel. Special consideration should be given to minimizing conflicts between travel modes.
- **Efficiency** - Transportation systems must be well-designed to effectively serve adjacent land uses. The degree to which each mode meets the needs of the community should be considered in terms of efficiency.
- **Balance** - A balanced transportation system provides multiple choices that are convenient and accessible for travelers. Balance is important to meet the diverse travel needs of a growing community.
- **Integration** - A multimodal system provides convenient, easy access between travel modes.
- **Mobility** - Mobility describes a person's ability to travel to destinations within a community. A balanced transportation system provides the ability to choose a travel mode based on the type and distance of a trip.
- **Accessibility** - Accessibility describes the degree to which travelers can use various modes in the transportation system. Accessible transportation systems provide ease of use for all people, regardless of physical ability or economic status.
- **Aesthetics** - Forms a uniqueness of the area and creates a theme that invites people to use the system and includes facility design, landscaping, and art.

The Street Element will continue to be the backbone of the transportation system and support the other modes. Transit, bicycle, and pedestrian facilities will be incorporated into the street system design as appropriate and needed. Bike lanes and routes will be included on much of the street system, and sidewalks will be an integral part of the street cross section. It should be noted that these features are already incorporated into the Town's design standards.

Streets are the backbone of the transportation system and support the other modes

The Transit Element presents opportunities to add local circulators that could connect to fixed routes outside Queen Creek and to build on the existing vanpool program.

The Non-Motorized Element includes bike lanes and routes on the arterial and collector streets, and shared use paths along washes and the utility corridors as well as sidewalks. The paths and trails would be developed in conjunction with the Parks and Recreation Department Master Plan and would include amenities to support non-motorized travel.

The ITS Element includes recommendations to continue to expand the Town's ITS infrastructure and to prepare an ITS Strategic Plan that will outline future ITS decisions and activities.

C. Performance Measures

There is a current trend to assess transportation investments using performance-based measures. Performance-based planning emphasizes a deliberate, thoughtful, and structured approach that ensures transportation projects that are based on full information and benefit the public. This approach is often described as performance-based planning and programming (PBPP), and it typically follows these steps:

- Where do we want to go? A broad vision that incorporates public input and sets overall goals.
- How are we going to get there? Identify trends and targets to help planners compare alternative strategies based on data and information from similar past projects.
- What will it take? The programming step selects specific investments to include in improvement plans, sometimes including mid-range, 10-year plans.
- How did we do? Evaluate how well each option for a project meets its goals.

Moving ahead for Progress in the 21st Century (MAP-21) established general, qualitative performance goals for federal highway programs and these are continued in the Fixing America's Surface Transportation (FAST) act signed into law in December 2015. Similarly, the current Arizona Department of Transportation (ADOT) Long-Range Transportation Plan also includes performance measures by plan goal. Table II-1 presents a comparison between the FHWA and ADOT plan goals.

TABLE II-1:SUMMARY OF FHWA AND ADOT GOALS

GOAL	FHWA	ADOT
Safety	X	X
Infrastructure Condition	X	X
Congestion Reduction	X	X
System Reliability	X	
Freight Movement	X	
Economic Vitality	X	X
Environmental Sustainability	X	X
Reduced Project Delivery Delays	X	
Link Transportation & Land Use		X
Strengthen Partnerships		X
Promote Fiscal Stewardship		X

Municipal agencies are also including performance measures in their transportation planning activities. Based on the Town of Queen Creek transportation plan goals, Table II-2 lists the goals along with suggested performance measures for the Town to use when evaluating the success of transportation improvements.

TABLE II-2: POSSIBLE PERFORMANCE MEASURES

GOAL	Possible Performance Measures
Economic Development	Roads improved to/from employment centers Job creation
Link Transportation & Land Use	Improved access management Hours of delay
Safety	Number of fatalities by mode Number of crashes by mode Number of safety infrastructure projects
Congestion	Percent of miles at acceptable congestion level Average speed during peak periods
System Reliability/Condition	Percent of miles in fair or better condition Percent of required maintenance spending
Multimodal	Vehicle occupancy Percent of sidewalk gaps Percent of bike lane gaps Percent non single occupant vehicle trips
Environmental Sustainability	Change in vehicle-related emissions
Strengthen Partnerships	Multi-jurisdiction improvements

III. PUBLIC OUTREACH

A. Introduction

Public involvement played an important role in the development of Queen Creek's Transportation Master Plan. The Town of Queen Creek regularly engages their residents and businesses when seeking input into Town activities, and the Transportation Master Plan process was no exception. Input and comments received from surveys and meeting participants was incorporated throughout the plan development, and the team worked closely with the Town's Marketing and Public Information Office to develop web-based content, maximize the use of the Town's social media, and relationship with local media in an effort to reach as many Queen Creek residents and property owners as possible.

Outreach methods included incorporating the "Better Roads Ahead" logo and theme, to make it easily identifiable and consistent with the Town's broader marketing efforts as it relates to improvements to the Town's existing transportation system and infrastructure. In addition, the team held two public meetings and developed a survey for resident input, for interested individuals to submit their specific comments to the project team.

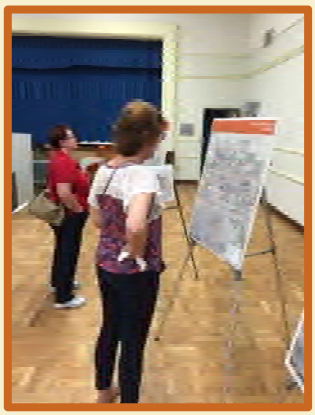
B. Public Involvement Strategies and Methods

Public involvement was incorporated into all aspects of plan development. A general plan of approach was discussed during project scoping and implemented as part of the effort. Additional strategies and outreach methods were incorporated into the public involvement timeline to cast and widen the net even further in encouraging public participation.

1. Public Meeting

Two public meetings were held as part of the planning process, one in February 2016 to introduce interested participants to the planning process and seek their input, and one in October 2016 to present the draft transportation master plan for comments and feedback.

To facilitate discussion at the public meetings, participants were invited to visit various stations, such as transit, bicycle & pedestrian, ITS, and roads. Comment forms were available at each of the public meetings. Prior to the second public meeting, the draft plan was made available on the Town's website so that those who could not attend the public meeting would still have an opportunity to provide their comments.



Notifications for public meetings were distributed via the following methods for all public meetings:

- Town website
- Town Social Media: Twitter/Facebook
- Local media
- E-blast invite sent to approximately 500 individuals

2. Resident Survey

An on-line survey was launched in November 2015 to offer Queen Creek residents, property owners, businesses and travelers an opportunity to provide their thoughts and concerns related to the future of Queen Creek's transportation. Notification of the survey being available was distributed similarly to the public meetings. A total of 744 surveys were completed by Queen Creek residents when the survey closed in April 2016, and selected results are depicted in Figures III-1 and III-2.

The findings from the public survey have been compiled into all survey respondents, and then exclusively Queen Creek residents, and this information provided much direction for the development of the TMP. As can be seen in Figures III-1 and III-2, 98% of respondents indicated that a vehicle was their primary mode of travel. Less than 50% of respondents believe that the existing streets and bicycle facilities provide for safe and efficient travel – improvements suggested were more travel lanes and more bike lanes.

C. Acknowledgements

The project team would like to thank the Town of Queen Creek Marketing and Public Information Office for their assistance in coordinating the messages and information for the project. Their partnership created the ability to reach many more residents, property owners, businesses and interested individuals in a timely manner, which provided those that were interested in participating with the opportunity to do so.

The project team also thanks those residents who completed the on-line survey as well as the Transportation Advisory Commission for their input and participation.

FIGURE III-1: ON-LINE SURVEY RESULTS-PART 1

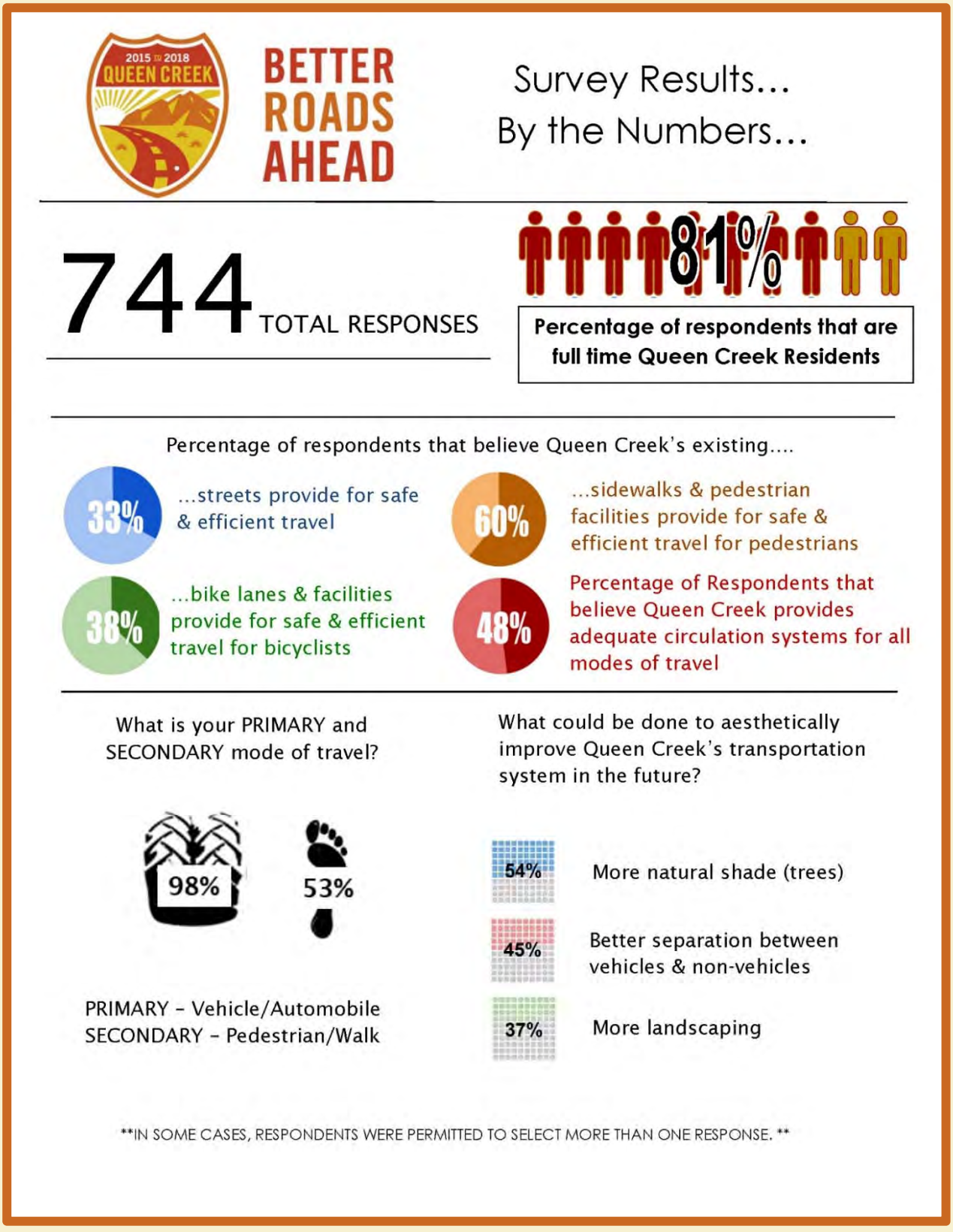
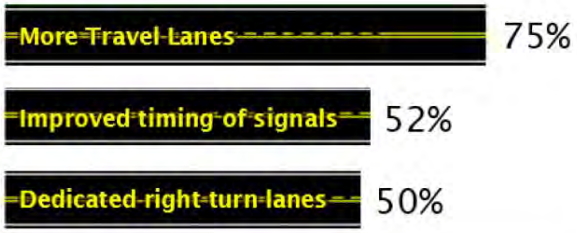


FIGURE III-2: ON-LINE SURVEY RESULTS-PART 2

What could be improved to provide for safer & more efficient travel along Queen Creek's roads?



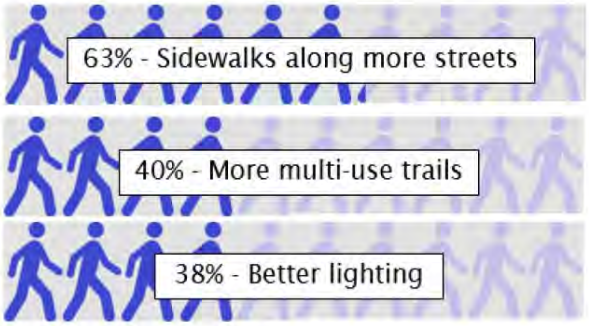
What could be improved to provide for safer & more efficient travel for bicyclists?

50% - Bike lanes on more streets

48% - Off street bike lanes

48% - Continuous network of bike lanes

What could be improved to provide for a safer & more enjoyable experience for pedestrians?



What connections are important for bicyclists?

What mode of travel needs the most improvement or consideration for the future of Queen Creek?

75% - Vehicle/Automobile

What is the **second** mode of travel which needs the most improvement or consideration for the future of Queen Creek?

35% - Bicycle

**IN SOME CASES, RESPONDENTS WERE PERMITTED TO SELECT MORE THAN ONE RESPONSE. **

IV. REVIEW OF PREVIOUS PLANS

There have been several plans prepared recently that included an analysis of various aspects of the Town's transportation system including:

- Queen Creek Small Area Transportation Study, 2007
- Circulation Element of the General Plan, 2008
- Southeast Mesa/Queen Creek Area Traffic Study, 2010
- Germann Road Corridor Study, 2013
- Queen Creek Transit Study, 2014
- Southeast Valley Transit System Study, 2015
- Meridian Road Corridor Study, 2013
- Intercity Rail Study
- SE Valley Transit Study
- South Specific Area Plan
- North Specific Area Plan

A. Queen Creek Small Area Transportation Study (SATS) – May 2007

The Queen Creek SATS included analysis of population and employment for 2005 and 2026; documentation of the current transportation system including regional highways, public transportation, and non-motorized; a review of future planned improvements; and recommendations. The arterial recommendations included the following:

- Meridian Expressway: Williams Gateway to Riggs/Combs
- Widen Hunt Highway to 4 lanes: Ellsworth to Power Rd
- Widen Power Rd to 4 lanes: Hunt Hwy to Riggs Rd
- Widen Gantzel/Ironwood to 8 lanes: Hunt Hwy to Williams Gateway Freeway
- Widen Riggs/Combs to 8 lanes: I-10 to N/S freeway
- Widen Ocotillo to 4 lanes: Higley to Hawes
- Queen Creek Rd to Germann Rd Connector
- Widen Queen Creek to 4 lanes: Hawes to Signal Butte
- Construct Crismon Rd: Germann to Queen Creek
- Construct/ widen Signal Butte to 6 lanes: Queen Creek Rd to Germann Rd
- Construct Signal Butte to 4 lanes: Empire to Riggs
- Construct Empire to 4 lanes: Ellsworth to Meridian
- Construct Meridian to 4 lanes: Empire to Riggs
- Widen Sossaman to 4 lanes: Hunt Hwy to Chandler Heights
- Widen Hawes Rd to 4 lanes: Hunt Hwy to Chandler Heights
- Widen Cloud Road to 4 lanes: Ellsworth to Rittenhouse

The high capacity recommendations included the following:

- Williams/North-South Freeways at 8 lanes; build out of Queen Creek arterial system
- Additional 6-lane freeway along Meridian and extending into Pinal County

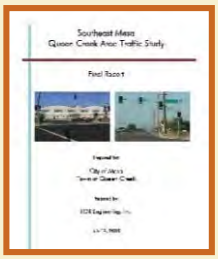
The public transportation recommendations included the following:

- Express service to Tempe/ASU/Sky Harbor, begun in 2007 (Line 534)
- Fixed-route service to Chandler, expected in later 2007; and
- Future service to major destinations in Mesa along the U.S. 60 corridor
- A local circulator

B. Circulation Element of the General Plan – May 2008

The continued population growth within and surrounding the Town requires the transportation system include multimodal options. The transportation goals included in the General Plan support the development of a comprehensive multi-use transportation network that provides opportunities for alternate vehicular and non-vehicular travel modes. The General Plan includes a planned transportation network, presented in Figure IV-1 that depicts arterial and collector streets. Items of note are a connection between Queen Creek Road and Germann Road (Queen Creek Parkway) west of the UPRR and the continuation of Ellsworth Loop north of Queen Creek Road.

C. Southeast Mesa/Queen Creek Area Traffic Study – July 2010

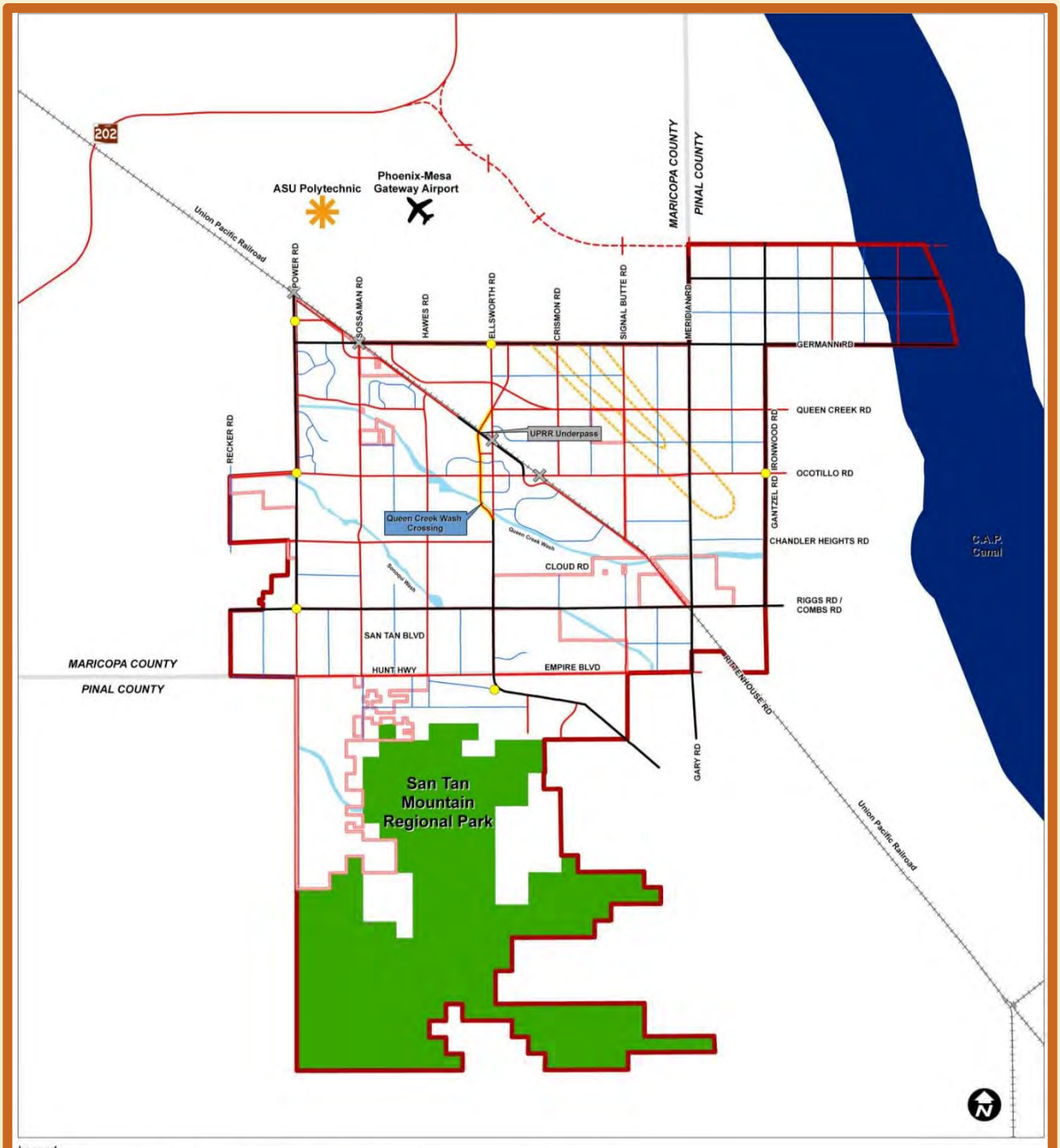


This study was sponsored by Queen Creek and the City of Mesa. The intent of this study was to provide a worst-case look at traffic operations on Sossaman Road in 2020. The first goal for this study was to understand the impacts that the proposed Queen Creek Parkway would have on the operation of Sossaman Road and the Gateway Airport. The second goal was to study the interaction between regional traffic and the planned growth around the west side of the Gateway Airport. The last goal was to identify system improvements to mitigate the impact of regional traffic flows on Sossaman Road so that there is adequate capacity to support economic development plans. Based on the analysis, it was determined that Queen Creek Parkway would have a minor effect on regional traffic flow and Sossaman Road, but there is a deficiency in north-south arterial street capacity. The highest priority for relieving Sossaman Road was recommended to be improvements to Signal Butte and Ray Road, with a long term recommendation for a grade separation of the UPRR at Germann and Sossaman.

D. Germann Road Corridor Study – July 2013

The Germann Road Corridor Improvement Study (CIS) was undertaken to examine the transportation demands and future right-of-way (ROW) requirements of a portion of East Germann Road located between South Power Road and North Ironwood Road. The principal focus of this CIS is the determination of future travel demands and identification of transportation

FIGURE IV-1: GENERAL PLAN FUNCTIONAL CLASSIFICATION



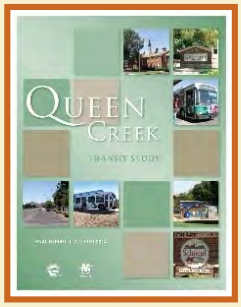
Source: Town of Queen Creek Transportation Department, 2007

63

improvements needed to satisfy those demands. The CIS establishes the facility type, number of lanes, ROW needs, and general alignment required to accommodate forecast traffic growth and enhance safety on Germann Road between Power and Ironwood roads. The recommendations included:

- Preserve 140 feet right of way to accommodate a six-lane arterial
- Conduct a DCR to further define a recommended configuration

E. Queen Creek Transit Study – October 2014



The Queen Creek Transit Study was intended to identify opportunities, challenges, and overall demand for providing transit services and multimodal transportation investments in the Town of Queen Creek. The southeast valley region has experienced a significant population and employment growth, resulting in an increased number of daily trips through the Town destined for locations across the Valley. To identify the Town's most pressing mobility needs, an analysis of demographic and employment trends, existing and future development patterns, and a community travel survey were conducted. A range of transit options were developed for consideration including express bus service to several destinations, the extension of existing local bus routes into Queen Creek, community connector service, pre-scheduled on demand shuttle service, and expansion of Valley Metro's vanpool and carpool programs. The recommendations included:

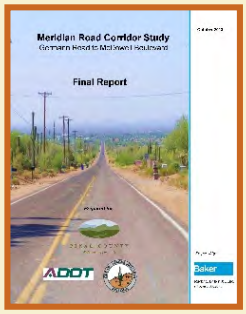
- Short term – explore the expanded use of Valley Metro's vanpool program
- Improve supportive public infrastructure, such as sidewalks, street furniture, bicycle facilities, and street lighting
- A community connector between Queen Creek and Superstition Springs Transit Center

F. Southeast Valley Transit System Study

The Southeast Valley Transit System Study (SEVTSS) analyzed transit services and ridership demand in transit-established and transit-aspiring communities within the southeast subarea of the Maricopa Association of Governments (MAG) region. The study area encompasses the full extents of the City of Tempe, City of Mesa, Town of Guadalupe, City of Chandler, Town of Gilbert, City of Apache Junction, Town of Queen Creek, City of Maricopa, and Town of Florence. The study involved a transit optimization analysis and a needs assessment. The study resulted in the identification of short-, mid-, and long- term recommendations that can be used to enhance and develop a performance-based transit system throughout the Southeast Valley. The recommendations included:

- Mid-term – promote vanpool in the Town of Queen Creek
- Long-term – consider express routes to/from Queen Creek/San Tan Valley

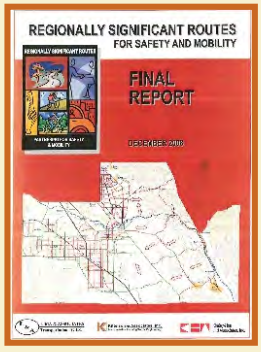
G. Meridian Road Corridor Study – October 2013



The purpose of this study was to evaluate the growing demands placed on local roads and streets by development in the region. The study addressed the transportation planning needs identified by the jurisdictions and more particularly to lead the local jurisdictions to develop consensus on socio-economic demographic, modeling forecasts, roadway facility type, number of lanes, and right-of-way requirements to guide the future development of the road. The study area included Meridian Road from McDowell Road to Germann road. The recommendations included:

- Mid-term - Meridian Road is anticipated to be extended from Warner Road to Germann Road as a four-lane divided roadway by 2025 including constructing Meridian Road intersections with Ray Road, Williams Field Road, Pecos Road and Germann Road.
- Long-term - The SR 24/Meridian Road Traffic Interchange is anticipated to be constructed by 2035.
- Ultimate – six-lane cross section from Southern Avenue to Germann Road

H. Regionally Significant Routes for Safety and Mobility (December 2008)



The 2006 Pinal County Small Area Transportation Study identified the need for regionally significant routes based on 2025 traffic forecasts. This follow on study and report developed a Regionally Significant Routes for Safety and Mobility (RSRSM) plan for Pinal County in partnership with federal, state, county, local, Native American Communities, and private stakeholders. The purpose was to provide guidance for the County and other stakeholders to preserve right of way, implement and fund regionally significant routes (RSR). RSR were defined as parkways or principal arterials both of which included six travel lanes.

Meridian, Gantzel, Germann, Ocotillo, Combs, and Skyline were recommended as principal arterials in Pinal County. Meridian and Gantzel, south of Combs were recommended as a top priority. Germann, Ocotillo, Combs, and Skyline were recommended as medium priority.

I. North Specific Area Plan (NSAP) – December 2015

The NSAP was conducted after the Town received multiple requests for Major General Plan Amendments to increase residential density or convert land from commercial and industrial to residential. The study area was bounded by Ellsworth Road, Germann Road, Meridian Road, and Queen Creek Road. The NSAP considered many of the element in the General Plan including transportation. The transportation recommendation included completing the arterial grid with the exception of Crismon Road between Germann and Queen Creek.

J. South Specific Area Plan (SSAP) – December 2015

The SSAP was conducted after the Town received multiple requests for Major General Plan Amendments to increase residential density or convert land from commercial and industrial to residential. The study area is shown to the right. The SSAP considered many of the elements in the General Plan including transportation. A major recommendation was to re-align Rittenhouse to the west at Riggs Road and to re-align Meridian to the east and terminate at Combs Road moving both roadways further from the UPRR.

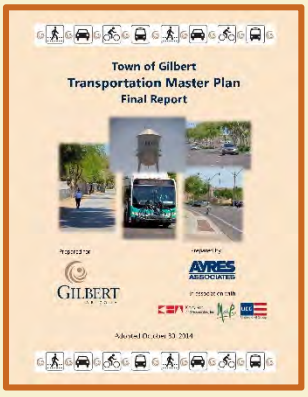
K. Mesa Transportation Plan – November 2014

The City of Mesa prepared an update to their transportation plan in 2014 to support the following vision: "Mesa will develop a transportation system that supports shorter trips, sustainable mode choices, a high quality of life, economic development, and the creation of high quality jobs." Recommendations include four lanes on Sossaman, Hawes, Ellsworth, and Crismon; and six lanes on Signal butte and Meridian north of Germann. Ellsworth Road includes bike lanes and Signal Butte is identified as a regional bicycle connection.

L. Gilbert Transportation Plan – November 2014

The Town of Gilbert completed its first transportation master plan (YTMP) in October 2014. The purpose of the TMP was to addresses a number of issues related to transportation:

- Create a balanced transportation system
- Improve mobility and accessibility for all users
- Construct street widening and intersection improvements
- Manage traffic congestion
- Improve public transit
- Consider the inter-relationship between land use and transportation
- Address the needs of bicyclists and pedestrians
- Coordinate with surrounding communities
- Provide adequate transportation funding
- Improve air quality



Recommendations that affect Queen Creek include:

- Widen Ocotillo Road to four lanes from Recker to Power
- Widen Hunt Highway to four lanes from Higley to Recker
- Transit option 1 and 2 included a bus route on Power Road south to Queen Creek Road – identified as low priority
- Transit option 2 included a circulator bounded by Pecos, Power, and Chandler Heights – identified as low priority
- Include bike lanes on Ocotillo Road from Recker to Power

M. ADOT Intercity Rail Study (on-going)

This study will document the purpose and need for intercity passenger rail service between Phoenix and Tucson, identify and evaluate alternatives, select a preferred alternative, and identify funding. The current status of the study is that comments were received on the three final alternatives. Next, the environmental document will be completed and a Record of Decision obtained in 2016 for a recommended alternative. One of the three alternatives (known as the Yellow Alternative) uses the UPRR right of way through Queen Creek and includes one station in the vicinity of Ocotillo Road. Of the three remaining alternatives, the Yellow Alternative was identified as the preferred alternative.

N. North-South Corridor Study

The Arizona Department of Transportation (ADOT), in partnership with the Federal Highway Administration (FHWA), is conducting the North–South Corridor Study, which will result in the preparation of a location/design concept report (L/DCR) and an environmental impact statement (EIS) for a proposed 45-mile-long, north–south transportation corridor in Pinal County, Arizona. The study area is bounded by US 60 on the north; I-10 on the south; SR 202, the Gila River Indian Community, and SR 87 on the west; and roughly SR 79 on the east. The Alternatives Selection Report (ASR) describes the alternatives development and evaluation process and the recommended alternatives that will be carried forward into the L/DCR and EIS for further detailed analysis. A principal design feature of the Corridor will be to accommodate both ADOT roadway design criteria for a fully access-controlled freeway facility and passenger rail should all or a segment of the Corridor be selected as an alternative for the ongoing ADOT Passenger Rail Study. ADOT recently announce that it will proceed with a Tier 1 Environmental Impact Study even though funding has not been identified.

V. EXISTING CONDITIONS

This chapter presents a summary of the existing conditions which includes population and employment, streets, transit, non-motorized, and ITS.

A. Population and Employment

The Maricopa Association of Governments (MAG) is the designated Metropolitan Planning Organization (MPO) for transportation planning for the metropolitan Phoenix area in Maricopa County as well as portions of Pinal County including San Tan Valley. MAG is also designated as Air Quality Planning Agency for the region. MAG membership consists of 27 incorporated cities and towns within Maricopa and Pinal Counties and the contiguous urbanized area, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, Fort McDowell Yavapai Nation, Maricopa County, Pinal County, Arizona Department of Transportation (ADOT), and Citizens Transportation Oversight Committee (CTOC). ADOT and CTOC serve as ex-officio members for transportation-related issues.

The Arizona Department of Administration (ADOA) prepares the state and county resident population projections, but authorizes Councils of Governments to prepare projections below the county level that are consistent with the County control totals developed by ADOA.

As the designated MPO, MAG is authorized to prepare sub-regional projections using the county population as a control total. In preparing these projections, MAG is required to follow standards established by the Arizona Department of Administration. Sub-regional projections are used:

- by MAG as input into the MAG transportation models to predict automobile traffic.
- by MAG as input into the MAG air quality models to predict emissions and concentrations.
- by local governments to evaluate infrastructure improvements.
- for gauging regional development and land use plans.
- by local governments to prepare general plans.

The corporate boundaries of a city or town define the area over which the jurisdiction exercises its authority. Since MAG projects future conditions, there is a need to define the future corporate boundaries of each city and town and maintain a constant geography over the projection horizon. As a result, MAG prepares its projections by Municipal Planning Area (MPA). An MPA represents a jurisdiction's area of planning concern and is based upon the anticipated future corporate boundaries of a city or town.

MAG approved new socioeconomic projections for the region in June 2016. Prior to the development of a new set of socioeconomic projections, MAG reviews the MPA boundaries with each member agency through the MAG POPTAC. Maps are distributed showing the MPA boundaries from the last set of projections and input is requested. A jurisdiction is responsible for reviewing and providing input on

land use, base data, surveys, assumptions and draft socioeconomic projections for the entire MPA. TAZs are modified as expected growth in a 30-year horizon expands geographically or density in existing TAZs warrants a split. TAZs and RAZs fall completely within only one MPA.

1. Population

MAG primarily uses the decennial census and the American Community Survey (ACS) for developing projections. The 2010 census was an actual population and dwelling unit count. The following variables were extracted from the 2010 decennial census and used as a part of the projections base: resident population in households, resident population in group quarters, total housing units, occupied housing units and vacant housing units. Because the ACS targeted April 1, 2014, it was necessary to adjust the database to July 1, 2014 to provide a mid-year benchmark for the projections series. This adjustment was carried out by adding the sum of housing units constructed and demolished from April 2, 2014 through June 30, 2014 to the April 1, 2014 housing unit figure. By applying census occupancy rates and persons per occupied household to the July 1, 2010 housing stock, a July 1, 2014 population was derived and used for projections. The MAG July 2015 population for the Queen Creek incorporated area is 34,000, which was based on the Town's mid-decade census which revealed a population of 33,649. The 2015 population for the Queen Creek planning area is estimated to be 45,500.

2. Employment

Total 2010 employment at the county-level was derived from a population control total developed by the Arizona Department of Administration (ADOA). Total employment includes self-employed as well as wage and salary workers. Using the 2010 Maricopa County employment control total, 2010 sub-regional employment estimates were prepared and reviewed by MAG member agencies. The employment from the employer database was then benchmarked to the ADOA North American Industry Classification System (NAICS) county totals. A land use was assigned to each employer record based on industry, industry to land use relationships, and TAZ land use.

The new projections include 2015 population and employment estimates based on the 2010 census. MAG tabulates the data by Regional Analysis Zone (RAZ) and Traffic Analysis Zone (TAZ) for use in their various modeling activities. The RAZ and TAZ boundaries are shown in Figure V-1 and the 2015 population and employment data by RAZ is presented in Table V-1. The majority of the population (89%) and employment (96%) is located in RAZ 339 which is the main part of town bounded by Power, Germann, Meridian, and Hunt Highway. Most of the remaining population and employment is found in RAZ 424 which is east of Meridian.

FIGURE V-1: RAZ & TAZ BOUNDARIES

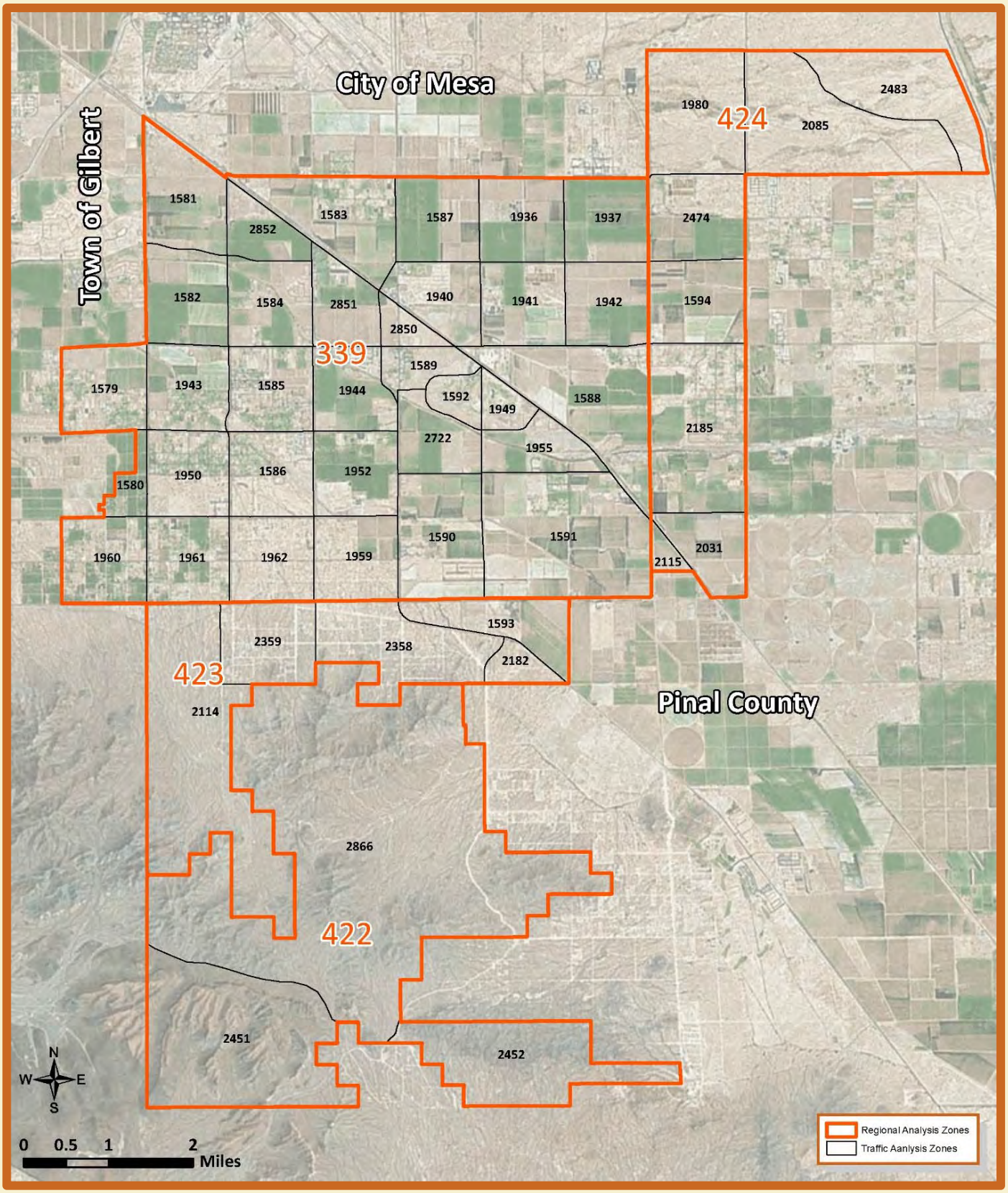


TABLE V-1: 2015 SOCIOECONOMIC DATA SUMMARY*

RAZ	Population	Employment
339	39,303	6,049
422	9	0
423	1,549	31
424	3,331	198
TOTAL	44,192	6,278

**source MAG*

Figure V-2 shows the population density for the Town based on the 2015 projections. As can be seen from the figure, the population density ranges from a high of 4,600 people per square mile to a low of 0 people per square mile. Generally, the higher density areas are the far northwest of the Town and a few square miles centered on Rittenhouse and Ocotillo. The lower density areas are in the southern and northwest portions of the town. Figure V-3 shows the employment density based on the 2015 projections. The high employment density areas follow the same pattern as the population density, however the variation in employment density is more dispersed.

FIGURE V-2: 2015 POPULATION DENSITY

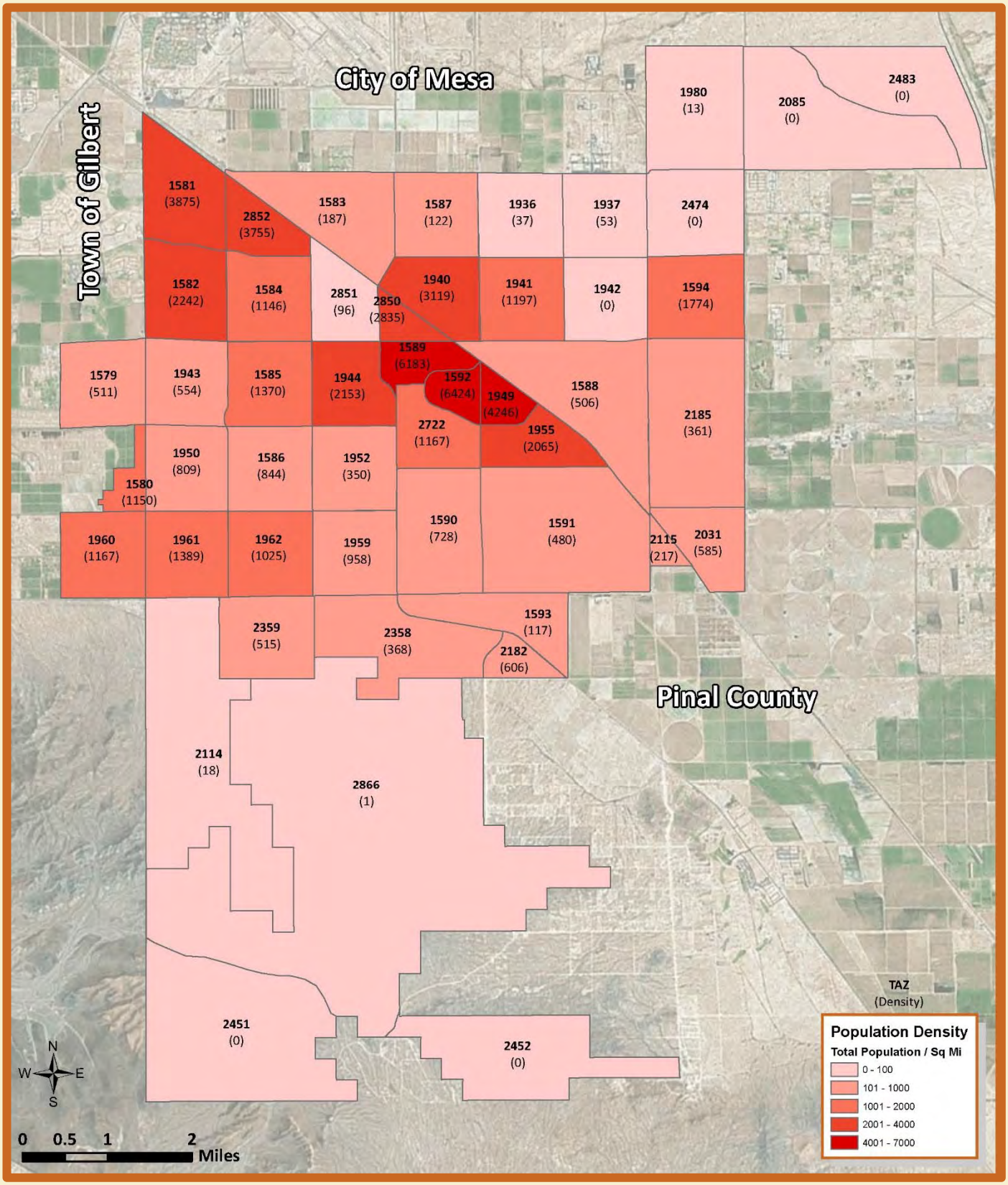
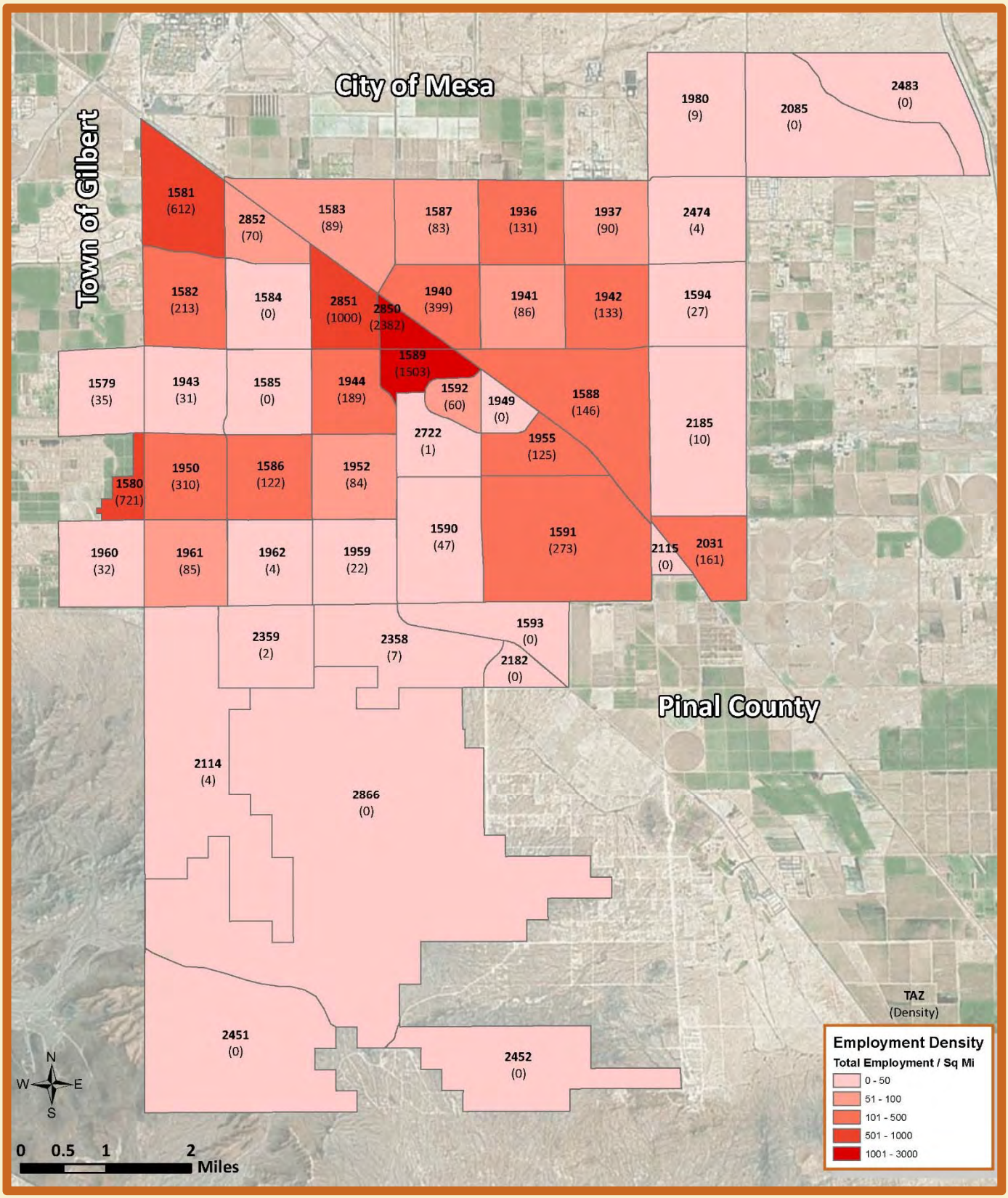


FIGURE V-3: 2015 EMPLOYMENT DENSITY



B. Streets

The backbone of the Town's transportation system is the street network and it will continue to be in the future. The street network provides the foundation for the other modes - transit, pedestrian, bicycle, and ITS. The following sections will examine several factors that affect the current street network conditions and then the future conditions are discussed in the next chapter. The following characteristics document existing street conditions.

- Functional Classification
- Existing Through Lanes
- Traffic Signals
- Crash Data
- Traffic Volumes
- Level of Service
- Population and Employment

1. Functional Classification

Functional classification defines the hierarchy of streets in a roadway system. The classifications generally used in the Maricopa Association of Governments (MAG) region include freeway, major arterial, minor arterial, major collector, minor collector, and local. In general, the freeways and arterials provide a high level of mobility for the traveling public with minimal allowance for access, while the collectors and local streets provide for direct residential, commercial, and employment access.

The roles and standards for each type of roadway are established in order to plan an efficient and effective system. Most travel involves movement through a network of roads of varying functional classification. Functional classification denotes the relationship of mobility, access, and trip length. The following are general characteristics associated with the different classifications in an urban system.

a) Freeway (ADOT jurisdiction)

Freeways are high-speed, limited access facilities that provide inter- and intraregional access with grade separated interchanges at arterial streets. The Town of Queen Creek has two freeways that serve the Town. Loop 202 (Santan Freeway) which passes to the northwest of the Town and SR 24, which connects to Ellsworth Road approximately three miles north of the Town boundary.

b) Arterial Streets

Arterials are high capacity roadways that carry large volumes of traffic between areas of high residential density, employment, retail and commercial land uses. Arterial streets provide limited direct access to abutting land uses. Primarily, the arterial street system in Queen Creek is laid out on the mile grid within town limits. There are two exceptions to the mile grid in Queen Creek - Rittenhouse Road which extends from the southeast at Riggs/Combs Road to the northwest town limit generally following the UPRR and Hunt Highway as it continues into Pinal County south of Empire Boulevard.

c) Collector Streets

Collector streets provide connections between arterial roadways and local streets linking residential, employment and commercial areas. Collector streets strengthen the continuity of the street network and establish an interconnected street pattern between the mile arterial grid streets. An interconnected collector street grid provides multiple routes, diffuses automobile traffic and provides better accessibility for non-motorized traffic. A planned system of collector streets can reduce the number of short trips that otherwise would occur on the arterials. The Town does not have a good system of collector streets because of the UPRR that extends diagonally through the Town and large master planned communities that are developed to minimize through collector streets. As a result, there is an over-reliance on the arterial street system even for short trips.

d) Local Streets

Local streets are designed primarily to provide direct access to property and secondarily to move local neighborhood traffic. Local streets carry low volumes of traffic traveling at lower speeds.

The functional classification of roadways from the General Plan was presented in the previous section. The section line streets are principal arterials with six-lanes or arterials which have four-lanes. The circulation includes collector streets which are generally on the mid-section line. Also included is a continuation of SR 24 to east on a curvilinear alignment to Meridian Road one-half mile north of Pecos Road, then continuing easterly into Pinal County.

2) Existing Lanes

The existing number of through lanes provided on the arterial streets currently varies from one through lane in each direction to three through lanes in each direction. The existing number of through lanes on the arterial street system is shown in Figure V-4. It should be noted that the figure represents the general number of through lanes on each segment. There may be short sections of more through lanes where development has occurred or fewer through lanes if no development has occurred. The number of lanes provided at individual intersections also varies. There are locations where additional through and/or turn lanes are added to improve intersection capacity.

3. Traffic Signals

A traffic signal can be simply defined as an automated device which alternately directs traffic to stop and then proceed. When properly used, traffic signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby influence traffic flow.

Traffic control signals have one or more of the following advantages:

- They provide for the orderly movement of traffic.
- They increase the traffic-handling capacity of the side-streets
- They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.
- When linked in a coordinated system, traffic signals can improve flow along a route.
- They are used to interrupt heavy traffic at intervals to permit other traffic, whether vehicular, bicycle, or pedestrian, to cross.

Figure V-5 shows the location of existing traffic signals within the Town. There are a total of 42 traffic signals in the Town.

4. Crash Data

Crash data was obtained by the Town from the Arizona Department of Transportation (ADOT) for the period from January 1, 2012 to July 31, 2015. The data was mapped for each calendar year and is presented in Figures V-6 to V-9. During the analysis period, there were a total of 778 reported crashes. The annual breakdown is as follows: 172 in 2012, 223 in 2013, 213 in 2014, and 170 through July 2015. It is not surprising for the number of crashes to increase in a rapidly growing community as traffic volumes and vehicle miles of travel increase. There were three crashes resulting in a fatality – one in 2013 and two in 2015. There were ten crashes involving non-motorists resulting in six injuries – two in 2012, 5 in 2013, two in 2014, and one in 2015.

FIGURE V-4: EXISTING NUMBER OF THROUGH LANES

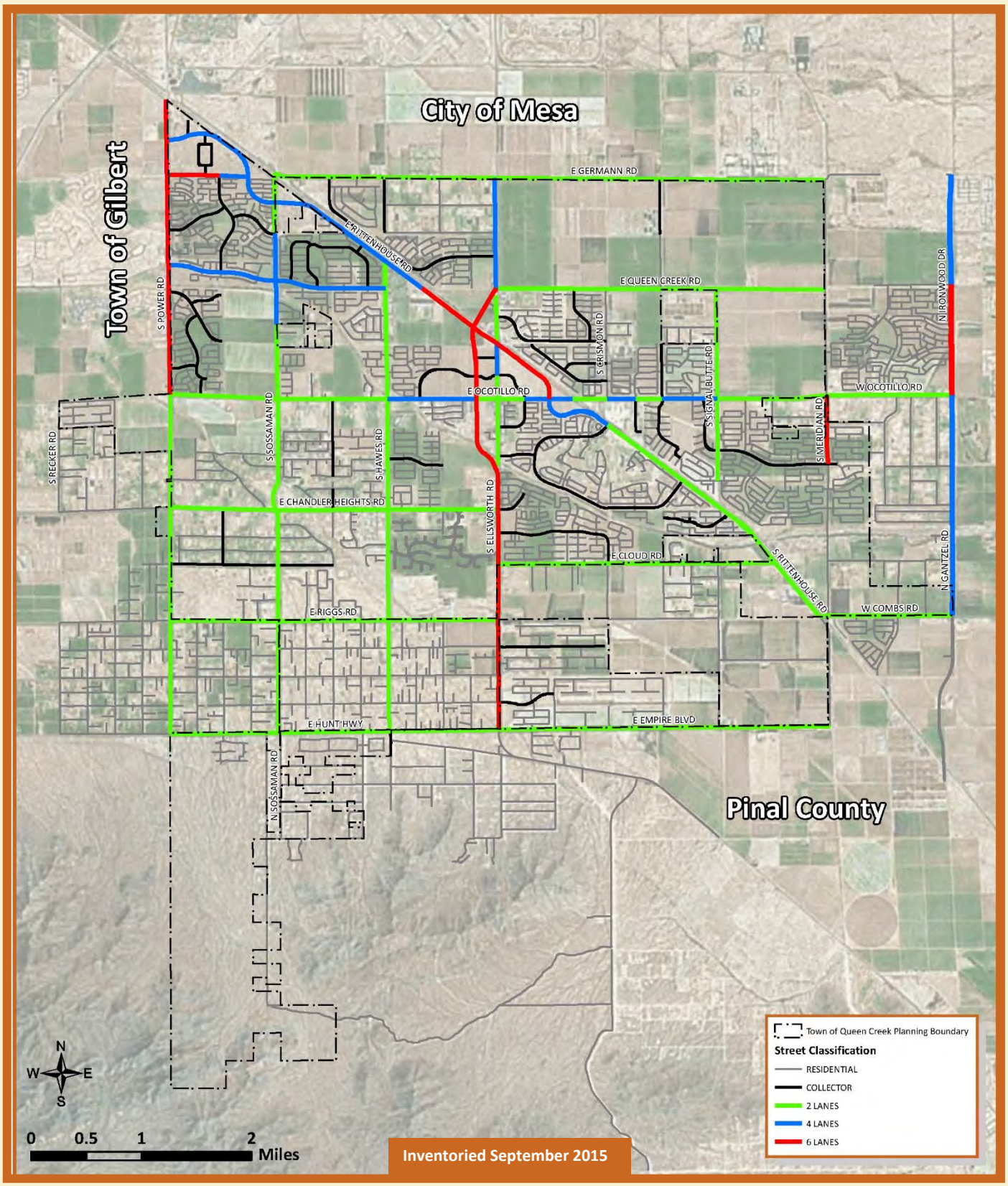


FIGURE V-5: TRAFFIC SIGNAL LOCATIONS

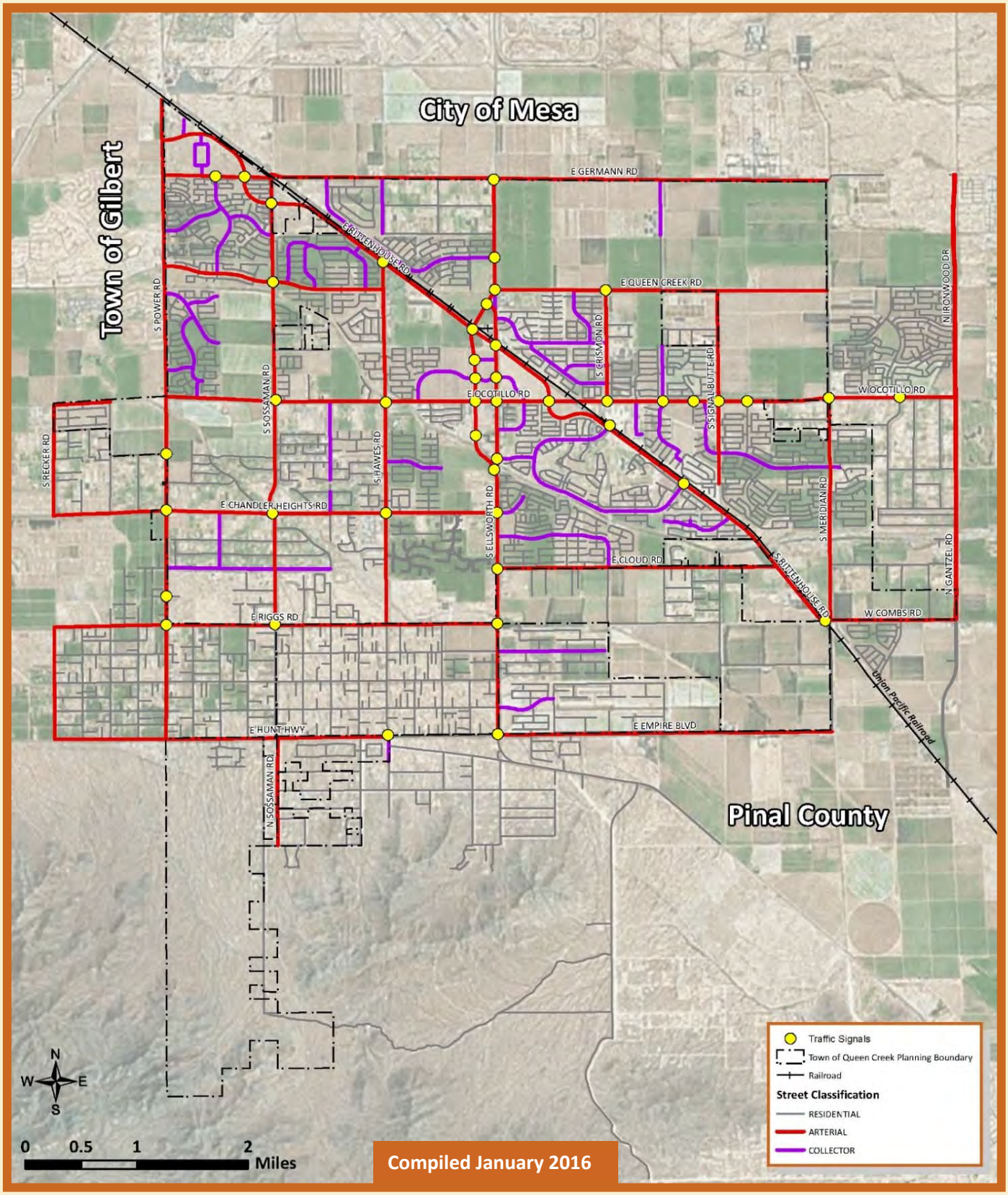


FIGURE V-6: CRASHES IN 2012

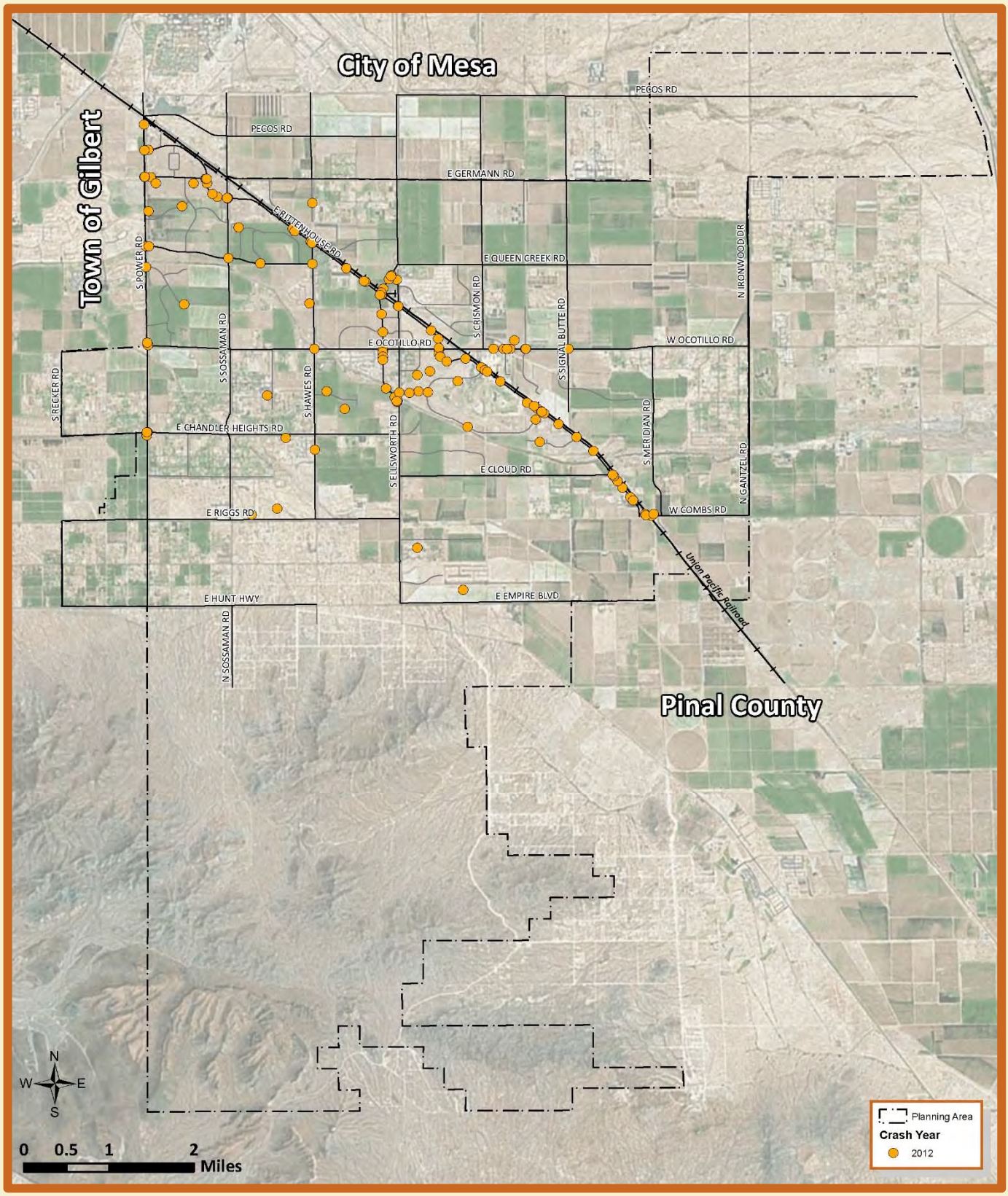


FIGURE V-7: CRASHES IN 2013

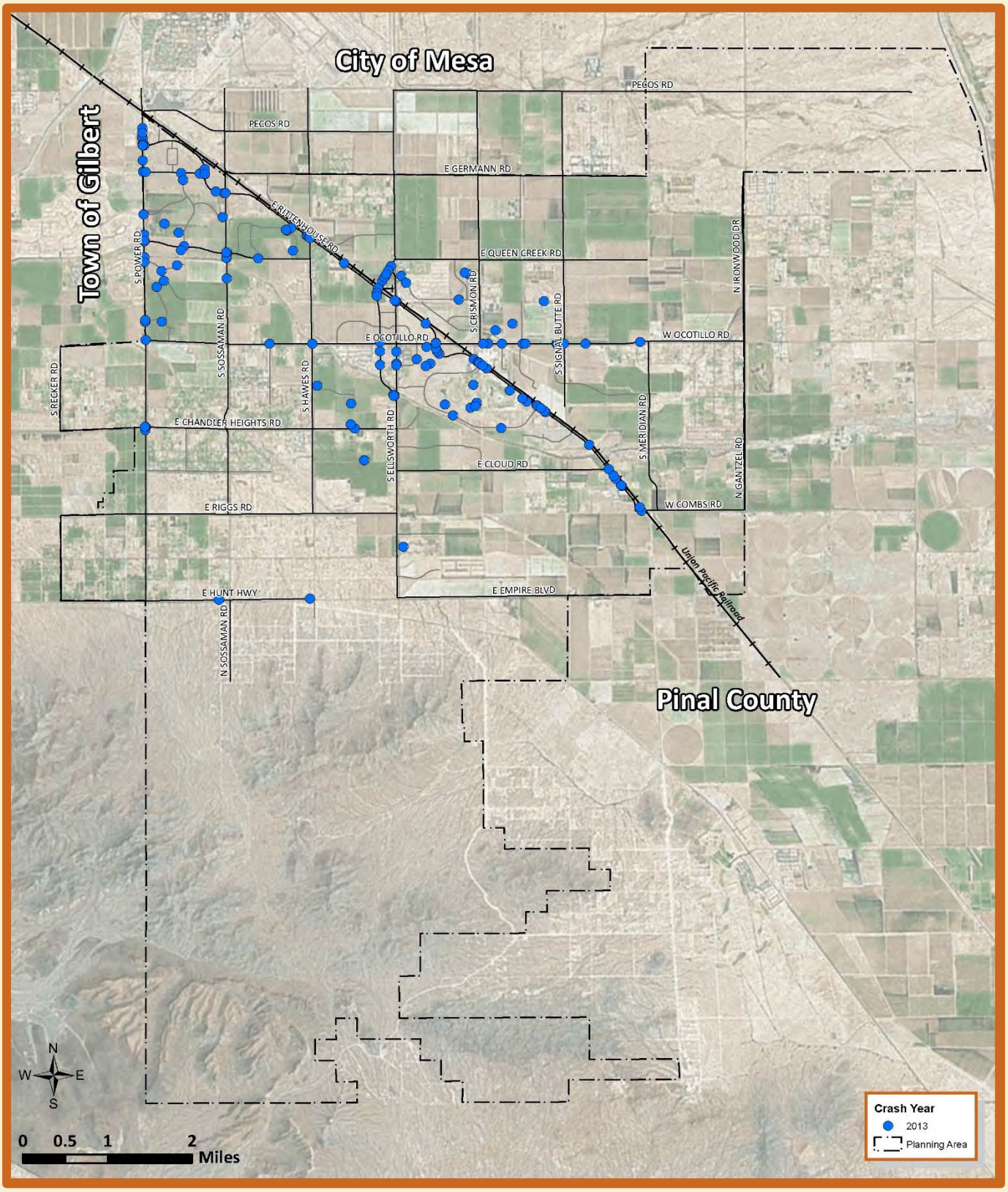


FIGURE V-8: CRASHES IN 2014

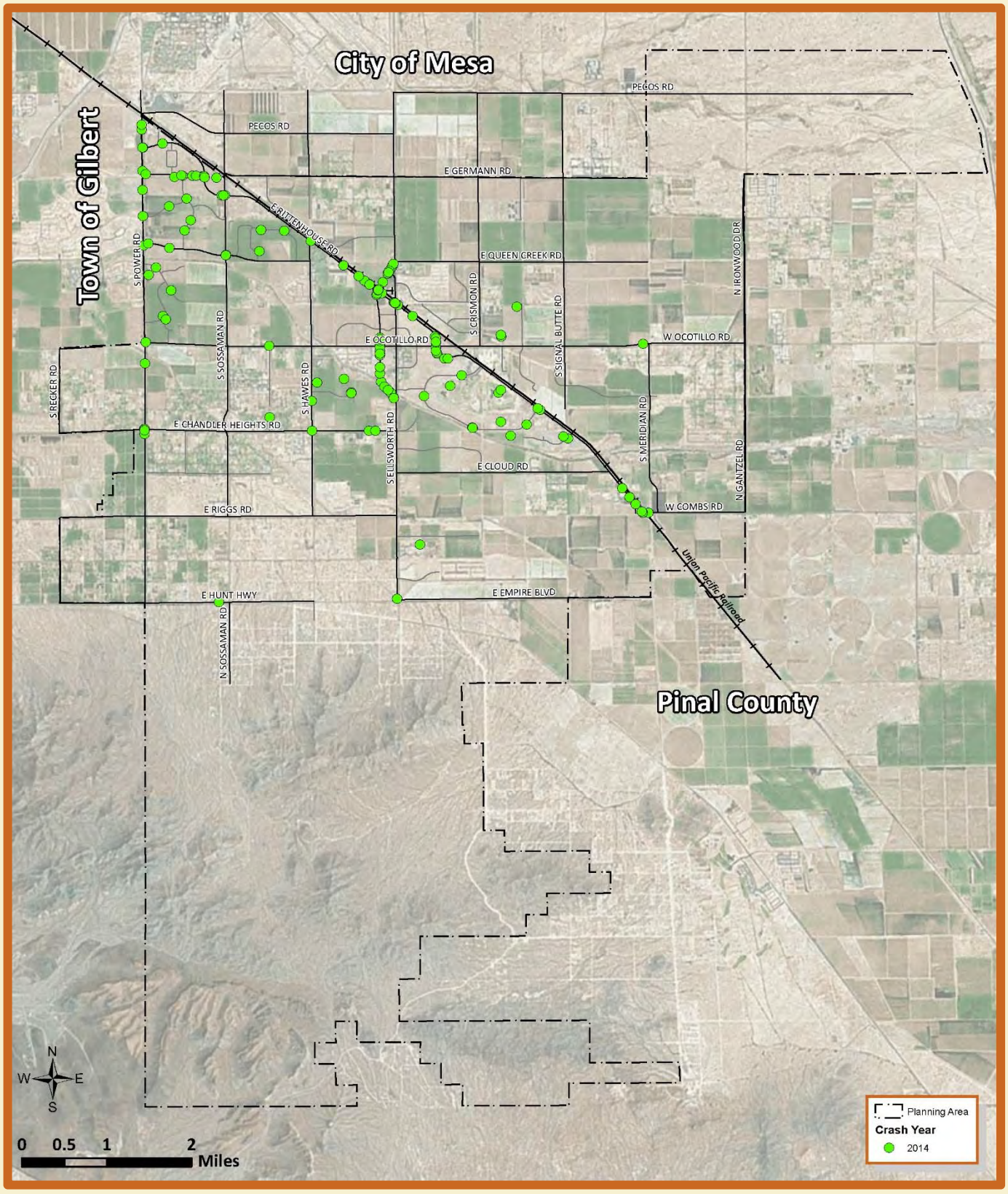
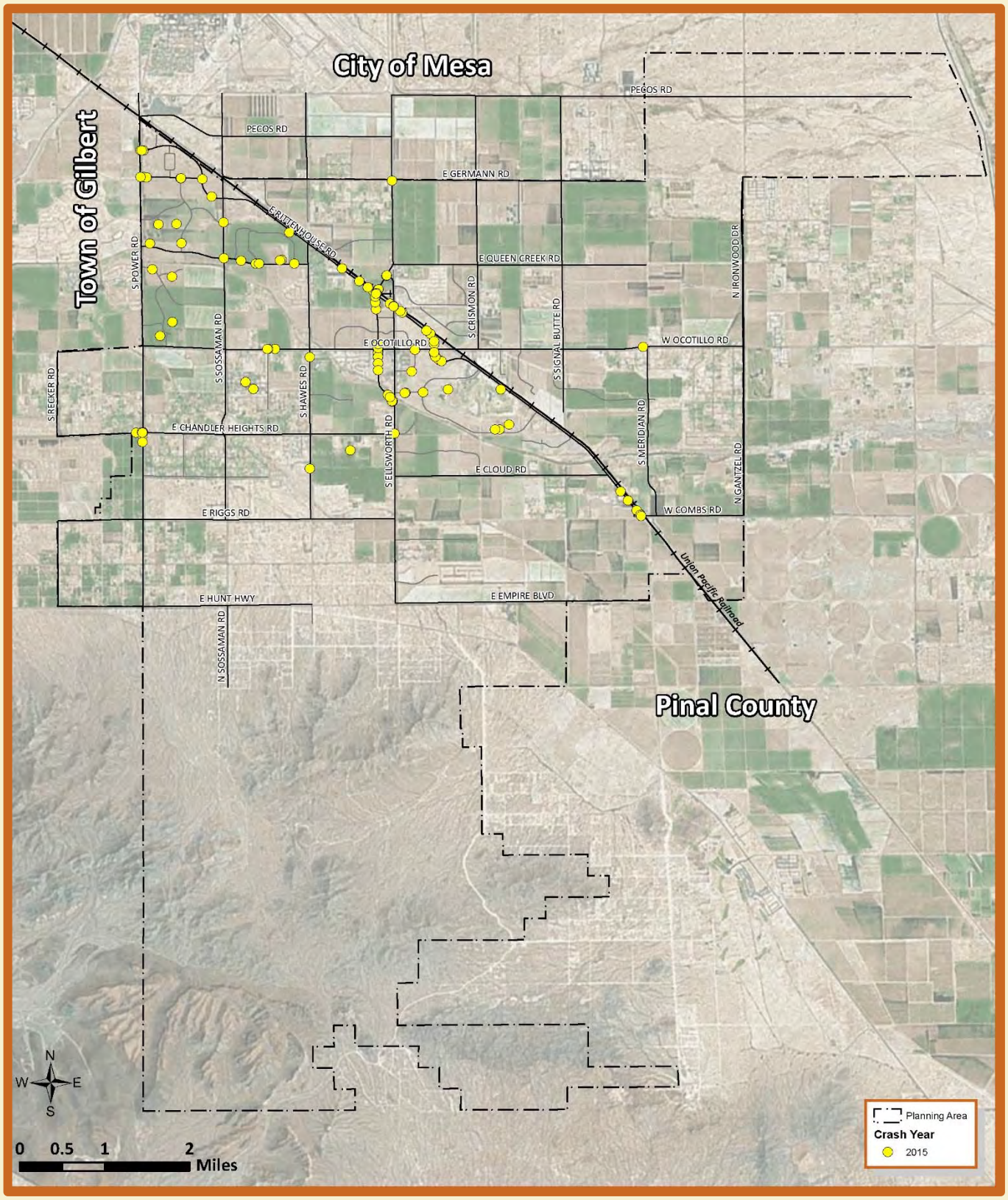


FIGURE V-9: CRASHES IN 2015



Other observations regarding the crash data include:

- The number of crashes at Rittenhouse and the two Village Loop Road intersections has decreased since 2012 – there were no crashes in 2015 through July
- The number of crashes on Rittenhouse between Ocotillo and Cloud has decreased
- The number of crashes on Rittenhouse between Cloud and Combs has decreased from 10 in 2012 to 5 in 2015
- The number of crashes in the area bounded by Rittenhouse, Power, Ocotillo, and Hawes increased after 2012
- The number of crashes on Queen Creek Road between Sossaman and Hawes increased from three in 2012 to seven in 2015 through July

There were no town-wide crash patterns identified based on the annual fluctuation in crashes. The Town should continue its emphasis on enforcement, which has a positive effect on crashes.

Table V-2 summarizes the number of crashes on the two roadways with the highest number of crashes during the analysis period – Ellsworth Loop and Rittenhouse Road.

TABLE V-2: ELLSWORTH AND RITTENHOUSE ANNUAL CRASHES

YEAR	2012	2013	2014	2015*
Ellsworth Loop (1.5 miles)	18	13	26	18
Rittenhouse Rd (7.5 miles)	45	37	38	26

*through July

5. Traffic Volumes

Traffic counts were conducted in 2015 in conjunction with the development of this plan. Forty-eight hour traffic counts were obtained on each mile segment within the Town except those locations where there was active construction that would affect the validity of the count and locations were the Town had existing data. The 48-hour traffic counts were conducted at 53 locations. The 24-hour average of the traffic counts are shown on Figure V-10. The ten highest volume locations are listed in Table V-3. Some interesting facts derived from the traffic count data are:

- Ellsworth Road or Ellsworth Loop have the six highest volume segments,
- Rittenhouse Road and Ocotillo Road have the other four highest volume segments with two each, and
- Nine of the ten highest volume segments are north-south or northwest-southeast streets indicating that a majority of travel in Queen Creek is to/from the north and west.

FIGURE V-10: EXISTING DAILY TRAFFIC VOLUMES

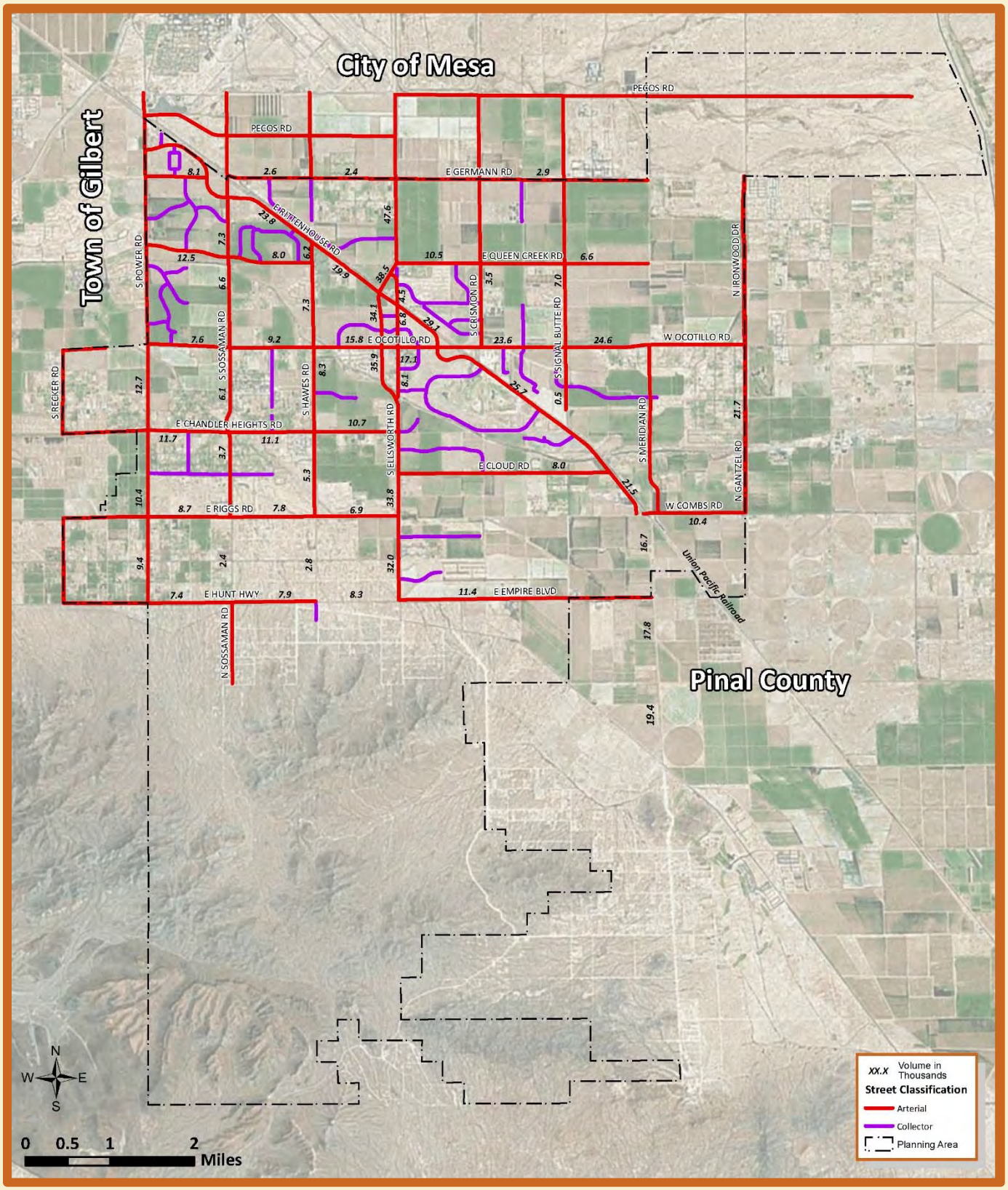
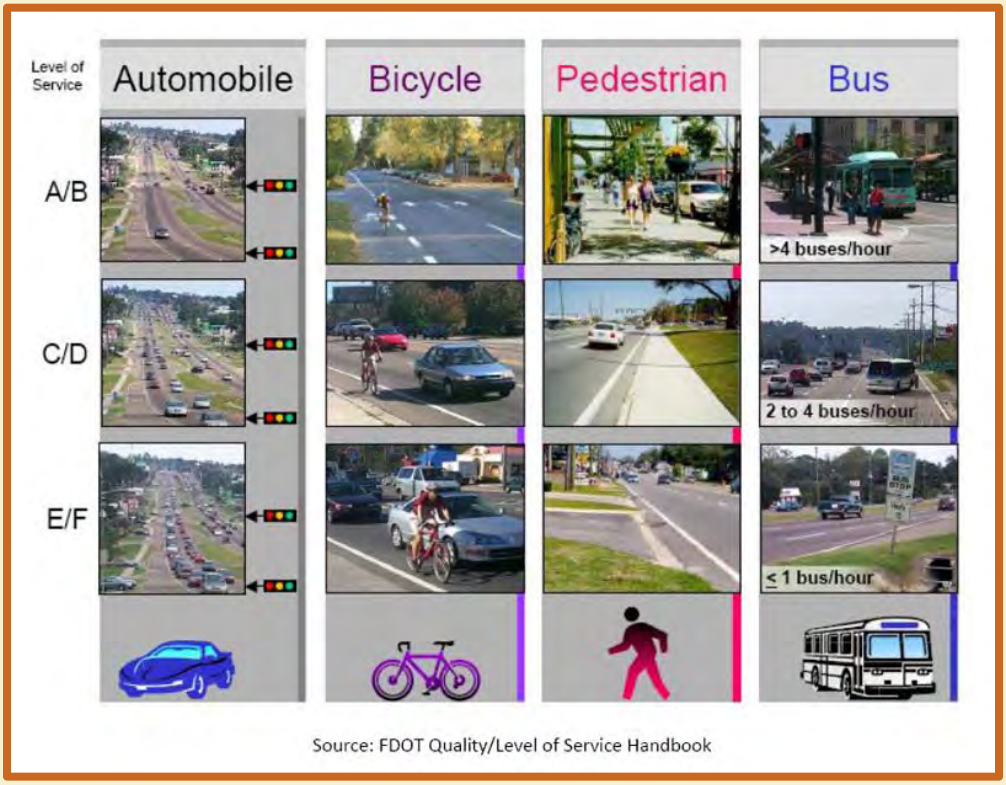


TABLE V-3: HIGHEST VOLUME LOCATIONS

SEGMENT	FROM	TO	2015 ADJUSTED DAILY VOLUME (Veh/Day)
Ellsworth Road	Queen Creek	Germann	47,580
Ellsworth Loop	Rittenhouse	Queen Creek	38,480
Ellsworth Loop	Chandler Heights	Ocotillo	35,940
Ellsworth Loop	Ocotillo	Rittenhouse	34,090
Ellsworth Road	Riggs	Chandler Heights	33,830
Ellsworth Road	Empire	Riggs	31,960
Rittenhouse Road	Ellsworth Loop	Ocotillo	29,050
Rittenhouse Road	Ocotillo	Cloud	25,740
Ocotillo Road	Signal Butte	Meridian	24,650
Rittenhouse Road	Sossaman	Haws	23,820

6. Level of Service

Historically, level of service (LOS) was used as a qualitative measure of a roadway's effectiveness at handling traffic, however, today there are also LOS measures for non-motorized and transit modes as depicted in the graphic below.



Source: FDOT Quality/Level of Service Handbook

The remainder of this discussion refers to roadway LOS. Level of service can be measured for a road segment or intersection. LOS ranges from A to F, where LOS A represents free flow conditions and LOS F represents a congested, unstable flow and is defined as capacity and over capacity. The vehicle capacity of a roadway can be defined as "the maximum number of vehicles that can pass a given point during a specified period under prevailing roadway, traffic, and control conditions" (Highway Capacity Manual 2010, Transportation Research Board). The ratio of the volume on a road segment compared to the traffic capacity of the segment is known as the volume to capacity or v/c ratio. The v/c ratio can be estimated for the various levels of service to relate level of service and capacity. The level of service definitions and related v/c ratios are presented in Table V-4.

LOS D is generally considered an acceptable goal for urban/suburban areas. Mesa, Chandler, and Gilbert used LOS D as acceptable in their transportation plans, because to achieve a level of service C town-wide can be cost prohibitive. LOS D was considered the minimum acceptable level of service for the Queen Creek Transportation Master Plan. Therefore, a v/c ratio of 0.85 was considered to be the maximum acceptable v/c ratio. The traffic volumes that represent the level of at a v/c = 1.0 or capacity are presented in Table V-5. These volumes are based on existing Queen Creek cross sections and Town standards.

TABLE V-4 – LOS DEFINITIONS AND V/C RATIOS

LOS	Definition	V/C Ratio Range
A	Free flow conditions; virtually no delay	0.0 to 0.50
B	In the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable.	0.51 to 0.60
C	Still in the range of stable flow, but marks the beginning of the range in which the operation of individual users becomes significantly affected by others	0.61 to 0.70
D	High-density but still stable flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience	0.71 to 0.85
E	Represents operating conditions at or near the capacity level. All speeds are reduced to a low but relatively uniform value	0.86 to 1.00
F	Traffic stream is defined as forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point	> 1.00

Source: Highway Capacity Manual 2010, Transportation Research Board

TABLE V-5: DAILY TRAFFIC VOLUMES AT CAPACITY (VEH/DAY)

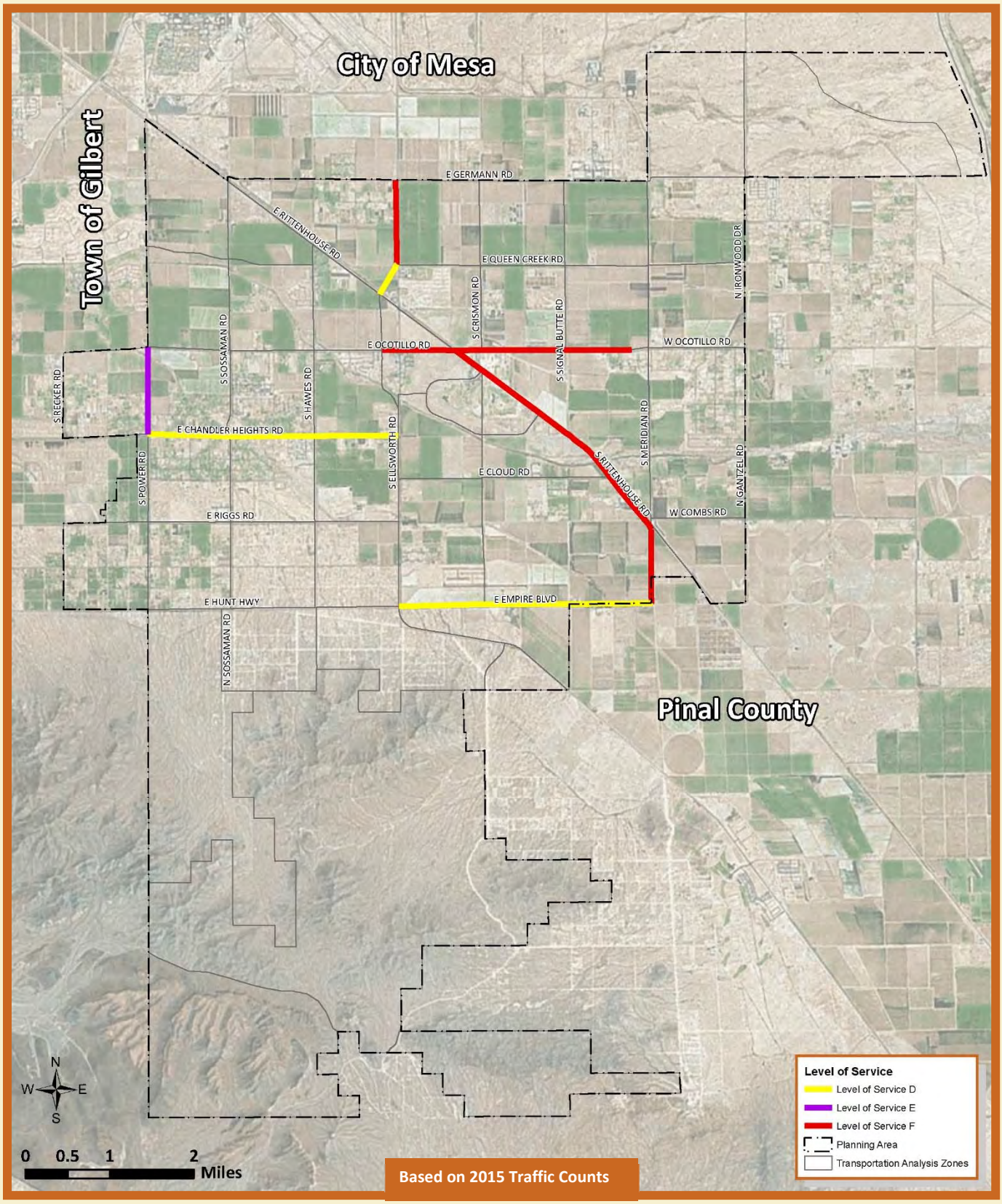
Type of Roadway	Number of Lanes	Daily Volume
Arterial	2	16,500
Arterial (no median)	4	32,000
Arterial (with median)	4	35,500
Arterial (no median)	6	49,000
Arterial (with median)	6	54,000

Based on the volumes shown in Figure V-10 and the capacity values in Table V-5, the road segments with existing level of service D, E, or F are summarized in Table V-6 and shown in Figure V-11. The existing number of through lanes is also shown and represents the least number of lanes along each individual segment. There were 57 segments analyzed, 13 segments (18%) were LOS D, E, or F, and 8 (7%) were LOS E or F. Daily volumes are not uniform throughout the day and LOS E or F on a segment probably occurs for 2-4 hours during the peak periods and the remainder of the day should have acceptable operation. It should be noted that Ellsworth Road between Queen Creek Road and Germann Road was recently widened to three lanes southbound. This improves the LOS in the southbound direction, but the northbound direction is still LOS F.

TABLE V-6: EXISTING LOS D, E, OR F

Street	From	To	Existing Through Lanes	LOS
Chandler Heights Rd	Power	Sossaman	2	D
Chandler Heights Rd	Sossaman	Hawes	2	D
Chandler Heights Rd	Hawes	Ellsworth	2	D
Empire Blvd	Ellsworth	Meridian	2	D
Ellsworth Loop Rd	Rittenhouse	Queen Creek	6	D
Power Rd	Ocotillo	Chandler Heights	2	E
Ellsworth Rd	Queen Creek	Germann	5	F
Ocotillo Rd	Ellsworth Loop	Signal Butte	4	F
Ocotillo Rd	Signal Butte	Meridian	2	F
Rittenhouse Rd	Ellsworth Loop	Cloud	2	F
Rittenhouse Rd	Cloud	Combs	2	F
Meridian Rd	Combs	Empire	2	F

FIGURE V-11: EXISTING LEVEL OF SERVICE



C. Transit

This section presents background information on transit service types and options, programs intended to reduce single occupant vehicles, and the current service provided in Queen Creek.

1. Valley Metro

Like many metropolitan regions, cities and towns in the Valley coordinate transit operations through a regional authority. Transit service in the region is provided by Valley Metro, the public transportation authority for Maricopa County. While regional transit services operate under the Valley Metro brand, the region is unique in that transit service is supported by a combination of regional and local funds. This fiscal situation means that transit funding and service levels differ from community to community.

Valley Metro local fixed-route services generally operate on the major arterials, where development concentration tends to be the highest. Because the Valley's major arterials are on a mile grid, the walking distance to transit routes can be much greater than the typical quarter-mile considered optimum, making some residences and destinations beyond the reach of transit. Several Valley cities have responded to this challenge by implementing neighborhood circulator routes that operate on collector and residential streets.

The passage of Proposition 400 in November 2004 meant increasing regionalization of transit service and funding in the Phoenix metropolitan area. Proposition 400 extended a county-wide, half-cent sales tax and dedicated one-third of the revenues to transit projects that were identified in the Maricopa Association of Governments (MAG) Regional Transportation Plan (RTP). The RTP enhances services on existing routes, creates new routes, and supports transit operations with capital funding for vehicles and facilities. The development of the RTP and passing of Proposition 400 also reflect an increased level of participation in transit planning by Valley Metro.

a) Regional Service Types and Facilities

The types of transit services that are available in the region and could be considered in the Town of Queen Creek are described below.

Circulators/Shuttles

Circulator service operates within a specific locale, such as a neighborhood or downtown area, and connect to major traffic corridors. There are currently 17 circulator routes and one pilot route in the region, operating in Phoenix, Tempe, Avondale/Tolleson, Scottsdale, Mesa and Glendale. There are no circulator routes in Queen Creek.

Local Routes

Local routes follow the alignment of major roads of the regional arterial grid network. These regional routes provide a consistent level of service across multiple jurisdictions. Regional funding of bus operations on these routes ensures a degree of consistency in service levels across jurisdictions, which may not otherwise be possible due to varying funding limitations of each municipality. This service operates on a fixed route, involves frequent stops, and as a result overall travel speeds are lower than passenger vehicles. The purpose is to deliver and pick up transit passengers close to their destinations or origins. There is no fixed route service in the Town. The nearest fixed routes are on Power Road and Williams Field Road and both end at ASU Polytechnic/Phoenix-Mesa Gateway Airport.

Express Routes

Express bus provides enhanced-speed, moderate-volume commuter or regional access in the MAG region and is designed to operate primarily on the region's freeway system, including the High Occupancy Vehicle (HOV) lanes. Express bus service typically operates from park-and-ride locations to employment centers throughout the region. There are currently no express routes serving the Town, however, it should be noted that an express route from Queen Creek to Tempe operated in 2007. After eight months, it was determined that the route was not cost effective and it was discontinued.

LINK Service

Valley Metro LINK is a state-of-the-art bus service in Mesa, Chandler and Gilbert that lets riders enjoy light rail-like comfort, speed and reliability. LINK service is similar to Bus Rapid Transit (BRT), but it does not operate in an exclusive right of way. LINK vehicles may have traffic signal priority at some intersections, meaning that traffic signals stay green until after the bus passes or the bus gets an advanced green. There are two LINK routes in service – Main Street and Country Club Drive/Arizona Avenue.

Paratransit

Paratransit service includes various types of passenger transportation that is more flexible than conventional fixed-route transit but more structured than the use of private automobiles. Paratransit includes Dial-a-Ride (DAR) demand response (DR) transportation services and RideChoice. Americans with Disabilities Act (ADA) paratransit service is regionally funded by the RTP, while senior paratransit service continues to be locally funded. Complementary paratransit service is required by the ADA within ¾ mile of fixed-route service to accommodate persons whose disabilities prevent their use of, or access to, fixed-route services. There are no paratransit services in Queen Creek.

Vanpools

Commuter vanpools allow groups of employees to self-organize and lease a vehicle from Valley Metro to use to operate a carpool service, providing a flexible transit solution for those trips not well served by more conventional fixed route service. The vanpool program is managed by Valley Metro through its complementary rideshare program. The current fleet is comprised of 383 vehicles; seating capacity

per vehicle varies from eight to fifteen passengers. Currently, there are 11 vanpools that originate in Queen Creek and have a total of 96 riders.

Light Rail Transit

The original light rail starter line extends approximately 20 miles from Phoenix to Mesa. The Mesa extension on Main Street from Sycamore Street to Mesa Drive opened in August 2015. A second extension from Mesa Drive to Gilbert Road is currently under design/construction and is expected to open in 2018.

Bus Stops/Park and Ride (PNR)/ Transit Center

There are no bus stops/pull outs, park and ride facilities, or transit centers in Queen Creek. If fixed route service is warranted and added in the future, the Town would need a policy decision whether to add bus pull outs on existing facilities or just designate bus stops. Bus pull-outs provide a benefit, particularly when there are only two lanes in one direction.

Other Transportation Programs

Transportation Demand Management (TDM) involves strategies to reduce automobile travel demand or to redistribute the demand so that it occurs less during peak commute periods. Its purpose is to provide cost-effective, environmentally sustainable alternatives to increasing capacity.

Valley Metro provides and administers a number of TDM services in the region, known collectively as Valley Metro Business Services. Services include:

1. ShareTheRide.com (an online ride-matching service)
2. Vanpool program
3. Trip reduction program—employer assistance
4. Clean Air Campaign—promote alternatives to reduce traffic congestion and air pollution
5. Transit education and outreach programs
6. Transportation Coordinator Associations—assistance
7. Alternative work schedules/telecommute program—assistance
8. Safe Routes to Schools
9. Bicycle and Pedestrian Safety and Education

2. Other Services

Recently, there have been new car-ride companies, such as Uber and Lyft, that match drivers with passengers who request rides through a smartphone app, and pay automatically through the app. The app automatically calculates the fare and transfers the payment to the driver. A passenger with a smartphone submits a trip request, which a software program then automatically sends to the registered driver nearest to the passenger and notifying the driver of the location. Drivers typically use their own personal cars. Currently, Uber operates in 507 cities worldwide and Lyft operates in 200 US cities. In some instances, drivers and passengers rate each other on a five-star scale after each ride,

and the ratings establish the reputations of both drivers and passengers within the network.

3. Existing Queen Creek Transit Service and Demand

As noted in the summary of service types, the only existing transit service in Queen Creek is the vanpool program.

In 2013, Valley Metro in coordination with Queen Creek staff conducted a travel survey in effort to determine community support and demand for transit services. Household travel surveys can be used to obtain information about work and non-work trip generation, trip distribution, and mode choice. In addition to understanding common travel patterns, demand, and desired travel destinations within Queen Creek and the greater Phoenix metropolitan region, the survey results indicate the type of service most likely to have the greatest return on investment for both the Town and Valley Metro.

When asked how often they utilized Valley Metro transit services, 47% reported that they never had used them. This is not surprising since no transit service currently exists within the boundaries of Queen Creek. Despite the absence of local service, 18% of respondents reported daily transit use, with another 8% and 9% indicating transit use a few times a week and a few times a month, respectively. Furthermore, when asked whether they would use transit services were it more convenient, an overwhelming majority (89%) responded that they would.

A majority of survey respondents (58%) indicated they would be willing to pay for transit services in Queen Creek. Survey respondents were also asked to identify what they thought to be the most important transit needs for Queen Creek and the greater Southeast Valley. The greatest share of respondents (65%) identified service to destinations around the valley as the most essential transit need, while 59% stated that availability of commuter rail was important and 58% indicated frequency of bus service.

D. Non-Motorized

The following sections describe the existing bicycle and pedestrian facilities.

1. Existing Bicycle Conditions

The Town of Queen Creek has existing bicycle lanes on various arterial and collector streets and bicycle paths along Queen Creek and Sonoqui Washes.

a) Types of Bicyclist

Bicyclists vary widely in terms of their skill, physical ability, comfort level, and trip purpose. While people do not fit into a single category, and a bicyclist's profile may change within a single day, a comprehensive bicycle network seeks to provide facilities that meet the needs of a wide variety of bicyclists.

Bicyclists can be profiled by their trip type. Utilitarian bicyclists, those who bicycle for everyday activities such as commuting to work or running errands, are typically better served by direct routes that are flat, well connected, and have access to facilities such as bicycle parking. A recreational bicyclist tends to be attracted to routes with visual interest and varied topography.

Similarly, bicyclists can be profiled based on their level of experience and skill. Experienced and confident bicyclists may be comfortable riding in on-street bike lanes next to vehicles on arterial and collector streets, travel at higher speeds for longer distances, and prefer more direct routes. In contrast, casual and less confident riders typically prefer to use off-street bicycle facilities such as shared use paths or to ride on neighborhood streets with low traffic volumes, travel at slower speeds for shorter distances, and take routes that may not be as direct.

Education and enforcement serve critical roles to improve bicyclist safety. The 'Three-Foot Safe Passing Distance Law" and other Arizona bicycle laws promote safety and establish the rights and responsibilities of bicyclists on the roadway (http://azbikelaw.org)

b) Types of Bicycle Facilities

On-Street Bike Lanes

Bike lanes are typically included on all collector and arterial streets within the Town as part of new construction or major reconstruction. It is also the policy of the Town to require new development to include bike lanes on new collector and arterial streets. Queen Creek's bike lane network is in the early stage of development similar to the development of the arterial street network. As new development continues and arterial and collector streets are constructed, the number

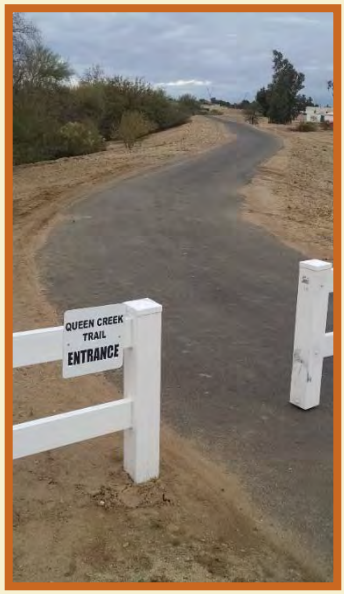
of bike lanes will continue to grow. Although there are many gaps in the bike lane network, as these areas develop, the number and length of gaps will be reduced. Currently, the Town has approximately 26 miles of roadway with on-street bike lanes on both sides and 6.5 miles of roadway with on-street bike lanes on just one side.

Local Streets

Local neighborhood streets are not typically marked with bike lanes but are generally considered suitable for on-street bicycle travel because they have lower traffic speeds and volumes than collectors and arterials. Local streets are an important element of the bicycle network as they provide connectivity to schools, to designated bike lanes, and to shared use paths and trails.

Off-Street Shared Use Paths and Trails

The Town of Queen Creek is developing an off-street shared use path network along both Queen Creek Wash and Sonoqui Wash. This network provides bicycle corridors that connect to the roadway and on-street bike lane networks. Currently, there are approximately 7 miles of officially designated shared use paved paths within the Town of Queen Creek.



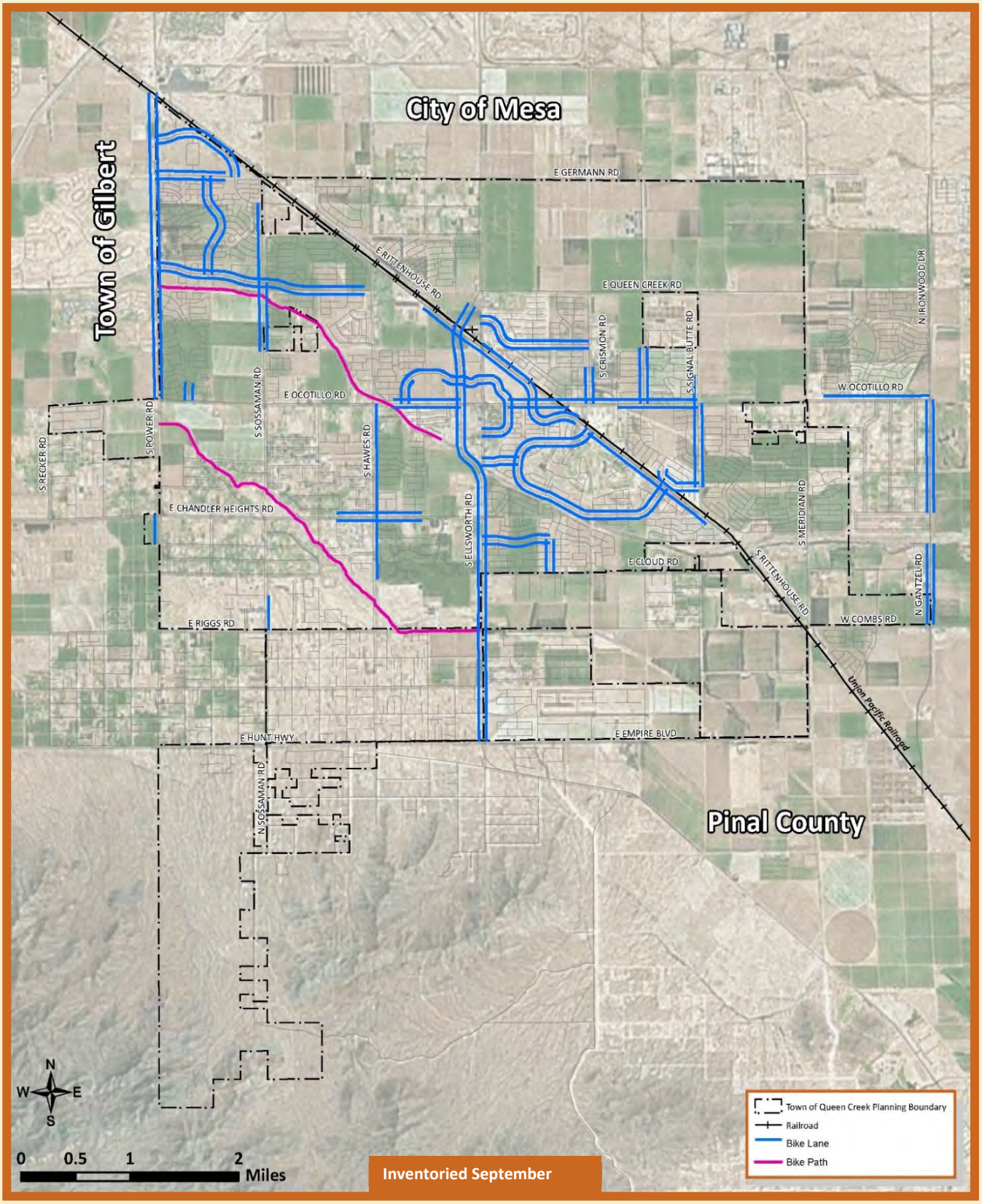
This off-street network provides facilities for recreational travel as well as connecting residential neighborhoods to key destinations throughout the community (e.g., parks, schools, employment centers, and community facilities) and to desired locations in adjacent communities.

The existing bike lanes and paved paths are shown in Figure V-12. As can be seen from the figure, the current bike lane and path network has gaps that reduce the ability to meet recreational and utilitarian transportation needs. Additionally, facilities that alternate between paved and unpaved surfaces are less functional for bicyclists who prefer a consistent and smooth paved surface.

c) League of American Bicyclists Designation

The League of American Bicyclists (LAB) (www.bikeleague.org) is a non-profit membership organization that promotes cycling for fun, fitness and transportation. Founded in 1880, the stated mission is “to lead the movement to create a Bicycle Friendly America for everyone”. Each year, the LAB assesses all 50 states. Communities, businesses, and universities are assessed through a voluntary application process. Applicants get customized feedback and access to technical assistance. In 2015, the LAB formally recognized 371 communities across 50 states as bicycle-friendly communities for "providing safe accommodation and facilities for bicyclists and encouraging residents to bike for transportation and recreation”. The LAB bicycle-friendly designation ranges Bronze to Platinum and is awarded to applicant communities that have demonstrated a commitment to improving and sustaining bicycling

FIGURE V-12: EXISTING BICYCLE FACILITIES



and bicycle safety through comprehensive programs, plans and policies. According to the 2016 LAB assessment, Arizona is ranked 19th as a bicycle-friendly state and has 10 bicycle-friendly communities. Currently, Queen Creek does not have an LAB assessment.

2. Existing Pedestrian Conditions

The Town of Queen Creek has a pedestrian network in place consisting of sidewalks, off-street shared use paths/trails, and crossings of roadways.

a) Sidewalks

Sidewalks are included on all streets within the Town as part of new construction or major reconstruction. It is also the policy of the Town to require new development to include sidewalk on all new streets. Over the past decade, the sidewalk network has expanded commensurate with new development. The gaps in the sidewalk network tend to be located in the unincorporated areas or areas where adjacent land is undeveloped. As these areas continue to develop, the number and length of gaps in the sidewalk network will be reduced.

b) Off-Street Shared Use Paths and Trails

Off street paths and trails also service pedestrian mobility and circulation. As with bicycles, these off-street facilities serve to connect residential neighborhoods to key destinations throughout the community (e.g., parks, schools, employment centers, and community facilities) and to locations in adjacent communities. There are also paths in unincorporated areas that are used for non-motorized access and circulation.

c) Walk Friendly Community Designation

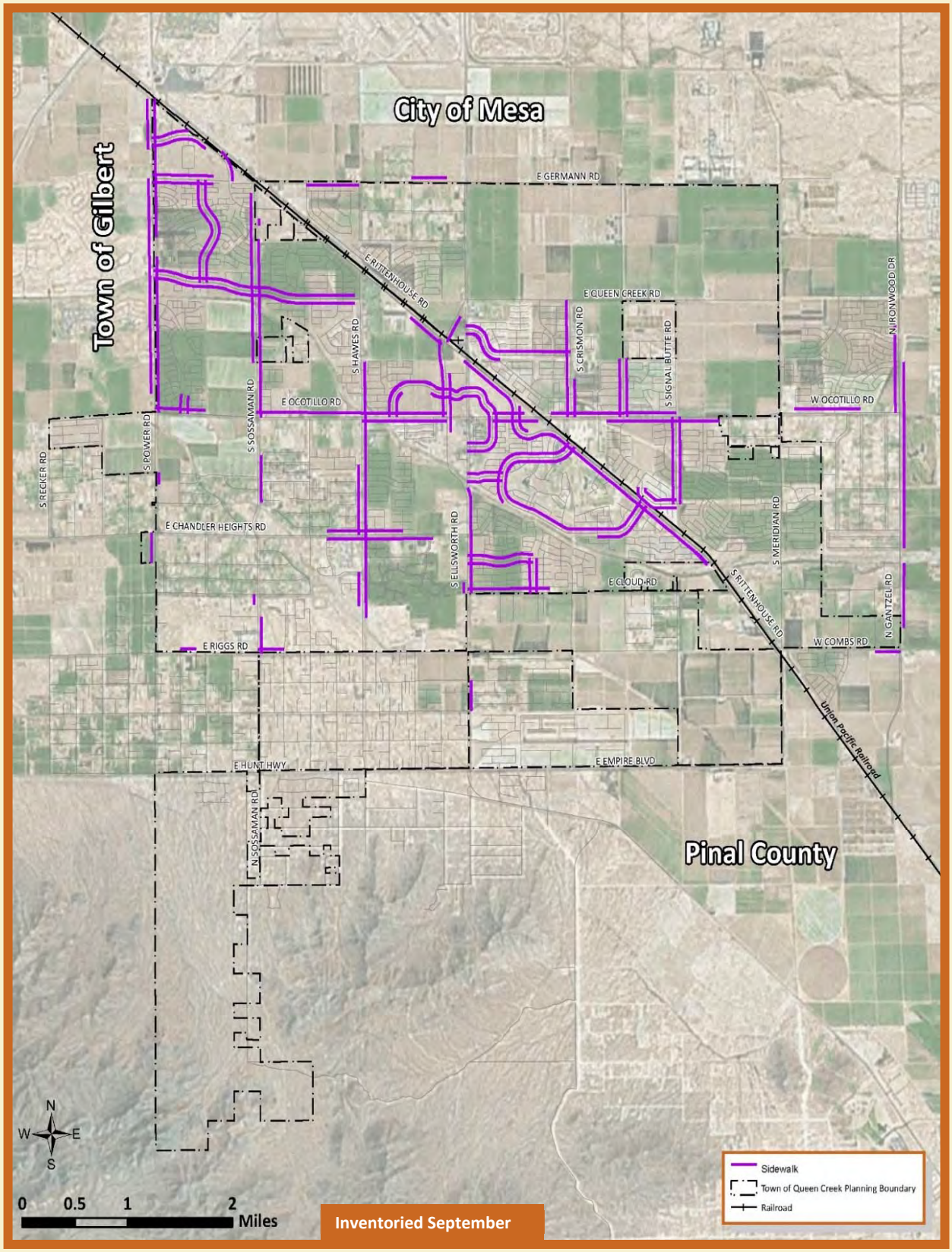
Walk Friendly Communities (WFC) (www.walkfriendly.org) is a national recognition program developed to encourage towns and cities across the U.S. to establish a high priority for supporting safer walking environments. A community that has received WFC designation represents a community that values public health, livability, and the environment.

The WFC designation, awarded from Honorable Mention (lowest designation) to Bronze, Silver, Gold, and Platinum (highest designation), is given to applicant communities that have demonstrated a commitment to improving and sustaining walkability and pedestrian safety through comprehensive programs, plans and policies.

At the core of the WFC program is a comprehensive assessment tool that evaluates community walkability and pedestrian safety through questions related to the "5 E's" of engineering, education, encouragement, enforcement, and evaluation/planning. The assessment tool questions are intended to both evaluate conditions for walking and provide communities with feedback and ideas for promoting pedestrian safety and activity. There are no communities in the Phoenix metropolitan area that have received WFC designation.

The existing sidewalk network is shown in Figure V-13.

FIGURE V-13: EXISTING SIDEWALK



E. ITS

Intelligent Transportation System (ITS) infrastructure and processes are generally utilized to manage traffic, to reduce congestion and promote safety as well as to provide real-time traveler information. ITS infrastructure and processes are typically used by public agencies to share information with the traveling public and with neighboring agencies, monitor traffic on corridors and at key intersections, collect and disseminate information that affects reliability (event closures, construction limits, restrictions, others), and use central systems to measure effectiveness of operations.

ITS infrastructure and processes can be used in multiple ways to improve the management of traffic, incidents, special events, and work zones. Implementing ITS can provide the following benefits for the Town, its partners, and the traveling public:

- Increase the capacity of roadways by 10 percent to 15 percent;
- Provide real-time traveler information;
- Reduce delays, vehicle emissions, and energy consumption;
- Reduce incidents on the roadway and improve incident clearance times;
- Improve the response time of emergency services;
- Be implemented within existing right-of-way – minimizing time for approvals/clearances and travel lane restrictions;
- Provide a cost-effective alternative to road widening or new roadway infrastructure;
- Leverage data and situational awareness of the transportation system to support multiple agencies' objectives; and
- Support other agency functions with operational data.

The Town of Queen Creek has existing ITS infrastructure in place that provides the Town with the capability to operate and manage a portion of the Town's existing transportation network. The ITS infrastructure provides communications between various Town facilities, eliminating or reducing leased communications line expenses. Queen Creek has invested in ITS infrastructure as the Town has developed and grown. The Town's current ITS infrastructure includes the following:

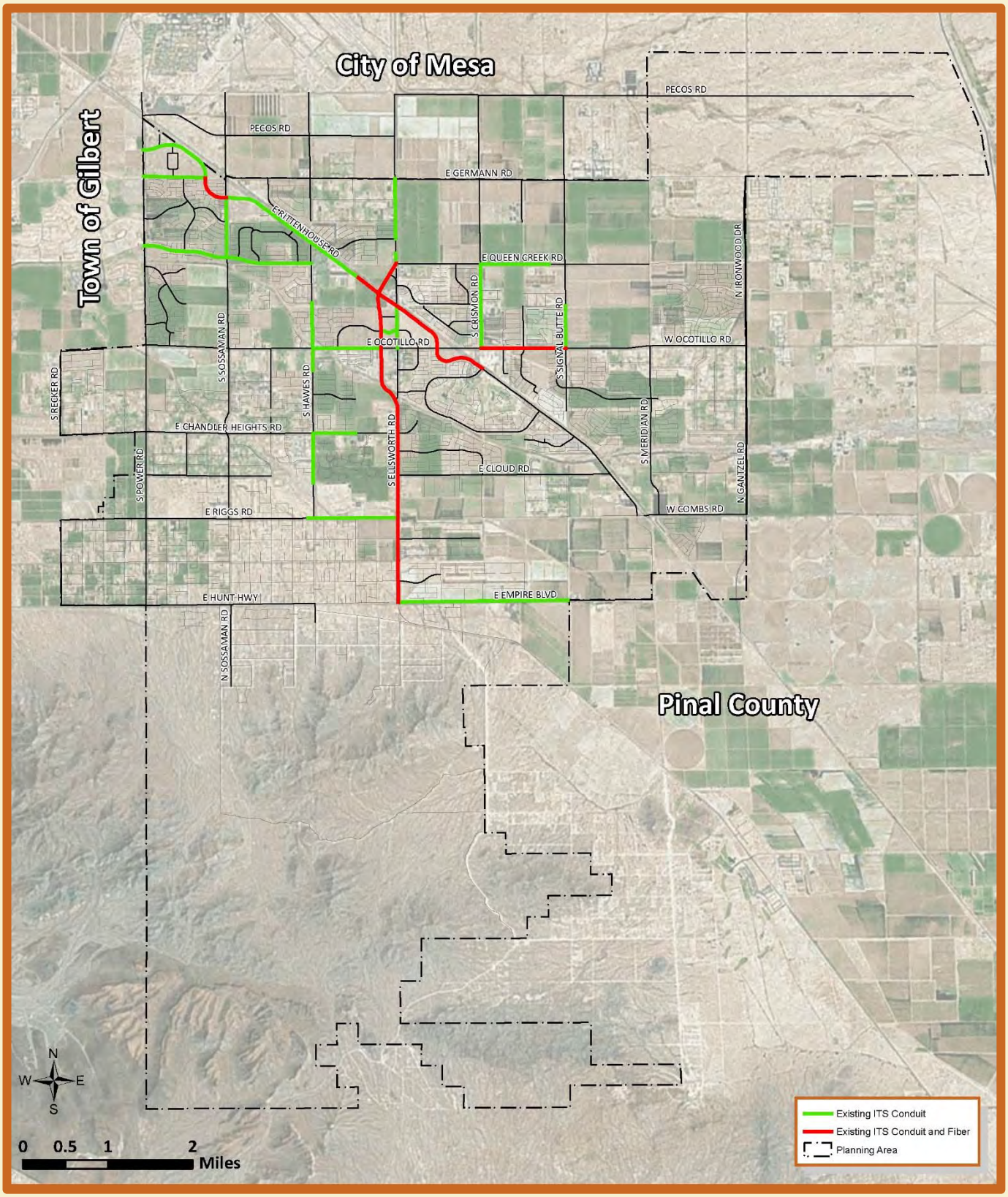
- A Traffic Operations Center (TOC) located at the Town municipal complex
- 36 traffic signals connected to the TOC either directly via fiber optic cable or wirelessly via broadband or radio
- Fiber optic cable and conduit
- Closed Circuit Television (CCTV) cameras with pan, tilt, and zoom capabilities that can controlled from the TOC
- Video detection cameras at many traffic signals

Wherever existing traffic signals are not connected to the Town's communications network via fiber optic cable, wireless radios are installed that link the traffic signals to the communications network. While wireless radios do not generally have as much capacity as fiber optic cable and are not as reliable, they do provide a low-cost solution that allows the Town to communicate to traffic signals that otherwise would not be connected to the communications network. CCTV video feeds are being streamed to the TOC via wireless radios currently.

Town staff manages the TOC video wall and the operation of the Town's traffic signals using a centralized traffic signal system that communicates to all of the Town's traffic signals. Traffic signal timing at intersections is regularly reviewed and adjusted as needed to meet traffic demands.

The existing ITS conduit and fiber is shown in Figure V-14.

FIGURE V-14: EXISTING ITS FACILITIES



VI. FUTURE CONDITIONS

The future conditions analysis includes quantitative documentation of population, employment, and traffic forecasts as well as a discussion on emerging trends regarding travel behavior and technology. Recent trends in demographics and changes in travel behavior suggest that a more diverse transportation system is appropriate for the future:

A. Emerging Trends

1. Travel Behavior

a) Aging Baby Boomers

Baby Boomers, the generation born from 1946 to 1964, are reaching retirement age and are healthier and living longer than previous generations. Today, about one in eight people in the United States is over 65; by 2030, this age group will include one in five people. According to the American Association of Retired Persons (AARP), nearly 90% of seniors today want to live in their own homes and communities for as long as possible. In most cases, that will mean remaining in low-density, suburban locations that are not well-served by transit. The bulk of Baby Boomers in Arizona will not retire to dense cities and will require different transportation options in their own communities when they are no longer driving motor vehicles.

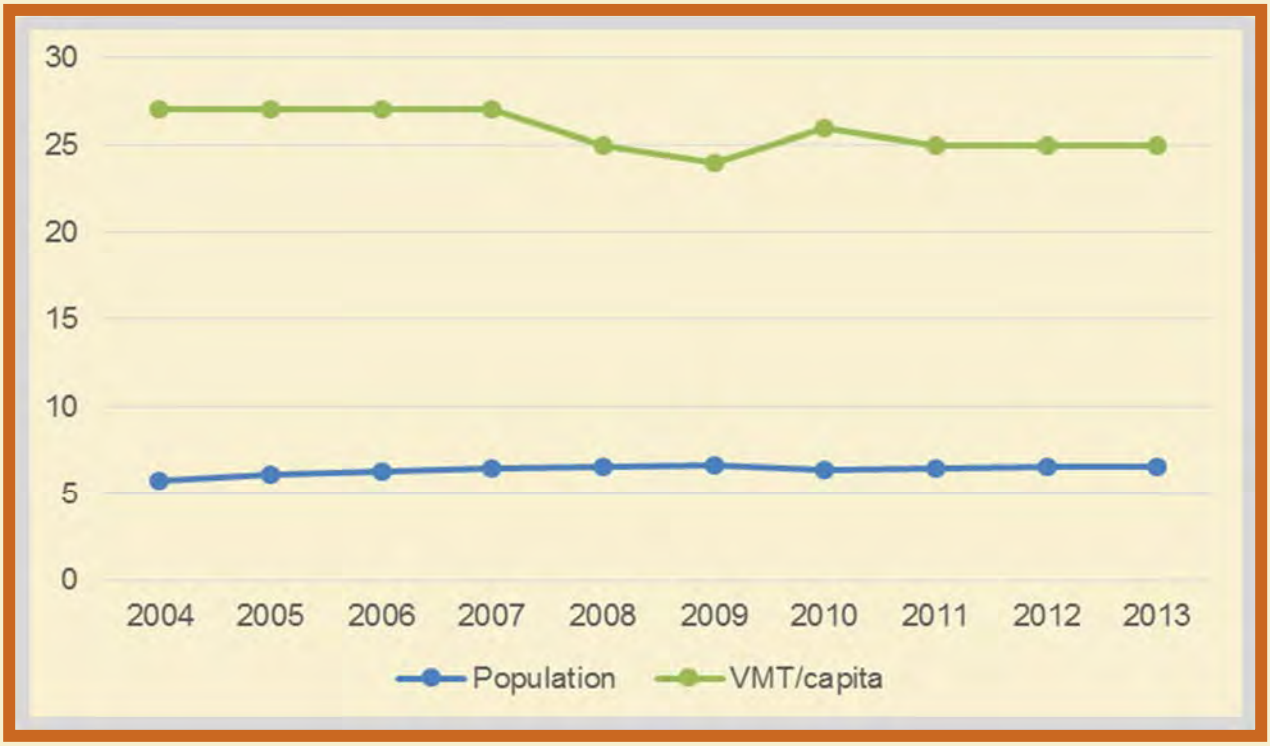
b) Rise of the Millennials

Recent data indicate that the generation of Americans born between the early 1980s and the early 2000s (referred to as "Millennials") are now the largest group of Americans. They tend toward city living and less driving, as compared to other age groups. In 2009, Millennials drove 23% fewer miles on average than the same age group did in 2001. This was a greater decline than any other age group. While economic recession was partially responsible for the decline, evidence also points to a declining interest in driving among this age group: the percentage of 16-to-24-year-olds with driver's licenses has been declining for much longer than per capita vehicle-miles traveled (VMT). Millennials live in cities in greater numbers than previous generations and have a stronger preference for urban living.

c) Vehicle travel trend

Vehicle-miles traveled, both per capita and in absolute terms, have historically risen steadily in Arizona and in the United States. States have responded by expanding the vehicle capacity of roadway systems to meet that demand. However, the rise of the Millennials, the aging of Baby Boomers, and the recent economic downturn have impacted the vehicle miles traveled. While population in Arizona had small increases between 2004 and 2013, vehicle miles traveled per capita had a decline between 2007 and 2009, a slight increase between 2009 and 2010, and then remained relatively stable between 2011 and 2013, but at levels below 2004-2007 as seen in Figure VI-1.

FIGURE VI-1:POPULATION AND VMT TREND



2. Technology

In addition to the changing patterns in vehicle travel and ownership, technology advances are changing the cars of the future.

a) Connected Vehicles

The U.S. Department of Transportation's (USDOT's) is supporting connected vehicle research, development, testing, and deployment. The USDOT's Connected Vehicle program is working with state and local transportation agencies, vehicle and device makers, and the public to test and evaluate technology that will enable cars, buses, trucks, trains, roads and other infrastructure, and our smartphones and other devices to "talk" to one another. Cars on the highway, for example, would use short-range radio signals to communicate with each other so every vehicle on the road would be aware of where other nearby vehicles are. Drivers would receive notifications and alerts of dangerous situations, such as someone about to run a red light as they're nearing an intersection or an oncoming car, out of sight beyond a curve, swerving into their lane to avoid an object on the road.

Within the USDOT, the Intelligent Transportation System Joint Program Office (ITS JPO) is working with other DOT federal agencies to coordinate and foster the advancement of connected vehicle technologies.

These include the:

- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Railroad Administration (FRA)
- Federal Transit Administration (FTA)
- National Highway Traffic Safety Administration (NHTSA)
- Office of the Assistant Secretary for Research and Technology

Significant progress has already been made in testing connected vehicle technologies and applications in real-world situations. The recently concluded USDOT Connected Vehicle Safety Pilot Program provided large amounts of valuable data on how these technologies, applications, and systems perform in the hands of everyday drivers. Based on the results of these test programs and other research, NHTSA made a decision early in 2014 that it would move ahead with working on a regulatory proposal to require vehicle-to-vehicle (V2V) communications in new cars and light trucks in the near future. In August 2014, NHTSA issued an advance notice of proposed rulemaking to begin implementation of V2V communications technology. The main focus of this initial decision is to enable collision warnings to drivers prior to a crash.

In February 2014, NHTSA announced its decision to take steps to enable V2V communications technology for light vehicles (and is considering a similar rule for heavy trucks). In May 2015, NHTSA announced that it will move ahead of its public time table for its proposal to require vehicle-to-vehicle (V2V) communication devices in new vehicles and work to accelerate testing necessary to ensure that V2V and vehicle-to-infrastructure transmissions are free from radio interference.


USDOT

Connected vehicle technology will enable vehicles, roads and other infrastructure, and our smartphones to all communicate and share vital transportation information. The communication flows will be based primarily on a networking technology known as dedicated short-range communications (DSRC), which is similar to Wi-Fi. Many vehicles today are already "connected" through cellular technology. DSRC offers unique

opportunities for fast, secure, and reliable communications, and is not vulnerable to interference.

In the future, every other vehicle on the road, will use DSRC, as well as GPS, cellular, Bluetooth, and other communications systems, to attain 360-degree awareness of nearby vehicles. This equipment will continually transmit position, direction, and speed (e.g., whether you were turning or putting on your brakes), as well as other information, to other vehicles sharing the road. It will even "talk" to equipment installed in the road itself and other infrastructure, such as traffic signals, stop signs, toll booths, work or school zones, and railroad crossings. By communicating with roadside infrastructure, drivers will be alerted when they are entering a school zone, if workers are on the roadside, and if an upcoming traffic light is about to change.

Safety is the USDOT's top concern. Connected vehicles could dramatically reduce the number of fatalities and serious injuries caused by accidents on our roads and highways. While the number of people surviving crashes has increased significantly thanks to airbags, anti-lock brakes, and other technology, the USDOT is shifting its focus from helping people survive crashes to preventing crashes from happening in the first place. The technology will alert you of potentially dangerous situations that are developing and provide you with the tools to avert crashes or reduce their consequences.

Connected vehicles have significant advantages over new technologies now appearing in high-end vehicles, such as radar, LIDAR, cameras, and other sensors. For one thing, connected vehicle technologies and applications have a greater range than on-board vehicle equipment, which will allow you to receive alerts of hazardous situations much earlier, providing more time to react and prevent an accident. Also, connected vehicle technology doesn't depend on "line of sight" communications to be effective. So if a car ahead of you is braking hard on the other side of a hill due to an obstruction, you would receive notification even though you can't see and aren't aware of the dangerous situation developing. Connected vehicle technology is also less expensive to install than radar and camera equipment in vehicles. This will enable it to become standard equipment in the future on practically all vehicles, not just luxury cars.

In addition to the tremendous safety potential of connected vehicles, they also promise to increase transportation options and reduce travel times. Traffic managers will be able to control the flow of traffic more easily with the advanced communications data available and prevent or lessen developing congestion. This could have a significant impact on the environment by helping to cut fuel consumption and reduce emissions. Anonymous signals in connected vehicles will help generate new data about how, when, and where vehicles travel - information that transportation managers will analyze to help make roads safer and less congested. Connected vehicle technologies (CVT) will generate real-time data that drivers and transportation managers can use to make green transportation choices.

b) Autonomous Vehicles

Looking further into the future beyond connected vehicle and infrastructure technology, the federal government, in partnership with state and local agencies, industry, and the public, is exploring the feasibility of partially or fully automated vehicles, possibly combined with connected vehicle technology. The combination of these two technologies could fulfill their full potential to provide unprecedented levels of safety, mobility, and environmental sustainability.

In September 2016, the USDOT published the Federal Automated Vehicles Policy which in part states "Today, the automobile industry is on the cusp of a technological transformation that holds promise to catalyze an unprecedented advance in safety on U.S. roads and highways. The development of advanced automated vehicle safety technologies, including fully self-driving cars, may prove to be the greatest personal transportation revolution since the popularization of the personal automobile nearly a century ago."

There are multiple definitions for various levels of automation and for some time there has been need for standardization to aid clarity and consistency. The USDOT policy adopts the Society of Automotive Engineers International (SAE) definitions for levels of automation. The SAE definitions divide vehicles into levels based on "who does what, when." Generally:

- At SAE Level 0, the human driver does everything;
- At SAE Level 1, an automated system on the vehicle can *sometimes assist* the human driver conduct *some parts of* the driving task;
- At SAE Level 2, an automated system on the vehicle can *actually conduct* some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;
- At SAE Level 3, an automated system can both actually conduct some parts of the driving task and monitor the driving environment *in some instances*, but the human driver must be ready to take back control when the automated system requests;
- At SAE Level 4, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and
- At SAE Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

Figure VI-2 provides additional task information for each of the levels of automation.

FIGURE VI-2: SAE LEVELS OF AUTOMATION

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

Source: SAE International and J3016

Previously, the National Highway Transportation Safety Administration (NHTSA) developed a policy that addresses:

- The areas of vehicle innovation and types of automation that offer significant potential for enormous reductions in highway crashes and deaths;
- A summary of the research NHTSA has planned or has begun to help ensure that all safety issues related to vehicle automation are explored and addressed; and
- Recommendations to states that have authorized operation of self-driving vehicles, for test purposes, on how best to ensure safe operation as these new concepts are being tested on highways.

While this technology remains in early development stages, USDOT, NHTSA, and SAE International will be involved in research on self-driving vehicles so that public safety is a priority.

c) Planning/Policy Implications

The rapid development of emerging automation technologies means that partially and fully automated vehicles are nearing the point at which widespread deployment is feasible. Essential to the safe deployment of such vehicles is a rigorous testing regime that provides sufficient data to determine safety performance and help policymakers at all levels make informed decisions about deployment. Industry plays a key role in this process by both conducting such testing and in providing data that establish the safety benefits of automation technologies that exceed the current level of roadway safety.

Several states, including Nevada, California and Florida have enacted legislation that expressly permits operation of self-driving (sometimes called "autonomous") vehicles under certain conditions. These experimental vehicles are at the highest end of a wide range of automation that begins with some safety features already in vehicles, such as electronic stability control. Today's policy will provide states interested in passing similar laws with assistance to ensure that their legislation does not inadvertently impact current vehicle technology and that the testing of self-driving vehicles is conducted safely.

Self-driving cars will make our commute more efficient, conserve resources, and boost mobility. However, according to researchers at the Illinois Institute of Technology, self-driving cars can have a long-range impact urban environments. The Driverless Cities Project is developing a comprehensive answer, folding in urban design, landscape architecture, transportation engineering, sociology, urban networks, and planning law. The project will explore current research around the country, along with more forward-thinking planning initiatives to create a suite of guidelines for municipalities to incorporate into their planning.

For example, how will parking work for autonomous vehicles? Should cities be building parking lots outside urban centers or will parking lots even be needed? The technology is unprecedented and developing quickly. There are still many unknowns regarding impacts to transportation planning such as will traffic volumes increase or decrease, can lanes be narrowed, what about pedestrians and bicycles? But perhaps the biggest question remains – when will this happen?

d) Traffic Operation

Technology is also available to improve safety in day-to-day traffic operations. Available programs include:

- red light running which uses a camera to record the violating vehicle – an enhancement to this technology extends the all-red phase of a traffic signal when it detects a vehicle could run the light, while also capturing the red light violator
- speeding which uses radar and a camera to record vehicles that exceed the speed limit by a predetermined amount

B. Land Use

The existing land use database identifies the current land use pattern in the urban area. MAG maintains a 100+ land use category classification that was established in concert with its member agencies. The database was created by MAG staff based on input from MAG member agencies and then circulated to the agencies for review and verification. Changes were made based on comments provided. The existing land use coverage is important to the projections process because it establishes areas that have already been developed or are not suitable for further development. The developed areas become ineligible for the allocation of population and employment growth, except where the area is planned for redevelopment.

The future land use database is based on the plans of MAG member agencies and identifies both the type of development that is anticipated to occur in the future and the density of that development. The database also uses the standard MAG land use categories which allows for a direct comparison between existing and planned land use. The difference between the existing and planned land use databases helps determine where development may take place. Since traffic demand in the Town of Queen Creek is influenced by the surrounding communities, it is important to examine land use beyond the Town limits. The June 2016 update of the socioeconomic data incorporates any changes in Mesa, Gilbert, and Pinal County.

C. Population and Employment

MAG develops a set of build out population and employment datasets based on population control totals for the county and the General Plans of the member agencies. Population, employment, and other model parameters are then interpolated for other years based on estimated growth rates.

The primary purpose of the population and socioeconomic projections developed by MAG is for input into its transportation and air quality models. These projections are also used for a wide variety of regional planning programs such as human services, regional development and by MAG member agencies in developing long range plans. Some important objectives of the modeling process are to:

- establish a linkage between transportation, land use and air quality models.
- incorporate a geographic information system (GIS) into the process for better data sharing and review with member agencies and for maintaining an innovative approach to land use planning.
- establish a process by which MAG member agencies can contribute their local knowledge into the model results so they are well-suited for use by member agencies.
- test various policy alternatives and land use scenarios on an as-needed basis to assist in regional planning.

The MAG region is subdivided into 29 municipal planning areas (MPAs), 153 regional analysis zones (RAZs) and 2,293 traffic analysis zones (TAZs). MPAs include the corporate limits of a municipality plus any adjacent areas that are anticipated to become a part of those corporate limits in the future. RAZs are subunits of MPAs. RAZs are further divided into TAZs. The TAZ is the smallest unit for which MAG prepares projections. TAZ boundaries are delineated utilizing existing and future highway corridors, transit networks, major arterials, waterways/canals, and other natural features such as mountains. Traffic analysis zones are generally one square mile in size in developed areas, but can be larger in developing and rural areas. There are 79 traffic analysis zones and 5 regional analysis zones within the Queen Creek planning area.

Socioeconomic projections are crucial to sound regional planning. Projections of population and employment are used as inputs to forecast future vehicle trips and air quality emissions. The MAG socioeconomic models consider the transportation system accessibility in the allocation of population and employment to smaller geographic areas. Socioeconomic projections are a collaborative effort between MAG staff and the staff of its member agencies. The MAG Regional Travel Forecasting Model can provide traffic data to validate existing conditions as well as forecast future traffic volumes.

For the Queen Creek Transportation Master Plan, 2035 was selected as the horizon year, however, 2025 was also analyzed. The 2025 and 2035 population and employment estimates by RAZ for Queen Creek are shown in Table VI-1 along with existing data. It should be noted that this data is from the MAG database with adjustments by Town staff and encompasses the Queen Creek planning area which includes some currently unincorporated area in both Maricopa and Pinal counties. It should also be noted that an additional 98,000 population in 2025 and 110,000 in 2035 is projected for San Tan Valley.

TABLE VI-1: SOCIOECONOMIC DATA SUMMARY

RAZ	Population*			Employment*		
	Existing	2025	2035	Existing	2025	2035
339	39,303	83,155	92,156	8,393	13,297	14,014
422	9	166	166	0	2	0
423	1,549	5,435	6,357	71	209	137
424	3,331	7,041	10,565	286	1,234	1,105
TOTAL	44,192	95,727	109,244	8,750	14,742	15,256

**source MAG database adjusted by Town staff*

Population and employment forecasts are estimates of how quickly the Town will grow and where. The forecasts included in this transportation plan are higher than the MAG projections. While a specific year is assigned to the projections, the year when that level of growth occurs is not important. Instead, the recommended improvements are needed when the population reaches 95,727 and 109,244 regardless of the years.

A review of Table VI-1 shows the following:

- No RAZs have a decrease in population or employment
- There is a substantial population growth by 2025 with a slower growth between 2025 and 2035
- A 147% increase in overall population
- A 74% increase in overall employment
- A 0.2 employment to population ratio today and .14 in 2035
- The largest population increase is in RAZ 339 (134% increase)
- The largest employment increase is in RAZ 339 (67% increase)

The 2025 and 2035 population and employment density for the Queen Creek planning area are shown in Figures VI-3 and VI-4. As can be seen, the denser population areas occur along Power Road and Meridian Road. The denser employment areas occur along Rittenhouse Road.

FIGURE VI-3: 2035 POPULATION DENSITY

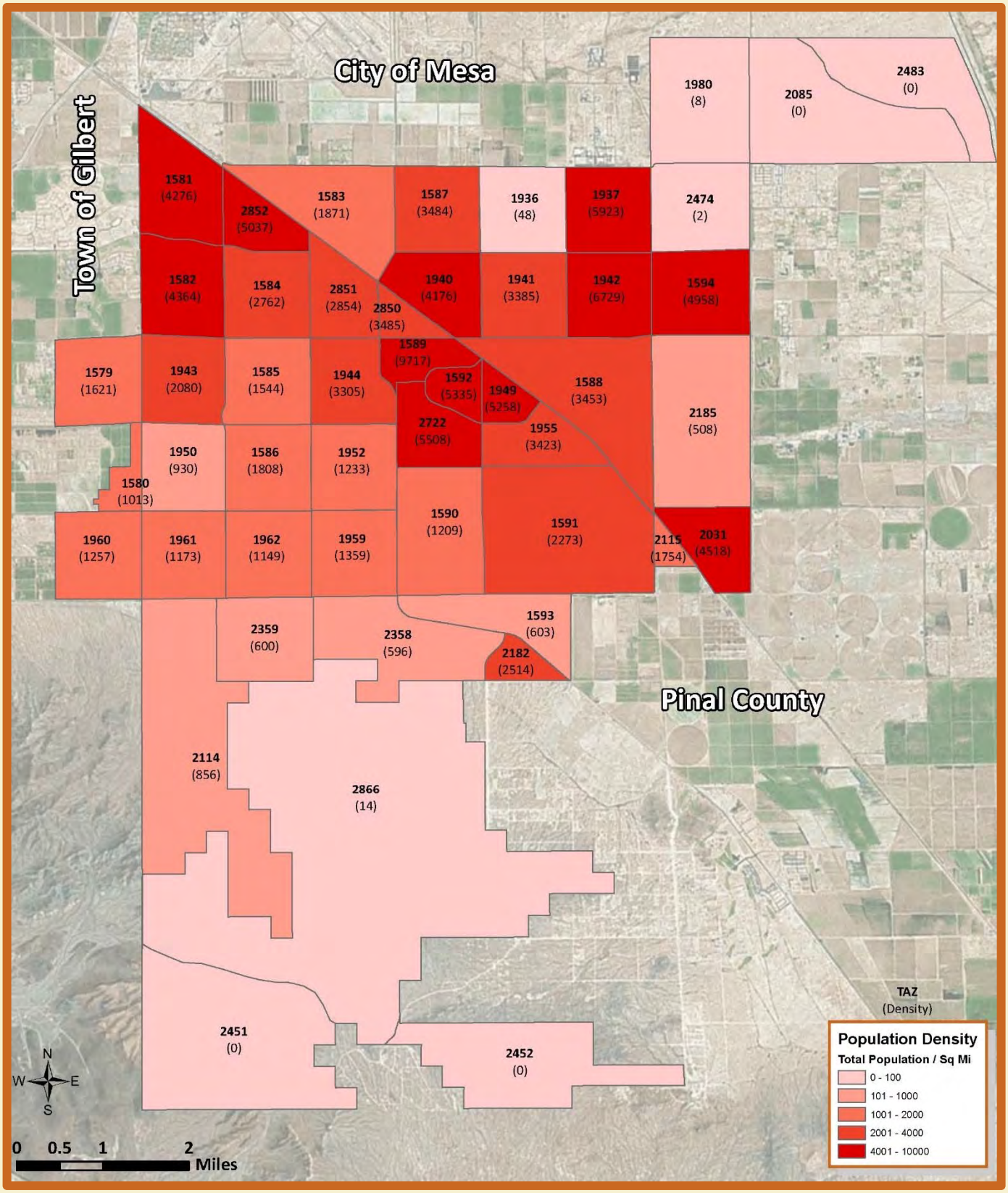
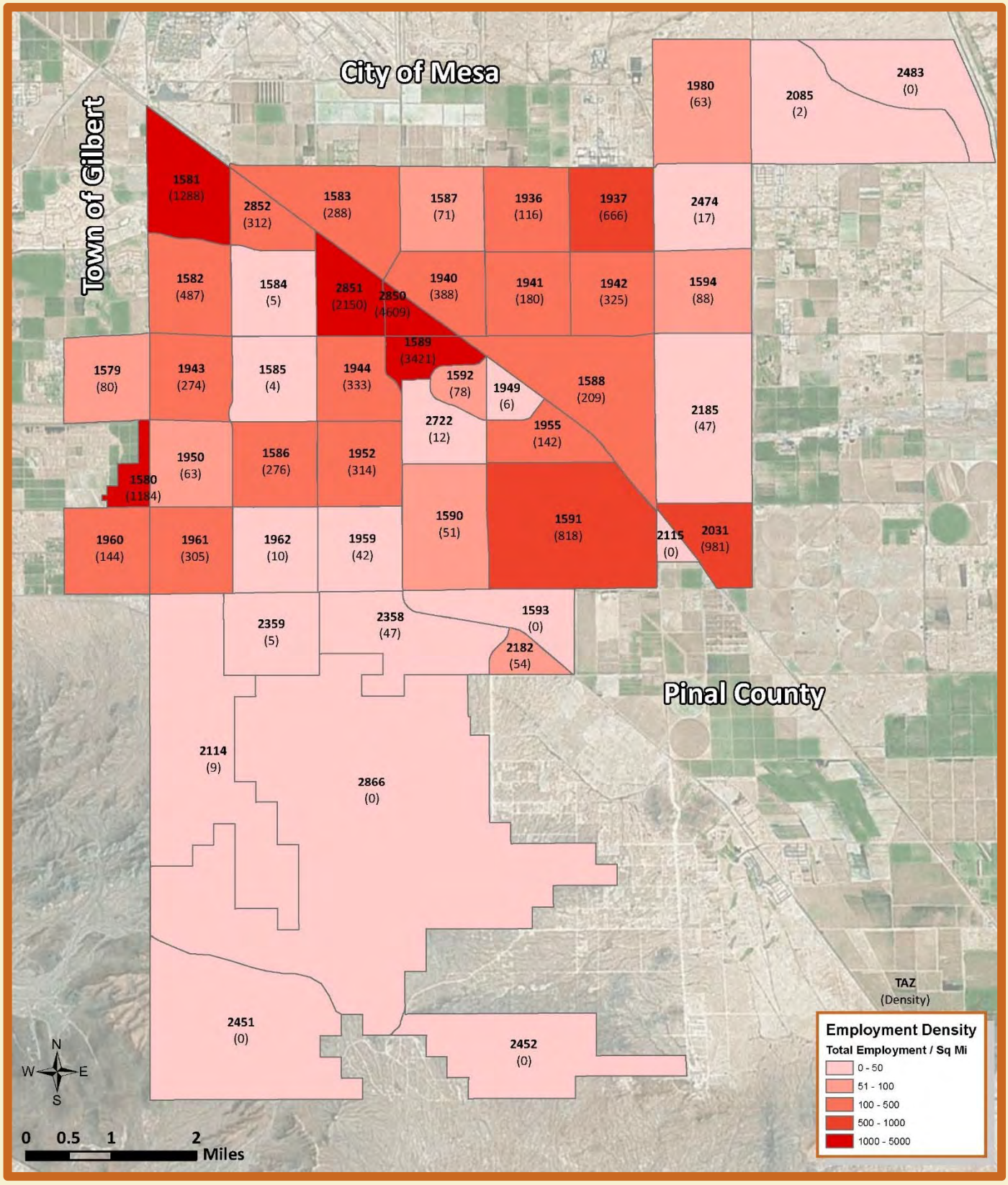


FIGURE VI-4: 2035 EMPLOYMENT DENSITY



D. TransCAD Model

The MAG TransCAD travel forecasting model is a mathematical representation of travel behavior. The model can provide traffic data to validate existing conditions as well as forecasts of future traffic volumes. The model process starts with two distinct sets of tasks. One set of tasks involves the compilation of land use data, including population and employment, and trip generation rates for the area. Socioeconomic projections are crucial to sound regional planning. Projections of population and employment are used as inputs to forecast future vehicle trips and air quality emissions. The MAG socioeconomic models consider the transportation system accessibility in the allocation of population and employment to smaller geographic areas. Socioeconomic projections are a collaborative effort between MAG staff and the staff of its member agencies. Using this information, the number of trips produced and attracted in each traffic analysis zone is calculated.

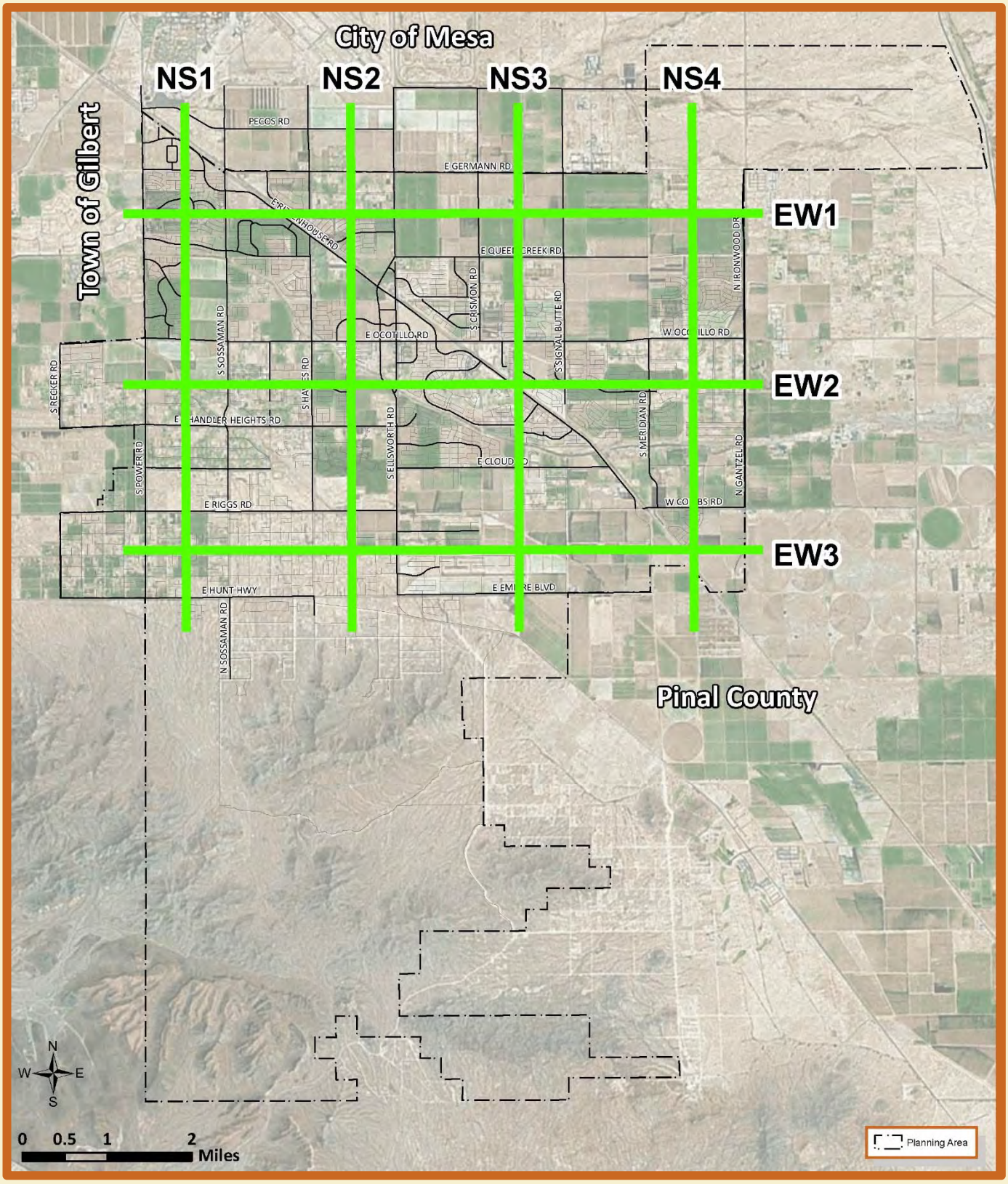
The second set of tasks includes the identification of the street system to be modeled. The street system is simulated by a network of links (street segments) and nodes (intersections). Network data includes street segment lengths, travel speeds, roadway types, and street capacities. Generally, the section line arterial streets and freeways comprise the network.

Using these data, the minimum time paths between TAZs are calculated. The trips calculated in the first set of tasks are distributed between zones based on the relative attractiveness of one zone to another. The zone-to-zone trips are then assigned to the network to obtain traffic volumes. The transportation models perform capacity-restrained traffic assignments based on successive iterations of travel time between zones. The model-simulated volumes for the year 2015 can be compared to the existing traffic volumes to determine how well existing conditions are being simulated. Based on the analysis of the 2015 model volumes, adjustment factors are developed and used later in the study process to refine the 2035 traffic forecasts produced by the model.

E. 2015 Simulated Volumes

The 2015 model generated volumes are compared to the 2015 traffic counts using a technique known as "screenline comparison". Screenlines are a tool used to examine changes in traffic volume across multiple streets. A screenline is an imaginary line that bisects several streets and provides an indication of general travel demand in an east-west or north-south direction as opposed to analyzing just one street. A north-south screenline examines east-west demand and an east-west screenline examines north-south demand. For this study, there are three east-west and four north-south screenlines. These screenlines are shown on Figure VI-5. The east-west screenlines are between Germann and Queen Creek, Ocotillo and Chandler Heights, and Riggs and Hunt/Empire. The north-south screenlines are between Power and Sossaman, Hawes and Ellsworth, Crismon and Signal Butte, and Meridian and Ironwood/Gantzel.

FIGURE VI-5: SCREENLINES



In the existing condition analysis, the 2015 model volume on the streets that cross the screenline are summed and compared with the actual traffic counts across the same screenline. The results of the existing screenline analysis show that the MAG model estimates the existing east-west volume ranges from 20% higher to 4% lower than the actual volumes. The north-south model estimates range from 4% higher to 15% lower than the actual volumes. Less than 100% means that the collected traffic volumes are lower than the model and greater than 100% means the collected traffic volumes are higher. The individual screenline analysis is shown in Table VI-2.

TABLE VI-2: SCREENLINE CALIBRATION

Screenline	MAG Model Volume	Traffic Count Volume	Count/Model
NS1	74.1	63.5	0.86
NS2	86.3	69.3	0.80
NS3	98.1	95.5	0.97
NS4	67.5	70.3	1.04
EW1	127.1	121.4	0.96
EW2	113.4	119	1.05
EW3	73.7	85	1.15

**source MAG and count data*

The primary purpose of the screenline analysis is to adjust the model generated 2025 and 2035 traffic forecasts. If the model is over-estimating traffic demand, then factors are developed to reduce the traffic forecasts across the screenline. Likewise, if the model is under-estimating, then factors are developed to increase the traffic forecasts across the screenline.

F. Traffic Forecasts

Using the 2025 and 2035 socioeconomic data and incorporating funded street improvements into the model, MAG prepared a 2025 and 2035 model run. It is important to note that the 2025 network does not include an extension of SR 24 beyond Ellsworth Road, while the 2035 network does include an extension of SR 24 to Ironwood with traffic interchanges at Signal Butte and Meridian even though the extension is not currently programmed.

The results of the model output were summarized for each of the screenlines. Then using the screenline factors developed from the 2015 validation model run, the 2025 and 2035 volumes are adjusted for the entire screenline. The results are shown in Table VI-3.

TABLE VI-3: SCREENLINE ANALYSIS

Screenline	Count/Model	Existing Count	2025 Adjusted Forecasts	2035 Adjusted Forecasts
NS1	0.86	79,500	113,000	135,000
NS2	0.80	69,300	115,000	124,000
NS3	0.97	106,300	161,000	179,000
NS4	1.04	70,300	128,000	135,000
EW1	0.96	120,400	170,000	220,000
EW2	1.05	120,000	169,000	223,000
EW3	1.15	85,000	136,000	173,000

**source MAG and count data*

Then the forecasts are adjusted further to "smooth" out the volumes between screenlines and along a street. The resulting forecasts for 2025 and 2035 are shown in Figures VI-6 and VI-7. The forecasts are estimates of travel demand on the Queen Creek arterial street network based on the population and employment growth shown in Table VI-1 and indicate areas where growth is expected. For example, the daily volume on Queen Creek Road between Signal Butte and Meridian is 6,600 vehicles today and projected to be 14,000 vehicles in 2025 and 15,000 vehicles in 2035. While a year is assigned to these growth estimates, the travel demand is actually based on the growth numbers, not a year. This means that the 2035 travel demand shown in Figure VI-7 is based on a planning area population of 109,244 and employment of 15,256 and may occur before 2035 or later than 2035 depending on the rate of growth.

It should also be noted that the MAG travel forecasting model includes portions of Pinal County southeast of Queen Creek. Like Queen Creek, Pinal County is still a relatively high growth area and the amount of growth included in the model is based on trends. If growth occurs more rapidly or is higher than what is included in the model, the traffic forecasts particularly in the southeast portion of the planning area could be higher. Conversely, if growth occurs more slowly or is less intense than what is included in the model, the traffic forecasts particularly in the southeast portion of the planning area would be lower.

The 2025 and 2035 traffic forecasts are used in the development of the street plan needed to accommodate the planned growth in Queen Creek and the surrounding area.

FIGURE VI-6: 2025 FORECASTS

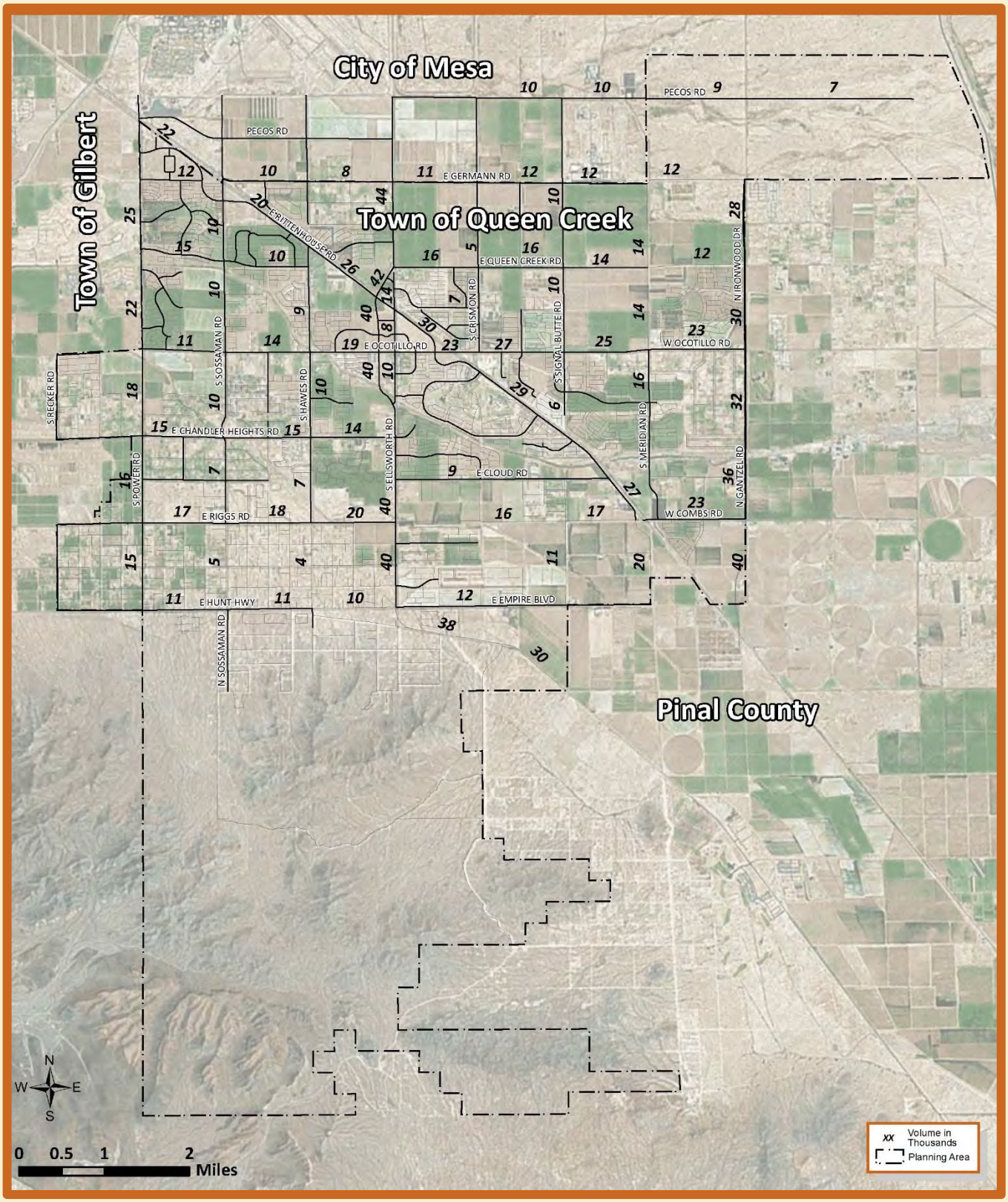
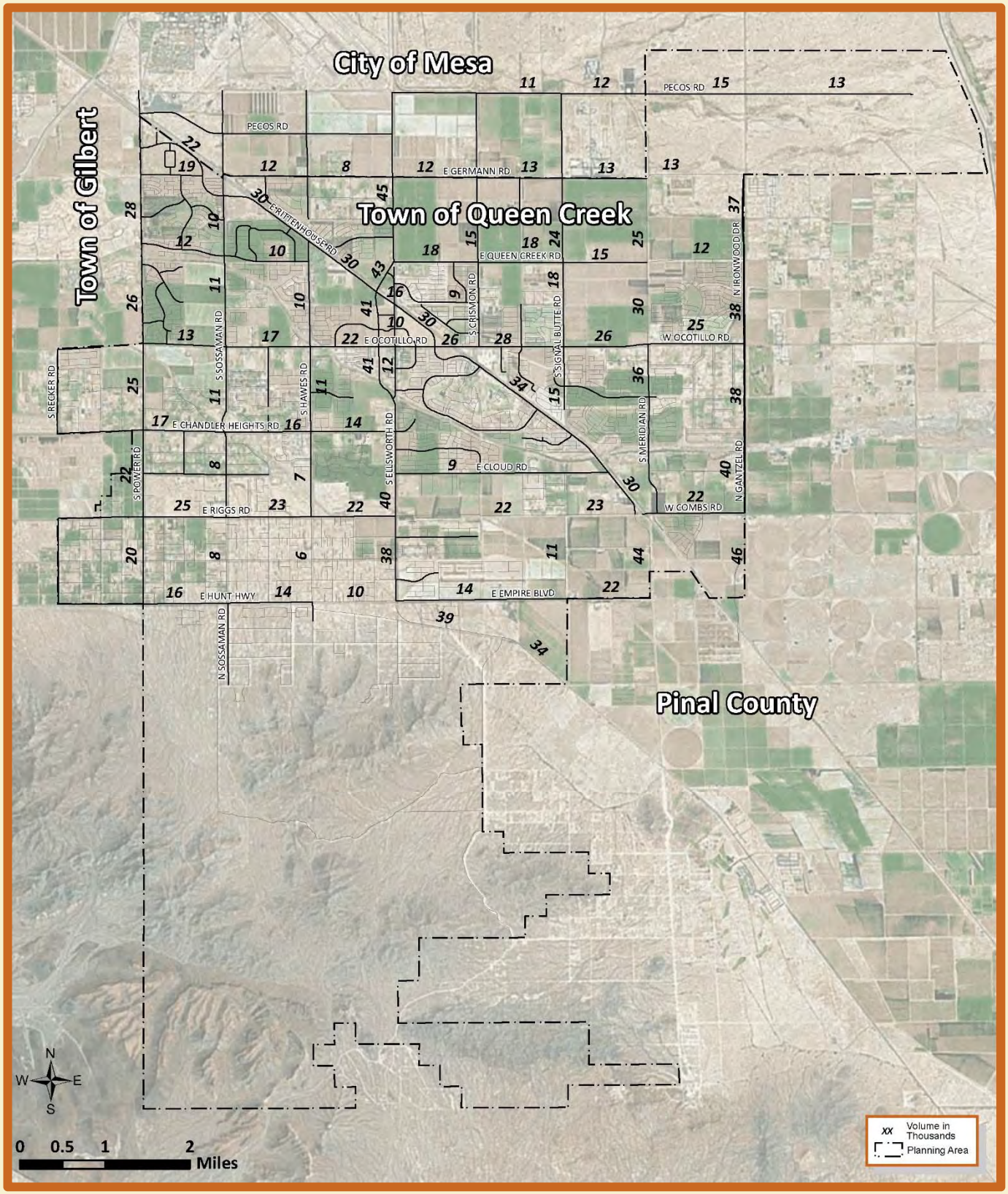


FIGURE VI-7:2035 FORECASTS



VII. PLAN ELEMENTS

The backbone of the Town's transportation system will continue to be the street network in the future. The street network provides the basis for the other modes including transit, pedestrian, and bicycle. Included in this chapter are the multimodal plans for streets, transit, non-motorized, and ITS.

A. Street Element

1. 10-year Projects

The Town of Queen Creek prepares a Capital Improvement Plan to document planned projects, estimated cost, and anticipated funding. The project implementation is identified by fiscal year for 10 years and beyond 10 years. According to the most recent list of 10-year transportation projects, funding sources include development fees, developer contribution, grants, general fund, Town of Gilbert, and MCDOT. This section presents a review of the projects included in the current listing of Transportation Projects. Those projects that involve arterial street improvements are summarized in Table VII-1.

Although the table presents a listing of street projects, it is important to note that when improvements are constructed to Town standards, bicycle lanes and sidewalk are included so these projects also accommodate non-motorized modes.

2. 2025 Base Level of Service

As described previously, level of service (LOS) is a qualitative measure of a roadway's effectiveness at handling traffic. Level of service can be measured for a road segment or intersection. The volume to capacity ratio can be estimated for the various levels of service to relate level of service and capacity. The level of service definitions and related v/c ratio were presented in Table V-4. The traffic volume for level of service 'E/F' (v/c = 1.0 or capacity) for various roadway cross sections were presented in Table V-5.

Using the 2025 traffic forecasts from Figure VI-6 and including the 10-year transportation projects in Table VII-1, a 2025 future base level of service analysis was performed. The results of the analysis are summarized in Table VII-2 and shown in Figure VII-1. As would be expected, there are significantly more LOS D, E, and F in the 2025 base condition compared to existing. There are projected to be 24 segments with LOS F, 10 with LOS E, and 32 with LOS D. Of the 34 segments with LOS E or F, 21 are unimproved segments with only 2 through lanes, while the other 13 are segments that are 4 lanes and may have right of way constraints.

TABLE VII-1: 10-YEAR TRANSPORTATION PROJECTS

PROJECT	DESCRIPTION	COST*	ESTIMATED COMPLETION
Ocotillo: Ellsworth Loop to Heritage Loop	Widen to five lanes	$3,819	2016
Ocotillo – UPRR crossing	Widen to five lanes, bike lanes and sidewalk	$2,582	2015
Ocotillo: Power to Recker	New 3-lane street	$2,435	2016
Ocotillo: west of UPRR to 218th St	Widen to five lanes	$3,438	2016
Ellsworth: Ryan to Germann	Widen to five lanes	$4,059	2016
Rittenhouse: Sossaman to QC Marketplace	Widen to four lanes	$5,048	2016
Ellsworth at Queen Creek	Geometric improvement	$2,775	2016
Chandler Heights at Sossaman	Intersection improvement	$721	2016
Power: Chandler Heights to Riggs	Widen to five lanes	$6,198	2024
Power: Ocotillo to Chandler Heights	Widen to five lanes	$8,925	2021
Power: Riggs to Hunt	Widen to five lanes	$4,000	2022
Riggs: Ellsworth to Meridian	Five-lane street (with MCDOT)	$14,500	2019
Rittenhouse: Village Loop North to Alliance Lumber	Widen to five lanes	$9,000	2021
Meridian: Combs to Queen Creek Wash	Construct & widen to five lanes	$7,000	2025
Ocotillo: Signal Butte to Meridian	Widen to five lanes	$7,000	2024
Signal Butte: Ocotillo to Queen Creek	Widen to five lanes	$5,000	2026
Hawes: Ocotillo to Rittenhouse	Widen to five lanes	$1,777	2022
Town Center Street: Duncan to Ocotillo	New two lane	925	2019
Duncan: Ellsworth Loop to Ellsworth Rd	New three lane	750	2020
Aldecoa: Ellsworth Loop to Ellsworth		825	2019
Germann Rd: Ellsworth to Crismon	Widen to five lanes	$2,767	2019
Hunt: Power to Sossaman	Widen to five lanes	$3,525	2021
Ocotillo Road: West of Sossaman Rd to Hawes Rd	Widen to five lanes	$6,500	2025
Queen Creek Road – Ellsworth to Signal Butte	Widen to five lanes	$9,852	2021
220th: Queen Creek to Ryan	New 3 lanes	$1,397	2017
Crismon Road: Queen Creek to Germann	Three-lane street	$2,275	2017
Ryan: Crismon to Signal Butte	New 3 lane	$2,275	2022
Chandler Heights: Power to Sossaman	Widen to five lanes	$7,400	2020
Chandler Heights: Sossaman to Hawes	Widen to five lanes	$7,400	2021
Chandler Heights: Hawes to Ellsworth	Widen to five lanes	$2,950	2022
196th: Ocotillo to Appleby2	New 3 lane	$2,450	2018
Riggs: Hawes to Power	Widen to five lanes	$1,300	2018
Ellsworth: Rittenhouse to UPRR	Bike lane, sidewalk & Town Center connection	$1,175	2019
Appleby2: Sossaman to 196th	New 3 lane	$2,300	2018
Box Canyon Spine Rd	New 3 lane	$11,300	2022

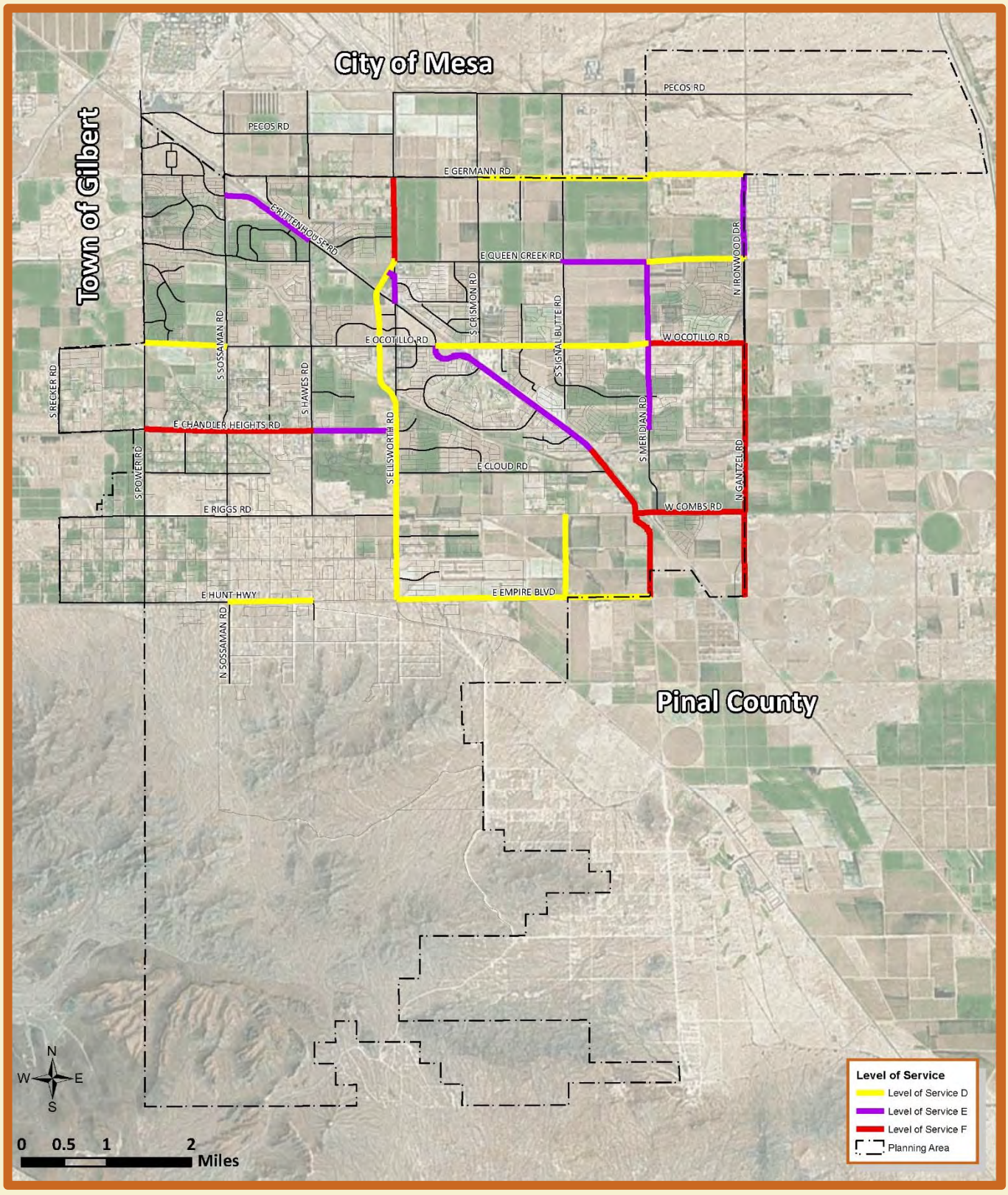
**cost in thousands*

TABLE VII-2: YEAR 2025 LOS D, E, OR F*

Street	From	To	Through Lanes	LOS
Germann	Crismon	Signal Butte	2	D
Germann	Signal Butte	Meridian	2	D
Germann	Meridian	Ironwood	2	D
Queen Creek	Signal Butte	Meridian	2	E
Queen Creek	Meridian	Ironwood	2	D
Ocotillo	Power	Sossaman	2	D
Ocotillo	Rittenhouse	Crismon	4	D
Ocotillo	Crismon	Signal Butte	4	D
Ocotillo	Signal Butte	Meridian	4	D
Ocotillo	Meridian	Ironwood	2	F
Chandler Heights Rd	Power	Sossaman	2	F
Chandler Heights Rd	Sossaman	Hawes	2	F
Chandler Heights Rd	Hawes	Ellsworth	2	E
Combs	Meridian	Gantzel	2	F
Empire Blvd	Sossaman	Hawes	2	D
Empire Blvd	Ellsworth	Signal Butte	2	D
Empire Blvd	Signal Butte	Gary	2	D
Ellsworth Rd	Empire	Riggs	6	D
Ellsworth Rd	Riggs	Chandler Heights	6	D
Ellsworth Rd	Chandler Heights	Ellsworth Loop	6	D
Ellsworth Loop	Ellsworth Rd	Ocotillo	6	D
Ellsworth Loop	Ocotillo	Rittenhouse	6	D
Ellsworth Loop	Rittenhouse	Queen Creek	6	D
Ellsworth Rd	Rittenhouse	Ellsworth Loop	2	E
Ellsworth Rd	Queen Creek	Germann	4	F
Signal Butte	Empire	Riggs	2	D
Gary	Empire	Riggs	2	F
Rittenhouse Rd	Hawes	Sossaman	4	E
Rittenhouse Rd	Ocotillo	Cloud	4	E
Rittenhouse Rd	Cloud	Riggs/Combs	2	F
Ironwood	Empire	Combs	4	F
Ironwood	Combs	Ocotillo	4	F
Ironwood	Queen Creek	Germann	4	E

**Includes 10-year transportation projects*

FIGUREVII-1 : 2025 LEVEL OF SERVICE



3 2025 Improvements

An analysis was conducted to determine what improvements would be needed in 2025 to mitigate the level of service E and F with the 2025 planned street system. The improvements shown in Table VII-3 would result in a year 2025 street network with level of service D or better.

TABLE VII-3: IMPROVEMENTS TO MITIGATE 2025 LOS E OR F

Street	From	To	Improvement
Queen Creek	Signal Butte	Meridian	Widen to four lanes
Ocotillo	Meridian	Ironwood	Widen to four lanes
Chandler Heights Rd	Power	Sossaman	Widen to four lanes
Chandler Heights Rd	Sossaman	Hawes	Widen to four lanes
Chandler Heights Rd	Hawes	Ellsworth	Widen to four lanes
Combs	Meridian	Gantzel	Widen to four lanes
Ellsworth Rd	Rittenhouse	Ellsworth Loop	Widen to four lanes
Ellsworth Rd	Queen Creek	Germann	Widen to six lanes
Gary	Empire	Riggs	Widen to four lanes
Rittenhouse Rd	Sossaman	Hawes	Widen to six lanes
Rittenhouse Rd	Ocotillo	Cloud	Widen to six lanes
Rittenhouse Rd	Cloud	Riggs/Combs	Widen to four lanes
Ironwood	Empire	Combs	Widen to six lanes
Ironwood	Combs	Ocotillo	Widen to six lanes
Ironwood	Queen Creek	Germann	Widen to six lanes

Based on the improvements shown in Table VII-3, Figure VII-2 shows the number of lanes recommended for the 2025 street network.

4. 2035 LOS

Using the 2035 traffic forecasts from Figure VI-7 and including the 2025 projects to mitigate LOS E and F shown in Table VII-3, a 2035 future base level of service analysis was performed. The results of the analysis are summarized in Table VII-4 and shown in Figure VII-3. As would be expected, there are significantly more LOS D, E, and F in the 2025 base condition compared to existing. There are projected to be 24 segments with LOS F, 10 with LOS E, and 32 with LOS D. Of the 34 segments with LOS E or F, 21 are unimproved segments with only 2 through lanes.

FIGURE VII-2: YEAR 2025 LANE REQUIREMENTS

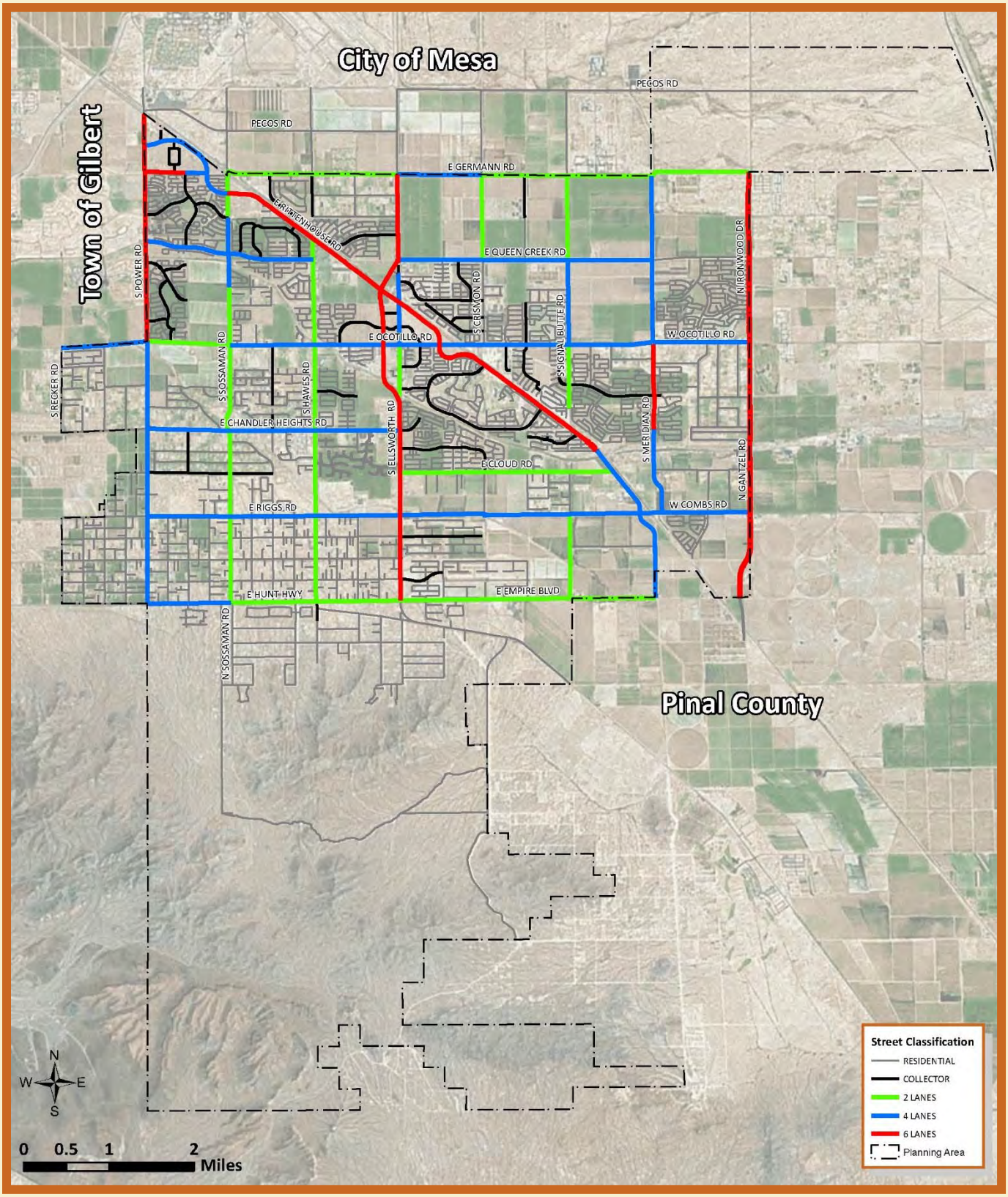
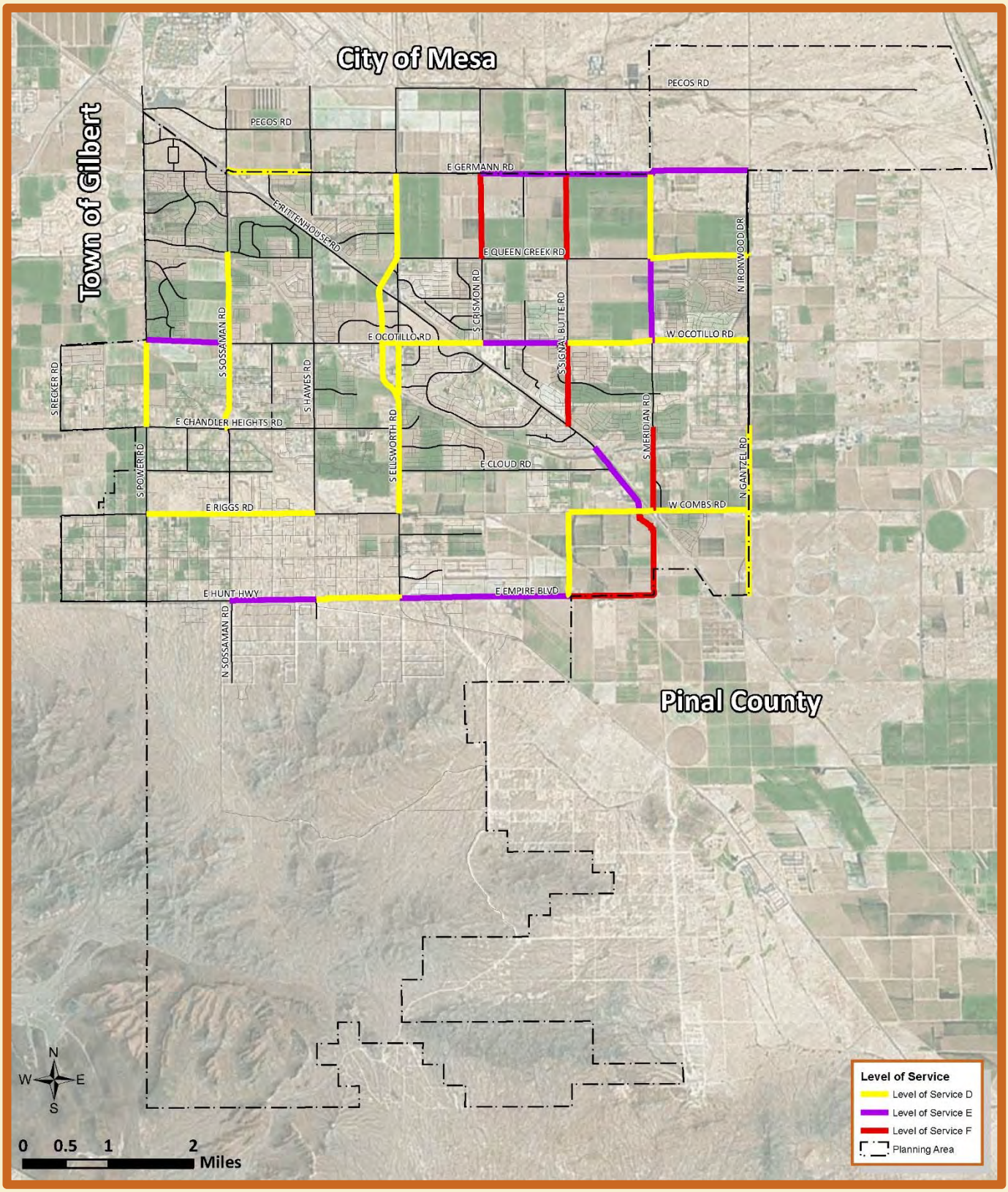


TABLE VII-4: YEAR 2035 LOS D, E, OR F*

Street	From	To	Through Lanes	LOS
Germann	Sossaman	Hawes	2	D
Germann	Crismon	Signal Butte	2	E
Germann	Signal Butte	Meridian	2	E
Germann	Meridian	Ironwood	2	E
Queen Creek	Meridian	Ironwood	2	D
Ocotillo	Power	Sossaman	2	E
Ocotillo	Ellsworth Loop	Crismon	4	D
Ocotillo	Crismon	Signal Butte	4	E
Ocotillo	Signal Butte	Meridian	4	D
Ocotillo	Meridian	Ironwood	4	D
Riggs	Power	Sossaman	4	D
Riggs	Sossaman	Hawes	4	D
Riggs	Signal Butte	Meridian	4	D
Combs	Meridian	Gantzel	4	D
Empire Blvd	Sossaman	Hawes	2	E
Empire Blvd	Hawes	Ellsworth	2	D
Empire Blvd	Ellsworth	Signal Butte	2	E
Empire Blvd	Signal Butte	Gary	2	F
Power Road	Chandler Heights	Ocotillo	4	D
Sossaman Rd	Chandler Heights	Ocotillo	2	D
Sossaman Rd	Ocotillo	Queen Creek	2	D
Ellsworth Rd	Riggs	Chandler Heights	6	D
Ellsworth Rd	Chandler Heights	Ellsworth Loop	6	D
Ellsworth Loop	Ellsworth Rd	Ocotillo	6	D
Ellsworth Loop	Ocotillo	Rittenhouse	6	D
Ellsworth Loop	Rittenhouse	Queen Creek	6	D
Ellsworth Rd	Ellsworth Loop	Ocotillo	2	D
Ellsworth Rd	Queen Creek	Germann	6	D
Crismon	Germann	Queen Creek	2	F
Signal Butte	Germann	Queen Creek	2	F
Signal Butte	Ocotillo	UPRR	2	F
Meridian	Chandler Heights	Riggs	4	F
Gary	Empire	Riggs	4	F
Rittenhouse Rd	Cloud	Riggs/Combs	4	E
Ironwood	Empire	Combs	6	D
Ironwood	Combs	Chandler Heights	6	D

**Includes year 2025 improvements*

FIGURE VII-3: 2035 LOS



5. 2035 Improvements

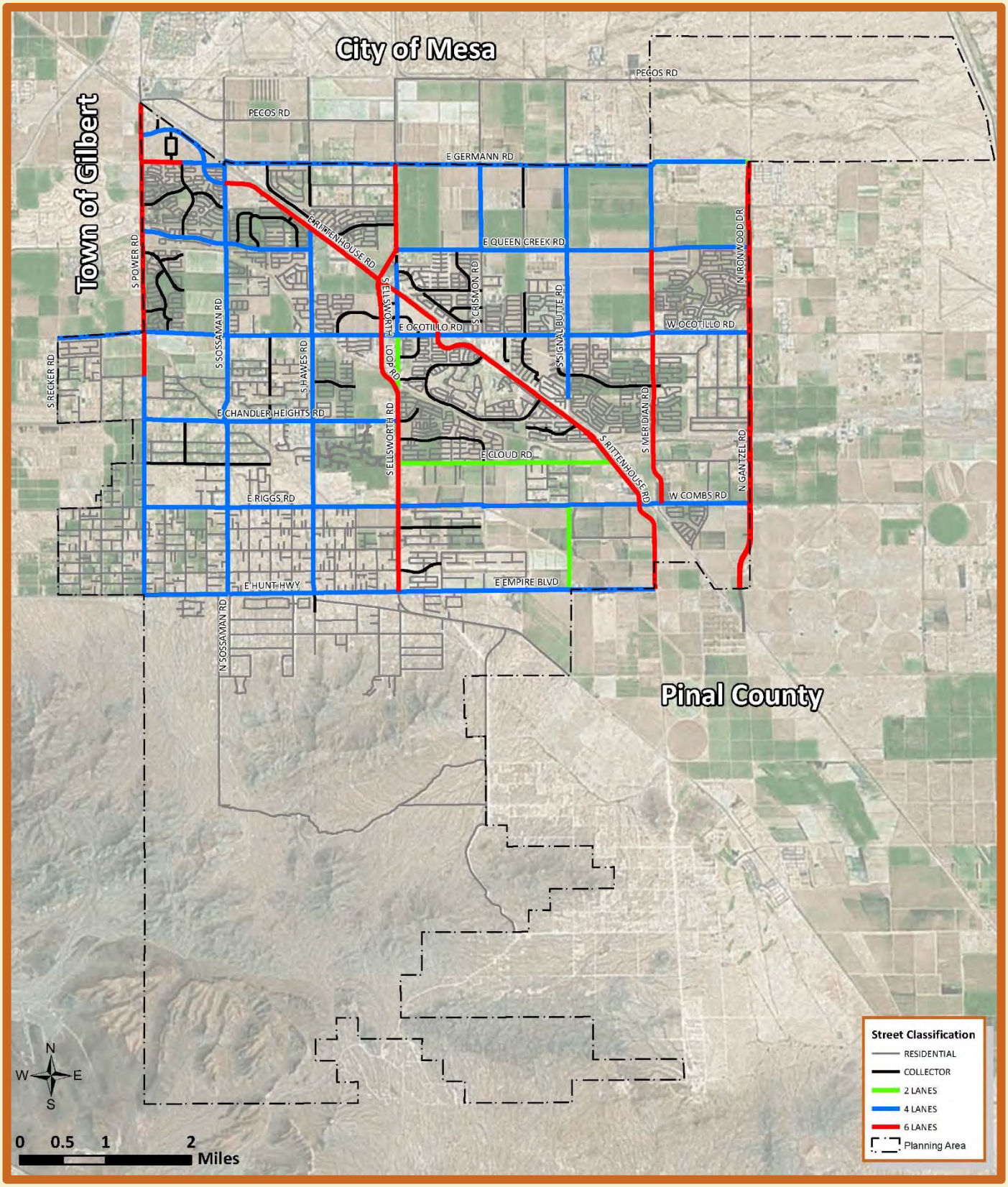
An analysis was conducted to determine what improvements would be needed by 2035 to mitigate the level of service E and F with the 2025 street system. The improvements shown in Table VII-5 would result in a year 2035 street network with level of service D or better.

TABLE VII-5: IMPROVEMENTS TO MITIGATE 2035 LOS E OR F

Street	From	To	Improvement
Germann	Crismon	Signal Butte	Widen to four lanes
Germann	Signal Butte	Meridian	Widen to four lanes
Germann	Meridian	Ironwood	Widen to four lanes
Queen Creek	Meridian	Ironwood	Widen to four lanes
Ocotillo	Crismon	Signal Butte	Widen to four lanes
Ocotillo	Signal Butte	Meridian	Widen to four lanes
Empire Blvd	Ellsworth	Signal Butte	Widen to four lanes
Empire Blvd	Signal Butte	Gary	Widen to four lanes
Crismon	Germann	Queen Creek	Widen to four lanes
Signal Butte	Germann	Queen Creek	Widen to four lanes
Signal Butte	Ocotillo	UPRR	Widen to four lanes
Meridian	Chandler Heights	Riggs	Widen to six lanes
Gary	Empire	Riggs	Widen to six lanes
Rittenhouse Rd	Cloud	Riggs/Combs	Widen to six lanes

In addition to the improvements needed to achieve level of service D or better, there are recommended improvements to maintain street continuity. Hunt Highway/Empire Boulevard will be four lanes except from Sossaman to Ellsworth which is only two lanes. That segment is also recommended to be four lanes for continuity. Both Sossaman Road and Hawes Road only require two lanes to accommodate the 2035 forecasts. However, since they are section line arterial streets and provide easy north/south access to Rittenhouse Road, it is recommended that they are widened to four lanes as development occurs. The 2035 recommended lanes is shown in Figure VII-4.

FIGURE VII-4: 2035 LANE REQUIREMENTS



6. Additional Recommendations

a) Freeway Access

As was noted in the previous discussion, SR 24 may be extended to Ironwood Road in the future. The project has not been programmed or funded. As part of the environmental process, the Town was asked to comment on the proposed scope of the extension of SR 24 to Ironwood Road. The Town did respond in a letter dated September 7, 2016 in favor of expediting the construction of an interim roadway between Ellsworth Road and Ironwood Road citing planned growth in the northeast portion of the Town as well as expansion to Phoenix-Mesa Gateway Airport. It is important for the Town to continue to monitor the discussion at ADOT and MAG regarding SR 24 and provide input. Based on the analysis in this transportation plan, there are definite benefits to the Town if SR 24 is extended. With connection to Signal Butte Road, Meridian Road, and Ironwood Road; north/south traffic destined for San Tan Valley and Pinal County would have multiple options in addition to Ellsworth Road.

In addition, ADOT has initiated study on the North-South Corridor, a 45 mile long limited access facility to the east of the Town. An alternatives selection report was completed and the next step is a Location/Design Concept Study and an EIS. The Town should maintain involvement in this study and provide input as appropriate.

b) Collector Roads

Collector roads serve a critical role in the street network by gathering traffic from local roads and funneling it to the arterial network and can also provide land access. Collector roads provide an alternative for shorter trips. Collector roads can be further classified as major collector and minor collector depending on length, volume, speed and spacing. As the Town continues to develop and improvements are evaluated, the Town needs to examine the benefit of including collector roads in new development and expanding existing collector roads. As was noted in the functional classification discussion, a well-developed collector road system provides relief to the arterial streets and in some cases may eliminate the need for arterial improvements. However, in most cases, a well-developed collector street system will divert short trips from adjacent arterial streets thereby improving the level of service on those arterial streets. Additionally, collector roads provide an alternative for bicycle travel for riders who prefer not to use the arterial streets.

Based on the current street network and opportunities as development occurs, the following collector streets should be considered to help alleviate traffic on the arterial street network by accommodating shorter trips.

- Ryan Road: Ellsworth to Meridian
- Barnes Parkway/Appleby Road: Crismon to Meridian
- Cloud Road: Meridian to Gantzel
- San Tan Boulevard: Power to Signal Butte
- Via Del Jardin: Continue to Ellsworth Loop
- 188th Street: Queen Creek to Ocotillo
- 196th Street: Appleby to Ocotillo
- 196th Street: Cloud to Empire
- 212th Street: Germann to Queen Creek
- 220th Street: Germann to Queen Creek
- 228th Street: Germann to Ocotillo

c) Town Center Plan

The Town completed a Town Center Plan in 2011. The plan included goals, land use, economics, circulation, character, and amenities components. As stated in the plan, "It is critical that the Town Center circulation network logically ties into the Town's overall circulation system." The Plan included design characteristics for Ellsworth Road and the intersection with Ocotillo Road. As the Plan evolves and opportunities are presented, components of the Plan will be implemented. There are two new roadways programmed in the 10-year transportation projects. One is Town Center Street which is a north/south connector between Duncan and Ocotillo and the second is Duncan Street which is an east/west connector between Ellsworth Road and Ellsworth Loop.

d) Intersection Reconstruction

Capacity constraints most typically occur at signalized intersections and not along sections of roadway. Intersection reconstruction can provide a benefit at arterial street intersections where one or both streets are four through lanes. The intersection widening would provide three through lanes and dual left turn lanes in each direction. Separate right turn lanes may be provided based on a traffic study. The benefit of intersection reconstruction along four-lane arterials is that additional street capacity is provided at key locations without widening an entire one-mile segment where right of way is limited. The result is that arterial street widening to six lanes can be postponed or may not be needed.

e) Complete Streets

Complete streets are safe, comfortable, and convenient for travel for everyone, including motorists, pedestrians, bicyclists, and public transportation riders regardless of age or ability. Street design must meet the needs of people walking, driving, cycling, and taking transit, all in a constrained space. The best street design also adds to the value of businesses, offices, and schools located along the roadway.

According to the National Complete Streets Coalition, typical elements that make up a complete street include sidewalks, bicycle lanes (or wide, paved shoulders), bicycle racks, shared-use paths, designated bus lanes, safe and accessible transit stops, and frequent and safe crossings for pedestrians, including median islands, accessible pedestrian signals, and curb extensions. Transit can become a more attractive option when access points that comply with the requirements of the Americans with Disabilities Act (ADA) are integrated into streets, sidewalks, and parking areas to allow easier, safer access for all users.

While the Town of Queen Creek does not have a formal complete street policy, the current engineering standards and details for arterial and collector streets include sidewalks and bike lanes on all newly constructed streets and therefore achieve the benefits of complete streets.

f) Phased Implementation

Several of the projects included in the 2013-2018 CIP as well as some of the additional recommendations in this plan are to construct six-lane streets. For funding reasons as well as consideration of "complete streets", there may be a benefit to construct new roadways as four lanes initially with the ability to widen to six lanes. The key to implementing this strategy is to obtain the needed right of way for a six-lane street. The Town can consider two options for phased implementation:

1. Ultimate Outside Curb - construct four lanes with a 40 foot wide median and then widen to six lanes in the future by narrowing the median to 16 feet
2. Ultimate Inside Curb - construct four-lanes with a standard median and then add two lanes on the outside in the future.

The following is a suggested guideline if the Town implements phased construction.

- Obtain 140 feet of right of way for a principal arterial street plus additional right of way at intersections.
- If a four lane street still results in level of service to 'F' in 2035, then construct the six-lane cross section with a 16-foot median.
- If a four lane street improves the level of service to 'E' in 2035, then construct the four-lane cross section with ultimate outside.
- If a four lane street improves the level of service to 'D' in 2035, then construct the four-lane cross section with ultimate inside.

g) Street Design and Access Control

Left turn lanes should be provided on all approaches to arterial- arterial intersections. The need for dual left turn lanes and right turn lanes should be evaluated during the design process using the Town's Traffic Impact Study Guidelines. Left-turn lanes should be designed such that the offset between left-turn lanes provides adequate sight distance for safe turning operation particularly when

the left turn movement will be a permitted phase.

Raised medians should be installed on all six-lane arterial streets and evaluated for all new four-lane arterial streets. Median breaks that support U-turn movements should be provided at one-quarter mile intervals. Median breaks that do not conform to this spacing must be justified by a traffic study.

h) UPRR Crossings

There is currently one grade separated crossing of the UPRR within the Town at Ellsworth Loop. This provides continuous north/south access regardless of train activity. The Town circulation system would benefit from one or more additional grade separated crossings especially with the potential Phoenix-Tucson intercity rail service likely located on this UPRR alignment. After reviewing the current street system, there is on possible candidate for a future grade separation with UPRR - Sossaman/Germann Road. This is a long term unfunded option that would improve circulation particularly if intercity rail service is implemented.

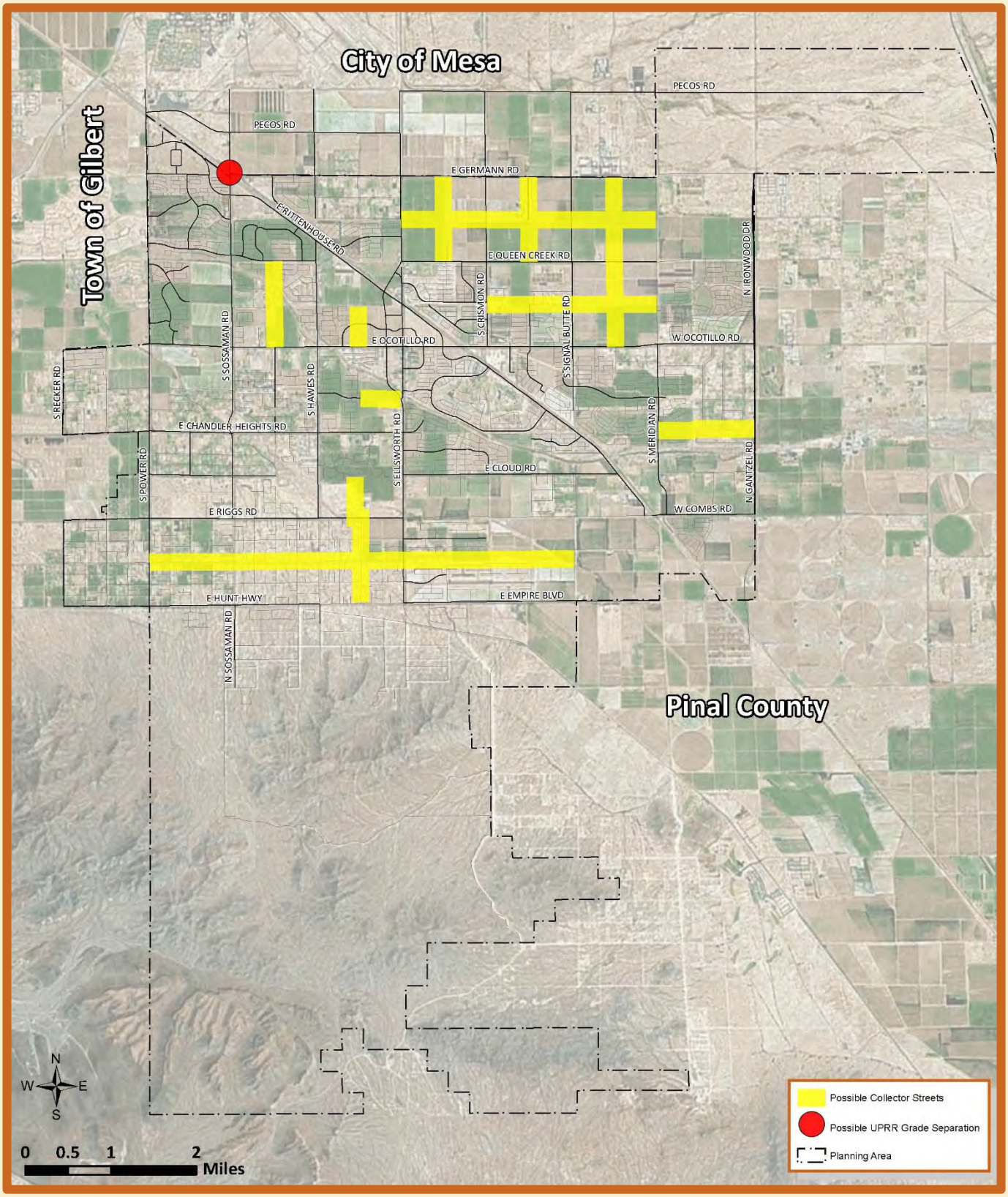
The potential crossing location and possible collector streets are shown in Figure VII-5.

7. Policy Considerations

There are other transportation facilities, studies, and future decisions that will affect Queen Creek and it is important that Town staff stay involved in those activities.

- Phoenix-Mesa Gateway Airport - the Town is a member of the airport authority and in that role can input the future direction and growth.
- Phoenix-Tucson Intercity Rail – as noted in the review of previous studies, the current preferred alternative is the UPRR line that passes through Queen Creek. The Town needs to stay involved in that process and identify desired improvements if and when the project is funded.
- North-South Corridor - as noted in the review of previous studies, ADOT is moving forward with a Tier 1 environmental study. The Town will be asked to provide input on the alignment and connections which will have an impact on future distribution of traffic in the Town.

FIGURE VII-5: ADDITIONAL RECOMMENDATIONS



B. Non-Motorized Element

The non-motorized plan presents a review of various treatments and strategies for non-motorized travel that are available and then includes recommended improvements. It should be noted that improvements to the non-motorized system will be supplemented by recommendations from the in-progress Park and Recreation Master Plan particularly for the trails and shared use paths component.

The physical environment is a key determinant whether people will ride their bicycles and/or walk. A well-connected non-motorized network consisting of neighborhood streets, bike lanes, shared use paths/trails, and crossings of roadways, along with policies to ensure connectivity and maintenance of these facilities, are critical to promoting non-motorized travel.

1. Toolbox of Options

The 2012 AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition provides the following guidance on bike lane widths:

- The recommended minimum width for bike lanes is 5 feet with adjacent vertical obstructions like curbs or guardrail and 4 feet with no adjacent vertical obstructions.
- When a bike lane is between a through lane and a right-turn lane, the minimum bike lane width is 4 feet while the preferred bike lane width is 5 feet.
- Bike lanes of 6-8 feet may be desirable adjacent to on-street parking, in areas with high bicycle use to allow for bikes passing each other, on high-speed (greater than 45 mph) and high-volume roads, and on roads with a high number of trucks and buses.

Current Town standards for arterial and collector streets require a 6' sidewalk with a minimum 4' setback from the curb and a 6' bike lane including the 1.5' gutter.

a. Narrowing Vehicle Lanes to Accommodate Bike Lanes

A cost-effective way to potentially add bike lanes to existing streets not scheduled for improvement is to narrow the vehicle lanes, thereby freeing up space for bike lanes. Based on an engineering and safety evaluation, travel lanes can be reduced to 10.5'. The cities of Phoenix and Tempe have examples of travel lanes less than 12'.

b) Widening Bike Lanes

The Town bike lane standard exceeds the minimum recommended AASHTO bike lane width of 5 feet, but to further promote bicyclist safety and comfort, the Town could consider wider bike lanes by reducing the width of travel lanes or medians by a corresponding amount to maintain the same total cross-section width. Another option would be to provide a wider "gutter" in order to eliminate the joint that currently

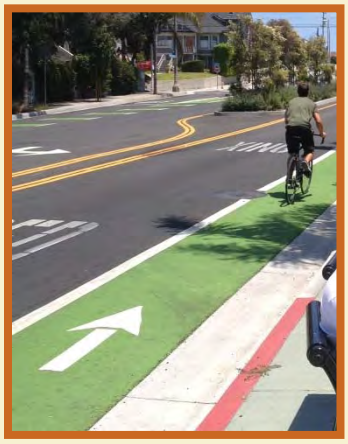
restrict the practical bike lane width to 4.5'.A gutter of 5.5' would provide an effective 5' bike lane.

c) Reducing the Number of Travel Lanes through a Road Diet

Road diets refer to reducing the number of travel lanes to improve safety and provide space to accommodate other modes of transportation. The reallocated space is typically used for bike lanes, turn lanes, pedestrian crossing islands, and/or parking. Road diets have safety and operational benefits for vehicles, bicycles, as well as pedestrians. These benefits can include reduced vehicle speeds and shorter street crossings. However, reducing the number of travel lanes does reduce the vehicle capacity, so an engineering evaluation should be conducted.

d) Shared Lane Markings

Shared lane markings, or 'sharrows', can be used on those streets where the addition of bike lanes is not feasible and where speed limits are no greater than 35 mph. Shared lane markings indicate a shared lane for bicycles and vehicles. The benefits of shared lane markings are that they reinforce the legitimacy of bicycle traffic on the street, provide a visual cue to drivers to watch for and yield to bicyclists, recommend proper bicyclist positioning within a lane, don't require additional street space, and can be configured to offer wayfinding guidance.



e) Green Colored Pavement

In 2011, FHWA issued an Interim Approval allowing for the optional use of green colored pavement in bike lanes and in extensions of bike lanes through intersections and other traffic conflict areas. Since that time, many communities across the country – including Phoenix, Tempe, and Tucson have utilized green colored pavement to make bike lanes or potential bicycle/motor vehicle crossing points more visible. Per the Interim Approval letter, research has found the green colored pavement gives drivers an increased awareness that bicyclists might be present and where they are likely to be positioned, thereby promoting bicycle safety.

f) Separated Bike Lanes

Separated bike lanes, also known as cycle tracks or buffered bike lanes, can be considered in areas with few controlled driveway openings and sufficient right-of-way to separate bike lanes from vehicles. The minimum desired bicycle-vehicle separation is 3 feet with a minimum bike lane width of 5-7 feet. Separated bike lanes can be one-way or two-way and can be at street level, sidewalk level, or at an intermediate level.

Common separators are curbs, medians, pavement color, texture markings, on-street parking and flexible bollards. Maintenance of the bike lane and separator needs to be considered when selecting what type of separator to use...

g) Connectivity of Local and Collector Streets

Local and collector streets serve an important role in the non-motorized plan in that they provide more comfortable travel way than arterial streets for most users. They are characterized by slower vehicle speeds and have lower traffic volumes than arterial streets.

As the Town continues to develop and evolve, the local and collector street network should be developed to provide sufficient connectivity through and to adjacent neighborhoods and destinations where feasible. Direct connections from local/collector streets to the off-street shared use network can provide safer access by bypassing arterial streets. Connectivity enables users to take shorter routes and travel on quieter streets. A well-connected street network can increase the number of non-motorized users, which helps reduce vehicle miles traveled.

Because there are not many continuous collector and local streets that run parallel to the arterial street network in Gilbert and Mesa, bike route signage and pavement markings can help bicyclists know where the designated bike routes are to minimize travel on arterial streets. Wayfinding is only effective if implemented systematically on key bicycle routes or pathways.

h) Off-Street Shared Use Paths and Trails

Off-street shared use paved paths and unpaved trails are considered a significant part of the Town's transportation circulation system that also provides recreational opportunities. Shared use facilities – particularly paved paths – provide opportunities for bicyclists and pedestrians away from traffic. The Town should continue to develop its network of off-street shared use paths and trails consistent with the recommendations in the Park and Recreation Master plan.

A critical component of the shared use path/trail network is where shared use facilities cross other transportation and utility facilities, particularly the arterial and collector street network and railroad tracks. These crossings represent potential conflict zones and as such need to be carefully planned and designed.

Potential crossing infrastructure treatments at arterial and collector streets include Pedestrian Hybrid Beacons (PHBs – also known as HAWKs), Bike HAWKs (similar to HAWKs but with additional features for bicyclists),

rectangular rapid flashing beacons (RRFBs), mid-block bicycle/pedestrian traffic signals, and median refuge islands.

Potential crossing infrastructure treatments at railroad tracks consist of at-grade solutions (e.g., sidewalk, railroad gate arms and lights) and grade-separated solutions (e.g., bridges or tunnels). At-grade solutions are much less expensive than grade-separated solutions but grade-separated solutions provide for complete separation between the shared use facilities and the railroad tracks. The MAG guidelines and recommendations for bicycle and pedestrian facility crossings at railroad tracks should be referenced in developing shared use/railroad crossing treatments.

i) Bicycle Sharing Program

The cities of Mesa and Phoenix and soon Tempe have a bicycle sharing program (branded as Grid Bike Share) that will provides access to bicycles for short-term rental. The bicycle sharing program allows a bicyclist to pick up a bicycle at one hub station or public bike rack and drop it off at another for a small fee. The objective of the program is to provide an affordable and convenient alternative to the motor vehicle for short trips in denser, urban areas; thereby reducing congestion, noise, and air pollution.

j) 4-E's

There are a number of actions and programs that relate to the 4-E's of Engineering, Education, Encouragement, and Enforcement that will help promote increased and safer non-motorized travel.

- Conduct crash analysis of high bicycle and pedestrian crash locations
- Close gaps in the sidewalk and bike lane networks
- Repair or replace broken sidewalks and curb ramps.
- Upgrade existing pedestrian ramps, driveway crossings and pedestrian push buttons to meet current Americans with Disabilities Act (ADA) and Manual on Uniform Traffic Control Devices (MUTCD) standards.
- Improve pedestrian access, safety, and convenience at crosswalks.
- Implement a Safe Routes to School (SRTS) Program.
- Implement education and training programs for pedestrian and bicycle safety
- Walk Friendly and Bicycle Friendly Community.
- Public service announcements to encourage safe walking and bicycling.
- Develop pedestrian and bicycle network maps
- Celebrate National Walk to Work and Bike to work Days.
- Wayfinding signage along shared use path routes.
- Cyclovia: Cyclovia are scheduled closings of city streets to automobiles for the exclusive use, benefit, and enjoyment of bicyclists and pedestrians.
- Formal training of police officers with respect to bicycle laws and safe practices
- Non-motorized data collection

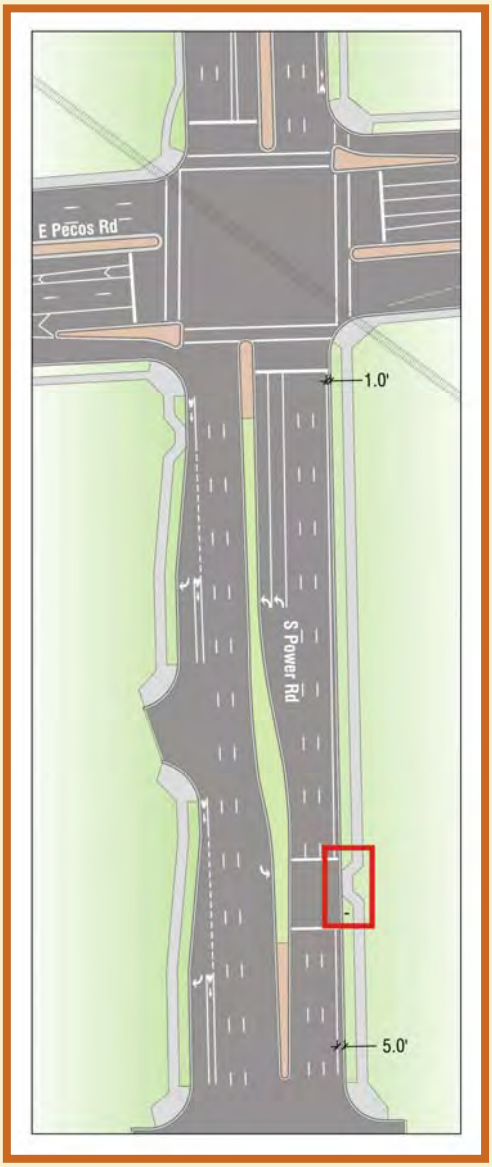
2. Recommendations

Table VII-6 summarizes the tools from the toolbox of treatments and strategies that are recommended for consideration by the Town of Queen Creek. These tools can improve the comfort, safety, and convenience of non-motorized travel in Queen Creek. Some of these tools will require more funding, resources, planning, and/or agency coordination than others and may take longer to implement. They have been categorized as short, mid, and long range.

In addition to the toolbox, there are specific gaps and inconsistencies in the non-motorized system that are addressed with recommendations that follow Table VII-6. It is recommended that the Town put highest priority on eliminating gaps in the network that are relatively inexpensive to fix, in the shared use paved paths of the existing trail network, and in areas of higher bicycle and pedestrian activity. The elimination of several gaps could potentially be combined into a single project for cost-effectiveness.

TABLE VII-6: RECOMMENDED NON-MOTORIZED TOOLS

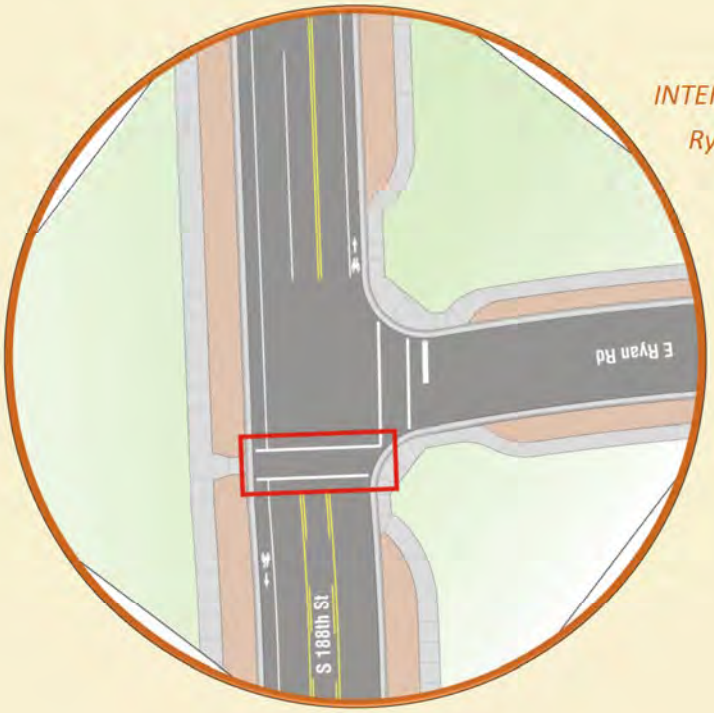
Short Range – next 5 years
Include 6-foot minimum sidewalks on all new streets
Construct new sidewalks to close gaps in sidewalk network
Develop a program to repair or replace broken sidewalks and curb ramps
Include bike lanes in new construction or major reconstruction of roadways
Revise arterial street standard to include a 5.5’ gutter
Conduct detailed crash analysis of high pedestrian and bicycle crash locations
Initiate a Safe Routes to School program
Develop and implement an ADA Transition Plan
Establish and implement a pedestrian and bicycle education and safety awareness campaign
Modify development codes to require bike racks and/or lockers
Install green colored pavement on Ellsworth Road to gauge acceptance and effectiveness
Mid-Range – years 5 to 10
Designate collector streets as alternate bike routes and develop a bike route map
Install shared lane markings on collector streets where there is not enough width to add bike lanes
Coordinate new and paving unpaved shared use paths with Parks and Recreation Master Plan
Install HAWKs, RRFBs, or signals where shared use paths cross arterials
Apply for LAB bicycle-friendly community status
Submit an application for recognition as a Walk Friendly Community
Celebrate National Bike Month and Walk to Work Day
Conduct police department pedestrian-oriented training
Develop annual goals and performance metrics
Establish a Bicycle and Pedestrian Advisory Committee
Implement public service announcements to encourage safe walking and driving
Long-Range – years 10 to 20
Develop a Complete Street ordinance or policy
Implement shared use path route signage
Implement bike route signage
Coordinate with regional partners to expand the non-motorized network
Construct at-grade or grade-separated shared use/railroad crossings
Conduct pedestrian-and bicycle themed celebrations or challenges
Implement a data collection program
Use Pedestrian and Bicyclist Intersection Safety Indices to prioritize improvements
Adopt ordinances, policies, and measures that promote non-motorized travel
Encourage dense, mixed-use development with pedestrian amenities



INTERSECTION DETAIL 1 – East Pecos Road & South Power Road

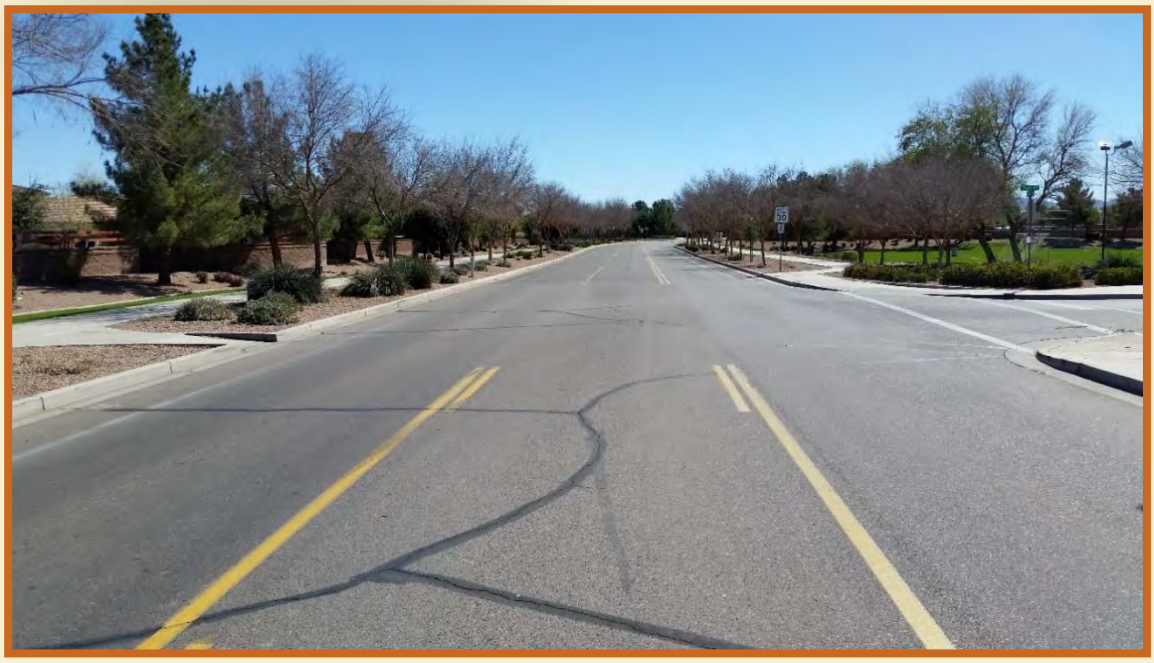
This intersection is problematic due to the fact that the bike lane on Power Road is not a consistent width. It tapers from five feet wide to a foot or less as you approach the intersection from the south.

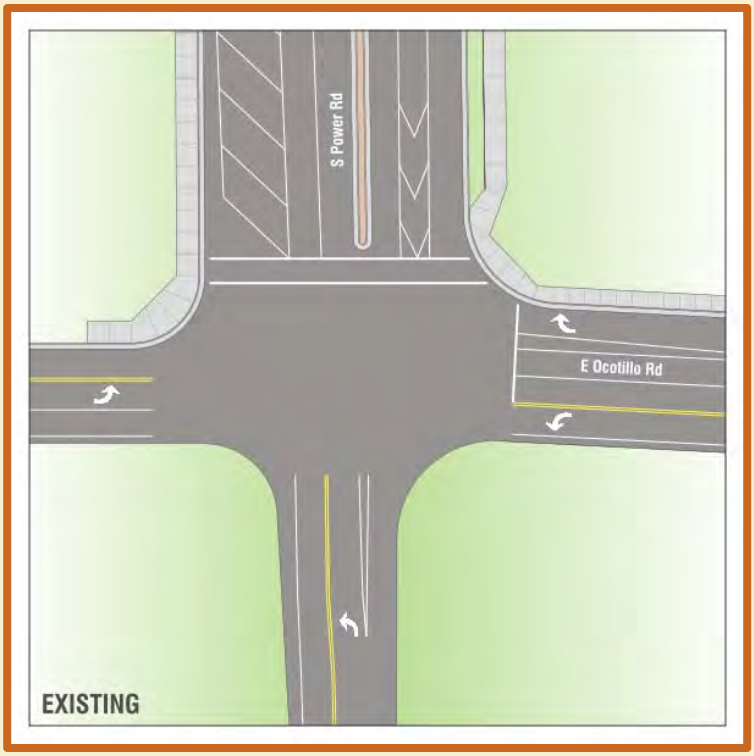
A possible solution to this issue is to create curb cut to the sidewalk at the area indicated in the graphic to the left. Bicyclists would then have the opportunity to shift to the sidewalk before the bike lane recedes. Signage should accompany the improvement directing bicyclists on to the sidewalk.



INTERSECTION DETAIL 2 – South 118th Street and East Ryan Road

It is recommended that a crosswalk be installed on South 188th Street north of Cortina Elementary School.

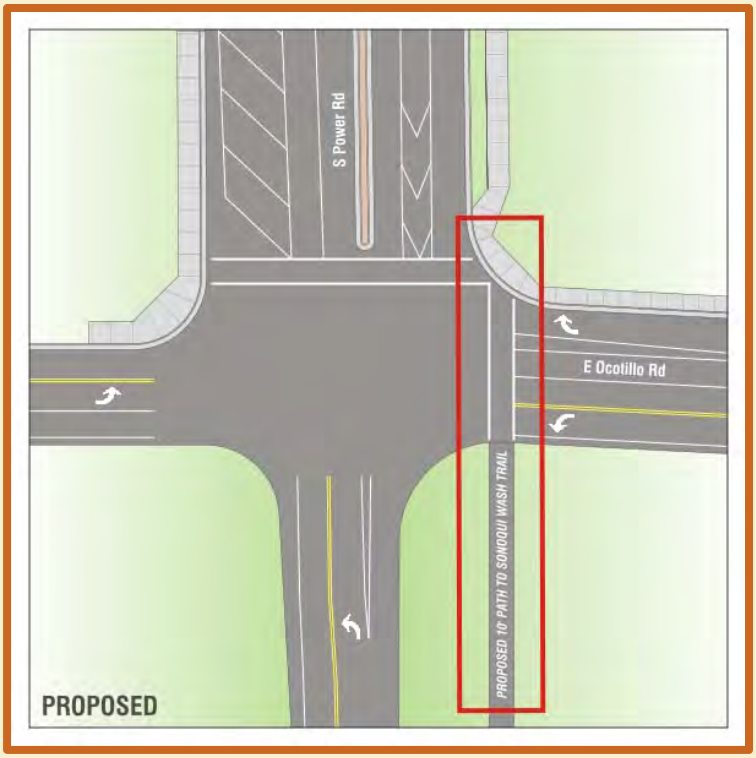




INTERSECTION DETAIL 3 – South Power Road and East Ocotillo Road

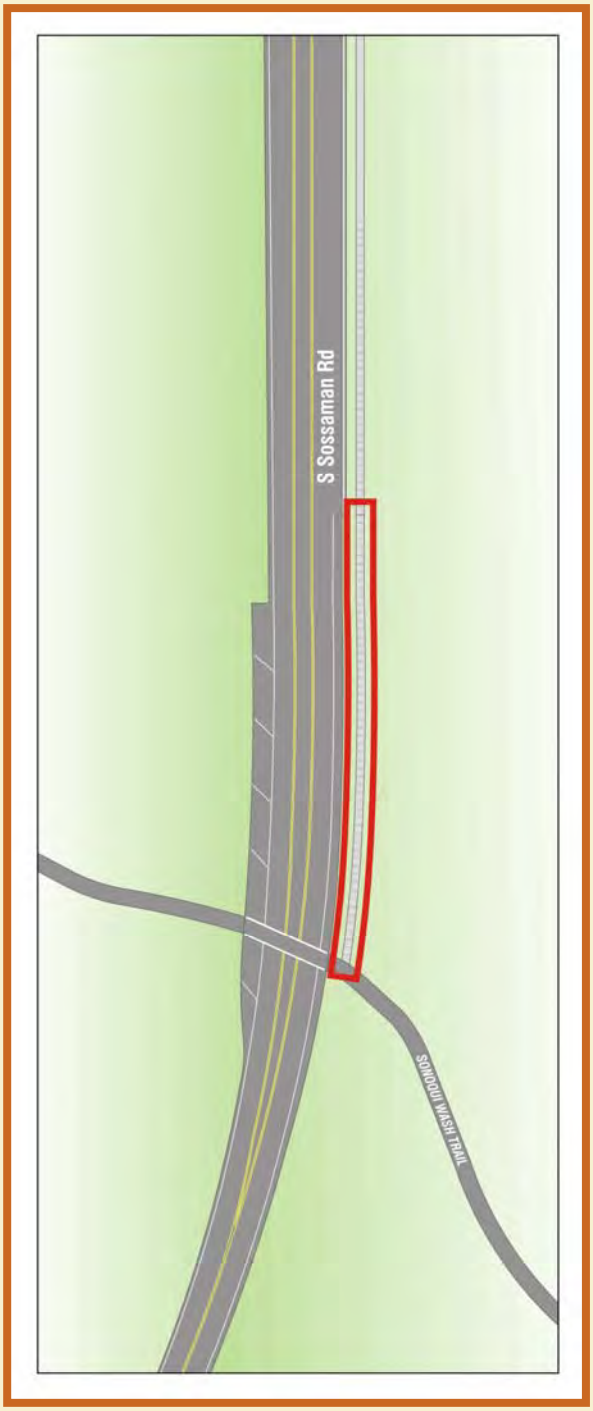
This plan proposes a 10’ path to be constructed on the east side of Power between Ocotillo and the Sonoqui Wash Trail. This path would serve the dual function of connecting the neighborhoods to the north to the trail, as well as completing a city wide loop.

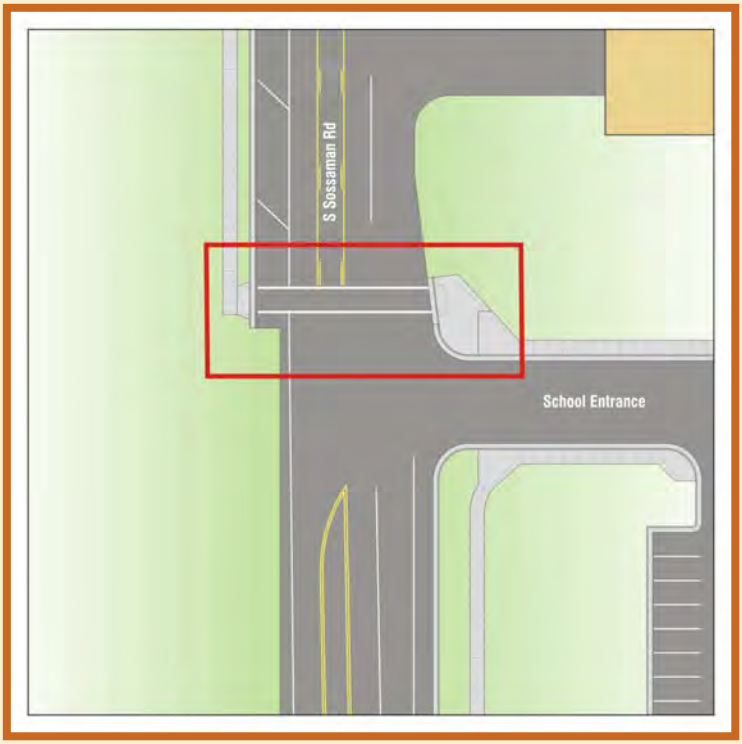
A crosswalk should be installed on Ocotillo if this proposed improvement is constructed.



NTERSECTION DETAIL 4 – South Sossaman Road and Sonoqui Wash Trail

Recommended improvements on South Sossaman Road include the extension of the sidewalk south to the Sonoqui Wash Trail.

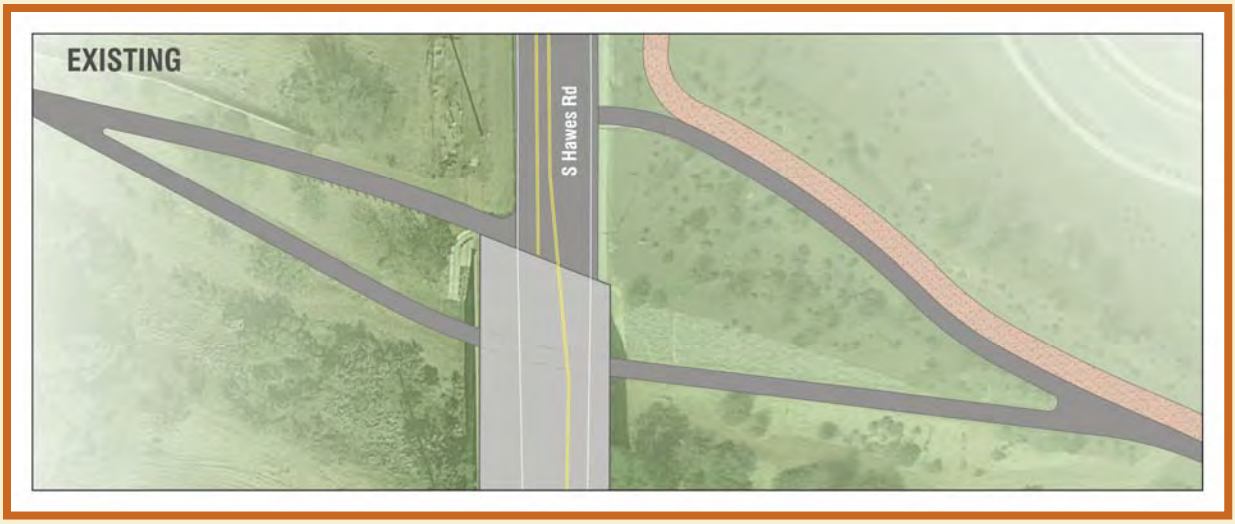




INTERSECTION DETAIL 5 – South Sossaman Road and Newell Barney Junior High School entrance drive

It is recommended that curb ramps and a crosswalk be installed on Sossaman on the north side of the north entrance drive.

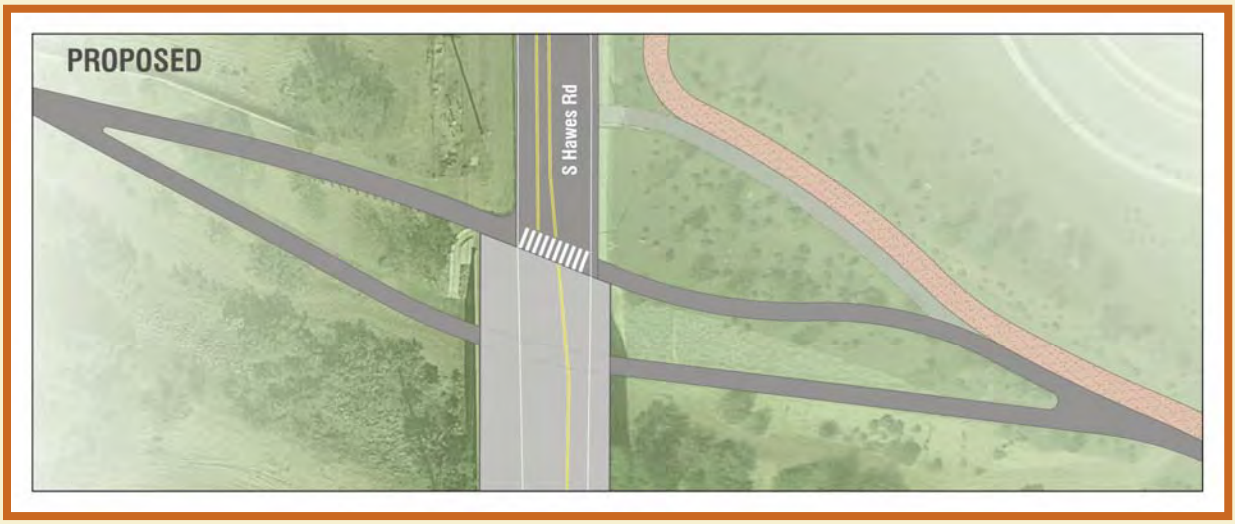
There is currently no safe crossing on Sossaman for pedestrians walking to the school from the north.

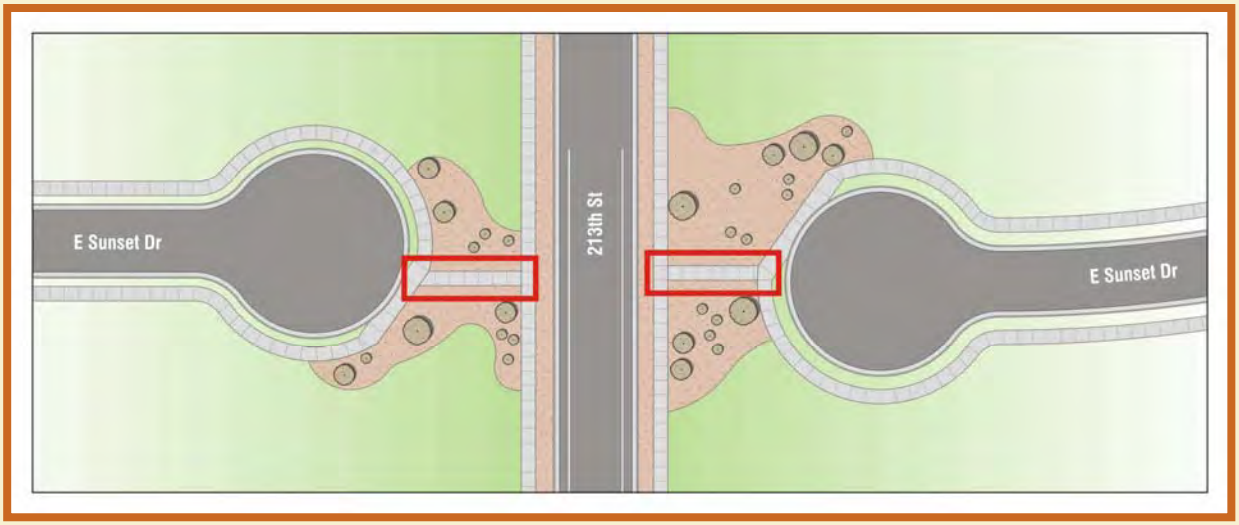


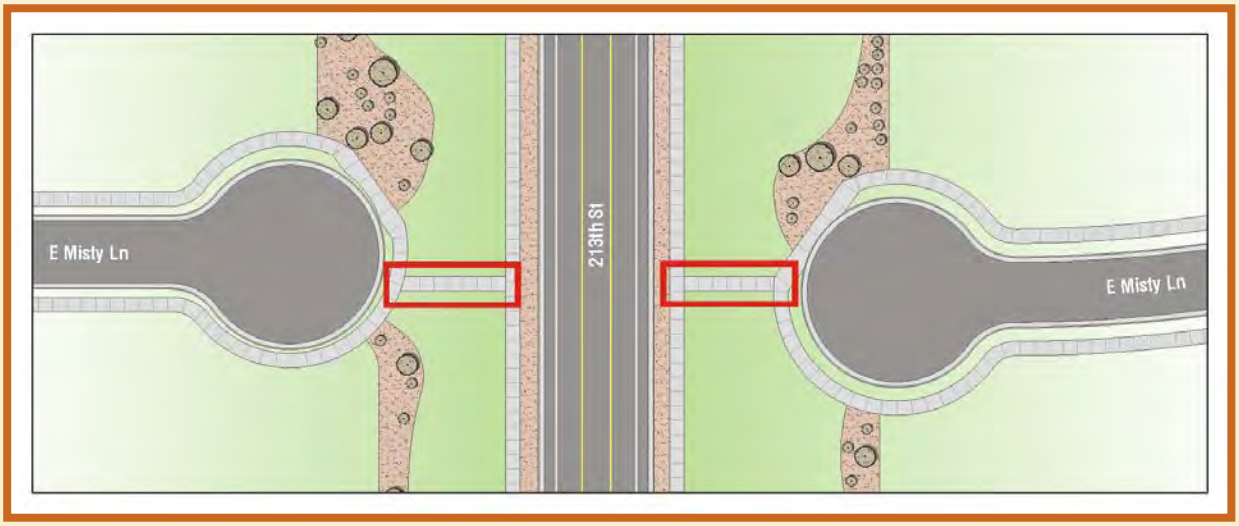
INTERSECTION DETAIL 6 – South Hawes Road and Queen Creek Wash Trail

The current configuration of the paved Queen Creek Wash Trail at Hawes could be improved. The street level crossing has no crosswalk. The crossing is also awkward in that a bicyclist or pedestrian heading west would cross to gravel shoulder rather than the continuing trail.

It is proposed that the path is realigned to match the trail on the east side of Hawes. Recommended improvements would also include a crosswalk, trail crossing signage and pedestrian actuated beacons.







INTERSECTION DETAIL 7 – 213th Street (E Sunset Dr & E Misty Ln)

Sidewalk segments are recommended at the end of the cul-de-sacs on Sunset Drive and Misty Lane to connect to 213th Street.

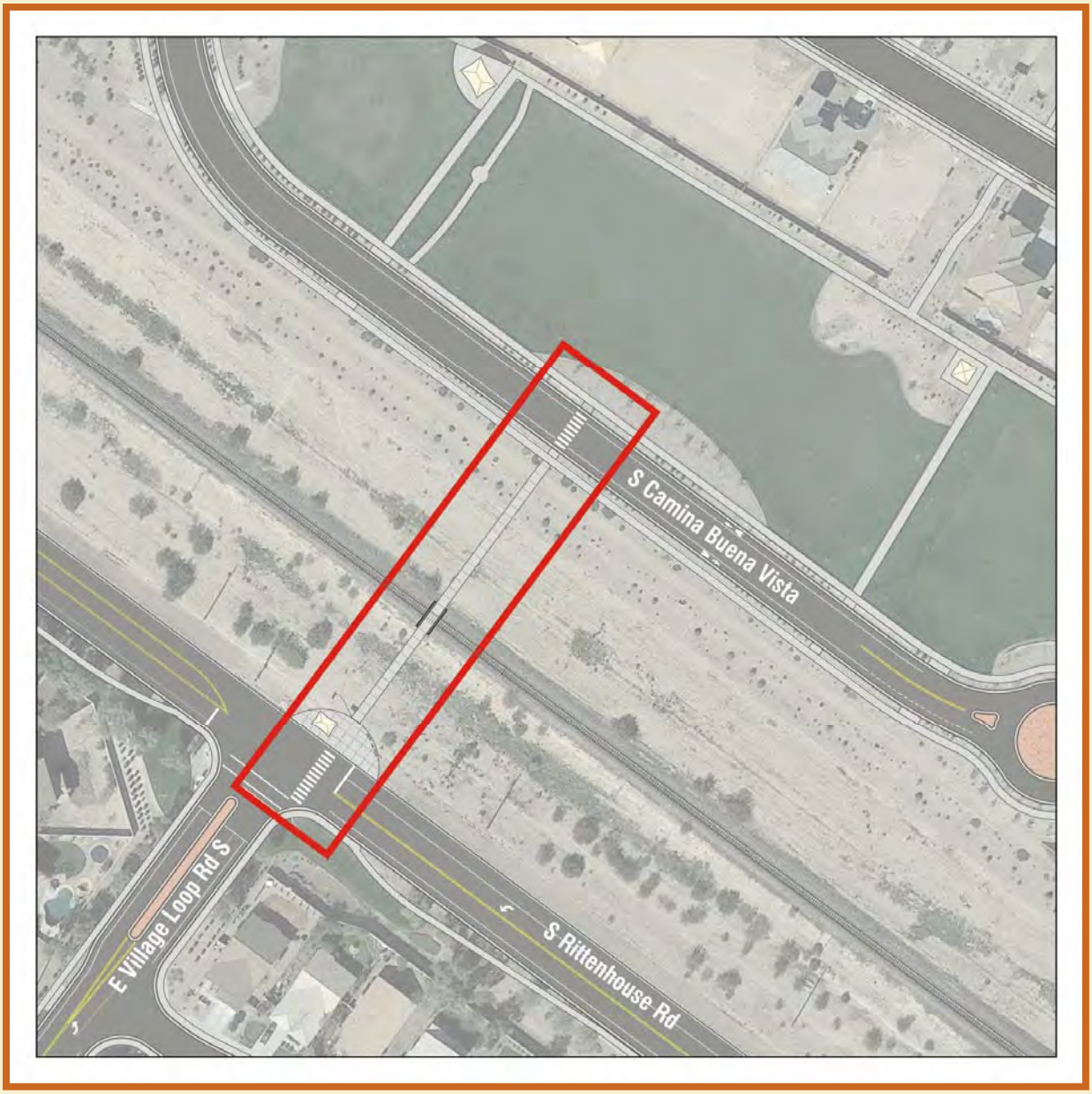
INTERSECTION DETAIL 8 – 218th Street and the future Queen Creek Trail

Upon the completion of the Queen Creek Trail extension, it is recommended that a connection be made to sidewalk near the intersection of 208th Street and East Via De Olivos.

Partially completed connection to the future Queen Creek Trail at the end of East Pecan Drive

INTERSECTION DETAIL 9 – South Rittenhouse Road and East Village Loop Road South

There is poor connection from the neighborhoods northeast of Rittenhouse and south of Ocotillo to the rest of the bicycle and pedestrian network.



It is proposed that a connection be made by the construction of a path from the intersection of East Village Loop and Rittenhouse to the sidewalk at South Camina Buena Vista. This includes an at-grade crossing of the UPRR.

C. Transit Element

1. Guidelines for New/Expanded Service

Valley Metro recently completed a report titled "Regional Transit Standards and Performance Measures-Phase 1". The document included transit service standards by which decisions regarding transit investments may be prioritized. In order to provide high level transit service that is affordable to passengers and taxpayers in the greater Phoenix metropolitan region, tradeoffs are required between the costs and the benefits of providing the service. Service Standards will provide a formal mechanism for making these tradeoffs in an objective and equitable way, and provide both decision-makers and the public with the necessary data and evidence when discussing routing, scheduling, and service change decisions. Multiple types of transit services can be applied to help meet objectives or serve a target market. It is important to identify transit service types due to differences in the expected level of service (service standards) of each service type.

Valley Metro identified five tangible goals related to values viewed as important for the region that were used in development of transit service standards and performance measures for Valley Metro funded and operated services. The five goals include:

- Implement services identified in the Regional Transportation Plan in consideration of a performance based system.
- Give high priority to services that focus on the transit-dependent population.
- Provide transit service that is desirable as an alternate mode to automobile travel.
- Improve Valley Metro's overall performance and promote the long-term financial stability of the agency.
- Promote expansion that builds existing services to meet standards and focuses new services in key areas, including higher population density areas, locations with limited auto availability, residential geographies with lower incomes, and the locations of major activity centers.

Transit users are generally of two categories: transit dependent persons with little or no other transportation options, and persons that chose transit because it is a competitive alternative. Transit dependent users are generally low income, disabled, youth, or elderly patrons. Riders that select transit as an alternative mode of travel do so because transit serves the growth areas and activity centers for the Town as well as the areas of high population and employment density.

Additionally, according to Valley Metro guidelines, planned and expanded service in the region should satisfy the following criteria:

- Coordinate with neighboring cities and the regional network
- Meet or exceeding regional service levels
- Expand the network to support existing development and neighborhoods
- Expand transit services into future growth areas
- Support all service with the appropriate level of capital and infrastructure
- Provide innovative new services

Multiple factors are associated with choosing the appropriate transit vehicle and service option for a particular service environment. Considerations that would be taken into account include bus size, carrying capacity, ADA accessibility, and cost. These factors are all likely to have a significant impact on the eventual success of a transit system relying on a bus as the primary mode.

Circulators are designed to supplement or be a replacement for local fixed route service where traditional size or service types are less practical or desirable because of street patterns, densities, or operating costs. Typical circulator services provide connections to the regional bus network and are designed to connect to activity centers and trip generators located in areas not typically served by the regional network. There are various types of circulator services based on their operating characteristics including fixed route (more traditional) and route deviation (flex type service). Fixed route circulators are designed to offer direct, timely connections within neighborhoods, communities, and multiple activity centers on a fixed schedule operating on secondary roadways within neighborhood streets. Route deviation circulators have fixed stop locations, but vehicles are allowed to leave the route to provide service to specific areas of the community as needed while still maintaining a service schedule. In both instances, route lengths are much shorter than typical local fixed route transit and provide service to areas of the community that wouldn't normally be considered for transit service due to their land uses or development densities.

Typically, smaller buses are used for circulator systems and may vary in type depending on the streets being navigated, number of passengers, and aesthetic impact on the community. Typical vehicle sizes range from 20 to 35 feet long serving between 12 and 30 passengers.

Express services provide fast connections over longer distances. However, because express services travel far distances and do not pick up passengers along their entire alignment, the cost of providing express service is usually higher per mile than local service. Industry best practices state that the cost effectiveness for express service is at or above 30 passengers per trip. Express services should focus on serving PNR lots. Effective express services generally stop at no more than two PNR lots - one at the beginning of the route and one in the middle of the route. It should be noted that the previous express service to Queen Creek initiated in 2011 was discontinued because of low ridership.

The Institute of Transportation Engineers (ITE) publication "A Toolbox for Alleviating Traffic Congestion" provides general transit supportive densities for various transit services. These guidelines are summarized in Table VII-7.

TABLE VII-7: TRANSIT SERVICE GUIDELINES

Service Type	Approximate Frequency	Minimum DU/Acre[1]	Minimum Population Density[2]	Minimum Employment Density[3]
Low Frequency Bus	60 min.	4 – 5	3,000 – 4,000	6,500 – 10,500
Medium Frequency Bus	30 min.	7	5,000 – 6,000	10,500 – 26,100
High Frequency Bus	10 min.	8 – 15	8,000+	26,100+
LRT	10 min.	8 - 15	8,000+	26,100+

[1] *Dwelling Units/Acre*

[2] *Population/Square Mile*

[3] *Employees/Square Mile*

2. Recommended Transit Services

For any transit system to be successful, it must support the following policies:

- Focus on the customer
- Attract and retain passengers
- On-time performance
- Time competitive with other modes
- Optimize the spacing of stops
- Employ technology

Based on the data currently available and a review of previous studies, it is not likely that fixed route transit service would be justified in the next 10+ years. This should be evaluated on a regular basis to identify any changes in population and employment density as well as transit expansion in neighboring communities that could connect to fixed route service in Queen Creek.

The recommendations set forth herein provide a framework for the Town to enhance transit service. Recently, MAG in conjunction with Valley Metro initiated a study titled "Southeast Valley Transit Study". The Town is a represented stakeholder. The study analyzed bus services and ridership demand in transit-established and transit-aspiring communities within the Southeast Valley.

a) Coordination with Valley Metro

Valley Metro is the provider of transit service in the Phoenix metropolitan area and any expansion of existing service or requests for new service will be coordinated with Valley Metro. The Town's existing vanpool program is managed by Valley Metro.

b) Coordination with Surrounding Communities

The Town should coordinate with surrounding jurisdictions regarding new or expanded service to ensure appropriate transit connections and continuity of service. The City of Mesa and the Town of Gilbert recently completed transit plans that outline their plans over the next 20 years. As the Town of Queen Creek evaluates transit service options, consistency and coordination with neighboring communities will be important. The Gilbert Transportation Plan includes fixed route service on Queen Creek Road to Power and on Power to Queen Creek Road but both are a low priority. The Mesa Transportation Plan includes long-term recommendations for fixed route local bus service on Ellsworth and Signal Butte to Pecos Road.

The recommendations for transit service in the Town of Queen Creek are shown in Figures VII-6 and VII-7 and summarized below. The circulator can provide the Town a relatively low cost opportunity to evaluate the residents' desire for transit service. If successful, the long term recommendation is to expand the circulator and connect with fixed route service in a neighboring community.

c) Mid-term – 5 to 10 years

- Promote vanpools – there are currently 11 vanpools based in Queen Creek. The Town should continue to promote vanpools using community activities and public service announcements as well as coordinate with Valley Metro.
- Circulator – work with Valley Metro to initiate one circulator service within the Town. Valley Metro can provide guidance regarding routing, but an initial service area should include the Town Center, Queen Creek Marketplace, and nearby high density residential areas.

d) Long-term – 10 to 20 years

- Continue vanpool support
- Expand the bus circulator program to the east to include planned residential areas with a connection to nearby fixed route service such as Power Road and/or Queen Creek Road (part of Town of Gilbert long range plan)
- Explore express route service to nearby transit centers and/or downtown Phoenix. Evaluate potential park and ride locations such as Queen Creek Marketplace.

e) TDM

TDM includes many policies and activities that aim to reduce single occupant passenger vehicles. In the short term, the following could help to reduce vehicle trips and thereby improve overall circulation.

- Create a link on the Town website that encourages and informs about TDM options
- Develop an incentive program where the Town subsidizes rides such as Uber that start and end within the Town
- Develop land use policies that encourage higher density that could support transit
- Support Valley Metro's ride share program on the Town website

FIGURE VII-6: MID-RANGE TRANSIT PLAN

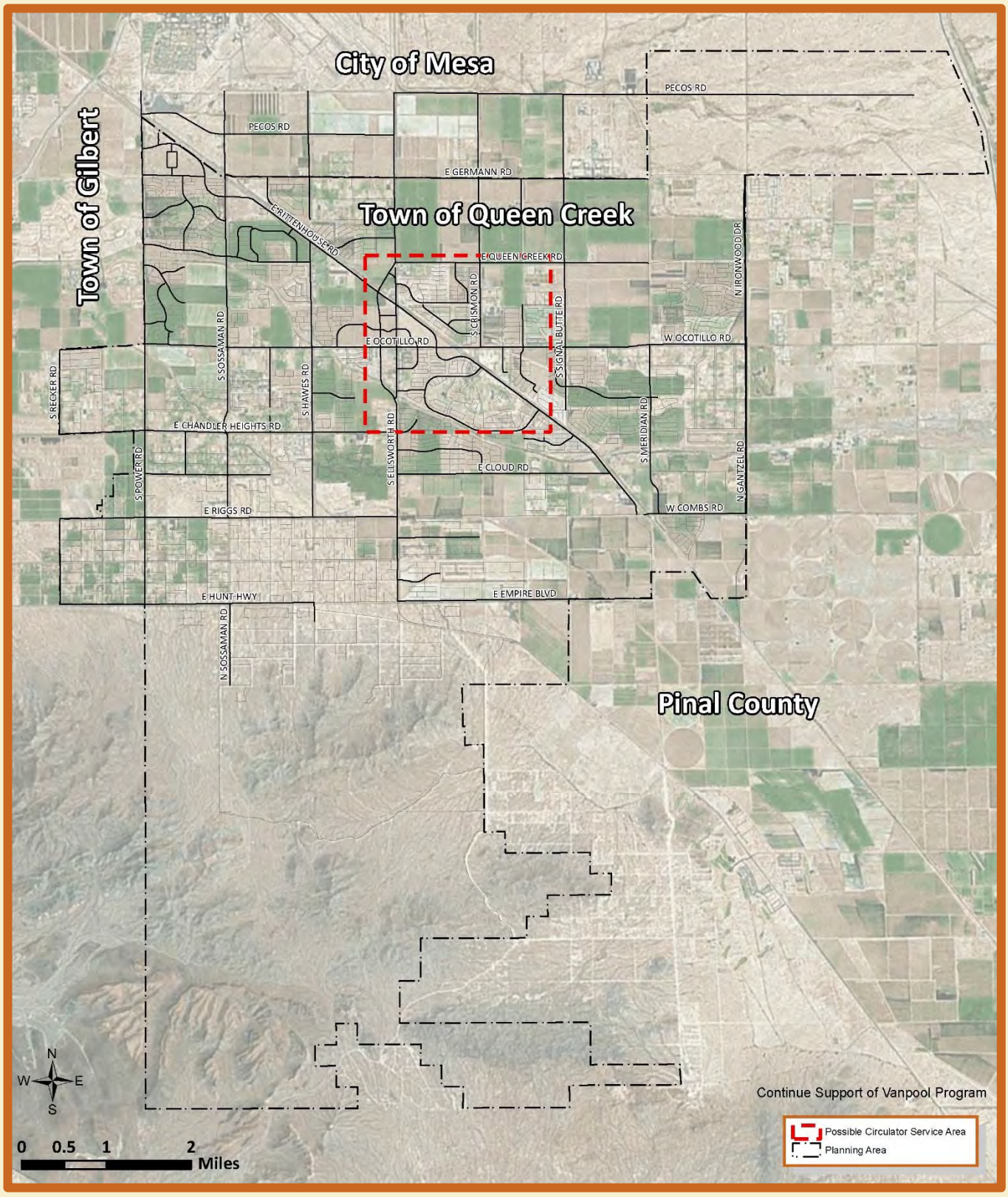
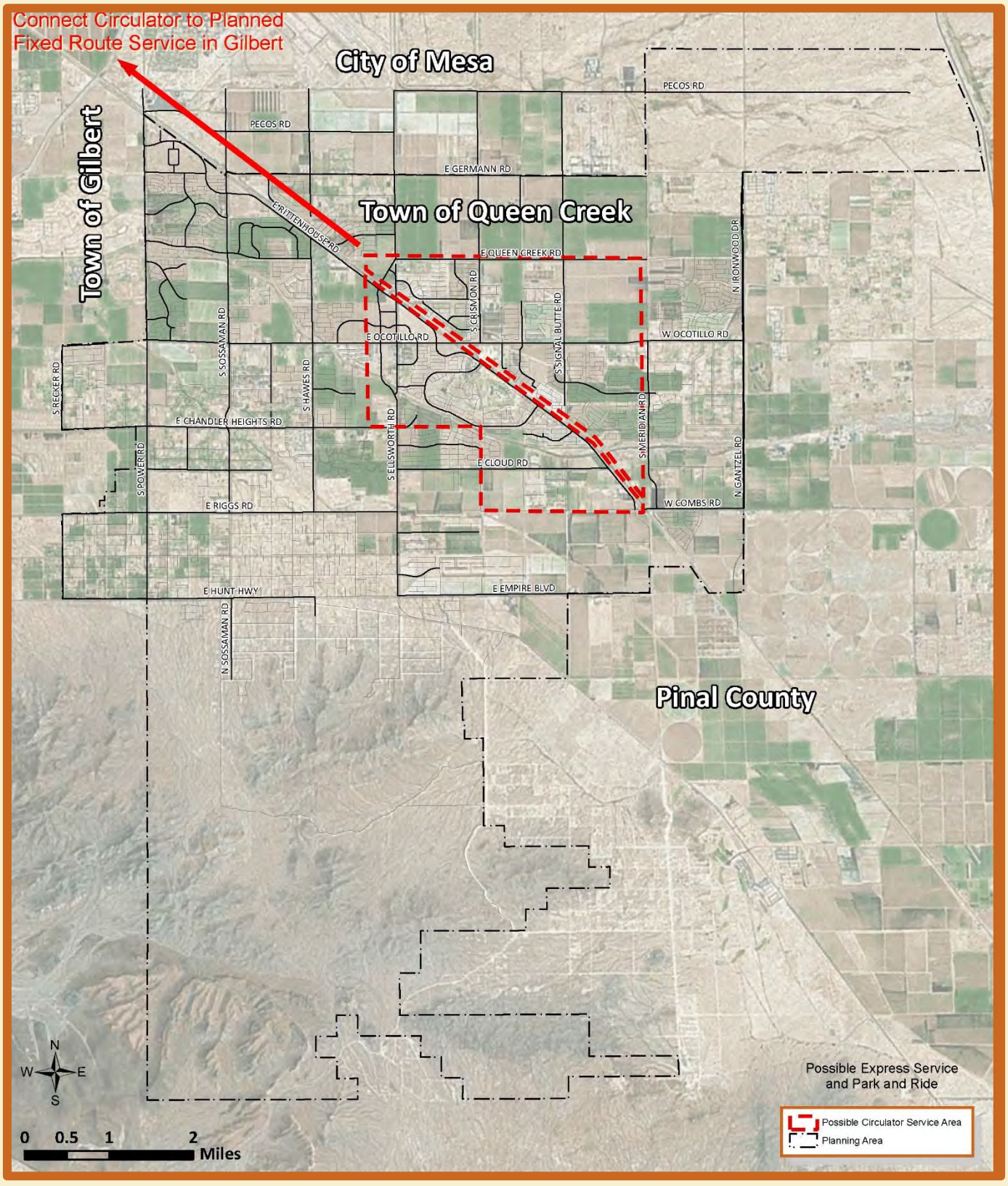


FIGURE VII-6: LONG-RANGE TRANSIT PLAN



D. ITS Element

Intelligent Transportation System (ITS) infrastructure and processes are generally utilized to manage traffic, to reduce congestion and promote safety as well as to provide real-time traveler information. ITS infrastructure and processes are typically used by public agencies in sharing information with the traveling public and with other neighboring agencies, monitoring traffic on corridors and at key intersections, collecting and disseminating information that affects reliability (event closures, construction limits, restrictions, others), and using central systems to measure effectiveness of operations.

The planned Town's fiber optic communications network is comprised of four backbone rings of fiber optic cable, wireless connections, and future ring connections. Fiber optic branch cables extend from those four rings at several locations to connect to nearby traffic signals. The fiber optic cables (containing 144 strands) are installed in conduits of various sizes.

Implementing ITS can provide the following benefits for the Town, its partners, and the traveling public:

- Increase the capacity of roadways by 10 percent to 15 percent;
- Provide real-time traveler information;
- Reduce delays, vehicle emissions, and energy consumption;
- Reduce incidents on the roadway and improve incident clearance times;
- Improve the response time of emergency services;
- Be implemented within existing right-of-way – minimizing time for approvals/clearances and travel lane restrictions;
- Provide a cost-effective alternative to road widening or new roadway infrastructure;
- Support other agency functions with operational data.

Specific technologies that will be available for use by the Town in the future are difficult to identify beyond a five year horizon based on the continually evolving nature of the technology industry. Examples of technology applications or uses that the Town may find value in for the future include:

- Variable speed limits;
- Detector-based activation or preemption to signal timing plans at signalized intersections;
- Shared control/permissions with other agencies for regional corridor operations;
- Automated vehicle location for transit, emergency services, police/fire vehicles, and maintenance vehicles to be viewable by TOC to help manage corridors for response;
- Dedicated safety or traffic calming systems for school zones, hospitals, fire station locations, libraries, downtown, and other areas of the Town that experience heavy mixing of vehicular, pedestrian, bicyclist, and transit travelers; and
- Intelligent integration with infrastructure at, near, or related to the freeway/arterial interchanges with SR 24

Table VII-8 provides an ITS "toolbox" that identifies multiple ITS technologies or methods that can be used for monitoring, traffic control, work zone management, lane management, information dissemination, parking management, and central system management.

TABLE VII-8: ITS TOOLBOX

ITS Function	Example	Purpose	Benefits (Pros)	Considerations (Cons)
Monitoring	Video Image Detection (VIDs) and Closed Circuit Television Cameras (CCTV)	To monitor traffic on corridors and at key intersections in real-time	• Situational awareness • Cost-effective capacity enhancement without adding lanes • Roadway efficiency improvement	• Requires maintenance and upgrades • Additional training needed to support operations and maintenance
Traffic Control	Traffic signals, pedestrian-activated crosswalks, emergency vehicle preemption, school flashers, and adaptive signal control	To support the movement of traffic on the roadway network	• Enhancements that are very visible to the traveling public • Warrants and safety considerations drive investments	• Integration can be challenging • Upfront capital cost and ongoing operations and maintenance • Potential lack of public understanding or acceptance
Work Zone Management	Portable traffic control devices (CCTV, dynamic message signs [DMS]), permitting system reporting, restriction notifications	To effectively manage/monitor work zone sites for traffic control and safety	• Improves safety of work zones • Visible to traveling public • Coordination with public safety for improved work zone	• Determining when, where, how, and why to deploy • System sharing / control permissions • Increased maintenance responsibilities
Lane Management	Reversible flow lanes and signage, lane control signs, and emergency evacuation signage	To manage lane movements of traffic during incidents and special events to increase safety and efficiency	• Very effective at targeting areas with specific congestion / safety issues	• Upfront capital cost and ongoing operations and maintenance • Additional training required • Potential lack of public understanding or acceptance
Information Dissemination	DMS, in-vehicle systems, websites, mobile applications, or other information dissemination services	To provide real-time information about road conditions, incidents or closures	• Visible benefit to traveling public • Public expectation to receive information provided in these formats	• Upfront capital or development cost and ongoing operations and maintenance • Visible information creates accountability for jurisdiction • Data collection costs
Signal Central Systems	Fiber optic network, wireless network, traffic management software, processing data to measure system effectiveness	Collect, store or use data to support operational, situational, or planning decision	• Cost-effective for the public agency when strategically implemented • Serves multiple purposes • Reduces personnel time if no field visit	• Sometimes costly to deploy if trying to implement "after the fact" • Requires regular maintenance and knowledge base to operate and keep system functioning

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1. Recommended ITS

Below is a listing of recommended future projects or activities that the Town should consider to further help the Town achieve the vision for how ITS can benefit traffic operations for the traveling public and enhance communications capabilities between and within the various Town departments (ordered in terms of priority within each grouping):

- Town ITS Strategic Plan:
  - Develop an ITS Strategic Plan that includes device-specific and technology-specific master plans (CCTV, DMS, detection, wireless and fiber communications, bike/ped applications, central systems, traveler information dissemination systems, etc.)
  - Concepts/plans for use and sharing of the ITS components, data, and information
  - Communications master design (including outlining internet protocol (IP) addressing, fiber strand/splice mapping, wireless backhaul, and redundant ring connection layout mapping)
- Fiber Optic Communications Network:
  - Connect all Town buildings and all ITS devices either directly or wirelessly, that are not currently connected
- Traffic Signals:
  - Connect all traffic signals to the fiber network
  - Upgrade traffic signal controllers to newer versions for more operating options and to report performance measures
  - Provide advanced detection at identified intersections for safety and operational benefits
  - Explore adaptive signal control where a need is identified
- CCTV Cameras:
  - Coordinate with other Town departments to share video images as needed
  - Install a CCTV camera at every major intersection (arterial to arterial) in the Town that does not currently have one, as well as at high activity areas such as the Town Center
- DMS:
  - Identify locations for future DMS and connect to fiber optic network so the DMS can be centrally controlled
  - Invest in portable DMS that can be moved around for seasonal, incident, or event purposes
- Regional Connectivity:
  - Share or request data from other agencies that may be beneficial to the Town's operations such as:
    - Freeway incident notifications from the Arizona Department of Transportation (ADOT)
    - Arterial incident notifications from emergency responders
    - Event coordination meetings and management with neighboring jurisdictions
    - Arterial traveler information dissemination methods through social media, Town website, ADOT's 511 system, or other outlets
  - Support regional efforts to increase connectivity and redundancy in the regional communications network

  - Participation in regional initiatives to stay informed of activities and potential funding/integration opportunities
- Performance Measures:
  - Determine ITS performance metrics that can be tied directly to Transportation Master Plan goals and sources of information such as the Town's central signal system that could supply data to determine metrics. These performance metrics could be developed as part of the aforementioned ITS Strategic Plan
  - Develop performance reporting methods to display successes/challenges with the Town's ITS infrastructure and processes
- TOC:
  - Improve remote accessibility to TOC systems and provide large monitors within existing workspaces of personnel that manage TOC systems to reduce the dependency on the TOC space
  - Provide more staff coverage at TOC during work hours
- Programming:
  - Educate staff and elected officials on the benefits of ITS to gain support and recognition for ITS
  - Submit eligible projects to the MAG ITS Committee for potential inclusion in the MAG Transportation Improvement Program (TIP)
  - Identify potential additional funding sources to support ITS capital, operations and maintenance
- Construction
  - Require new development to install conduit for future ITS use
- Operations
  - Evaluate red-light running technology including the all red extension feature for use in the Town

VIII. FUNDING SOURCES

There are a number of funding sources available to the Town and many are currently used.

- Regional Transportation Plan funds for arterial and transit improvements
- Bonds (general obligation, future)
- Traffic impact fee
- Town general fund
- Adjacent community joint projects
- Grants
- Other Town sources such as investment income or outside sources
- Developer contributions

These funding sources are described in more detail below.

A. Regional Transportation Plan (RTP)

The Maricopa Association of Governments (MAG) is the designated planning organization for the Phoenix metropolitan area. MAG prepared the Regional Transportation Plan (RTP) in 2003 and has updated it periodically. The major regional funding sources for the RTP include:

- Maricopa County Half-cent Sales Tax (Proposition 400)
- Arizona Department of Transportation (ADOT) Funds
- MAG Area Federal Transportation Funds

On November 2, 2004, the voters of Maricopa County passed Proposition 400, which authorized the continuation of the existing half-cent sales tax for transportation in the region. The revenues collected from the half-cent sales tax are deposited into the Regional Area Road Fund (RARF) for freeway/highway and arterial street projects and into the Public Transportation Fund (PTF) for public transit programs and projects. These monies must be applied to projects and programs consistent with the MAG RTP. A local match of 30 percent is required for RTP-funded projects unless the projects involve federal funds, in which the federal match requirements apply.

ADOT relies on funding from two primary sources: the Highway User Revenue Fund (HURF) and federal transportation funds. The HURF is comprised of funds from the gasoline and use fuel taxes, a portion of the vehicle license tax, registration fees and other miscellaneous sources.

In addition to the half-cent sales tax revenues and ADOT funding, federal transportation funding from the Federal Highway Administration and the Federal Transit Administration are available for use in implementing projects in the MAG RTP.

B. Bonds

Bonds are issued in several forms. State law requires voters to authorize general obligation and revenue bonds through an election. General Obligation (GO) Bonds must be approved by the voters and are backed by the full faith and credit of the Town of Queen Creek. The Town Council then must approve the selling, or issuing, of the authorized bonds. State law also permits other forms of bonds to be issued without voter approval such as Public Facility Municipal Property Corporation (PFMPC) and Water Resource Municipal Property Corporation (WRMPC) bonds, which must be used within defined geographic boundaries (e.g., facilities or improvement districts).

Bonds are secured by the property tax of Queen Creek and are limited in size based on the secondary assessed valuation as determined annually by the Maricopa County Assessor. There is a limit of 20% of secondary assessed valuation for projects involving water, sewer, lighting, parks, public safety, open space, recreational purpose and streets and safety projects. There is a limit of 6% of secondary assessed valuation for any other general municipal purpose projects. As of the 2011/2012 secondary assessment, the Town has an unused 20% debt capacity of approximately $172 million and an unused 6% debt capacity of just over $100 million.

For transportation-related projects, the FY15 to FY19 CIP includes $71 million in existing bonds that have been authorized but not sold. The decision to sell additional bonds or ask voters to authorize additional bonds will be contingent on both the ability to support additional bonds within the current tax rate and the ability to have sufficient operating resources to maintain and operate the facilities without compromising established Town service standards. Transportation-related projects in the CIP funded by bonds are primarily projects in the Streets classification group.

C. Transportation Development Fee (TDF)

TDFs, also known as development impact fees, are limited to financing new construction created by growth. SDFs can only provide for capital costs, so it is important to establish and incorporate all additional operating and maintenance expenses as part of the total ongoing cost of the project. The Town is in the process of updating the TDF.

D. General Fund

The Town's general fund is primarily comprised of the Town's portion of revenues from state income taxes, state/local sales taxes, and franchise fees as well as user fees generated by Town-owned facilities.

E. Adjacent Communities

Adjacent communities contribute funding for joint projects with the Town of Queen Creek along Queen Creek's boundaries. This sharing of funding is governed by intergovernmental agreements. An example project with joint funding is Riggs Road improvements.

F. Federal/State Grants

Grants are available for various types of projects through different federal and state sources and governmental agencies. Congestion Mitigation/Air Quality (CMAQ), Highway Safety Improvement Program (HSIP), Transportation Alternatives (TA), and Community Development Block Grant (CDBG) are examples of commonly used grant programs for transportation projects. If grants are listed as one of the funding sources, the project will likely not proceed until the grant is awarded. A grant-funded project may also require Town of Queen Creek matching funds.

G. Developer/Private Contributions

Developers contribute toward costs of capital projects when the construction is of direct benefit to their development. In some cases, funds are contributed toward a project from private sources as well. These sources are described as developer, if required; and private, if voluntary.

H. Summary of Current Funding Sources for Transportation-related Projects

1. Public Works

The Public Works department is responsible for the maintenance of facilities, fleet, streets, grounds, and provide solid waste services. The department also actively implements the Capital Improvement Program, the pavement maintenance plans, and maintains public parks and grounds. Solid Waste is a contracted program within the Public Works Department.

Table VIII-1 summarizes the funding sources identified in the FY16-17 Town budget for the public works department.

TABLE VIII-1: FY16-17 PUBLIC WORKS FUNDING SOURCES

Source	Total
General Fund	$3,551,282
Streets/HURF Fund	$5,499,592
Drainage & Transportation Fund	$295,855
Solid Waste	2,410,774
Total	$11,757,503

2. Capital Program

The capital budget process determines which major projects will be financed and constructed. Capital projects are those with high monetary value (typically more than $50,000) that add to the capital assets or infrastructure of the Town. These projects are long-term in nature (more than one year) and are generally financed on a long-term basis.

Funding for capital programs is appropriated annually. However, due to the fact that these projects are rarely completed within the fiscal year, carry-forward contingencies are budgeted to cover purchase orders that remain open at the end of the fiscal year and for projects that were not expended or encumbered by fiscal year end.

During the annual budget cycle, the Town of Queen Creek prepares a five-year infrastructure/capital improvements program (IIP/CIP) budget. The CIP shown in this budget document provides estimates for the fiscal years ranging from FY 2016/17 through FY 2020/21 and identifies fiscal year needs and financing sources. The FY 2016/17 CIP program is balanced including the use of revenues, fund balances, transfers and new debt issues; however, future years contain undetermined funding requirements that will be addressed prior to projects moving forward.

Table VIII-2 summarizes the funding sources in the FY16-17 Town budget for the capital program.

TABLE VIII-2: FIVE YEAR CAPITAL PROGRAM FUNDING SOURCES

	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	TOTAL
Development Fees	$7,706,864	$9,397,530	$11,372,874	$10,284,227	$9,390,896	$48,152,391
Capacity Fees	9,440,740	9,826,980	10,847,440	10,928,740	10,387,740	51,431,640
Construction Sales Tax	4,664,890	5,587,970	6,743,840	6,315,160	6,059,290	29,371,150
Third-Party Contributions	2,766,596	177,421	8,233,333	4,425,000	4,457,228	20,059,578
Bond Proceeds	45,000,000	-	-	-	-	45,000,000
Short Term Financing	14,000,000	-	-	-	-	14,000,000
Interest Income	110,000	110,000	110,000	110,000	110,000	550,000
CIL	2,939,991	-	-	-	-	2,939,991
Total Revenues	$86,629,081	$25,099,901	$37,307,487	$32,063,127	$30,405,154	$211,504,750

I. Other Potential Future Funding Sources

Other potential future funding sources that could provide additional revenue include:

- Restoration of HURF revenue allocation per State statute
- Increase in statewide gas tax rate or vehicle license tax
- Local sales tax dedicated to transportation
- Local property tax dedicated to transportation
- New or increased user fees
- On-street or off-street parking fees
- Public-private partnerships (P3)
- Future Voter Bond Authorization

J. Project Prioritization

It is likely that the cost of the Transportation Master Plan improvement needs will exceed the available funding for the foreseeable future. Opportunities to generate additional revenue from new funding sources should be pursued where feasible to reduce this funding imbalance.

Projects in the CIP should be prioritized to ensure the most efficient use of Town funds and to ensure that the most important projects can be implemented given the current and anticipated funding constraints. In order to provide a ranking that considers all modes equally, the criteria described below should be used to prioritize future transportation projects competing for funding to maximize the investment made in infrastructure and to consider all modes. The Town could develop a scoring system based on the relative importance of each criteria. The criteria include:

- ***Safety*** – a measure of the safety benefit associated with the project such as improving an identified crash pattern or generally improving safety based on similar projects
- ***Economic development*** – the project has a positive impact on the economy because it is located in a growth area or employment center and provides new development opportunities
- ***Intergovernmental agreements and regulatory compliance*** – the purpose of this criteria is to determine if joint projects with other agencies have intergovernmental agreements
- ***Funding*** – this criteria will examine if the project meets a known funding category
- ***Congestion reduction through added capacity or modes*** – the project reduces congestion, delay, or travel time with added capacity or alternate mode options
- ***Promotes travel choices/enhances the environment and sustainability*** – this criteria considers if the project will improve non-vehicular travel
- ***Compatible with and/or supported by existing plans*** – this criteria determines if the project is a recommendation in a Town or other approved plan
- ***Project complexity*** – this criteria considers the complexity of the project including engineering challenges and other stakeholders
- ***More efficient/effective use of previous investments and technology*** – this criteria considers if the project improves and/or enhances previous investments and the use of technology