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BICYCLE MASTER PLAN: 2018

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MESA'S VISION FOR BICYCLING

"Mesa is a world-class city for bicycling where bicycling is a viable transportation choice. Mesa encourages active participation in policy and planning efforts through all levels of the community. Mesa will build a more inclusive bicycling community through a well designed, finely woven web of facilities connecting parks and recreation, schools, activity centers, and employment centers, and by representing the needs of the diverse population of bicyclists in Mesa."

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The City of Mesa began its bicycle planning nearly 45 years ago when the first Mesa Bicycle Study was conducted, resulting in the first 14.5 miles of bike lanes in the City. Forty-four years and five bicycle plan documents later, the City of Mesa is one of the premier cities in the southwestern United States for bicycling. The 2018 Mesa Bicycle Master Plan is an update to the 2012 Plan and continues with and refines the goals, objectives, and strategic performance measures set and defined in the 2012 Plan, to make Mesa a world class community for bicycling. While this plan is visionary, it has constructed a framework that is practical and functional, which will create a bicycle network and supporting facilities, and programs necessary to make bicycling a viable choice for a wide variety of trips. This 2018 plan is designed to increase social interaction on streets, offer alternatives to driving, reduce pollution, and promote education and awareness, thereby advancing Mesa towards achieving Bicycle Friendly Community "Platinum" status.

As Mesa becomes ever more mindful of the need to be sustainable as a City and to provide a well-connected and intelligent transportation network, it is natural that bicycling is woven into the urban fabric to provide residents of Mesa the tools needed to function as a city of the 21st century. Bicycling is already a popular form of transportation in Mesa, and current economic factors are motivating more and more residents in Mesa to get out of their automobiles and reunite themselves with bicycling.

GOALS AND OBJECTIVES

The City of Mesa Bicycle Master Plan presents five goals that will be pursued over the life of the plan. These goals can be considered directives that must be taken to achieve the plan's intent.

GOAL ONE: To increase bicycle mode share for all trips to work and school in Mesa within the life of the plan.

GOAL TWO: To improve safety of bicyclists throughout Mesa, reducing the rate of bicycle related crashes by one-third by the year 2022.

GOAL THREE: To develop and implement the League of American Bicyclists five measurable E's of a Bicycle Friendly Community: Education, Enforcement, Engineering, Encouragement, and Evaluation.

GOAL FOUR: To achieve Gold and then Platinum level Bicycle Friendly Community Status by the year 2022.

GOAL FIVE: To establish capital and operating budgets for the Bicycle Program at a level to accomplish these goals by 2022.

Each goal is broken down into a series of objectives and strategic performance measures in Chapter Two in order to provide realistic steps toward each goal and methods to account for any achievement.

Progress towards each goal since the 2012 Plan has been assessed and recorded for this 2018 Plan Update.

EDUCATION, ENCOURAGEMENT, AND ENFORCEMENT

There is an emphasis on the City's intent to attain League of American Bicyclists, Bicycle Friendly Community "Platinum" status. Current safety education and encouragement programs include media campaigns, special events, public outreach, and education for children and adults. The City also provides resource materials such as Bike Maps and safety information brochures.

Continual implementation and enhancement of current programs and educational opportunities will increase awareness and enthusiasm for bicycling. Proposed programs include diversion programs for traffic infractions, education material for motorists, and more participation in the Safe Routes to School program.

MESA'S BICYCLE FACILITIES

Since the adoption of the 2012 Bicycle Master Plan and this 2018 Plan Update, an additional 450 miles of bicycle lanes have been added to the network by modifying existing lane widths and cross-sections to include bicycle lanes. Nationally, every year there are more innovations in bicycle infrastructure that help improve safety and efficiency across the country. Through implementation of design alternatives such as raised, colored and separated bike lanes; "sharrows;" pedestrian traffic signals; shared-use paths; wayfinding; and bicycle parking, the City of Mesa continues to be a regional and national leader for bicycle infrastructure. This 2018 Plan Update reflects the latest innovation in approaches and sets the intention of creating an "all ages and abilities" bicycle network.

MESA'S BICYCLE NETWORK NEEDS

The Mesa Bicycle Master Plan presents a strategy for progression to Bicycle Friendly Community "Platinum" status by recommending expansion of network on-street and off-street facilities during the life of the plan to encourage residents to bike more often for recreation, mobility, and transportation.

The methodology based on gaps in the existing network developed by city staff for the 2012 Bicycle Master Plan continues to be used and refined to determine facility needs in the City's bicycle network. Approximately 100 projects have been identified to create the ultimate no-gaps bicycle network.

Priority is given to areas that would significantly benefit from the addition of bicycleamenities connecting services with neighborhoods and employment. The improvement and connectivity of existing and fragmented facilities helps to serve a wide range of cycling residents.

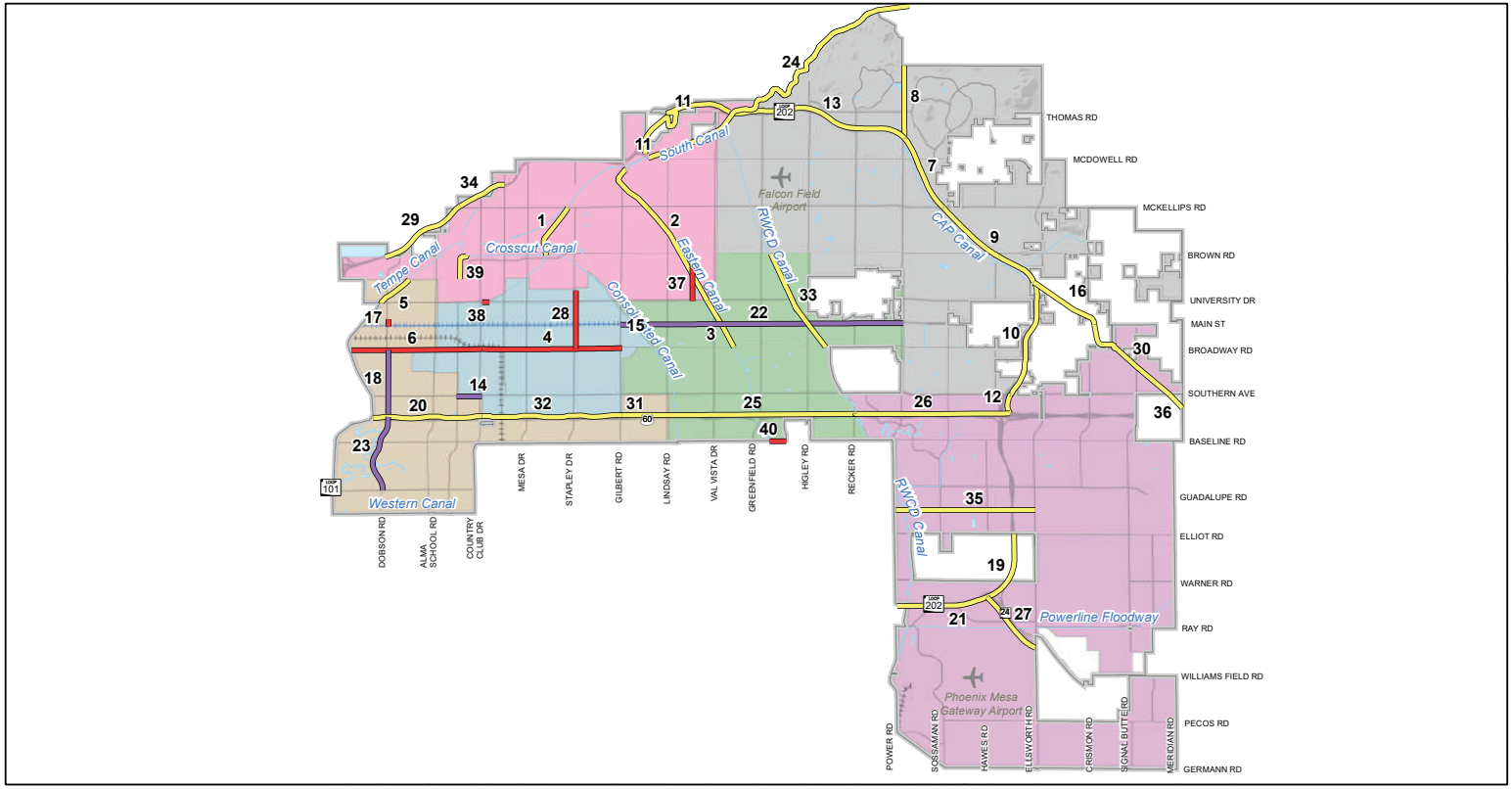
MESA'S BICYCLE PROGRAM NEEDS

In addition to the planned facilities, the plan proposes to expand programs as well. These include safety education for children, adults, bicyclists, and motorists; improving the existing Safe Routes to School Program within the Mesa Public Schools; reducing bicycle related citations through traffic diversion classes; establishing a viable media campaign to deliver bicycle related information to the public; and establishing a tourism campaign that will successfully promote Mesa as a bicycling destination and encourage travel to Mesa for bicycling.

Significant program expansion has been accomplished in the last five years. The City of Mesa will continue to align itself with the objectives and standards that have been set forth by the League of American Bicyclists Bicycle Friendly Communities Program with the goal of achieving "Platinum" status.

IMPLEMENTATION, EVALUATION, AND FUNDING

The network segments are scored with a set of "implementation criteria" developed for the 2012 Plan. These are "real world" subjective judgments by Transportation staff are used to balance the purely analytical results of the needs ranking. The combination score of the implementation criteria and the needs ranking results in a priority list for segment projects citywide. City staff reevaluates these projects and their ranking every two to three years to incorporate community input and staff analysis. The top 40 prioritized projects are listed and shown on Map 6-2. Additionally, the projects are presented for each Council District on Maps 6-3 through 6-8 included in Chapter Six. Finally, Map 6-9 shows the ultimate future bike network that takes into consideration all existing facilities and all future facilities proposed in this plan.



2018 Bicycle Master Plan

Map 6-2

Top 40 Projects
Labeled in Priority Order

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Project Facility Type

- Bike Lane
- Separated Bike Lane
- Shared-Use Path

District

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6

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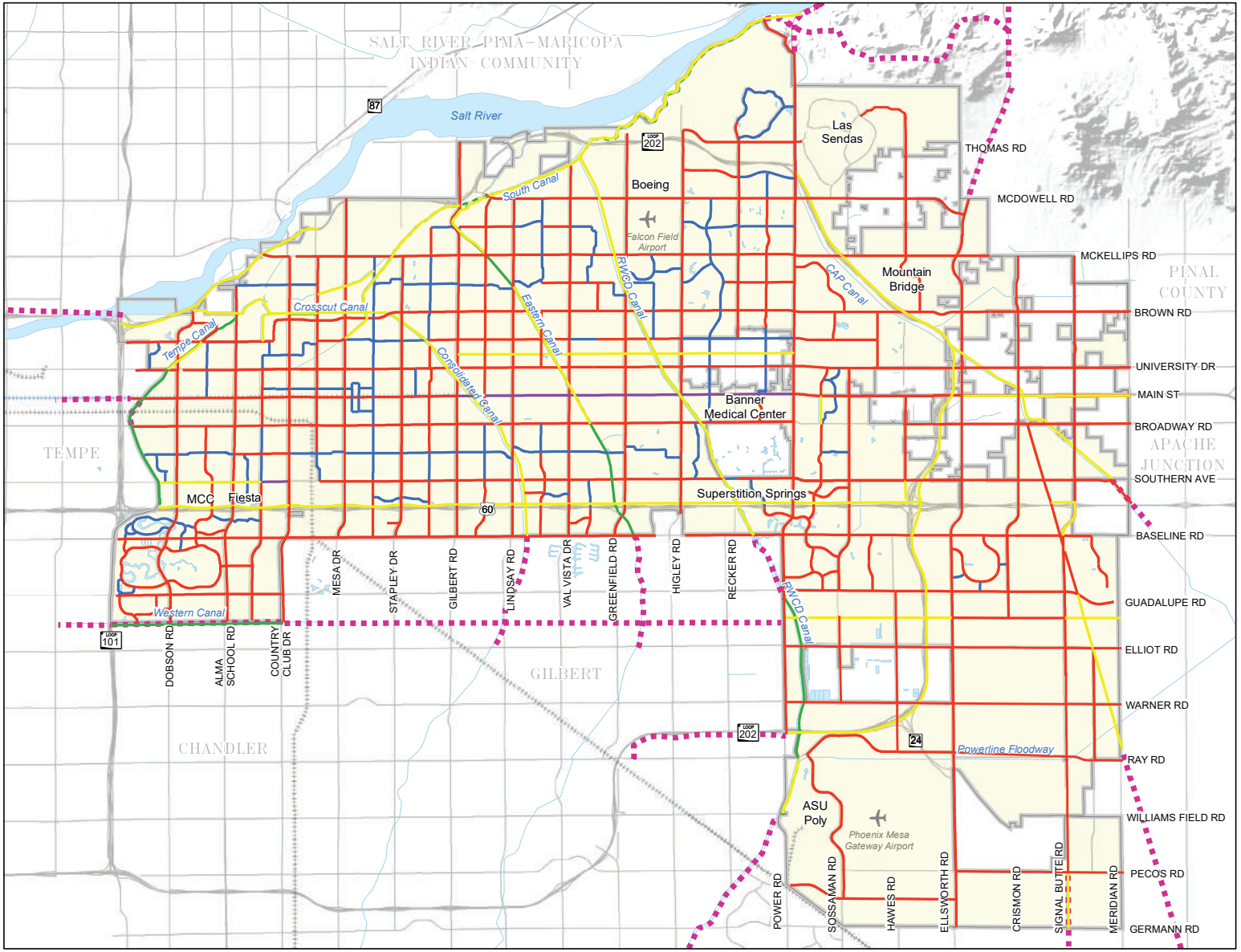
Priority	District	Project Location and Description	Facility Type
1	One	South Canal - McKellips to Consolidated Canal	Shared-Use Path
2	One	Eastern Canal Trail - Gilbert Road to University Drive	Shared-Use Path
3	Two	Eastern Canal - University Drive to Broadway Road	Shared-Use Path
4	Four	Broadway Road - Country Club Drive to Gilbert Road	Bike Lane
5	Three	Tempe Canal - University Drive to Rio Salado Parkway/8th Street	Shared-Use Path
6	Three	Broadway Road - Country Club to West City Limit	Bike Lane
7	Five	Loop 202 Red Mountain/CAP - Power Road to McKellips Road	Shared-Use Path
8	Five	Power Road - Park and Ride to North City Limit	Shared-Use Path
9	Five	Loop 202 Red Mountain Freeway - McKellips Road to University Drive	Shared-Use Path
10	Five	Loop 202 Red Mountain Freeway - University Drive to Southern Avenue	Shared-Use Path
11	One	Lehi Crossing - McDowell to Val Vista	Shared-Use Path
12	Six	Loop 202 Red Mountain Freeway R.O.W. - Southern Avenue through the US 60 Interchange	Shared-Use Path
13	Five	L202 Red Mountain Freeway ROW - Val Vista to Power	Shared-Use Path
14	Four	Southern Avenue - Country Club Drive to Extension Road	Separated Bike Lane
15	Four	Main Street - Gilbert Road to the Consolidated Canal	Separated Bike Lane
16	Five	CAP Canal - Loop 202 Red Mountain Freeway to Main Street	Shared-Use Path
17	Three	Dobson Road - Main Street to 1st Street	Bike Lane
18	Three	Dobson Road - Broadway Road to US 60	Separated Bike Lan
19	Six	Loop 202 San Tan Freeway - Ph2: Elliot to Hawes (Gateway Shared-Use Pathway Project)	Shared-Use Path
20	Three	US 60 R.O.W. - West City Limit to Country Club Drive	Shared-Use Path

Priority	District	Project Location and Description	Facility Type
21	Six	Loop 202 San Tan Freeway - Ph3: Hawes to Power (Gateway Shared-Use Pathway Project)	Shared-Use Path
22	Two	Main Street - Consolidated Canal to Power Road	Separated Bike Lane
23	Three	Dobson Road - US 60 to Guadalupe Road	Separated Bike Lane
24	Five	South Canal - Val Vista to Granite Reef Dam	Shared-Use Path
25	Two	US 60 R.O.W. - Lindsay Road to Recker Road	Shared-Use Path
26	Six	US 60 R.O.W. - Recker Road to the Loop 202 San Tan Freeway	Shared-Use Path
27	Six	SR 24 - Ph4: Hawes to Ellsworth (Gateway Shared-Use Pathway Project)	Shared-Use Path
28	Four	Stapley Drive - Broadway Road to Rio Salado Parkway/8th Street	Bike Lane
29	One	Salt River Basin Shared-Use Path - Dobson Road to McKellips Road	Shared-Use Path
30	Six	CAP Canal - Main Street to Southern Avenue	Shared-Use Path
31	Three	US 60 R.O.W. - Gilbert Road to Lindsay Road	Shared-Use Path
32	Four	US 60 R.O.W. - Country Club Drive to Gilbert Road	Shared-Use Path
33	Two	RWCD Canal SUP - Brown Road to Broadway Road	Shared-Use Path
34	One	Salt River Basin Shared-Use Path - McKellips Road to Center Street	Shared-Use Path
35	Six	Powerline Easement - Power Road to Ellsworth Road	Shared-Use Path
36	Six	CAP Canal - Southern Avenue to Meridian Road	Shared-Use Path
37	One	32nd Street - Brown Road to University Drive	Bike Lane
38	One	University Drive - Country Club Drive to Robson	Bike Lane
39	One	Eureka Canal Connection - Rio Salado Parkway to the West Mesa Connector	Shared-Use Path
40	Two	Baseline Road - Eastern Canal to Pierpont	Bike Lane



2018 Bicycle Master Plan

Map 6-9

Ultimate Bicycle Network

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Ultimate Bicycle Network

- Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path
- Cycle Track
- Regional Connection

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CHAPTER ONE

INTRODUCTION

INTRODUCTION

A vibrant bike culture is growing across Mesa, but its scope is still minuscule when compared to other peer cities in America and Europe. In Minneapolis, Minnesota; Portland, Oregon; and Boulder, Colorado; in Copenhagen, Denmark; and Amsterdam, Netherlands; and other cities abroad, cycling is the norm for both general transportation and commuting to work or school. In North America, cyclists are in the midst of a "cycling renaissance" and generally speaking, cycling is more popular in the western United States than in the east.

These facts are supported when analyzing the variables of income and transportation needs. Transportation networks in the eastern region of America often have much more robust public transportation systems than their peer cities in the west, which allow individuals and families to easily transverse their communities. In the west, people from low-income populations do not have access to as effective public transportation options and are more dependent on bicycling or walking to effectively traverse the city.

The reasoning behind this large paradigm shift between the east's and the west's viable transportation options is in large part due to the costs associated with operating public transportation in regions that have experienced such dramatic suburban sprawl and blighting of traditional densely populated urban cores. These differences between the two regions is greatly shaped by the usage of other forms of multi-modal transportation besides public transportation. While Americans take pride in their new growing bike culture, North American cities can still observe a lot and identify best practices from research and analysis of European communities who have celebrated bicycle travel for decades.

Bicycling culture and the built environment are closely related. The built environment supports cycling by reducing barriers such as inconvenient routes and perceived threats to safety. However, without strong ridership it can be difficult for municipalities to justify bike-friendly expenditures. Which comes first, the bicycle facilities or the bicyclists? Likely, it's both—and the situation may be different for different communities.

Mesa's urban environment is always evolving. There is a shift toward purposeful site design that integrates multiple goals into city landscapes. The public spaces being constructed communicate a direct reflection of the lifestyles we support. New developments do not necessarily require major adjustments, but rather, should reinforce seamless integration.

As Mesa's bike enthusiasm increases, so does the range of available products and best practices with regards to infrastructure. By Mesa continuing to add more bicycle infrastructure such as separated bicycle lanes, shared use paths, and public bike parking; Mesa will continue to build the overall local cycling culture into that of a world class bicycling city.

ACHIEVEMENTS SINCE 2012 BIKE MASTER PLAN

The City of Mesa Bicycle Master 2018 Plan is an update to the 2012 Plan and it reflects today's best practices in municipal planning for bicycling at a national and international level. An update of the 2012 Bicycle Master Plan, this 2018 Plan reflects the latest innovation in approaches and sets a goal of creating an "all ages and abilities" bicycle network. The "8 and 80" framework is a reliable test for all ages and abilities. An 8- year-old or an 80-year-old should be able to navigate by bicycle comfortably and safely. The 2012 Plan set the stage for a significant expansion of the bicycle network, primarily through painted bicycle lanes, resulting in a substantial increase in bicycling throughout Mesa.

- Mesa's bicycle network grew from 128 miles to 578 miles since 2012, a 450% expansion in only six years.
- Existing bicycle lanes were and continue to be routinely made safer and more comfortable by widening or buffering lanes and by addressing parking concerns in the bicycle lane. Many more

projects are in design or under construction. Restriping projects are often coordinated with street resurfacing in order to create work efficiencies.

- The expanded bicycle network resulted in a citywide bicycle mode share of 1.2% in 2015, nearly doubling rates from 2009. (Mode share indicates people who primarily commute to work by bicycle, at least three days per week.)
- Within the 32 square miles of central Mesa, the mode share reported was 5.5% and as high as 13% in certain census tracts in 2012. This 5 to 13% mode share is already taking a significant load off the congested motor vehicle travel lanes in Central Mesa.
- The City of Mesa completed dozens of new signature projects and removed barriers to cycling. Some of these projects are highlighted in the following paragraphs.

Major Network Improvements Since 2012

Stadium Connector

This 2.5 mile shared-use path is located between Dobson Road and Center Street. This path is a 10-foot wide asphalt connector to the Consolidated Canal Shared Use Pathway from the east at Center Street, and to the Rio Salado Pathway on the west at Dobson Road. The path includes LED lighting and other amenities spread throughout the length of the path. This path makes use of physically separated bike lanes ***(the first protected two-way cycle track in the state of Arizona)*** along Country Club Drive, Date Street, and Alma School Road.

Porter Parkway

This one mile shared-use path is located between Mesa Drive and 8th Street adjacent to Kino Junior High School. This path is a 12-foot wide asphalt connector to the Consolidated Canal Shared Use Pathway to the north with LED lighting and frequently positioned rest areas spread throughout the length of the path. A pedestrian traffic signal and refuge island are located at Brown Road to control crossings. The path provides access to Eisenhower Elementary School at Mesa Drive and Kino Junior High School just south of Brown Road. The path is also incorporated into Porter Park.

Rio Salado Pathway

This 1.5-mile-long shared-use path is located along the south edge of the Rio Salado river from the L101/ L202 Red Mountain Freeway interchange on the west to Dobson Road on the east. Near the center of this stretch there is a tunnel to the south, under the L202 freeway, that provides access to the City's Riverview Park and Chicago Cubs training facilities. The path is 10 feet wide with lighting, rest nodes, and edge protection along the river bank. At Dobson Road, the path crosses under the L202 interchange to the eastbound on-ramp for the freeway where it connects to the City's Stadium Connector shared-use path project.

SHIFT IN BIKE CULTURE

The City's Transportation Department Bicycle and Pedestrian Program established strategic performance measures as part of the 2012 Bicycle Master Plan's Goals and Objectives to ensure that the plan's vision remained on course throughout the life of the plan's horizon. These established strategic performance measures and benchmarks fall under five major categories. These categories will be used to gather and evaluate information for future decisions regarding expansion and funding of the bicycle and pedestrian program. These five major categories are:

- Measuring Mode Share
- Network Evaluation and Asset Management
- Assessing Feedback and Reporting Achievements
- Crash Severity Reduction and Safety
- Funding Acquisition

These five categories are evaluated each year and an annual report is produced, which, per the adopted bicycle plan, will be presented to the Transportation Advisory Board (TAB). The report will then be provided electronically for public consumption on the City of Mesa Transportation webpage. As outlined in the 2012 Mesa Bicycle Master Plan, the annual report should contain the following information to be presented to the TAB:

- Infrastructure project updates
- Street Maintenance improvements affecting the bicycle and pedestrian program
- Program updates
- Bike Month events
- Special events supported
- Adult education efforts
- Child education efforts
- Bicycle count efforts
- Customer satisfaction survey results (if conducted)
- Trip reduction and mode share reports (if conducted)

Existing and future bicycle facilities provide valuable connections throughout the neighborhoods and villages where people live and provide a service in supporting residents' daily needs of going to the local grocery store, coffee shop, friend's homes, and school or day care. If a busy road or network gap obstructs a resident from getting to their local village destination, other mobility choices such as driving a car will be more attractive.

SHIFTS IN BEST PRACTICES

Many U.S. cities are now incorporating separated bike lanes (SBL) into their overall bicycle infrastructure network inventory, including the City of Mesa. In the summer of 2017, Mesa added SBL's to its inventory of bicycle transportation facilities with the opening of the Stadium Connector shared use pathway. The two-way cycle track, separated physically by vertical curb and drainage bio-swales protects the cyclists from motor vehicles, enabling users to ride on an arterial street without the level of stress that is typically experienced when not separated by a vertical barrier from fast, heavy, and lethal cars. Mesa's new separated bike lanes are the first to be constructed in Arizona and currently exist on portions of Country Club Drive, Alma School Road, and Brown Road/Date Road in northwest Mesa. As we increase mode share in Mesa and in the Valley of the Sun it is important that Mesa remains steadfast in its ability to provide safe and equitable facilities for all.

Health Impact Studies

Through collaboration with the Maricopa County Public Health Department, trends were identified to compare the effects of bicycling with health. Asthma, heart disease, and diabetes were compared to both recreational and commuting bicycling. The Maricopa County Public Health Department prepared a Health Impact Indicator report which can be found Appendix A of this Plan.

CREATING AN ALL AGES AND ABILITIES NETWORK

Mesa is forging forward with design standards that will change the purpose of streets as public spaces for congregating, socializing, and interacting. By Mesa ensuring that all ages and abilities are the total focus when designing and building multimodal facilities, Mesa can begin to visualize and enjoy roadways that are truly safe and inviting public spaces where the community can come together and interact with one another in a manner that is currently uncomfortable and intimidating. To achieve growth in Mesa's bicycling community, infrastructure must incorporate three vital elements to be successful:

- Equity
- Comfort
- Safety

Bikeway design will need to meet the needs of a very broad spectrum of people in order to capture all ages and abilities whom might utilize bicycling facilities. This means that when planning for multimodal facilities it should be taken into consideration that our intent is to provide services to all users including but not limited to:

- Children
- Senior citizens
- Women
- People with developmental disabilities
- People of different races
- People of low income
- Confident cyclists
- People moving goods and cargo

The previously designed bicycle network in Mesa has the motorists in mind instead of the cyclist and did not take into account a large segment of potential cyclists that might have otherwise ridden if they had felt safe. As bicycling gains traction, the City of Mesa is at the cutting edge of innovative infrastructure. Facilities should be designed keeping in mind the comfort levels of the 'No Way, No How' and 'Interested but Concerned' cyclists that may have otherwise been intimidated by previous facilities, therefore creating an equitable and accessible network.

Capturing Short Trips

Shifting short motor vehicle trips to bicycle trips is aimed at increasing bicycling. Most trips Americans take are short, usually less than 3 miles. Short trips are the most likely motor vehicle trips to convert to bicycle or walking trips. Implementation of separated bicycle lanes should be focused where short trips most frequently occur to maximize return on investment. As a result, the 2018 plan focuses on routes with high concentrations of existing short trips, most notably

> "A connected bicycle network provides a safe and comfortable transportation experience, ensuring people of all ages and abilities to get where they need to go."

within the central Mesa area but also to neighborhood destinations throughout the city such as schools, parks, businesses, and shopping districts. To serve mid-length trips in the 3 to 9-mile range that are still good candidates for bicycle trips, the plan focuses on key routes to central Mesa from outlying areas. To serve longer trips, the 2018 plan focuses on linking short bicycle trips with longer transit trips by providing separated bicycle lanes to major transit stations and secure bicycle parking at stations. Bike share systems, such as an expanded Mesa's GR:D bike share program, are a powerful and flexible tool to connect transit users to their destinations solving the "last mile" problem (the last mile problem refers to the difficulty in getting people between their homes and transit to their destination).

BICYCLING IN MESA

As Mesa approaches the third decade of the 21st century, we realize that there is an increasing need to make available a vibrant connected bicycle network that will provide an efficient, safe, and reasonable means of transportation for our residents' daily trips.

Bicycling in Mesa has already become a very popular way of getting from one place to another. During these times of high gas prices, high cost of vehicle ownership, a warming climate, increasing traffic volume, and expanding waistlines, large numbers of bicyclists are utilizing the City's bicycle lanes, paths, and routes to travel to their homes, schools, work, transit lines, friends, or shopping.

On weekends, the City's bicycle network is teeming with cyclists including clubs, racers, and enthusiasts wishing to get out and enjoy the wonders of the Arizona landscape. Mesa is recognized and respected as a Bicycle Friendly Community and destination as evidenced by Mesa's current Silver level status for excellence in engineering awarded by the League of American Bicyclists. Mesa was recognized in 2010 by Forbes Magazine as the tenth best city in the nation for bicycle commuting according to the 2010 Alliance for Biking & Walking Benchmarking Report. Other cities across the nation have soared to the top of these kinds of lists, pushing Mesa's ranking to the 19th best city in the nation for bicycle commuting according to the 2016 Alliance for Biking & Walking Benchmarking Report, due to their aggressive implementation of separated bicycle lanes, growth of sustainable and inclusive transit, and new bike share systems.

As Mesa set this plan update in motion for the fifth edition of the Bicycle Plan, staff is maintaining a comprehensive framework to ensure bicycling continues to be an integral part of the City's multi-modal transportation system by focusing on the two main goals initially set in the 2012 Bicycle Plan:

1. INCREASE THE USE

Increase the use of bicycling for all trips by establishing a bicycle network that adequately responds to the transportation needs and desires of all Mesa residents.

2. INCREASE CYCLIST SAFETY

Increase cyclist safety through the development and maintenance of a bicycle network that improves compatibility among bicycles and other transportation modes.

The League of American Bicyclists began as the League of American Wheelmen (LAW) in 1880, and was responsible for defending the rights of cyclists. The League of American Wheelmen is credited with getting paved roads in this country before the reign of the automobile.

By 1898, the League of American Wheelmen had more than 102,000 members including the Wright Brothers, Diamond Jim Brady, and John D Rockefeller! In 1994, the League was renamed the League of American Bicyclists and began to focus its programs on education in addition to advocacy.

The League's Bicycle Friendly Community program recognizes communities nationwide that support the five E's of bicycling -- education, enforcement, engineering, evaluation, and encouragement.

These two main goals are being developed through:

- Analyzing existing bicycle facility conditions and developing the network of bikeways.
- Promoting and facilitating bicycling as a safe, convenient, and comfortable form of transportation and recreation throughout the City.
- Making bicycling safer and more convenient for bicyclists of all ages and skill levels.

Mesa began identifying the need for bicycle facilities with the adoption of the first Mesa Bicycle Study in 1974. Since that time, Mesa has continued to provide bicyclists with an improved environment though the addition of on-street and off-street bicycle facilities.

This section will identify some of the benefits of bicycling including:

- The role of bicycling in alleviating congestion on the overall transportation network of the City
- Enhanced health
- Economic benefits of riding a bicycle

Additionally, it is important to understand bicycle trip characteristics associated with a person's level of experience riding a bicycle, and how bicycle trips are characterized and analyzed.

THE BENEFITS OF BICYCLING

Bicycling as an alternative form of transportation to the high-cost automobile is more appealing than ever. There are a variety of benefits associated with bicycling on a regular basis. Bicycling can:

- Provide needed relief to a congested transportation network.
- Provide considerable environmental and health benefits.
- Provide economic benefits and financial relief from expenditures related to operating and maintaining a vehicle.
- Create benefits to the quality of life and happiness of people, which directly benefit the social health of a city.

Bicycling is an activity that can be enjoyed by all ages, and represents a viable means of transport.

MOTOR VEHICLE TRIP REDUCTION

Some city streets experience daily volumes above the designed road capacity. This often results in a lower level of service, lost time, increased pollution, and driver frustration, according to the League of American Bicyclists. Many vehicle trips residents take on a daily basis are short and could be taken by bicycle in 10 minutes or less. Traffic volumes throughout the City's arterial corridors can average anywhere from 20,000 to 50,000 vehicles per day. Shifting some of these trips to bicycle can help to reduce traffic volumes. Alternative modes of travel such as bicycling are encouraged throughout the City by providing enhanced bicycle facilities and a well-connected bicycle network.

Collectively, as an alternative to the automobile, increased bicycling throughout the City can also reduce on-street parking demand in concentrated areas. Often, a bike trip can be more convenient than a vehicle trip in an urbanized area since a bicycle is easier to maneuver, and parking is often less problematic for a bicycle. Also, bicyclists can easily transfer to bus and rail to continue a trip or travel a farther distance to their destination.

ENVIRONMENTAL BENEFITS

Bicycling, instead of driving a car, can significantly help to improve the environment by reducing the amount of pollutants in our air and water. Every day millions of barrels of oil are burned in the form of gasoline. According to the Environmental Protection Agency , In 2016, greenhouse gas emissions from transportation accounted for about 28.5 percent of total U.S. greenhouse gas emissions, making it the largest contributor of U.S. greenhouse gas emissions. In terms of the overall trend, from 1990 to 2016, total transportation emissions increased due, in large part, to increased demand for travel. In the U.S., the number of vehicle miles traveled (VMT) by light-duty motor vehicles (passenger cars and light-duty trucks) increased by approximately 45 percent from 1990 to 2016, as a result of a confluence of factors including population growth, economic growth, urban sprawl, and periods of low fuel prices.[1]

Sixty percent of the pollution created by automobile emissions happens in the first few minutes of operation, before pollution control devices can work effectively. Since "cold starts" create high levels of emissions, shorter car trips are more polluting on a per-mile basis than longer trips (League of American Bicyclists).

According to the World Watch Institute, a short four-mile trip by bicycle can keep approximately four pounds of pollutants out of the air that we breathe. Not surprisingly, many of the United States' major metropolitan areas do not meet the air quality standards specified in the 1990 Clean Air Act Amendments. By encouraging our citizens to switch motor vehicle trips over to bicycle trips we can reduce energy needs and pollution emissions from the transportation sector.

PHYSICAL HEALTH

No matter what your experience is with bicycling or how much bicycling you have done in the past, riding a bicycle can be a great way to exercise and become more fit. Riding a bicycle on a regular basis may result in increased strength, stamina, conditioning, and associated long-term weight loss. When considering the growing rate of obesity in the United States associated with poor diet and a sedentary lifestyle, the choice of cycling on a regular basis is not only good for one's overall health, but it also lowers the risk of heart-related diseases and other health problems. It is also very helpful in reducing overall stress levels.

Since bicycling promotes a healthier lifestyle, there are subsequent economic benefits associated with increased levels of physical activity. Collectively, increased levels of exercise and proper nutrition may help to reduce obesity and an array of diseases. These reductions may ultimately have an impact on lowering long-term health costs and relieving the burden on the nation's healthcare system. Obesity, high blood pressure, and heart-related diseases are responsible for a significant amount of annual medical expenditures within the United States.

QUALITY OF LIFE FACTORS

Comfortable, well-connected bicycle facilities offer alternatives to driving in a motor vehicle and make bicycling for exercise or recreation easier. This increases the opportunity for social contact with other individuals. By providing suitable bicycle facilities and amenities that are well connected and offer coordinated routes, communities enable the interaction between neighbors and members of the public that can strengthen relationships and contribute to a greater sense of place and identity. The number of people bicycling can be an indication of a community's livability factor, which has a profound effect on attracting businesses, workers, and tourism.

ECONOMICS

Economic rewards to the individual bicyclist can be realized through reduced health care costs and reduced auto ownership, insurance, maintenance, and operating costs. Economically, bicycling provides a cost-efficient means of travel, dramatically offsetting the costs associated with dependence on a vehicle. Opting to ride a bicycle to work or school can save on gas, vehicle maintenance, and parking costs.

The majority of Americans drive a motor vehicle to and from work. According to the U.S. Census Bureau 2012-2016 American Community Survey (ACS), approximately 86 percent of all Americans age 16 or over drove a motor vehicle to their place of employment, whereas 0.6 percent rode a bike. In Mesa, according to the U.S. Census Bureau 2012-2016 ACS, approximately 0.9 percent of all individuals who commuted to work traveled by means of a bicycle. Therefore, an increase in bicycle ridership could help to reduce costs to those individuals who drive motor vehicles to work.

Some people may not live within a comfortable distance to ride a bicycle to work. However, for those who do, they can take advantage of the benefits associated with bicycling.

According to a number of bicycle clubs such as Greater Arizona Bicycling Association (GABA), Coalition of Arizona Bicyclists, and articles about the cost of bicycle ownership, the typical costs associated with maintaining and operating an average bicycle on an annual basis ranges from $150 to $550 dollars including maintenance, tires, and theft. In contrast, the American Automobile Association in a 2017 study entitled, "Your Driving Costs," the annual cost of maintaining a vehicle is much higher. The national average for vehicle ownership depends on the type of vehicle, and the total miles that are placed on the vehicle each year as shown in Table 1-1.

The American Automobile Association averages are based on a number of considerations, including:

- Fuel and oil
- Maintenance, repair and tires
- Insurance
- License, registration, and taxes
- Depreciation
- Finance charges

When considering the differences between the two modes of travel, it is certain that any use of a bicycle to offset overall vehicle mileage is extremely cost effective and will save money.

Table 1-1			
2017 NATIONAL AVERAGE FOR VEHICLE OWNERSHIP (Total Ownership Operating Costs)			
Type of Vehicle	**Miles Per Year Total Costs (Cents Per Mile)**		
	10,000	15,000	20,000
Small Sedan	$5,508 (55¢)	$6,354 (42¢)	$7,429 (37¢)
Medium Sedan	$7,163 (72¢)	$8,171 (54¢)	$9,424 (47¢)
Large Sedan	$8,222 (82¢)	$9,399 (63¢)	$10,879 (54¢)
Small SUV (FWD)	$6,573 (66¢)	$7,606 (51¢)	$8,923 (45¢)
Medium SUV (4WD)	$8,208 (82¢)	$9,451 (63¢)	$11,041 (55¢)
Minivan	$8,023 (80¢)	$9,146 (61¢)	$10,543 (53¢)
1/2 -Ton, Crew-Cab Pickup (4WD)	$8,664 (87¢)	$10,054 (67¢)	$11,835 (59¢)
Hybrid Vehicle	$6,888 (68¢)	$7,687 (51¢)	$8,742 (44¢)
Electric Vehicle	$7,736 (77¢)	$8,439 (56¢)	$9,423 (47¢)
2017 ESTIMATED AVERAGE FOR BICYCLE OWNERSHIP (Total Ownership Operating Costs)			
Type of Vehicle	**Miles Per Year Total Costs (Cents Per Mile)**		
	2,500	5,000	10,000
Bike Share Subscription	$240 (9.6¢)	$240 (9.6¢)	-
Bicycle	$350 (14¢)	$550 (11¢)	-
Electric Bicycle	$800* (32¢)	$1100* (22¢)	-

*Does not include Maintenance and Repairs

Source: American Automobile Association, 2017, Your Driving Costs

BICYCLE TRIP AND RIDER CHARACTERISTICS

When assessing the types of bicyclists in the community and the nature of the trips that they are taking, there are a number of categories to consider. The League of American Bicyclists distinguishes rider abilities by dividing all bicycle riders into four different levels that can be categorized by experience, the types of trips that occur on a regular basis, the length of those trips, and the route taken.

The information in this section, taken directly from the League of American Bicyclists, will provide a brief overview of concepts related to:

- Overall rider experience levels
- Types of bicycle trips
- Trip length
- Trip purpose

The Bicycle Master Plan will take into account and include facilities for users at all experience and comfort levels.

Level of Experience/Types of Riders

Experienced riders are typically those who have ridden a bicycle for several years in various conditions. The experience level, or comfort level, can generally be broken down into four different groups: 1) No Way, No How; 2) Interested but Concerned; 3) Confident & Enthused; and 4) Strong & Fearless. These cyclist types are characterized by the needs and concerns that they share about their bicycling environment.

No Way, No How

People who fall in the "No Way, No How" classification are often those who have either had a bad experience as a bicyclist, or motor vehicle driver; or those with physical limitations or fears that prevent them from riding a traditional bicycle. Usually, under no circumstance will these cyclists ride on the street in or near traffic. They are prone to be nervous and unpredictable in or around traffic.

Interested But Concerned

"Interested but Concerned" bicyclists are often riders who have simply yet to obtain the proper safety and bicycle handling skills needed to feel safe and proficient in traffic. Familiarity with proper handling skills, in addition to an understanding of bicycle safety issues and how to interact with traffic, often increase the inexperienced bicyclist's knowledge, equipping them with a better grasp of operating a bicycle in traffic.

Confident & Enthused

"Confident & Enthused" bicyclists feel comfortable in traffic and have the needed skills to effectively maneuver their bicycles in a variety of different traffic conditions. These cyclists have the confidence and skills to travel and operate their bicycles as motor

vehicles on arterials; however, if given the opportunity, will choose an alternative path of travel such as a shared-use path or secondary street instead.

Strong & Fearless

The "Strong & Fearless" riders will ride anywhere in any condition and are as comfortable on their bicycles as they are in their cars. Their overall skill levels, confidence in operating a bicycle, understanding of bicycle safety, ability to ride in a variety of road and bicycle facility conditions, and ability to maneuver a bicycle within a range of traffic conditions ultimately gives them the confidence and knowledge to ride on roadways that offer no bicycle lane or shoulder with the same ease as a roadway with full bicycle facilities.

Bicycle Trip Characteristics

Although bicycle trips and trip distances vary considerably, all trips are generally identified as being either recreational, utilitarian, or commuter oriented. One intent of this plan is to provide equal opportunity to bicyclists for all trip types.

Recreational Trips

Recreational trips are taken for general leisure purposes, sightseeing, personal training, exercise, or trips of a similar nature to city parks and recreational facilities. With this type of trip, most bicyclists travel along arterials, collectors, local roadways, bicycle lanes, shared-use canal paths, off-road mountain biking trails, or other linkages connecting several recreational uses. Although not always the case, the majority of recreational trips have a tendency to occur over the weekend and during the early morning hours, when cyclists are out exercising or training over the road.

Utilitarian Trips

Utilitarian trips are those that involve the use of a bicycle for personal trips, such as shopping, attending to personal business, or social visits. Such trips regularly occur on the City's arterial, collector and local streets, and are often shorter than recreational or commuter bicycle trips. Utilitarian trips are rather popular in local areas where traveling longer distances is not necessarily required.

Commuter Trips

Commuter trips on bicycles typically involve cyclists who travel to a place of employment or school. The nature of a commuter bicycle trip to and from work is often considered "utilitarian" in scope. However, it is often placed into a separate category for bicycle planning purposes. Commuting trips frequently occur during morning (a.m.) and late-afternoon to early-evening (p.m.) periods of peak traffic and involve longer distances than utilitarian trips. During the week, commuting cyclists generally represent a good number of individuals riding bicycles, whereas, recreational and utilitarian bicycle trips are typically more frequent during the weekends.

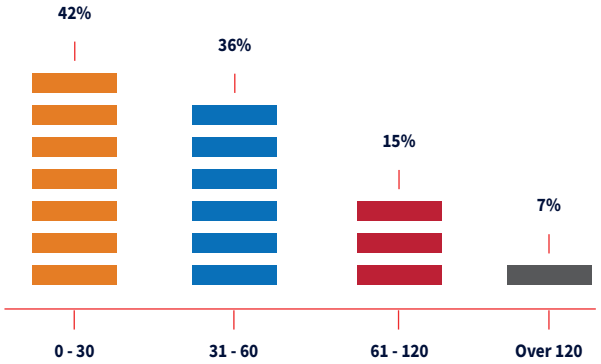
Standard Bicycle Trip Lengths and Purpose

According to a 2013 American Association of State Highway and Transportation Officials Study on Commuting in America, the average length of a bicycle trip in the United States was approximately 3.8 miles. The 2012 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors, Highlights Report released information on the average trip lengths:

- 42% of all bicycle trips were 0-30 minutes long
- 36% of all trips ranged from 31-60 minutes long
- 15% of all trips ranged from 61-120 minutes long
- 7% of all trips were over 121 minutes long

Bicyclists reported a variety of responses regarding their purpose for taking a trip as indicated in the chart below.

AVERAGE TRIP LENGTH (MINUTES)



At a national level, the primary facilities used for bicycling trips were as follows:

- 48.1% Paved roads
- 13.6% Sidewalks
- 13.1 % Bicycle paths, walking paths, and trails
- 12.8% Shoulders of paved roads
- 5.2% Bicycle lanes on roads
- 5.2% Unpaved roads
- 2.1% Other

BICYCLE USE IN MESA

Annually, the City of Mesa conducts an online Bicycle and Pedestrian Program Customer Satisfaction Survey to gather information about the public perception of the bicycle, socioeconomic information, and general demographics of bicyclists.

During the most recent survey conducted in 2017, 498 respondents answered a series of questions that were focused upon general cycling preferences and facility needs throughout the City of Mesa.

While it is understood that the Mesa Online Bicycle Survey attempted to reach a wide and diverse cross-section of the public through several avenues, only a small sampling of the overall public responded to the survey. However, the resulting survey data was helpful in providing a better understanding of bicyclists who are on the City's transportation network and their concerns. It is also acknowledged that the survey data has not captured the responses of the younger children and elementary, middle, and high school students, who typically ride on local, non-arterial streets, canal paths, and areas associated with recreational uses and schools.

The completed survey results have offered an initial public discourse on bicycle facility usage, the need for future bicycle facilities, and a general overview of traffic and safety concerns expressed by citizens of Mesa who regularly ride bicycles throughout the community. Some general observations from the survey are listed below:

- The majority of respondents (37.2%) were between the ages of 46 and 60 years old.
- The majority of respondents (56.0%) were male.
- The majority of respondents (87.7%) use an automobile as their primary mode of transportation.
- The majority of respondents (77.0%) claim to often ride a bicycle in Mesa, with the majority of those rides (78.17%) being for recreation.
- Of all respondents, 45.0% consider themselves an experienced traffic rider; 43.8% consider themselves intermediate bicyclists, and 7.5% consider themselves to be beginners. The remaining 3.8% don't ride.
- The majority of respondents (66.0%) say they wear a helmet when they ride.
- The majority of respondents (78.4%) say they do not use the Mesa Bike Map to plan their rides.
- When asked about the type of facilities respondents prefer to ride on, 80.9% prefer to ride off street, 95.9% prefer that when they ride on streets, the bike lanes are separated from traffic. 77.2% plan their route based on the availability of off-street and bike lane facilities, with 74.4% willing to take a longer route if it means using off-street facilities.
- The design feature with the highest demand is bike lanes buffered/separated from automobile traffic 56.3% of respondents identifying this as 'very important'.
- The primary reason respondents (94.4%) commute by walking or bicycling because it is healthy and good exercise.
- The primary reason respondents (47.8%) don't commute by walking or bicycling because they live too far from their workplace.
- The majority of respondents report that the number one problem they experience commuting by bike is vehicles not sharing the roadway.

Mesa Compared to Other Cities

Table 1-2 provides an analysis of bicycle commuting to work for selected American cities with populations between 350,000 and 550,000. These cities were chosen because of their similar population to the City of Mesa, and collectively serve as a reasonable comparison of how bicycle commuting in Mesa compares with other regions of the country. Data was collected from the Alliance for Biking & Walking 2016 Benchmarking Report.

The total number of people who commute to their place of work by bicycle is relatively low. Only 1.2% of the working population in the top 50 populated cities in the United States uses a bicycle as a means of getting to work. When comparing Mesa with the selected list of cities, Mesa has a greater share of cyclists commuting to work than Miami, St. Louis, Atlanta, Cleveland, and Kansas City. In Arizona, only Tucson has a higher percentage of bicycle commuters than Mesa.

These figures suggest that Mesa is a city that has a visible bicycling population. Additionally, recent surveys suggest that the percentage of commuters biking to work is closer to 5%. The City of Mesa should continue to take the necessary steps to enhance existing bicycle facilities and to plan for future facilities that will become necessary over time. When considering the increased demand for cyclists wanting to ride to work as indicated through survey responses, in addition to the City's intent to improve upon the existing bicycle network, the City of Mesa will continue to work toward creating an overall environment that promotes higher percentages of bicycle commuters over time.

Table 1-2		
BICYCLE COMMUTING (Comparison Between Mesa and Peer Cities)		
City	2013 U.S. Census Population Estimate*	% of Labor Force Commuting To Work by Bike
Portland, Oregon	603,047	6.1%
Minneapolis, Minnesota	393,661	3.9%
Oakland, California	401,278	3.0%
Tucson, Arizona	524,904	2.9%
Sacramento, California	475,536	2.3%
Mesa, Arizona	451,306	1.0%
Miami, Florida	414,144	0.9%
Atlanta, Georgia	441,064	0.9%
St. Louis, Missouri	318,892	0.7%
Cleveland, Ohio	391,317	0.5%
Kansas City, Missouri	464,448	0.4%
National Average		1.2%
Source: U.S. Census 2010, American Community Survey (ACS) 2013		

PAST BICYCLE PLANNING EFFORTS

This section will provide an overview of past planning efforts at the local and regional levels and consider the plans of governmental entities that surround the City of Mesa. An overview of efforts by surrounding communities and county jurisdictions will be provided and assessed in an effort to incorporate regional connectivity into this plan. Regional bicycle lanes and routes will also be considered when developing and implementing Mesa's long-range bicycle planning process.

Over the past several decades Mesa has developed a commitment to all modes of travel. During the 1970's when many communities were without basic pedestrian facilities, Mesa began to study and understand that modes of transport other than the automobile were needed in order to have a well-balanced transportation network. Planning efforts began in 1974 with the first of many studies and plans that would pave the way for the bicycle friendly community that the citizens of Mesa enjoy today.

1974 Mesa Bicycle Study

The Mesa Bicycle Study was prepared approximately 44 years ago by a municipal Bicycle Committee, representing one of Mesa's earliest attempts at addressing comprehensive bicycle planning. The 1974 study encouraged the inclusion of bicycle lanes and bicycle paths along existing streets and within future developments and addressed the issue of bicycle routes.

After the 1974 bicycle study was completed, a total of 14.5 miles of bicycle routes were developed within the City of Mesa. The routes were primarily situated along Horne, Longmore, 8th Avenue/Pueblo, and 8th Street/Adobe Road, and were selected as part of a community-wide bicycle route demonstration project. These particular streets were designated as "preferential" areas for bicycles and had bicycle route signs posted without any other bicycle facilities such as striped lines for bicycle lanes.

Although the study led to the development of bicycle routes, many of the recommendations and concepts of the study were not implemented as the City grew significantly over the 1970's and 1980's. Today, the recommendations of the 1974 Mesa Bicycle Study are considerably outdated, and the plan is no longer a useful document for implementation purposes.

Draft Mesa Bikeway Plan 1988

In 1988, Diana Jensen Marsh, an Arizona State University Planning student, prepared the Mesa Bikeway Plan in cooperation with the City of Mesa Transportation Department for fulfillment of her graduate student degree. Although the City Council never adopted the plan, it represented the first in-depth, comprehensive overview of bicycle planning topics throughout the community, and acknowledged the recurrent need for bicycle facilities in Mesa.

The plan assessed existing conditions, provided an overview and analysis of bicycle safety and education, established a series of goals, objectives, and strategies, and called for the creation of a defined bikeway system throughout the City of Mesa. In addition, the Draft Mesa Bikeway Plan provided an analysis of bikeway system design concepts for bicycle lanes, shared traffic lanes, bicycle paths, and sidewalks. The Plan also addressed the need for a Bicycle Program Coordinator, encouraged education and enforcement programs, identified implementation measures, and outlined a number of short and long-range projects designed to enhance bicycling throughout Mesa.

City of Mesa Bicycle Plan: Fiscal Years 1997 to 2000

In 1993, Mesa continued to advance the awareness of bicycling when the Mayor appointed an Ad Hoc Bicycle and Pedestrian Amenities Committee to address a number of bicycle and pedestrian issues throughout the community. This effort resulted in 24 recommendations from the Committee that were meant to improve the local bicycling environment. A bicycle planning effort was launched in Mesa by incorporating the Ad Hoc Committee's 24 recommendations, which resulted in the City of Mesa Bicycle Plan: Fiscal Years 1997 to 2000.

The 1997 to 2000 Mesa Bicycle Plan addressed issues and needs, developed goals and objectives, assessed opportunities and constraints, inventoried existing conditions, and provided a number of recommendations that were intended to improve cycling in Mesa. The plan focused upon four primary goals:

- Develop and maintain a continuous and interconnected bikeway system.
- Promote the City of Mesa streets as shared roadways for the use of motorist and bicyclists.
- Develop bicycle safety education for children and adults.
- Promote bicycling as a viable alternative to motorized travel for short trips and as a way to improve air quality and decrease congestion.

The plan assessed bike routes, bike lanes, bike paths and multi-use paths, and developed a number of bike route recommendations that were implemented between the Fiscal Years of 1997 to 2000. Recommendations were also made for multi-use bike paths, bicycle facilities, codes, policies, safety, and bicycle promotion activities throughout the City of Mesa.

City of Mesa Parks and Recreation Plan

The purpose of the City of Mesa Parks and Recreation Division Strategic Master Plan is to provide a broad policy and management framework to guide decision-making to meet current and future recreational needs well into the twenty-first century. The recommended policies and actions are intended to further the City's General Plan to address "Growing Smarter Plus" legislation and the City's Strategic Plan completed in June 2001. The Parks and Recreation Strategic Master Plan is comprehensive in that it addresses the recreation programming, park maintenance, park land, and recreation facility needs that are required to support Mesa residents over the next 25 years. Previously it was the responsibility of the Parks and Recreation Division to plan, operate and maintain the off-street bicycle facilities in the City. In 2005 those responsibilities were transitioned to the Transportation Department where they are currently managed today.

Bicycle Crash Analysis

The City of Mesa performs annual bicycle crash analysis reports, which represent a statistical compilation of pedalcyclists involved in crashes with motor vehicles on City of Mesa streets and are used to inform infrastructure improvement decisions.

By definition, a "pedalcyclist" represents a non-motorized vehicle operated by pedals and propelled by human power, and is inclusive of bicycles, tricycles, unicycles, pedal cars, and other multi-axle means of pedal transportation operated by human power. These annual studies were initiated in an effort to understand the underlying causes of collisions between pedalcyclists and motor vehicles, and to determine whether the traffic environment could be improved to provide better safety for pedalcyclists throughout the community.

These studies address crash rates at intersections and mid-block locations, crashes by street and intersection classification, by location, and by direction of travel. They analyze the geographic distribution of crashes throughout the City, and the number of crashes by age, gender, cause, date, time, and injury severity. The studies also consider the types of equipment used by pedalcyclists involved in crashes, compliance with state laws, the number of hit and run victims, and whether alcohol was involved. These studies represent a thorough analysis of crash statistics concerning pedalcyclists, and have been a very useful resource.

Mesa Bike Map Evolution

In 2017, the most recent publication of the Mesa Bike Map was released. The first version of the Mesa Bike Map was released in 1988. In recent history, the bike map is typically updated biannually to reflect the new changes in the network.

The newest version of the Mesa Bike Map displays bike lanes, bike routes, separated bike lanes, shared-use paths, paved canal paths, featured bicycle routes, and unpaved canal paths throughout the City. The City of Mesa has adopted a numbered bike route system, which is shown on the map. The bike map displays the location of all streets within the community, labels the major roads, and displays all connecting bike facilities. Additionally, the bike and pedestrian signals, light rail stations, park and ride and docked bike share locations are displayed on the map. This useful resource also provides a variety of safety and defensive driving tips for the bicycling public. The most updated version of the City of Mesa bike map is printed and available free to the public, and is also available as a PDF and interactive map on the City of Mesa website.

City of Mesa 2012 Bicycle Master Plan

In 2012, a previous iteration of the Mesa Bicycle Master Plan was published and adopted by City Council identifying the need to grow Mesa as a leader in the bicycling community. The 2012 Mesa Bicycle Master Plan was a platform for the recent large growth in Mesa's bicycle infrastructure. This plan was approved by the City Council and used to identify necessary improvements to Mesa's bicycle facilities.

The plan established and built upon existing goals, inventoried existing conditions, and provided recommendations based on public input and national best practices.

The plan focused on the following five goals:

- Increase bicycle mode share for all trips to work and school in Mesa to 5% within the life of the Plan.
- Improve safety of bicyclists throughout Mesa. Reduce the rate of bicycle-related crashes by one-third by the year 2028.
- Develop and implement the League of American Bicyclists' five measurable Es of a Bicycle Friendly Community (Education, Enforcement, Engineering, Encouragement, and Evaluation).
- Achieving Gold, then Platinum recognition from the League of American Bicyclists by 2022.
- Establish capital and operating budgets for the Bicycle Program at a level to accomplish these goals on an ongoing basis.

In the last 6 years since this plan was adopted national best practices have changed, the previously established goals have been met, and the Mesa cycling network has grown. Bike share and separated bike lanes weren't on the horizon in 2012 and have since become a staple addition to any complete bicycle network. As such, an update is necessary to keep the City of Mesa current and a leader in the bicycling community.

Mesa 2040 Transportation Plan: Bicycle Component

On November 17, 2014, the Mesa City Council adopted the Mesa 2040 Transportation Plan. This plan included streets, transit, bicycles, pedestrians, travel demand management, the Mesa city center, finance, and proposed measures on how to potentially implement the adopted transportation plan over time.

The bicycle element of the 2040 Mesa Transportation Plan reiterates and references information contained within the 2012 Mesa Bicycle Master Plan.

REGIONAL PLANNING & COORDINATION EFFORTS

The Maricopa County Bicycle Transportation System Plan (1999)

On May 19, 1999, the Maricopa County Board of Supervisors adopted the Bicycle Transportation System Plan. The plan was developed to provide an overview of:

- Bicycling conditions within Maricopa County.
- Facility and policy program changes focused on improving and integrating bicycle transportation.
- Ways to strengthen the overall bicycle program at the County, while implementing a number of recommendations over time.
- The Plan also presented the existing on and off-road bicycle network facility recommendations.

Maricopa Association of Governments Regional Bicycle Plan (1992)

The Maricopa Association of Governments (MAG) Regional Council adopted the Regional Bicycle Plan in February 1992. The Regional Bicycle Plan has been incorporated into the region's Long Range Transportation Plan. The MAG Regional Council approved a bicycle plan update in March 1999.

Maricopa Association of Governments Regional Off-Street System Plan (2001)

Adopted by MAG in February 2001, the Regional Off-Street System (ROSS) Plan was prepared as a complement to the 1999 MAG Regional Bicycle Plan and identified existing off-street corridors, which could be utilized for non-motorized transportation. The ROSS Plan provided an overview and identified a series of issues pertaining to access, safety, connectivity, facilities, and implementation.

Maricopa Association of Governments Regional Bikeway Master Plan (2007)

In 2005, MAG's Regional Bicycle Task Force and Pedestrian Working Group initiated discussions regarding the need for the MAG Regional Bikeway Master Plan, and identified primary tasks that were essential for the success of the plan. As a result of this process, the 2007 MAG Regional Bikeway Master Plan was created and adopted and includes sections on:

- Goals and objectives
- Regional bicycle plan maps
- Project rating criteria
- Recommendations and future actions
- Identifying cost estimates for the overall implementation of the on-road regional bicycle plan

Southeast Maricopa/Northern Pinal County Area Transportation Study (2003)

Completed in September of 2003, the Southeast Maricopa/Northern Pinal County Area Transportation Study was a jointly sponsored project among the Maricopa Association of Governments, the Central Arizona Association of Governments, and the Arizona Department of Transportation. While the intent of the plan was focused upon examining the long-range transportation needs between Maricopa and Pinal Counties, it also provided for an analysis of bicycle linkages, and included the area of Mesa south of the US 60 Superstition Freeway within the planning study area. The plan provided an overview of bicycle nodes and destinations, existing on and off-road bicycle facilities, and provided a brief overview of other bicycle plans and municipal bicycle policies.

Maricopa County Active Transportation (2018)

In 2018, Maricopa County Department of Transportation (MCDOT) finalized their Active Transportation Plan (ATP) to develop a comprehensive guide that outlines a vision for active transportation within unincorporated Maricopa County. The MCDOT ATP focuses on unincorporated areas spread throughout the region including County islands, unannexed areas surrounded by a city or town. The MCDOT ATP updates and supersedes the existing MCDOT 1999 Bicycle Transportation System Plan (BTSP). While the 1999 BTSP focused on bicycle lanes and paved shoulders suitable for confident and experienced bicyclists, the ATP explores pedestrian and bicycle facilities needs to accommodate all users, regardless of their age or ability. MCDOT envisions a transportation network with connections and choices for people of all ages and abilities to walk, bike, and move. MCDOT and Mesa will collaborate to expand the region's bicycle network by completing bicycle facility gaps on roads of County islands surrounded by the City of Mesa.

Maricopa Association of Governments Active Transportation Plan (2019)

The Maricopa Association of Governments (MAG) is developing a Regional ATP to serve as a guide for improving, expanding, and connecting the MAG region's active transportation network. MAG's ATP will identify planning and design strategies to address challenges related to current levels of active transportation use and serious or fatal collisions involving people walking and biking; and support a desirable, safe and economically competitive region. Progress towards addressing these challenges will be tracked through the establishment of the following regional targets.

- Mode Share: Increase the active transportation mode share from 4.4% to 30% by 2040
- Safety: Achieve zero pedestrian and bicyclist traffic fatalities by 2030
- Public health: Increase the percentage of people getting enough physical activity from 37% to 64% and decrease the percentage of people who are considered obese or overweight from 64% to 37% by 2040

MAG's active transportation targets will be supported by the efforts of local cities, including Mesa, and Maricopa County, most of which have adopted plans and policies focused on expanding the active transportation network. Once regional bicycle routes have been identified, Mesa will collaborate with MAG to implement regionally funded enhancements. Mesa will include these routes and evaluate connectivity to these regional routes in future bicycle planning efforts.

The MAG ATP will also develop an online toolbox of best practices in bicycle facility design which Mesa will encourage use as a resource for flexibility in design and pilot programs.

NEIGHBORING BICYCLE PLANNING AND REGIONAL CONNECTIVITY

City of Apache Junction

The City of Apache Junction General Plan was adopted on November 2, 1999. Through the document's Land Use and Circulation Elements, the plan calls for the connection of a shared use pathway between the City of Apache Junction and the City of Mesa's eastern planning boundary. The plan also calls for the continuation of bicycle lanes along the major arterials passing from Pinal County into Maricopa County.

In May of 2012 the City of Apache Junction also completed a Comprehensive Transportation Study, which specified the incorporation of bicycle lanes into

minor and major arterial roadways throughout the community and the expansion of pedestrian, bicycle and trail facilities throughout the City. Development of Apache Junction's first Active Transportation Plan was initiated in 2018. The plan will serve as the primary tool for deployment and integration of safer modes of transportation for bicyclists, pedestrians, equestrians and other modes of non-vehicular transportation.

City of Chandler

The City of Chandler's General Plan was adopted by the Chandler City Council in 2016 and contains a circulation element that plans for the community's bicycle network. The City of Mesa shares a common boundary with the City of Chandler along the Western Canal between the Price Freeway and the County Club Drive/Arizona Avenue corridor. Primary bicycle lanes and bikeways from the City of Chandler currently connect with the City of Mesa along the Price Road, Dobson Road, and Alma School Road corridors and the Western Canal.

Town of Gilbert

The Town of Gilbert currently uses the community's 2014 Transportation Master Plan to plan for their municipal bicycle network. The City of Mesa and the Town of Gilbert share north-south connectivity on a number of common arterials with bike lanes, which include:

- Power Road
- Higley Road
- Val Vista Drive
- Lindsay Road
- Stapley Drive (Cooper Road)

East-west, connectivity is shared with the Town of Gilbert through:

- Baseline Road
- Guadalupe Road
- Ray Road
- Pecos Road
- Williams Field Road

Additionally, the City of Mesa shares a number of canals with the Town of Gilbert, including the RWCD Canal, the Eastern Canal, the Consolidated Canal, and the Western Canal.

City of Tempe

The City of Tempe has planned for its bicycle network through the 2015 City of Tempe Transportation Master Plan, and the Tempe General Plan 2040. Shared major and minor arterials between the City of Tempe and the City of Mesa with bike lanes include:

- University Drive
- Main Street
- Broadway Road
- Baseline Road
- Guadalupe Road
- 8th Street/Rio Salado Parkway and Town Lake Path.

Pinal County

The Pinal County Open Space and Trails Master Plan is the Open Space and Recreation Element of the Pinal County Comprehensive Plan (2007). Pinal County has identified regional trail connections throughout the county, which include the Central Arizona Project (CAP) canal corridor and Sun Circle Trail Network. Within Pinal County, the intent is to include a 10-foot wide shared use pathway along the CAP canal corridor with connectivity to nearby Maricopa County. The CAP canal corridor enters the City of Mesa Planning Area from the eastern boundary with the City of Apache Junction near Meridian Road between Southern Avenue and Baseline Road. Pinal County also addresses localized and sub-regional bicycle planning goals and efforts through transportation and land use studies.

Regional Trail Systems

The area's regional trail system provides extensive opportunities for recreation, non-motorized mobility, and commuting throughout Maricopa and Pinal County.

Rio Salado Pathway

The Rio Salado Pathway is a multi-jurisdictional pathway that runs on both sides of the Salt River. On the south bank of the Salt River the pathway runs from State Route 143 in Phoenix to Dobson Road in Mesa. On the north bank the trail runs from Priest Drive to Rio Salado Park. The pathway is a paved pedestrian and bicycle trail that is an essential connector to other regional trail networks and connects the Mesa trail system to neighboring cities such as Tempe and Scottsdale.

Maricopa County Regional Trail System

The Maricopa County Regional Trail System Plan is an essential element of the multi-modal transportation system throughout Maricopa County. This system was built with the vision that all major parks belonging to Maricopa County would be connected by these segments of trails linking together to form the larger trail system. Maricopa County facilities provide alternative transportation corridors for bicyclists and pedestrians by connecting off-street, non-motorized

trails between the County's regional parks.

The Maricopa County Regional Trail system, which lies within portions of Mesa, encompasses the Roosevelt Water Conservation District Canal (RWCDC) and the East Maricopa Floodway (EMF). The corridor runs from the South Canal along the northern border of Mesa to Queen Creek Wash through the towns of Gilbert and Queen Creek, a distance of 18 miles.

Sun Circle Trail

The Sun Circle Trail encompasses approximately 140 miles of hiking and riding trails that encircle the greater Phoenix metropolitan area, and for the most part use existing canal banks. In the mid-1960's, the Arizona State Horsemen's Association Trails Committee first recognized the unique recreation opportunity made available by the canals and preceded to ride, map, and propose the Sun Circle Trail to the Maricopa County Board of Supervisors. In 1965, the Maricopa County Board of Supervisors, the Salt River Project (SRP), and the Bureau of Reclamation provided an historical first by signing a 50-year agreement for use of sixty-six miles of canals for parts of the trail.

Valley Forwards Pedestrian Freeway

The Valley Forward Association (now known as Arizona Forward) brings business and civic leaders together for thoughtful public dialogue on regional issues and to promote cooperative efforts towards regional planning. The Valley Forward Pedestrian Freeway was designed to provide additional enhancements to the Maricopa County Regional Trail System. Arizona Forward's vision is to connect communities and selected key destinations through a non-motorized system promoting health and wellness, connectivity and economic development. The City of Mesa is fortunate to have or be near a large portion of eight Valley Forward "gems," which include:

- Salt River, Tonto National Forest, Usery Mountain Regional Park
- Chandler Regional Park
- Riparian Preserve at Water Ranch
- Red Mountain Park
- Park of the Canals
- Pueblo Grande Ruins

The City of Mesa's portion of the Va Shly'ay Akimel Environmental Restoration Project and Rio Salado Pathway Tempe to Mesa Project would connect the Phoenix and Tempe Rio Salado projects with 13 more miles of trail along Gem 28 of the planned "Priceless Necklace of Trails and Gems."

WHY MESA NEEDS AN UPDATED BICYCLE PLAN

The Mesa 2018 Bicycle Master Plan is a renewal of the City's commitment to bicycling and dedication to providing guidance and policy that will help improve air quality, reduce congestion, and the wellbeing of the community.

Cutting edge cities like Mesa have a responsibility to ensure that there are suitable and sustainable networks in place that offer an alternate mode for travel other than the use of the automobile. For people experiencing poverty, individuals with disabilities, the elderly, transit dependent individuals and other vulnerable populations - access to safe, affordable and reliable transportation options is especially crucial.

The previous City of Mesa planning and construction efforts have established a solid foundation of arterial-based bicycle lanes and has begun to develop a complete network of varying facility types. This plan update will reinforce the bicycle network and program to include riders of all ages and abilities and introduce separated bicycle lanes as well as health indicators.

Environmental Quality

Each year the transportation network in the United States is responsible for one third of the nation's carbon footprint. In order to help address Mesa's commitment to environmental quality, this bicycle plan provides recommendations to increase and improve bicycling options for the residents of Mesa. Mesa is with in PM-10 and therefore qualifies for funding through the MAG Congestion Mitigation and Air Quality Improvement Program.

A New Shift in the Expectations of Mesa Residents

As societies mature and become more educated, personal basic needs are fulfilled and attention to necessities begins to shift and grow, giving way to experiences and self-actualization over physical goods. During this transformation, the residents who inhabit these societies begin to look for cities that are willing to accommodate the way of life of residents of all ages. Mesa strives to maintain a community that will be equitable for all, following the 8 and 80 city mold. If a city is great for an 8 year old, and great for an 80 year old, it will be a successful, sustainable city for everyone else.

More emphasis has been put on careers which target educated individuals whose economic function is to create new ideas, new technology, and creative content. They prefer to work in a nontraditional workplace environment, have nontraditional work hours, have nontraditional business dress, and prefer

to commute and travel in an area that allows them to use alternate modes for transportation such as bicycle and transit.

The development of areas attractive to this type of individual draws the industry and services that are focused on developing new opportunities and supporting innovation. The companies that draw these professionals are very conscious of the diverse and individualistic lifestyles which are interactive, environmentally conscious, and experimental. People drawn to these places have a very perceptive understanding of the livability of their communities, striving to create a sense of place that is sustainable and focuses on the values of a better quality of life, creative freedom and recreation. Developing a sustainable community for bicycling with this plan will help the City adapt to all generations of residents.

Finally, there is simply more demand for bicycle facilities by all types of riders. The 2018 Bicycle Master Plan addresses this new demand with recommendations for additional facilities and improved programs.

How the Plan Will Be Used

The City of Mesa Bicycle Plan is part of the overall Mesa Transportation Plan update providing guidance in managing bicycle facilities and policy recommendations that meet the current and future demand within the public right-of-way.

The 2018 Mesa Bicycle Plan also incorporates policy recommendations and project priorities, which serve as the basis for future funding requests.

CHAPTER TWO

PURPOSE OF GOALS AND OBJECTIVES

PURPOSE OF GOALS AND OBJECTIVES

Goals

This chapter provides an overview of the planning goals and objectives from the City of Mesa's 2012 Bicycle Master Plan which are to be maintained in the 2018 Bicycle Master Plan. These goals and objectives helped to establish a framework for enhancing the overall bicycle network and for effectively working toward achieving the desired community vision for the City of Mesa, as identified within Chapter One of this plan.

These goals and objectives identify clear directives to achieve the desired bicycle vision for the City of Mesa, and represent a response to community needs, values, and concerns. The identified goals and objectives will continue to guide the actions of staff and elected officials to improve the bicycling experience within the City of Mesa. As part of the Plan's implementation strategy, the goals and objectives are regularly assessed to determine how effectively they are being carried out over time.

Objectives

While a goal is a broader statement of what a community would like to accomplish over time, and a goal statement essentially functions as a "target" of what is to be reached in order to obtain a desired outcome, objectives are statements or items that represent steps toward accomplishing a goal. While goals are essentially broader policy targets, objectives are designed to function as individual implementation steps on how to obtain a desired goal. The purpose for establishing goals and objectives as identified within this chapter is primarily intended to provide a comprehensive framework for the implementation of the Mesa Bicycle Master Plan over time.

The goals and objectives will help to accomplish the Plan's vision statement and set a clear foundation for what directions will need to be taken over time in order to implement the Bicycle Plan.

These goals capture the essence of the community's and City's vision for bicycling in Mesa. The objectives and actions that describe each of the goals act as a vehicle to achieve these goals. The five primary goals of the 2012 BMP are listed in the table below.

GOAL	DESCRIPTION
Goal One	Increase bicycle mode share for all trips to work and school in Mesa to 5% within the life of the Plan.
Goal Two	Improve safety of bicyclists throughout Mesa. Reduce the rate of bicycle-related crashes by one-third by the year 2022.
Goal Three	Develop and implement a bicycle program using the League of American Bicyclists' five measurable E's of a Bicycle Friendly Community: Education, Enforcement, Engineering, Encouragement, and Evaluation/ Planning.
Goal Four	Achieve Platinum recognition from the League of American Bicyclists by 2022.
Goal Five	Prioritize needs and establish capital and operating budgets for the Bicycle Program.

GOAL ONE

Increase bicycle mode share for all trips to work and school in Mesa to 5% within the life of the Plan.

Objectives

- Increase bicycle network connectivity between neighborhoods, parks, canals, various land uses, other transportation modes, and neighboring jurisdictions.
- Develop a bicycle count program to collect data.
- Adopt a target level of bicycle use (e.g., percent of trips) within a specific timeframe, and improve data collection methods necessary to monitor progress.
- Provide direct bicycle access to common destinations.
- Identify and connect all gaps in current bicycle network.
- Develop an attractive and inviting bicycle network. Plan, design, construct, and maintain bicycle facilities that meet or exceed accepted standards and guidelines.
- Continue to promote, encourage, and increase bicycling to work.
- Make the City of Mesa itself a model employer by encouraging bicycle use among City employees (e.g., by providing parking, showers, and lockers).
- Develop and implement a citywide bike share program.

Strategic Performance Measures

- Percentage of on and off-street bikeways completed within one (1) mile of all residential sub-divisions.
- Percentage of bicycle commuter trips increased (Survey Data).
- Percentage of overall bicycle ridership increased (Survey Data).
- Ensure new developments include appropriate bicycle routes and facilities.
- Ensure new developments provide for bicycle connectivity to surrounding development.
- Support new land use policies aimed at increasing mixed use developments at high densities.

Progress Towards Goal Since 2012

- Percentage of bicycle commuter trips remained the same 0.9% (2012-2016 ACS)
- Percentage of overall self-reported bicycle ridership as a primary mode of travel is 9.86% (2017 Mesa Bike Ped Program Customer Satisfaction Survey – 497 respondents)

- A count program has been established for pathways. There are currently six permanent count stations at the Consolidated Canal/Main Street, Consolidated Canal/Baseline Road, Rio Salado Pathway, Porter Park Pathway – South, Rio Salado Pathway – East, and Porter Park Pathway – North. Monthly counts are recorded and analyzed for trends to justify the need for additional bicycle facilities and Federal grant funding applications. Additionally, Mesa conducts bicycle counts on various sections of improved pathways throughout the City, including segments of a road or path that is being evaluated for additional or enhanced bicycle and pedestrian facilities and for all new capital improvement transportation projects.
- An annual count of bicycles and scooters at the Mesa Public Schools is conducted.

GOAL TWO

Improve safety of bicyclists throughout Mesa. Reduce the rate of bicycle-related crashes by one-third by the year 2022.

Objectives

- Increase awareness by implementing a media campaign for bicycle safety.
- Provide safety literature and current bicycle route maps for public use.
- Identify areas and conditions perceived as unsafe with the highest bicycle-involved crashes. Use this crash data to determine areas of the City to be targeted for enforcement in an effort to reduce these crashes and violations.
- Develop a mitigation plan to correct areas and conditions that are deemed unsafe in the previous objective.
- Coordinate with the Mesa Police Department to develop and implement education curriculum for both officers and citizens to improve enforcement and observance of bicycle laws.

Strategic Performance Measures

- Reduce bicycle crash rates.
- Encourage Mesa driving schools to increase bicycle awareness, and awareness of bicycle-related rights and responsibilities.
- Establish an adult bicycle education program.
- Establish a bicycle traffic ticket diversion education program.
- Implement improvements needed to make streets a safer place to ride a bicycle.

Progress Towards Goal Since 2012

- The 2012 - 2016 five year average of bike crashes per 100,000 population was 39.6% compared to 47.9% for 2007 - 2011.
- The 2012 - 2016 five year average is 183 crashes per year (3.5% of total crashes), a 16% reduction from the 2007 - 2011 five year average of 218 crashes per year (3.7% of total crashes).
- Mesa has created a media campaign for bicycle safety including hosting Ride-In-Movies at the Park, publishing the semi-annual “Spokelife” magazine, and conducting adult and child safety education classes.
- Mesa provides basic bicycle and helmet education to children in the Mesa libraries, after-school programs, during school, and to many youth community groups. As of January 2016, 3,200 kids have been reached with more than 1,900 helmets and other safety gear items distributed.

- Mesa has partnered with Mesa Public Schools' District office as well as the Director of PE and Nursing to increase interest and involvement from more schools to participate in International Walk to School Day. In October 2016, 10 schools participated, with over 4,800 students. Each school tailored the event to fit their needs; some held a walk from a remote drop off location, others had safety assemblies, or celebrated those students already walking to school every day. Mesa Police Department is actively involved in assisting with all of the Mesa Bicycle and Pedestrian Program events. A dedicated webpage has been created for school staff to utilize as a resource and to sign up for support at their events.
- The Bicycle and Pedestrian Program developed the Light up the Night Bike Light program as an education tool that could be administered by the Police Department to bring awareness to the law against riding a bicycle after dust until dawn without a proper headlight and tail light or reflector. Magnets were produced in both English and Spanish, which explains the Arizona Revised Statue regarding the use of bicycle lights. The Bicycle and Pedestrian Program purchased one thousand headlight/taillight sets and packaged them along with the magnet. Mesa Police Officers then took them and kept them in their patrol cars to handout in lieu of a citation as long as the bicyclist did not have any other wants or warrants.
- Mesa has put City Code 10-1-15 into effect making it illegal to ride your bicycle on the sidewalk along Main Street, between Sirrine and Country Club Drive due to the strong pedestrian presence in the downtown center along Main Street and the number of outdoor seating areas. The code has been complemented by permanent signs reminding bicyclists to walk their bicycles on the sidewalk and a Walk your Wheels public education and safety campaign.

GOAL THREE

Develop and implement the League of American Bicyclists' five measurable Es of a Bicycle Friendly Community (Education, Enforcement, Engineering, Encouragement, and Evaluation).

Objectives

- Develop a bicycle education program for bicyclists and motorists based on legal, predictable, and safe behaviors for all road users.
- Implement a Safe Routes to School Program within the City of Mesa.
- Encourage increased use of bicycles for transportation and recreation.
- Support local organized events and promote Mesa's ideal climate & facilities for year-round bicycling to visitors.
- Work with health and wellness industry to promote bicycling.
- Increase awareness throughout the community by implementing a media campaign for bicycle safety.

Strategic Performance Measures

- Percentage of schools within the Mesa Public Schools District Implementing Safe Routes to School Programs.
- Number of adult bicycle education and encouragement programs included in private industry wellness programs.
- Number of bicycle-related events held in Mesa.
- Number of bicycle public service announcements.

Progress Towards Goal Since 2012

- Mesa hosts the following regular reoccurring bicycle-related events: CycloMesa, El Tour de Mesa, Arizona Bicycle Summit, Mesa Adventure Challenge, CycloMesa Winterfest, Ride-In-Movie Series, and Bike2Work Day. Events are summarized annually in the Bicycle and Pedestrian Program Annual Report.
- Mesa partners with the Mesa Public Schools District to conduct Safe Routes to School studies. In 2018, MAG began administration of regional SRTS Studies Projects funded with Transportation Alternative (TA) SRTS funds.

GOAL FOUR

Achieving Silver, then Gold, then Platinum recognition from the League of American Bicyclists by 2022.

Objectives

- Establish a Bicycle Advisory Committee to guide and advise on implementation of the 2012 Bicycle Master Plan.
- Update City of Mesa laws, regulations, and policy documents to address bicycle accommodations through City Codes and Zoning Ordinances.
- Strive to make streets a safer place to ride a bicycle.
- Increase the number of bicycle racks, bicycle lockers, and bicycle service centers throughout the City.
- Establish information programs to promote bicycling for all purposes, and to communicate the many benefits of bicycling to residents and businesses (e.g., with bicycle maps, public relations campaigns, neighborhood rides, etc.).

Strategic Performance Measures

- Number of Mesa Bicycle Maps distributed.
- Number of Mesa residents participating in bicycle education programs or events.
- Number of bicycle racks installed.
- Level of Bicycle Friendly Community recognitions and awards.

Progress Towards Goal Since 2012

- Mesa has created a tailored education presentation for adults on basic bicycle education called Smart Cycling FUN-dementals. This introductory workshop reviews basic bicycle techniques, rules, and equipment discussed in a 90-minute class. An update on the City's bicycle projects and events is given. Participants pre-register and the class is limited to 30 people. At the completion of the class participants are provided with a helmet, lock, front/rear lights, reflective vest, bell, water bottle, and maps. There have been an average of 25 students per class for more than 400 residents educated to date.
- Mesa received the award level of "Silver" in the spring of 2017, which is valid through 2019. At the completion of this 2018 update to the Bicycle Master Plan, Mesa will apply for Gold Bicycle Friendly Community status with the League of American Bicyclists.

GOAL FIVE

Establish capital and operating budgets for the Bicycle Program at a level to accomplish these goals on an ongoing basis.

Objectives

- Secure funding for design and construction of future bicycle facilities.
- Secure funding for implementation of programs outlined in the 2012 Bicycle Master Plan.
- Continually address bicycle needs, and incorporate improvement needs into the five-year Capital Improvement Program (CIP).
- Encourage available private funding and partnerships, corporate donations, and other sources that could be utilized to develop bicycle facilities and programs.
- Identify and design high priority projects to compete for available MAG regional funding.

Strategic Performance Measures

- Amount of grant funding applied for and obtained for bicycle programs.
- Improvement of established partnerships between City of Mesa Transportation Department Bicycle Programs and local businesses, Transportation Advisory Board, Coalition of Arizona Bicyclists, non-profit organizations, and educational institutions to promote public/private partnerships.

- Percentage of Mesa bicycle network connected to activity centers and adjacent cities.
- Number of bicycle projects added to the City of Mesa Capital Improvement Program.

Progress Towards Goal Since 2012

- Mesa's bicycle network grew from 128 miles to 578 miles since 2012, a 450% expansion in only six years.
- Existing bicycle lanes were and continue to be routinely made safer and more comfortable by widening or buffering lanes and by addressing parking concerns in the bicycle lane. Many more projects are in design or under construction. Restriping projects are often coordinated with street resurfacing in order to create work efficiencies.
- Mesa Capital Improvement Plan
  2015-2019
    Shared Use Paths: $19,089,555
    Streets*: $257,766,400
  2019-2023
    Shared Use Paths: $28,229,295
    Streets*: $337,759,139
- MAG Transportation Improvement Program
  2014-2018
    Bike/Ped: $7,420,319
  2018-2022
    Bike/Ped: $17,614,959

**Total budget provided, portion related to bicycle projects and improvements is unknown. Street projects presented in the CIP include, if feasible, bicycle facility improvements (adding or improving the conditions of bike lanes, sidewalks and/or ramps).*

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CHAPTER THREE

EDUCATION, ENCOURAGEMENT & ENFORCEMENT

INTRODUCTION

The purpose of this chapter is to provide an overview of bicycle safety and education within the City of Mesa. This chapter will assess items pertaining to safety and enforcement; existing bicycle safety and awareness; types and targets of educational programs; the existing bicycle safety, education, and awareness program; future safety and public educational needs; and a public awareness campaign to promote safety and continuing education. When addressing the subject of bicycles, and Mesa's on and off-road bicycle network, the issue of safety and maintaining a safe environment is of primary concern for residents. The public expects and demands Mesa's transportation network to be safe for all users. Improving safety through education and enforcement can help to alleviate neighborhood livability issues as well as decrease the probability of a variety of health and economic problems.

MESARIDES!

In November of 2010, Mayor Scott Smith in cooperation with the Mesa Police and Transportation Departments launched an Education, Encouragement, and Enforcement awareness campaign called **"MesaRides!"** a City of Mesa initiative to promote safe cycling in Mesa. Efforts under the umbrella of **"MesaRides!"** focus on Encouragement, Education, and Enforcement, three of the five Es of the League of American Bicyclists. These efforts include:

- Public Service Announcements running on Channel 11 and YouTube throughout the year.
- Articles regarding bicycle safety and education published in City newsletters, including "OpenLine" which goes out with City utility bills.
- Partnerships with local bike shops and non-profit agencies to distribute bicycle safety information.
- Participation in community events including City Hall at the Mall, Building Stronger Neighborhoods, and City Council pancake breakfasts where residents can get information, ask questions, and make suggestions about bicycling in Mesa.
- Continuing to develop Mesa's "Bike4Life" and "Bike2Work" community bike events during Valley Bike Month each April. These events promote bicycling as a viable travel mode option.

Having partners to educate both motorists and cyclists about the current laws and help them understand how to ride and drive safely in Mesa is a commitment that will be carried through and expanded on with **"MesaRides!"**

EDUCATION

"Safety" can be defined as freedom from danger, risk, injury, or harm. When addressing the concept of bicycle safety, the theory set forth by the League of American Bicyclists is to educate the user to safely operate a bicycle when traveling from one geographic area or location to another. Maintaining an individual's personal safety without incident is the primary goal and focus of bicycle safety. Safety education efforts can contribute to maintaining a safe environment for bicyclists, and can be more effective when coordinated with other public agencies and private organizations.

When taking into consideration the level of ability that individuals have with operating a bicycle on the public street network, many are afraid of riding their bicycles along busy roads, or simply lack the essential knowledge or skills to ride in busy traffic conditions. Bicycle safety, education and awareness programs are intended to address a variety of issues, and provide services related to improving awareness and keeping individuals safe when operating a bicycle throughout the community. Ongoing education and services are concerned with reaching bicyclists of all ages, and the City of Mesa places an emphasis on organizing events, teaching, training, providing awareness, building confidence, and setting target goals to educate children, adults, and motorists throughout the City.

Types and Targets of Educational Programs

The City of Mesa currently has a number of educational and safety programs that are intended to promote public awareness and foster an environment of bicycle safety throughout the community. The following information provides a brief overview of programs that are designed or targeted specifically for children, adults, and motorists. Although Mesa has made progress toward enhancing a curriculum of teaching bicycle safety to children and students, enhancing bicycle safety awareness throughout the community, and providing public outreach opportunities concerning the general public, there are still many things that could to be done in order to educate, and promote safety and awareness to the motoring public.

Early Intervention Programs for Youth Bicyclist

The City of Mesa currently has a number of educational opportunities that are targeted toward enhancing bicycle safety and awareness for elementary school-age children in Mesa Public Schools. Bicycle safety opportunities are primarily targeted at public schools and public events for children and students. This effort is concentrated on specific bicycle safety education programs such as: bicycle rodeos, school crossing guard training, public ride events, and information distributed at training and bicycle events. Bicycle safety education programs at Mesa Public Schools are often provided to all grade levels, depending on the school's request, and involve helmet education, traffic rules, handouts, and videos.

Programs for Adult Bicyclist

Bicycle safety education and awareness for adults within the City of Mesa primarily focuses on public events and educational meetings associated with bicycling or bicycle commuting. A 90 minute basic bicycle educational class is offered for adults in the community. The Mesa Transportation Department is active in distributing educational materials and brochures at public safety events throughout the community and at scheduled races and rides. The Mesa Transportation Department also visits company events and scheduled meetings for adult commuters who utilize a bicycle as a means of transportation to and from work on a regular basis. Other safety and awareness opportunities are associated with Annual Bike to Work and family ride events. Additionally, the City often supports other outreach efforts provided by the League of American Bicyclists, Greater Arizona Bicycle Association (GABA), Arizona Bicycle Clubs, the Coalition of Arizona Bicyclists, and Safe Kids of Maricopa County.

Existing Bicycle Safety, Education, and Awareness Programs

The following information provides an overview of safety, educational and awareness programs, and bicycle events (where materials are distributed and awareness is highlighted).

Safe Kids Coalition of Maricopa County

The Safe Kids Coalition of Maricopa County is part of a global network of organizations whose overall mission is to prevent accidental childhood injuries, including bicycle injuries, which collectively, are a leading killer of children under the age of 14 years old. A City of Mesa representative from the Transportation Department has been an active participant of the Safe Kids Coalition since 2004 and an active board member of the coalition since 2007. The Safe Kids Coalition provides the ability to communicate prevention messages directly to kids and their families through comprehensive programs, which entail home safety, child passenger safety, fire safety, and bicycle and pedestrian safety.

Helmet Your Head

The Helmet Your Head safety program was developed by the St. Joseph's Children's Hospital and focuses on the prevention of head and traumatic brain injuries. Its principles are taught in Mesa elementary schools and by representatives of the Mesa Transportation Department at community events. This safety program educates students on the dangers of brain injuries, and promotes the importance of wearing a helmet while operating a bicycle.

Think First

This is an award-winning national program for teens and young adults. Think First is primarily focused on teaching students to consciously "use their minds" in order to "protect their bodies" from serious injury that may result from operating a bicycle. The Think First curriculum is taught in the Mesa elementary schools.

Cardon Children's Medical Center

At present, select elementary schools within the Mesa Public School District participate in a program through the Cardon Children's Medical Center, where they provide assistance for children in preschool and kindergarten with free bicycle helmet fitting and bicycle safety education. This is a program that is sponsored by the hospital's Injury Prevention Coordinator and is very beneficial to school-aged children learning bicycle safety. Helmet fitting is also supported by the Mesa Transportation Department's safety education staff.

School Crossing Guard Training

Sponsored by the Maricopa Association of Governments, the City of Mesa provides the location and training for annual East Valley crossing guard training. Past and current Mesa Public School crossing guards, as well as adjoining school district's crossing guards, are educated in crossing procedures,

equipment, traffic laws, health, and safety. The crossing guards then educate the students on how to cross the street while bicycling and instruct students who ride their bicycles how to cross a crosswalk onto campus.

ENCOURAGEMENT

Bicycle Resources

Mesa Bike Map — In 2017, the City of Mesa released its latest "Mesa Bike Map." The 2017 version maps out six featured bike routes of varying lengths in addition to showing locations of bicycle lanes, routes, shared-use paved paths, paved canal paths, and unpaved canal paths throughout the City. The bicycle map shows all public streets within the community, labels the major streets, and displays all connecting bicycle facilities. This useful resource also provides a variety of safe and defensive riding tips for bicycle operators. Several thousand maps were printed and are distributed throughout the community.

Bicycle Safety, Enforcement, and Awareness Materials — Mesa regularly creates bicycle safety, enforcement, and awareness informational materials such as brochures, papers, booklets, public service announcements (PSA's), and other source information that is distributed to the general public. Mesa publishes Spoke Life semi-annually; a magazine that highlights local cyclists, and informs Mesa residents about biking tips, biking in Mesa and current cycling focused events. In addition, Mesa regularly advertises sponsored bicycle events through the public media and on the web in an effort to promote safety, enforcement, and bicycle awareness. Community outreach needs are continually assessed to keep the public informed and up to date on current information.

Bicycle Events

El Tour de Mesa

El Tour de Mesa is an annual 70- mile ride/race that begins and ends within the City of Mesa. It includes a 25-mile ride and 10-mile and 5-mile "family fun rides." The event is coordinated by Perimeter Bicycling Association of America, headquartered in Tucson, and includes an annual registration that has averaged over 1,200 bicycle riders in the last several years. The City of Mesa maintains a safety education booth at the event, and highlights bicycle helmet awareness, bicycle safety, and distributes informational materials and bicycle maps to participants and the general public.

Arizona Bicycling Summit

The Arizona Bicycling Summit is a conference that has been held annually since 2016. The summit gathers leaders, eduactors, planners, public health professionals, event promoters, and cyclists of all kinds to discuss current issues related to bicycling in Arizona. The summit objectives are to:

1. Share information regarding the enviornment for bicycling in Arizona.
2. Bring bicyclists, advocates, and public servants together to network and share information.
3. To build a roster of advocacy skills and interests within Arizona.

The summit is part of CycloMesa.

CycloMesa

CycloMesa (formerly the Great Arizona Bicycle Festival), featuring El Tour de Mesa and the Arizona Bicycling Summit, is a celebration of all things bike. In April of each year, in coordination with Valley Bike Month, the festival offers residents the opportunity to take part in the Great Arizona Bike Swap, Downtown Historic

Bicycle Tour, a Kids Zone, and Bicycle Safety Rodeo along with a health fair, live music, food, and more.

Valley Metro Bike Month

Within the State of Arizona, Bike Month is held annually during the month of April as opposed to the National Bike Month held in May. Arizona celebrates Bike Month in April to take advantage of cooler spring weather. Valley Metro, the regional public transportation agency, takes the lead in coordinating and communicating with the cities, agencies, and departments that participate in Bike Month activities and events, and takes the lead in advertising Bike Month events throughout the metropolitan region. The City of Mesa participates in this event, and coordinates activities with Valley Metro to promote Bike Month on an annual basis.

Bike2Work and School Day

The City of Mesa sponsors an annual Bike to Work and Bike to School Day, and coordinates the event with Earth Day and regional bike to work efforts in neighboring cities. Bike2Work is open to the public, and the Mesa Transportation Department sponsors a pancake breakfast to riders as well as safety education

information, free handouts, and informational packets. This event is well-marketed throughout the City and includes a department challenge for City employees. The department with the highest percentage of participants is awarded a free lunch and receives the traveling trophy to be displayed in that department's work section for the year.

For the Bike to School component, the City of Mesa depends on extensive advertisement throughout each school within the Mesa Public School District to ensure maximum participation. The Mesa Public Schools also include informational updates within school newsletters. The Transportation Department utilizes the annual Bike to School event as an awareness opportunity, and provides safety and educational information to schools throughout the district.

International Walk and Bike to School Day

Although this event includes and promotes walking as well, the City of Mesa uses this event to teach students about bicycle safety and rules of the road. The Mesa Transportation Department coordinates the annual event. The Mesa Police Department, Fire Department, and others often take time to participate in these events.

CycloMesa Winter Festival

Every December the City of Mesa celebrates with snow play and a guided bike ride to view the neighborhood Christmas light displays. This event focuses on concussion awareness regarding not only bicycle riding but also from different snow play activities.

Future Needs

In order to establish a safe environment for bicyclists throughout the community, the City of Mesa continually works toward the goal of reducing the number of collisions and fatalities through ongoing safety education and awareness for all ages and types of motorists and bicyclists. Mesa will continue to educate bicycle riders on the concept of "driving a bicycle" as opposed to "riding a bicycle."

A crucial component of bicycle safety and education is to stress that a bicycle is a vehicle, not an impractical form of transportation or a toy, and that driving a bicycle carries the same responsibility as driving a car. Some of the community's primary safety and educational needs include the following items:

- To educate and support additional Mesa schools to actively participate in the Safe Routes to School Program.
- To continue adding bicycle lanes and routes (when applicable) throughout the City of Mesa in an effort to expand the overall network, and to provide a higher level of bicycle accessibility.
- To increase the frequency and marketing of community bicycle rides in order to promote ongoing awareness.
- To expand educational and awareness programs by the City of Mesa, as resources permit.
- To increase marketing efforts for "Share the Road" as outlined in Arizona Revised Statutes (ARS) 28-735. This legislation highlights the importance of maintaining three-foot spacing between motor vehicles and bicycles. Through the promotion of additional "Share the Road" concepts, there is a need to include signs signifying the importance of providing three feet of space between a motorist and a bicyclist. There is a need to have these signs placed along heavily utilized bicycle routes and lanes throughout the City. In addition to "Share the Road" signs, the Bicycles MAY USE FULL LANE (R4-11) sign with a CHANGE LANES TO PASS placard (R4-11aP) was added to Arizona's Manual of Approved Signs in March of 2017.
- To install additional pedestrian and bicycle crossing signals as needed where shared-use pathways cross arterial streets.

Public Awareness Campaign to Promote Safety and Continuing Education

Although the City of Mesa is very active in promoting bicycle safety, education, and awareness to the community-at large, future efforts will continue to focus on elements of "how to enhance the overall public awareness campaign" in an effort to further

advance bicycle safety and continue bicycle education throughout the City of Mesa. This not only helps to reinforce the message, but also ensures that our residents will receive information that is current and in a format that is convenient for them.

The City of Mesa has established an organized delivery mechanism through **MesaRides!** to effectively provide an overall safety message, product, or service to the bicycling community of Mesa. **MesaRides!** transmits this message through print, public awareness announcements, or visual media. Opportunities to promote the safety message include the following activities:

- Current local and regional bicycle maps at City facilities, the Chamber of Commerce, libraries, and bicycle shops.
- The development of a current web site and social media with bicycle safety information and maps.
- The promotion of Bike Month activities, events, and rides at the local and regional levels.
- More of an emphasis on and awareness of bicycles and public transportation. This campaign can place an emphasis on the interface between bicycling commuters, the availability of METRO Light Rail, and Valley Metro local and regional bus transport.
- Coordinating activities with Citywide bicycle clubs and organizations, and bicycle shops in order to maximize participation in City bicycling activities both at the municipal and private levels so that bicyclists can in turn participate in club-organized and individual bike shop- level sponsored events.
- Coordinate activities with the Employees Clean Air Club, private clubs and employers, and other organizations that are currently located within the City of Mesa.
- Establish community wide efforts and coordination to actively participate in rides sponsored by various organizations to promote sharing the road with bicyclists and motorists on a daily basis.

In the future, it will be necessary to continue to advance safety, education, and awareness concepts throughout the community. In doing so, the City will continue to advance a multi-tiered approach to maximizing public bicycle awareness in the future.

Be Seen, Be Safe Bike Light Program

After research showed most bicycle violations and citations were to bicyclists that either were not using bike lights or using them improperly, violating Mesa City Code 10-1-16, the City of Mesa purchased head lights and tail lights and batteries, developed an educational magnet, and packaged them together to hand out to those in need of this safety equipment.

This program creates a positive interaction between the community and the Police Department. Law enforcement officers in the community were supplied with several kits to provide at their discretion as they had contact with those that in need of bicycle lights. Bike light kits are also distributed through the Crime Prevention Officers, Park Rangers, events, and supplied at the front desk of the Transportation Department.

ENFORCEMENT

Laws should be consistent and interpreted consistently so that neither police nor users (motorists and bicyclists) will be confused on what is legal behavior. Many of the traffic laws that are in place today were created to provide the efficient and safe movement of motor vehicles. Enforcement of bicycle safety rules and regulations is also a function of the Mesa Police Department. Enforcement of traffic laws is an important component of educating motorists and cyclists about the laws of the road as well as improving safety between both users. Bicyclist and motorists both have common behaviors that are illegal and dangerous (Table 3-1).

Law enforcement officers enforce laws for pedestrians, bicyclists, and vehicle drivers, to improve safety. Presently, the enforcement of violations by cyclists plays a very important role in overall traffic safety within Mesa. Enforcement for bicycle violations within the community helps promote compliance with traffic laws, potentially reducing the number of violators and repeat traffic offenders. By increasing enforcement of bicycle related laws, there may be a reduction in fatalities and the number of car-bicycle crashes, thus promoting increased safety.

Types of enforcement throughout the City may include issuing citations, conducting arrests, or providing written or verbal warnings to bicyclists concerning traffic violations. Common violations for bicyclists are driving on the wrong side of the roadway and operating a bicycle at night without appropriate lighting. Other legal obligations for bicyclists can be found in Arizona Revised Statutes, Title 28, entitled Transportation Laws.

Table 3-1	
COMMON VIOLATIONS BY ROAD USERS	
Bicyclists	**Motorists**
Failure to have proper lighting	Failure to signal
Running red lights	Running red lights
Rolling through stop signs	Rolling through stop signs
Failure to yield to pedestrians	Failure to yield the right of way
Parking in front of walkways	Parking in bike lanes
Riding on the wrong direction	Turning right from the bike lane or in front of cyclists

Based on observations and input from citizen advocates, advisory boards, survey respondents, and City staff, typical bicycle-motor vehicle conflicts that should be addressed include the following items:

- Motorists not yielding to bicyclists.
- Motorists driving in bicycle lanes.
- Motorists not providing bicyclists with enough room on the street (three-foot spacing as specified in ARS 28-735).
- Bicyclists disobeying traffic signals or wrong way riding.
- New drivers and winter visiting drivers not aware of bicycle laws.
- Bicyclists not utilizing proper safety equipment such as lights and reflectors.

Between community education and support for enforcement efforts, the City of Mesa can help to build respect between bicyclists and motorists by working together with the Mesa Police Department and the Maricopa County Sheriff's Office in identifying high

risk areas that have above average crash and fatality rates. The City of Mesa will continue to assess future enforcement needs and requirements in order to promote a safe environment for bicycling throughout the community. There will also be a thorough analysis of how the City can work to incorporate enforcement components into the mode of bicycling, in order to maintain bicycling as a safe and efficient mode of transport for citizens of the community.

Mesa Bicycle Mounted Police Officers

Mesa bicycle officers are able to better incorporate their senses, including smell and hearing, to detect and address crime. Mesa bicycle patrol officers are often able to approach suspects virtually unnoticed, even in full uniform and are a highly mobile, visible presence. According to the International Police Mountain Bike Association (IPMBA) research has shown that bicycle patrols are more approachable than cruisers allowing for positive interface between the police and public. Mountain bikes have proven effective in a number of different environments. They are swift and agile in busy urban areas where traffic snarls and crowds delay motorized units. Bicycles are also effective in less urban areas for park patrol, parking lots, campus areas, residential patrol, business security, athletic or civic events, and specialized details. They can be operated on streets, sidewalks, alleys, trails, and other areas that are difficult to access with motor vehicles.

Police Education

Police officers come in contact with bicyclists and motorists on a daily basis. This puts police officers in a unique position to assist with and add credibility to community efforts encouraging bicycling and improving bicycle safety. However, most officers do not possess the bicycle specific law knowledge to enforce bicycle laws effectively. Awareness of these rules can lead to more efficient enforcement of laws and encourage good behaviors, while taking advantage of teachable moments with both bicycles and motorists. The ultimate goal is to prevent crashes and enhance traffic safety. Most police officers have never received bicycle specific training and they are unaware of the leading causes of bicycle related crashes. Without the proper knowledge and training police officers cannot warn bicyclists and motorists of improper actions that may lead to accidents and injuries between the two modes of users. Currently the City of Mesa has taken steps to inform police officers about bicycle laws through the institution of briefings on bicycle related traffic laws. These briefings are conducted in all districts on an annual basis.

Mesa has put City Code 10-1-15 into effect making it illegal to ride your bicycle on the sidewalk along Main Street, between Sirrine and Country Club Drive due to the strong pedestrian presence in the downtown center along Main Street and the number of outdoor seating areas. The code has been complemented by permanent signs reminding bicyclists to walk their bicycles on the sidewalk and a Walk your Wheels public education and safety campaign.

Arizona Bike Law

Cyclists riding their bicycles on the roadway, shoulder, or driveway are considered drivers of vehicles and must operate according to the laws for drivers of vehicles. Cyclists walking with their bicycles are considered to be pedestrians, and must operate according to the laws for pedestrians. These laws are enacted in an attempt to create a safer environment for the citizens of Arizona. Unfortunately, it seems that many are unfamiliar with bicycle related traffic laws, and thus compliance is much lower than with laws that pertain primarily to motor vehicle operation. It is important for bicyclists, drivers of vehicles, and police officers to understand these laws, and to view a bicyclist as an operator of a vehicle on the roadway and not a bicycle rider.

This concept of operating a bicycle as a driver is not easily understood or remembered by a lot of cyclists because since childhood, unlike the automobile, bicycles were a toy. Enforcement programs can be used to educate roadway users about the traffic laws and serve as a reminder to obey traffic rules, and encourage safer behaviors.

Enforcement is not meant by definition to limit a police officer to writing a citation. Enforcement can apply to several different approaches that can be effective for getting the violator's attention of an infraction and the corrective measures that are needed to become a safer participant on the road.

Several states have integrated bicycle operation and safety questions into motor vehicle driver tests. These questions are intended to bring awareness and understanding of bicyclists and their lawful place on the roadway. Challenging drivers to be knowledgeable about bicycles and understanding that bicycles are in fact a legal mode of transportation with the right to use roadways should help to discourage animosity and negative connotations and misconceptions about cyclists.

Mesa staff support implementation of bicycle laws with higher safety standards such as mandatory helmet laws for minors and prohibiting bicycle riding on sidewalks in the Town Center and other high pedestrian areas. Mesa staff also provide support for new bicycle related legislation brought forward in initiatives by private non-profit bicycle advocacy groups.

CHAPTER FOUR

BICYCLE FACILITIES AND DESIGN OPTIONS

Introduction

This chapter will provide an overview of bicycle facility elements used by the City of Mesa. Additionally, this chapter will introduce innovative concepts that are emerging and nationally accepted best practices in bicycle facility design. The bicycle facilities used within the City of Mesa are meant to provide a safe and comfortable experience for the bicyclist. Facilities include separated bicycle facilities, bicycle lanes, bicycle routes, shared use paths, bicycle parking, bicycle signals and bicycle access. The City of Mesa is at the cutting edge of bicycle infrastructure and will continue to implement innovative and creative alternatives as a regional and national leader.

As mentioned above, this plan will expand the City's current bicycle facility options by discussing current best practices and introducing innovative concepts. The goal of this chapter is to develop and present the best bicycling facilities available.

Basic Elements

The network of facilities for bicyclists consists of a handful of basic elements. These elements include bicycle lanes and routes, shared-use paths, various signing and pavement markings used to define bicycle facilities, unique traffic controls, and the bicycle boulevard concept. Many of these elements will help to create a street that includes space for bicyclists, thereby making it more "complete." A Complete Street helps to encourage bicyclists, as well as pedestrians, to use the street cross-section to travel.

Shared use paths, separated bike lanes, standard bike lanes, bicycle boulevards, and bicycle routes are the key infrastructure alternatives to create a complete bicycle network. All have of varying levels of comfort for the user and appeal to different rider types with shared use paths being the most removed from vehicular traffic to bicycle routes and boulevards being the least removed. Discussions on the basic bicycle facilities elements follow.

Bicycle Lanes

Bicycle lanes provide bicyclists with a space dedicated to them that allows the rider to travel at a speed independent from adjacent motor vehicles or pedestrians. Bicycle lanes help to increase the visibility of bicycle riders to motorists. In cases where right-of-way or barriers prevent the continuation of a bicycle lane, the facility may be reduced to a bicycle route until continuation of the bicycle lane is possible. All bicycle lanes should be in accordance with the City of Mesa Standard Details and the Manual on Uniform Traffic Control Devices (MUTCD).

The 2012 AASHTO Guide defines a bicycle or bike lane as "a portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists." The City of Mesa typically incorporates bicycle lane design into all appropriate new construction. Additionally, existing roads are routinely evaluated and bike lanes are added whenever possible during resurfacing and reconstruction of existing streets.

There are several factors Mesa considers when looking at the design of a bicycle lane. The City follows AASHTO minimum recommendations for bicycle lane width. If there is no curb and gutter, AASHTO recommends a minimum 4 foot width. If there is curb and gutter, 5 feet is the minimum recommended width. City of Mesa Standard detail M47.5 illustrates specifications for a typical bicycle lane layout and is used for implementation. Bicycle lanes not only provide a dedicated space for bicyclists, but also greatly reduce bicycle and pedestrian conflicts.

Bicycle lanes have the following characteristics:

- Bicycle lanes are not physically separated from vehicle lanes
- Bicycle lanes are designated by signs and pavement markings (lane striping and symbols).
- Bicycle lanes offer preferential or restricted use to bicyclists.
- Bicycle lanes increase operating width for bicyclists.
- Bicycle lanes provide for more predictable movement of motorists and bicyclists.
- Bicycle lanes may vary in width depending on conditions.

Other considerations that may be taken into account when designing bicycle lanes are:

- Bicycle lanes should be one-way facilities.
- Bicycle lanes should carry bicycle traffic in the same direction as adjacent motor vehicle traffic.

- Pavement surfaces should be level and smooth.
- Where drain inlets and utility covers are present, they should be bicycle-safe and adjusted flush with the roadway surface.
- Delineate bicycle lanes from motor vehicle lanes with minimum 6-inch wide solid white stripes. Mesa uses 8-inch wide stripes for bike lanes.
- Where bicycle lanes exist in advance of a roundabout, terminate bicycle lane striping at a bicycle ramp or the pedestrian crosswalk, providing access to the shared use path.

Separated On-Street Bike Lane/Cycle Track

A Separated On-Street Bike Lane or Cycle Track is a more secure bike lane with one- or two-way lanes separated from car traffic by a barrier. Not only do cycle tracks put a physical barrier between cyclists and vehicles, which has been proven to reduce motor vehicle crashes, but cycle tracks also encourage new bicyclists out of the 'interested but concerned' group because they feel safer riding removed from traffic.

Some barrier types include a striped buffer with delineator posts, physical median, bioswales and grade separation.

Bike lane buffers offer a gap between the bicyclist and traffic, providing a more protected experience for the bicyclist. Bike lane buffers should be a minimum of 18 inches, with an optimal width of 3 feet preferred depending on the type of vertical separation. 6 feet is the maximum width recommend. The FHWA Separated Bike Lane Planning & Design Guide provides guidance and details for various design applications.

The material for the bike lane buffer can vary. The most cost-effective way to indicate a bike lane buffer is with a striping pattern. For buffers in the 18 inch to 3 foot range, a diagonal stripe is recommended in conformance with NACTO and the MUTCD. Buffers greater than 3 feet should be striped in a chevron pattern.

An alternative to striping is stamped asphalt. Stamped asphalt provides a variant in texture, alerting both drivers and bicyclists to stay on their respective sides. The material should be a contrast to the asphalt, a brick red color is preferred. In areas of high speed traffic, vertical elements can be installed for additional protection.

Landscape medians or on street parking can be used to provide an even larger separation between bicyclists and vehicles. When on street parking is put between the traffic lane and the bike lane, it's important to design considering the 'door zone' and provide an additional 3 feet of space for parked vehicles to enter and exit without impacting the safety of the bicyclist. Landscape medians vary in width and material, the distinction is that a curb is provided between the bike lane and the traffic lane. In addition to providing a barrier, landscape medians also provide a sense of place along a corridor and can be an improvement the aesthetic and shade.

Raised Bicycle Lanes create a physical grade separation and an individual space for the rider. The change in surface elevation and color help both the motorist and the cyclist to differentiate between travel lanes. The raised lane design should take into account considerations such as smoothness, drainage, color, and mountable curb slope.

To make bicycling feel safe for most people, it is necessary to physically protect bicycle lanes; painted single lines are simply not enough of an incentive to encourage bicycle riding when people are exposed to motor vehicle traffic. National studies have found about half of the population fits into the category of "Interested but Concerned" - they are interested in bicycling for transportation but concerned about their safety on the roads. In Mesa, only about one-third of people on bicycles will ride in a painted bicycle lane on a busy road while 70% of bicyclists would feel comfortable riding in a protected bicycle lane, but not a painted one.

The safety performance of separated bike lanes (SBL), has been studied extensively over recent years, both in the United States and abroad. Much of the high-quality research regarding SBL's is coming from outside the U.S. Currently, studies from as near as Canada and as far as the Netherlands and Denmark in Europe are conducting the greatest detail into their safety research. These hubs for research, which are currently leading the world as the foremost authority on bicycle infrastructure are an excellent reference for U.S. cities and jurisdictions wishing to make their communities more bicycling and walking friendly. By studying these studies and research topics, planning organizations

and departments can better understand rider behavior and how the differences in behaviors between cyclists and drivers affect the all ages and abilities paradigm. With that being said it is vital as public representatives for our community to carefully consider findings and be able to apply them in a context that is sensitive to the local wants and needs of our community.

Current, global best practice agendas or methods take into account for:

- Crash Analysis
  - Incident analysis
  - Severity analysis
- Before and after studies
- Case studies / incident interviews
- Video observation
- Conflict path analysis

Aside from the Dutch and other international entities that are currently researching and examining the safety of all ages and abilities networks, Federal Highways Administration (FHWA) has produced its own Separated Bike Lanes planning and design guides about the specific subject that should be considered;

- What are the general ridership benefits of separated bike lanes?
- What are the preferred speed and volume thresholds to recommend separated bike lanes?
- What are the preferred widths for a one and two – way separated bike lanes?
- What is that best practices for horizontal alignment of separated bike lanes and intersection movements?
- What should the recommended height of the separated bikes be relative to the adjacent roadway and sidewalk height?

The main objective of a bicycling network is to make it possible for people to get where they need to be by bicycle, using a route that does not exceed the cyclist tolerance for traffic stress, without undue detour.

Shared-Use Pathway Design

Shared-use paths are facilities exclusive to non-motorized users and have minimal vehicular cross traffic. Shared-use paths are not to be confused with trails, which are similar with regard to right-of-way, but typically not paved.

Shared-use paths provide excellent recreational opportunities to bicyclists as well as joggers, walkers, roller bladders, and wheel chair users. Shared-use paths can occupy abandoned railroad alignments, canal access roads, or utility easements, as well as parks and educational campus environments.

An important consideration when planning and designing shared-use paths is access management. Ingress and egress opportunities should be provided frequently, accessing local streets, neighborhoods, activity centers, and parks. Shared-use paths should be well lit to provide security and visibility.

The City of Mesa strives to achieve a minimum of 10 feet in width for shared-use paths, which complies with the AASHTO Guide. However, when possible, paths ranging from 12-15 feet are preferred. Conversely, there are often situations where the area is too narrow to obtain the minimum desired width. In those cases it is better to reduce the path width than terminate it all together. In locations that will be used by equestrians in addition to bicyclists and pedestrians, consideration should be given to accommodating horses. The Equestrian Design Guidebook for Trails, Trailheads and Campgrounds, produced by the FHWA, USDA and USDOT should be used for any shared use paths designed to accommodate equestrians. Equestrians should be offered a mode separation that will afford horses better footing such as decomposed granite or sand.

Bicycle Routes

Bicycle routes are identified through a number of signs but do not have separate lanes for exclusive bicycle use. Bicycle routes have traditionally been placed along roadways and half-mile streets with lower traffic volumes, yet provide higher degrees of connectivity between neighborhoods and the arterial street network. They have worked well in providing access to neighborhoods. Bicycle routes have also functioned as a safety component to the transportation system through their use of visible route signage, which provides notice to motorists that they are driving along a designated bicycle route, and that bicyclists could be near. Although not striped like a bicycle lane, bicycle routes often contain a pavement line separating road shoulders from vehicular traffic.

Bicycle Boulevards

Bicycle boulevards are low motor vehicle volume, low motor vehicle speed streets, where bicycle traffic is encouraged while similar through trips by non-local vehicular traffic are discouraged. Bicycle boulevards are meant for safe and efficient movement of bicycles. This can be achieved through several different methods including use of signs, on-street markings, or traffic calming devices to create a roadway that prioritizes bicycle traffic.

The design of the bicycle boulevard is very flexible and can be tailored to meet specific needs for each roadway. The idea of the bicycle boulevard is to provide an environment where bicyclists are free to use the full lane, sharing road space with cars. Motorists on these routes expect to see bicyclists and therefore travel with caution. Not all design elements are needed to constitute a bicycle boulevard. A bicycle boulevard can be created simply with the incorporation of pedestrian / bicycle actuated signals and wayfinding along a route. Designated streets should be distinguished with uniformly colored signs and pavement markings.

Shared Lanes (SHARROWS)

Sharrows are used to show motorists that bicyclists may "take the lane" as well as helping bicyclists achieve proper lane positioning. In San Francisco, which studied design and placement of sharrows in 2004, sharrows were shown to improve lane positioning of bicyclists and improve passing distance by motorists. Sharrows also cut down on the number of sidewalk bicyclists and wrong-way bicyclists.

Sharrow lane markings can be used to alert motor vehicle drivers to the presence of bicyclists. Identifying the lane as shared-use will inform bicyclists to take their lawful portion of the travel lane while positioning them outside the "door zone" of cars parked on-street. The use of shared lane markings also encourages motorists to give the lawful three feet of distance when passing.

Shared lanes are often used within roundabouts and where there is not enough right-of-way to incorporate full bike lanes but traffic volumes and street width warrants the encouragement of bicyclists to ride on the correct side of the roadway. Shared lane markings should not be used on roads with a speed limit more than 35 mph, and lane markings should be provided at a minimum of once every 250 feet as well as after every intersection.

Bicycle Facility Design Guidance

As a leader in bicycle infrastructure in the United States, Mesa is continuously striving to implement the national best practices. Nationally, every year there are more innovations in bicycle infrastructure that help improve safety and efficiency across the country. As such, annually there are more tools available to grow, design and develop a superior bicycle network. Flexibility in design is encouraged by FHWA in developing context sensitive solutions, particularly in urban areas. If Mesa continues to stay up to date with the best practices and be aware of innovation occurring in comparable cities, we will grow as a national example.

The City of Mesa Transportation Department uses national and regional guides in designing and operating bicycle facilities. The following resources are current best practices relevant to bicycle infrastructure design:

- American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities *(AASHTO Guide) (https://store.transportation.org/Item/CollectionDetail?ID=116)* The fifth edition will be published in 2019.
- FHWA Separated Bike Lane Planning and Design Guide *(https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/)*
- MassDOT Separated Bike Lane Planning & Design Guide *(https://www.mass.gov/lists/separated-bike-lane-planning-design-guide)*
- National Association of City Transportation Officials (NACTO) Urban Bike Design Guide provides a baseline for bicycle infrastructure and has recommendations for everything from bicycle signal design to high visibility pavement markings. *(https://nacto.org/publication/urban-bikeway-design-guide/)*
- The MAG Active Transportation Plan toolbox will be available in 2019 and will include design guidelines for sidewalk accessibility and comfort; on- and off-street bicycle facilities; low stress bicycling network connectivity; active transportation districts and placemaking; shared use paths and rural paved shoulders; integration with local and regional transit; and active transportation amenities such as street calming, lighting, shade, and wayfinding. The toolbox will also include: intersection design guidelines for protected intersections, bike boxes, enhanced pedestrian crossings, protected bike lanes, midblock crossing medians, seating, drinking water fountains and restrooms, bicycle parking,

and bicycle and pedestrian signal strategies, including detection, priority and pre-emption. The toolbox will include detailed guidance, considerations, and references for additional design guidance *(e.g., NACTO, AASHTO, FHWA).*

Interim Approvals Issued by FHWA

Colored Bike Lanes can often be a traffic calming technique that gives a visual perception of a narrower roadway. Colored bike lanes give the rider a psychological perception of separation from traffic and provide guidance and separation of bicycle and motor vehicles in confusing mixed traffic intersections. Green bike lanes highlight areas where bicycles and cars could encounter a potential conflict from crossing paths. The green color of the bike lanes is to alert drivers and bicyclists of the possible conflict and prompt them to take extra precaution when traveling across these areas. If a pair of dotted lines is used to extend a bicycle lane across an intersection or driveway (see Section 3B.08 of the 2009 MUTCD) or a ramp, green colored pavement may be installed between these lines as a supplement to the lines. When the pattern of the green colored pavement is dotted in a manner that fills in only the areas that are directly between a pair of dotted line segments that are on opposite sides of the bicycle lane extension, it may be referred to as “bike cross” or “peppermint stripes”. Mesa has been granted Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14).

The State of Arizona has been granted Interim Approval for the Optional Use of an Alternative Design for the U.S. Bicycle Route (M1-9) Sign (IA-15), which applies to all jurisdictions within Arizona. U.S. Bicycle Route 90 follows Adobe Street, Mountain Road, Quarterline Road, Brown Road, 80th Street, Grand, University Drive and Rio Salado Parkway within Mesa.

Bicycle signals are typically used to improve identified safety or operational problems involving bicycle facilities or to provide guidance for bicyclists at signalized intersections or hybrid beacons to indicate bicycle signal phases and other bicycle-specific timing strategies (e.g., bicycle only movements, leading bicycle intervals). Use of bicycle signal faces that contain bicycle symbols shall be limited to situations where bicycles moving on a green or yellow signal indication in a bicycle signal face are not in conflict with any simultaneous motor vehicle movement at the signalized location, including right (or left) turns on red. Mesa has been granted Interim Approval for Optional Use of a Bicycle Signal Face (IA-16).

A Bike Box is formed by an advance stop line placed at least 10 feet in advance of the intersection stop line at a signalized intersection that allows bicyclists to position themselves in front of traffic waiting at the red light. Green-colored pavement may be used within a bicycle box and the approach bicycle lane. When the cross street has bicycle facilities and a high volume of bicycle traffic, bike boxes can provide extra assistance for bicyclists turning left. Designed to be used only at signalized intersections, the box is intended to reduce car-bike conflict, increase cyclist visibility, and provide bicyclists a head start when the light turns green.

Right turns on red shall be prohibited from the approach where a bicycle box is placed using a NO TURN ON RED (R10-11 series) sign. Mesa would need to submit a written request to the FHWA for Interim Approval for the Optional Use of Intersection Bicycle Boxes (IA-18) prior to implementation.

The two-stage bicycle turn box is an area set aside for bicyclists to queue to turn at a signalized intersection outside of the traveled path of motor vehicles and other bicycles. When using a two-stage bicycle turn box to make a left turn, a bicyclist would proceed on a green signal indication to the turn box on the right-hand side of the travel lanes, and then turn left within the turn box and wait for the appropriate signal indication on the cross street to proceed. Two-stage bicycle turn boxes can also be used with a left-side bicycle facility to facilitate bicyclists turning right. In addition to mitigating conflicts inherent in merging across traffic to turn, two-stage bicycle turn boxes reduce conflicts between bicycles and pedestrians and separate queued bicyclists waiting to turn from through bicyclists moving on the green signal. Mesa would need to submit a written request to the FHWA for Interim Approval for the Optional Use of Two-Stage Bicycle Turn Boxes (IA-20) prior to implementation.

Accommodations at Major Intersections

Intersection design is complicated by the need to accommodate several different turning patterns at one time by bicyclists, vehicles, and pedestrians. When evaluating an intersection with regard to movement of motor vehicles and non-motor vehicles, several different assumptions may be considered regarding traffic volume, location, and specific context of the intersection.

- Motor vehicles executing a right hand turn should do so from the furthest most right lane.
- Bicycle through traffic should always be to the left of a motor vehicle right turn only lane.
- Bicycle traffic executing a left hand turn at an intersection should do so from the left hand turn only lane or from the lane furthest to the left or as close to the centerline or the left side lane as practicable. Where a significant volume of left turning bicyclists are expected, bike boxes should be installed to provide additional visibility.

The only clear instruction found in the MUTCD with regard to bicycle lanes that enter into or extend through an intersection is that a through bicycle lane shall not be positioned to the right of a right turn only lane. Intersection layout details are available in the City of Mesa Standard Details.

Bicycle and Pedestrian Actuated Crossing Signals

The success of a shared use pathway or trail system is highly dependent on the ability of the user to safely cross busy streets when encountered. The choice to travel as a bicyclist is in part dependent upon the actual and perceived ability to safely and efficiently cross streets along the intended travel route. In order to prevent a high traffic volume arterial from becoming a barrier to bicyclists, the incorporation of pavement markings and traffic signals should be considered.

There are a variety of crossing treatments available to assist bicyclists and pedestrians to cross the road safely. These treatments may include crosswalks or enhanced crosswalks and traffic signals, such as pedestrian hybrid beacons, also known as HAWK signals.

To convert a traditional pedestrian hybrid beacon to a BikeHAWK the following elements need to be added to the enhanced crossing:

- A clearly marked bike lane to position bicyclists into a safety zone
- Signal detection buttons in an easy to reach location for bicyclists
- MUTCD approved signing and marking advising bicylists to observe pedestrian signals and ride with traffic after the crossing

The FHWA Memorandum, “Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)” released in 2013 spells out the purpose, background, research and details about how bicycle signal faces should be used at signalized intersections.

Pedestrian Actuated Signal Devices

Pedestrian actuated signal devices require the user to push a button in order to activate a walk signal indicator and initiate a WALK interval. According to the MUTCD, pedestrian actuated signal devices should be installed:

- When a traffic signal is installed under the Pedestrian Volume or School Crossing warrant,
- When an exclusive pedestrian phase is provided (when motorists are stopped in all directions),
- When vehicular indications are not visible to pedestrians, and
- At any established school crossing with a signalized intersection.

Bicycle Detection

Bicycle detection can be incorporated at intersections that experience heavy volumes of bicycle traffic. When a bicycle is detected, the green time will be extended to allow the bicycle enough time to safely cross the intersection. Bike signals can additionally be installed to give bicyclist the ‘go’ before vehicles in the intersection are allowed to move. Non-intrusive video bike detection or loop detection can be used. A detection symbol pavement marking should be indicated when bicycle detection is being used.

Wayfinding

Wayfinding for bicycling means a consistent use and organization of definite sensory cues from the external environment. These cues can be present in the form of pavement markings and signs, or other audible or tactile cues. Wayfinding provides valuable information at decision points, helping bicyclists find their way through the built and natural environment.

The City of Mesa established number routes to get residents safely to popular destinations using a clear route. Route numbering signage was adopted along these paths for bicyclists to navigate Mesa’s network. The City of Mesa has also implemented wayfinding into major routes, such as the Stadium Connector, Porter Parkway and Rio Salado pathway. At these locations, wayfinding is done through traditional signage and pavement markings. Wayfinding can provide

directional instruction, as well as useful information to the bicyclist. Experienced, intermediate, and novice riders alike will have an enhanced experience with an alternative that blends the roadway riding experience with the conveniences of separated and canal shared-use pathways.

Bicycle Parking Design Standards

At present, the City of Mesa does not have adopted bicycle parking provisions in its municipal zoning ordinance. Current planning cases are reviewed during design and are generally recommended to consider bicycle parking at all commercial and industrial developments. These recommendations do not include the number of spaces needed, location, or proximity to buildings. They also do not account for long-term versus short-term parking. Current design standards as specified in Chapter 15 of the City of Mesa Zoning Ordinance do not provide direction for bicycle rack placement, how the rack element interacts with the bicycle, or direction for additional racks when placed in groups.

Review of Bicycle Parking Classifications

Bicycle parking types fall into two primary classifications: short and long term parking. These classifications define the type of facilities that will be provided to the bicyclist. Short-term parking focuses on outdoor installations intended for limited use, enabling the bicyclist to secure their bicycle usually for a period of less than four hours. Long-term parking is intended for bicyclists who are leaving their bicycles for an extended period of time, typically for the work or school day.

Short-Term Parking

Short-term parking is usually provided by a bicycle rack unit that is intended to provide two points of support to the bicycle, and may be used with a typical bicycle lock. Typically, short-term parking does not provide security for bike accessories or weather protection, and is intended to be located no more than fifty feet (50') from the main door of the building, but not farther than the closest automobile parking space, in a well-lit, visible location. The amount, location, usage, and ratio of bicycle to motor vehicle parking spaces should be monitored and adjusted to best accommodate the users of that facility.

Long-Term Parking

Long-term parking is intended for users who are going to leave their bicycles unattended for extended periods of time. Locations that might be considered for long-term parking facilities may include places of employment, transit centers, educational facilities, airports, and train stations. Mesa prefers using bicycle lids for long term bicycle parking facilities, which are installed when requested. Currently, the locations utilizing long term parking accommodations are large employment centers. Bike lids are a secure clam-shell cover that provides long term protection from the elements, vandals and thieves which adds a level of security that provides peace-of-mind for riders needing a long-term parking solution.

Design Standards

Bicycle rack elements should be designed to follow these standards (See Figure 4-1):

- The bicycle rack must support the bicycle upright by its frame in a minimum of two places.
- Enable the bicycle frame and one or both wheels to be secured.
- Support a bicycle without a diamond shaped frame with a horizontal top tube.
- Allow front-in parking. A U-lock should be able to lock the frame down tube and front wheels securely.
- Allow back-in parking with the ability to U-lock the bicycle seat tube and rear wheel.
- The rack unit should be resistant to cutting or being detached by common hand tools that can be stored in a backpack or coat.

Bicycle Parking Dimensions

- Bicycle parking should be at least two feet wide by six feet long, and have a minimum overhead clearance of seven feet.
- Racks should have a minimum of a four-foot aisle for bicycle maneuvering beside or between each row of parking.
- Racks and lockers should be securely anchored to the ground or a structure.

Bicycle Parking Locations

- Bicycle parking should be located in a well-lit, secure location, within 50 feet of the main entrance or an entrance when located at a building with multiple entrances, but not further than the nearest motor vehicle parking space.
- Parking racks should be located so they will not conflict with pedestrian movements, and should have direct curb cut access to discourage riding on the sidewalk.
- Parking should be separated from vehicle parking by a physical barrier to reduce to the chance of

damage to the bicycle by an adjacent vehicle.

- Many facilities will require both types of bicycle parking to provide appropriate parking for both short-term customers and long-term employees.
- Bicycle parking, when located in public right-of-way, should maintain a minimum of 42 inches of clearance to allow for substantial ADA pedestrian passage through the area.

Recommended Zoning Code Additions

Tables 4-1 and 4-2 provide bicycle parking requirements recommended to be included in the zoning code.

In addition to the recommended minimum bicycle parking requirements, facilities to accommodate the basic needs of bicyclists requiring longer term bicycle security and amenities that will support longer commutes such as locker and shower facilities are recommended.

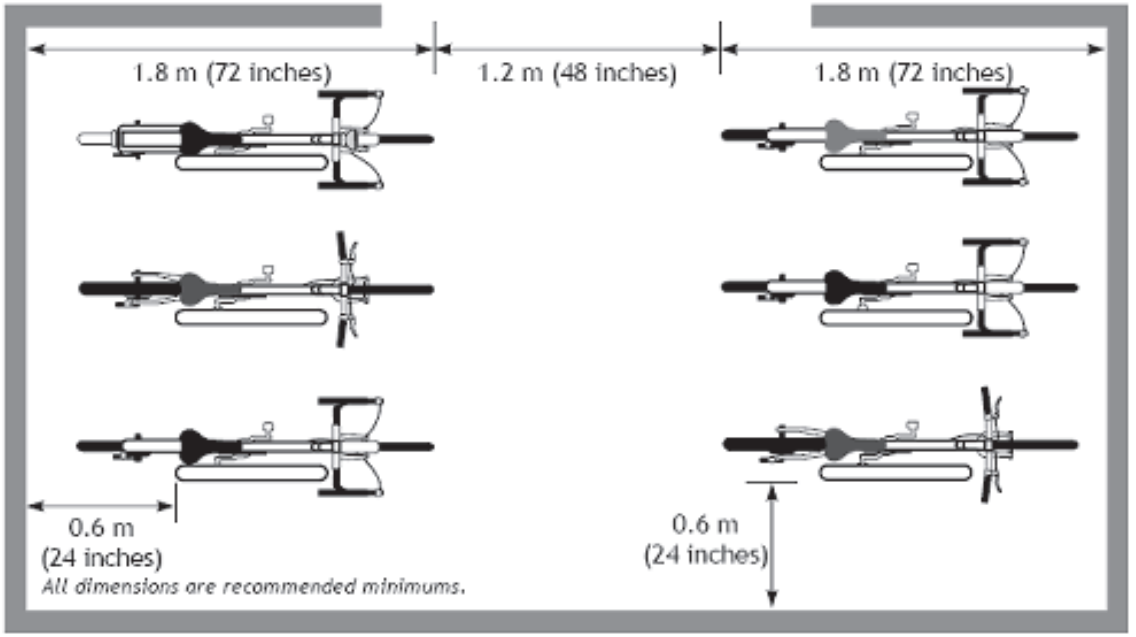

Figure 4-1 Bicycle parking dimensions Source: Wisconsin DOT

Table 4-1 Recommended Zoning Code Minimum Required Bicycle Parking Spaces

PARKING FOR BICYCLES			
Use		**Bike Parking Requirement**	
		Long-term	**Short-term**
Residential Users			
I	Multiple Residences	1 per 4 units	None
II	Multiple Residences with 5 or more units shall also provide	None	2 bike racks per 20 units
Public Assembly and Schools			
III	Theaters, auditoriums, assembly halls, churches, clubs, lodges, fraternal buildings, funeral homes, arcades, cyber bars	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts	1 per 40 seats and 1 per 1,000 sq. ft. of non-seated area: 1 per 20 seats and 1 per 1,000 sq. ft. of non-seated area in Downtown Core (DC) Districts

Table 4-1 Recommended Zoning Code Minimum Required Bicycle Parking Spaces (continued)			
PARKING FOR BICYCLES			
Use		**Bike Parking Requirement**	
		Long-term	**Short-term**
Public Assembly and Schools			
IV	Community centers and libraries, pools	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts
V	Swap meets and farmers markets	1 per 4,000 sq. ft.	1 per 4,000 sq. ft.
VI	Schools, kindergarten through ninth grade	1 per classroom	None
VII	High schools, charter schools, academies, colleges, universities, trade or vocational schools	A number of spaces equal to ten (10) percent of the maximum students present at peak hour plus five (5) percent of employees	None
Health Care			
VIII	Medical or dental offices and outpatient clinics	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts
IX	Hospitals and nursing and convalescent homes	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.
X	Day care centers and nurseries	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.
Group Commercial Developments			
XI	Group Commercial Developments (Shell buildings, no specific uses)	1 per 12,000 sq. ft.	1 per 4,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts
Independent Commercial Building and Uses			
XII	General offices/retail and services	1 per 10,000 sq. ft. 1 per 8,000 sq. ft. in Downtown Core (DC) Districts	1 per 3,000 sq. ft. 1 per 2,000 sq. ft. in Downtown Core (DC) Districts
XIII	General auto repair garage, service stations, car washes and drive through lubrication shops	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.
XIV	Hotel and motel	1 space per 10 rooms or suites	2
XV	Restaurant, bar	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.
XVI	Outdoor sales and service areas, (car lots, plant nurseries, building supplies, etc.)	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.

Table 4-1 Recommended Zoning Code Minimum Required Bicycle Parking Spaces (continued)			
PARKING FOR BICYCLES			
Use		**Bike Parking Requirement**	
		Long-term	**Short-term**
Recreation			
XVII	Bowling centers	1 per 12,000 sq. ft.	1 per 4,000 sq. ft.
XVIII	Golf courses and driving ranges	None	2
XIX	Miniature golf, amusement parks, batting cages, water parks, skating rinks, dance/event halls	1 per 8,000 sq. ft.	1 per 2,000 sq. ft.
XX	Health spas/clubs, gyms, handball, racquetball courts/clubs	1 per 8,000 sq. ft.	1 per 2,000 sq. ft.
XXI	Municipal and private parks	1 per 2500 sq. ft. of built area	1 per 500 sq. ft. of built area
Group Industrial Buildings and Uses			
XXII	Shell building, no specific use	1 per 12,000 sq. ft.	2
Independent Industrial Buildings and Uses			
XXIII	Mini storage	None	2
XXIV	Warehouses	1 per 12,000 sq. ft.	2
XXV	Manufacturing	1 per 12,000 sq. ft.	2

Table 4-2 Recommended Long-term Bicycle Parking Amenities for Special Zoning Districts.	
Within Town Center/ Fiesta/ and Mesa Gateway Districts	
Recommendation per use	**Amenities**
Structures containing LESS than 50,000 square feet of M-1, M-2, P.E.P, O-S, C-1, C-2, C-3, DC, and DC gross floor area should provide shower and clothing storage facilities for employees commuting by bicycle.	One shower stall per gender and two lockers per gender.
Structures containing 50,000 square feet or MORE of M-1, M-2, P.E.P, O-S, C-1, C-2, C-3, DC, and DC gross floor area should provide shower and clothing storage facilities for employees commuting by bicycle.	One shower stall per gender and two lockers per gender per 50,000 square feet of gross floor area.
All structures in Overlay Zoning Districts: BIZ, PAD, or DMP gross floor area should provide:	One additional shower stall per gender and two additional lockers per gender.

Bicycle Parking at Transit Shelters

While the majority of bicyclists in Mesa take their bicycles with them when transferring to transit, consideration still should be given to ensure that bicyclists are able to leave their bikes in a safe, secure location if choosing not to travel with them. Transit stops at major arterials in Mesa typically provide amenities including covered shelters, shade screens, benches, trash receptacles, and bike loops.

Bicycle Stations

Bicycle stations provide support services to bicyclists, including secure, staffed bicycle parking and resources for repairs, maps, and other information. Many of these bicycle station facilities offer free parking during hours of operation, as well as paid memberships, which offer 24-hour access to secure parking.

BIKE SHARE

Bike share programs offer users the ability to rent bicycles on a per minute weekly or subscription basis to make short trips to and from popular destinations like the light rail stations and downtown Mesa. Bike share programs provide an accessible way to get users active in biking without having to front the cost of owning and maintaining a bicycle. There are two primary types of bike share, hubs and dockless. Docked bike share programs have a central hub where users must return them to and pick them up from. These stations generally have a kiosk with information about the program or maps of the local bike network. Dockless bikes can get picked up and dropped off anywhere in the designated region. There is a device attached to each of the bikes which tracks its location via GPS and has a keypad for users to free the rear-wheel and unlock the bike when they want to use it.

The bike share companies routinely gather used bicycles from isolated locations and move them to popular areas of town to be reused. Currently there are both docked and dockless style companies that currently operate in Mesa. There are no existing design guidelines or regulations for bikeshare at this time. Bike share companies are currently evaluated on a case by case.

BICYCLE ACCESSIBILITY

Bicycle accessibility generally refers to how bicycles will be accommodated at interchanges, intersections, driveways, and median openings of a roadway. The objectives are to enable access to land uses while maintaining roadway safety and mobility through controlled access location, design, spacing, and operation. This is particularly important for arterials intended to provide efficient service to high volumes of vehicle traffic. Intersections, mid-block collector streets, and private driveways increase the potential for conflicts involving vehicles, bicyclists, and pedestrians. Controlling access to specific land uses and limiting the number of ingress and egress points along an arterial can enhance a cyclist's experience by limiting conflict points that have to be navigated.

Existing limited access to typical Arizona neighborhoods creates a significant barrier to bicyclists and pedestrians who are attempting to enter or exit a location. Mesa is working to improve this common design practice by keeping bicyclists in mind while reviewing new neighborhood design proposals and identifying ways to eliminate existing barriers that will reduce the indirect routes that make non-motorized travel inconvenient.

Corridor Design Improvement Opportunities

Intersections, major arterials, physical barriers, T-intersections, drainage grates, bridges, and railway crossings all require attention with respect to how they impact accessibility to the street network by bicyclists. In some cases, several alternative design treatments need to be used to address complex issues along routes. Using designs that are sensitive to the

unique context of each individual project allows proper roadway treatments to be incorporated, ensuring that all modes of traffic are equally addressed, thus creating a "complete street" that serves all users.

Existing Major Arterials and Roadways

Mesa currently has 237 centerline miles of arterial streets that provide a grid network across most of the City on approximately one mile intervals that serves as the backbone of the transportation network in Mesa. Failing to provide provisions for non-motorized travel leads to an incomplete, fragmented, and inefficient transportation system that increases traffic volumes by inadvertently promoting single occupant vehicle (SOV) travel.

Arterial streets include two, four, six, and eight lane streets, with traffic volumes ranging from 20,000 to 50,000 vehicles per day. Although the City of Mesa strives to add more bike lanes each year as normal maintenance covers existing lane markings, there are locations where there is not enough room to provide the width needed to incorporate bike lanes.

Where there is a relatively short section (approximately 1,000 feet or less) that it is too narrow for a bike lane, but there is room for a bike lane before and after the narrow section, Mesa uses alternative signing and pavement markings that allow bicyclists to continue in a shared lane capacity until they reach the end of the narrow section and re-enter the bike lane.

Sidewalks

There are a great number of bicyclists who ride on the sidewalks and against traffic. Arizona State Law does not prohibit bicycle riding on sidewalks. It does require bicyclists operating on the roadway or shoulder to follow the rules that apply to drivers of vehicles. However, sidewalks are not part of the roadway or shoulder for this purpose, and bicyclists may ride in either direction along a sidewalk.

Bicyclists who ride on the sidewalk in effect create a bikeway/driveway intersection that is separate from a driveway's intersection with the street. According to the American League of Bicyclists, "bicyclists that ride on the sidewalk are approximately 50% more likely to be involved in an accident due to the fact that each driveway encountered becomes a potential intersection scenario." The motorist looks to ensure that traffic is clear, not seeing the cyclist on the sidewalk outside of the line of sight. This is especially likely when the bicyclist is moving in the opposite direction as the adjacent street traffic.

Drainage Grates on Roadways and Paths

The City of Mesa has made the use of bicycle friendly drainage grates a high priority. This has improved safety for riders throughout the City. Older, non-bicycle friendly grates posed the potential for bicycle wheels to fall into the grate causing an accident. The most effective way to avoid drainage grate conflicts for bicyclists is to replace them with curb inlet style drains that eliminate the need to have a drainage grate in the bike lane. (Figure 4-2)

Figure 4-2 curb inlet style drain

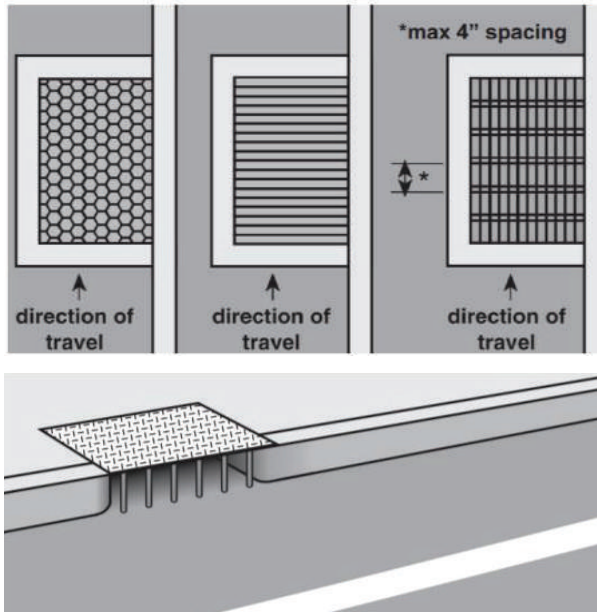

Figure 4-3 Source: Oregon DOT

Due to drainage requirements, including the need to limit how far water from a 10-year storm will encroach upon traffic lanes, it is generally necessary to use inlet catch basins that have the capability to handle larger volumes of water than curb inlets can handle. When drainage grates are needed, it is imperative that they use bicycle friendly designs. (Figure 4-3)

Curbing and Current Street Pavement Conditions

The City of Mesa continually assesses the condition of curbing, sidewalks, and pavement as part of its general maintenance procedures. The average lifespan of pavement is 20 years. From the moment that a road is constructed it begins to deteriorate. Nationally, civil engineers and street maintenance professionals utilize the Pavement Condition Index (PCI). The City of Mesa has been utilizing the Pavement Condition Index for

over 25 years to perform pavement condition surveys each year on over 1,200 miles of streets. Information from the annual surveys identifies specific areas where various types of preventive maintenance treatments such as slurry seal, acrylic seal, or other sealcoats, can be applied. The surveys also identify areas requiring more aggressive rehabilitation projects like a rubberized asphalt overlay or partial reconstruction. Each year Mesa strives to improve the City's overall roadway pavement conditions.

Mesa staff assess the condition of curbing and sidewalks at the same time they evaluate street pavement condition. Sidewalk and curb deficiencies impacting safety or ability to use the sidewalk are repaired right away. Other repairs and updates such as adding ramps are completed in coordination with the road rehabilitation or reconstruction. Additionally, during these rehabilitation projects for major streets, Mesa staff determine if bicycle lanes can be added to the roadway as part of the project.

Physical Barriers

Major barriers that cause difficulties to bicyclists in the City of Mesa are the US60 and L202 Red Mountain freeways. These barriers have been mitigated through the use of bike lanes and sidewalks that extend over the freeways at most arterials and half-mile collector streets. In addition to these major barriers that divide the City, there are other obstacles that provide the cyclist with equally challenging obstacles during their rides.

Medians are intended to restrict or limit motor vehicle traffic from performing left hand turns to reduce the number of conflict points along major arterials. While these are very helpful for reducing vehicle conflicts, there must be design consideration of the median impact on cyclists' access to housing and commercial developments.

Canals are often popular choices for pedestrians and bicyclists who travel throughout the City of Mesa. While canals offer an alternative option that allows bicyclists to travel in Mesa while encountering minimal contact with motor vehicles, they often provide a long barrier for those users needing to access areas that are across the canal. The City of Mesa works with the Salt River Project (SRP) to provide bridge crossings at high use areas when planning and constructing shared-use paths along canals. While these canals are owned by the United States and maintained by SRP, the City of Mesa has a long standing intergovernmental agreement that allows recreational use of the canal banks.

Crossings at Bridges

The City of Mesa currently has 92 bridges within the City limits that are accessible to bicycles. These bridges range from canal crossings at points where canals intersect roadways to ADOT overpasses that cross the US60 and the L202 Red Mountain freeways. The majority of the bridges on Mesa's roadways have been constructed to fully accommodate bike lanes. Those bridges that do not meet current City of Mesa standards are brought up to substantial conformance during road reconstruction projects when feasible.

Railroad and Roadway Intersections

The City of Mesa currently has two rail lines that intersect Mesa's roadway network. AASHTO design considerations recommend that all railroad grade crossings should ideally be at a right angle to the rails. The greater the angle deviates from the recommended right angle, the greater the probability that the bicyclist's front wheel may become trapped in the flangeway causing loss of control. In cases where railroad tracks cross the roadway at an angle of 45 degrees or less, a widened shoulder should be provided to enable the cyclist to achieve a safer angle when approaching the crossing. Crossing surfaces should be level and constructed of a material such as concrete, which is longer lasting than wood or asphalt and less likely to become uneven or damaged.

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CHAPTER FIVE

MESA'S BICYCLE NETWORK

INTRODUCTION

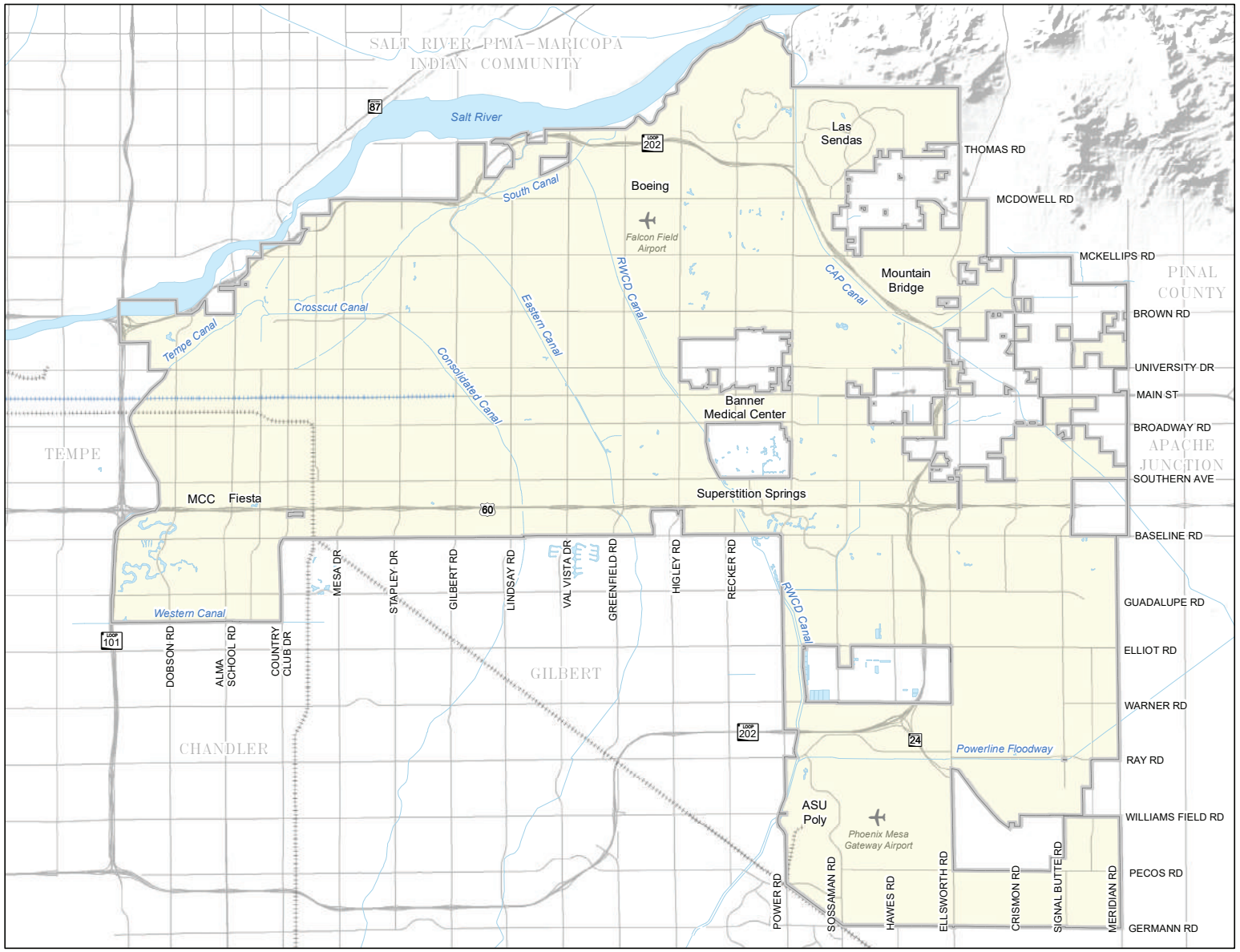
This chapter will provide an overview of the methodology and results of the detailed connectivity and gaps analysis assessment performed for the 2012 Bicycle Master Plan to determine facility needs and prioritization.

City staff biannually analyze current access points and connections, determine current gaps in the network, and prioritize future project funding.

DESCRIPTION OF THE STUDY AREA

The existing boundaries of the City of Mesa are displayed on Map 5-1. As shown on the map, the far eastern boundary of the City is currently situated along the Meridian Road corridor; whereas, the western boundary of the community is situated along the Loop 101 Price Freeway corridor. From east to west, the City is approximately 18 miles wide. The far northern boundary of the City is situated along the Salt River, and the southernmost boundary of Mesa is situated along Germann Road. From north to south, the community is a little over 16 miles in distance.

For the purpose of this plan, the study area will encompass an extended area on which the City of Mesa anticipates to have an influence with respect to bicycling and connectivity to neighboring cities. Map 5-2 displays the Study Area Boundary for the City of Mesa Bicycle Master Plan.



2018 Bicycle Master Plan

Map 5-1

Municipal Boundary

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

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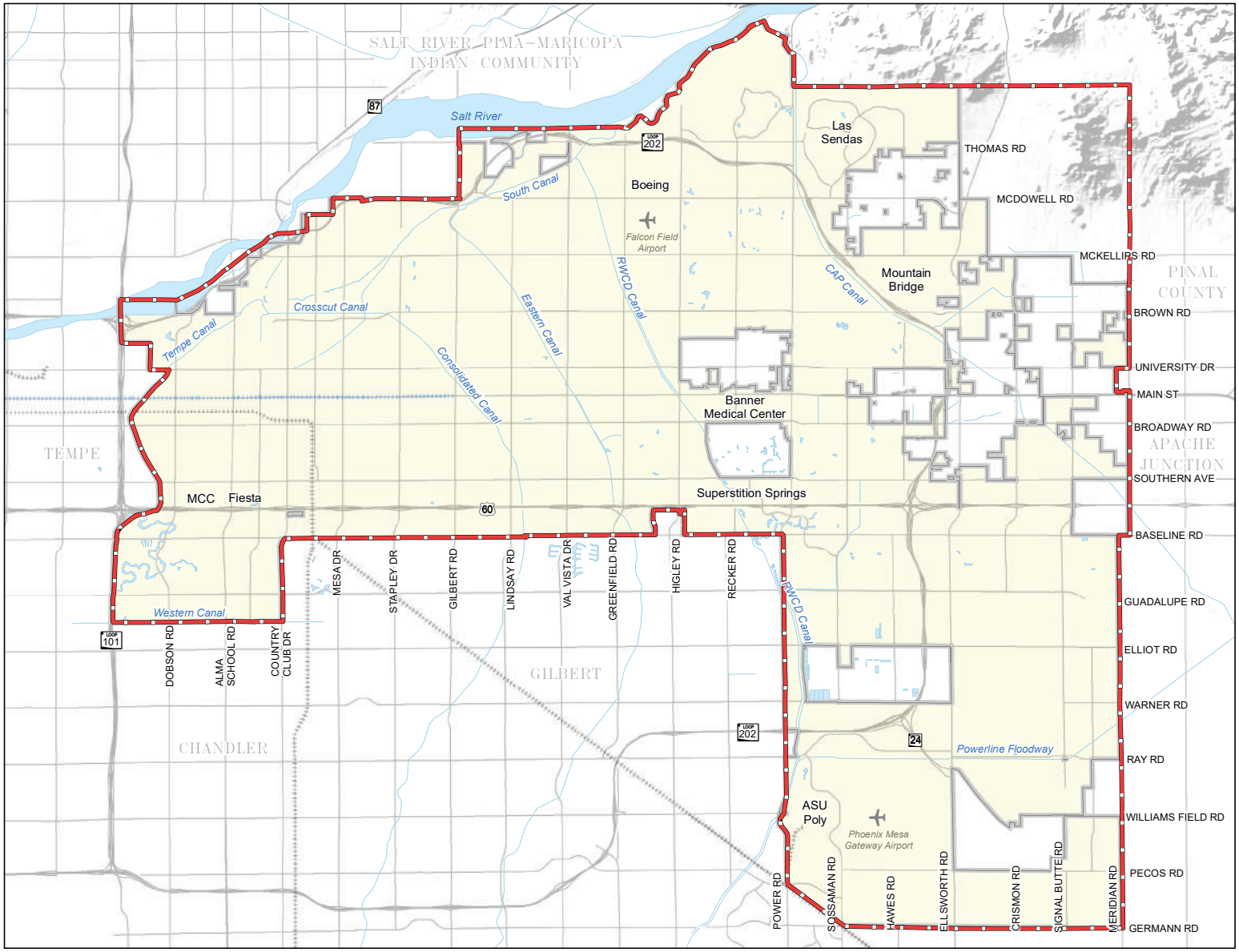

2018 Bicycle Master Plan

Map 5-2

Study Area Boundary

Legend

- Study Area Boundary
- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

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BUILDING OUT MESA'S MULTI-MODAL NETWORK

An integral part of increasing bicycle usage in Mesa is a well-established, finely-grained bicycle network that increases connectivity between neighborhoods, various land uses, and other modes, as well as connections to neighboring jurisdictions. It is the vision of Mesa to provide direct bicycle access to all common destinations and connect all gaps in the current bicycle network.

To accomplish an increase in ridership, the City of Mesa must first realize the need to achieve a new balance between the different modes utilized by residents to achieve their everyday travel needs. When comparing different travel modes, there is a growing general understanding that the existing balance among types of road users too heavily favors motor vehicles and underserves bicyclists and pedestrians. It is quite apparent that motorized vehicles enjoy a place on the road that severely dominates over the movement of other modes.

When looking at these restrictive factors and the negative effects they may have on bicycle usage, a good starting point is understanding the work that has already begun in the Netherlands by a non-profit organization called C.R.O.W. (The National Information and Technology Centre for Transport and Infrastructure) in which the government and businesses work together in pursuit of their common bicycling interests through the design, construction, and management of roads and other traffic and transport facilities. Active in research and in issuing regulations, C.R.O.W. focuses on distributing knowledge products to all target groups. C.R.O.W.'s design manual "Sign Up For the Bike," has become a world renowned publication for bikeway design.

As discussed in the C.R.O.W. design manual, there are five main component requirements that should be met. Failing to adhere to these requirements could result in a condition where cycling is not as attractive of a mode of transportation as it could be. The five main components are safety, coherence, directness, comfort, and attractiveness. When applying these components to the current conditions in Mesa, respondents from our survey stated that:

- Safety was a major concern, and road safety problems were a key factor in the choice to cycle or not.
- Coherence in that consistency and continuity of bicycle facilities need to be achieved to have a non-restrictive, finely tuned bicycle network.
- Directness affects travel time, distance, and the ability to reach desired destinations safely and efficiently, and is a consideration affecting the choice to make a trip by bicycle.
- Comfort of road and pathway surfaces, and the number of stops have a direct effect on the cyclist's perception of a facility and its suitability for bicycling.
- Attractiveness is most significant to recreational cyclists who tend to have strong opinions on the attractiveness of bicycle facilities and their perception of safety and how restrictive a facility is.

Although the perceptions of cyclists may differ, and some opinions weigh heavier in some categories than others, each of these components will need to be evaluated to achieve a context sensitive bicycle network that will accomplish a balance among all five components and provide a non-restrictive, well connected bicycle network.

Access to Facilities

Accessibility refers to the ease of reaching destinations. High accessibility allows users to reach other activities or destinations quickly while inaccessibility allows fewer places to be reached in the same amount of time. The analysis developed for the 2012 Plan determined those projects which provide the greatest accessibility for cyclists while improving facilities.

Ultimately, the goal of the bicycle network is to provide "low stress" routes between origins and destinations. Currently, there are a number of corridors in Mesa where bicycles are sharing the road with other users. As the City evaluates these corridors for future improvements, it is important to review each roadway project to identify possible lane reductions, lane narrowing, or roadway widening that will allow bicycle facilities to be added.

> Since the publication of the 2012 Bicycle Master Plan and this 2018 update, an additional 450 miles of bicycle lanes have been added to the network by modifying existing lane widths and cross-sections to include bicycle lanes.

Connections

As Mesa continues to expand and improve upon its existing arterial-based bicycle network, important connections that allow cyclists to gain access to the main bicycle arteries throughout the City must be maintained. By integrating non-arterial bicycle routes

and shared-use pathways, we will begin to weave a fine-grained, well-developed circulatory system for all levels of cyclists to travel on. This system will increase user confidence and provide a potentially safer alternative for those users not at ease traveling adjacent to higher speed arterial vehicular traffic.

In addition to evaluating our public street projects, Mesa will continue to work with future developers and business owners for improved bicycle access. These private parties will be informed about the benefits of providing sensible and attractive interconnectivity between neighborhoods and businesses. These connections will help to encourage residents to leave their automobiles at home and ride their bicycles for daily errands.

Context Sensitive Solutions (CSS)

Context sensitivity can mean a variety of different things and can solve a variety of problems when used to determine the best and most efficient bicycle facilities for a certain street or corridor. Context sensitivity pays close attention to the "micro" scale of a roadway and how it influences specific land uses in communities. Land uses that border a roadway also have a great deal to do with the way motorists, pedestrians, and bicyclists actually use the street environment.

According to a Federal Highway Administration report published in March 2007 titled "Context Sensitive Solutions Strategic Planning Process Summary Report," the following core CSS principles apply to transportation processes, outcomes, and decision-making:

1. **STAKEHOLDER VISION**
   Strive toward a shared stakeholder vision to provide a basis for decisions.

2. **UNDERSTANDING**
   Demonstrate a comprehensive understanding of contexts.

3. **ACHIEVE CONSENSUS**
   Foster continuing communication and collaboration to achieve consensus.

4. **TRANSPORTATION SOLUTIONS**
   Exercise flexibility and creativity to shape effective transportation solutions, while preserving and enhancing community and natural environments.

CSS plays a key role in community planning theories and practices like smart growth, new urbanism, and place making.

Mesa takes an active approach in CSS through neighborhood and stakeholder interaction to provide written direction and policy in subarea plans. These plans guide developers through the planning process, ensuring their projects capture the flavor of the district that community steering members deem to be important.

CSS principles have been incorporated into Mesa's core planning practices for new development and capital street projects. Applying CSS results in streets that provide a more balanced transportation hierarchy, creating shared spaces for all users, including bicyclists.

DEVELOPING A RECOMMENDED FUTURE NETWORK

Existing Bicycle Network

Mesa's emphasis on expansion of the current bicycle network from 1974 to 2018 has influenced the popularity of bicycling in Mesa. Priority has been placed on building a well-connected bicycle network that will efficiently convey cyclists throughout the City during their daily travels.

Mesa's dedication to the enhancement of on-street and off-street facilities provides a bicycle network for a well-established rider base that has continued to be expanded upon in order for Mesa to continue as a well-known bicycle destination in the region and state.

Mesa's existing on-street bicycling system is comprised of numerous bicycle lanes and designated bicycle routes throughout the City. As displayed on Map 5-3, as of 2018 there were a total of approximately 600 miles of designated routes and lanes that make up the existing on-road bicycle system. The majority of bicycle lanes and routes are located along the arterial roadway network, which also facilitates the majority of Mesa's vehicular trips.

Sidewalks, small neighborhood bicycle paths, and other facilities that are not located on roadways, such as trails, off-street shared use paths, or shared-use paths along canals, are technically not classified as part of the on-street bicycling system.

Bicycle Lanes

A bicycle lane is a segment of a roadway cross-section which has been specifically designated for bicyclists, and includes signage and pavement markings. Chapter Four discussed the design standards of bicycle lanes in more detail.

The City of Mesa's bicycle lane network has been in development since 1974 and has continued to expand in overall mileage over the years. In 1990, there were a total of 13 centerline miles of bicycle lanes throughout the City. This number expanded to a total of 40 centerline miles in 2000, 128 centerline miles in 2012, and as of 2018, there are approximately 578 centerline miles of bicycle lanes throughout the community. As displayed on Map 5-3, the majority of bicycle lanes throughout the community are situated along the arterial road network, and additional lanes are situated on a number of the City's half-mile roads that are located midway between the arterial streets.

Bicycle Routes

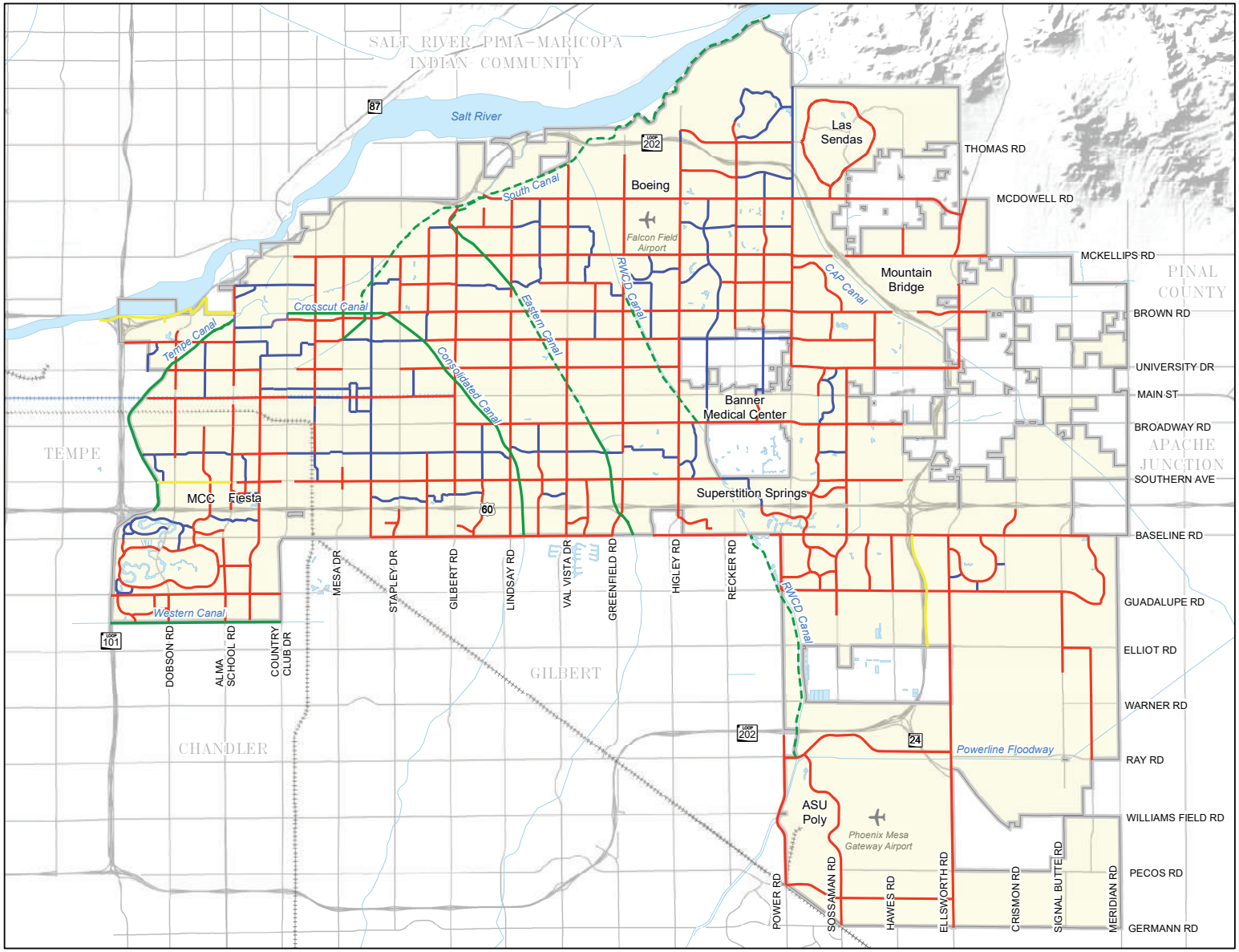
Aside from bicycle lanes, another component of the Mesa on-road bicycle system is that of bicycle routes, which are located throughout various areas of the City. The first bicycle routes within the City of Mesa were designated during 1974, when a total of approximately 25 miles were established by the Mesa City Council. By 1994, there were a total of 42 miles of bicycle routes, and this number slightly increased to a total of 45 miles by 2000. The decade of the 1990s signifies a time when the City placed more of an emphasis on establishing bicycle lanes throughout areas of the community in an effort to establish more of an integrated network. As of 2010, there were a total of 77 designated bicycle route miles within the City.

Featured bike routes within the City of Mesa are delineated by signage that provides clear wayfinding along the designated route to help the bicyclists to navigate. The purpose of the route system throughout the City of Mesa is to indicate locations throughout the City where bicycling conditions are favorable and which directly connect destinations and other multi-modal uses. The City will incorporate the use of destination wayfinding signs throughout the network to direct bicyclists to activity centers, parks, schools, and transportation stations.

Mesa's Off-Street System

Mesa's off-street bicycling system is comprised of paved and unpaved shared-use pathways located throughout the community.

By definition, an off-street system is a bicycle network that is physically separated from vehicular traffic by open space, trails, or other barriers that prohibit direct contact with the roadway grid network. The off-street network is often referred to as the "Shared-Use Pathway" system, because such routes are often shared by cyclists and other non-motorized users who use these paths for various recreational and non-recreational purposes.



2018 Bicycle Master Plan

Map 5-3

Existing Bike Facilities

Legend

- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- City Boundary

Existing Bike Facilities

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path

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METHODOLOGY TO IDENTIFY NEEDS

City staff deveoped a methodology that was used to determine facility needs in the City of Mesa bicycle network for the 2012 Bicycle Master Plan. The methodology consisted of compiling the following set of gap categories:

Staff Analysis Gaps – Gaps in the bicycle network identified by Transportation Department staff members.

Latent Demand Gaps – Gaps in the bicycle network that are needed to serve high-demand areas of the City as determined by a latent demand analysis.

Transit Gaps – Gaps between the bicycle network and transit facilities such as bus stops and Park and Ride centers.

Public Comment Gaps – Gaps highlighted by citizens during the public participation process.

Regional Connection Gaps – Gaps between the City of Mesa bicycle network and surrounding agency and regional network facilities.

Each of these gap categories is explained further and analyzed in this chapter. Mesa City staff continues to evaluate the gaps within the network as needed. When the Active Transportation Plan or Bicycle Master Plan is updated in the next 5 to 10 years by the City of Mesa, the methodology and identified gaps from the 2012 Bicycle Master Plan should be revisited.

Future On-Street Improvements by Standard Roadway Improvements

Periodically, Mesa's streets are improved through new construction or rehabilitation projects throughout the City. These projects can be initiated through the Regional Transportation Plan, routine maintenance, and new construction by developers who are required to make street improvements adjacent to their developments. These improvements may result in adding bike lanes. Map 5-4 shows an estimate of future bicycle lanes based on projects completed per the 2025 Transportation Plan.

Generators and Attractors

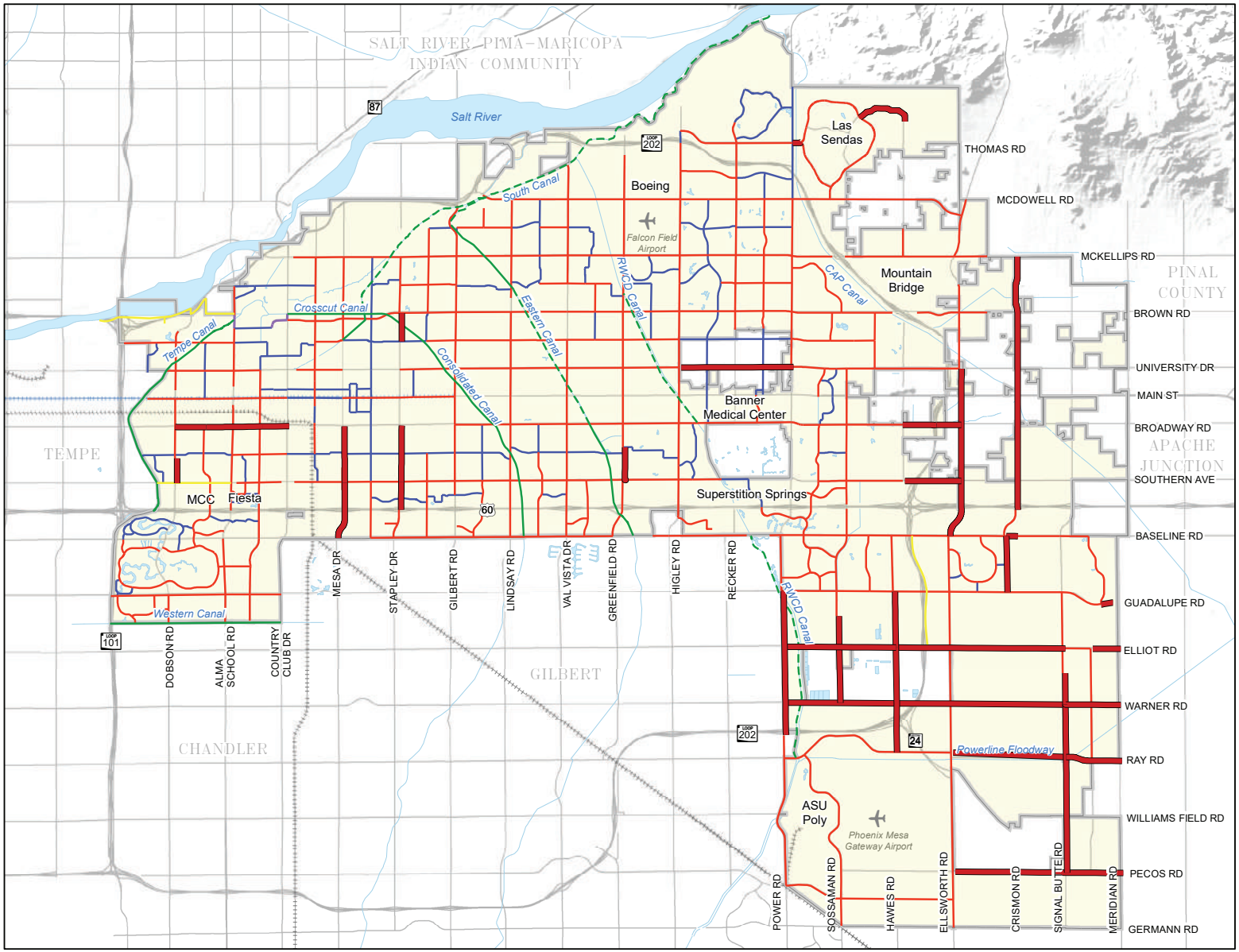
When observing and analyzing where and which type of bicycle improvements should be implemented, it is important to view the overall context of the surrounding land use and movement patterns for the specific area. Generators and attractors represent trip ends for four general utilitarian trip purposes identified in the National Personal Transportation Survey (NPTS):

1. Work trips (WK)
2. School trips (SC)
3. Shopping and errands trips (SE)
4. Recreational and social trips (RS)

Generators are origins (beginning trips) that are represented by every residence in a specific Target Study Area (TSA) as shown on Map 5-6a.

Attractors, as shown on Map 5-6b are destination (end of trip) locations that are represented by every:

- Business
- School



2018 Bicycle Master Plan

Map 5-4

Anticipated Future Bike Facilities

Legend

- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- City Boundary

Existing Bike Facilities

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path

Anticipated Future Bike Facilities

- Bike Lane

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- Park
- Social establishment
- Service establishment

Detractors, as shown on Map 5-6c are conditions that would potentially detour users from traveling along a particular route to a specific attractor due to certain elements such as:

- High traffic speeds
- High daily traffic volumes
- Barriers (railroad, freeways, canals)

Latent Demand Modeling Identified Gaps

Latent demand modeling was conducted as part of the 2012 Bicycle Master Plan to analyze the network and identify gaps. The full methodology can be found in Chapter 5 of the 2012 Plan. The latent demand methodology used demographic data. Including employment densities and residential neighborhood densities. This data is related by the phenomenon of a neighborhood's density being directly impacted by an employment center's density. In other words, when an employment center density increases, the surrounding neighborhood density increases. Also, more employment centers will result in denser surrounding neighborhoods. As discussed in earlier chapters of this plan, bicyclists tend to prefer trips between one and three miles. Therefore, the more employment centers or other attractors within a one to three mile radius, the more likely someone will make a trip by bike. Map 5-6e shows population density. Higher density is represented by darker colors.

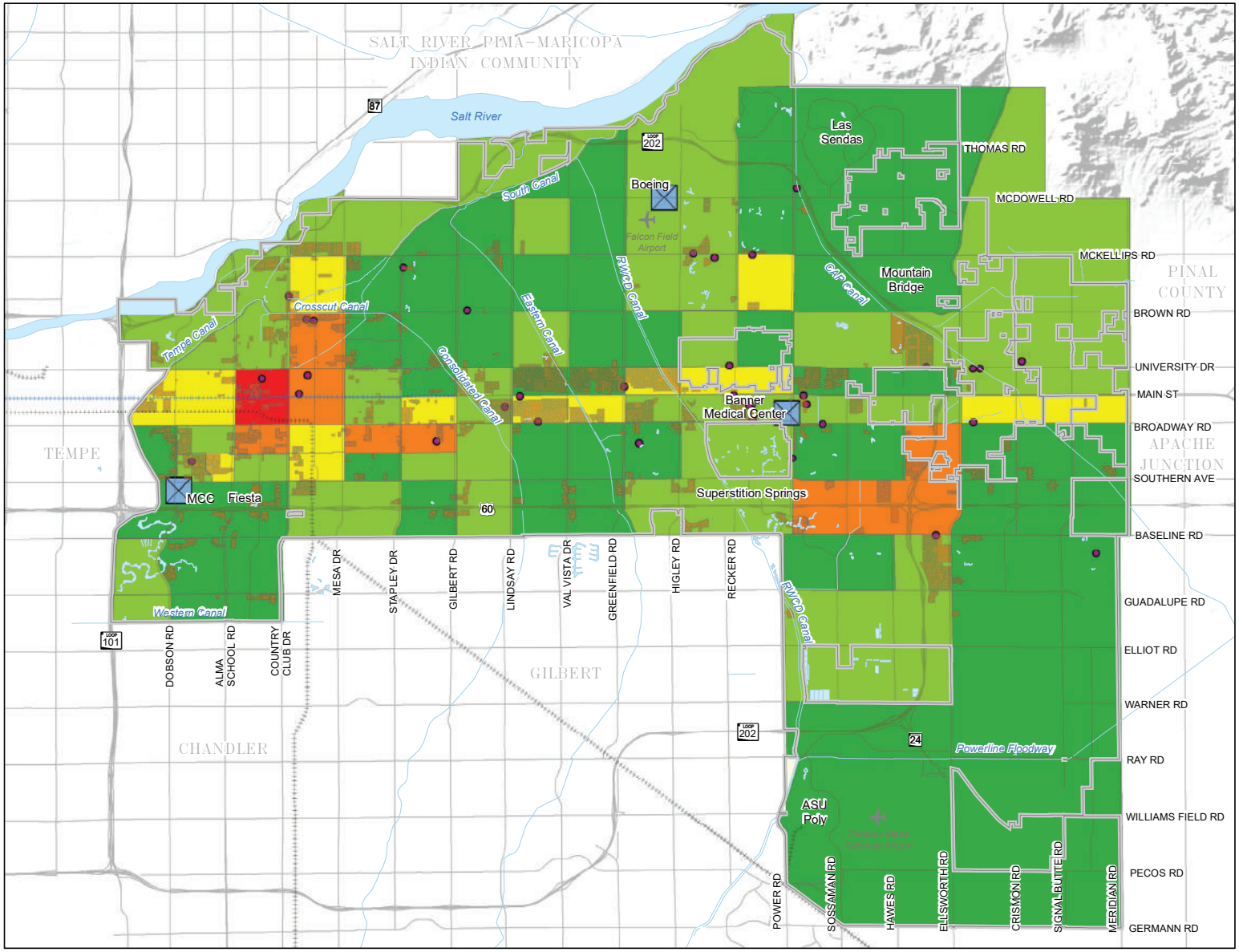
Research and anecdotal evidence indicate that demand for residential housing, the housing prices, surrounding amenities, and proximity to employment are all factors that influence whether a transportation corridor has more or less potential to be favored for on-street and off-street bicycle facilities. These factors also impact the desire for bike connections to transit and end of line amenities at employment centers for bike commuters. The residential and employment factors discussed above were applied to the Latent Demand Scoring (LDS), part of the modeling process.

Gaps in Connections Between Bicycles and Transit

While bicycling and walking typically account for approximately one half of all personal trips in European cities, there is a sharp contrast to the United States where non-motorized trips account for a mere 10 percent of trips. Automobile park and ride facilities account for a major share of suburban transit access according to the Federal Highway Administration (FHWA-PD-93-016, The National Bicycling and Walking Case Study No. 17: Bicycle and Pedestrian Policies and Programs in Asia, Australia, and New Zealand, 1993).

Integration between bicycles and transit services enhances travel potential for both modes by offering advantages that each mode alone cannot provide such as:

- Bike-on-transit service enables bicyclists to travel greater distances and overcome topographical barriers.
- Bicycle-on-transit services to recreational destinations during off-peak periods can increase overall transit ridership and increase efficient use of capacity.
- Bicycle-on-transit services, on-street bicycle lanes, and bicycle parking enlarge transit's catchment area by providing accessibility to travelers who are beyond walking distances from transit stations.



2018 Bicycle Master Plan

Map 5-6a

Generators

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- Multi-Family Housing
- Senior Community

Density Per Sq Mile

- Employment 15K+

Bicycle Commuters

- 0 - 8 Commuters
- 9 - 25 Commuters
- 26 - 54 Commuters
- 55 - 102 Commuters
- 103 - 209 Commuters

Source: 2000 Census

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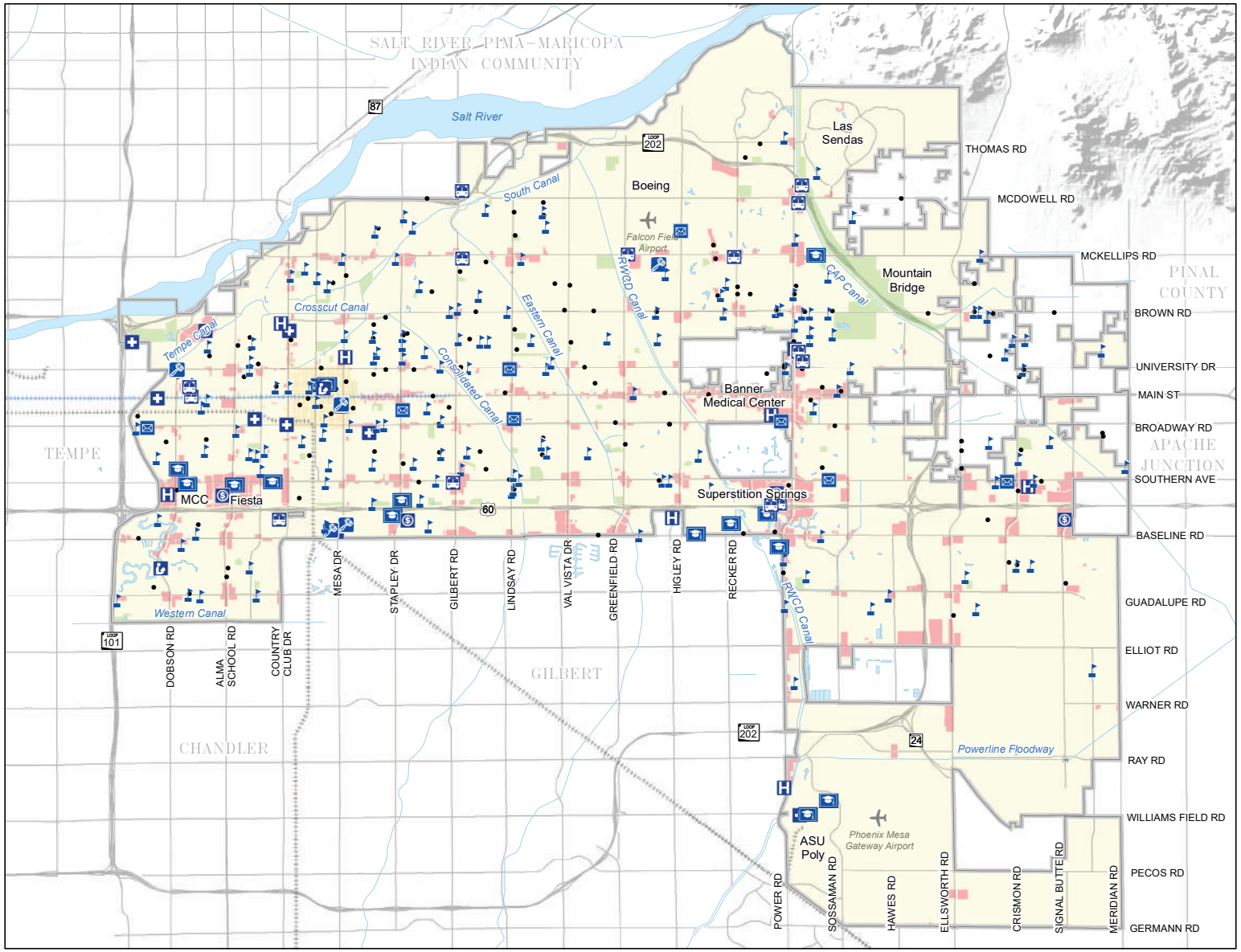

2018 Bicycle Master Plan

Map 5-6b

Attractors

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- Transit Center or Park & Ride
- Library
- Regional Commercial
- College
- K-12 School
- Post Office
- Hospital
- Court
- Church
- Public Assistance
- Commercial Zoning
- Town Center
- Park

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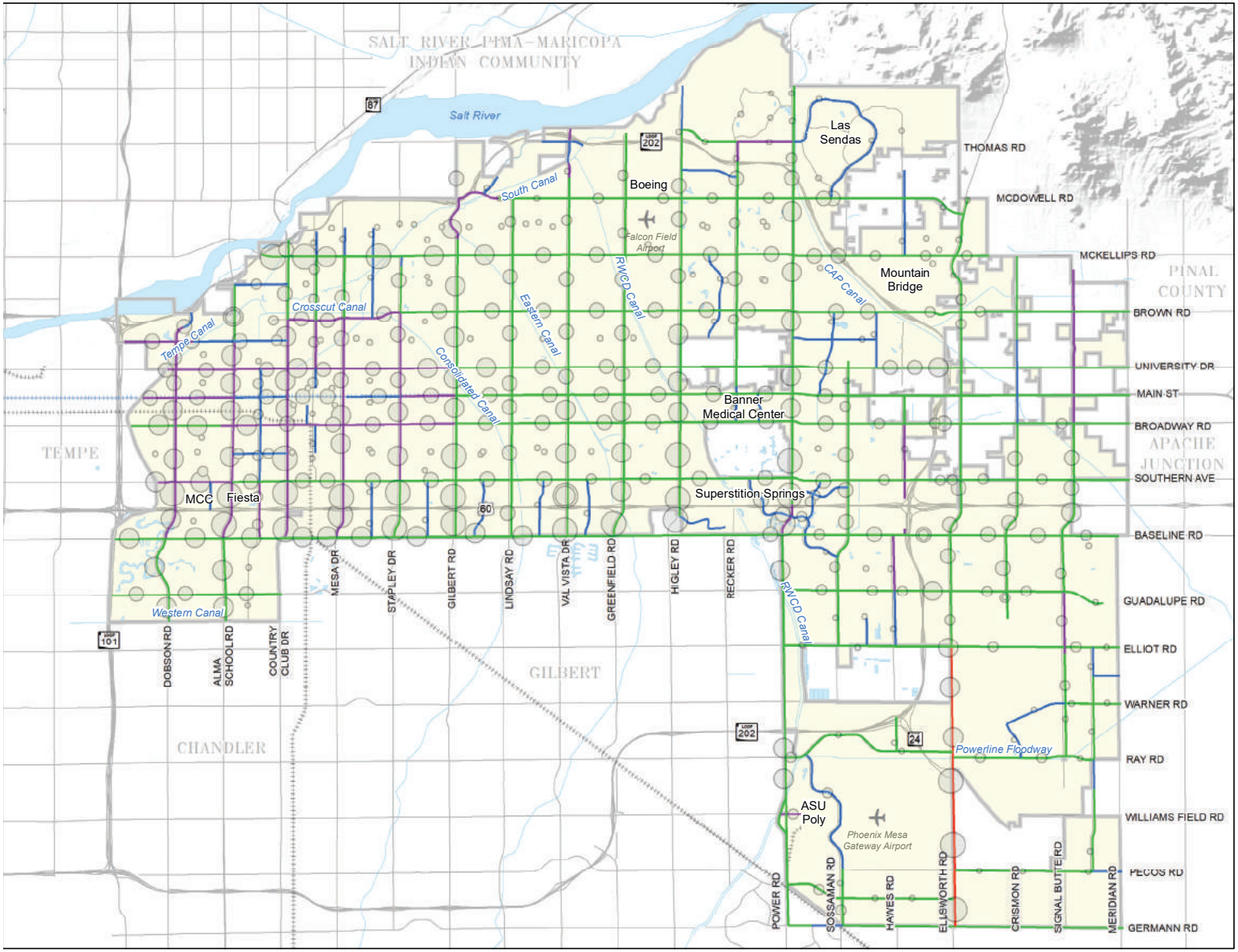

2018 Bicycle Master Plan

Map 5-6c

Detractors

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

2016 - 2017 Average Daily Traffic

- 0 - 7,000
- 7,000 - 14,000
- 14,000 - 24,000
- 24,000 - 34,000
- 34,000 - 48,000

Speed Limit

- 35 mph
- 40 mph
- 45 mph
- 50 mph

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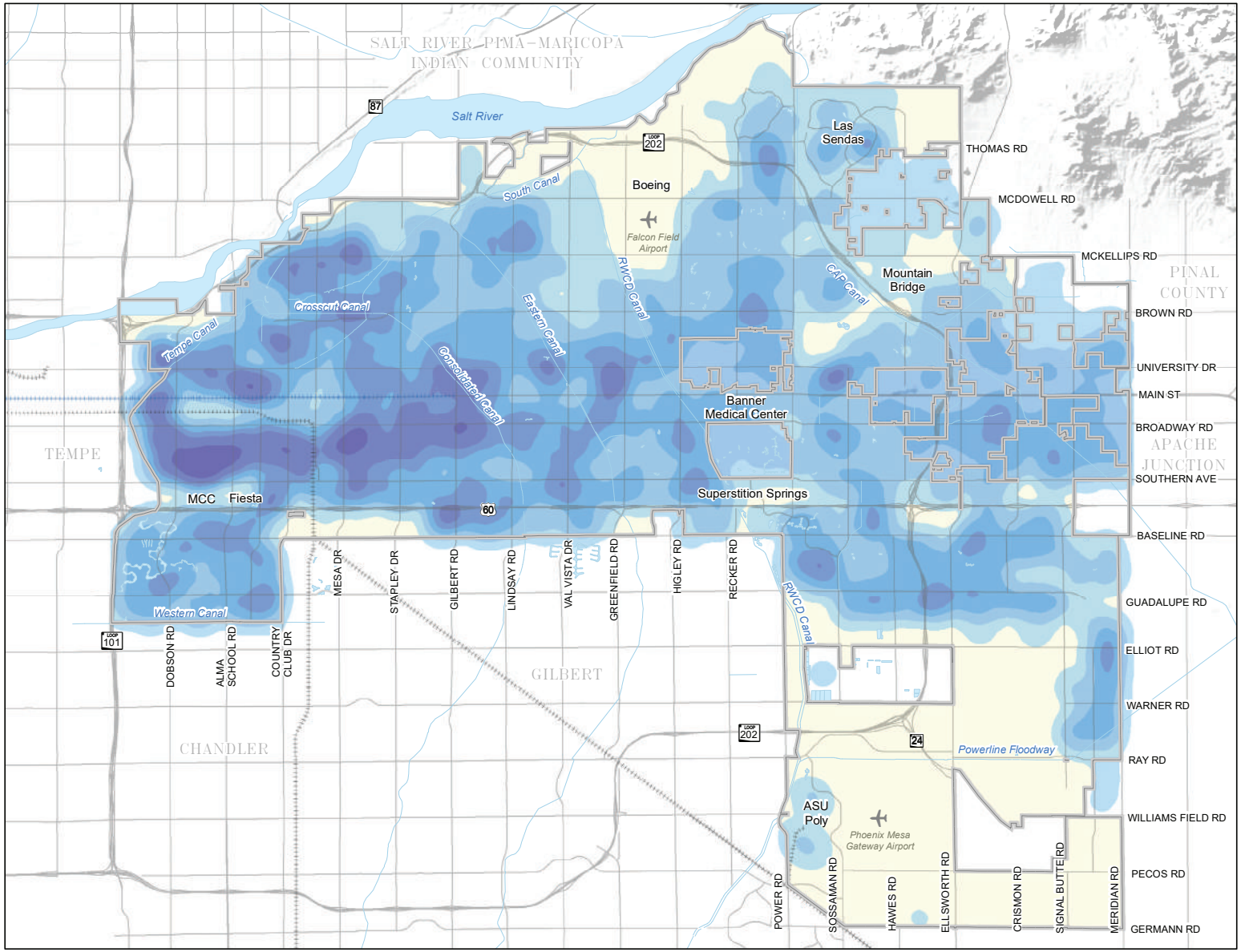

2018 Bicycle Master Plan

Map 5-6e

Population Density

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Population per Square Mile

- 500 - 2,000
- 2,000 - 4,000
- 4,000 - 6,000
- 6,000 - 8,000
- 8,000 - 12,000
- 12,000 - 18,500

Source: 2010 Census

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Currently, the City of Mesa contracts with Valley Metro, the regional public transportation agency, to offer a total of 13 local fixed routes as depicted on Map 5-9a. In addition to these local routes, there is a fare-free local community downtown circulator, five express routes shown on Map 5-9b providing service to downtown Phoenix, and a bus rapid transit (BRT) service that connects to METRO light rail. The light rail is a 25-mile system that opened throughout the Phoenix Metropolitan area on December 27, 2008.

The Central Mesa Light Rail extension added 3.1 miles of service on Main Street between Sycamore Drive and Mesa Drive in 2015. The Northwest Phase I Light Rail extension added 3.2 miles within the City of Phoenix in 2016. The Gilbert Road extension will extend Light Rail on Main Street from Mesa Drive to Gilbert Road in 2019.

Valley Metro, in partnership with the cities of Mesa and Tempe, initiated the Tempe/Mesa Streetcar Feasibility Study in 2018 to evaluate streetcars, a high capacity transit option in a corridor that would connect the Tempe Streetcar route with regional activity centers, employment destinations, and multi-unit residential developments.

Public Assessment of Gaps in the Current Bicycle System

As part of Mesa's overall assessment of the current bicycle network and the public's perception of that network in 2012, staff invited comments through several open public meetings. The outcome of these public meetings can be seen in Chapter 5 of the 2012 Bicycle Master Plan.

Through its Bicycle & Pedestrian programs, Mesa regularly connects with residents and conducts an annual Mesa Bike Ped Program Customer Satisfaction Survey. Mesa has an established program for bicycle safety and community engagement including hosting Ride-In-Movies at the Park, publishing the semi-annual "Spokelife" magazine, and conducting adult and child safety education classes. Community feedback collected through these efforts is incorporated into project identification, prioritization, and design.

Regional Bicycle Connection Gaps

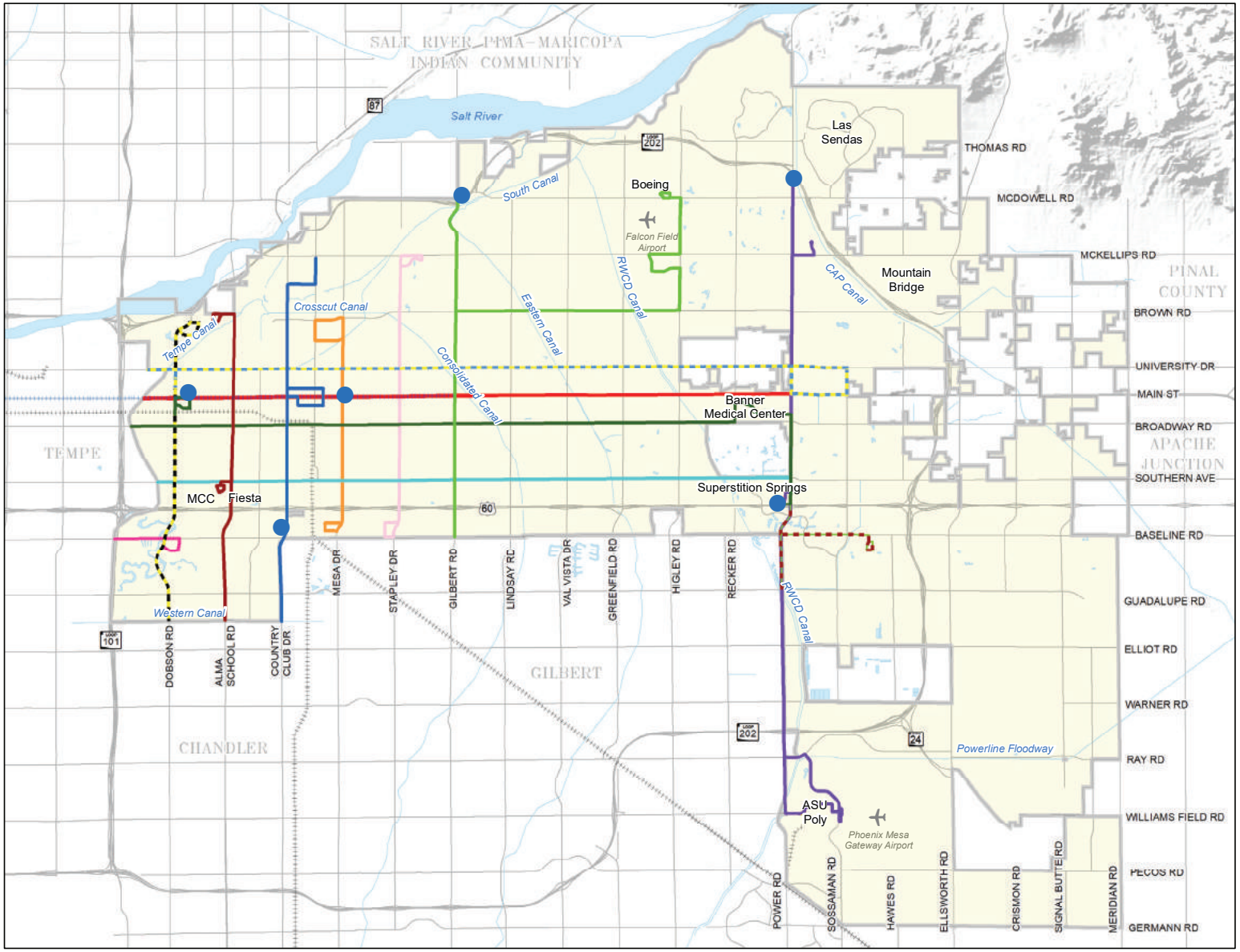
The City of Mesa Bicycle Plan should take advantage of opportunities to connect to adjacent communities' networks. This allows users to expand trips to further ranges. Connecting links to adjacent networks are shown on Map 5-12. Map 5-13 shows the regional connections along with the future bicycle network.

SUMMARY

Throughout this chapter, various maps have been presented in an attempt to illustrate those factors that impact where bicycle facilities are needed. Map 5-4 shows an estimate of future bike facilities based on the City of Mesa 2025 plan. While identified gaps that have been recognized as needing critical improvements, many improvements will depend on a variety of factors including:

- Project costs.
- Funding.
- Fatal flaws identified during feasibility.
- Public support or opposition.
- Future development, which could present new opportunities that would benefit bicycling.

All these factors are defined and discussed in Chapter Six, and play an important role in the prioritization process.



2018 Bicycle Master Plan

Map 5-9a

Local Bus Routes

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Local Bus Route

30	108
40	112
45	120
61	128
77	136
96	156
104	184

- Park & Ride

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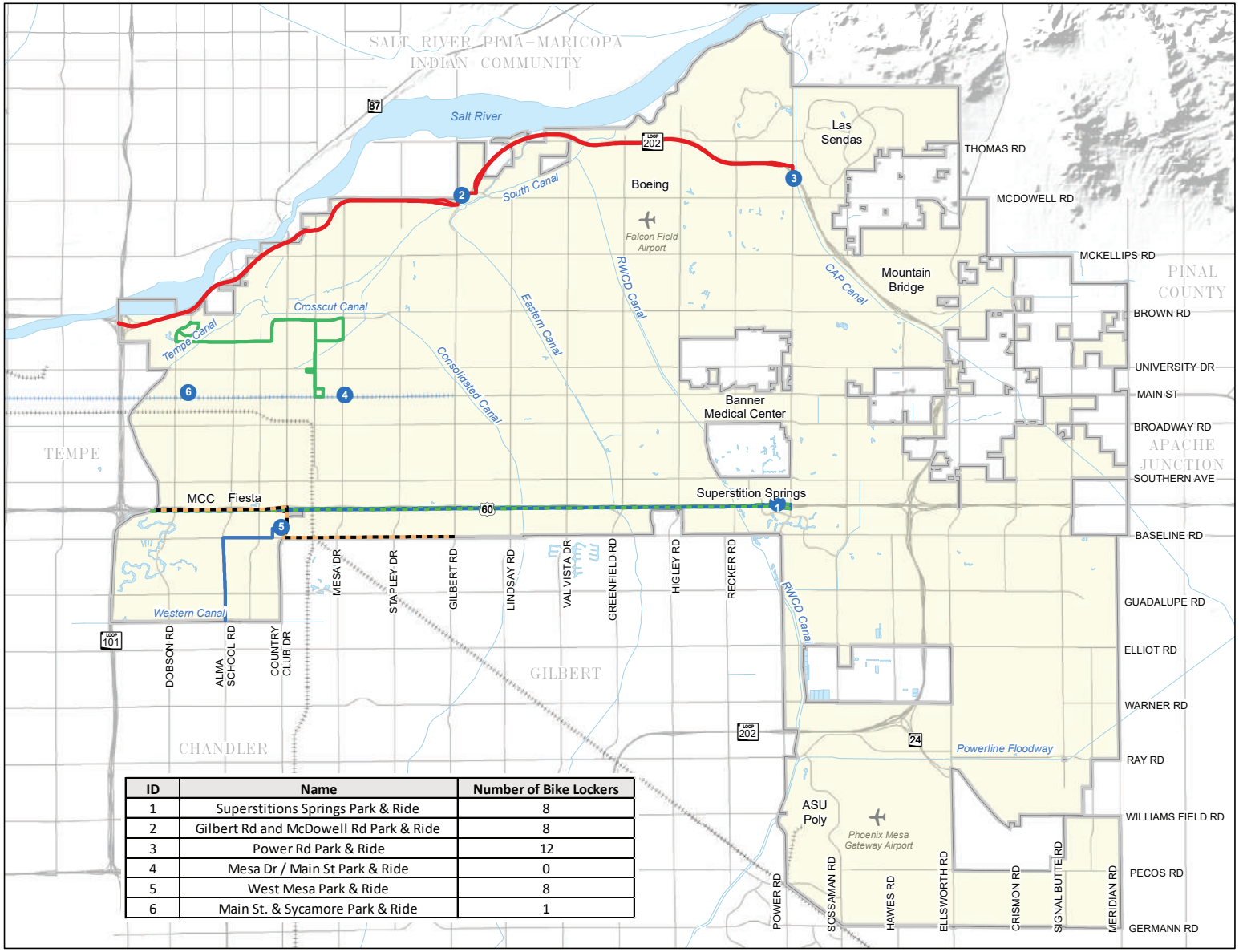

ID	Name	Number of Bike Lockers
1	Superstitions Springs Park & Ride	8
2	Gilbert Rd and McDowell Rd Park & Ride	8
3	Power Rd Park & Ride	12
4	Mesa Dr / Main St Park & Ride	0
5	West Mesa Park & Ride	8
6	Main St. & Sycamore Park & Ride	1

2018 Bicycle Master Plan

Map 5-9b

Other Bus Routes

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Express Bus Service

- 531
- 533
- 535
- 541

Community Circulator

- The Buzz

Park & Ride Facilities

- Park & Ride

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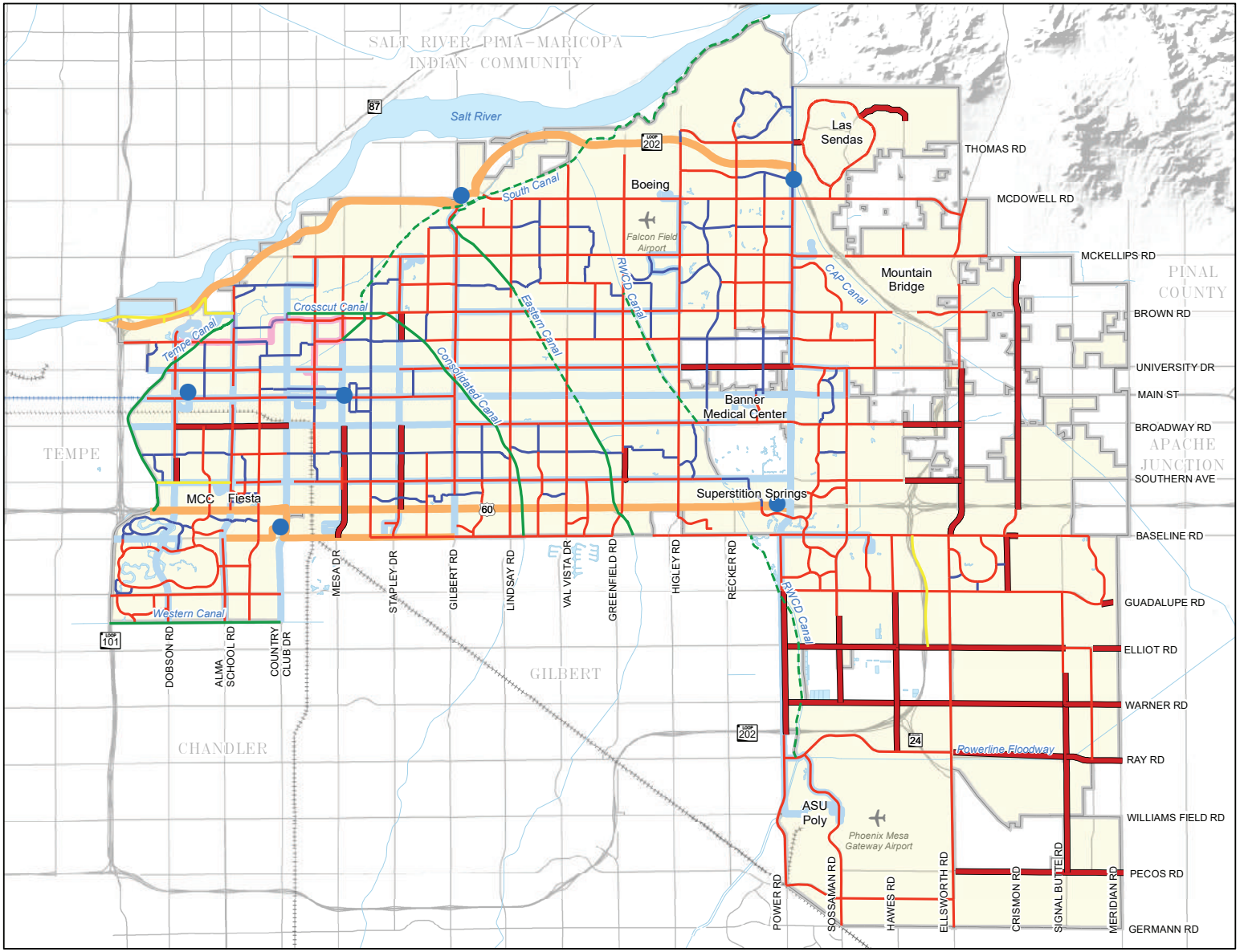

2018 Bicycle Master Plan

Map 5-10

Transit and Bike Facilities

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Valley Metro Bus Routes

- Express
- Buzz Circulator
- Local
- Park & Ride

Existing Bike Facilities

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path

Anticipated Future Bike Facilities

- Bike Lane

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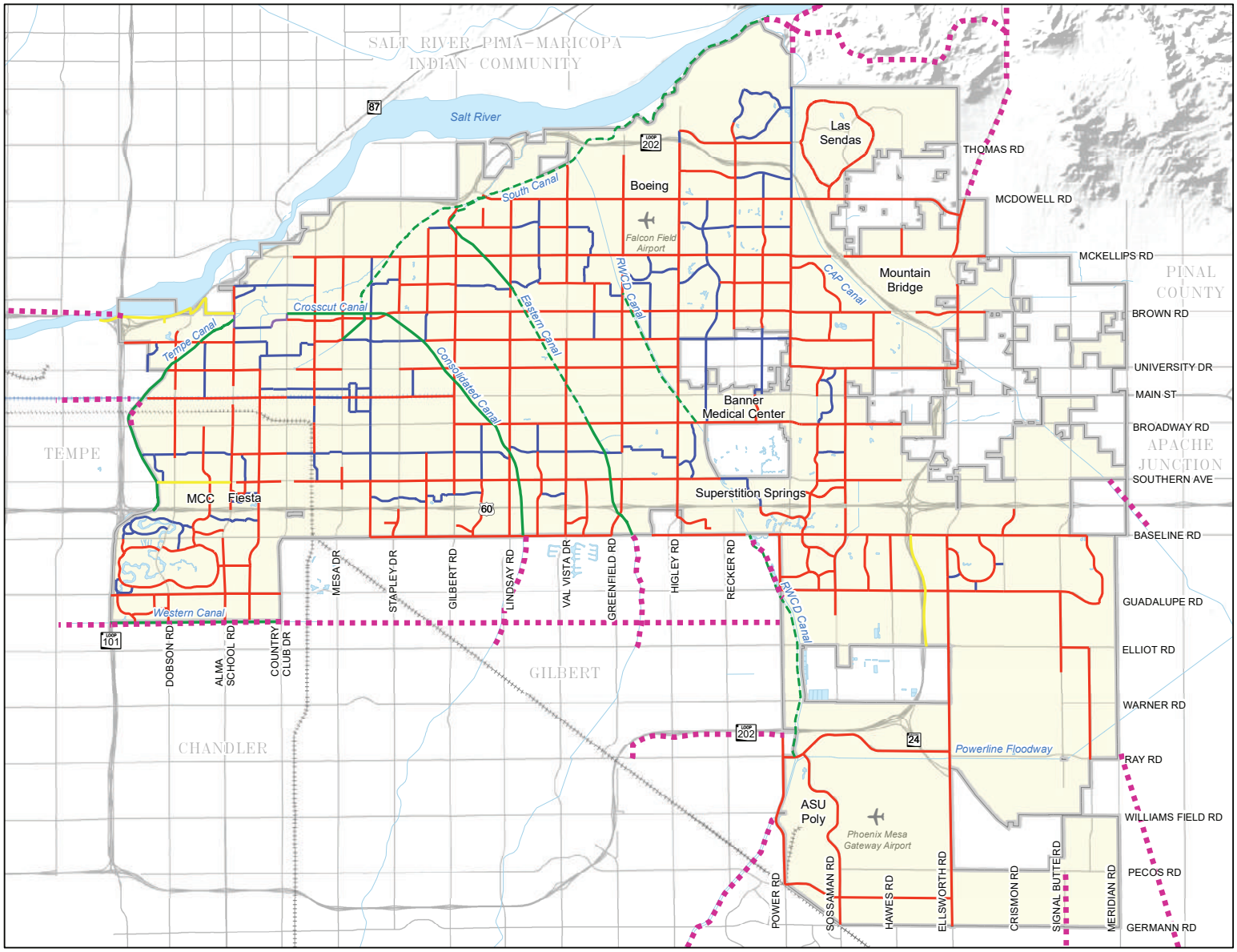

2018 Bicycle Master Plan

Map 5-12

Regional Connections and Existing Bike Facilities

Legend

- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- City Boundary

Existing Bike Facilities

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path

Regional Connection

- Regional Connection

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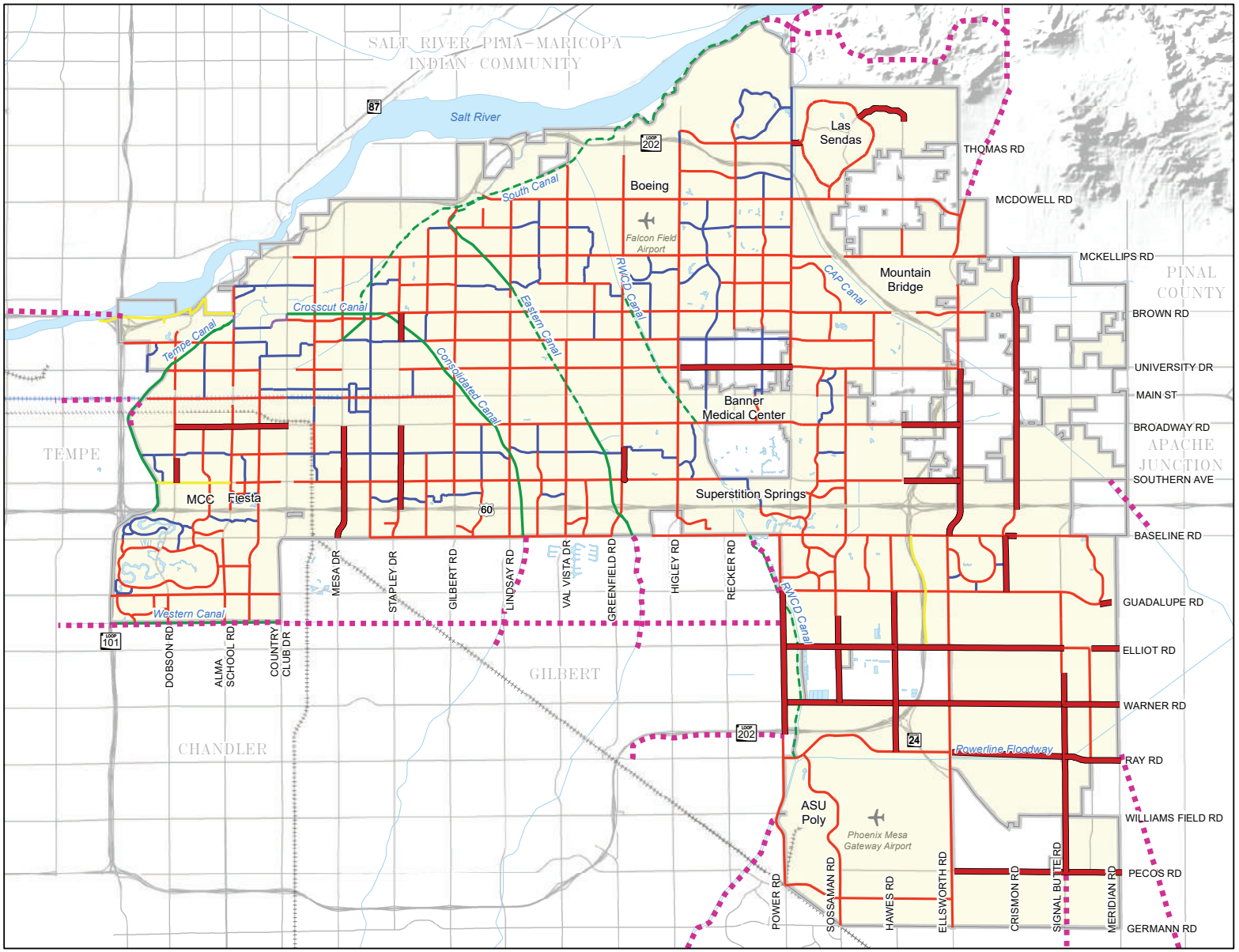

2018 Bicycle Master Plan

Map 5-13

Regional Connections and Future Bike Facilities

Legend

- Airport
- Canal
- Light Rail
- Railroad
- Major Street
- City Boundary

Existing Bike Facilities

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path

Regional Connection

- Regional Connection

Anticipated Future Bike Facilities

- Bike Lane

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CHAPTER SIX

IMPLEMENTATION, EVALUATION, AND FUNDING

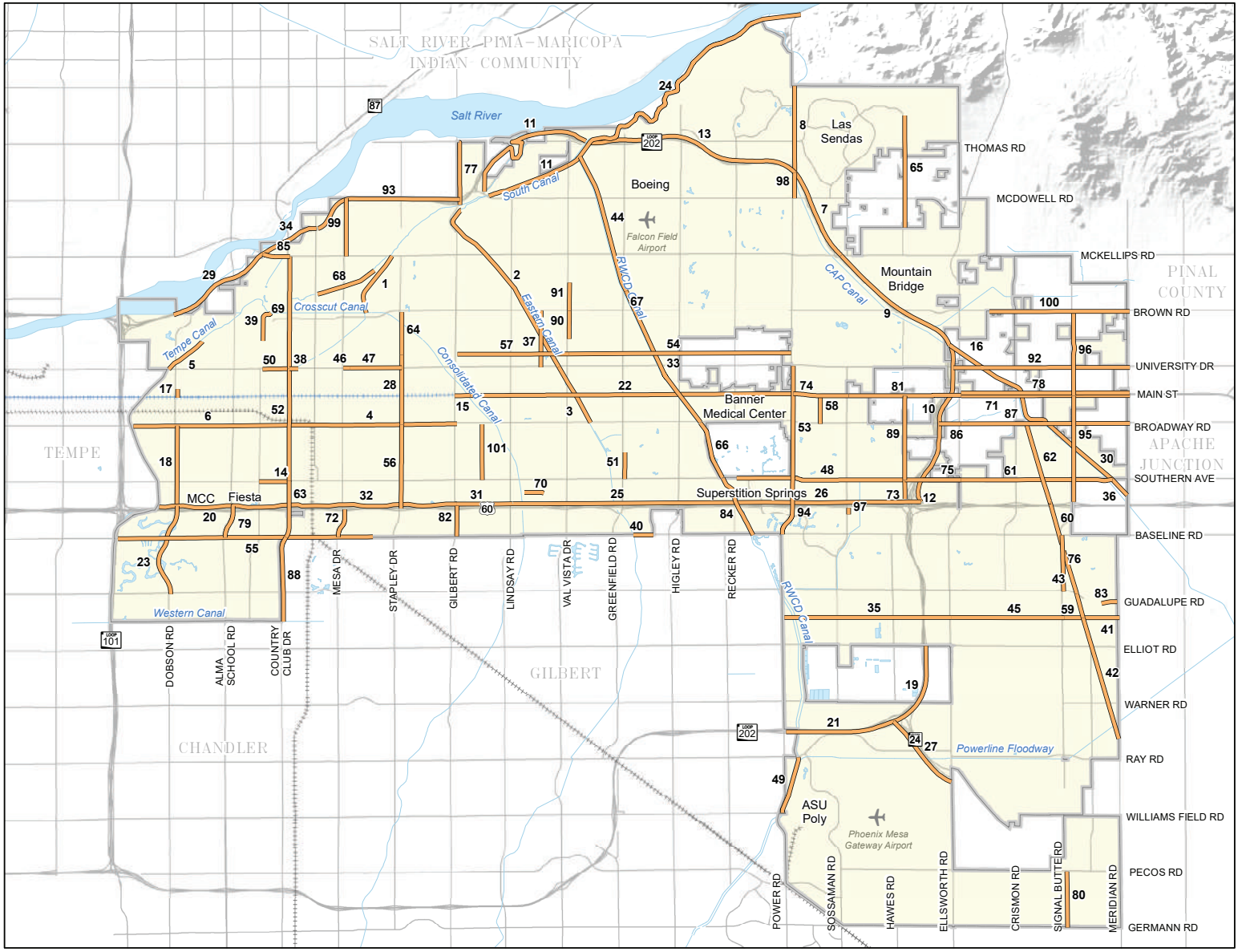
DEVELOPING AND PRIORITIZING PROJECT LIST

This chapter summarizes the vision outlined in the 2012 plan for both bicycle facilities and programs to be instituted in Mesa. The overall needs determined from the gap analysis described in Chapter 5 of the 2012 BMP was processed further in order to establish priority for the projects on a citywide basis.

The implementation approach is tailored to be both manageable and realistic while taking into account funding, the changing environment, and needs of the City's citizens. Implementation is heavily dependent on the ability to secure funding and adapt to changing costs and benefits. When developing the implementation plan of the bicycle network and programs, Mesa focuses on achieving a balance between signature projects and projects that will benefit the most residents as soon as possible.

Gap, socioeconomic and user bicycling analysis, crash statistics, and survey data identified several areas of the City that were under served while other areas have benefited from network improvements that have increased the bikeability of the surrounding area. Through the implementation process, Mesa focused on those areas of the City that are poorly served by existing bicycle facilities. Additionally, priority is given to areas that would significantly benefit from the addition of bicycle amenities connecting services with neighborhoods and employment. While the addition of new bicycle facilities and signature projects send out the message that Mesa is a premier bicycling community, it is important to remember that the improvement and connectivity of existing and fragmented facilities helps to serve a wide range of cycling residents. The proposed program improvements generally apply citywide. All proposed future projects are shown on Map 6-1. Prioritization of the projects were based on a set of implementation criteria established in the 2012 Bicycle Master Plan. Once a final, total prioritization score is determined for each project, the list is sorted by the total score. The result is a final prioritized list of bicycle facility projects for the entire City. The top 40 projects are featured as key projects and mapped by council district on Maps 6-3 through 6-8. City staff reevaluates the list of bicycle facility projects every two years with community input and staff analysis.

Map 6-9 illustrates the ultimate "build-out" bicycle network for the City of Mesa. This map combines existing facilities with facilities likely to be built with future road improvements, as well as the facilities determined as needed through the gap analysis.



2018 Bicycle Master Plan

Map 6-1

Identified Projects

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Identified Projects

- Bicycle Project

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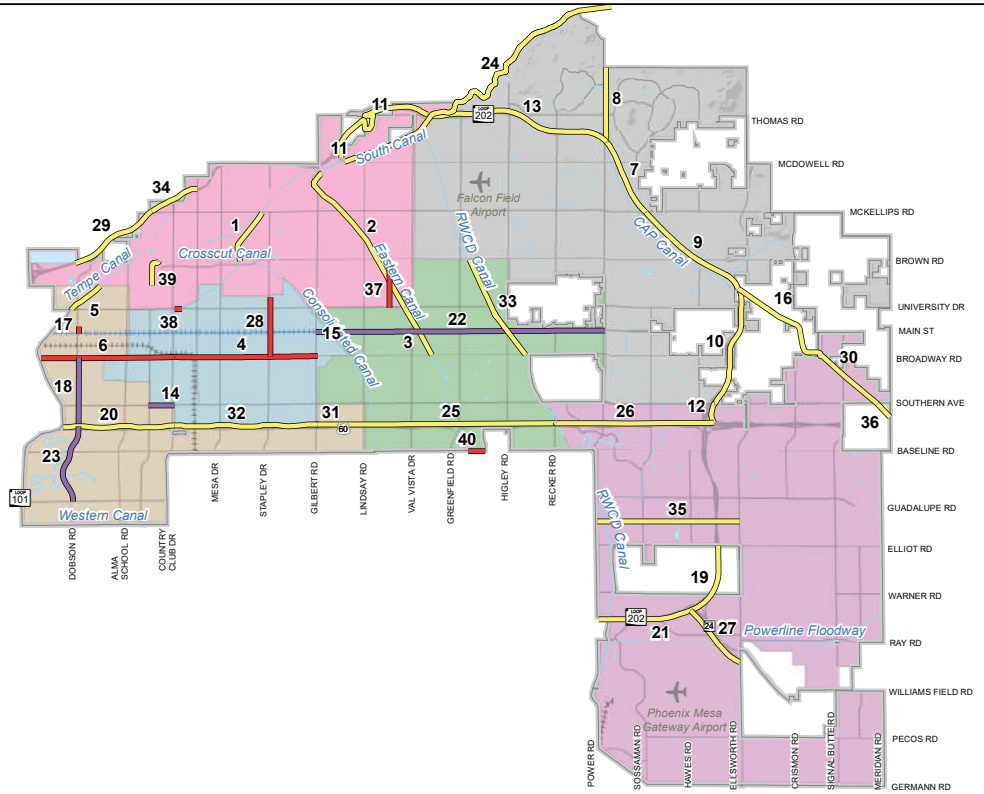

2018 Bicycle Master Plan

Map 6-2

Top 40 Projects
Labeled in Priority Order

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Project Facility Type

- Bike Lane
- Separated Bike Lane
- Shared-Use Path

District

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6

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Miles

The City of Mesa makes no claims concerning the accuracy of this map nor assumes any liability resulting from the use of the information herein.

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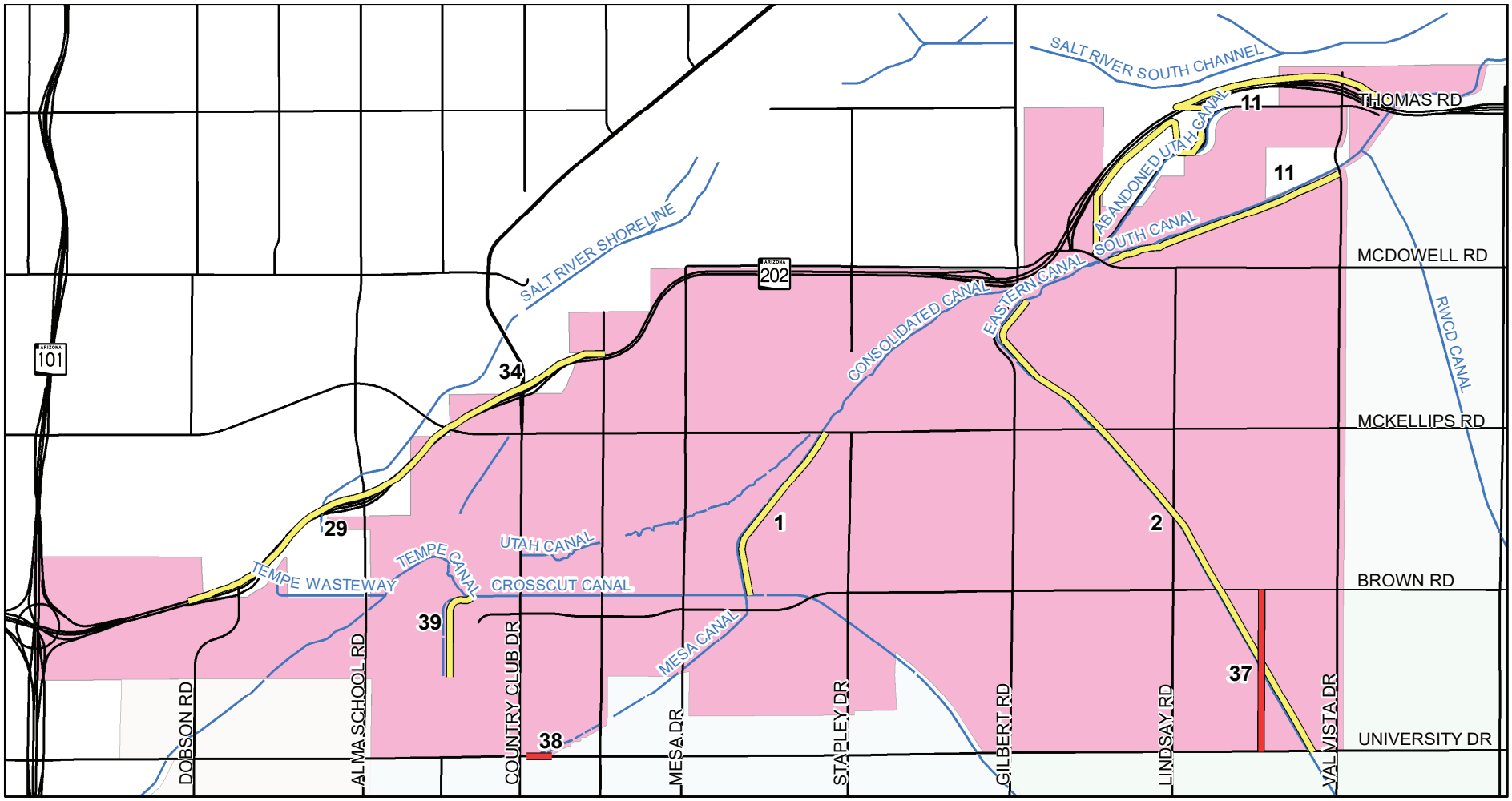
Priority	District	Project Location and Description	Facility Type
1	One	South Canal - McKellips to Consolidated Canal	Shared-Use Path
2	One	Eastern Canal Trail - Gilbert Road to University Drive	Shared-Use Path
3	Two	Eastern Canal - University Drive to Broadway Road	Shared-Use Path
4	Four	Broadway Road - Country Club Drive to Gilbert Road	Bike Lane
5	Three	Tempe Canal - University Drive to Rio Salado Parkway/8th Street	Shared-Use Path
6	Three	Broadway Road - Country Club to West City Limit	Bike Lane
7	Five	Loop 202 Red Mountain/CAP - Power Road to McKellips Road	Shared-Use Path
8	Five	Power Road - Park and Ride to North City Limit	Shared-Use Path
9	Five	Loop 202 Red Mountain Freeway - McKellips Road to University Drive	Shared-Use Path
10	Five	Loop 202 Red Mountain Freeway - University Drive to Southern Avenue	Shared-Use Path
11	One	Lehi Crossing - McDowell to Val Vista	Shared-Use Path
12	Six	Loop 202 Red Mountain Freeway R.O.W. - Southern Avenue through the US 60 Interchange	Shared-Use Path
13	Five	L202 Red Mountain Freeway ROW - Val Vista to Power	Shared-Use Path
14	Four	Southern Avenue - Country Club Drive to Extension Road	Separated Bike Lane
15	Four	Main Street - Gilbert Road to the Consolidated Canal	Separated Bike Lane
16	Five	CAP Canal - Loop 202 Red Mountain Freeway to Main Street	Shared-Use Path
17	Three	Dobson Road - Main Street to 1st Street	Bike Lane
18	Three	Dobson Road - Broadway Road to US 60	Separated Bike Lan
19	Six	Loop 202 San Tan Freeway - Ph2: Elliot to Hawes (Gateway Shared-Use Pathway Project)	Shared-Use Path
20	Three	US 60 R.O.W. - West City Limit to Country Club Drive	Shared-Use Path

Priority	District	Project Location and Description	Facility Type
21	Six	Loop 202 San Tan Freeway - Ph3: Hawes to Power (Gateway Shared-Use Pathway Project)	Shared-Use Path
22	Two	Main Street - Consolidated Canal to Power Road	Separated Bike Lane
23	Three	Dobson Road - US 60 to Guadalupe Road	Separated Bike Lane
24	Five	South Canal - Val Vista to Granite Reef Dam	Shared-Use Path
25	Two	US 60 R.O.W. - Lindsay Road to Recker Road	Shared-Use Path
26	Six	US 60 R.O.W. - Recker Road to the Loop 202 San Tan Freeway	Shared-Use Path
27	Six	SR 24 - Ph4: Hawes to Ellsworth (Gateway Shared-Use Pathway Project)	Shared-Use Path
28	Four	Stapley Drive - Broadway Road to Rio Salado Parkway/8th Street	Bike Lane
29	One	Salt River Basin Shared-Use Path - Dobson Road to McKellips Road	Shared-Use Path
30	Six	CAP Canal - Main Street to Southern Avenue	Shared-Use Path
31	Three	US 60 R.O.W. - Gilbert Road to Lindsay Road	Shared-Use Path
32	Four	US 60 R.O.W. - Country Club Drive to Gilbert Road	Shared-Use Path
33	Two	RWCD Canal SUP - Brown Road to Broadway Road	Shared-Use Path
34	One	Salt River Basin Shared-Use Path - McKellips Road to Center Street	Shared-Use Path
35	Six	Powerline Easement - Power Road to Ellsworth Road	Shared-Use Path
36	Six	CAP Canal - Southern Avenue to Meridian Road	Shared-Use Path
37	One	32nd Street - Brown Road to University Drive	Bike Lane
38	One	University Drive - Country Club Drive to Robson	Bike Lane
39	One	Eureka Canal Connection - Rio Salado Parkway to the West Mesa Connector	Shared-Use Path
40	Two	Baseline Road - Eastern Canal to Pierpont	Bike Lane



Priority	District	Project Location and Description	Facility Type
1	One	South Canal - McKellips to Consolidated Canal	Shared-Use Path
2	One	Eastern Canal Trail - Gilbert Road to University Drive	Shared-Use Path
11	One	Lehi Crossing - McDowell to Val Vista	Shared-Use Path
29	One	Salt River Basin Shared-Use Path - Dobson Road to McKellips Road	Shared-Use Path
34	One	Salt River Basin Shared-Use Path - McKellips Road to Center Street	Shared-Use Path
37	One	32nd Street - Brown Road to University Drive	Bike Lane
38	One	University Drive - Country Club Drive to Robson	Bike Lane
39	One	Eureka Canal Connection - Rio Salado Parkway to the West Mesa Connector	Shared-Use Path

2018 Bicycle Master Plan

Map 6-3

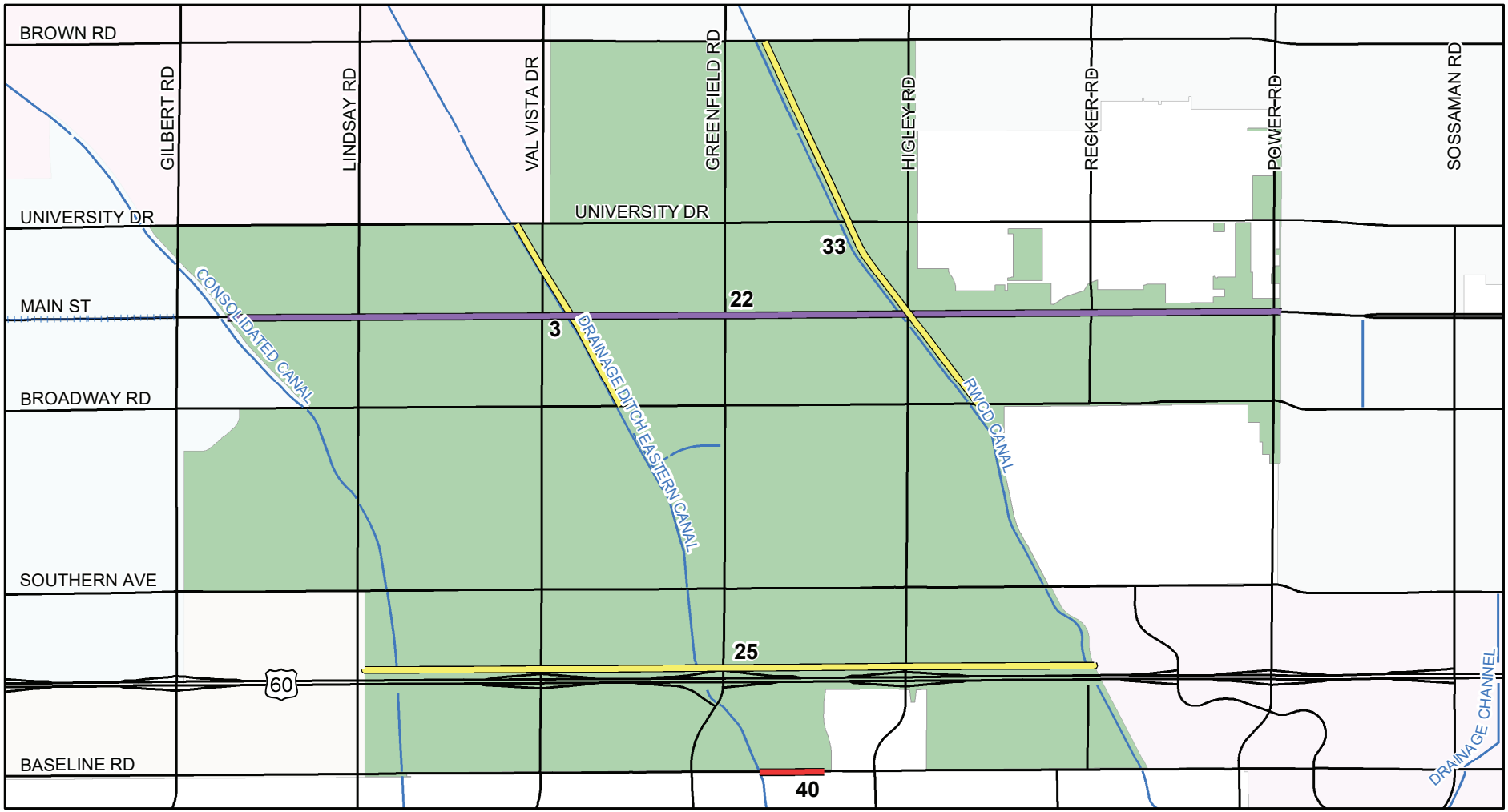
District 1 Recommended Projects

Poject Facility Type

- Bike Lane
- Shared-Use Path

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6

- Light Rail
- Railroad
- Major Street
- Canal



2018 Bicycle Master Plan

Map 6-4

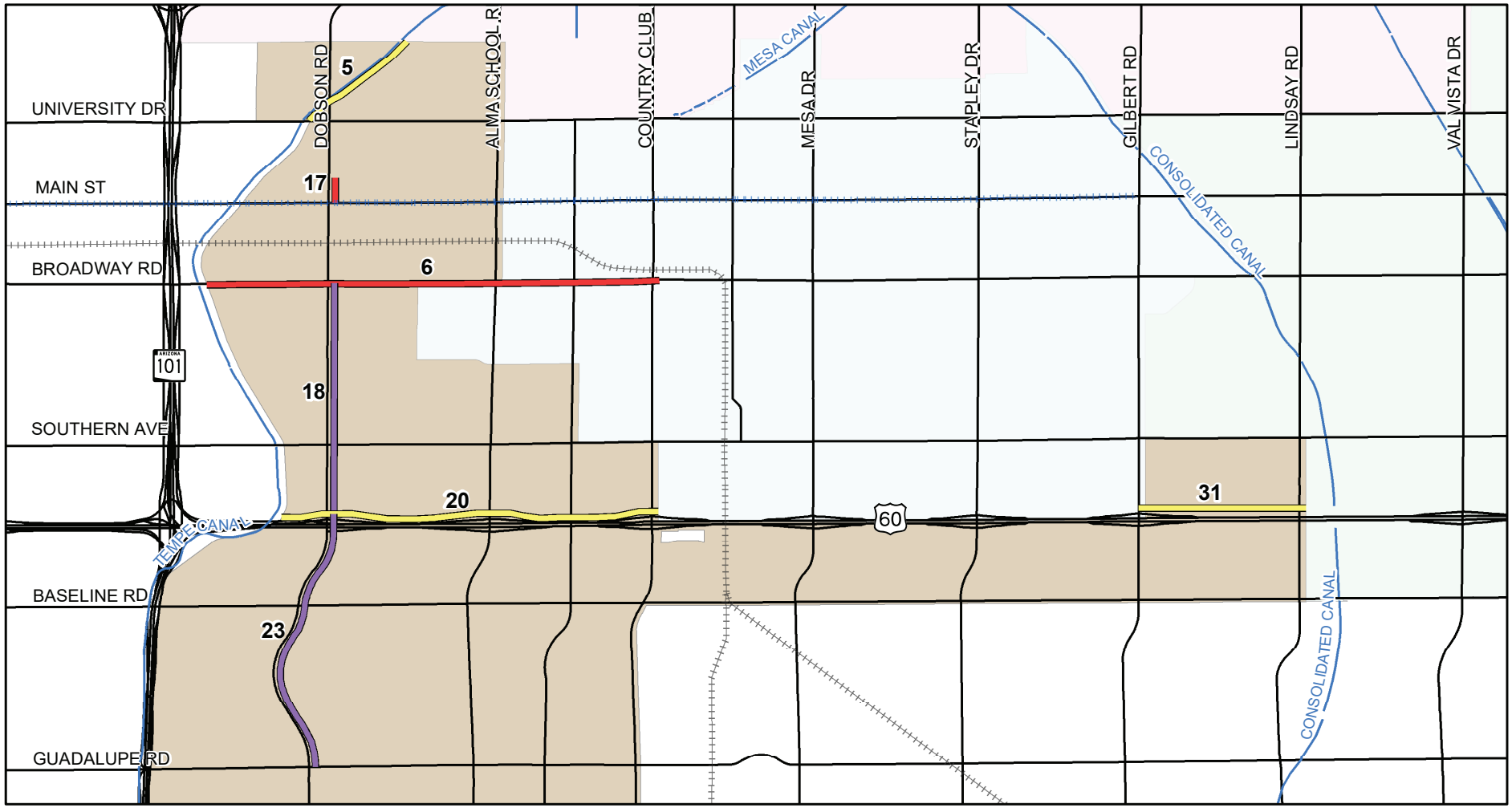
District 2 Recommended Projects

Priority	District	Project Location and Description	Facility Type
3	Two	Eastern Canal - University Drive to Broadway Road	Shared-Use Path
22	Two	Main Street - Consolidated Canal to Power Road	Separated Bike Lane
25	Two	US 60 R.O.W. - Lindsay Road to Recker Road	Shared-Use Path
33	Two	RWCD Canal SUP - Brown Road to Broadway Road	Shared-Use Path
40	Two	Baseline Road - Eastern Canal to Pierpont	Bike Lane

Project Facility Type

- Bike Lane
- Separated Bike Lane
- Shared-Use Path

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- Light Rail
- Railroad
- Major Street
- Canal



2018 Bicycle Master Plan

Map 6-5

District 3 Recommended Projects

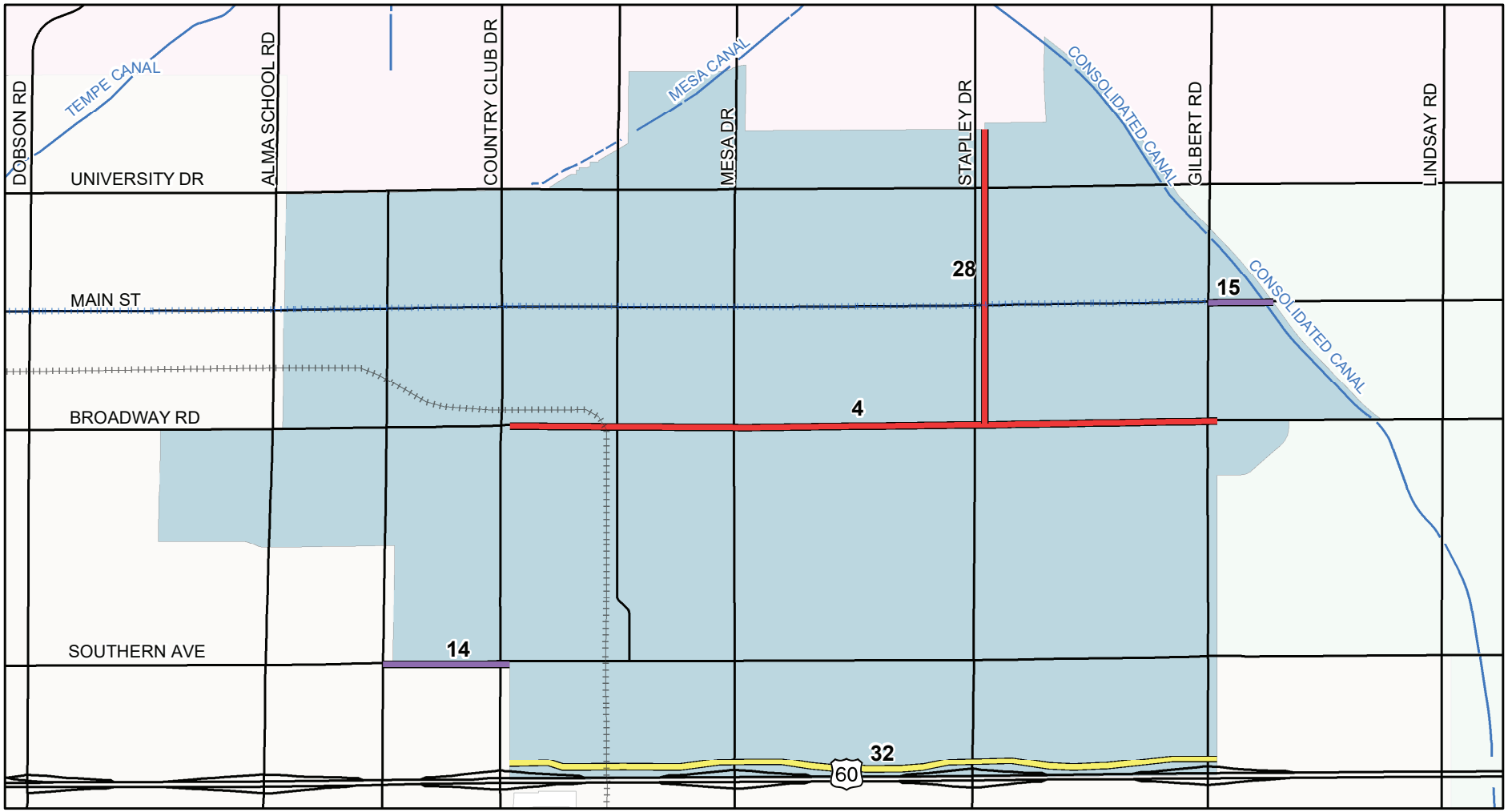
Project Facility Type

- Bike Lane
- Separated Bike Lane
- Shared-Use Path

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6

- Light Rail
- Railroad
- Major Street
- Canal

Priority	District	Project Location and Description	Facility Type
5	Three	Tempe Canal - University Drive to Rio Salado Parkway/8th Street	Shared-Use Path
6	Three	Broadway Road - Country Club to West City Limit	Bike Lane
17	Three	Dobson Road - Main Street to 1st Street	Bike Lane
18	Three	Dobson Road - Broadway Road to US 60	Separated Bike Lane
20	Three	US 60 R.O.W. - West City Limit to Country Club Drive	Shared-Use Path
23	Three	Dobson Road - US 60 to Guadalupe Road	Separated Bike Lane
31	Three	US 60 R.O.W. - Gilbert Road to Lindsay Road	Shared-Use Path



2018 Bicycle Master Plan

Map 6-6

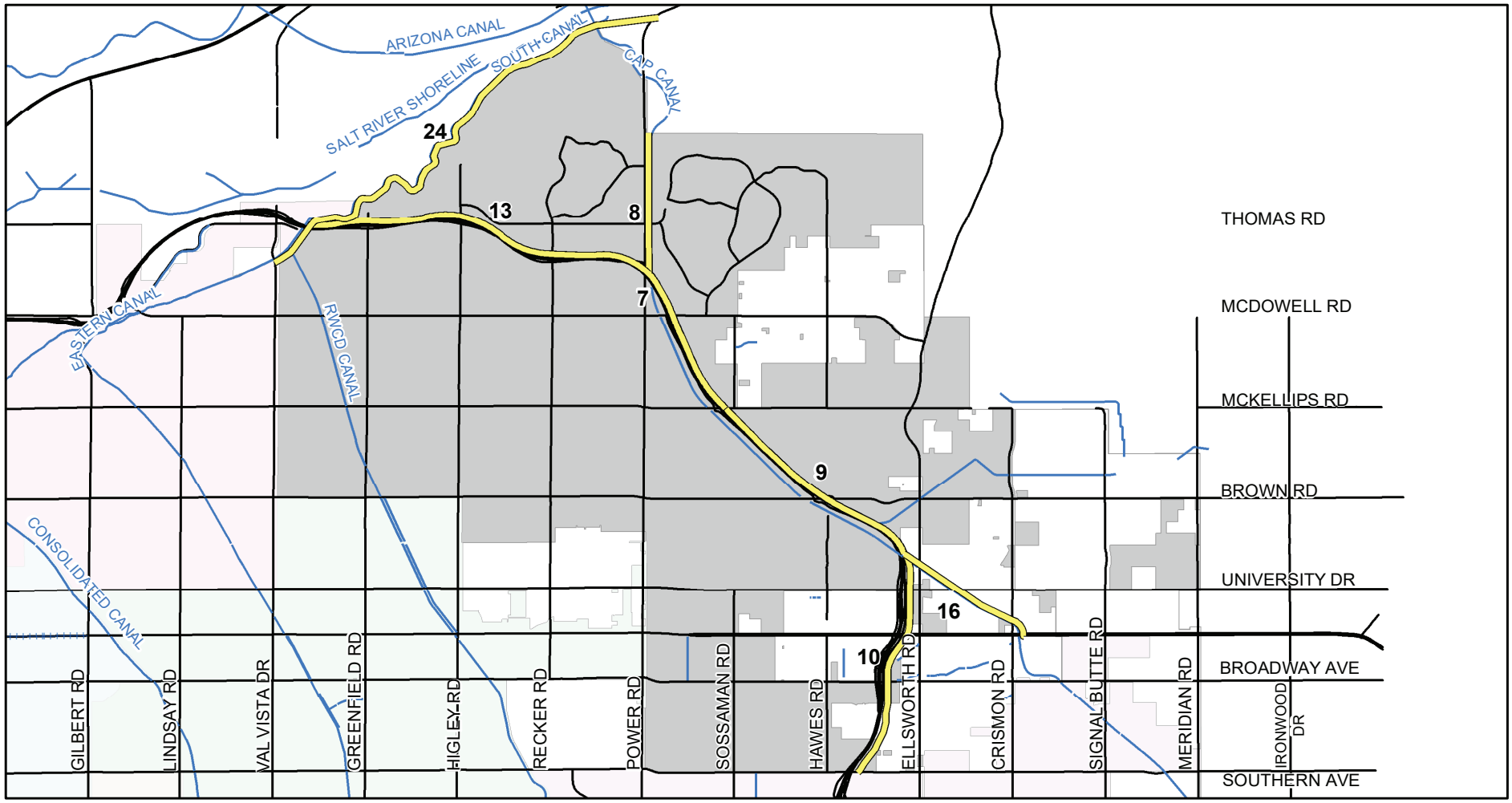
District 4 Recommended Projects

Priority	District	Project Location and Description	Facility Type
4	Four	Broadway Road - Country Club Drive to Gilbert Road	Bike Lane
14	Four	Southern Avenue - Country Club Drive to Extension Road	Separated Bike Lane
15	Four	Main Street - Gilbert Road to the Consolidated Canal	Separated Bike Lane
28	Four	Stapley Drive - Broadway Road to Rio Salado Parkway/8th Street	Bike Lane
32	Four	US 60 R.O.W. - Country Club Drive to Gilbert Road	Shared-Use Path

Project Facility Type

- Bike Lane
- Separated Bike Lane
- Shared-Use Path

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- Light Rail
- Railroad
- Major Street
- Canal



2018 Bicycle Master Plan

Map 6-7

District 5 Recommended Projects

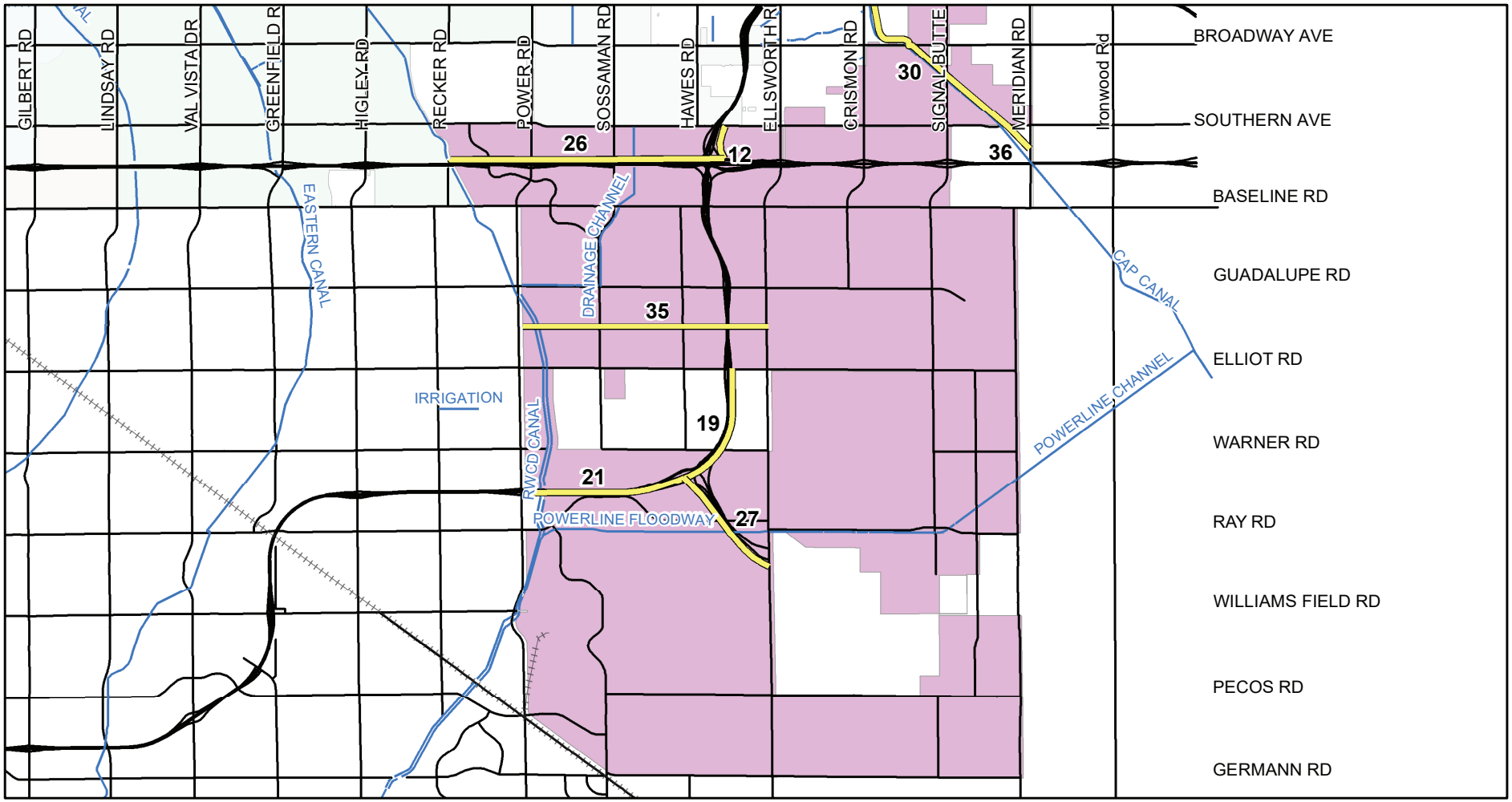
Priority	District	Project Location and Description	Facility Type
7	Five	Loop 202 Red Mountain/CAP - Power Road to McKellips Road	Shared-Use Path
8	Five	Power Road - Park and Ride to North City Limit	Shared-Use Path
9	Five	Loop 202 Red Mountain Freeway - McKellips Road to University Drive	Shared-Use Path
10	Five	Loop 202 Red Mountain Freeway - University Drive to Southern Avenue	Shared-Use Path
13	Five	L202 Red Mountain Freeway ROW - Val Vista to Power	Shared-Use Path
16	Five	CAP Canal - Loop 202 Red Mountain Freeway to Main Street	Shared-Use Path
24	Five	South Canal - Val Vista to Granite Reef Dam	Shared-Use Path

Project Facility Type

Shared-Use Path

District 1
District 2
District 3
District 4
District 5
District 6

Light Rail
Railroad
Major Street
Canal



2018 Bicycle Master Plan

Map 6-8

District 6 Recommended Projects

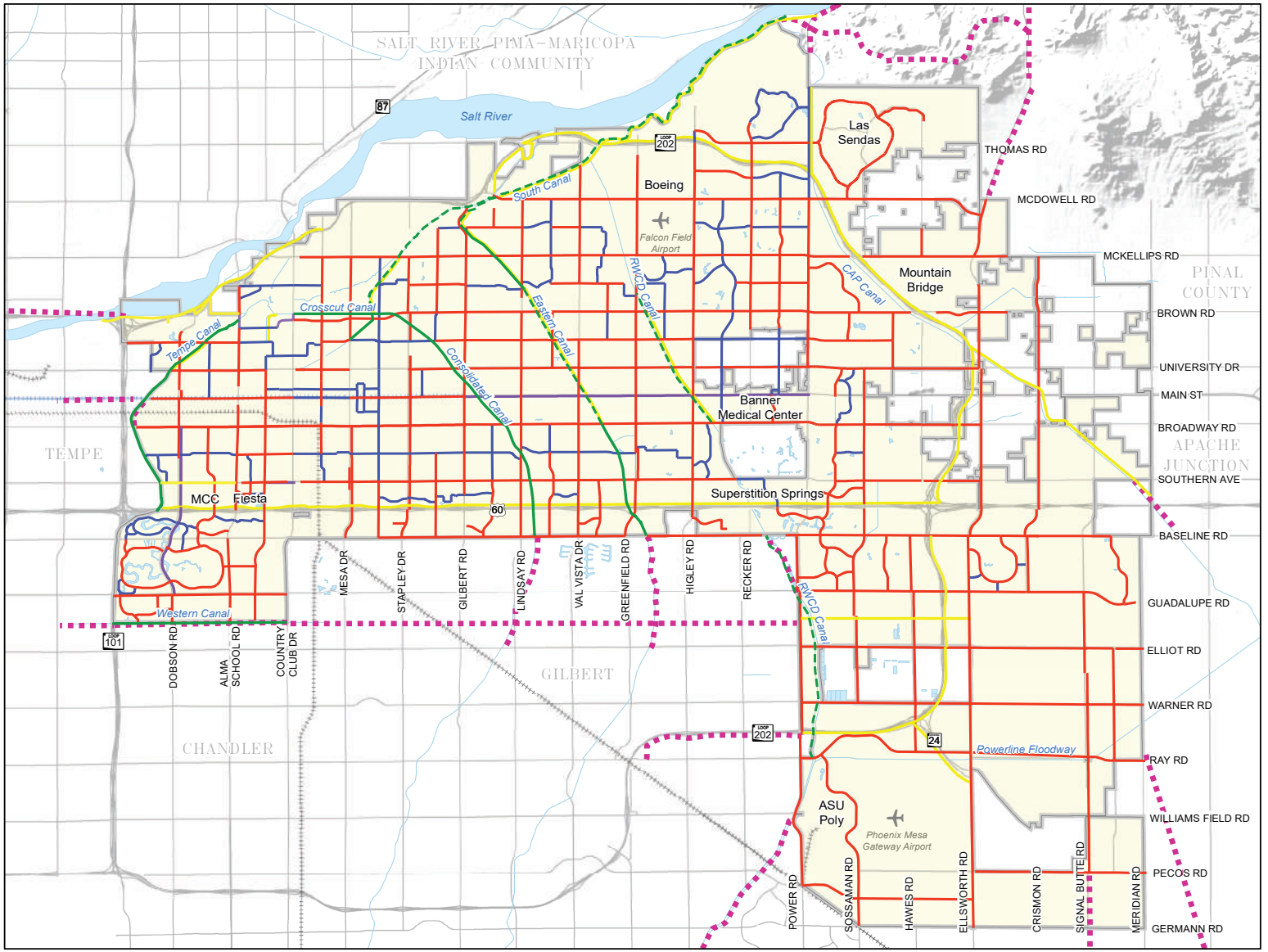
Priority	District	Project Location and Description	Facility Type
12	Six	Loop 202 Red Mountain Freeway R.O.W. - Southern Avenue through the US 60 Interchange	Shared-Use Path
19	Six	Loop 202 San Tan Freeway - Ph2: Elliot to Hawes (Gateway Shared-Use Pathway Project)	Shared-Use Path
21	Six	Loop 202 San Tan Freeway - Ph3: Hawes to Power (Gateway Shared-Use Pathway Project)	Shared-Use Path
26	Six	US 60 R.O.W. - Recker Road to the Loop 202 San Tan Freeway	Shared-Use Path
27	Six	SR 24 - Ph4: Hawes to Ellsworth (Gateway Shared-Use Pathway Project)	Shared-Use Path
30	Six	CAP Canal - Main Street to Southern Avenue	Shared-Use Path
35	Six	Powerline Easement - Power Road to Ellsworth Road	Shared-Use Path
36	Six	CAP Canal - Southern Avenue to Meridian Road	Shared-Use Path

Project Facility Type

Shared-Use Path

District 1
District 2
District 3
District 4
District 5
District 6

Light Rail
Railroad
Major Street
Canal



2018 Bicycle Master Plan

Map 6-9

Ultimate Bicycle Network

Legend

- City Boundary
- Airport
- Canal
- Light Rail
- Railroad
- Major Street

Ultimate Bicycle Network

- Bike Lane
- Separated Bike Lane
- Bike Route
- Shared-Use Path
- Paved Canal Path
- Unpaved Canal Path
- Regional Connection

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IMPLEMENTATION OF PROGRAM EXPANSIONS IDENTIFIED IN 2012

This section explains the expansion of Bicycle Programs that were proposed in the 2012 Bicycle Master Plan to be developed in direct correlation to the Goals and Objectives that were outlined in Chapter Two of this Master Plan. These programs were either implemented or are currently ongoing at this time. Along with these programs and the implementation of the facilities that were previously discussed in this chapter, the City of Mesa will continue to align itself with the objectives and standards that have been set forth by the League of American Bicyclists Bicycle Friendly Communities Program with the goal of achieving "platinum" status.

Transportation Advisory Board - Bicycle Element

The Transportation Advisory Board is an 11 member board of civic-minded citizens wishing to become involved in their local government and make recommendations to the Mesa City Council. This board meets monthly to oversee and make recommendations to the Mayor and City Council regarding transportation related issues and policies involving multiple modes of transportation, including bicycling.

Role of the Transportation Advisory Board on bicycling includes:

- Advise the City Council on bicycle policy issues.
- Interact with citizens on bicycle issues and mediate when necessary.
- Act as a sounding board for staff on bicycle operational matters.
- Be knowledgeable about the benefits bicycling provides within a community.
- Be ongoing citizen/neighborhood contact within member's area of influence and liaison to staff.
- View issues from a "big picture" and "greater good" perspective.
- Be a cheerleader for bicycling in the community.

Programs for Adult Bicyclists

The City of Mesa will be incorporating a citywide adult education program in coordination with the Maricopa Association of Governments (MAG) and the Arizona Coalition of Bicyclist through federal funding secured by the Regional Bicycle and Pedestrian Committee. This program will be offered free of charge. The curriculum will follow the League of American Bicyclists "Smart Cycling" Traffic Skills course set, which will be taught by League of American Bicyclists certified instructors. These adult education classes will be offered throughout the City as a combined effort between the City of Mesa Parks, Recreation, and Commercial Facilities Department and Transportation Department.

Safe Routes to School

Through efforts to continually expand and enhance the current City of Mesa Safe Routes to School (SRTS) program, the following will be addressed:

- Creation of a new vision statement for City staff that will outline the direction and proposed advancement of the SRTS program strategies related to engineering, enforcement, education, encouragement, and evaluation.
- The addition of new programs in schools with walking and bicycling students.
- Established SRTS programs with champions in place will continue to be supported, but will be encouraged to be self-sustaining.
- Additional schools will be added each year to International Walk to School Day.
- Additional schools will be added to Valley Bike Month Bicycle to School Day events.

Bicycle Media Campaign

Delivering information promoting the Bicycle Program is vital for the bicycle program to thrive in the public eye.

The key elements of the media campaign will facilitate strategic communications designed to identify a variety of opportunities and challenges for the City of Mesa Bicycle Program through the CityLink Smart Phone app. Identifying, highlighting and celebrating the accomplishments of the bicycle program are imperative. Fortunately, numerous successes do exist, and very exciting projects, programs, and events are happening throughout the year. The campaign will include consistent messages explaining how the bicycle program works and highlighting accomplishments.

Bicycle Tourism Packet

The Legacy Mesa Convention & Visitors Bureau, now known as Visit Mesa, supports the City of Mesa in on-going efforts to boost the City's presence as a bicycle-friendly community. Visit Mesa sees value in helping to build the City's reputation and promote Mesa as a destination and a cycling community and supports these efforts through:

- Communications
- Media and Promotions
- Online and Email Marketing
- Advertising
- Mesa Sports & Tourism Development

Visit Mesa also attends several trade shows and sports industry events where they market Mesa as a destination suitable for bicycle-related sporting competitions.

Bicycle Annual Report

The City of Mesa bicycle program annual report will be provided to the Transportation Advisory Board and be made available each year during the life of this Bicycle Master Plan. The report may include the following:

- Infrastructure project updates
- Street maintenance improvements affecting the bicycle program
- Program updates
- Bike Month events
- Special events supported
- Adult education efforts
- Child education efforts
- Bicycle counts
- Customer satisfaction survey results
- Trip reduction and mode share reports

ADDITIONAL STAFF REQUIREMENTS

The implementation of these platforms into the City of Mesa bicycle program will require additional staff to implement and prevent the reduction in productivity and efficiency of the program. Additional staff will be assigned specific duties in each of the areas discussed in this chapter including but not limited to education, Safe Routes to School, enforcement, and promotion of the Bicycle Program. By providing staff who specialize in each of the program areas the City will ensure that it is in on par with other Cities of similar size and is effectively progressing towards its goal of Bicycle Friendly Community "Platinum" status.

PERFORMANCE MEASUREMENT

Performance measures and benchmarks fall under five major categories, which are used to gather and evaluate information that will be utilized to guide future decisions regarding expansion and funding. These five major categories include:

1) Measuring Mode Share

U.S. Census Bureau, 2009 American Community Survey (ACS) data, identifies Mesa's current bicycle mode share as of 2009 to be 0.9%, which is well above the current national average of 0.38%. Mesa's Bicycle Master Plan lays out a vision that intends to increase bicycle trips to work and school mode share to 5% within the life of the plan. Annual data will be collected to monitor mode share progression through the development of local annual surveys that will be distributed in various formats and the continuation of data collection from the ACS.

2) Network Evaluation and Asset Management

Evaluation of Mesa's bicycle network is approached in three ways to provide a comprehensive overview of assets and facilities managed by the City of Mesa Transportation Department. This evaluation is imperative to the success of the program and offers a fiscal analysis for purposes of budgeting justification. The three areas that assess the network are:

a. Asset Inventory — Successful inventory management of bicycle facilities is vital to fulfilling Mesa's multimodal mission. Establishing, inventorying, operating, and maintaining assets of Mesa's bicycle program will maintain an up-to-date account of bicycle facilities.

b. Facility Condition — Ongoing evaluation and maintenance of bicycle facilities will take place to maintain favorable conditions for users to ensure they are not discouraged by unserviceable and/or unclean conditions.

c. Usage — This measurement is key for assessing the bicycle network. Annual screen-line volume counts and user surveys of on-street and off-street facilities in conjunction with permanent

counts provide verification of several determining factors of the network including connectivity, cleanliness, security, and user friendliness.

3) Assessing Feedback and Reporting Achievements

The continued improvement and creation of new assessment techniques contributes to cutting-edge bicycle program analysis. Mesa works to incorporate innovative new bicycle assessment tools that will help Mesa's analysis of its bicycle infrastructure. Mesa's bicycle data also contributes to regional, state, and national research on bicycle movement and usage. Following are assessment and reporting tools being used pertaining to infrastructure and the use of bicycle facilities, as well as programs that have been instituted by the City of Mesa since first recommended in the 2012 Bicycle Master Plan.

Infrastructure and Facility Usage Assessment Tools

Bike Counts

Bicycle and pedestrian usage of specific intersections and screen line locations throughout the City will be counted and documented, similar to the National Documentation Project. Just like motor vehicle counts, counting bicyclists and pedestrians at specific locations will help Mesa to more accurately estimate demand, measure the benefits of investments, and design projects.

By developing and conducting bicycle counts throughout Mesa utilizing automated and volunteer counters, baseline usage will effectively track the positive benefits of investments made to bicycle infrastructure compared to the other transportation modes. These bicycle counts will be published in a Bicycle and Pedestrian Annual Report that will be presented to the Transportation Advisory Board and made available to the general public.

With the increasing need to provide tools that measure performance and provide information indicating an increase in mode shift and air quality, the City of Mesa plans to institute manual counts and a number of automated counters. These counters will produce data needed to substantiate the federal funding and justify investment decisions, which are going to be the focus of upcoming grant opportunities.

The City will use a combination of available technologies which include:

- Manual Counts
- Video Recording and Replay
- Passive or Active Infrared
- Inductive Loops

The product of these count stations will provide the City with automated raw data that will be utilized for prioritization and trend analysis that will provide a snapshot of before-and-after studies for project types and locations.

Permanent count stations have been installed on Mesa's shared use paths and will be considered with new construction projects.

By operating count stations staff will be able to:

- Prioritize work on facilities by usage
- Evaluate use of facilities over time
- Justify investments
- Understand user circulation patterns
- Modify infrastructure according to need
- Measure usage of a specific facility
- Assess the impacts of an investment
- Plan maintenance priorities
- Monitor seasonal variations
- Evaluate the impact of new facilities

The City of Mesa Bicycle Program is working in cooperation with the Maricopa Association of Governments and the partnering agencies to develop a uniform process that will be used throughout the region to incorporate the bicycle count information obtained into the current MAG traffic demand model (TDM).

Annual Satisfaction Surveys

Annual Customer Satisfaction Surveys will be conducted via the Internet allowing staff to collect feedback from users citywide each fiscal year. The information Mesa gathers will measure high level relationships with users and will draw attention to areas where Mesa needs to focus more attention. Information collected through these annual satisfaction surveys will then be compiled, analyzed, and published in a Bicycle and Pedestrian Annual Report that will be presented to the Bicycle Advisory Committee and made available to the general public.

Interactive User Reporting of Maintenance Issues

Bicycle issues regarding on-street bike lane maintenance, shared use paths, danger areas, and end of line facility concerns at public buildings and transit centers are able to be reported immediately utilizing the "CityLink" smart phone app. Users are able to select from a list of different issues related to bicycling along with a variety of issues that currently include graffiti, potholes, street sweeping, and a number of other areas that may need attention. The "CityLink" app guides the user through a few questions about the item being reported and then prompts the user to take a picture to submit along with the request. The

"CityLink" app also automatically collects the location of the request using the smart phones' built in GPS so crews can be dispatched to the exact location.

Bicycle Program Assessment Tools

Class Registration and Attendance

Programs offered with have a target of 80% annually and will be measured as actual registered participants compared to the maximum number allowed in each program. This measurement will be compiled and presented in the Bicycle and Pedestrian Annual Report.

Satisfaction Surveys Distributed to Class Attendees

At the completion of each class, instructors will conduct a survey that will help measure the satisfaction and understanding of materials utilized in order to maintain quality assurance of each curriculum. Customers will be given a survey regarding their satisfaction with the class, with a target of 90% satisfaction rate annually for all classes provided.

Trip Reduction and Mode Share Increase

Over time, one long-term measurement that is provided by US Census data and contributed to League of American Bicyclists Bicycle Friendly Community (BFC) Status is increased mode share. Currently, Mesa's mode share is increasing, which has been one of the determining factors awarding the City BFC Silver level status. Over the life of this plan, mode share will be evaluated on an annual basis through trip reduction reported by Maricopa County Trip Reduction Survey reports. The Maricopa County Air Quality Department is a regulatory agency whose goal is to ensure that federal clean air standards are achieved. The Maricopa County Air Quality Department is governed by the Maricopa County Board of Supervisors and follows air quality standards set forth by the federal Clean Air Act.

The data that is collected by the Maricopa County Air Quality Department will be compiled by the City of Mesa and reported to the Transportation Advisory Board in the Bicycle and Pedestrian Annual Report. Mesa's goal for mode share will run in line with the goal of BFC Gold level status with a target of 4.0% by the year 2020 and 5.0% by the year 2022.

4) Measuring Crash Reduction and Safety

Bicycle crash rates directly reflect bicycle safety. Mesa has been measuring and analyzing bicycle accidents for many years. When analyzing bicycle related accidents, Mesa measures those crashes annually, tracking crashes involving bicycles and motor vehicles identified in Police Accident Reports (PARs) investigated and reported by the City of Mesa Police Department.

The purpose of analyzing bicycle crashes is to better understand the underlying causes of collisions between bicycles and motor vehicles. Analysis of the crashes reveals facts about the types of streets where crashes happened, behavior of bicyclists and motorists that caused the crashes, the times of day and year crashes occur, and age and gender of bicyclists involved in bicycle/motor vehicle collisions. Once an understanding of the root causes of bicycle crashes is gained, the Transportation Department can do further analysis to determine if the traffic environment in the City of Mesa can be made safer for bicyclists. Analysis of bicycle crashes also helps in developing appropriate messages for educating the public on safer bicycling habits and how bicyclists and motorists can best share the streets in the City of Mesa.

The number of bicycle crashes has fluctuated over the past five years. Crashes are normalized by looking at how many bicycle crashes occur per every 1,000 people in Mesa's population in a given year. Normalization puts into perspective an increase or decrease in the number of bicycle crashes when there is a concurrent rise in the number of drivers, cyclists and automobiles due to population growth.

These reports are conducted annually by the Transportation Department.

Bicycle Related Police Citations

Citations related to bicycles issued to either bicyclists or motorists will be reviewed on an annual basis through the bicycle diversion program that the City is considering offering as described previously. Violators would have the option to enroll in a League of American Bicyclists certified four hour bicycle safety education course in lieu of a fine and including the benefit of having those charges dismissed from the violator's record one time per 12-month period. By reviewing court records we are able to retrieve information about how many overall bicycle related citations were issued for any given year and the percentage of those citations that were deferred to diversion classes and how many elected to pay the citation. By retrieving these numbers we can not only analyze how many citations related to bicycles are being written, but also the geographic locations of those citations.

5) Funding Acquisition

The Bicycle Program is continually searching for funding avenues for projects in the City of Mesa. Completion of Mesa's implementation plan will be dependent on the ability of the City to identify and obtain funding and provide staffing to manage and implement each of the items included in the implementation strategy. Mesa receives the majority of its funding opportunity information through MAG and ADOT, which are the administrators of

several federal grants that are offered in the region. Periodically, funding opportunities become available through professional associations such as the League of American Bicyclists, the Association of Pedestrian and Bicycle Professionals and Pro Bike/Pro Walk that administer grant monies that are donated to these non-profit agencies for the betterment of walking and bicycling in America.

The primary federal source from which Mesa received surface transportation funding, which includes bicycle facilities, was SAFETEA-LU, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users. The $286.5 billion SAFETEALU bill passed in 2005 and authorized Federal surface transportation programs for the five-year period between 2005 and 2009. As of September 30, 2009, SAFETEALU expired, although the bill's programs have been kept alive at a 30% reduction in funding by Congress through a series of continuing resolutions.

Beginning on October 1, 2012 "Moving Ahead for Progress in the 21st Century" (MAP-21) replaced SAFETEA-LU. MAP-21 funded surface transportation programs at over $105 billion for fiscal years 2013 and 2014. MAP-21 continued through a number of extensions.

The current federal law that provides funding for surface transportation infrastructure is the Fixing America's Surface Transportation (FAST) Act. The FAST Act authorizes $305 billion over fiscal years 2016 through 2020. Administration of federal funding occurs through MAG as the regions Metropolitan Planning Organization (MPO).

Congestion Mitigation and Air Quality (CMAQ) Improvement Program

Congestion Mitigation and Air Quality improvement funds are programmed for projects likely to contribute to the attainment of a national ambient air quality standards and reduce congestion.

Transportation Alternative (TA)

The federal Surface Transportation Program includes a set-aside of Surface Transportation Block Grant (STBG) program funding for transportation alternatives (TA). TA funds aim to help expand travel choices and enhance the transportation experience. Bicycle facility infrastructure projects are eligible under this funding.

Safe Routes to School (SRTS) Program

The Safe Routes to School (SRTS) Program came into effect in August 2005. The MAG region receives an annual allocation of federal aid Transportation Alternatives funding from ADOT. MAG member agencies are eligible to submit applications for utilizing the funding to help schools and communities promote the health and safety of k-8 students. SRTS initiatives and activities include crossing guard training workshops, non-infrastructure projects, and SRTS studies.

MAG Design Assistance (DA) Program

The MAG Design Assistance Program was originated in 1996 to encourage the development of designs for pedestrian facilities according to the MAG Pedestrian Policies and Design Guidelines. In 2006, MAG initiated the Bicycle Facilities Design program encouraging MAG members and private sector professionals involved in transportation and land use design to utilize the AASHTO Guide for the Development of Bicycle Facilities. In 2017, MAG initiated the Bicycle and Pedestrian Master Plans and First Time Updates program.

Economic Vitality and Flexibility

With the current fluctuation in the US economy, Mesa is approaching bicycle and pedestrian design and construction with the point of view that future funding to support bicycle facility development may be limited, or not readily accessible, depending on political climate and economic stability. The availability of funding will significantly affect Mesa's future bicycle network, facilities, and program development.

Therefore, Mesa is making every effort to prioritize projects and programs in this plan to ensure that if and when funding becomes available, the City is prepared to effectively and efficiently compete and advance those projects for that funding.

SUMMARY

This final chapter of the City of Mesa Bicycle Master Plan presented an implementation strategy to build out the bicycle network and program for the future. In a way, this vision is the culmination of everything the bike plan has delivered – addressing goals and objectives, implementing education, encouragement and enforcement, improving facilities and building the network, and finally, laying out a plan for continuous evaluation. By following the strategy for building the network and programs as suggested in this chapter, the City of Mesa will create a more livable community that its residents will enjoy for many years.

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APPENDIX A

HEALTH IMPACT INDICATORS REPORT

2018 CITY OF MESA
BICYCLE MASTER PLAN UPDATE

HEALTH IMPACT INDICATORS REPORT

Assembled by Maricopa County Department of Public Health
Offices of: Community Health Innovation, Epidemiology & Public Health Policy

At the request of the City of Mesa Bicycle and Pedestrian Program and Y2K Engineering, MCDPH provides this Health Impact Indicator report to better inform the City's 2018 update to its 2012 Bicycle Master Plan. This update is a timely opportunity to implement methods to improve the health and wellbeing of Mesa's residents and visitors – especially those that are underserved.

This Health Impact Indicator report:

- Introduces why active transportation and health intersect
- Provides key data related to four key health indicators
- Presents data-informed recommendations

Why Health Impact Indicators?

Organizations such as the American Public Health Association, which has worked to improve the country's health for over 145 years, defines a truly equitable transportation system as one that is carefully designed to support and improve community health. Collaboration between transportation professionals and health practitioners has also been supported by national agencies such as the Federal Highway Administration within the US Department of Transportation.

Transportation investments have a profound impact on the wellbeing of communities. For people experiencing poverty, individuals with disabilities, the elderly, transit dependent individuals and other vulnerable populations - access to safe, affordable and reliable transportation options is especially crucial. With proper investment, planning and execution, these transportation options allow for

greater employment and educational opportunities; better access to vital health promoting resources such as healthy food retailers, recreation facilities and healthcare providers; as well as access to an overall higher quality of life for residents. Furthermore, transportation options such as walking, bicycling and taking transit can, through increased levels of physical activity, reduce risk of early death or illness due to chronic diseases such as Heart Disease, Diabetes and Cancer.

Transportation plans, policies and projects can either simplify or complicate people's ability to conveniently travel to meet their daily needs or to commute between home and work. Key to this ability is making it easier for people to utilize active transportation, including walking and bicycling, to safely reach their everyday destinations.

Health Indicator #1: Demographic Information

Why? - Transportation investments can have profound impact on public health for the poor, the elderly, people with disabilities and other vulnerable populations.[i] These individuals may not own vehicles and tend to be more reliant on active transportation or transit. Particular attention should be focused on the prevalence of individuals with access and functional needs (those with blindness, hearing loss, physical disabilities, etc.). Planning for these populations may be more difficult, so greater efforts to authentically engage them during planning, design and construction processes will reveal valuable information and insights.

*All categories below – Data retrieved from - *U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates*	Mesa		Maricopa County	
Total population	458,860		4,018,143	
Male	226,220	49.3%	1,986,158	49.4%%
Female	232,640	50.7%	2,031,985	50.6%%
White alone	293,738	64.0%	2,303,538	57.3%%
Black or African American alone	15,622	3.4%	198,489	4.9%%
American Indian and Alaska Native alone	8,456	1.8%	63,388	1.6%%
Asian alone	8,679	1.9%	149,319	3.7%%
Native Hawaiian and Other Pacific Islander alone	1,875	0.4%	7,464	0.2%%
Hispanic or Latino (of any race)	121,946	26.6%	1,209,034	30.1%%

Under 5 years	31,568	**6.9%**	272,710	6.8%%
5 to 9 years	31,943	7.0%	287,752	7.2%%
10 to 14 years	30,926	6.7%	286,424	7.1%%
15 to 19 years	30,125	6.6%	275,870	6.9%%
20 to 24 years	33,482	7.3%	283,042	7.0%%
25 to 34 years	65,773	14.3%	569,970	14.2%%
35 to 44 years	54,884	12.0%	539,197	13.4%%
45 to 54 years	56,957	12.4%	522,995	13.0%%
55 to 59 years	26,297	5.7%	232,062	5.8%%
60 to 64 years	25,450	**5.5%**	209,667	5.25%%
65 to 74 years	38,020	**8.3%**	308,128	7.7%%
75 to 84 years	23,928	**5.2%**	163,572	4.1%%
85 years and over	9,507	**2.1%**	66,754	1.7%%
Population with a Disability Definitions here: https://www.census.gov/people/disability/methodology/acs.html	**Mesa**		**Maricopa County**	
	53,811	**11.8%**	417,695	10.5%%
With a hearing difficulty	16,360	**3.6%**	127,801	3.2%%
With a vision difficulty	10,033	**2.2%**	78,294	2.0%%
With a cognitive difficulty	19,420	**4.6%**	152,030	4.1%%
With an ambulatory difficulty	27,867	**6.5%**	218,610	5.9%%
With a self-care difficulty	10,608	**2.5%**	82,280	2.2%%
With an independent living difficulty	18,144	**5.3%**	142,707	4.8%%

Income and Benefits (In 2015 inflation-adjusted dollars)	Mesa		Maricopa County	
Total households	168,914		1,442,518	
Less than $10,000	11,029	6.5%	99,549	6.9%%
$10,000 to $14,999	8,684	**5.1%**	65,358	4.5%%
$15,000 to $24,999	20,367	**12.1%**	144,738	10.0%%
$25,000 to $34,999	19,703	**11.7%**	148,677	10.3%%
$35,000 to $49,999	26,501	15.7%	205,124	14.2%%
$50,000 to $74,999	32,094	19.0%	266,089	18.4%%
$75,000 to $99,999	19,377	11.5%	178,890	12.4%%
$100,000 to $149,999	19,907	11.8%	194,519	13.5%%
$150,000 to $199,999	6,796	4.0%	71,054	4.9%%
$200,000 or more	4,456	2.6%	68,520	4.8%%
Median household income (dollars)	**$48,809**		$54,229	
Mean household income (dollars)	**$64,147**		$74,347	

With Supplemental Security Income	5,615	3.3%	50,703	3.5%%
With Cash Public Assistance income	4,306	2.5%	29,878	2.1%%
With Food Stamp/SNAP benefits in the past 12 months	19,142	11.3%	170,880	11.8%%

Health Insurance Coverage	Mesa		Maricopa County	
Civilian non-institutionalized population	457,392		3,988,822	
With health insurance coverage	382,040	83.5%	3,381,464	84.8%%
With private health insurance	283,417	62.0%	2,516,393	63.1%%
With public coverage	151,608	**33.1%**	1,253,234	31.4%%
No health insurance coverage	75,352	**16.5%**	607,358	15.2%%

**Please note that demographic information in the tables above was presented for the entire city. Differences exist depending on zip code, census tract or neighborhood. These differences should be further examined in the context of active transportation planning. Demographic information was also provided to the City and Y2K through Arc GIS Online in order to illustrate the demographics throughout the City's census tracts. Please see maps for more detailed info.*

Things to consider related to Demographic Information data in Mesa:

When comparing to Maricopa County as a whole, Mesa has:

- A slightly larger population of children under 5 years of age.
- A larger population of individuals over 60 years of age (in all provided age categories)
- A higher rate of individuals with various disabilities (in all provided categories)
- A higher percentage of individuals living under federal poverty level
- Lower median and mean household incomes
- A higher percentage of individuals with **public** health insurance coverage or with **no** health insurance coverage

Recommendations:

1.1 – Increase outreach to and responses from those over 60, those with disabilities and those with lower incomes during Mesa's annual Bicycle and Pedestrian survey.

1.2 – Engage vulnerable populations during planning and construction of bicycle and pedestrian infrastructure projects – for example, populations living in government subsidized housing complexes. The next bicycle master plan update is an opportunity for a strong public outreach effort.

1.3 – Work with bike share providers to implement discounts for bike share services for lower income populations – for example, those with SNAP (formerly called food stamp) benefits or those on Medicare/Medicaid healthcare plans.

1.4 - Encourage dockless bike share companies to locate bicycles in communities that lack access to the GriD system.

1.5 – Include benches and shaded refuge areas on pathways that are comfortable for older adults, individuals with disabilities and care-givers of young children.

1.6 – Strongly consider locations with higher percentages of vulnerable populations during the prioritization of bicycle and pedestrian infrastructure improvements (whether new or retro-fit).

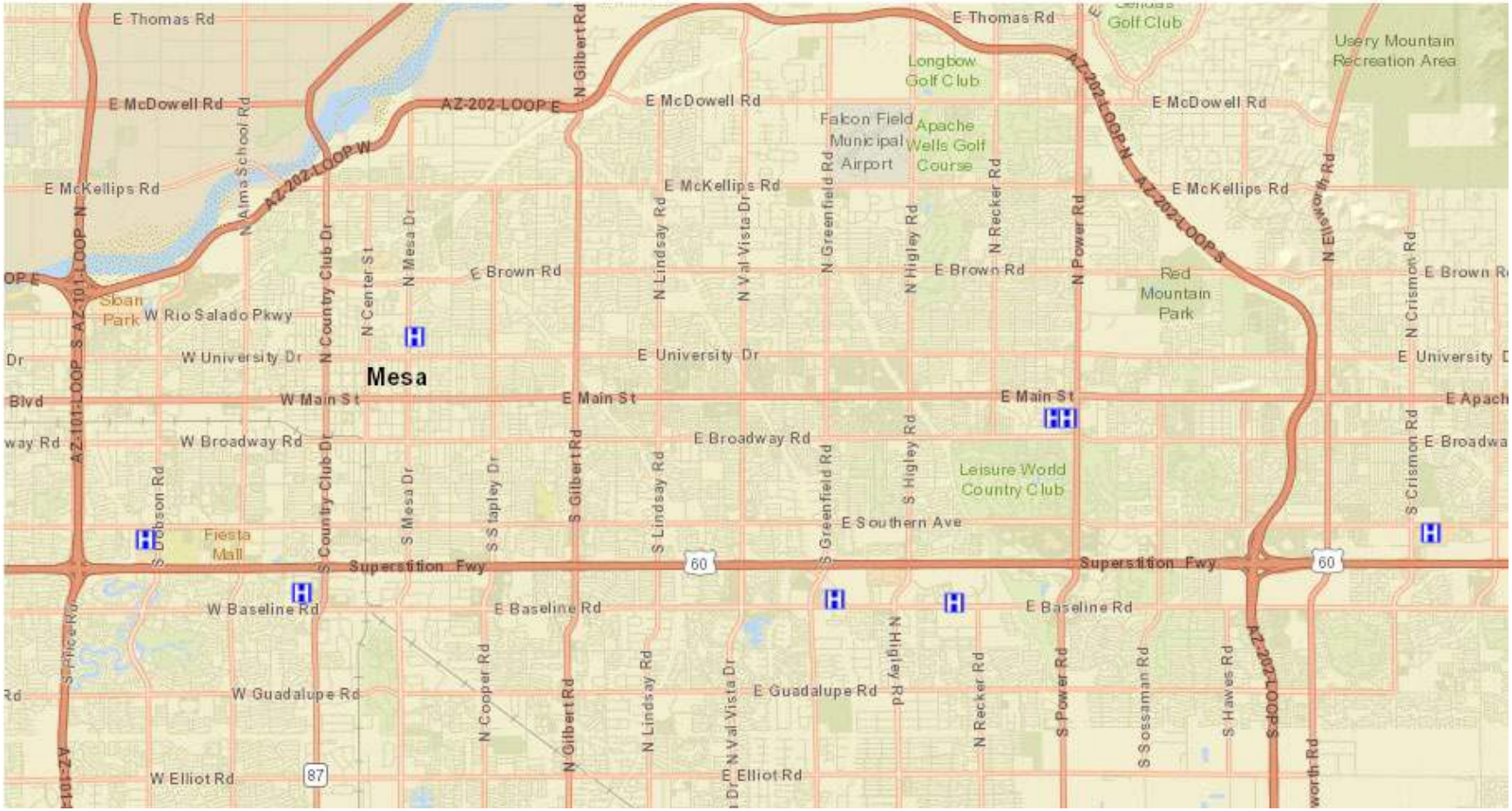
Health Indicator #2: Health Promoting Resources

Why? - Inequitable access to healthcare services, healthy foods and safe and accessible spaces to recreate contributes to health disparities for many residents of low-income neighborhoods.[ii] For example, transit dependent individuals accessing healthcare may travel long distances, make multiple bus transfers and experience inconsistent service, which can cause them to miss appointments, delay care, and forego medications and vaccinations. Low income, more transit dependent residents may also face challenges accessing healthy foods including: a scarcity of full service grocery stores; and an overabundance of convenience stores and fast food restaurants[iii] [iv]. Distance to a grocery store is a predictor of health food purchasing and of better nutrition. Safe, comfortable and accessible bicycle and pedestrian infrastructure can improve access to health promoting resources. Furthermore, walking and biking to these resources offers opportunities to increase daily physical activity levels.

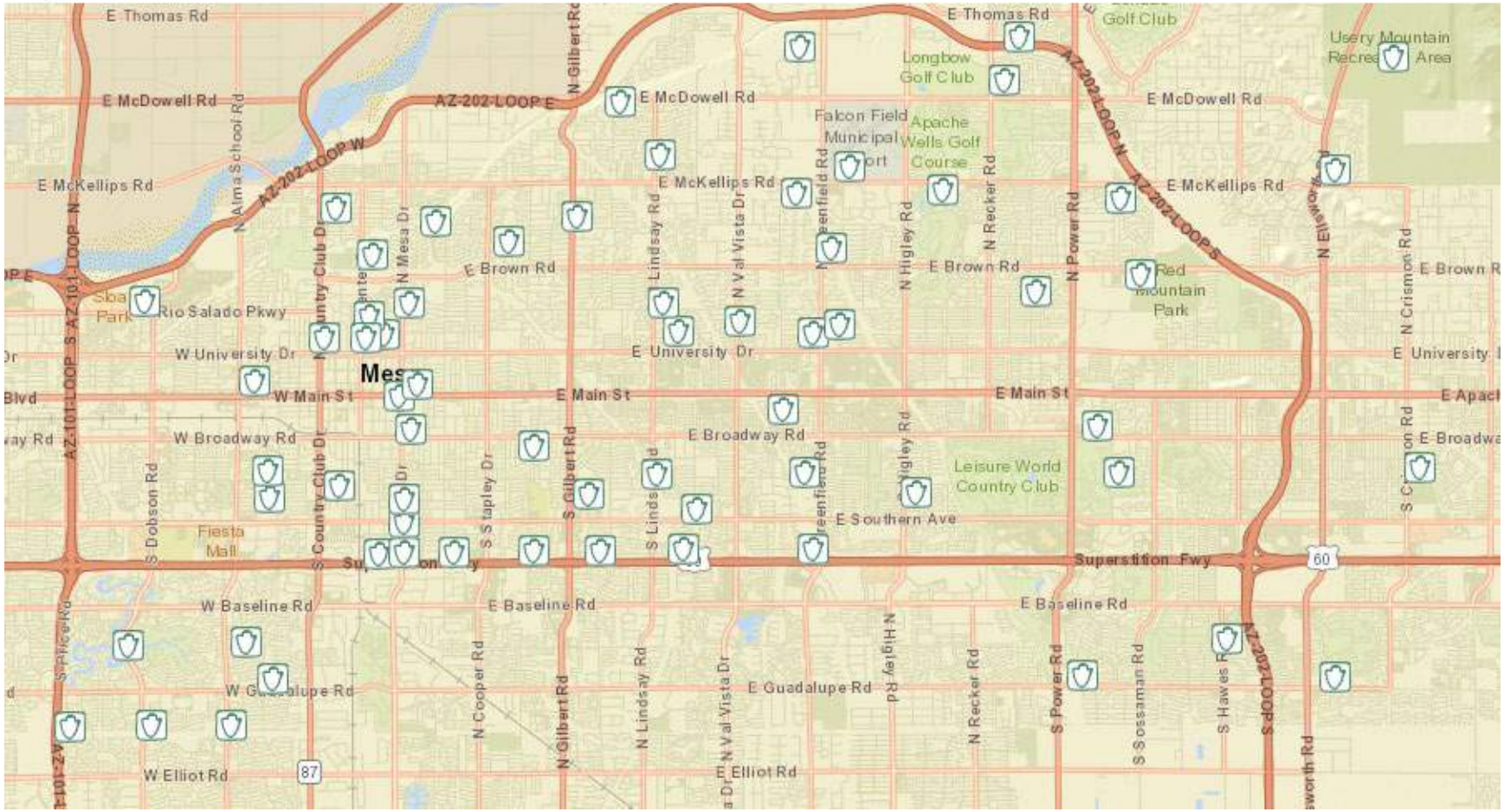
GIS maps of the locations of health promoting resources in the community including: Healthcare facilities, full-service grocery stores, and government-owned parks.

Additional maps available through ArcGIS Online. .

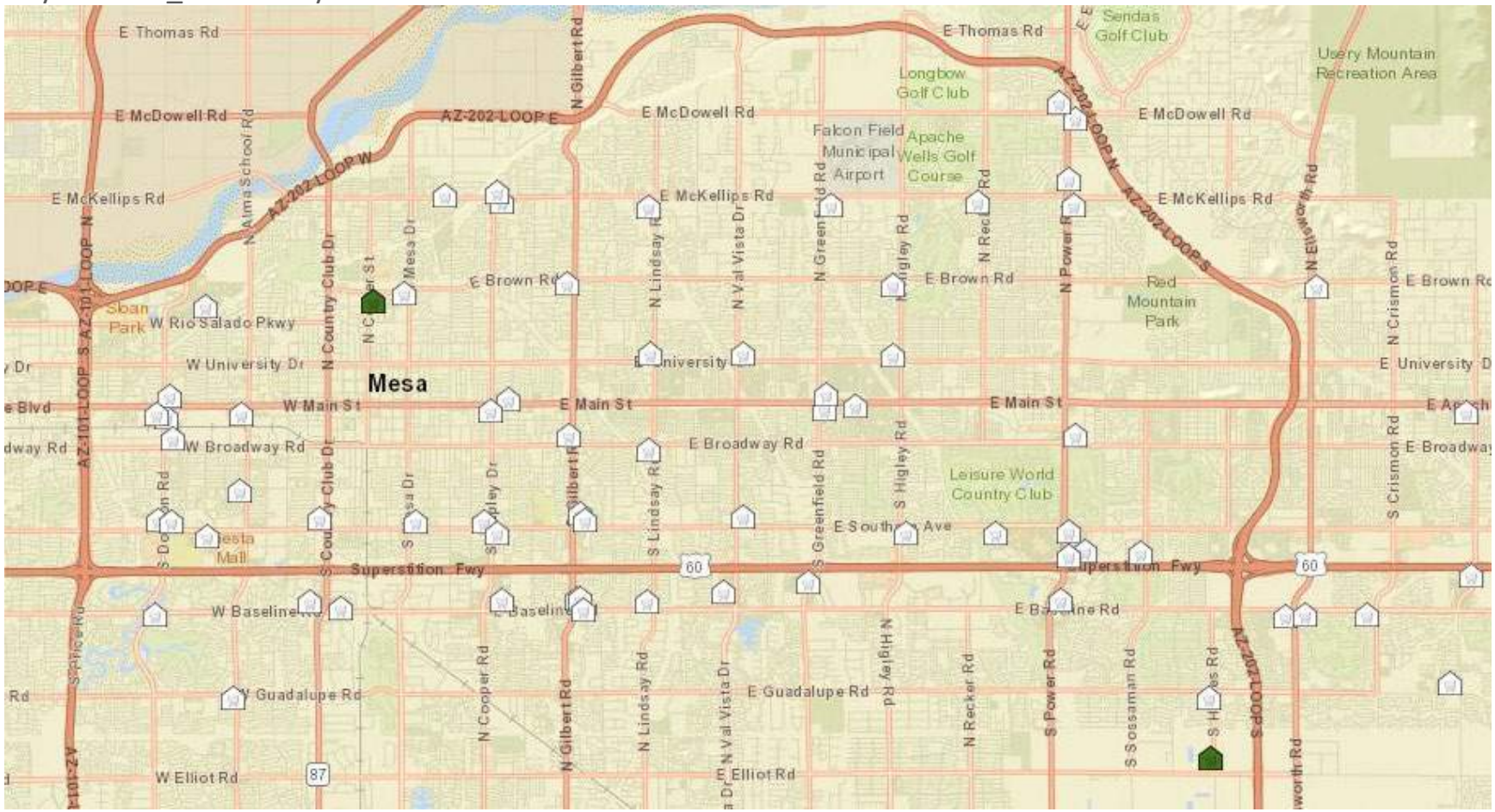
City of Mesa_All Hospitals



City of Mesa_All Parks



City of Mesa_All Grocery Stores and Farmers Markets



Things to consider related to Health Promoting Resources in Mesa:

- Heat is a major factor in utilizing active modes to access health promoting resources. While research shows that individuals are willing to walk between .25-.5 miles and bike between 2-4 miles to access community amenities, this may change in the warmer months.
- Hospital patients may not commonly walk or bike to their appointments, however, hospitals employ a large number of staff and have many visitors. It's important to consider how these folks are getting to the hospital.
- Hospitals in Mesa are fairly spread out. The elderly and those that lack adequate social support may have difficulty obtaining non-emergency medical transportation to appointments at hospitals and primary care facilities (not included in map).
- There are gaps in access to city/county parks in Mesa. Furthermore, although the number of parks may appear adequate, not all parks are created equally. Utilization of parks varies depending on amenities offered as well as perceived and actual safety.
- Gaps also exist throughout Mesa in terms of access to healthy food. In areas that do have an adequate number of grocery stores, quality and affordability of fresh produce differ between stores located in different neighborhoods. Accessibility of transit near grocery stores can help residents have a better experiencing getting to the grocery store. Currently, only two Farmers markets operate regularly in the city.
- Grocery stores also are large employers or local residents.

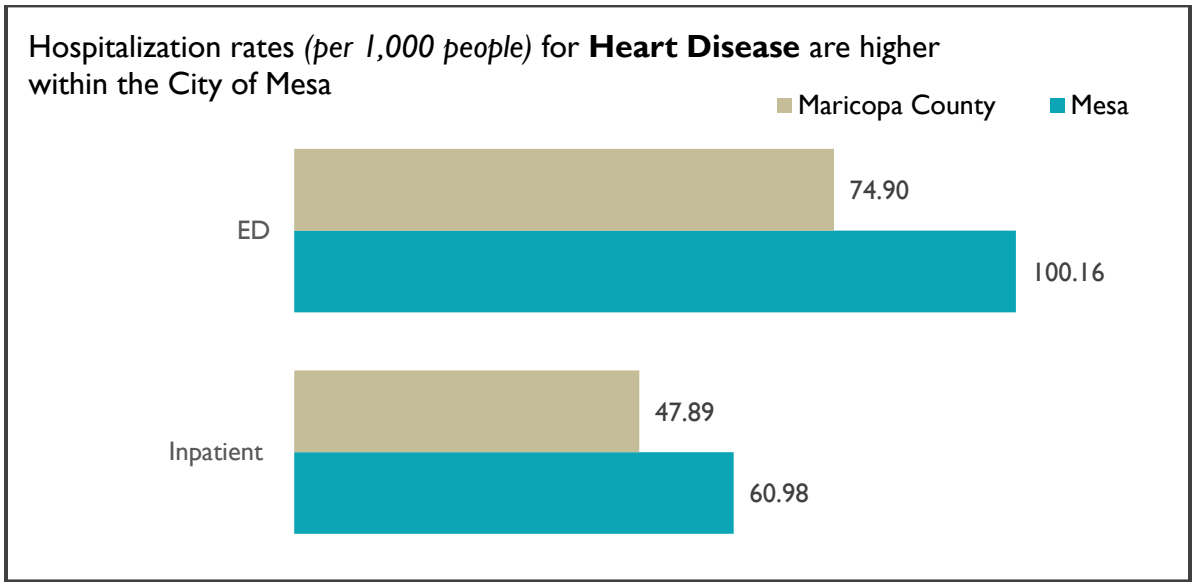
Recommendations:

2.1 – Provide adequate shade through natural or structural features in routes taken between home and work as well as in areas where people are making short trips to health promoting resources.
2.2 - Identify, plan for, and prioritize ways to better connect low-income, transit dependent residents to resources that promote health through safe, preferred infrastructure (example – buffered or protected bike lanes, which 96% of people who ride in Mesa prefer according to the annual bicycle and pedestrian survey).
2.3 – Work with hospital and other healthcare facilities to 1) expand bicycle infrastructure (racks, storage etc.) for employees, visitors and possibly patients and 2) promote bicycle education programs with staff.
2.4 – Survey residents about how they get to medical appointments and inquire about specific challenges.
2.5 – Work with City and County Parks and Recreation staff to ensure safe bicycle/pedestrian infrastructure around existing and future parks. Ensure bicycle racks and repair stations are available at parks.
2.6 – Work with Transit Department to ensure accessible and reliable routes exist between neighborhoods/housing facilities and grocery stores, especially for those living in low supermarket access areas.
2.7 – Encourage bike share accessibility near all health promoting resources. Track and analyze bike share data to learn about utilization of bike share to access healthcare, parks and healthy food outlets.

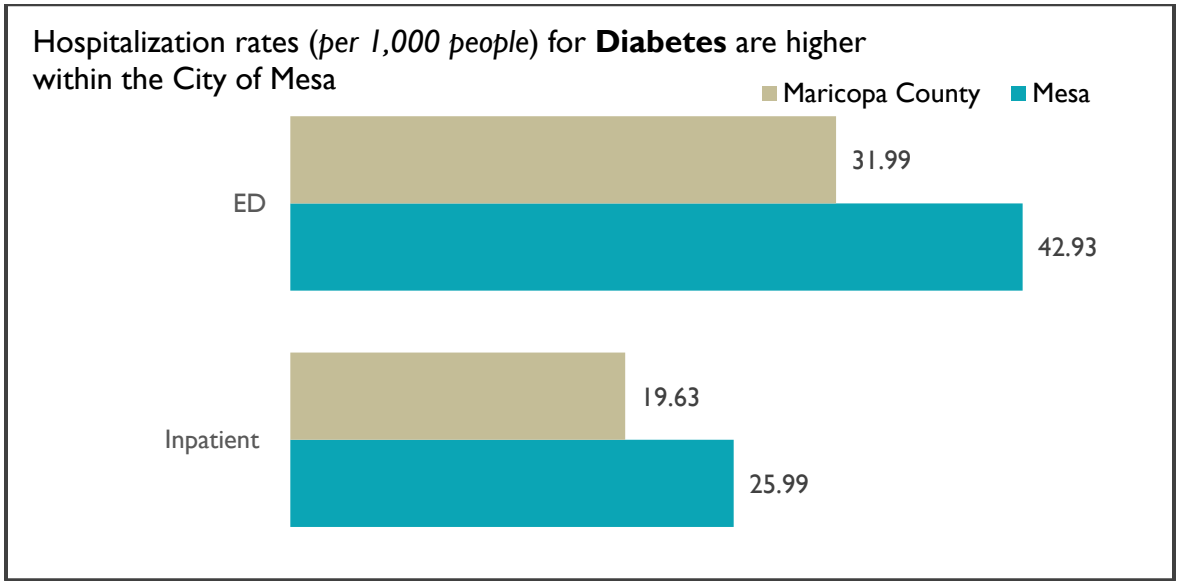
Health Indicator #3: Hospitalization Data

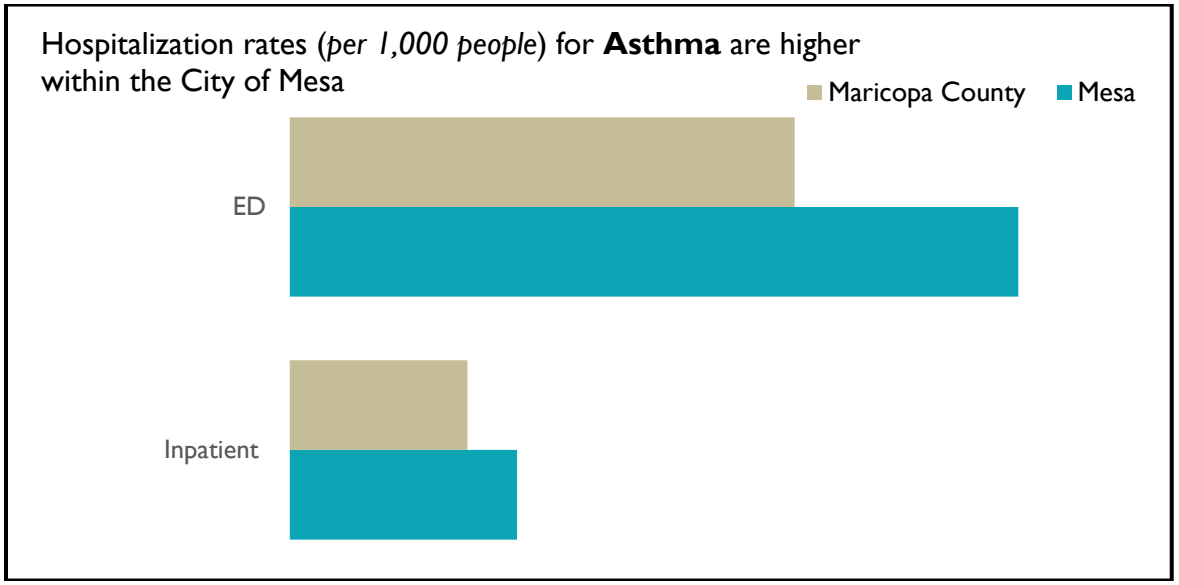
Hospitalization rates for 1) Heart Disease, 2) Diabetes & 3) Asthma.

Why? - The connections between physical activity and public health are widely documented. Research suggests that physically active adults "have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, and depression" than their physically inactive peers.[v] Walking or bicycling as a form of transportation or walking to public transportation stations, such as bus stops, count toward meeting daily physical activity recommendations.[vi] [vii] Furthermore, there is an established link between asthma and air quality[viii]. The promotion of bicycling instead of motor vehicle use can improve air quality, which can in turn potentially reduce the incidence of asthma as well as number of asthma related complications.



** Heart Disease, Diabetes and Asthma rates were also provided to the City and Y2K through Arc GIS Online in order to illustrate the distribution of hospitalization rates throughout the City's census tracts. Please see maps for more detailed info.*


Hospitalization rates (*per 1,000 people*) for **Diabetes** are higher within the City of Mesa
Maricopa County
Mesa
ED
31.99
42.93
Inpatient
19.63
25.99


Hospitalization rates (*per 1,000 people*) for **Asthma** are higher within the City of Mesa
Maricopa County
Mesa
ED
Inpatient

Things to consider related to Hospitalization data in Mesa:

- Heart Disease and Type II Diabetes are two of the leading causes of preventable death in AZ and in the U.S.
- Primary diagnoses related to these diseases from Arizona Department of Health Services Hospital Discharge data in 2016 indicate that Mesa residents experience higher rates of hospitalizations for both Heart Disease and Diabetes than Maricopa County as a whole. Hospitalizations rates are useful since actual prevalence of those living with these diseases are only available at the county and state levels.
- Asthma related hospitalizations are higher in Mesa as well.
- While higher hospitalization rates do not prove that there are more individuals with these diseases in Mesa, these rates are a strong indicator that the burden of the disease is high in the area. Furthermore, these hospitalization rates tend to reflect patients that don't have health insurance and/or a primary care physician helping them to manage their disease and are often called 'preventable' visits.
- Planning of infrastructure, programs and education that increase active transportation in Mesa may result in higher levels of physical activity and improved air quality, with subsequent reductions in chronic disease rates.
- Evidence also shows improvements in mental health outcomes for those that are physically active and those that engage with nature.

Recommendations:

3.1 – Identify, plan for and prioritize bicycle and pedestrian infrastructure in census tracts seeing the highest rates of hospitalizations for heart disease, diabetes and asthma (communities experiencing health disparities).
3.2 – Expand bicyclist and driver education in communities experiencing health disparities, especially if higher rates of incidents/crashes are also occurring in these areas.
3.3 – Work with other departments within the City (Housing, Neighborhood Services, Human Services etc.) that are engaging with populations experiencing health disparities to collaborate efforts.
3.4 – Engage with schools and other organizations to promote health and active lifestyles (through programs like Safe Routes to School, Shared use agreements, etc.) at a young age in communities experiencing health disparities.
3.5 – Continue to identify and track indicators of progress in reducing chronic disease in the City as bicycle/pedestrian networks expand.

Health Indicator #4: Travel Reduction Program Survey Data

Why? - Travel Reduction Program (TRP) survey data (from Maricopa County Dept. of Air Quality) can provide insight into how many residents currently walk, bike, or take transit to work, and how many residents are interested in walking, biking, or taking transit to work. Healthy People 2020 identified "increasing the number of trips made by walking and bicycling" as a target for improving the health of the U.S. population.[ix] Multiple studies have shown that taking active modes to work, especially bicycling, can significantly reduce the risk of early death as well as reduce the risk of developing or dying from heart disease, cancer and other illnesses[x]. Since hospitalization rates may skew towards older populations, these TRP data can help gather a sense of how active individuals of working age are in communities.

Median and Mean One-Way Distance to Work in Miles

Region	Median Distance	Mean Distance
Mesa	13.0 miles	14.8 miles
Maricopa County	12.0 miles	14.4 miles

Method of transportation used 4 or more times per week in Mesa	Number (%)
Driving Alone	48,758 (85.8%)
Carpool	4,587 (8.1%)
Telecommute	1,069 (1.9%)
Bus	992 (1.7%)
Walk/Run	499 (0.9%)
Bicycle	**449 (0.8%)**
Vanpool	284 (0.5%)
Light Rail	218 (0.4%)
**percentages based on the 56,856 surveyed who reported using any single transportation option for four or more days of the week*	

Transportation Changes (Q: If you were willing to make a change to your daily commute, which options would interest you most? Select all that apply.)

Mode of Transportation	Mesa (% Surveyed)	Maricopa County (% Surveyed)
Alternative Fuel	10,849 (17.1%)	71,404 (16.7%)
Bicycle	**7,620 (12.0%)**	**50,908 (11.9%)**
Bus	5,852 (9.2%)	44,135 (10.3%)
Carpool	18,348 (28.8%)	122,723 (28.6%)
Compressed Work Week	15,767 (24.8%)	106,626 (24.9%)
Light Rail	9,188 (14.4%)	60,555 (14.1%)
Telecommute	14,543 (22.9%)	106,317 (24.8%)
Vanpool	3,825 (6.0%)	26,278 (6.1%)
Walk/Run	3,237 (5.1%)	22,658 (5.3%)

Things to consider related to Travel Reduction Program survey data in Mesa:

- A limitation of these data is that they only include working adults. TRP survey data are also available for Students of driving age but not included in this report.
- According to the city's respondents of the 2016 TRP survey, the median one-way distance to work for the employed workforce in Mesa, AZ is slightly longer than the distance to work of residents in Maricopa County. Longer distances to work may present challenges for walking and bicycling, but offer opportunities to walk/bike to transit options.
- Similar to many cities and towns throughout the MAG region, most of the employed workforce in Mesa drive alone to work. In fact, almost 86% of the survey respondents drive alone to work 4 or more days a week. Only 0.8% indicate bicycling to work 4 or more days per week.
- Importantly, when asked to 'select all' alternative modes of transportation that survey respondents would be willing to try, responses were positive. Many respondents appear to be willing to try alternative, more active modes that they are not currently engaging in. Take for instance that fact that 12% of respondents are interested in bicycling to work. This percentage is much higher than the 0.8% that indicated they currently utilize bike 4 times or more per week. Additionally, 14.4% are interested in taking light rail and 9.2% are interested in taking the bus – which may include residents within bicycling distance to light rail or bus stations.

Recommendations:

4.1 – Strongly consider target areas (through Arc GIS maps) where residents are currently bicycling to and from home to work (West Mesa) or have expressed interest in bicycling to and from home to work (throughout the City, but especially near job centers) during the planning, design, construction and maintenance of bicycle facilities.
4.2 – Improve bicycle routes between neighborhoods and the light rail stations.

4.3 - Expand and target public education efforts to work toward increasing the number of working residents that move from just being interested in alternative modes to actually using them at least 1-2 days per week. Work with MC Air Quality and MAG to allow for TRP survey respondents to opt-in for more information on bicycle and other commuting options.
4.4 – Engage with employers whose employees have indicated high levels of interest in bicycling to work to assess route improvement opportunities, facilitate group rides, promote annual bike to work day and offer incentives.
4.5 – Work with other City Departments to Promote the League of American Bicyclist's Bicycle Friendly Business Program to employers

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[i] *American Public Health Association. Public Health and Equity Principles for Transportation; 2016.* http://www.apha.org/topics-and-issues/transportation/public-health-and-equity-principles-for-transportation

[ii] Dora, C., & Phillips, M. (2000). *Transport, environment and health* (No. 89). WHO Regional Office Europe.

[iii] Alameda County Public Health Department. (2013) Getting on board: A health impact assessment of bus funding and access.

[iv] Syed, S. T., Gerber, B. S., & Sharp, L. K. (2013). Traveling towards disease: transportation barriers to health care access. *Journal of community health*, *38*(5), 976-993.

[v] *U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General; 1996.* http://www.cdc.gov/nccdphp/sgr/pdf/sgraag.pdf

[vi] *Freeland AL, Banerjee SN, Dannenberg AL, Wendel AM. Walking Associated with Public Transit: Moving Toward Increased Physical Activity in the United States. American Journal of Public Health;2013:103:536-42.*
http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2012.300912 [external link]

[vii] *Besser LM, Dannenberg AL. Walking to Public Transit: Steps to Help Meet Physical Activity Recommendations. American Journal of Preventive Medicine;2005:29:273-80.*
*http://www.ajpmonline.org/article/S0749-3797%2805%2900255-2/abstract [external link] **

[viii] Michael S. Friedman, MD, Kenneth E. Powell, MD, MPH, Lori Hutwagner, MS, LeRoy M. Graham, MD, W. Gerald Teague, MD, *Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma*, AMA 2001

[ix] *U.S. Department of Health and Human Services. Healthy People 2020; 2010.* http://www.healthypeople.gov

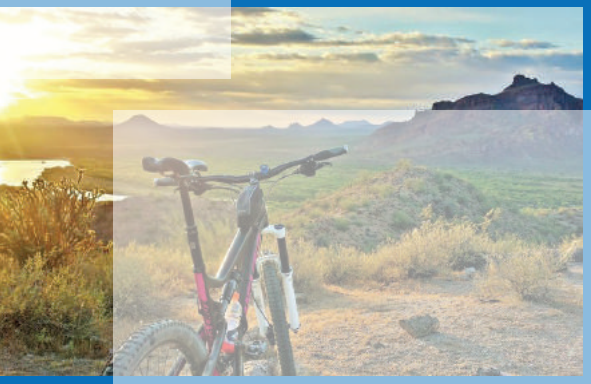
[x] *Celis-Morales, Carlos A., et al. "Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study." bmj 357 (2017): j1456.*











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