



2020

ACTIVE
TRANSPORTATION PLAN



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ACKNOWLEDGMENTS

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Purpose and goals of the plan

Purpose of the plan

The Maricopa Association of Governments (MAG) Active Transportation Plan (ATP) aims to shift the Valley's culture from being car-centric to people-centric, and to create a happier, healthier, and more economically competitive region.

The ATP will serve as a guide for improving, expanding, and connecting the regional active transportation network in an effort to increase the number of people who walk, bike, and take transit. The plan focuses on creating walking

and biking environments that are attractive to people of all ages and abilities for a variety of trip purposes, including running errands, visiting friends and family, traveling to work or school, or recreation.

The ATP is based on an understanding that investments in high-quality infrastructure are most likely to have the best return on investment in places with the highest demand. To this end, it presents a framework of "complete corridors" and "Regional Conduits" (as explained on page

25) that connect areas of the region with the greatest potential for walking and biking trips. By highlighting important cross-jurisdictional routes and areas within local communities where investment is needed to support regional performance targets, the MAG ATP can foster collaboration across boundaries that can achieve positive outcomes throughout the region.



Active transportation improves access to jobs and opportunities, supports active lifestyles, and contributes to thriving communities - all important factors for the MAG region's economic success.

Active transportation is good for the region

Walking, bicycling, and transit connect people of all ages and abilities to their jobs, schools, health care services, neighbors, and communities. Walking and bicycling trips are essential to providing access to local destinations and for connecting people to regional destinations via the transit network. In turn, the regional transit network connects people from across the region to essential economic, educational, medical, and recreational resources. By focusing on expanding access to active transportation options, the lives of people throughout the MAG region can be improved, and significant health, safety, equity, economic, and livability benefits across the region will be realized.



Health



Currently, 64 percent of residents in Maricopa County are obese or overweight.¹ Being physically active is one of the most important steps people can take to improve their health. Numerous studies have identified increasing physical activity levels as an effective strategy for reducing risks for chronic disease and associated it with reducing the risk of being overweight/obese, high blood pressure, diabetes, coronary heart disease, some cancers, depression, and more.^{2,3,4,5,6} Using active modes such as walking and biking is a low-cost and effective way to incorporate physical activity into daily routines. In recognition of the importance of physical activity on health, the United States Surgeon General and the Centers for Disease Control (CDC) encourage communities to design streets to make walking and biking safe and easy.⁷

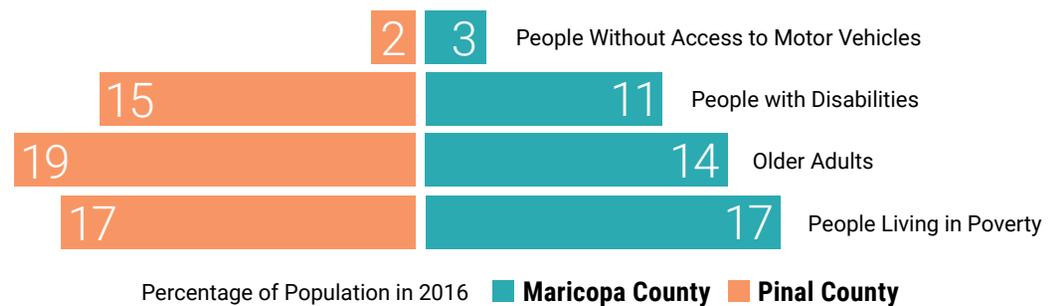
Equity



Active transportation investments help make places more equitable by improving access to jobs and everyday needs, reducing crash risks in places where they are disproportionately high, and improving public health indicators in communities most impacted by chronic diseases tied to lack of physical activity. Safe, connected, and accessible active transportation networks are especially important for people without motor vehicles,⁸ older adults,⁹ and people with disabilities.¹⁰

Figure 1 shows the MAG region's significant populations of older adults, people with disabilities, and people living in poverty. Many of these people are unable to drive because they don't have the physical or financial ability to do so. It is projected that by 2020, there will be 700,000 adults over 65 in the region.¹¹ A MAG Municipal Aging Services survey found that many respondents are concerned or very concerned with losing the ability to drive as they

Figure 1: Populations Disproportionally Impacted by Barriers to Active Transportation¹²



age, and 30 percent anticipate using public transit as a frequent mode of transportation. Providing safe and comfortable active transportation opportunities in the region is critical for meeting the region's transportation needs in an equitable manner.

Economic success

Complete and connected active transportation networks are good for the economy. A 2012 study estimated that the bicycle industry generated \$17.7 billion nationally in federal, state, and local taxes.¹³ A 2016 study for the State of Colorado estimated that bicycling and walking



account for combined health and economic benefits of approximately \$4.8 billion annually statewide (\$3.2 for walking and \$1.6 for bicycling).¹⁴ And in Indianapolis, the value of nearly 18,000 parcels within 500 feet of the Cultural Trail, a high-quality walking and biking path around the downtown area, increased by over \$1 billion over a 6-year period after its construction.¹⁵

Regional active transportation investments also lead to savings for community members. In the Portland, Oregon region, community members save \$1.2 billion annually in costs associated with purchasing, operating, and maintaining motor vehicles due to the region's investment in walking, biking, and transit.¹⁶

Active transportation improves access to jobs and opportunities, supports active lifestyles, and contributes to thriving communities - all important factors for the MAG region's economic success. Employers are increasingly looking for locations that offer their employees walkable and bikeable neighborhoods in which to live, work, and play; and to appeal to younger workers some of whom may prefer downtown job centers served by bicycling and transit resources.¹⁷ Creating places with safe opportunities to walk and bike is key to amplifying the region's quality of life.



Where we are today

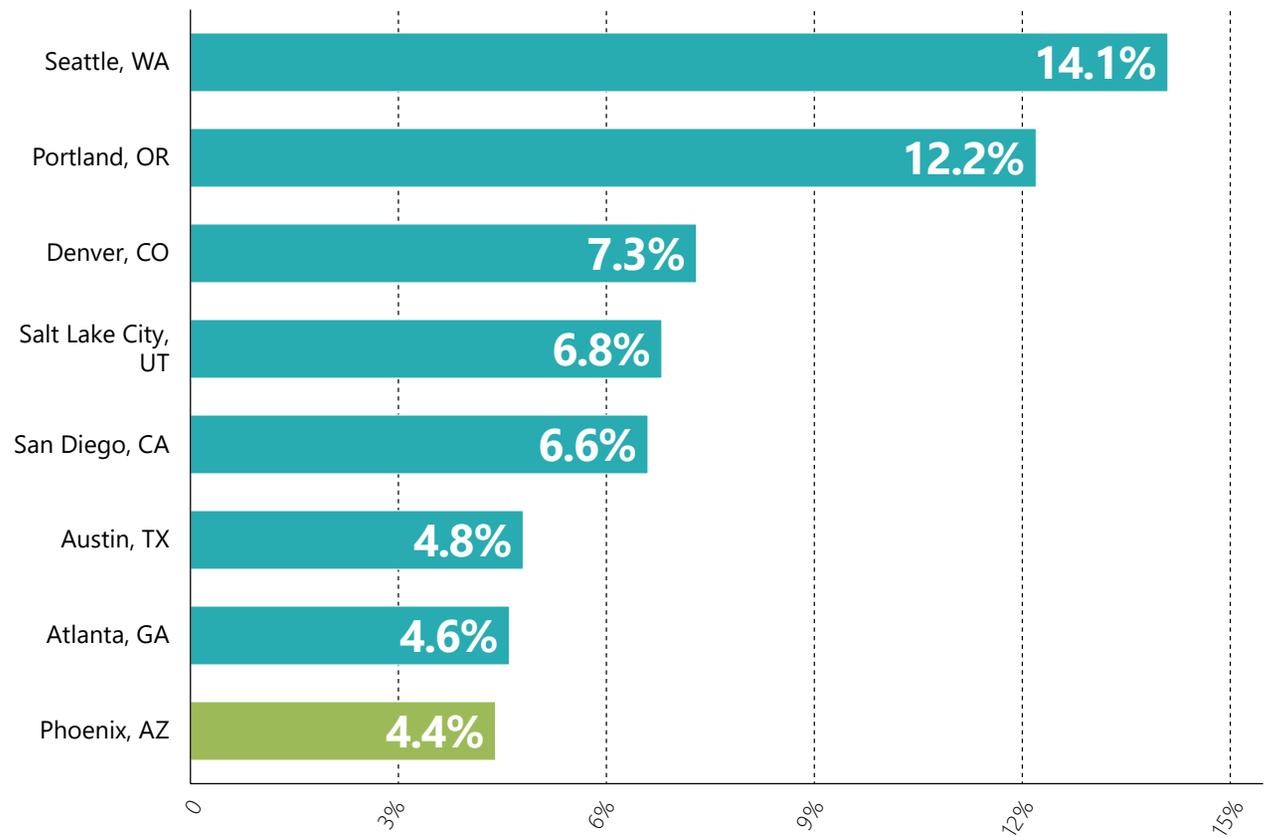
The MAG region is one of the fastest growing regions in the U.S. To meet the transportation demands that come with this growth, the region must invest in multimodal transportation solutions that give people more transportation choices and relieve congestion in a more cost-effective way than expanding roadways. While MAG and its member agencies have been making active transportation investments for several decades, there are many gaps in the network, walking and biking facilities do not generally meet the needs of people of all ages and abilities, and safety is a significant issue.

Transportation choices

According to a national survey, 73 percent of Americans feel they have no choice but to drive to get to where they need to go, and 66 percent of Americans want more transportation options beyond driving.¹⁸ Nearly 30 percent of the region's population is either too young or too old to drive or is unable, unwilling, or otherwise restrained from driving.¹⁹

Compared to seven peer regions—Atlanta, Austin, Denver, Portland, Salt Lake City, San Diego, and Seattle²⁰—the MAG region has the lowest percentage of commute trips taken by walking, bicycling, and transit. While commute trips only represent a portion of all transportation trips, they can be used to compare mode share between communities on a regular basis through the American Community Survey. Figure 2 shows that there is a clear indication of a lack of competitive choices. Mobility and accessibility is essential to the regional economy, and providing more options for getting around will make the region more resilient, equitable, and economically competitive.

Figure 2: Active transportation and transit commute modeshare²¹



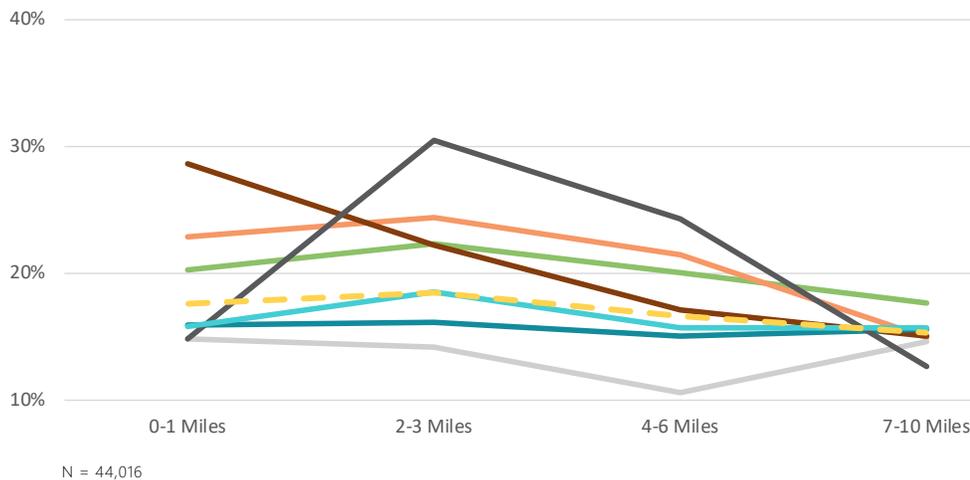
73% of Americans feel they have no choice but to drive to get to where they need to go and **66%** of Americans want more transportation options beyond driving.²²

Maricopa County's 2017 Trip Reduction Survey shows that commuters in the MAG region have widespread interest in walking/running, biking, and taking transit to work and school in both the central Phoenix area and in the east and west valleys (see Figure 3).^{23,24} The survey results also reinforce a finding that is supported by research: that people are most willing and interested in walking or biking for shorter trips.^{25,26} The greater interest in walking, running, bicycling and transit for trips greater than 10 miles is likely a reflection of respondents' desires to live and work in communities that support these types of trips or incorporate these modes of travel into their commutes. The survey results also suggest that there is unmet demand for connected regional transit services and for local and regional pedestrian and bicycling networks that serve commuter trips.

Figure 3: Top self-reported interest among commuters to walk or run, bicycle, or take transit to work by commute distance from the 2017 Trip Reduction Survey²⁷



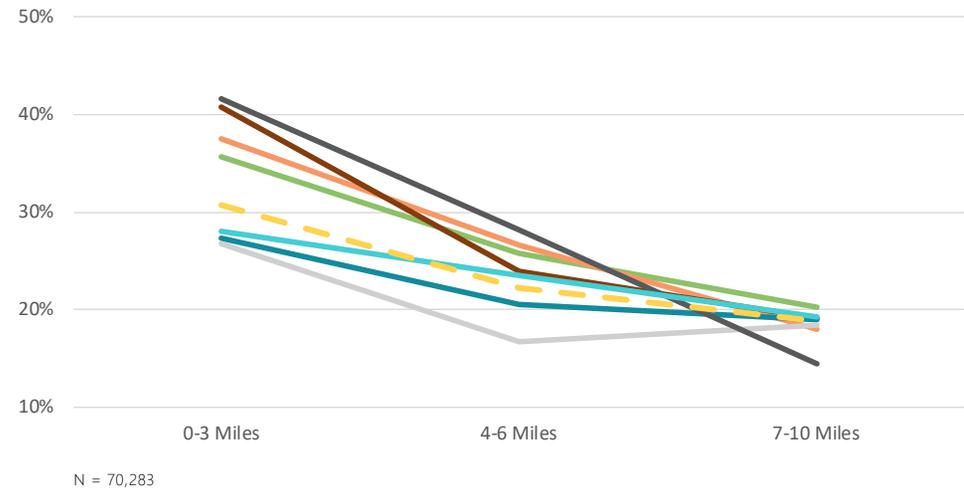
Interested in walking/running to work, by city, by distance traveled to work (one way)



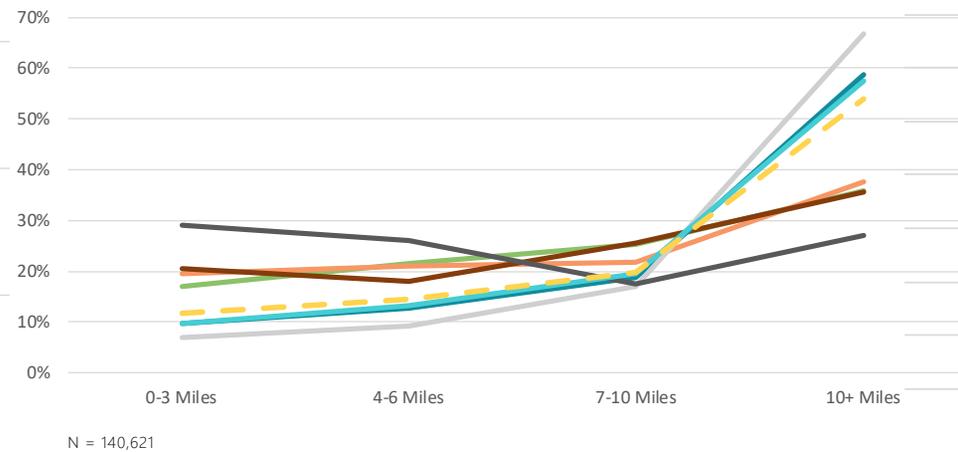
KEY: Glendale, Mesa, Peoria, Phoenix, Scottsdale, Surprise, Tempe, County Average



Interested in bicycling to work, by city, by distance traveled to work (one way)



Interested in taking transit to work, by city, by distance traveled to work (one way)

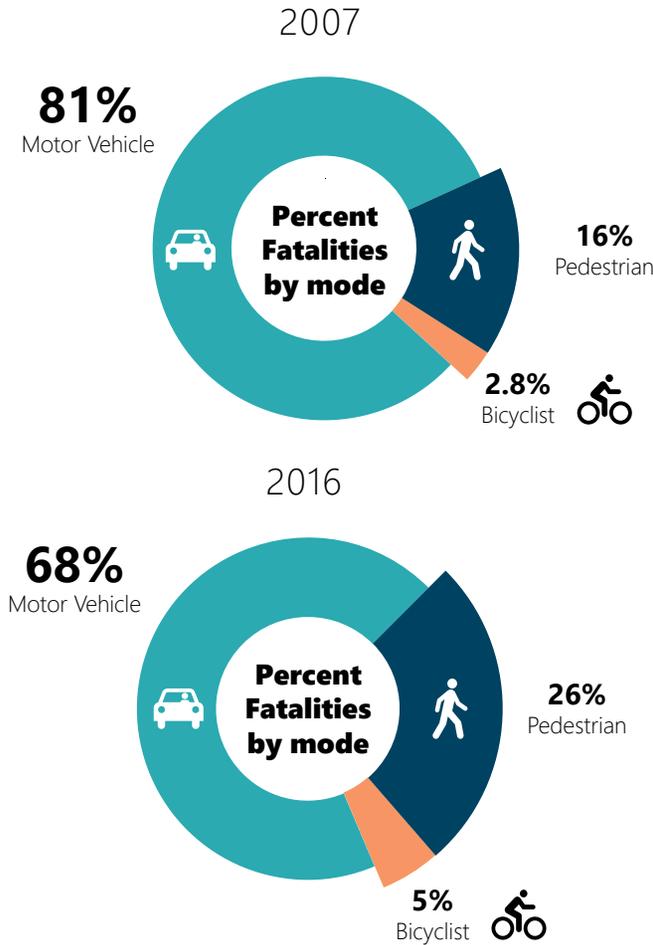


The number of pedestrians and bicyclists being killed and injured is unacceptable and preventable

The number of collisions involving bicyclists and pedestrians has been on the rise nationally. This trend has unfortunately been particularly strong in the MAG region, where from **2007 to 2016 there was an 80 percent increase in the total number of bicyclist fatalities and a 63 percent increase in pedestrian fatalities.**²⁸ This increase in fatal and severe collisions in the MAG region is a primary factor to Arizona being designated a “Focus State” by the Federal Highway Administration. While this increase in fatal collisions may correspond with increases in the number of bicyclists or pedestrians, bicyclist and pedestrian fatalities are still overrepresented among all roadway users. As a percentage of all traffic fatalities, bicyclist fatalities rose from 2.8 percent in 2011 to 5.0 percent in 2016, and pedestrian fatalities rose from 16.2 percent to 26.3 percent within the same timeframe, even though bicycling and walking trips are a small fraction of all trips made each year.²⁹ The bicycle and pedestrian collision data includes collisions between bicyclists and motor vehicle drivers and pedestrians and motor vehicle drivers, respectively.

Conditions that contribute to pedestrian and bicyclist collision risk are well-documented. Roadway designs that encourage higher vehicle speeds in areas with pedestrian and bicycle traffic contribute to greater risk of collisions that result in a serious or fatal injury. This risk increases with the number of vehicles and number of vehicle lanes in locations where pedestrians and bicyclists cross the street. Impairment and distraction are also significant contributing factors to motor vehicle collisions involving people walking and biking.

Figure 4: Percent of traffic fatalities by mode, 2007 and 2016³⁰



Since 2007, **1,069 pedestrians** and **196 bicyclists** have been killed in the MAG region, and an average of over two thousand people walking and biking have been injured on roads in the region each year.³¹

Tempe Aims for Zero

The City of Tempe is the first jurisdiction in the MAG region to adopt Vision Zero. Vision Zero is a traffic safety policy that takes an ethical approach towards achieving safety for all road users. The goal is to achieve a reduction in the number of fatal and serious injury crashes to zero in Tempe.

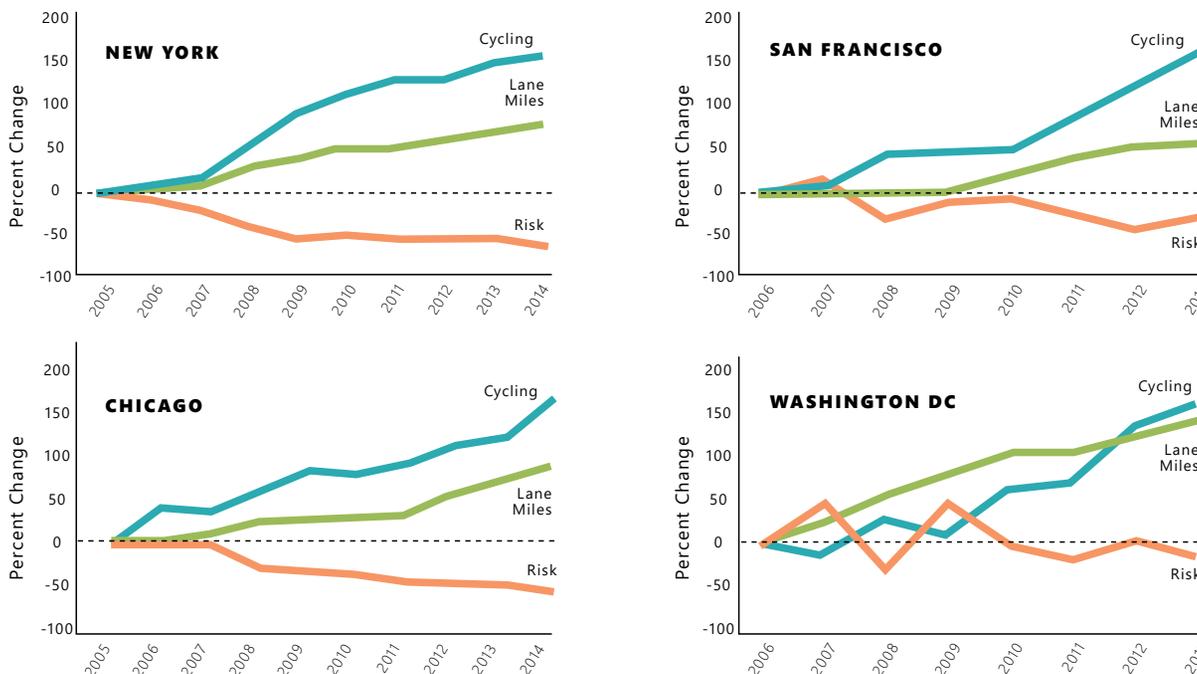


Research shows that bicycling risk in an area decreases when the number of bicyclists increases. This “safety in numbers” phenomenon is intuitive in nature and has been well researched over the past few decades. Safety in numbers creates a positive feedback loop with increasing numbers of bicyclists creating safer bicycling conditions, and then attracting more bicycling.^{32,33}

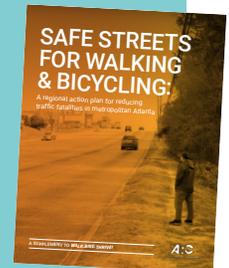
In addition to safety in numbers, connected networks of low-stress bikeways are positively correlated with increased levels of bicycling.³⁴ Since 2006, New York City, San Francisco, Chicago, and Washington D.C. have all experienced increased cycling levels in tandem with growing numbers of lane miles and lowering risk levels as shown in Figure 5.

While the cities listed below are far denser than anywhere in the MAG region, they show that focused investment in bicycle infrastructure providing a high level of comfort for people of all ages and abilities gets more people riding and creates safer conditions.

Figure 5: Changes in bicycling activity, lane miles and risk in New York City, San Francisco, Chicago and Washington D.C. Image from NACTO.³⁵



The Atlanta region gets serious about safety



In recognition of the Atlanta region’s high pedestrian and bicyclist fatality rates, the Atlanta Regional Commission (ARC) recently developed a Bike/Pedestrian Safety Action Plan. In the plan, the ARC identified a multi-staged strategy for improving safety across the region by re-focusing regional transportation dollars on projects that improve safety for pedestrians and bicyclists, supporting local jurisdictions’ efforts to implement “Safe System” approaches³⁶ and championing local complete streets initiatives.³⁷

Planning for all ages and abilities

MAG has a strong active transportation foundation to build on due to a history of investing in active transportation infrastructure, but significant gaps remain in the region's active transportation network. Notable regional planning initiatives in the MAG region intended to guide active transportation include the *Pedestrian Policies and Design Guidelines* (MAG, 2005)³⁸, *Regional Bikeway Master Plan*

(MAG, 2007)³⁹, *Complete Streets Guide* (MAG, 2011)^{40,41}, and *Multimodal Level of Service Study* (MAG, 2017)⁴².

Active transportation planning and facility design has been rapidly evolving over the past 10 years. There is now a solid understanding of the principles and factors that most influence functional active transportation networks,

and offer truly viable transportation options, for people of all ages. Connected networks of walking and biking facilities that provide separation from motor vehicles and safe, accessible means to cross the street have been documented to increase the number of active trips taken.



Plan process

Visioning workshop

During the visioning workshops, representatives from more than 24 organizations identified goals and strategies for moving active transportation forward in the MAG region.

To significantly increase the number of person-trips being made using active modes, the Visioning Workshop participants highlighted multiple approaches focused on infrastructure and development patterns. The participants recommended strategies focused on creating multimodal arteries within communities, linking the transit system with business centers, encouraging transit-oriented development (TOD), and more aggressive transportation demand management strategies.

Participants agreed that pedestrian and bicyclist deaths and serious injuries resulting from collisions with motor vehicle are unacceptable, and that the region needs to more aggressively address the safety risks that contribute



to such collisions. There was consensus that zero traffic-related pedestrian and bicyclist deaths by 2030, and serious injuries by 2040, is an appropriate goal for the region.⁴³ Participants identified a mix of engineering, education, and enforcement approaches for achieving this goal. Engineering approaches outlined by the participants focused on separating vehicles from pedestrians and bicyclists, reducing traffic speeds, and combining infrastructure and educational efforts. Participants discussed reducing impaired and distracted driving as key outcomes for education and enforcement efforts. Finally, enforcement efforts were viewed as important, but not as effective as other strategies focused on infrastructure and education.

The participants recognized the various ways investing more in active transportation could help improve public health outcomes for the region.⁴⁴ Increasing physical activity rates, decreasing obesity-related illnesses and diseases, reducing social isolation, increasing life expectancy, and increasing access to fresh and healthy foods were identified as important health benefits that derive from investments in active transportation.

Finally, the participants also discussed the benefits of increasing active transportation rates in the region that fall outside of the three main goal areas. There was general consensus that investment in high quality active transportation could pay dividends in the form of economic development and tourism opportunities, enhanced sense of community and pride in the region, reduced greenhouse gases, and generally creating a more desirable and livable region. Participants recognized that getting buy-in from MAG policy committees and executives is key to realizing

the benefits of active transportation investments in the region. The group also recommended developing succinct elevator-style speeches, sharing personal stories, and partnering with advocacy groups such as the AARP to get the right messaging and stories out to decision makers and the public.

Technical Advisory Committee

A Technical Advisory Committee (TAC) comprised of representatives from several MAG member agencies was convened to provide direction on the ATP. The TAC met four times to review and provide input on interim deliverables. The TAC also played an important role in sharing information about the ATP with other stakeholders.

Visual preference survey results

From November 2017 to May 2018, MAG conducted an online visual preference survey. The purpose of the survey was to find out which types of roadway environments community members prefer and how different environments make them feel. More than 1,000 people completed the survey; nearly 8% of completed responses were from Spanish speakers. Survey respondents preferred the following elements of roadway design:

- Clearly marked crossings for pedestrians;
- Designated spaces for pedestrians, bicyclists, and motorists;
- Street trees and sidewalk amenities (e.g., seating); and,
- More separation from motor vehicles for people walking and biking.

Interactive Online Map

An interactive online map was used to get location-specific information on where people bike and walk and problems they encounter when doing so. This map was originally created as part of Maricopa County Department of Transportation's Active Transportation Plan process, which was focused on the unincorporated portions of Maricopa County. The map was adapted to collect additional input for the MAG ATP and went live on MAG's website in December 2017. A total of 869 comments were received (683 during the MCDOT process, 186 during the MAG process). Figure 6 shows the number of comments received by category. Some key themes that emerged from the comments received include:

- Extend on-road bicycle facilities and off-road shared use paths to create complete connections between communities (The ATP uses the term "shared use path" to be consistent with Federal guidance even through some local agencies may use other terms, such as trail, multi-use path, or pathway).
- Improve safety conditions at intersections by extending bicycling facilities through intersections, signaling intersections, and adding protected left-turn signals; and, placing HAWKS and lighting improvements at

midblock crossings.

- Invest in new pedestrian and bicycle under- and overpasses that connect communities to active transportation networks, bridge natural and manmade barriers, and benefit other recreational users - including golfers and equestrians.
- Increase levels of vertical and horizontal separation between motor vehicle and pedestrian/bicycle traffic along existing pedestrian and bicycling facilities.
- Improve pavement conditions for on- and off-road bicycle facilities, conduct sidewalk repair work, remove bollards, and manage vegetation along shared use paths for personal security.

Comments were used to evaluate corridor alignment alternatives. MAG will continue to use the map to receive comments on walking and biking conditions throughout the region and will share this information with cities and counties on a periodic basis as a means to inform planners and designers of issues that may need to be addressed.

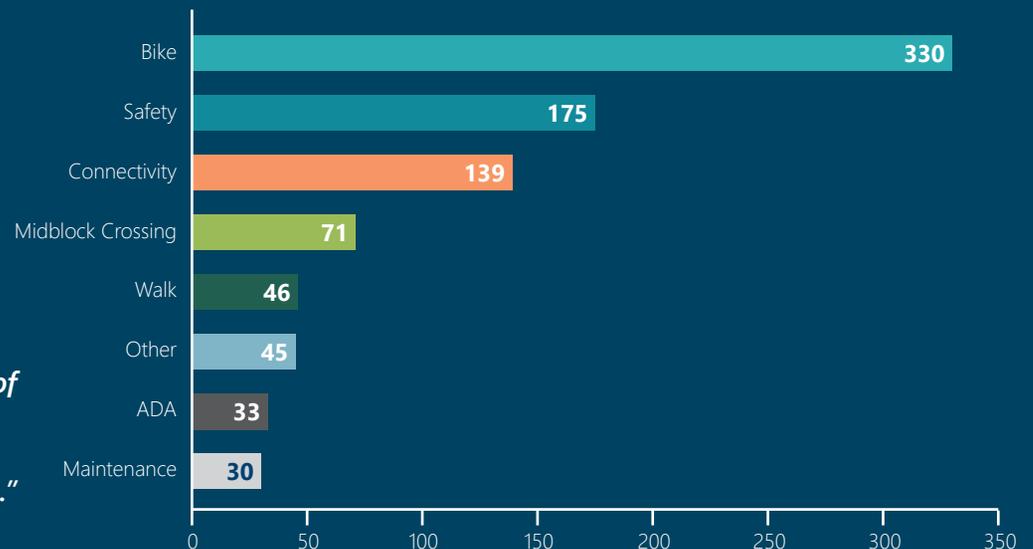
MAG Committee Workshop

In October 2018, a workshop involving members of MAG's Transit, Transportation, Safety, Streets and Active Transportation committees was held to review and provide input on the draft ATP framework and Active Transportation Toolbox. More than 40 people were in attendance representing more than half of the local jurisdictions in the MAG region. Generally, there was agreement that high quality pedestrian and bicycle infrastructure is key to more people choosing these modes of travel, and that focusing such investments in areas of high demand is a practical approach. However, there was some concern from jurisdictions further out in the west and east valleys that the system of complete corridors did not serve their communities. In response, the ATP puts more emphasis on Regional Conduits that connect many of these communities and local investment in high quality active transportation infrastructure within locally-defined activity centers.

Visioning Workshop participants offered headlines for a newspaper story written in 2040 about how active transportation has transformed the region:

- "Valley of the Sun voted for highest quality of life in USA."*
- "Phoenix reigns happiest city."*
- "Phoenix hits 50% active mode share."*
- "Region built for cars becomes region built for people - quality of life soars."*
- "Elected officials prioritize people over vehicles - happiness ensues."*

Figure 6: Online map comments received by comment category



Goals for active transportation in the region

Increase the active transportation mode share to 30 percent by 2040

Achieve zero pedestrian and bicyclist traffic fatalities by 2030

Increase the percentage of people getting enough physical activity to 80 percent by 2040



These goals — identified by stakeholders at the visioning workshop — provide focus for initiatives promoting active transportation and can be used to monitor the effectiveness of active transportation investments and programs throughout the region.

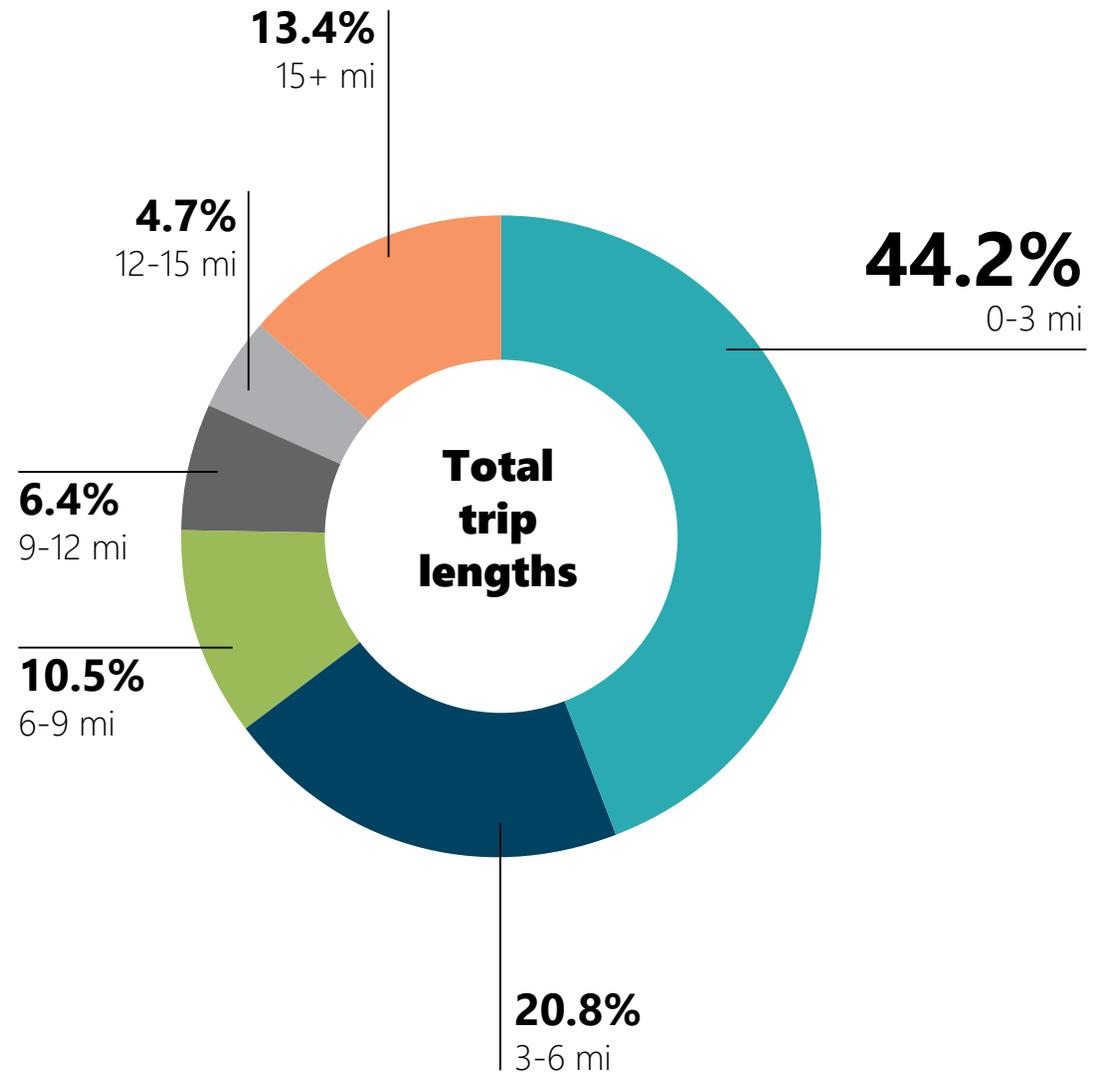


Strategies for increasing active transportation in the region

Short trips are the key to mode shift

According to MAG's 2017 Household Travel Survey, over 44 percent of trips in the MAG region are 3 miles or less and another 20 percent of trips are between 3 and 6 miles in length (see Figure 7). Many of these trips could be made by walking and biking. Short bicycling trips of 1-3 miles require no special equipment or clothing. The framework presented in the MAG ATP emphasizes high quality "complete corridors" that connect activity centers within a reasonably bikeable distance of 5 miles or less. The intent is to make the short trip attractive for walking and biking, and, in doing so, significantly increase the number of people using active travel modes for a variety of trip purposes.

Figure 7: MAG 2017 household travel survey, trip lengths (miles)⁴⁵



Build more high comfort networks

Communities can encourage walking, bicycling, and transit trips by providing safer, better connected, and more comfortable active transportation infrastructure for people of all ages and abilities. Active transportation facilities should not only be safer in terms of reducing the number of crashes, but they should also feel safer for users.

With respect to bicycling, there is a well-documented relationship between perceived levels of bicycling safety and comfort with the frequency of cycling trips.^{46,47,48,49}

To promote bicycling, it is important to consider not only where there are reported crashes and make safety improvements at these locations, but also the conditions that contribute to low perceptions of safety.

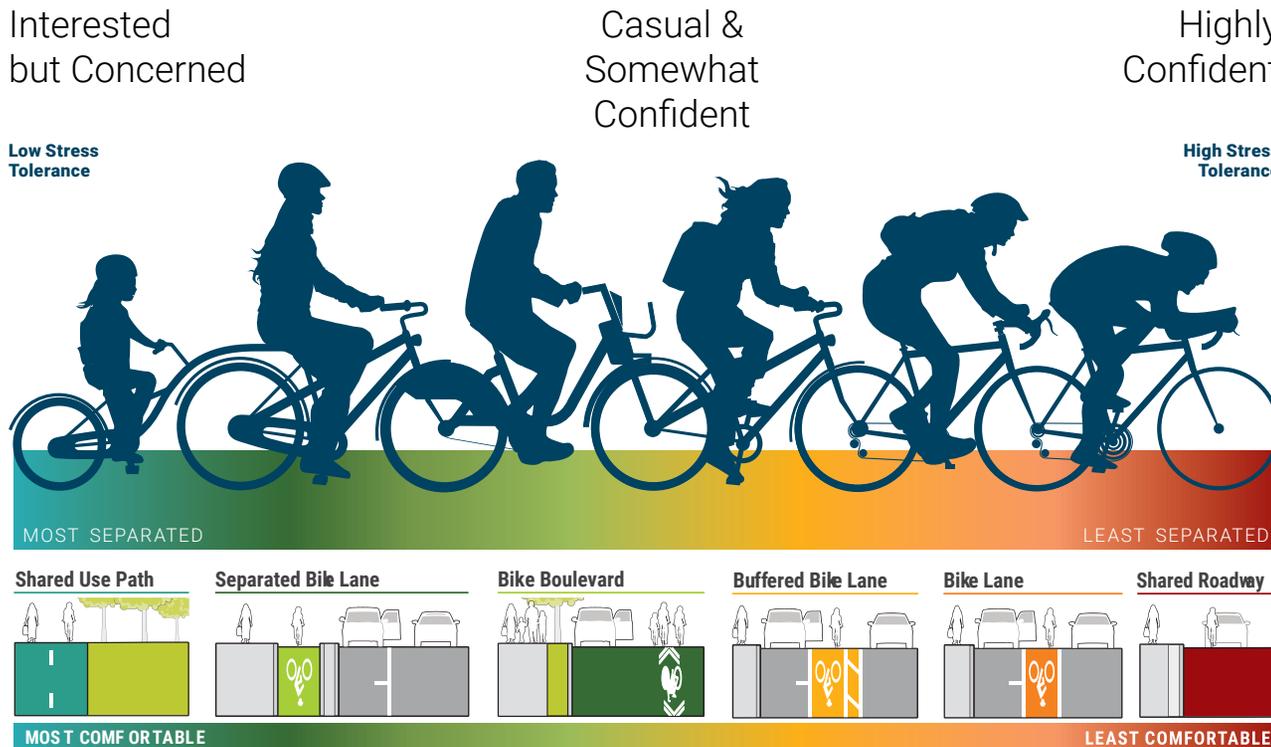
Researchers have identified three general adult bicyclist profiles that help to structure shared levels of comfort among bicyclists. These three profiles are “Highly Confident,” “Somewhat Confident,” and “Interested but Concerned” bicyclists (see Figure 8).⁵⁰

Interested but Concerned bicyclists represent the largest share of potential and existing adult bicyclists, at 51 to 56 percent of the total population. This group of bicyclists prefers the greatest amount of separation from motor vehicles. Conventional bike lanes, particularly on higher speed roadways, may not provide enough separation for these bicyclists. These bicyclists may choose to bike on sidewalks or not bike at all if only conventional bike lanes are provided. *Interested but Concerned* bicyclists feel most comfortable using shared use paths, separated bicycle lanes, and quiet, traffic-calmed residential streets.⁵¹

The second group is *Somewhat Confident* bicyclists. *Somewhat Confident* bicyclists are comfortable riding in bike lanes and paved shoulders, but they prefer more separation than *Highly Confident* bicyclists. This group is much smaller than *Interested but Concerned* bicyclists, at 5 to 9 percent of potential and existing adult bicyclists.⁵²

The final and smallest group of adult bicyclists are *Highly Confident* bicyclists, at only 4 to 7 percent of all potential and existing adult bicyclists. *Highly Confident* bicyclists report feeling comfortable riding within motor vehicle traffic on roads with and without bike lanes.⁵³

Figure 8. Three types of bicyclists⁵⁴



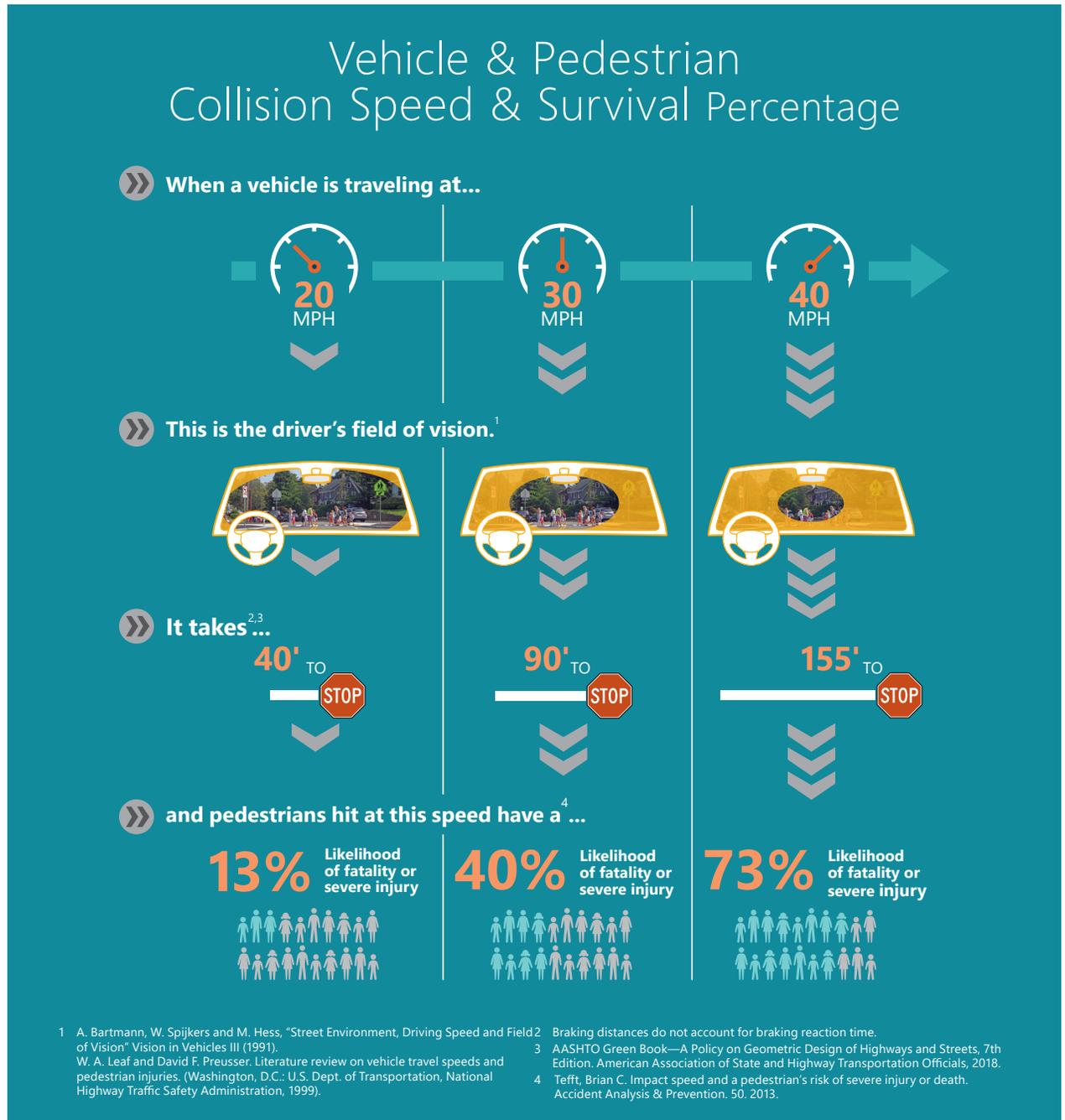
Manage vehicle speeds

Fast vehicle speeds diminish the comfort and safety of people walking, biking and using other forms of active transportation. When motorists drive at faster speeds, their cone of vision is narrowed and the distance they need to stop increases.^{55,56,57} These factors heighten the risk of collision, particularly where there are higher numbers of people walking and biking. If a collision does occur, the probability of a serious injury or fatality increases as vehicle speeds increase.⁵⁸ Thus, managing vehicle speeds through street design and enforcement is critical to creating a safe and comfortable active transportation network that attracts people of all ages and abilities. The MAG Active Transportation Toolbox provides information on speed management strategies.⁵⁹

Integrate active transportation and transit

Given the size of the MAG region and distances between cities and other activity centers, transit has an important role to play in the regional active transportation network. There are several strategies that support the integration of transit and active transportation:

First-last mile connections – Connections to transit with high-quality walking and biking infrastructure at the local level broadens the reach of transit investments and makes walking and biking more viable for trips that are more regional. Ensuring there are direct sidewalk connections and safe crossings within a half mile of bus or light rail stops greatly enhances access to transit.



Likewise, providing comfortable and safe bicycle facilities within 1 and 3 miles of a transit stop effectively expands the reach of transit. A region-wide assessment of first/last mile connections to transit would help identify gaps and where such investment is needed. Valley Metro buses and light rail trains provide racks for passengers to load their bikes with them on the buses and trains. Valley Metro also provides secure bike lockers at some transit stations.

Mobility hubs – Mobility hubs integrate different modes of transportation, multimodal supportive infrastructure, and place-making strategies to create activity centers that maximize first -/last mile connectivity. Mobility hubs are where public transit converges with other mobility services such as bikeshare, e-scooters, and rideshare. They incorporate bike parking, pick-up and drop-off space for rideshare, electric vehicle charging stations, and safe and attractive waiting areas, along with other supportive services such as mobility ambassadors (who can assist travelers understand and connect with various mobility options, bike repair stations or services), wayfinding, real-time information, and Wi-Fi connectivity. Hubs are typically located in areas that accommodate other active uses, such as retail and attractive public spaces. Mobility hubs are connected to surrounding neighborhoods by high-quality pedestrian and bicycle infrastructure.

Transit-oriented development – Transit-oriented development (TOD) is the creation of compact, walkable, pedestrian-oriented, mixed-use communities centered (i.e., within a 5-10 minute walk) around high-capacity transit. Valley Metro serves as a resource that its member cities can use to attain their community and economic development goals by promoting high-quality and more intensive development on and near properties adjacent to light rail. Valley Metro’s mission as it relates to TOD is threefold:

- Improve access to public transportation;
- Make communities more pedestrian and bicycle friendly; and,

- Create new living spaces that better serve the daily activities of the region by interfacing with a more diversified set of mobility options.

MAG and its partners are currently updating the Regional Transit Framework Study. The purpose of the update is to identify the highest potential corridor for future high-capacity transit investments in the region. The expansion of high-capacity transit complements the MAG ATP by offering more opportunities to connect to regional destinations via transit and further the reach of local active transportation networks. Many of the potential corridors identified in the update interface with the complete corridors, Regional Conduits, and activity centers (see page 25).

Count active transportation trips

MAG piloted a regional bicycle counts program in 2013, coordinating with member jurisdictions to identify locations for counters and distribute data to cities and towns for review. The program ended in 2016 and all of the data collected during the pilot program is available upon request. Beyond this effort, count data for bicyclists and pedestrians is fragmented and inconsistent throughout the region that results in the number of walking and biking trips being significantly underestimated. Motor vehicle volume data is routinely collected and analyzed, but there are no similar efforts for pedestrian and bicycle

volumes. This lack of data makes it difficult to plan, design, and evaluate active transportation infrastructure, and it reinforces an auto-focused transportation system.

In recognition of this, MAG will begin a comprehensive regional bicycle count program in October of 2019. Counts will be conducted at up to 500 locations using different technologies, including video detection, in an effort to support non-motorized travel monitoring and modeling. The intention of this effort is to properly assess the need for safe and effective active transportation facilities throughout the region.



Given the size of the MAG region and distances between cities and other activity centers, **transit has an important role to play** in the regional active transportation network.

Principles for an all ages and abilities active transportation network

While efforts to make walking, biking, and taking transit more available and accessible in the region have seen a lot of progress, a continued and sustained focus on the following principles will elevate active transportation and contribute to a more equitable, economically competitive, and healthy region. Further detail on each of these principles is provided in the online [Active Transportation Toolbox](#).

Equity and Inclusion



The MAG region's transportation system was largely built with a focus on private motor vehicle use. People who walk, bike, use a mobility device, or take transit — whether by choice or necessity — do not have the same level of access and mobility as people who drive. Furthermore, the region's reliance on automobiles and the degree to which automobiles have been prioritized have had adverse impacts on public health in the form of obesity and chronic diseases, exposure to air pollution, and increased collision risk. Enhancing the region's active transportation network is essential to providing a more equitable and healthy transportation system. High-quality active transportation investments that enhance safety must:

- Focus on enhancing travel options and access to basic services and job opportunities for underserved populations.
- Incorporate universal access principles and be designed to meet Public Rights-of-Way Accessibility Guidelines.
- Provide more opportunities for people, particularly populations experiencing inequitable health outcomes, to integrate activity into their daily lives.

Safety



People walking, riding bicycles, or using other active forms of transportation are the most vulnerable users of the roadway network because they have minimal to no protection in the event of a collision with a motor vehicle. Streets that are safer for the most vulnerable roadway users are also safer for motorists, and they are key to reducing traffic-related fatalities and serious injuries.

Safety is also closely tied with comfort: if people perceive a street environment to be unsafe due to the vehicle speed, lack of appropriate space to walk or bike, or personal security then they will feel less comfortable and be less likely to choose these modes of travel. Safety — whether perceived or actual — impacts the use and overall success of an active transportation network. High-quality active transportation investments that enhance comfort must:

- Minimize conflicts between roadway users.
- Provide safe and convenient pedestrian crossings.
- Reduce vehicle speeds at conflict points.
- Delineate space for active transportation users.
- Provide consistent design in the MAG region.

Comfort



People will walk, bike, and take transit more if they feel comfortable and safe as they use the transportation system. High-quality active transportation investments must:

- Provide separation between modes.
- Be intuitive to use.
- Provide thermal comfort.
- Support social space.
- Instill dignity and status.

Connectivity



Connected active transportation networks provide access to where people want to go and are essential to significantly increasing the number of people who choose to walk, bike, and take transit. Gaps in the network or indirect connections to important destinations may expose active transportation users to situations they deem unsafe or uncomfortable; they may also just make a trip less convenient. Both are significant disincentives to choosing to walk or bike. High-quality active transportation investments that enhance connectivity must:

- Facilitate short trips.
- Close gaps.
- Provide direct, seamless transitions.
- Facilitate intermodal connections.



Focus active transportation strategies and investments

The benefits of active transportation described earlier in this plan will be realized by focusing on short trips, building high comfort walking and biking infrastructure, managing vehicle speeds, and enhancing walking and biking connections to transit. Applying these strategies in areas that have a higher propensity for walking and biking will yield the greatest benefits in terms of attracting more people to use these active modes for a variety of trip purposes. To this end the Active Transportation Grid (AT Grid) and Activity Centers were identified. Regional Conduits (i.e., regional shared use paths) and transit expand the reach of active transportation into other parts of the region.

The AT Grid

The Active Transportation (AT) Grid is a network of complete corridors that leverages the region's grid system of streets and promotes multimodal travel with high-quality design that emphasizes safety, comfort, connectivity, and equity. Complete corridors comprise sidewalks (ideally buffered from traffic), separated bike lanes, safe and direct street crossings, landscaping, shade and respite features, easy access to transit and adjacent land uses, and public art or other features that add interest and activity. Complete corridors may also be comprised of

shared use paths or shared streets that have low vehicle volumes and speeds. The [Active Transportation Toolbox](#) provides guidance for developing active transportation infrastructure that meets the needs of people of all ages and abilities.

The AT Grid was defined using the following steps:

1. Calculating regional active transportation demand using employment data; data on schools, universities, and parks; crash data; transit stop location and ridership data; Strava data; and demographic data. Demand is shown on Map 1.
2. Identifying activity centers such as municipal cores, key downtown areas, densely populated centers of municipalities, major employment centers, major shopping centers, universities, and other locations that generate (or have potential to generate or support) walking and biking trips. The Technical Advisory Committee confirmed the identified activity centers and suggested additional activity centers.
3. Calculating the "gravity score" between activity centers to determine active transportation linkages that are most likely to attract the greatest number of trips. The gravity score is a function of activity center demand and the distance between activity centers. The higher the relative demand of an activity center, the greater its gravitational pull (i.e., the potential someone would want to bike to it). Conversely, as the distance between locations increases beyond a reasonable distance someone is willing to ride a bike (e.g., 5 miles), the gravitational pull decreases. Map 1 also shows results of the where demand between activity centers (i.e., origin-destination segments) is the highest.



Hardy Drive between University Drive and Broadway Road in Tempe embodies many "complete corridor" attributes.

4. Identifying corridors that serve the highest demand linkages between activity centers. These corridors were generalized as mile-wide swaths to provide options for how complete corridors may be implemented by local agencies. Map 2 shows how the highest demand lines informed the corridors identification.
5. Identifying and assessing two or more alignment alternatives within each AT Grid corridor based on their viability for accommodating high-quality active transportation facilities and using the criteria listed in Table 1.
6. Evaluating alignment alternatives to determine which alternative is likely to best accommodate active transportation demand. The results of the alternative evaluation are intended to inform local decision-making and regional coordination. Map 3 shows the AT Grid with evaluated alignment alternatives. Appendix A contains more detailed maps showing the evaluated alignment alternatives and a table of criteria used in the evaluation process.

Regional Conduits

Regional Conduits connect cities, towns, and other activity centers throughout the region. These connections are primarily existing and planned shared use paths (e.g., canal paths), but in a few cases they are on-street facilities. Regional Conduits take advantage of the substantial investment the region has made in shared use paths and the popularity of these facilities, which is largely due to the high level of comfort these types of facilities offer to people walking and biking. In recent years there has been much focus in the MAG region on improving safety and reducing delay for path users where these facilities intersect with highways and major streets by building overpasses and underpasses, or enhancing crossings with signals and other safety features. Regional Conduits connect directly with activity centers in many cases, while in other cases local active transportation networks provide connections between these facilities and activity centers.

Activity centers

Activity centers are places with a variety of destinations such as schools, employment and commercial areas, and where people can connect with health-promoting resources such as parks, farmers markets, grocery stores, and healthcare facilities. Such destination-rich centers typically offer more potential for short trips using active modes such as walking and biking. Other attributes that support walking and biking within activity centers include transit service, a mix of housing types, and a connected street grid. A local jurisdiction's general plan typically identifies activity centers as areas of more intense development, such as downtowns, employment centers, neighborhood business districts, urban villages, etc. Other activity centers considered in this plan's analysis include airports, universities and colleges, and major transit centers. Activity centers are where investments in active transportation infrastructure, such as sidewalks and high-comfort bicycle facilities, are likely to yield the greatest benefits and generate the highest use regionally.



Table 1: Criteria for Identifying Complete Corridor Alignment Alternatives

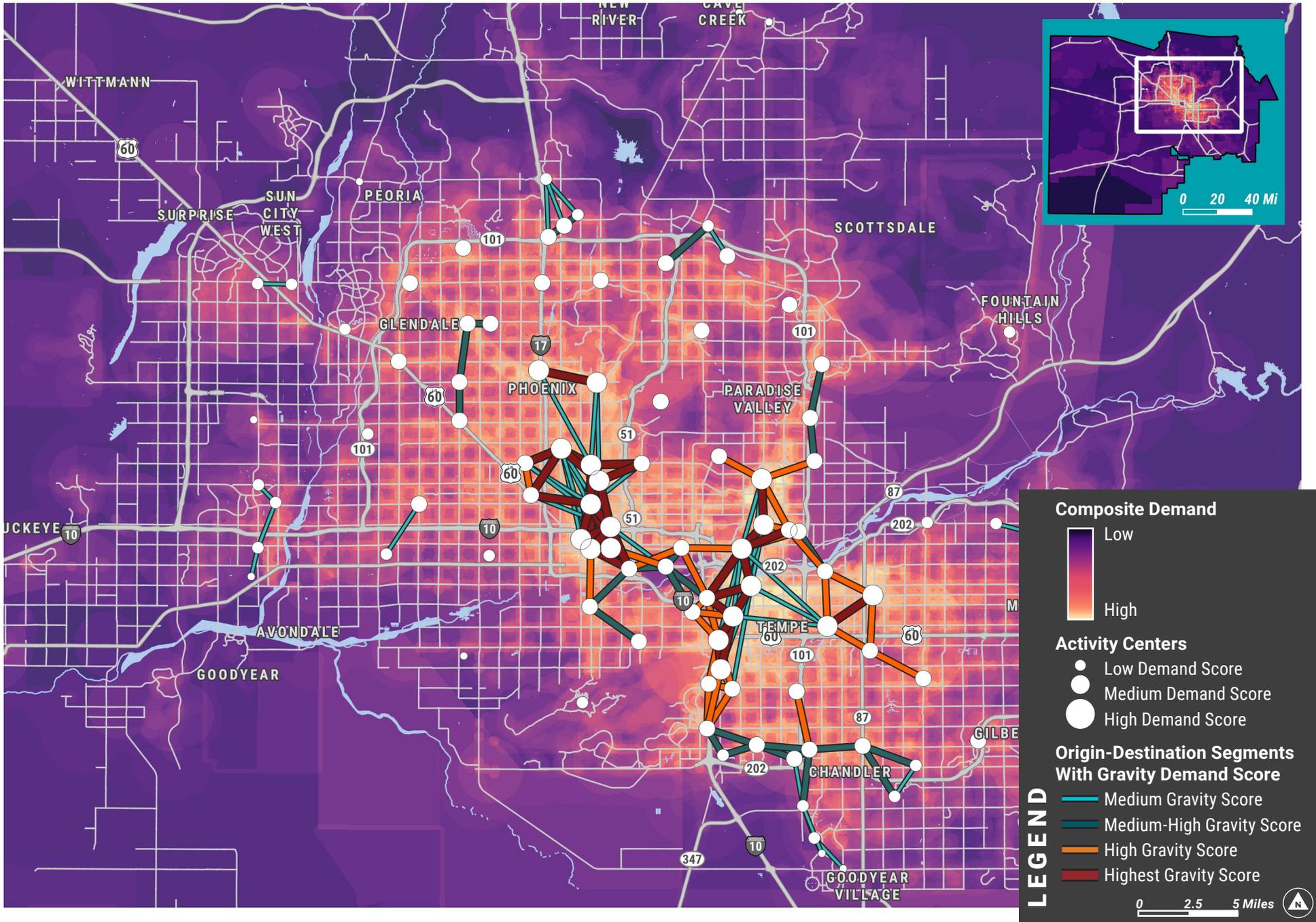
- Alignment should take into consideration the bicycle plan of the affected local jurisdiction.
- Alignment should be positioned to provide direct access to major activity centers, either by running along a main street serving the activity center or a street a block or two away.
- Alignment should be direct. It is undesirable for an alignment to include jogs and circuitous paths that involve many turns.
- When an alignment crosses an arterial, it is undesirable for the route to jog along the arterial before resuming unless it provides the most suitable or feasible route.
- Alignment should be within or near the defined mile-wide complete corridor (i.e., where demand between activity centers has been determined to be highest).

Advantages of the AT Grid:

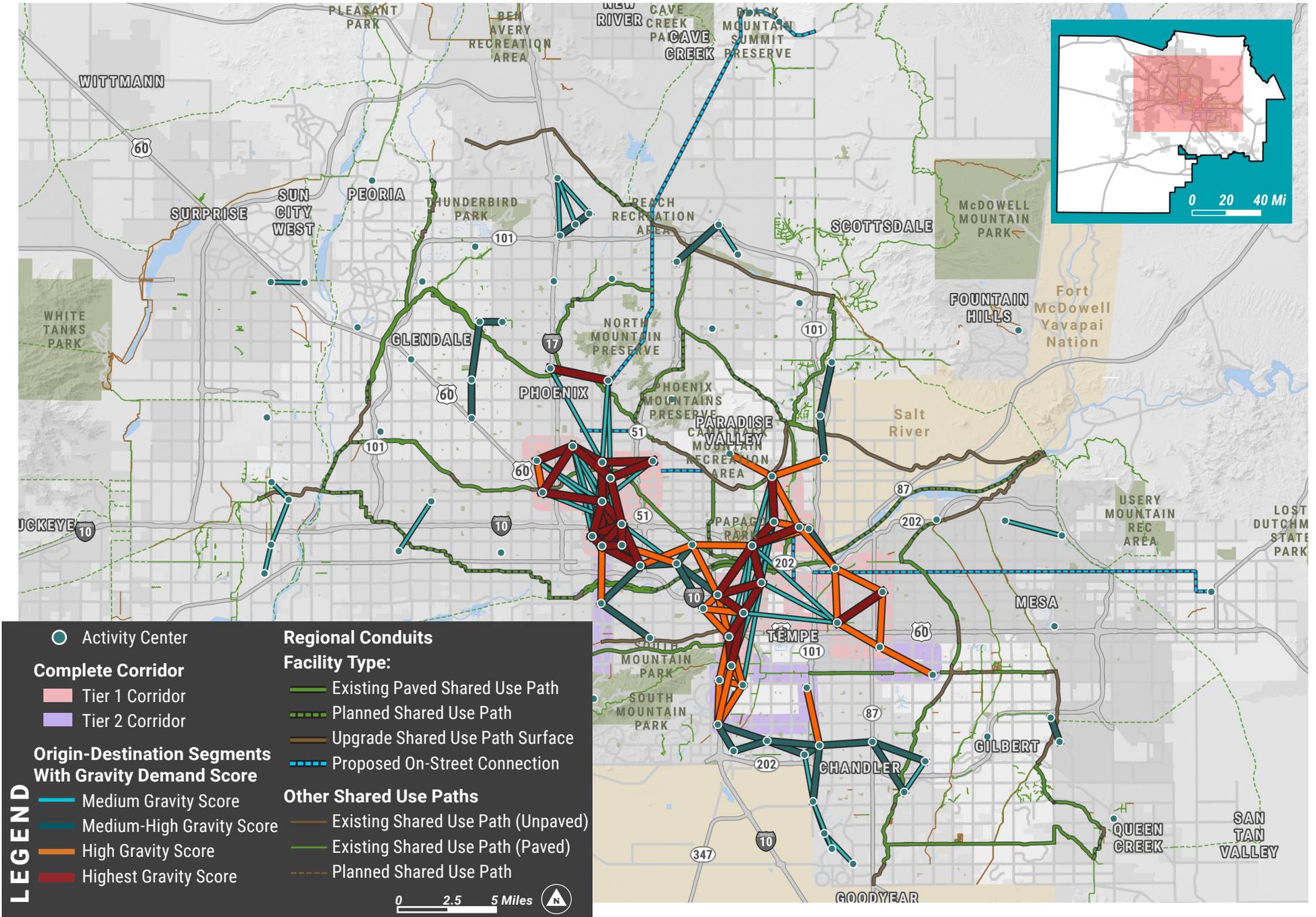
- **Improved legibility.** The MAG region is vast, but it has a regular street grid system that helps to orient people. Utilizing this grid system and devising an identifiable system of corridors that connect to one another, as well as to popular shared use paths and the transit system, will improve navigability and intuitiveness for people using active modes. Applying established and branded wayfinding and other design elements may further improve legibility and help people feel more confident walking, biking, and taking transit. For example, each corridor or loop, or the system as a whole, could have distinctive branding that MAG and its local agency partners could further develop.
- **A regional framework for local networks to connect to.** Many jurisdictions within the MAG region have developed, or will be developing, their own active transportation plans that focus on local networks that connect to local destinations. These local networks may align with one or more of the alternatives identified within the AT Grid and, therefore, serve both a local and regional function.
- **Efficient active transportation access to regional destinations and transit.** The AT Grid is focused on the destinations and corridors with the highest potential demand. The loop configuration of the AT Grid provides more than one complete corridor option between activity centers, particularly when integrated with shared use paths and transit.
- **Reduced potential for multimodal conflicts.** Starting with their basic layout, complete corridors are designed to minimize multimodal conflicts. By focusing on continuous corridors serving proximate activity centers rather than a series of smaller segments where connecting two activity centers may require multiple turns, complete corridors reduce the number of potential turning conflicts.
- **A template for active transportation planning in other parts of the region.** While potential corridors identified in the AT Grid map are focused on connecting proximate activity centers with the highest potential demand for walking and biking, the same approach may be used in other parts of the MAG region at a range of scales.



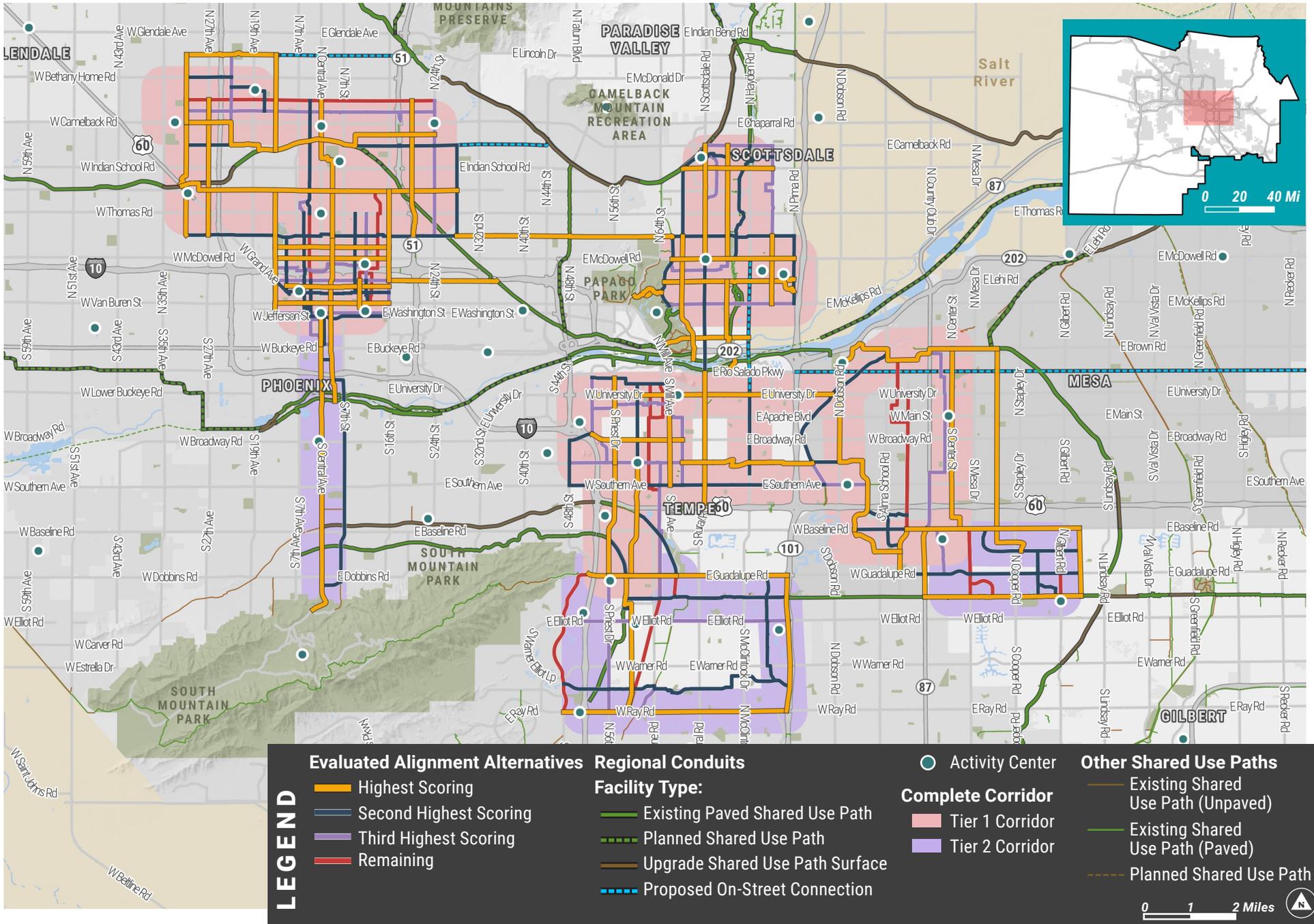
Map 1: Regional demand and gravity analysis



Map 2: Gravity analysis, AT Grid and Regional Conduits



Map 3: AT Grid and ranked corridor alignment alternatives



Micromobility is transforming the mobility landscape

Micromobility refers to any small, human or electric-powered transportation solution such as bikes, e-bikes, scooters, e-scooters, e-skateboards, monowheels, and one-wheels. These devices can be accessed through personal ownership or participation in shared models (e.g. bikeshare programs). Bikeshare and e-scooter share options have emerged in cities across the country and have transformed the mobility landscape of the MAG region by providing more options for how people get around and additional opportunities to integrate active trips with transit. These options offer great benefits to residents, but need to be thoughtfully managed, regulated and properly administered.

The micromobility landscape is rapidly evolving nationally and in the MAG region. In addition to the continued expansion nationally of traditional docked bikeshare programs, there has also been enormous growth around dockless micromobility systems. Since arriving in the U.S. in 2017, the dockless industry itself has undergone significant technology changes with the introduction of e-assist bikes and e-scooters. In particular, e-scooter programs are rapidly expanding nationally. Within the MAG region, Phoenix launched a 6-month e-scooter program and Tempe adopted e-scooter regulations in 2019. As personal e-scooters and e-scooter share programs continue to grow in popularity, communities should take immediate steps today to prepare for e-scooters, or to guide existing e-scooter programs.

Safety

Safety is a primary concern for e-scooter programs. Tracking a program's safety metrics, or measuring the impact of regulatory and infrastructure approaches to improve safety, are challenging though as it can be difficult to track e-scooter crashes. Currently, there are no universally adopted standardized reporting



mechanisms, and vendor and police reporting generally under-represents e-scooter crashes. To date, emergency department data are regarded as the most comprehensive source of crash information. Communities interested in focusing on safety efforts should work with their local health departments and hospitals to standardize reporting to more easily identify e-scooter-involved injuries. Additionally, communities with existing e-scooter programs can also partner with e-scooter service providers to encourage education and rider training for safer device operation.

Regulation

Communities should update or develop regulations that balance an e-scooter program's orderly use of the public right-of-way, while maintaining service provider interests. Communities can begin by clarifying their e-scooter definition and its allowed use in the public right-of-way (parking and riding locations, and operating speed) in their code. In addition, communities should identify compliance assurance methods that use enforcement (service provider fines), education (hard-copy or in-app materials), and engineering (designated parking areas) tactics in their supporting policies.

Within service provider agreements, communities should establish expected service levels (e.g. vehicle minimums and maximums, operating speed



thresholds, and incident response times) permit fees, and data sharing requirements. Permit fees help communities cover the additional staff time needed to oversee and monitor e-scooter programs, respond to community concerns, and support related safety educational programs. Additionally, access to program data is essential to managing the program and making informed decisions. Communities should consider requiring one of the two standard data reporting formats in their agreements: the Mobility Data Specification (MDS), and/or the General Bikeshare Feed Specification (GBFS).

Infrastructure

Communities should identify designated or shared e-scooter operating spaces, additional pavement maintenance needs, and accessibility policies ahead of permitting e-scooter programs. To address accessibility concerns, agencies can work with disability advocacy groups to integrate mobility requirements from the Americans with Disabilities Act (ADA) into service provider agreements (e.g. prohibiting e-scooters from blocking sidewalk access for pedestrians), and to identify local accessibility challenges. In areas with significant accessibility challenges, communities should consider using geofencing (i.e. establish virtual perimeters) to limit e-scooters' speed, use, or parking.



Building out a regional active transportation network for all ages and abilities

What will it take?

Building out the AT Grid and other active transportation infrastructure throughout the region will require a continued partnership between MAG and its member agencies as well as other community partners such as the Arizona Department of Transportation (ADOT), Maricopa County, Valley Metro, health organizations, advocacy organizations, developers and other business interests. It will also take cultural acceptance of active transportation as a worthy investment and an acknowledgment that the inherent trade-offs that come into play when retrofitting streets to accommodate high-quality walking, biking and transit infrastructure are worthwhile for achieving a safer, more equitable and livable region.

There is ample evidence that people in the MAG region want options. From support for light rail funding to investments in the regional shared use path network, to separated bike lanes and other high-comfort bicycle facilities being constructed in a range of communities including Surprise, Mesa, Phoenix, Tempe, and Avondale, it is very clear that the MAG's communities, and the residents and employers within them, understand the value of investing in high-quality active transportation infrastructure.

Investing in high-quality active transportation infrastructure will ensure that the MAG region remains a place where people and employers want to move and stay. It also will contribute to a more equitable region where everyone has the opportunity to access jobs, schools, and other opportunities using low-cost transportation options.



Local agency tools

Build high quality infrastructure within the AT Grid, activity centers and Regional Conduits

Cities and counties own, operate, and maintain the streets and roadways within the region, except those owned by ADOT. As the metropolitan planning organization, MAG supports local implementation through funding and other assistance, but local jurisdictions ultimately prioritize, fund, build, and permit the construction of most non-freeway roadway projects in the region. The ATP provides a framework within which investments in high-quality pedestrian and bicycle infrastructure would yield the greatest benefits. These include facilities within the AT Grid, along Regional Conduits, and within activity centers (as defined by local jurisdictions). MAG works with local jurisdictions, as well as ADOT, to implement projects within this framework.

While MAG provides a significant amount of funding to local jurisdictions for designing and implementing active transportation projects, it is not enough to meet regional and local needs. Local jurisdictions have a critical role to play in building out the region's active transportation network, shifting more trips to active modes, and reducing traffic collisions that kill or seriously injure people. The following pages present key areas of focus for local jurisdictions interested in supporting active transportation.

Adopt policies or ordinances that support complete streets

Complete streets simply means designing and building streets that provide safe and accessible mobility for all people regardless of what mode of travel they choose or have available to them. Without a policy that dictates this

as the standard approach, the needs of some users—most often people who walk, bike or use mobility devices—often go unaddressed. Adoption of policies or ordinances that support complete streets would better ensure that streets are designed to support active transportation. The National Complete Streets Coalition provides information and technical assistance to help communities craft complete streets policies and implement streets that enhance transportation choices and community livability.

Establish a Safe System policy

Safe System thinking considers the roles that local context and activity play when determining appropriate roadway designs. Adopting the Safe System approach involves a fundamental shift from conventional safety approaches in three main ways⁶⁰:

First, rather than focusing on preventing human error, it instead accommodates human error. Since drivers are

known to make mistakes that can lead to serious collisions, the Safe System is designed to accommodate such errors without resulting in serious injury. For example, slowing traffic on streets where pedestrians and bicyclists are present allows more reaction time and reduces injury levels when inevitable conflicts occur.

Second, the Safe System approach is characterized by shared responsibility. Rather than attributing serious crashes solely to a failure of the road user, the responsibility for serious collisions is shared among those who might have prevented the situation through improved roadway or vehicle design as well as improved road user behavior.

And third, whereas conventional safety methods are primarily reactive, the Safe System approach is proactive. In addition to analyzing past collisions and looking for ways they could have been prevented, the Safe System approach looks forward to identify where crashes might



occur in the future and considers all ways that such collisions could be prevented. The Safe System approach considers human injury tolerance and gives priority to systemwide changes that will prevent collisions that expose people to lethal crash forces.

A Safe System approach involves commitment to analyze safety problems, identify changes that bring the best return on investment, and implement these improvements throughout the system to prevent further occurrences. For example, high vehicle speeds are a contributing factor to roadway fatalities in the MAG region, particularly among more vulnerable roadway users such as people walking and biking. Managing and reducing vehicle speeds is essential for reducing fatal and serious collisions (see the [Active Transportation Toolbox](#) for speed management strategies). Collisions involving pedestrians crossing mid-block outside of a crosswalk are also an issue in many parts of the MAG region. Ensuring there are safe and convenient crossing opportunities is essential to reducing these types of collisions. Distraction and impairment are other significant contributing factors to collisions nationally and within the MAG region. These must be addressed through education and enforcement.



Safe System principles are the foundation of Vision Zero, an international movement to eliminate fatal and severe traffic-related injuries. The City of Tempe is the first jurisdiction in the MAG region to adopt a Vision Zero policy. The Vision Zero Network provides information and technical assistance to help communities craft strategies and take action to improve safety for all transportation system users.

Update street design standards and guidelines

Cities and counties often have outdated or incomplete street design standards and guidelines that do not incorporate best practices for designing streets that are context-sensitive and optimized for safe, multimodal travel. Updating street design standards and guidelines to reflect complete streets principles and design best practices is a critical step toward supporting a variety of safe and convenient transportation options. More than half of MAG's member agencies have street design standards or guidelines that specifically address pedestrian and bicycle infrastructure, however many of these are general

in nature or have not been updated recently to reflect current state of the practice. Important design topics that should be incorporated into street standards and guidelines include:

- Establishing target speeds that respond to different land use contexts and levels of walking and bicycling activity.
- Geometric design strategies for meeting target speeds such as narrowed travel lanes and smaller curb radii.
- Providing enhanced protection for bicycle facilities on arterials, such as separated bike lanes.
- Sidewalks with widths greater than four feet and that are buffered from vehicle lanes.
- Marked crosswalk and crosswalk enhancement decision tools.
- Shade and respite features in the right of way.

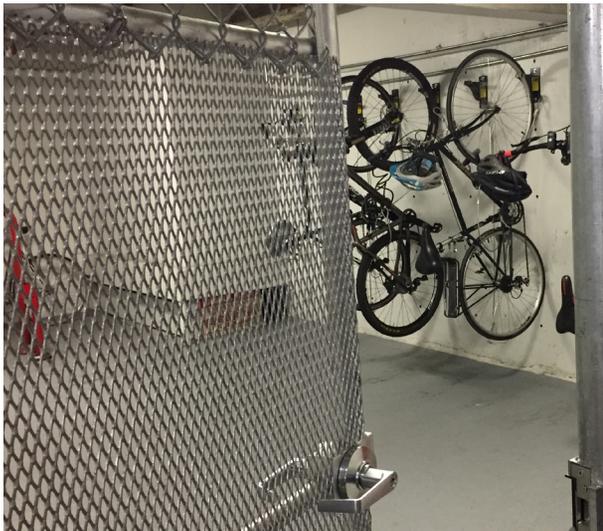
The [Active Transportation Toolbox](#) is intended to present best practices in pedestrian and bicycle facility design and point member agency staff and stakeholders to other resources with more detailed design guidance. MAG's member agencies are encouraged to use the Toolbox to update their own street design standards and guidelines.

More than half of MAG's member agencies have street design standards or guidelines that specifically address pedestrian and bicycle infrastructure, however many of these are general in nature or have not been updated recently to reflect current state of the practice.

Adopt supportive land use and development regulations

While local jurisdictions have direct control over the public rights of way that they own and how they design for people walking and biking, it is also within their purview to regulate and influence land use and building design to be supportive of active transportation. Supportive land use and development regulations include:

- Minimum street connectivity requirements and discouraging cul-de-sacs.
- Zoning that encourages a mix of land uses and compact development, especially near transit and in areas with good connectivity.
- Requiring large developments to maintain or improve existing street connections.
- Prohibiting walls or other barriers between developments.
- Prohibiting blank building facades adjacent to sidewalks in walkable urban areas.
- Prohibiting surface parking lots between buildings and the street in commercial and mixed use areas.



- Requiring sidewalks and other frontage improvements, such as landscaping and lighting, in all new developments.
- Requiring end-of-trip facilities such as short- and long-term bicycle parking, showers, and repair stations in commercial and multi-family residential buildings.
- Incorporating bicycle/pedestrian coordinators or local experts/advocates in the development review process.
- Encouraging commercial and multi-family residential buildings to incorporate shade elements into building facades and frontage improvements.

Update parking requirements

Providing sufficient vehicle parking is important for providing access to businesses and residences. However, when there is an over supply of parking, or parking is prioritized over other uses, it can detract from efforts to promote walking and biking, induce additional vehicular traffic, and unnecessarily drive up development costs, making housing and business operations more expensive. Communities should revisit their parking policies to ensure the right balance between providing parking supply and achieving other community goals such as more walkable neighborhoods, housing affordability, and encouraging multimodal trips. Parking policy reforms may differ based on context. In areas that are well served by transit, reducing the amount of parking can encourage walking and biking.

Key elements of parking policy reform in urban areas, university districts, town centers, and transit-oriented developments include:

- Reducing minimum parking requirements.
- Establishing parking maximums.
- Restricting new surface parking lots and encourage conversion of existing lots to active uses.
- Encouraging/allowing shared parking.
- Unbundling the cost of parking from housing and commercial leases.

- Requiring spaces for bicycles and carshare.
- Implementing metered on-street parking and charge market price.
- Creating a parking benefit district where a portion of parking revenues go towards street improvements that promote walking, biking, and transit use within the district.
- Designing all parking for pedestrian access and maximize shade along the pedestrian route.

Key elements of parking reform for lower density suburban areas that are not well-served by transit include:

- Restrict new surface parking lots between buildings and the sidewalk and encourage conversion of existing lots to active uses.
- Require buildings to be built up to and with entrances from the sidewalk.
- Limit the number of driveways through consolidation and other access management policies.

Dedicate resources for active transportation

Communities that see the most success in promoting walking and bicycling, in terms of increasing the number of people using these modes, typically dedicate funding and staff resources for this purpose. Without a dedicated funding source (e.g., a capital improvement program line item, voter-approved funding initiative, etc), project implementation typically relies on grant funding or larger roadway resurfacing or capital projects that might incorporate elements that enhance walking and biking. While such an opportunistic approach does get important facilities built, it often results in disconnected networks that see little use. Dedicated staff time is critical for coordinating projects across departments and reviewing development plans to ensure projects are built as planned, and to optimize active transportation access and safety.

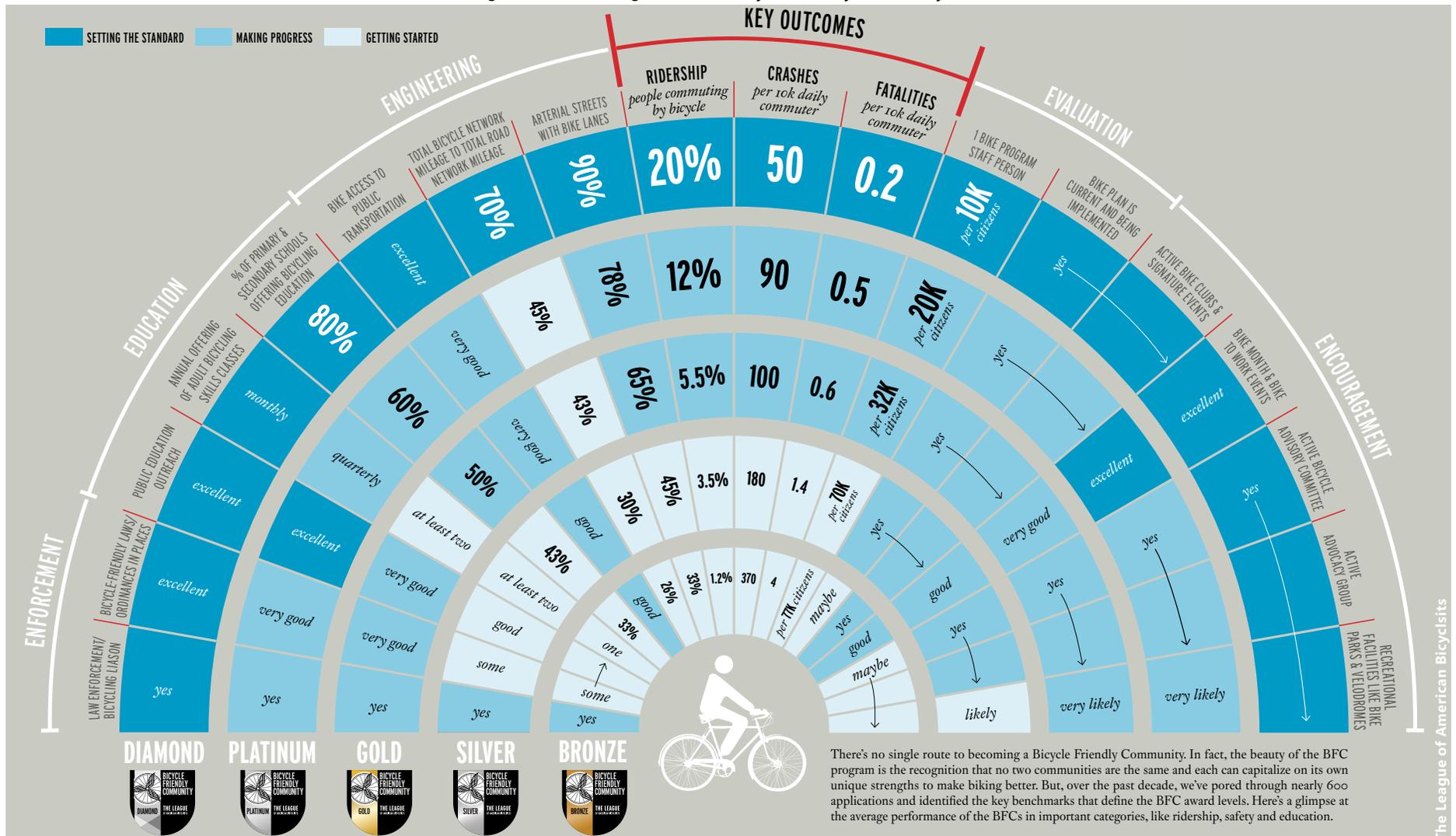
Become a walk friendly and bicycle friendly community

Walk Friendly Community (WFC)⁶¹ and Bicycle Friendly Community (BFC)⁶² designations are part of national programs to recognize communities who are making a concerted effort to becoming more walking- and bicycling-

friendly. Each of the programs prescribes a comprehensive approach based on the "5 Es" (engineering, education, encouragement, enforcement, evaluation and planning) and ensures that communities are creating a culture of decision-making and investment that positively supports walking and biking (see Figure 9). Tempe and Scottsdale

have achieved BFC Gold level status, Mesa is Silver, and Gilbert, Chandler and Phoenix are Bronze. Equity is a 6th 'E' that many communities are focusing on, recognizing that transportation systems should provide low-cost and safe options for all people, and historically underserved populations deserve special attention.

Figure 9: The Building Blocks of a Bicycle Friendly Community⁶³





Off- and on-street portions of the Mesa Stadium Connector. Photos courtesy of the City of Mesa.

CASE STUDY: City of Mesa, Stadium Connector

The Mesa Stadium Connector links together the Oakland A’s and Chicago Cubs spring training facilities (Hohokam Stadium and Sloan Field, respectively) and the adjacent neighborhoods. The City of Mesa identified the project need while developing the city’s 2010 Bike Plan, and it completed the project in 2017. The Mesa Stadium Connector comprises several phases, one of which is a 2.5-mile stretch of 10-foot concrete shared use path between Dobson Road and Center Street.

The shared use pathways were constructed for just under \$3 million, and the City of Mesa used a mix of park bonds and local funds to support the project. The Mesa Stadium Connector project also includes two-way separated bike lanes and bicycle boulevards that follow the Salt River Project (SRP) canals, the Rio Salado river bank, and neighborhood streets. Along the Stadium Connector signalized bicycle and pedestrian crossings, themed wayfinding signage, custom railings, decorative seating, and landscaping elements are used to direct people walking and bicycling. The landscaping elements use bioswales to harvest water.

CASE STUDY: City of Surprise, Bullard Multimodal Redesign

The Bullard multimodal redesign project in Surprise improves pedestrian and bicycling access along Bullard Avenue and access across the roadway to nearby elementary schools and neighborhoods. The project was completed in early 2019 and resulted in protected bike lanes on both sides of Bullard Avenue; two new traffic signals and three new school crossings serving six schools; sidewalk repairs; a reduction in the number of travel lanes to two lanes in each direction; narrowed travel lanes; and raised, landscaped medians along the 3-mile corridor.

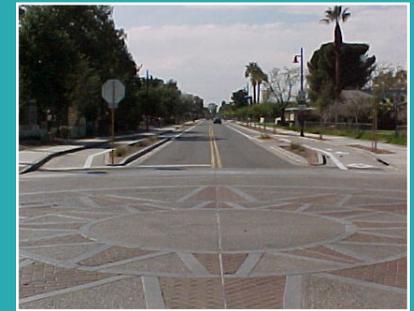
City staff identified the need for this project in the fall of 2016, when they received multiple requests from parents who desired to allow their children to walk to schools on the other side of Bullard Avenue, but were hesitant due to what they perceived as dangerous conditions. In response to resident requests, City staff worked with a grant-funded Safe Routes to School team to create a plan that included lowering Bullard Avenue's speed limit to 35 mph, constructing protected bike lanes, and narrowing travel lanes from 14 feet to 11 or 12 feet. As a result of these improvements, as many as 600 students cross Bullard Avenue each school day. Surprise leveraged a mix of MAG program and local funds to support this project.

Bullard Multimodal Redesign. Image courtesy of the City of Surprise.



CASE STUDY: City of Tempe, 5th Street Corridors

The City of Tempe constructed the 1-mile 5th Street project in 1999 to improve the corridor's comfort for all roadway users, reduce vehicle speeds and cut-through traffic levels, and upgrade the roadway's drainage functionality. The city achieved its goals by narrowing and rechannelizing vehicle lanes, installing separated and conventional bike lanes, widening sidewalks and constructing new sidewalk segments, adding curb extensions and raised pedestrian crossings to intersections, and installing bus bulbs and shelters. Shade and public art features were also installed to improve the corridor's aesthetics and comfort level for all roadway users. The project cost \$3.5 million to construct, and the city leveraged a mix of MAG program and local funds to support this project.



Bike lanes, traffic calming devices and public art along the Tempe 5th Street Corridor. Photos courtesy of the City of Tempe.



Landscape- and parking-protected sections of the Central Avenue Protected Bike Lanes. Photos courtesy of the City of Avondale.

CASE STUDY: City of Avondale, Central Avenue Protected Bike Lanes

The Avondale Central Avenue project created one mile of landscape island-separated bike lanes by implementing a five-to-three lane road diet from Western Avenue to Van Buren Street. Completed in 2017, the project connects local elementary schools, encourages on-road bicycling, and upgrades adjacent pedestrian facilities to meet current ADA standards. The project's construction

activities cost approximately \$2.65 million, and the city leveraged local dollars by securing MAG program funds. In addition to reducing the number of motor vehicle lanes, the project also narrowed the remaining motor vehicles lanes, repaired and widened existing sidewalks, and added new bus shelters, traffic calming features, lighting, and planters.

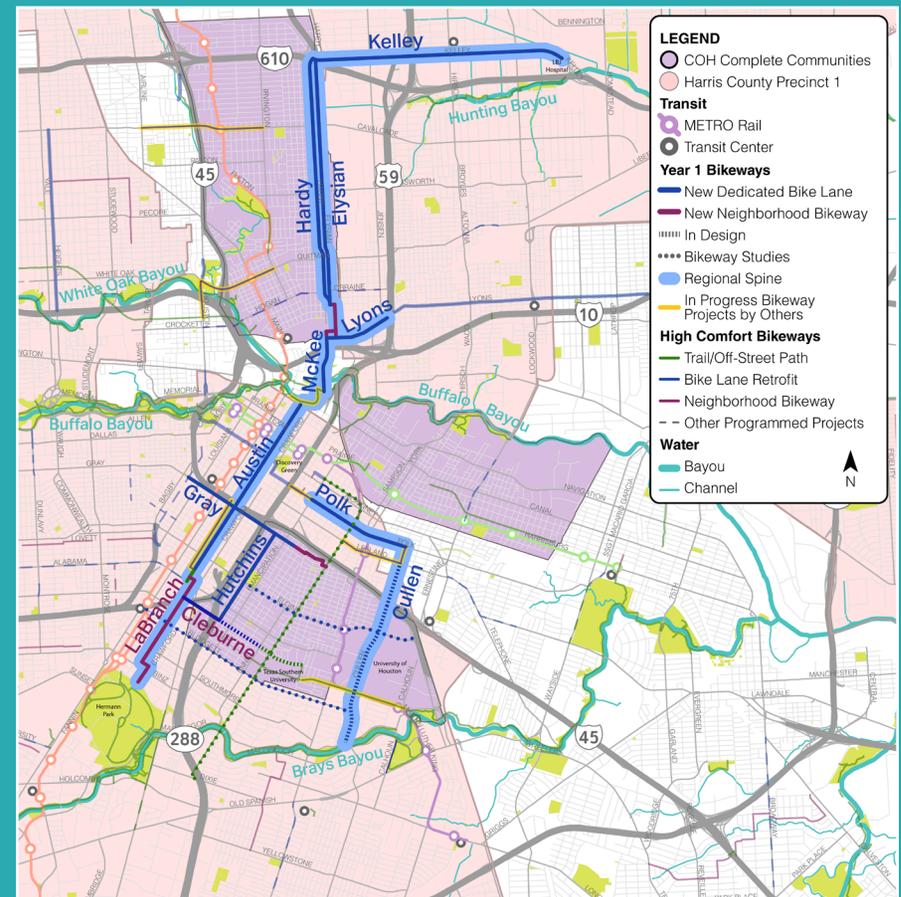
CASE STUDY: Achieving a connected network through rapid implementation

The City of Houston, Texas is using a rapid implementation model to improve the safety and equity of its transportation system. In the first year alone, Houston's Rapid Implementation Bike Network project has led to 19 miles of new bikeways; 58 signal modifications, including bicycle signals; 33 new bus stops, including nine floating bus stops; and ADA upgrades at dozens of intersections. The rapid implementation bike network leverages Houston's existing network of bayou shared use paths to create bicycle and pedestrian connections across Houston. While Harris County funded the design and construction of the bikeways, the City of Houston led the public and stakeholder engagement.

This project began by Bike Houston, a local nonprofit focused on promoting bicycling in Houston, presenting the Build 50 Challenge—50 miles of on- and off-street bikeways in 12 months—to the City of Houston, Harris County, and the Houston Parks Board. Harris County Precinct 1 Commissioner Rodney Ellis led an investment of \$10 million focused on providing all ages and abilities bikeways in lower income communities to connect people in these neighborhoods to schools, work, healthy food resources, cultural and entertainment destinations, and hospitals. Ellis's investment built on the City of Houston Mayor Sylvester Turner's Complete Communities initiative. The Complete Communities initiative places a holistic focus on improving the services and infrastructure in five lower income areas of Houston while also ensuring that existing residents can stay in homes that remain affordable.

While the year one (2019) network is currently under construction, planning to further extend the connections possible on Houston's bikeway network in year two (2020) is currently underway. As Commissioner Ellis states, "It's important that we maintain a collaborative approach and be creative. I want to challenge other organizations, including cities, management districts, nonprofits and others to work together. No single organization can do everything."

Figure 10: Map of corridors designed or studied in In the Houston's first year of the Rapid Implementation project. Image courtesy of TEI.



What will it cost?

Advancing active transportation in the region so that people of all ages and abilities feel safe and comfortable walking and biking—whether to work, school, shopping, transit, recreation, or to visit friends—is a big undertaking. It will take political support at every level, and it will require funding at every level. To maximize return on investment this funding must be strategic; focusing on infrastructure investments that will fill network gaps and provide a high level of comfort that attracts the broadest spectrum of users.

The cost of implementing the AT Grid and completing the Regional Conduits is detailed in Table 2. The AT Grid consists of Tier 1 and Tier 2 corridors; Tier 1 being corridors with the highest potential demand based on a demand analysis (see Appendix A). Only those jurisdictions where the AT Grid or Regional Conduits are located are listed in Table 2. These are areas where the potential for active transportation trips between activity centers is highest. Other jurisdictions also have active transportation needs and a role to play in connecting people to transit for more regional trips. These needs may be addressed locally or through MAG’s existing funding programs, as well as existing and planned regional transit service.

There are many more active transportation projects that have been identified by local jurisdictions that are not necessarily included in the costs shown in Table 2. For example, the cost of implementing a local bike lane connection that does not overlap with the AT Grid or Regional Conduits is not part of this regional system cost estimate, but is clearly valuable in contributing to the regional network.

These planning-level cost estimates are intended to serve as a baseline for regional investment in high quality active transportation infrastructure that best meets potential

demand. Costs may inform future transportation funding allocation and initiatives. Specifics of each corridor, such as utility impacts and detailed constructibility issues, were not investigated; rather, unit costs were developed to reflect average conditions. Improvements on some corridors are likely to be more expensive than estimated, while others are likely to be less expensive than estimated. The cost estimates do not include right of way acquisition because of the uncertainty in individual projects’ right of way needs and the wide variability in costs both geographically across the MAG region and over time. However, the cost estimates are intended to include both design and construction phases of projects. Costs are presented in 2019 dollars.

More information on the cost-estimating process can be found in Appendix B.

The cost estimates were developed based on the below four steps:

1. Identify corridors in the AT Grid.
2. Determine the appropriate active transportation accommodations on each corridor.
3. Calculate planning-level costs for each accommodation type using:
 - Previous plans in the region that identified costs of improvements.
 - Information received from MAG member agencies

Table 2: Planning-level cost estimates for AT Grid and Regional Conduits

Jurisdiction	Regional Conduits	AT Grid Tier 1	AT Grid Tier 2	Total
Apache Junction	\$ 12,180,000			\$ 12,180,000
Avondale	\$ 4,200,000			\$ 4,200,000
Carefree	\$ 8,050,000			\$ 8,050,000
Cave Creek	\$ 11,200,000			\$ 11,200,000
Chandler	\$ 2,100,000		\$ 6,048,000	\$ 8,148,000
Gilbert	\$ 5,550,000		\$ 23,800,000	\$ 29,350,000
Glendale	\$ 16,000,000			\$ 16,000,000
Mesa	\$ 66,900,000	\$ 29,715,000		\$ 96,615,000
Paradise Valley	\$ 8,800,000			\$ 8,800,000
Peoria	\$ 800,000			\$ 800,000
Phoenix	\$ 179,050,000	\$ 106,040,000	\$ 18,532,000	\$ 303,622,000
Queen Creek	\$ 3,600,000			\$ 3,600,000
Salt River Pima-Maricopa Indian Community	\$ 19,350,000			\$ 19,350,000
Scottsdale	\$ 8,400,000	\$ 27,795,000		\$ 36,195,000
Tempe	\$ 5,110,000	\$ 85,632,000	\$ 35,165,000	\$ 125,907,000
Grand Total	\$ 351,290,000	\$ 249,182,000	\$ 83,545,000	\$ 684,017,000

Amounts shown in table do not reflect local jurisdiction obligations, but rather the cost of implementing the high quality infrastructure identified as part of the AT Grid or Regional Conduits as shown in the ATP. The ATP serves as a guide for where local jurisdictions may want to invest in high quality active transportation infrastructure that enhances regional connectivity.

about actual costs expended for particular projects, converted to appropriate unit costs and adjusted for inflation.

- Research on typical project costs from agencies and sources outside the MAG region.

4. The corridor's length, the proposed accommodation type, and the corresponding unit cost.

Funding and assistance

MAG oversees several programs intended to advance the expansion of active transportation networks and improve transportation safety throughout the region. MAG will prioritize funding for projects that are within the complete corridors and Regional Conduits identified in this ATP, as well as projects within local activity centers that support short trips or connect to complete corridors, Regional Conduits, or regional transit. In addition to funding programs that MAG oversees, there are a variety of funding sources at the federal, state and local level that can be used to fund a range of active transportation infrastructure. Appendix C provides details on federal, state, regional, and local funding sources.

Measuring success

This plan establishes a framework for improving conditions for active transportation across the region. It also identifies critical steps for regional and local agencies to pursue to achieve the vision. Monitoring progress at the regional level is a critical way of understanding whether the goals of this plan are being achieved and whether the needs of community members who walk, bicycle, and take transit are being adequately met.

MAG will monitor progress toward regional active transportation targets through the 12 performance measures listed in Table 3. Each performance measure

relates to the target goals established in the planning process. MAG encourages its local partners to adopt these goals as their own where possible. When available at the regional or county level, baseline data for a given performance measure serves as a reference for future

comparison. Performance measures without readily available data are included to inspire MAG and its member agencies to begin collecting and tracking. At a later point, the plan may be amended to include targets for each performance measure.

Table 3: Active transportation performance measures

Goal	Performance Measures	Baseline Data	Data Source
Increase the active transportation mode share to 30 percent by 2040	Percent of people in the MAG region who walk, bike, or take transit	18.4% (2017) ⁶⁴	MAG Household Travel Survey ⁶⁵
	Annualized pedestrian and bicycling volumes along key corridors	N/A	MAG pedestrian and bicycle counts Third-party GPS-enable location data: Strava, StreetLight
	Number of annual transit boardings	66,784,913 (2018) ⁶⁶	Valley Metro Annual Ridership Report
	Miles of high-comfort bicycle facilities in the region funded by MAG (and miles connecting to underserved communities)	N/A	MAG TIP
	Miles of sidewalks along arterials and collector streets funded by MAG (and miles connecting to underserved communities)	N/A	MAG TIP
	Number of new light rail, streetcar, and high-capacity bus stations (and in underserved communities)	38 (2019) ⁶⁷	Valley Metro
Achieve zero pedestrian and bicyclist traffic fatalities by 2030.	Annual number of pedestrian fatalities	156 (2017) ⁶⁸	MAG
	Annual number bicyclist fatalities	25 (2017) ⁶⁹	MAG
	Annual number of pedestrian and bicycle fatalities per 100,000 community members in the region	4.29 (2017) ^{70,71}	MAG
Increase the percentage of people getting recommended levels of physical activity to 80 percent by 2040.	Percent of residents getting enough physical activity	47% (2012) ⁷²	Maricopa County Dept. of Public Health

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