

West Phoenix Transportation Study

Technical Memorandum #2 Future Conditions Report

August 2023

Prepared for:

City of Phoenix

Street Transportation Department
Design and Construction Management Division
1034 E. Madison Street
Phoenix, AZ 85034



Prepared by:

Michael Baker International

2929 N Central Avenue, 8th Floor
Phoenix, AZ 85012



Table of Contents

1 Introduction	4
Study Area Overview	8
Planning Process.....	9
2 Growth Analysis	11
Future Land Use	11
Future Demographic & Socioeconomic Overview	16
Forecasted Traffic Conditions with Existing Infrastructure	24
3 Proposed Transportation System.....	50
4 Next Steps.....	69

List of Figures

Figure 1-1: West Phoenix Regional Vicinity Map.....	6
Figure 1-2: West Phoenix Transportation Study Area.....	7
Figure 1-3: Project Schedule	9
Figure 2-1: Future Land Use Map (Buildout Scenario)	12
Figure 2-2: Future Land Uses Upon Existing Vacant, Agricultural, and Developing Residential Parcels.....	15
Figure 2-3: Future Population and Housing Projection	16
Figure 2-4: Total Population (2030) Map.....	17
Figure 2-5: Total Population (2050) Map.....	18
Figure 2-6: Total Households (2030) Map	19
Figure 2-7: Total Households (2050) Map	20
Figure 2-8: Future Employment Projection	21
Figure 2-9: Total Employment (2030) Map.....	22
Figure 2-10: Total Employment (2050) Map.....	23
Figure 2-11: Roadway Movement vs. Access Graphic.....	24
Figure 2-12: Major Arterial Cross-Section	26
Figure 2-13: Major Arterial and Arterial Cross-Section.....	27
Figure 2-14: Major Arterial and Arterial Cross-Section.....	27
Figure 2-15: Major Arterial and Arterial with Raised Median Cross-Section.....	28
Figure 2-16: Arterial and Major Collector Cross-Section.....	28
Figure 2-17: Collector Cross-Section	29
Figure 2-18: Minor Collector with Parking	29
Figure 2-19: Minor Collector with Bike Lane	30
Figure 2-20: Local Street Cross-Sections.....	31
Figure 2-21: Proposed Functional Classification Map	32
Figure 2-22: Future Traffic Volumes 2030 Map.....	34
Figure 2-23: Future Traffic Volumes 2050 Map.....	35
Figure 2-24: Future 2030 Level Of Service Map	38
Figure 2-25: Future 2050 Level Of Service Map	39
Figure 2-26: Level of Traffic Stress Scale.....	41
Figure 2-27: Level of Traffic Stress (2030) Map.....	48
Figure 2-28: Level of Traffic Stress (2050) Map.....	49
Figure 3-1: Previous Study and PUD Recommendations	51
Figure 3-2: West Phoenix High-Capacity Transit Alternatives Analysis Study Area	52
Figure 3-3: West Valley Flexible Transit Study Area.....	53
Figure 3-4: Aldea Center Master Street Plan.....	54
Figure 3-5: Acero at the Stadium and Urban 95 PUD and Roadway Network.....	55
Figure 3-6: Algodón Center BP-1 Site Plan	55
Figure 3-8: Algodón Center Planned Circulation	56
Figure 3-7: Residential Community: Campbell Avenue and North 93rd Avenue.....	56
Figure 3-9: Sheely Center Planned Circulation	57
Figure 3-10: Inventory of Proposed Roadway Network/Capacity Projects Map.....	64

Figure 3-11: Proposed Active Transportation and Mobility Projects Map68

List of Tables

Table 2-1: Future Land Use Distribution.....	11
Table 2-2: Existing and Future Land Use Comparison.....	13
Table 2-3: Distribution of Future Land Uses Upon Existing Vacant, Agricultural, and Developing Residential Parcels.....	14
Table 2-4: Projected 2030 and 2050 Traffic Volumes.....	33
Table 2-5: Projected Changes in Roadway Segment Level Of Service.....	37
Table 2-6: Segment Level of Traffic Stress Scoring Criteria.....	42
Table 2-7: Unsignalized Intersection Level of Traffic Stress Scoring Criteria.....	43
Table 2-8: Projected 2030 Segment Level of Traffic Stress.....	43
Table 2-9: Projected 2030 Intersection Level of Traffic Stress.....	44
Table 2-10: Projected 2050 Segment Level of Traffic Stress.....	45
Table 2-11: Projected 2050 Intersection Level of Traffic Stress.....	47
Table 3-1 Inventory of Proposed Roadway Network/Capacity Projects:.....	59
Table 3-2: Inventory of Proposed Traffic Calming Projects.....	61
Table 3-3: Inventory of Proposed Safety/Operations Studies.....	62
Table 3-4: Proposed Active Transportation and Mobility Projects.....	65

1 Introduction

The City of Phoenix (City) and Arizona are currently undergoing rapid population growth similar to what is being experiencing in other large cities and states in the Mountain West and South. Due to this rapid growth, it is crucial that undeveloped areas adjacent to already developed areas of Phoenix are proactively planned with appropriate housing and transportation facilities to accommodate this population growth. The West Phoenix Transportation Study (WPTS) process builds upon extensive coordination, review, and documentation of future planned developments within the City and surrounding jurisdictions including Glendale, Avondale, Maricopa County, and Tolleson. ADOT was also consulted to understand planned improvements to the I-10/Loop 101 interchange and any traffic interchanges with local arterials. Future development plans and timing were factored into identification of multimodal transportation system recommendations resulting from the WPTS. **Figure 1-1** illustrates the Maryvale urban village and the WPTS study area in the far western portion of the City running from the I-10/Loop 101 interchange along and northward up the Loop 101 corridor bounded to the south and west by the City of Avondale, to the north and east by the City of Glendale, and to the south by the City of Tolleson. The WPTS area is rapidly developing and represents many characteristics that are common to areas that serve as an urban/rural interface.

The City initiated the WPTS to develop a multimodal transportation plan that considers the needs of all users in an area of the City that includes both established neighborhoods adjacent to and west of the Loop 101 Corridor and large tracts of agricultural land in various phases of approval for near-term development as shown in **Figure 1-2**. The WPTS focuses on vehicle and roadway infrastructure while encouraging active transportation through modifying and providing new infrastructure and enhanced connectivity to transit.

The WPTS vision builds upon the 99th Avenue Compass Study completed in 2015 by the Maricopa Association of Governments (MAG). This study identified a transportation network that includes multimodal Complete Streets that support sustainable economic development in addition to providing new opportunities to generate enhanced business and sales tax revenues. Considering the partially built out nature of the WPTS Study Area, a unique opportunity exists to develop a more livable and sustainable development pattern on undeveloped parcels by encouraging a connected, safe, accessible, and reliable transportation system that places less emphasis on automobile reliant development by supporting and accommodating all transportation modes.

The WPTS helps facilitate development and implementation of community transportation goals, leading to transportation facility and service improvements by:

- 1) Focusing on providing a transportation system that provides equitable opportunities for users of all ages and abilities and modes to connect to neighborhood, municipal, and regional destinations;
- 2) Identifying desired future bicycle/pedestrian, transit, and/or automobile uses of arterials and collectors within the Study Area by reviewing and integrating feasible transportation system enhancement recommendations and policies from the yet to be adopted Key Corridors Master Plan (KCMP), City of Phoenix Complete Streets Policy, Phoenix Active Transportation Plan, Phoenix Bicycle Master Plan, 99th Avenue Compass Study, Avondale Transportation

- Plan, Avondale Active Transportation Plan, Glendale General Plan, Glendale Transportation Plan, and Glendale Active Transportation Plan into project recommendations;
- 3) Evaluating and recommending multimodal and active transportation enhancements that will improve connectivity and safety on arterials and collectors within the Study Area;
 - 4) Comparing future roadway connectivity and capacity needs to existing roadway conditions by evaluating future planned growth within the Study Area to identify future vehicle demands and Level Of Service (LOS), Level of Traffic Stress (LTS), bicycle/pedestrian needs, transit propensity, and incorporating mode-specific design features (dedicated bike lanes, sidewalks, bus pullouts, safety-driven lane width designations) into roadway cross-sections, and right-of-way needs for all future arterial and collector enhancements;
 - 5) Recommending desired roadway widths, policies, and procedures to preserve the necessary right-of-way to ensure connectivity and multimodal transportation functionality of all enhancements to existing and future recommended roadways in the Study Area;
 - 6) Identifying ways to better connect City of Phoenix bicycle and pedestrian (active transportation) facilities to existing and planned facilities in the neighboring jurisdictions of Avondale and Glendale;
 - 7) Identifying select areas where low environmental impact/low impact development drainage (Green Stormwater Infrastructure [GSI]) features may be potentially implemented and maintained;
 - 8) Identifying recommendations to deliver sufficient capacity and multimodal transportation infrastructure for the City of Phoenix to accommodate future planned residents, businesses, and visitors in the Study Area;
 - 9) Reviewing existing zoning and land use to identify areas where potential modifications to land use designations and/or design principles may be acceptable to provide an opportunity to increase bicycle, pedestrian, and transit modeshare;
 - 10) Coordinating timing of all on street recommended bikeway enhancements with the pavement maintenance program to identify opportunities for “quick wins” through striping plans modifications;
 - 11) Identifying opportunities to enhance bicycle and pedestrian connectivity across Loop 101 by providing on-street, above and/or below grade improvements;
 - 12) Identifying potential grant and other funding sources at the regional, state, and national levels to implement recommended solutions (i.e., U.S. Department of Transportation (USDOT) Reconnecting Communities Program (RCP), RAISE, etc.);
 - 13) Developing planning level cost estimates that incorporate City of Phoenix design soft costs and delivery timeframes into programming considerations for recommendation of short-, mid-, and long-term capital improvements that can be programmed in the City of Phoenix Street Transportation Department Capital Improvement Program.

Figure 1-1: West Phoenix Regional Vicinity Map

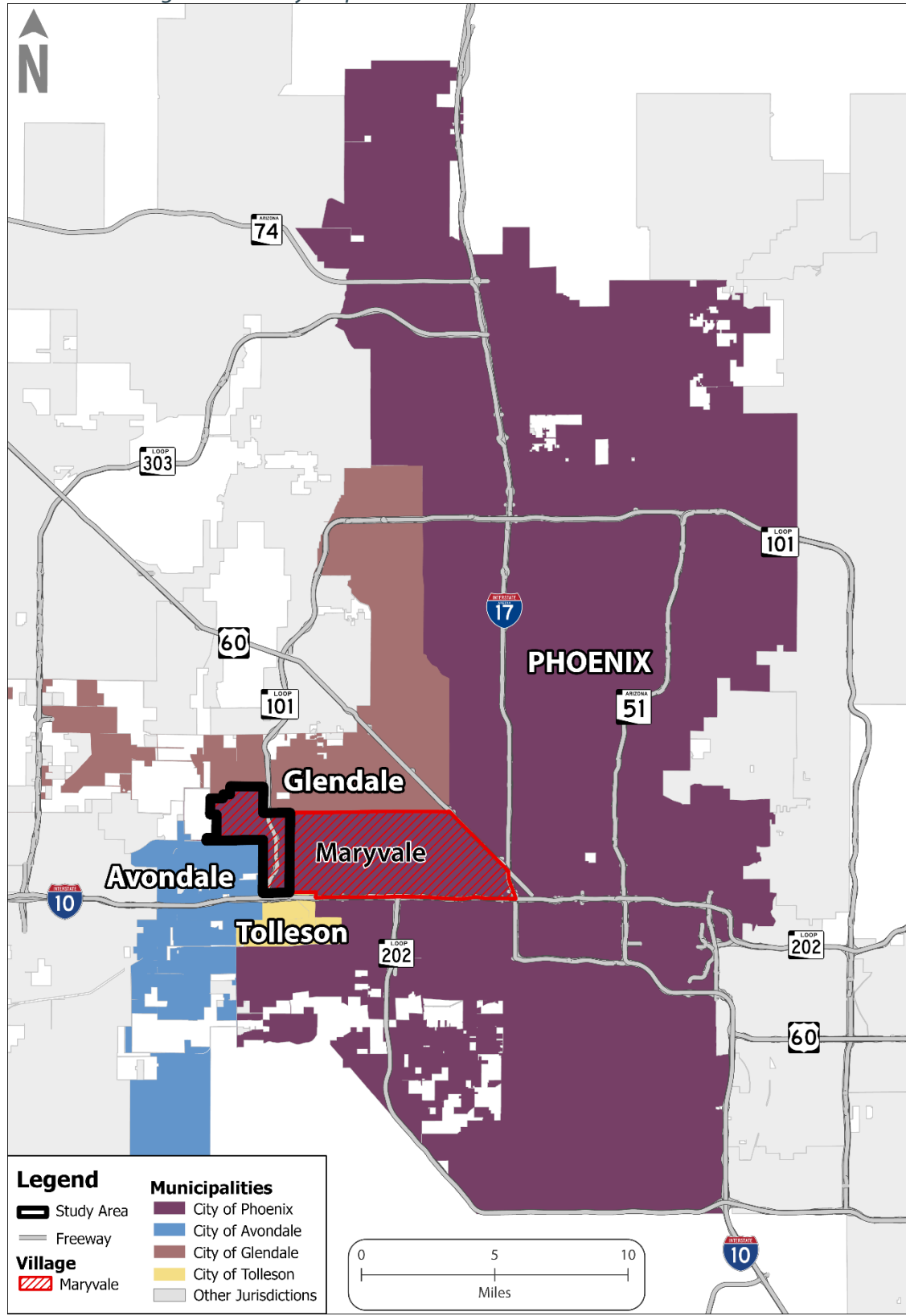
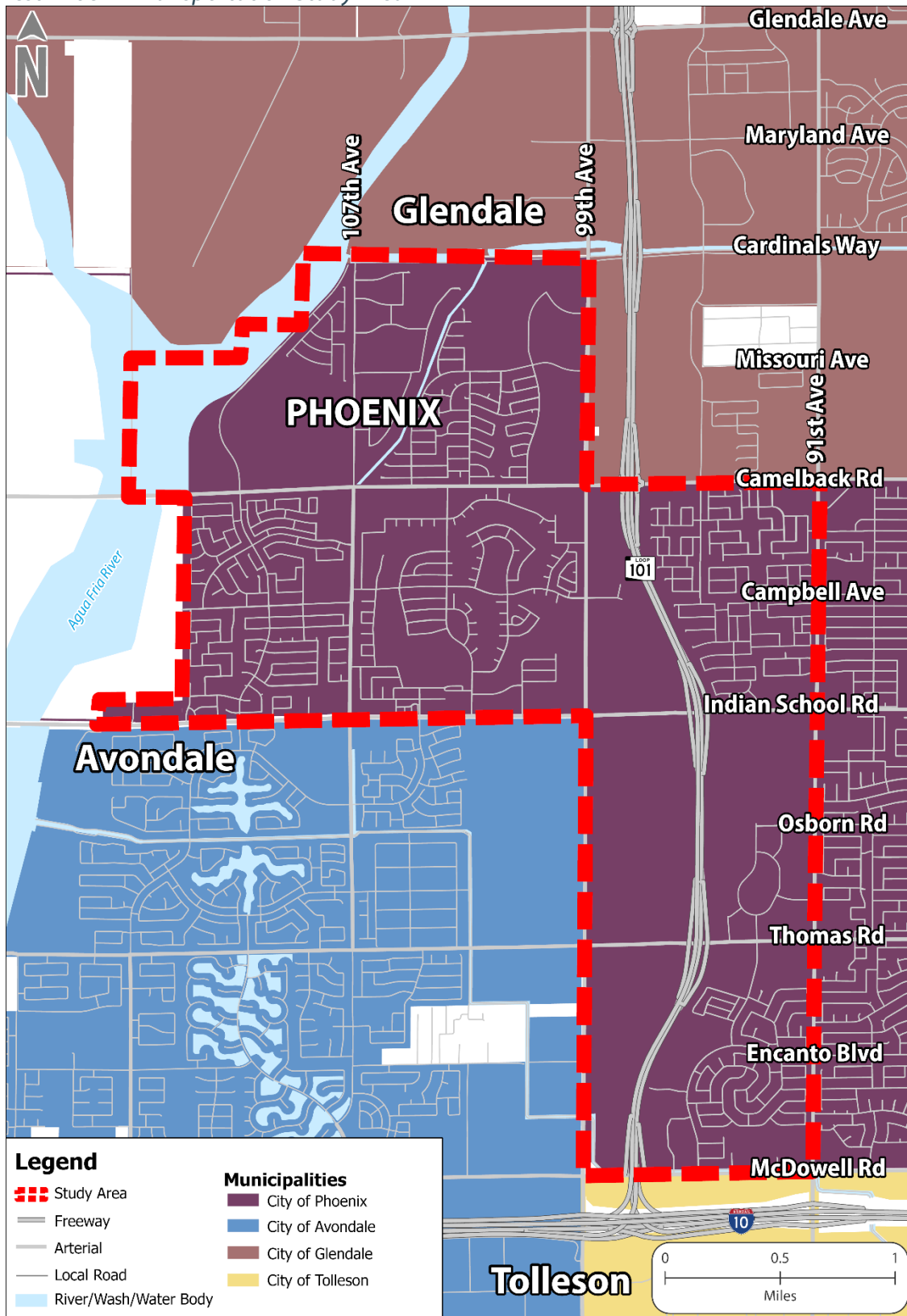


Figure 1-2: West Phoenix Transportation Study Area



Study Area Overview

The WPTS area encompasses 6.5-square miles in far west Phoenix, centered on the State Route 101 Loop (Loop 101) Corridor from Camelback Road in the north to McDowell Road in the south, 91st Avenue to the east, and 99th Avenue to the west. The Sheely Farms, Terracita, and newly developed Western Enclave neighborhoods are located in the area to the east of Loop 101. Additionally, the study area includes the Villa de Paz, Camelback Ranch, and Larissa neighborhoods west of the Loop 101 extending to the Agua Fria River between the Grand Canal on the Bethany Home Road alignment to the north and Indian School Road to the south. The City of Glendale borders the study area to the north and northeast, and the City of Tolleson and the City of Avondale border it to the south and west, respectively.

Arterial roadways within the study area facilitate connections between West Phoenix neighborhoods including the remainder of Maryvale Village, the balance of Phoenix, and the greater metropolitan area. Roadways include one major arterial, six arterials, eleven major collectors, and four collectors. In terms of active transportation connections, bike lanes and sidewalks are present in the Villa de Paz, Camelback Ranch, Larissa, and Sheely Farms neighborhoods, especially on the collector roads. However, there is a lack of active transportation facility connections between neighborhoods and throughout the study area primarily due to the barrier created by the Loop 101 Corridor.

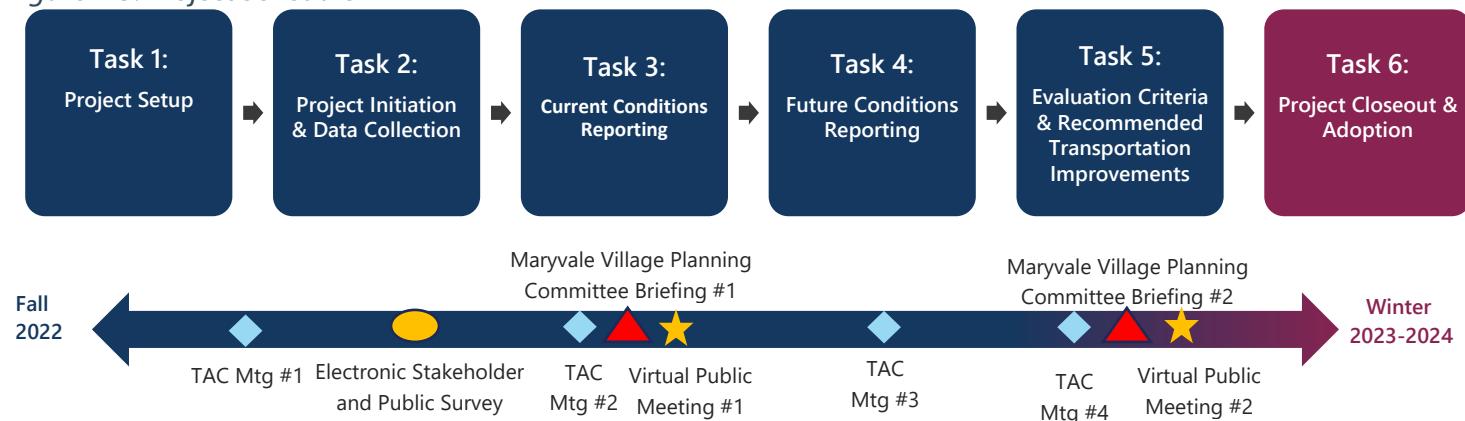
The study area contains approximately 600 acres of open, agricultural land surrounding the Loop 101 Corridor between Campbell Avenue and McDowell Road that will be developed in the near future. This development is trending toward higher density single-family and multi-family residential than previously seen in the area with an increasing supply of rental options. Other future development includes employment and mixed-use land uses. A large residential development just outside the study area in the City of Avondale to the west of 99th Avenue is currently under construction that will also add vehicular traffic within the study area, primarily on 99th Avenue. To the south of the undeveloped agricultural land within the study area is the Phoenix Events and Entertainment Complex that comprises 16 sport fields spread across 50 acres. The complex regularly hosts soccer, rugby, flag football, lacrosse, and other sports throughout the year. Consecutive sporting events on weekends can last the entire day, bringing continuously high traffic volumes to the area. Due to these regular events combining with Avondale's nearby major retail destination Gateway Pavilions and the regular presence of slow-moving agricultural vehicles, City of Phoenix roads near the Phoenix Events and Entertainment Complex are frequently congested.

The other unique factor that influences the study area is the presence of a ballpark at Camelback Ranch, within the study area in the City of Phoenix, and State Farm Stadium, just outside of the study area in the City of Glendale. Both of these venues regularly host large sporting events and other activities that draw large crowds greatly increasing traffic on roads in and around the study area at random and sporadic intervals.

Planning Process

As illustrated in **Figure 1-3**, this Study is being completed within six tasks that incorporate comprehensive and collaborative public and stakeholder outreach. The entire planning process is being supported by invaluable contributions from stakeholders and members of the public that will be garnered during Technical Advisory Committee (TAC) meetings, an electronic stakeholder and public survey, Maryvale Village Planning Committee briefings and virtual public meetings at key milestones during development of the plan.

Figure 1-3: Project Schedule



The WPTS process includes data analysis and facilitation of discussions between several internal and external City departments and stakeholders, including Phoenix Street Transportation, Phoenix Planning & Development, the Phoenix Neighborhood Services Department, the Flood Control District of Maricopa County, and other agencies to develop a coordinated and sustainable transportation plan for the area that connects to the balance of Phoenix and the neighboring communities of Avondale, Glendale, and Tolleson.

Analysis of Phoenix land use and zoning policies and planned developments led to identification of planned future growth and Planned Unit Development (PUD) design elements that may lead to development of large blocks with minimal intersection frequency and through connectivity to adjacent development, land uses, and key destinations that will hinder active transportation and multimodal uses. Recommendations for land use, zoning policy, and planned development modifications were coordinated between the Street Transportation Department and Planning & Development Department to enact potential policy changes to the extent necessary and feasible as referenced in Chapter 3.

This Future Conditions working paper includes identification of candidate lists of innovative roadway, multimodal, and active transportation solutions supported by data and stakeholder input. Preliminary recommendations will be prioritized as part of the next phase of the project, Task 5 – Evaluation Criteria & Recommended Transportation Improvements. These solutions will be tailored for direct inclusion in the Phoenix Street Transportation Department Capital Improvement Program. Recommended projects can be implemented as part of the City’s on-going project delivery efforts (i.e., striping bike lanes as part of pavement preservation efforts) or utilized by Street Transportation Department staff to seek local, state, and federal funding opportunities.

Future Conditions Report Purpose

The purpose and intent of the Future Conditions Report is to analyze the planned and forecasted conditions in the WPTS study area to develop multimodal and active transportation system and infrastructure improvement recommendations that are implementable, maintainable, and fiscally feasible. Task 5 – Evaluation Criteria and Recommended Improvements will prioritize candidate solutions into near through long-term implementation timeframes. The near-term improvements will have a 2030 planning horizon, while the long-term improvements will have a 2050 planning horizon. The recommendations presented in this report are preliminary and will be reviewed by the TAC, Maryvale Village Planning Committee and the public before being finalized.

Report Structure

This report is divided into four sections which each include a different topic and contain various levels of information relative to the objectives of the Study. The following four sections include:

- 1) **Introduction** – This section provides an overview of the WPTS area, an overview of the WPTS process, and overview of the purpose of the Future Conditions Tech Memo.
- 2) **Growth Analysis** – This section provides an overview of the study area future land use, future population, future households and future employment. This section also provides an assessment of the future roadway intersection and segment network, which includes projected Level Of Service (LOS) and projected Level of Traffic Stress (LTS).
- 3) **Proposed Transportation System** – This section describes the future/planned transportation system recommendations within the WPTS area. The recommendations in this report are a combination of past reports, planned PUD development reports, additional stakeholder and public outreach and analysis.
- 4) **Next Steps** – includes WPTS planning and development process next steps.

2 Growth Analysis

This section provides a growth analysis of the study area by evaluating the future land use buildout scenario, projected population, households, and employment growth as reported by the Maricopa Association of Governments (MAG). The MAG Travel Demand Model (TDM) was used to forecast future population, household, and employment growth for horizon years 2030 and 2050. The following Traffic Analysis Zone (TAZ) demographic numbers shown throughout this section include data for the entire TAZ boundary whether it is completely within the study area or not. There are 13 TAZs totaling 6.54 square miles that intersect the study boundary. Evaluation of future population, households, and employment provides insight on changes in future travel demand and helps inform the recommended improvements for the study area.

Table 2-1 and **Figure 2-1** show the distribution of future land uses in the study area at buildout as identified by MAG. Future land use distribution projections within the study area suggest that single-family residential will be the largest land use, nearly 43 percent, with the second and third largest land uses being mixed-use and other/public employment. The data also indicates that there will be growth in multi-family residential, commercial, office, and industrial land uses within the study area.

Future Land Use

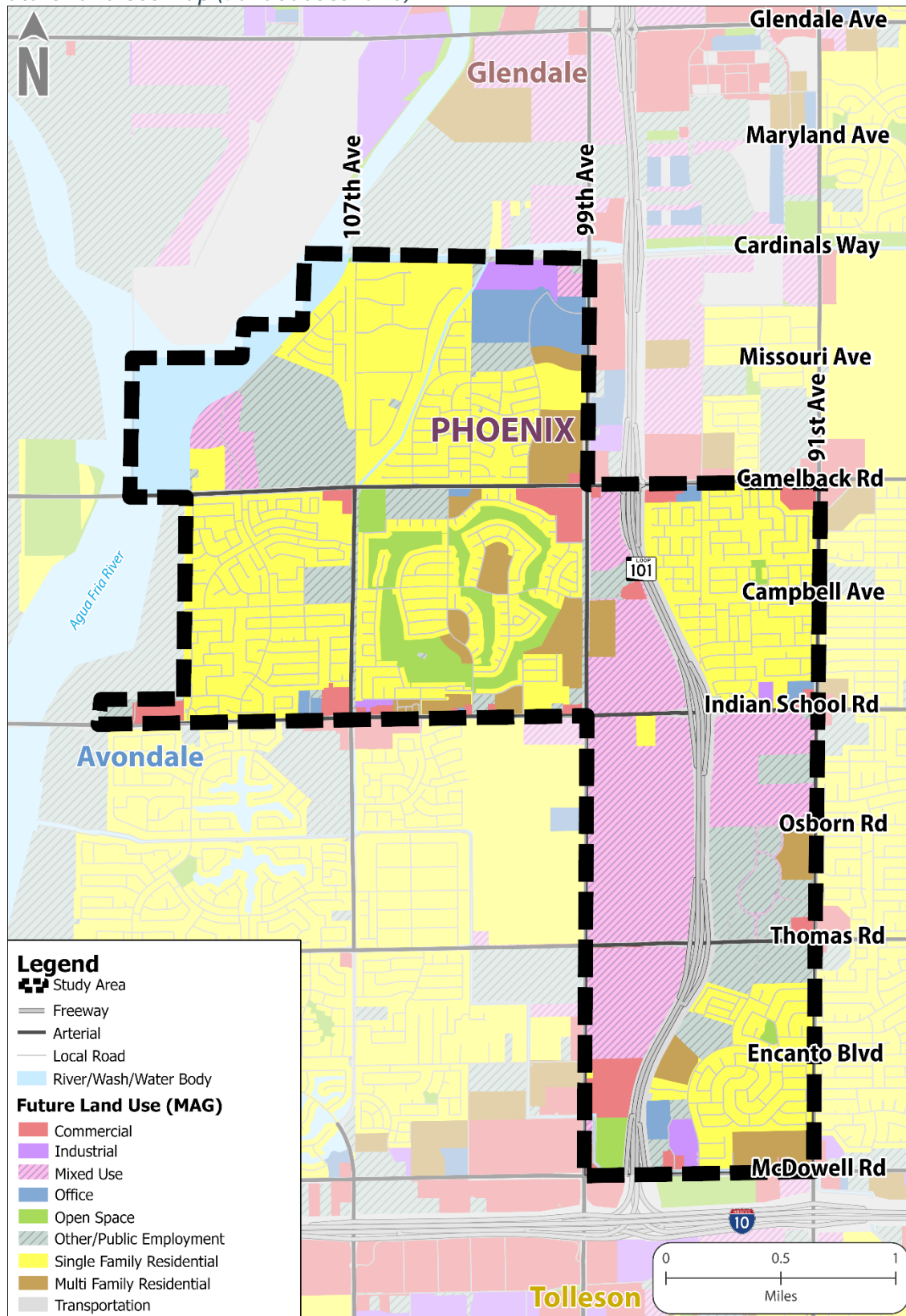
Future Land Use

Table 2-1: Future Land Use Distribution

Future Land Use Classification	Acres	Percent
Single Family Residential	1,788.15	42.71%
Mixed Use	698.20	16.68%
Other/Public Employment	475.02	11.35%
Open Space	373.42	8.92%
Transportation	327.95	7.83%
Multi-Family Residential	230.33	5.50%
Commercial	139.54	3.33%
Office	104.52	2.50%
Industrial	49.29	1.18%
Total	4,186.4	100.00%

Source: Maricopa Association of Governments, 2020, Buildout Scenario

Figure 2-1: Future Land Use Map (Buildout Scenario)



Comparing existing land use in the study area to future land use offers useful insight into the planned growth within the study area. The comparison can be used to inform more appropriate short- and long-term infrastructure improvement recommendations. **Table 2-2** shows the distribution of lands intended for new development as part of the full buildout scenario of future land uses in the study area.

Table 2-2: Existing and Future Land Use Comparison

Future Land Use	Existing Acres	Existing Percent	Buildout Acres	Buildout Percent
Single Family Residential	1,555.81	37.16%	1,788.15	42.71%
Agriculture	844.37	20.17%	0.00	0.00%
Vacant	393.89	9.41%	0.00	0.00%
Other/Public Employment	373.42	8.92%	475.02	11.35%
Open Space	373.26	8.92%	373.42	8.92%
Transportation	326.71	7.80%	327.95	7.83%
Multi-Family Residential	134.89	3.22%	230.33	5.50%
Commercial	108.23	2.59%	139.54	3.33%
Industrial	46.49	1.11%	49.29	1.18%
Office	29.33	0.70%	104.52	2.50%
Mixed Use	0.00	0.00%	698.20	16.68%
Total	4,186.4	100.00%	4,186.4	100.00%

Source: Maricopa Association of Governments (MAG), 2020

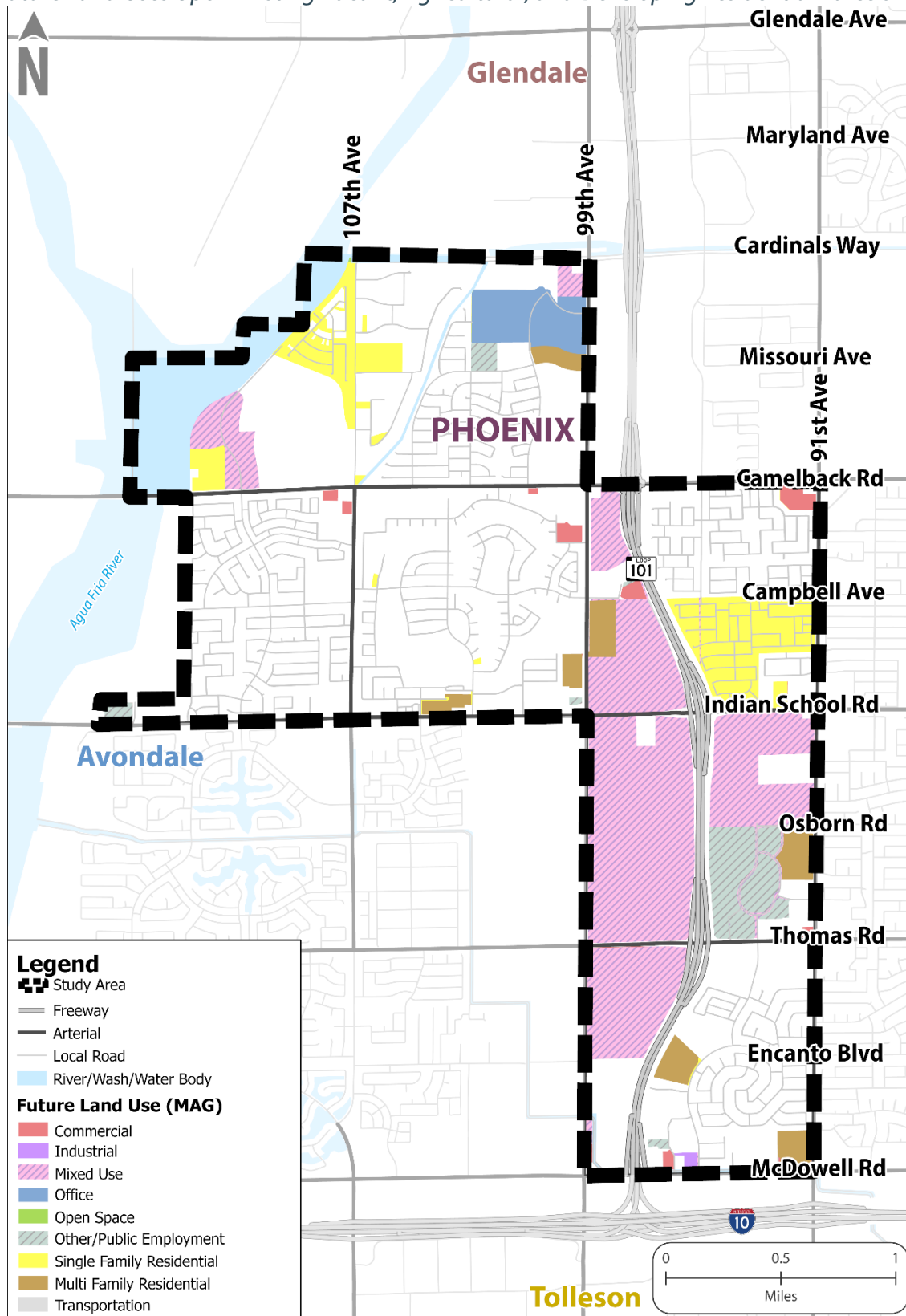
The existing 844 and 394 acres of agriculture and vacant land use in the study area are slated for future development. These two land uses total nearly 30 percent of the study area. In the buildout scenario, 698 acres of the existing agriculture and vacant land uses are planned for mixed use. Mixed use is planned to be roughly 17 percent of the study area at buildout. The majority of the mixed-use land use is adjacent to Loop 101 between Camelback Road and Encanto Boulevard, which is where the planned Algodón Center and Sheely Center developments are located. The increase in businesses and housing within the planned development will increase the roadway volumes within the study area. Single family residential will increase by a total of 232 acres and is planned to be the largest portion of land use within the study area at roughly 43 percent. The third and fourth largest increases are other/public employment and multi-family residential land uses, which are planned to take up roughly 11.35 percent and 5.5 percent respectively at buildout. The office land use will increase from .70 percent to 2.5 percent while the four remaining land use categories (open space, transportation, commercial, and industrial) currently make up roughly 35 acres of the existing agriculture and vacant land uses with little change anticipated in the future.

The remaining land uses and percentages identified for new development are found in **Table 2-3**. For this comparison, only future land use changing from agriculture and vacant to new development or that is currently developing is shown in **Figure 2-2** for easy viewing of where new development is planned.

Table 2-3: Distribution of Future Land Uses Upon Existing Vacant, Agricultural, and Developing Residential Parcels

New Development Land Use	Acres	Percent
Mixed Use	698.20	56.39%
Single Family Residential	232.34	18.76%
Other/Public Employment	101.60	8.20%
Multi-Family Residential	95.44	7.71%
Office	75.18	6.07%
Commercial	31.31	2.53%
Industrial	2.80	0.23%
Transportation	1.23	0.10%
Open Space	0.16	0.01%
Total	1,238.26	100.00%

Figure 2-2: Future Land Uses Upon Existing Vacant, Agricultural, and Developing Residential Parcels



Future Demographic & Socioeconomic Overview

Projected Population and Housing

The MAG TDM projects future population, households, and employment. Reviewing future population and employment provides insight on changes in future travel demand and informs solutions. **Figure 2-3** shows the projected increase in population and households within the study area between 2023, 2030, and 2050, the planning horizon for this study. **Figure 2-4 – Figure 2-7** illustrate the population and household projections out to 2050.

The projected population and household growth is expected to increase within the residential neighborhoods between Camelback Road, Indian School Road, 113th Drive, and 99th Avenue. However, there are other TAZs along Loop 101 between Indian School Road, McDowell Road, 99th Avenue, and 91st Avenue that currently show less than 10 households but are projected for greater than 550 households in 2050. The large increase in population and households in this location is due to the planned Algodón Center and Sheely Center developments. The population and households within the study area show a projected increase of roughly 18 percent between 2023 and 2030 and another 25 percent between 2030 and 2050 for total projected population growth of 43 percent through 2050.

Figure 2-3: Future Population and Housing Projection

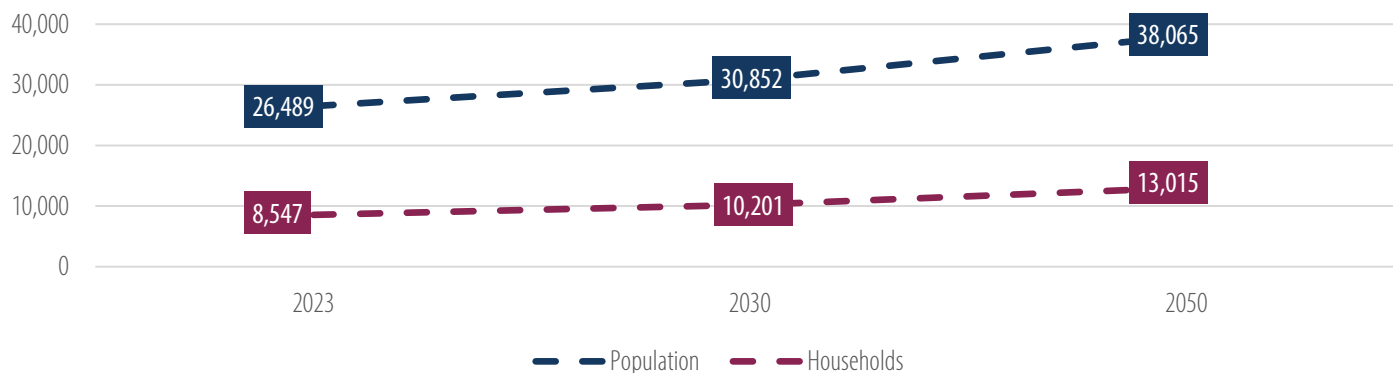


Figure 2-4: Total Population (2030) Map

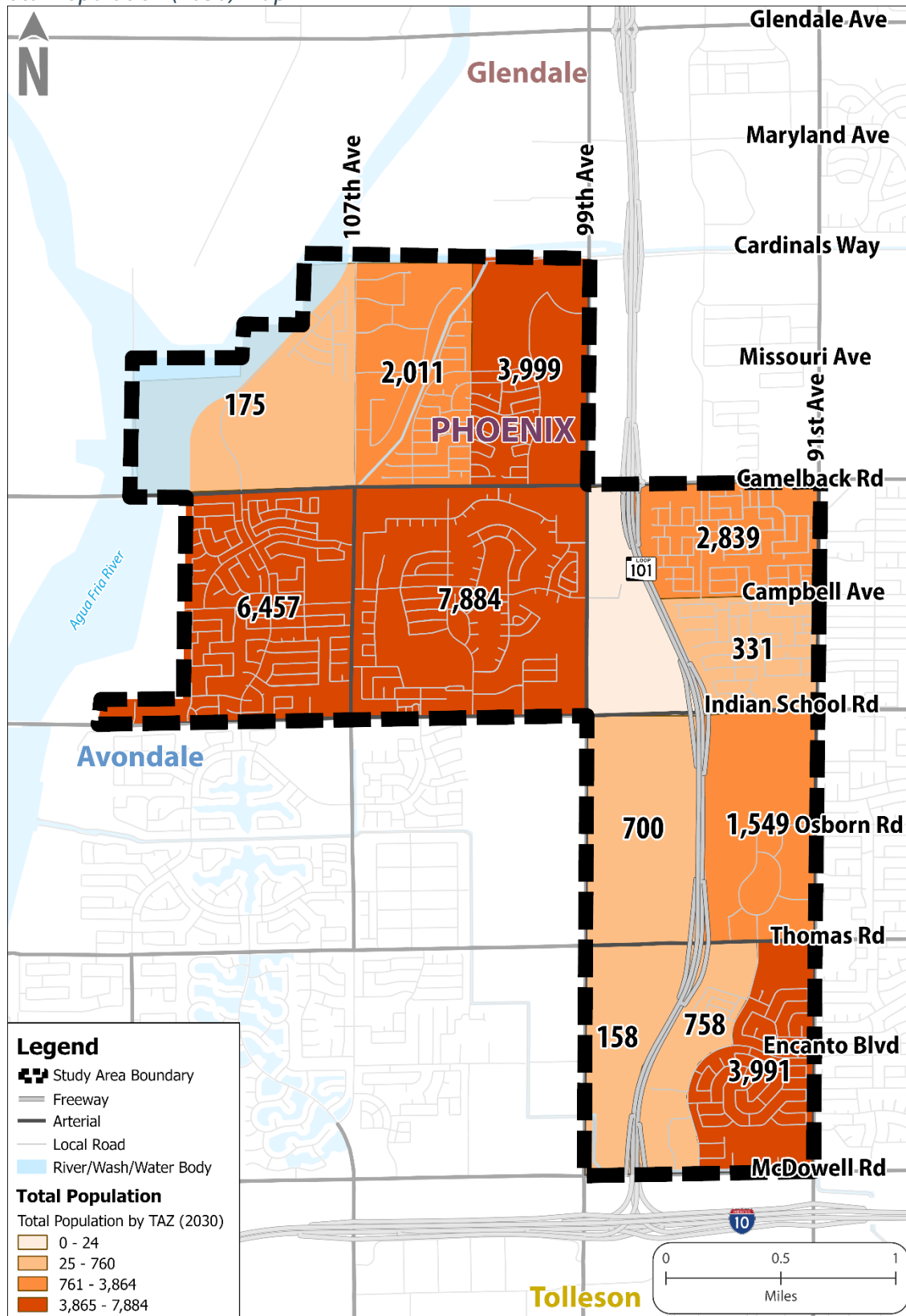


Figure 2-5: Total Population (2050) Map

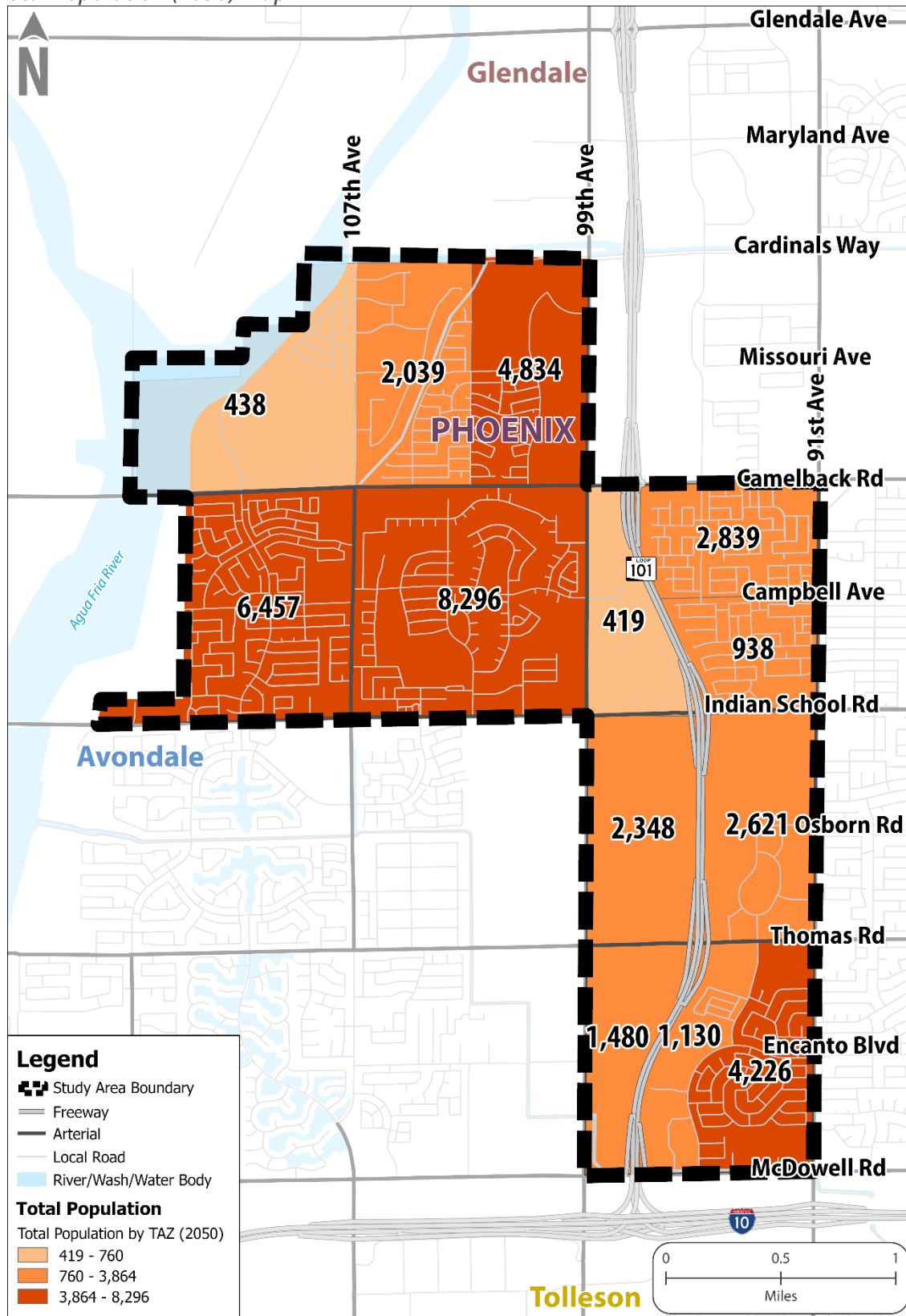


Figure 2-6: Total Households (2030) Map

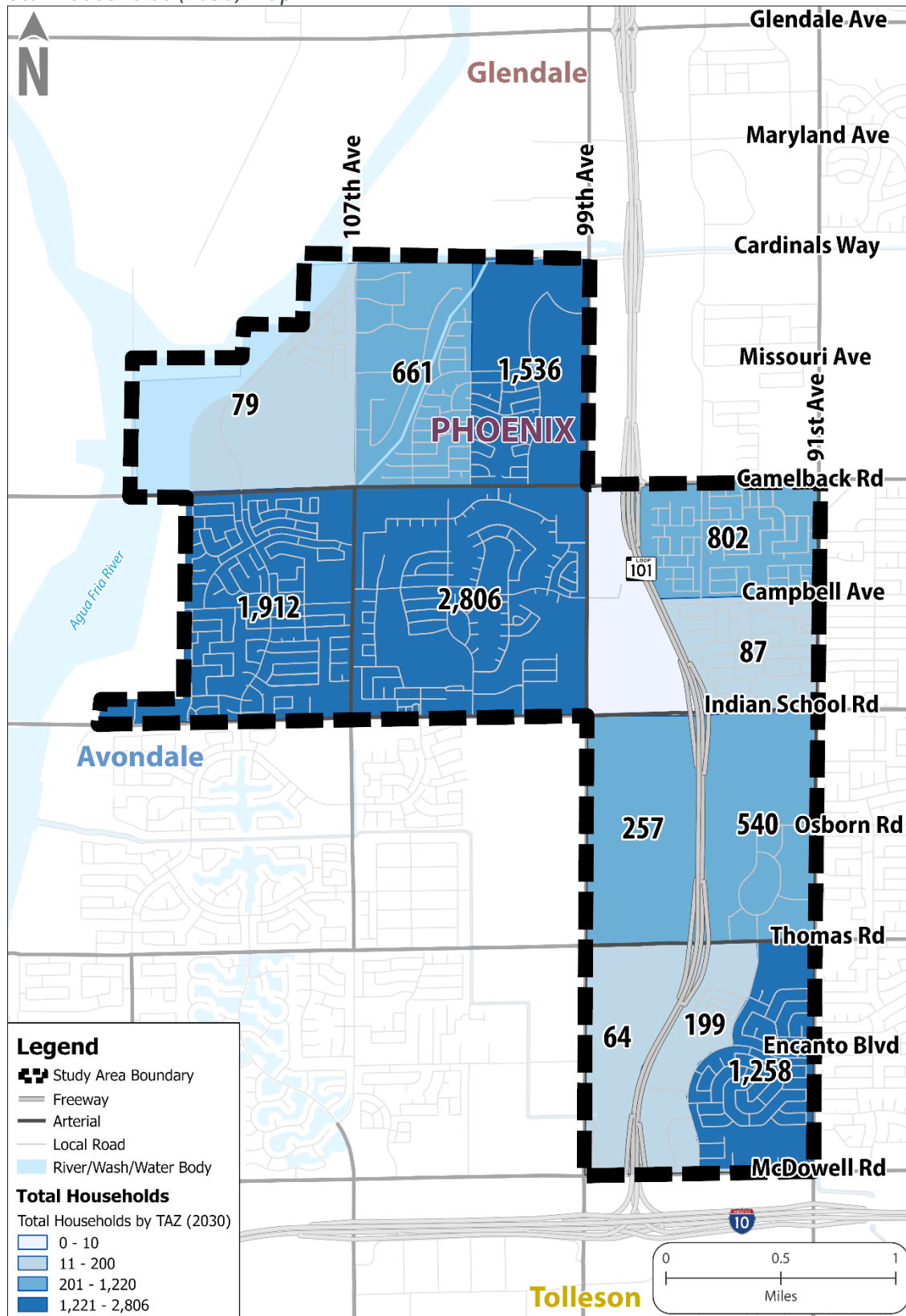
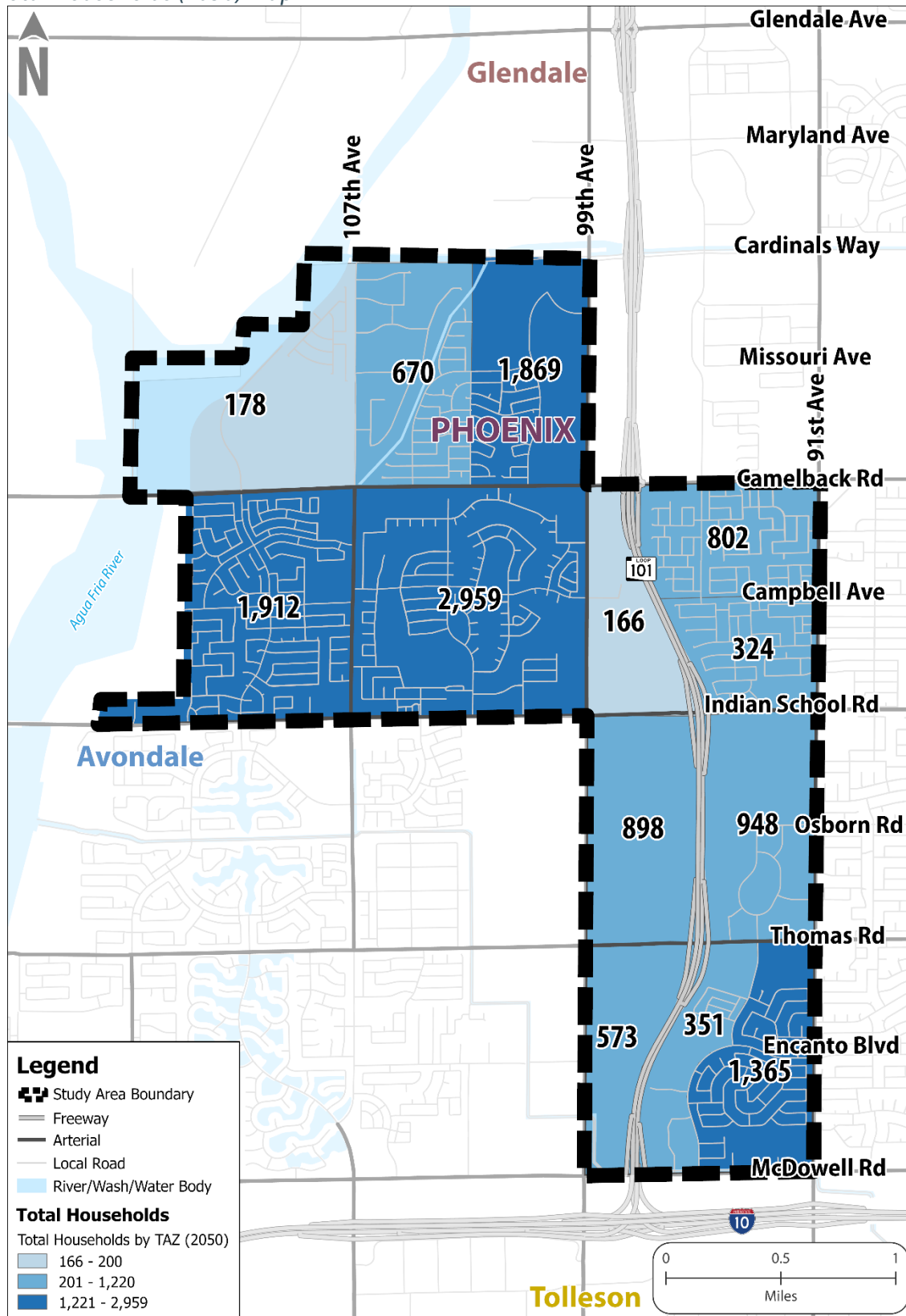


Figure 2-7: Total Households (2050) Map



Future Employment

The MAG TDM also projects future employment out to 2030 and 2050. Reviewing future employment provides insight on changes in future travel demand and informs transportation solutions. **Figure 2-8** shows the projected increase in employment within the study area between 2023, 2030, and 2050, which is the planning horizon for this study. Due to the future densification and the development of vacant and agricultural land along Loop 101 and within the study area, employment is expected to grow by roughly 14 percent between 2023 and 2030 and 53 percent between 2030 and 2050 for total employment growth of 67 percent through 2050.

As shown in **Figure 2-9** and **Figure 2-10** the majority of the projected employment growth is expected to increase within the study area between Indian School Road on the north, McDowell Road on the south, 99th Avenue on the west and 91st Avenue on the east. The large increase in employment is due to the planned Algodón Center and Sheely Center developments. These future activity centers will have portions designated to mixed use land use to allow for increased employment, population, and households within the study area. Another notable location where employment will increase is between Camelback Road on the north, Indian School Road on the south, 99th Avenue on the west, and 91st Avenue on the east. All other TAZs within the study area increase in total employment; however, due to their existing relatively built out nature there is less space to build additional developments meaning that these TAZs will experience less growth compared to the other TAZs within the study area.

Figure 2-8: Future Employment Projection

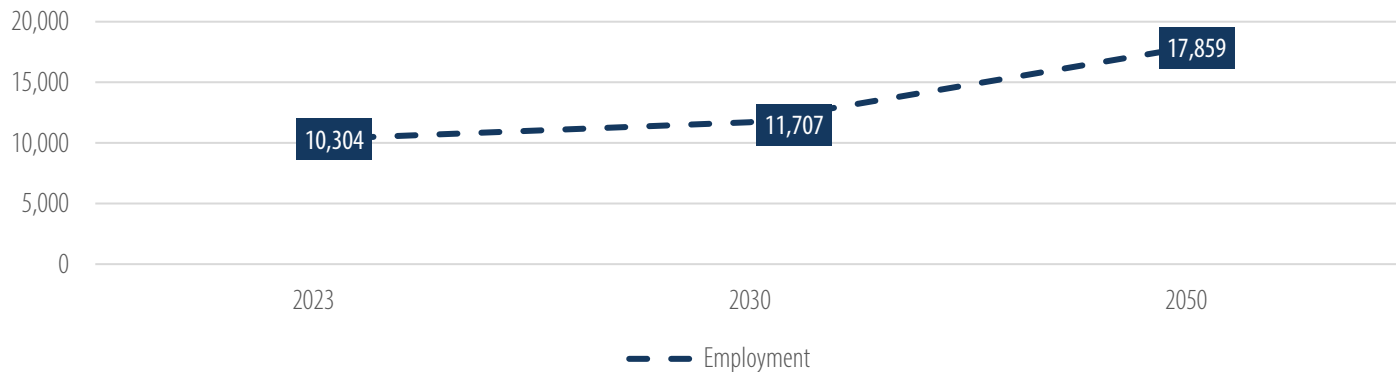


Figure 2-9: Total Employment (2030) Map

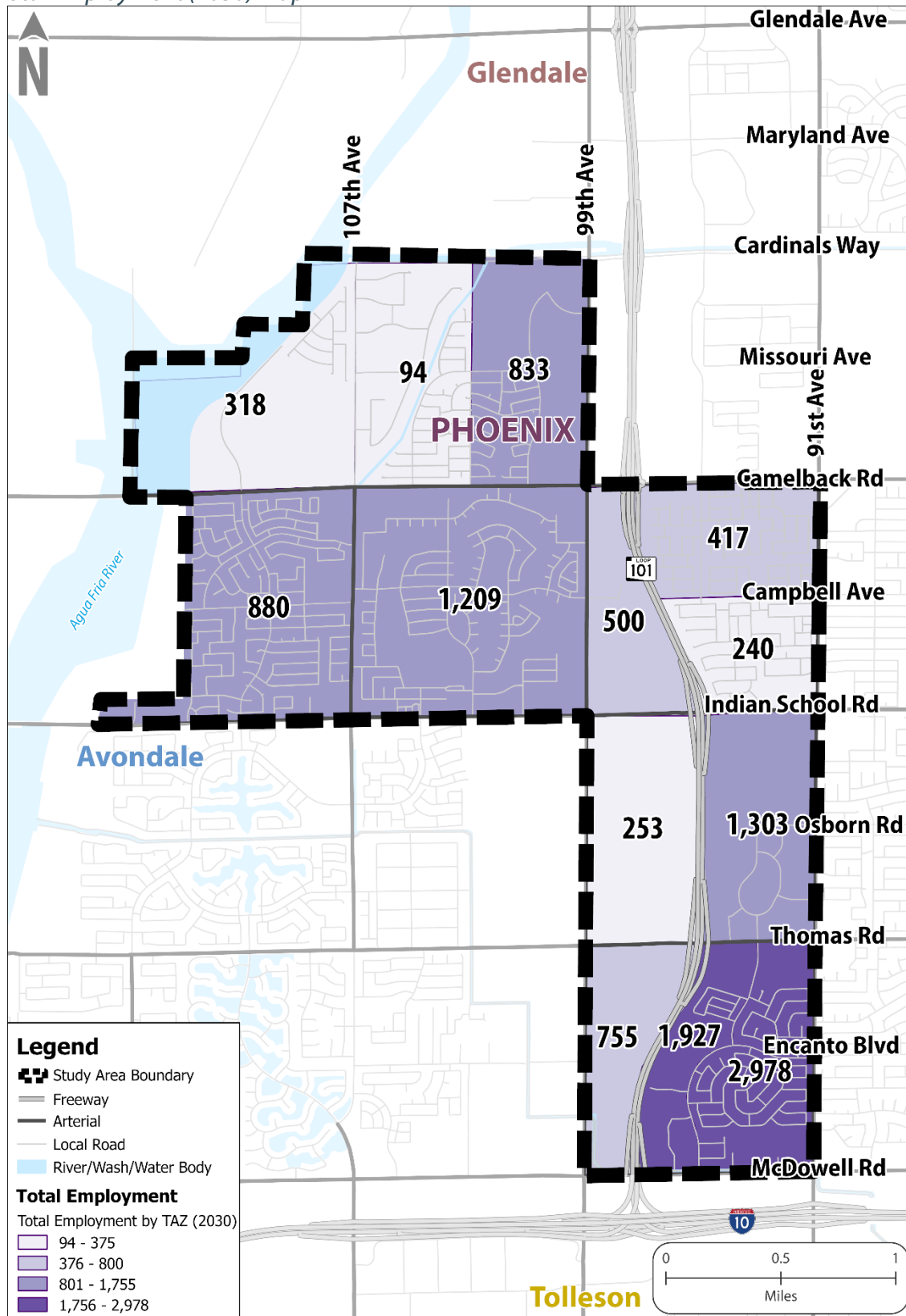
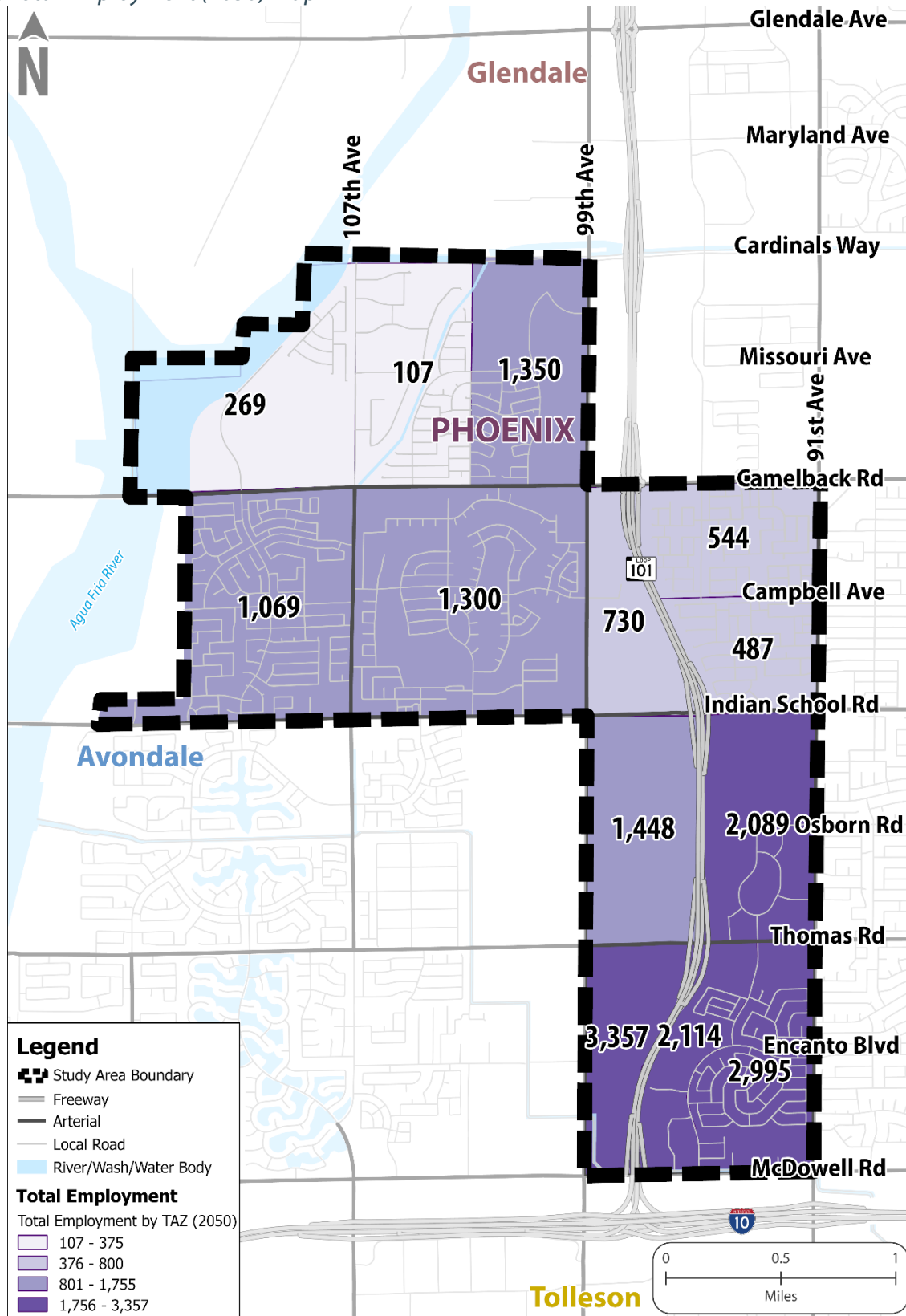


Figure 2-10: Total Employment (2050) Map



Forecasted Traffic Conditions with Existing Infrastructure

This section provides an inventory and analysis of existing infrastructure (i.e., number roadway lanes and current bike lane widths) layered with a planned roadway network and forecasted traffic volumes in the horizon years 230 and 2050. The planned collector and arterial roadway network was developed from analysis and finding in Tech Memo #1, the functional classification and other roadway infrastructure data was provided by the City of Phoenix, and projected traffic volumes were forecasted using an annual exponential growth model (see *Section Future Traffic Volumes*).

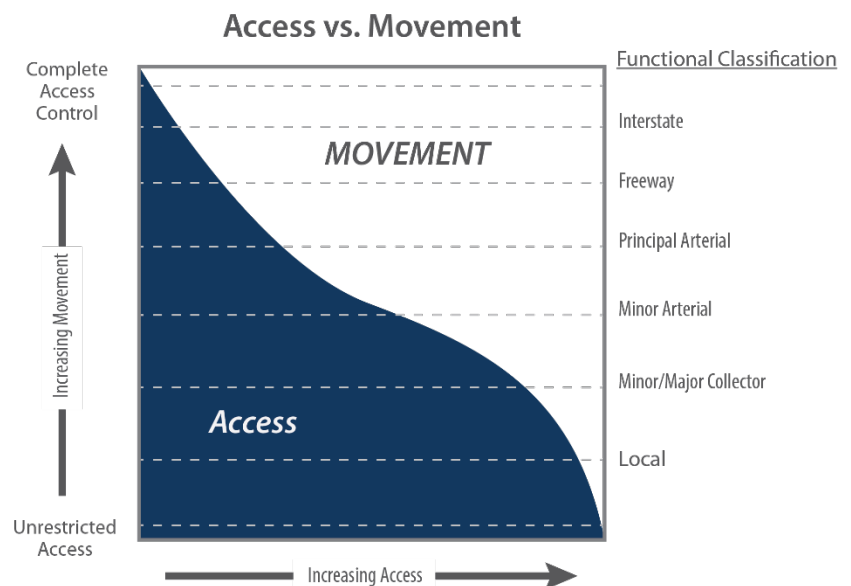
Roadway LOS and bicycle LTS results were calculated with existing infrastructure and forecasted 2030 and 2050 traffic volumes. This phase of analysis provides a glimpse of the potential future conditions on roadways in the future if no infrastructure improvements are implemented. *Section 3 - Proposed Transportation System* includes preliminary infrastructure project and policy recommendations. The next phase of the study – evaluation criteria and project prioritization – will identify measurable project impacts by analyzing the recommended condition with forecasted traffic volumes.

Roadway Functional Classification

Roads provide for two distinct and competing functions: mobility and land (destination) access. As mobility increases, land access decreases and vice versa as shown in **Figure 2-11**. Both functions are vital and no trip is made without both functions. Roads are functionally classified by the relative amounts of through and land-access service they provide, amounts of traffic they can support, and the distance of trips they facilitate. There are four primary functional classifications, which include:

- **Interstates/freeway** facilities are provided to service long distance trips between cities and states. No land access is provided by these facilities – only via traffic interchanges.
- **Arterial/parkway** facilities are provided to primarily serve through-traffic movement. While some land-access service may be accommodated, it is clearly a minor function. All traffic controls and the facility design are intended to provide efficient through movement.
- **Collector** facilities, the “middle” classification, are intended to serve both through and land-access functions in relatively equal proportions. For long through trips, such facilities are usually inefficient, nevertheless they are frequently used for shorter through movements associated with the distribution and collection portion of trips. Collector streets are essential for the City’s bicycle facility network.

Figure 2-11: Roadway Movement vs. Access Graphic



- **Local** facilities primarily serve land-access functions. Local Street design and control facilitates the movement of vehicles onto and off the street system from land parcels. Through movement is difficult and is discouraged by both the design and control of this facility.

As previously discussed, the study area is partially developed with just under one-third of the land mass considered as developable land (agricultural and vacant land). The current roadway network consists of approximately 84.64 linear miles of roads. The most notable roadway facility in the study area is the Loop-101 corridor which bisects the study area south to north as the facility spans from the System Traffic Interchange with Interstate 10 all the way through the study area to the north. This facility is the primary source for regional trips into and out of the study area; However, the facility also limits east-west connectivity within the study area with points to cross only at one-mile increments at arterial roadways. This condition negatively impacts people who walk and ride bicycles and it will be crucial to identify locations for potential crossing locations between those one-mile increments to create better east-west connectivity across Loop-101.

The arterial roadways are the other major components of the current street network. Arterial streets are dedicated as public streets as their primary function is to collect and disburse regional traffic at often evenly spaced intersections in the absence of physical or geographic constraints. Generally speaking, all arterial roadways are located on section lines spaced one-mile apart from one another in the traditional grid-like pattern showcased across the City. Arterial street volumes may range between 15,000 to 50,000 ADT with two to three through lanes in each direction. Traffic volumes for major arterial streets may range between 30,000 to 60,000 ADT with three lanes, up to four lanes in the transition area where the street serves as an extension of a freeway or expressway in each direction upon build-out. Facilities that run east-to-west are named roads and those that run north-to-south are numbered and named avenues. The arterial roadways include:

- Camelback Road
- Indian School Road
- Thomas Road
- McDowell Road
- 107th Avenue
- 99th Avenue
- 91st Avenue

The Street Classification map may not reflect all collector street locations and alignments. Collector streets are to be designated at the half-mile point east to west and north to south within every quarter section. Consideration can be given to existing topography, wash corridors, and the existing street network in identifying placement. A collector street's primary function is to collect and distribute traffic between local streets or high-volume traffic generators and arterial streets at evenly disbursed intersections. Collector streets shall remain and/or be dedicated as public roadways. Collector street placement should reflect existing alignments and be connected and extended in areas where a collector street exists to facilitate network connectivity. Traffic volumes for collectors may range between 5,000 to 30,000 ADT dependent on whether there are one or two through lanes in each direction. Minor residential collector volumes may range between 1,000 to 8,000 ADT with one lane in each direction. Single family lots fronting onto a collector street should be avoided. If proposed within a new subdivision, a minimum collector street section shall be provided to allow for on-street parking, separated bicycle lanes and turn lane striping at intersections. Collector facilities include:

- Campbell Avenue
- Osborn Road
- Missouri Avenue
- Encanto Boulevard
- 111th Avenue
- 105th Avenue
- 103rd Avenue
- 101st Avenue
- 95th Avenue
- 93rd Avenue

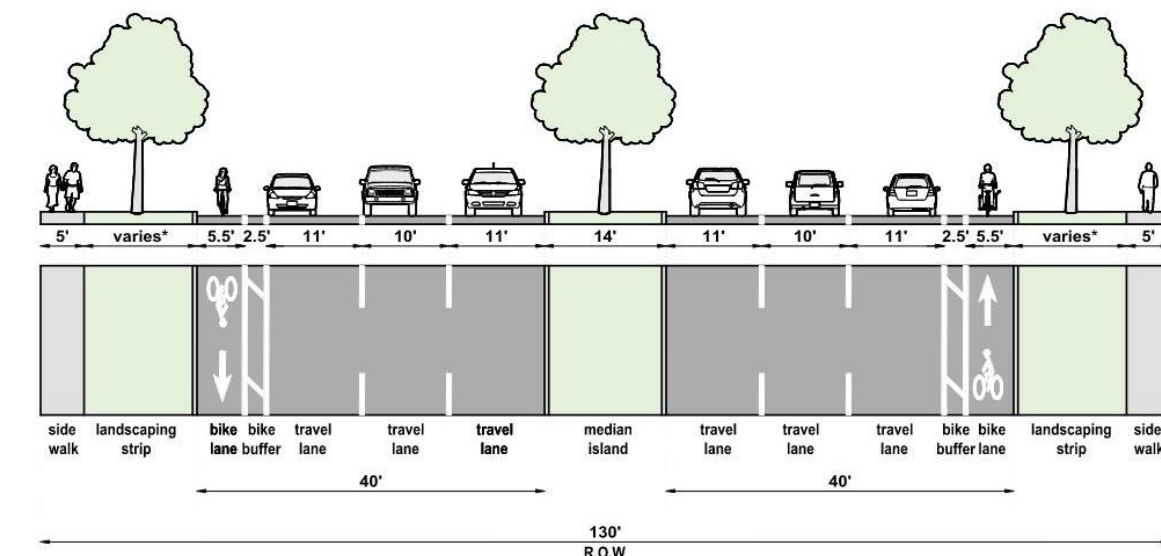
Local streets are not intended for regional through traffic; local streets provide internal trips connections to adjacent collector and arterial streets. Traffic volumes should be under 1,000 ADT; 100 vehicles an hour for single family homes, 2,000 ADT; 200 vehicles an hour within more densely developed areas. A local street's primary function is to provide direct access to abutting lands and for traffic movements within neighborhoods connecting to localized entities such as schools, parks, trailheads, and shopping centers. The Street Classification map does not reflect local street locations or alignments. Local streets typically shall remain and/or be dedicated as public roadways.

Functional Classification Cross-Sections

The City's adopted Street Planning and Design Guidelines Manual (SPDGM) includes 11 street cross-sections (**Figure 2-12** through **Figure 2-20**) based upon the type and level of use for which the streets are intended. Recommended functional classification cross sections are shown on **Figure 2-21** for each arterial and collector within the study area – all other roadways are assumed to be local roads.

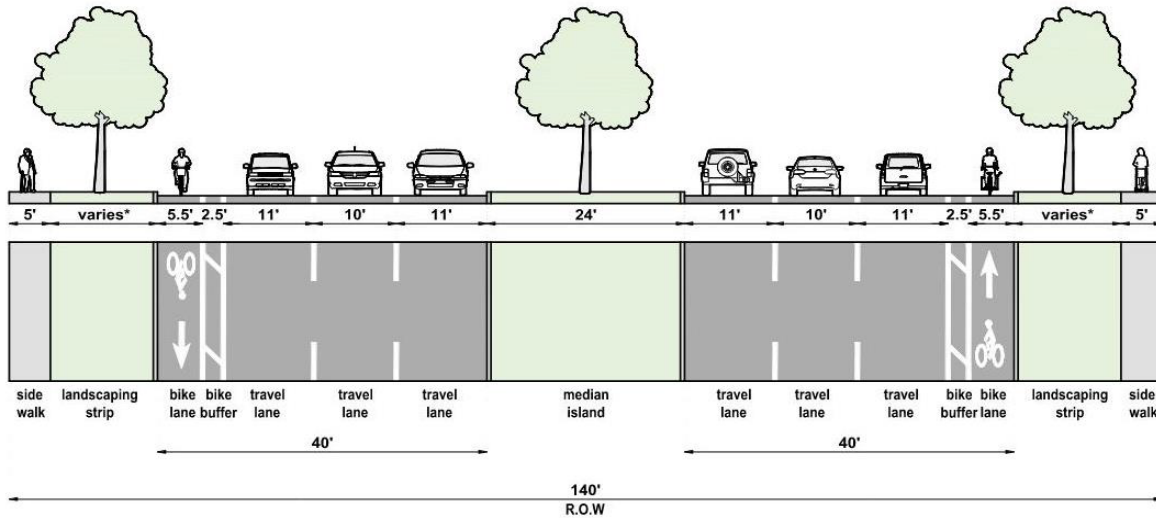
The corresponding figures show the geometric details of each of the cross-sections. There are multiple options for cross-sections for each functional classification based on lane configurations/widths, available right-of-way, and/or surrounding land use context.

Figure 2-12: Major Arterial Cross-Section



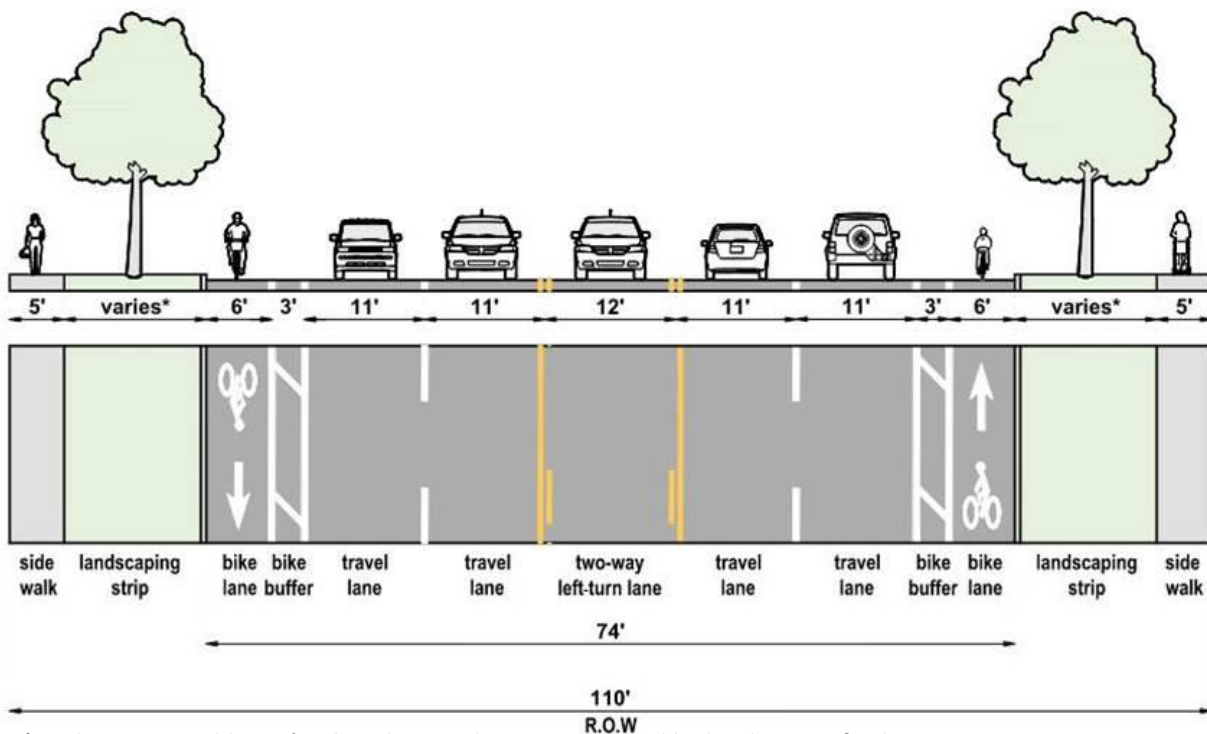
*Preferred minimum width is 10' and is subject to character area, neighborhood, or specific plans.

Figure 2-13: Major Arterial and Arterial Cross-Section



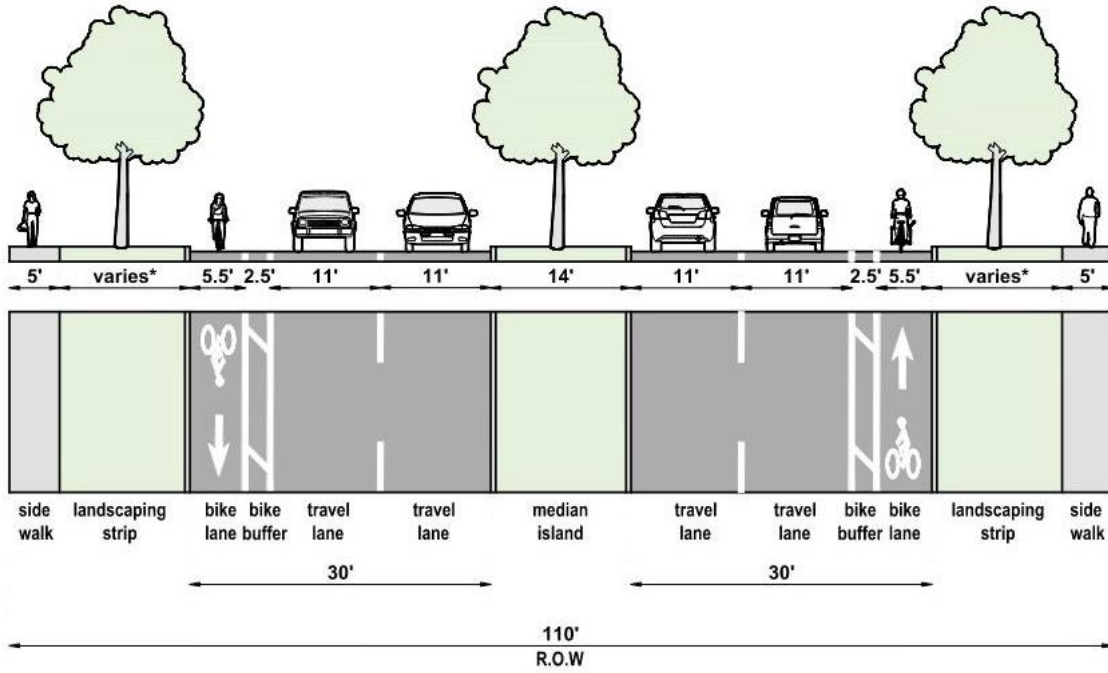
*Preferred minimum width is 10' and is subject to character area, neighborhood, or specific plans.

Figure 2-14: Major Arterial and Arterial Cross-Section



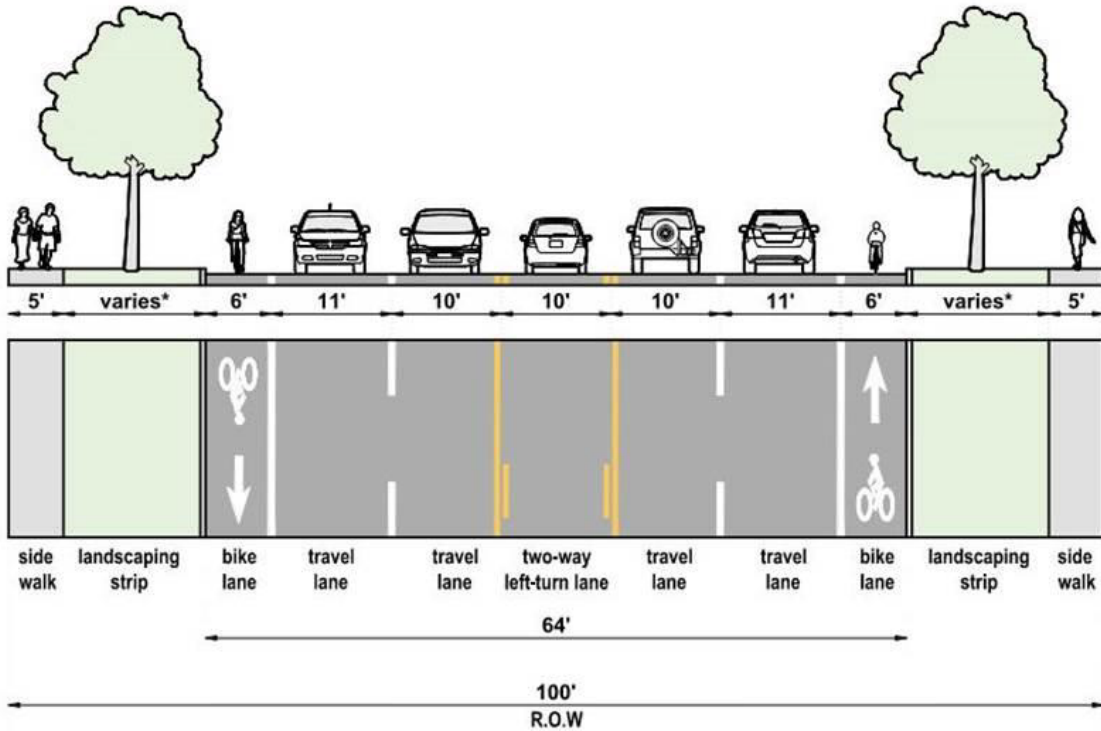
*Preferred minimum width is 10' and is subject to character area, neighborhood, or specific plans.

Figure 2-15: Major Arterial and Arterial with Raised Median Cross-Section



*Preferred minimum width is 10' and is subject to character area, neighborhood, or specific plans.

Figure 2-16: Arterial and Major Collector Cross-Section



*Preferred minimum width is 10' and is subject to character area, neighborhood, or specific plans.

Figure 2-17: Collector Cross-Section

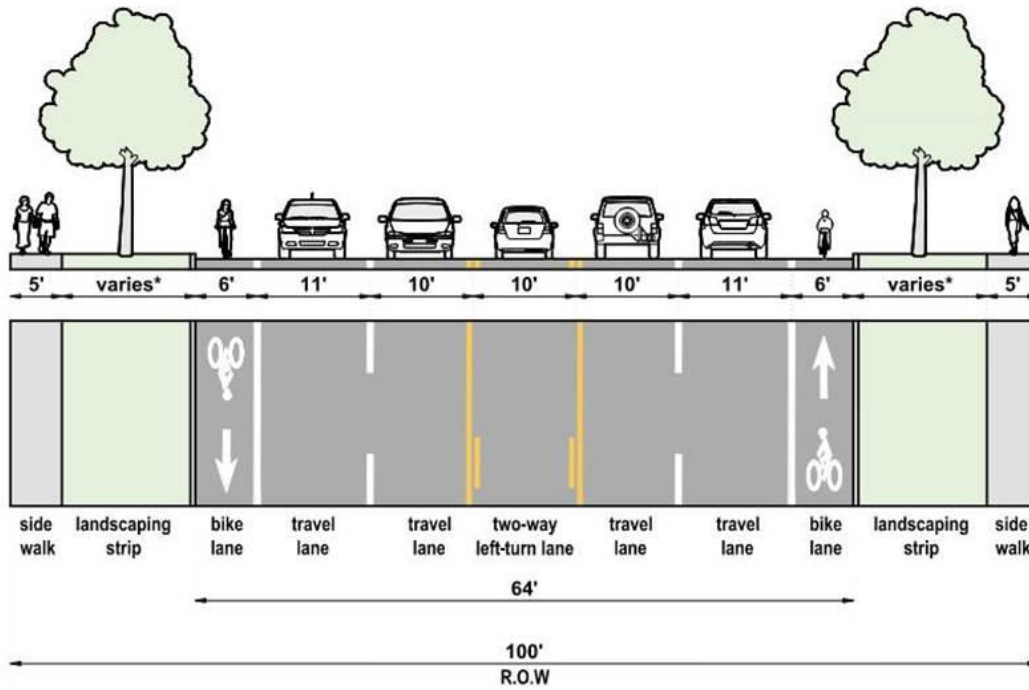


Figure 2-18: Minor Collector with Parking

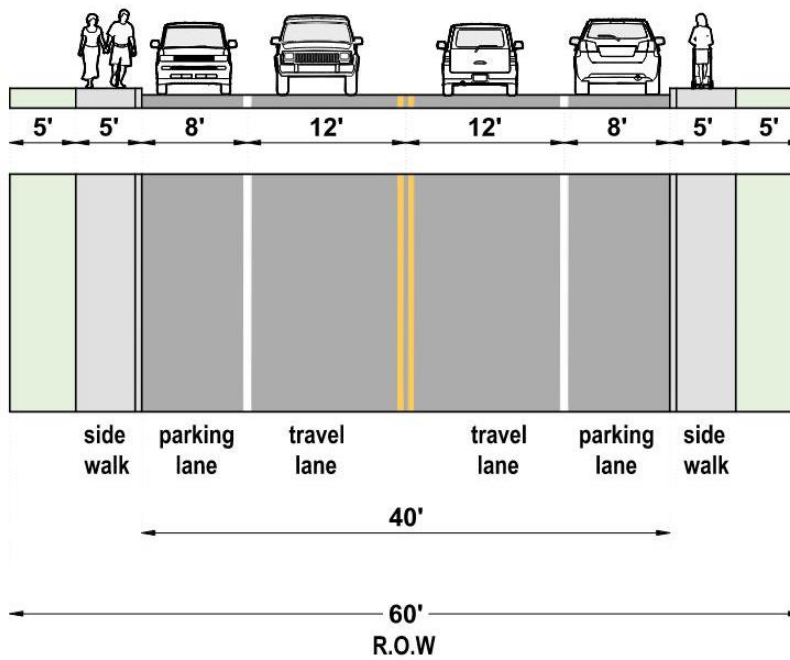


Figure 2-19: Minor Collector with Bike Lane

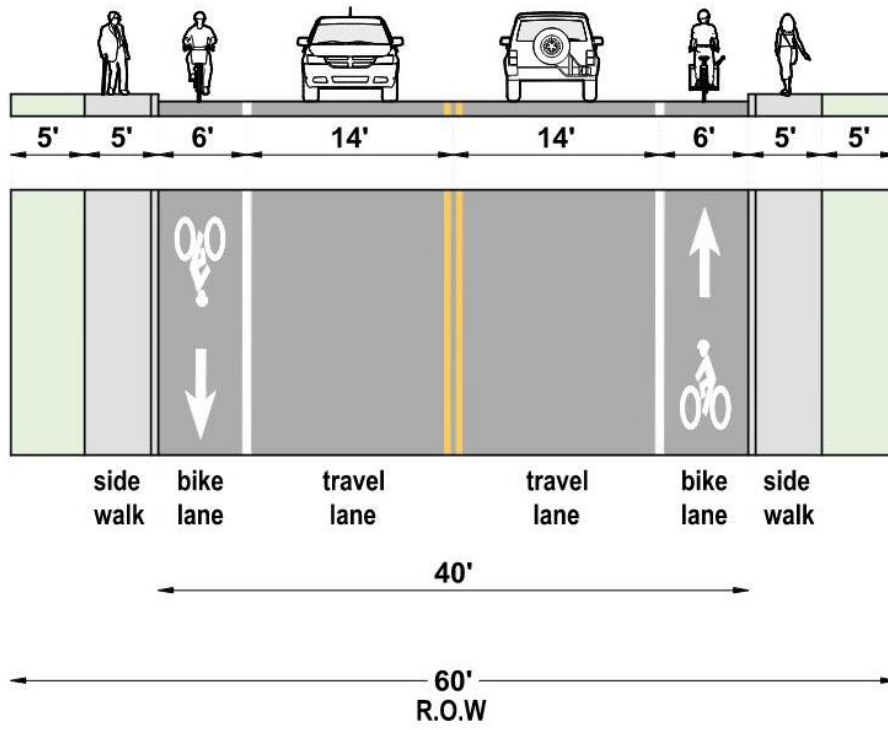


Figure 2-20: Local Street Cross-Sections

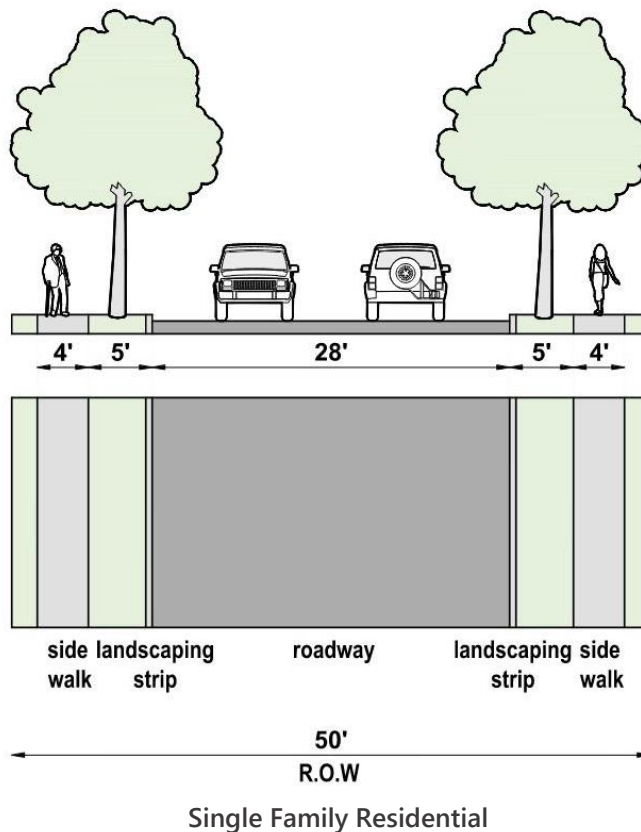
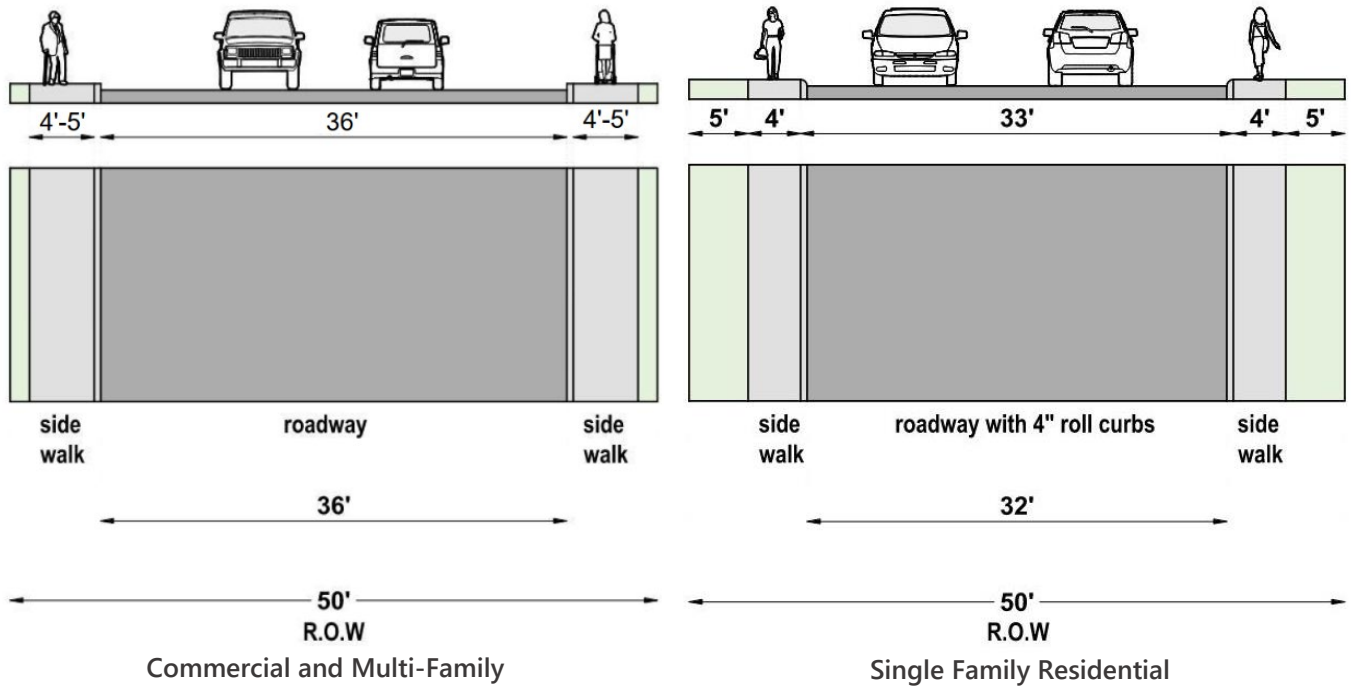
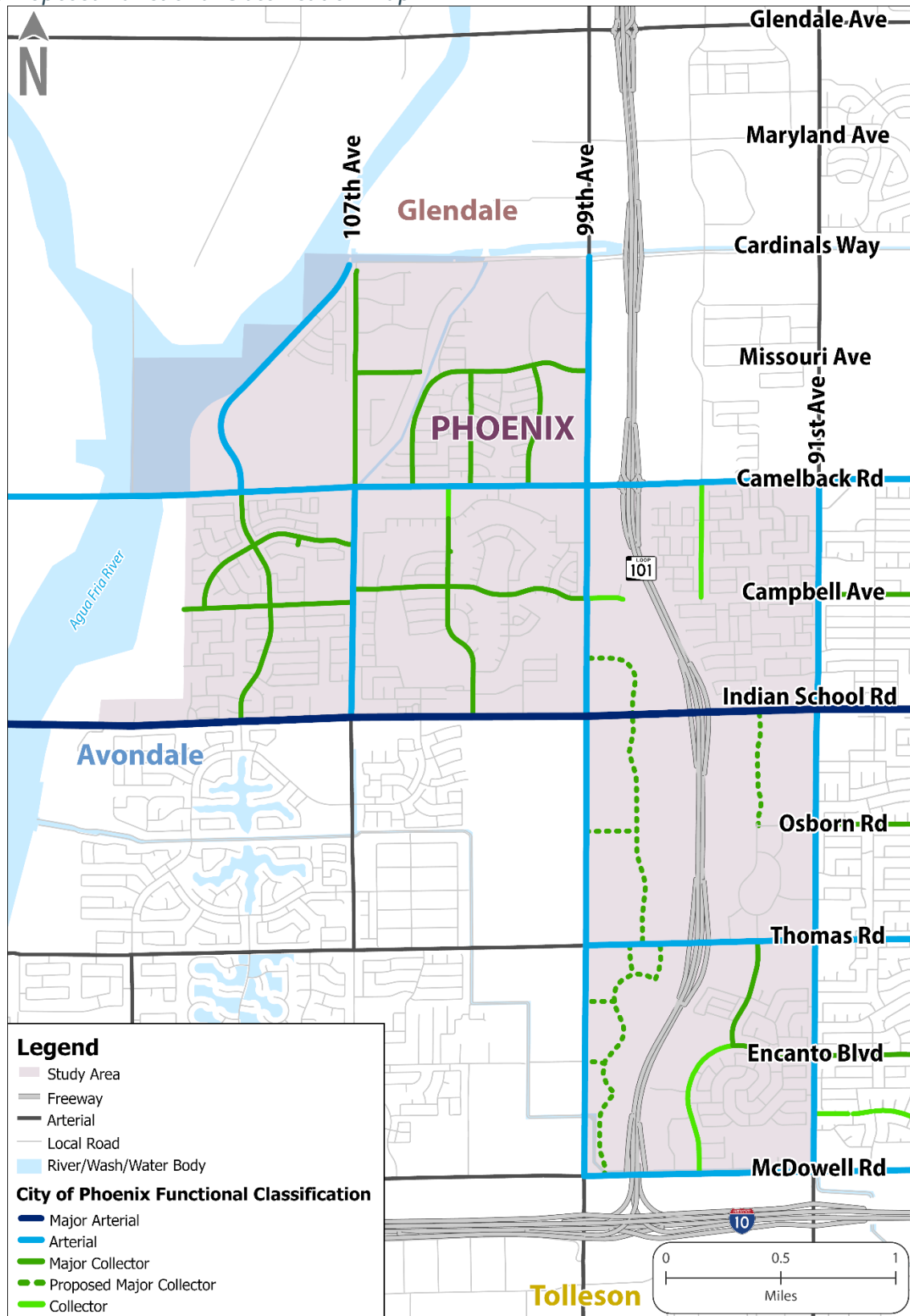


Figure 2-21: Proposed Functional Classification Map



Future Traffic Volumes

Due to discrepancies identified between the MAG Transportation Data Management System (TDMS) 2022 and MAG traffic volumes, daily 2022 traffic volumes MAG provided by MAG TDMS within the project area were used to generate future 2030 and 2050 projected traffic volumes.

Based on the existing and future land use maps and traffic volumes obtained from MAG for the project area, the roadways within the West Phoenix area are projected to experience an average of a 2 percent annual growth rate in traffic volumes between 2022 and 2030 and a similar 2 percent annual growth rate in traffic volumes between 2030 and 2050. Therefore, a growth rate of 2 percent is applied to the 2022 traffic volumes obtained from the MAG TDMS for all roadways within the project limits. This equates to a 23 percent change between 2022 traffic volumes and 2030 forecasted volumes, and a 74 percent change between 2022 traffic volume and 2050 projected traffic volumes. **Table 2-4** shows the projected 2030 and 2050 volumes in descending order from highest to smallest increases within the study area. The study area future 2030 and 2050 volumes are illustrated in **Figure 2-22** and **Figure 2-23**.

Table 2-4: Projected 2030 and 2050 Traffic Volumes

Location	Traffic Volumes				
	Existing (2022)	2030	% Change from 2022	2050	% Change from 2022
Camelback Road from 107th Avenue to 99th Avenue	50,179	61,721	23%	87,312	74%
McDowell Road from 99th Avenue to 91st Avenue	49,609	61,019	23%	86,320	74%
Camelback Road from 99th Avenue to 91st Avenue	45,027	55,384	23%	78,347	74%
Indian School Road from 107th Avenue to 99th Avenue	40,584	49,919	23%	70,616	74%
Indian School Road from 113th Drive to 107th Avenue	34,284	42,170	23%	59,654	74%
99th Avenue from Camelback Road to Indian School Road	29,807	36,663	23%	51,864	74%
Indian School Road from 99th Avenue to 91st Avenue	29,396	36,157	23%	51,149	74%
Thomas Road from 99th Avenue to 91st Avenue	29,129	35,829	23%	50,685	74%
Camelback Road from Agua Fria River to 107th Avenue	27,656	34,017	23%	48,121	74%
99th Avenue from Indian School Road to Thomas Road	26,517	32,616	23%	46,140	74%
91st Avenue from Thomas Road to McDowell Road	23,783	29,253	23%	41,382	74%
99th Avenue from Thomas Road to McDowell Road	23,324	28,689	23%	40,584	74%
91st Avenue from Indian School Road to Thomas Road	22,494	27,668	23%	39,140	74%
91st Avenue from Camelback Road to Indian School Road	15,685	19,293	23%	27,292	74%
107th Avenue from Camelback Road to Indian School Road	13,727	16,885	23%	23,885	74%
99th Avenue from Cardinals Way to Camelback Road	12,318	15,152	23%	21,433	74%
111th Avenue from Camelback Road to Indian School Road	6,974	8,578	23%	12,135	74%
North Ball Park Boulevard from Cardinals Way to Camelback Road	4,140	5,093	23%	7,204	74%
West Campbell Avenue from 107th Avenue to 99th Avenue	3,806	4,682	23%	6,622	74%
107th Avenue from Cardinals Way to Camelback Road	2,138	2,630	23%	3,720	74%

Figure 2-22: Future Traffic Volumes 2030 Map

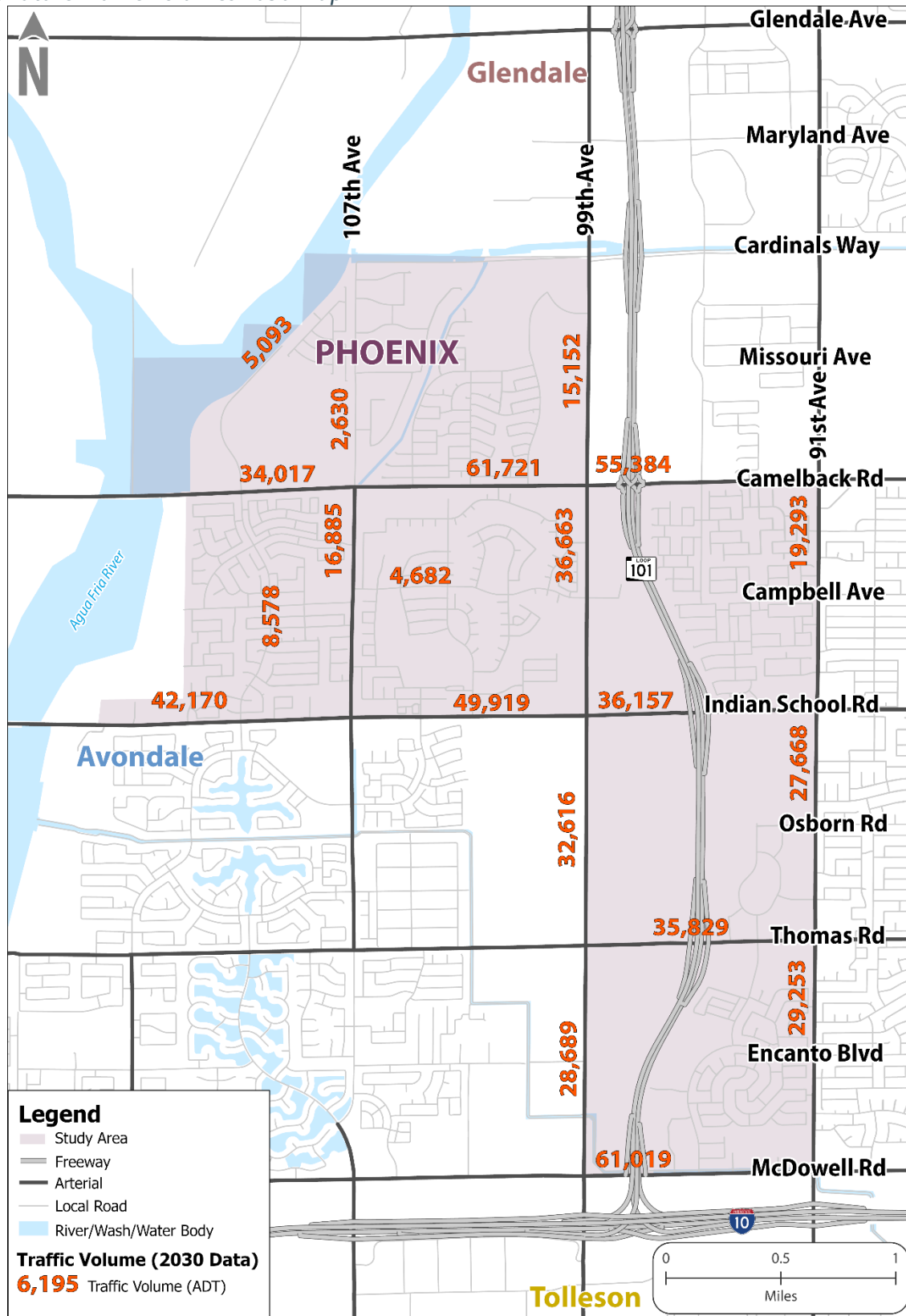
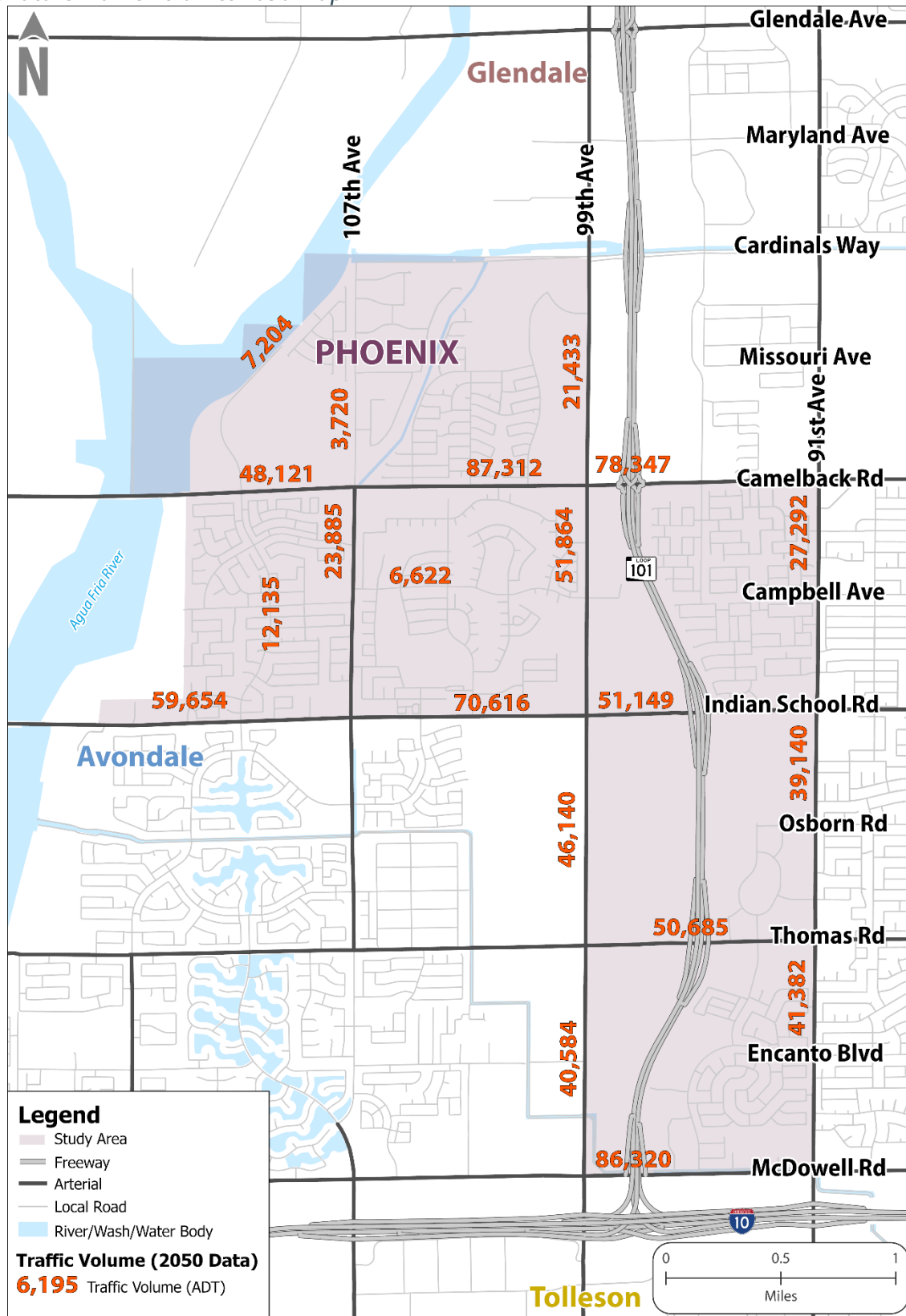


Figure 2-23: Future Traffic Volumes 2050 Map



Future Level Of Service (LOS)

The same methodology used to calculate the existing traffic LOS described in Tech Memo #1 – Section 4 Existing Transportation System Traffic Analysis – was used to determine the future years 2030 and 2050 LOS. LOS for the years 2030 and 2050 used the projected 2030 and 2050 volumes shown in **Figure 2-22** and **Figure 2-23**, existing roadway functional classification shown in Tech Memo #1 and the existing number of lanes shown in Tech Memo #1.

As shown in **Table 2-5** and illustrated in **Figure 2-24**, the following roadways are expected to operate at unacceptable Level Of Service (LOS F) with projected 2030 traffic volumes and the existing roadway network:

- 1) Camelback Road: 107th Avenue to 99th Avenue – LOS F
- 2) Camelback Road: 99th Avenue to 91st Avenue – LOS F
- 3) Indian School Road: 113th Drive to 107th Avenue – LOS F
- 4) Indian School Road: 107th Avenue to 99th Avenue – LOS F
- 5) Indian School Road: 99th Avenue to 91st Avenue – LOS F
- 6) McDowell Road: 99th Avenue to 91st Avenue – LOS F
- 7) 99th Avenue: Camelback Road to Indian School Road – LOS F
- 8) 99th Avenue: Indian School Road to Thomas Road – LOS F

As shown in **Table 2-5** and illustrated in **Figure 2-25**, the following roadways are expected to operate with unacceptable Levels Of Service (LOS D, LOS E and LOS F) with projected 2050 traffic volumes and existing roadway network:

- 1) Camelback Road: 113th Drive to 107th Avenue – LOS F
- 2) Camelback Road: 107th Avenue to 99th Avenue – LOS F
- 3) Camelback Road: 99th Avenue to 91st Avenue – LOS F
- 4) Indian School Road: 113th Drive to 107th Avenue – LOS F
- 5) Indian School Road: 107th Avenue to 99th Avenue – LOS F
- 6) Indian School Road: 99th Avenue to 91st Avenue – LOS F
- 7) Thomas Road: 99th Avenue to 91st Avenue – LOS F
- 8) McDowell Road: 99th Avenue to 91st Avenue – LOS F
- 9) 111th Avenue: Camelback Road to Indian School Road – LOS D
- 10) 99th Avenue: Camelback Road to Indian School Road – LOS F
- 11) 99th Avenue: Indian School Road to Thomas Road – LOS F
- 12) 99th Avenue: Thomas Road to McDowell Road – LOS F
- 13) 91st Avenue: Indian School Road to Thomas Road – LOS E
- 14) 91st Avenue: Thomas Road to McDowell Road – LOS F

Table 2-5: Projected Changes in Roadway Segment Level Of Service

Location	Roadway Segment LOS				
	Existing (2022)	2030	Change from 2022	2050	Change from 2022
Camelback Road: 113 th Drive to 107 th Avenue	LOS C	LOS C	-	LOS F	↑
Camelback Road: 107 th Avenue to 99 th Avenue	LOS F	LOS F	-	LOS F	-
Camelback Road: 99 th Avenue to 91 st Avenue	LOS D	LOS F	↑	LOS F	↑
Campbell Avenue: 107 th Avenue to 99 th Avenue	LOS B	LOS B	-	LOS B	-
Indian School Road: 113 th Drive to 107 th Avenue	LOS C	LOS F	↑	LOS F	↑
Indian School Road: 107 th Avenue to 99 th Avenue	LOS C	LOS F	↑	LOS F	↑
Indian School Road: 99 th Avenue to 91 st Avenue	LOS C	LOS F	↑	LOS F	↑
Thomas Road: 99 th Avenue to 91 st Avenue	LOS C	LOS C	-	LOS F	↑
McDowell Road: 99 th Avenue to 91 st Avenue	LOS F	LOS F	-	LOS F	-
Ball Park Boulevard: Cardinals Way to Camelback Road	LOS B	LOS B	-	LOS B	-
111 th Avenue: Camelback Road to Indian School Road	LOS B	LOS C	↑	LOS D	↑
107 th Avenue: Cardinals Way to Camelback Road	LOS B	LOS B	-	LOS B	-
107 th Avenue: Camelback Road to Indian School Road	LOS B	LOS B	-	LOS B	-
99 th Avenue: Cardinals Way to Camelback Road	LOS B	LOS B	-	LOS B	-
99 th Avenue: Camelback Road to Indian School Road	LOS C	LOS F	↑	LOS F	↑
99 th Avenue: Indian School Road to Thomas Road	LOS C	LOS F	↑	LOS F	↑
99 th Avenue: Thomas Road to McDowell Road	LOS C	LOS C	-	LOS F	↑
91 st Avenue: Camelback Road to Indian School Road	LOS B	LOS B	-	LOS C	↑
91 st Avenue: Indian School Road to Thomas Road	LOS C	LOS C	-	LOS E	↑
91 st Avenue: Thomas Road to McDowell Road	LOS C	LOS C	-	LOS F	↑

Figure 2-24: Future 2030 Level Of Service Map

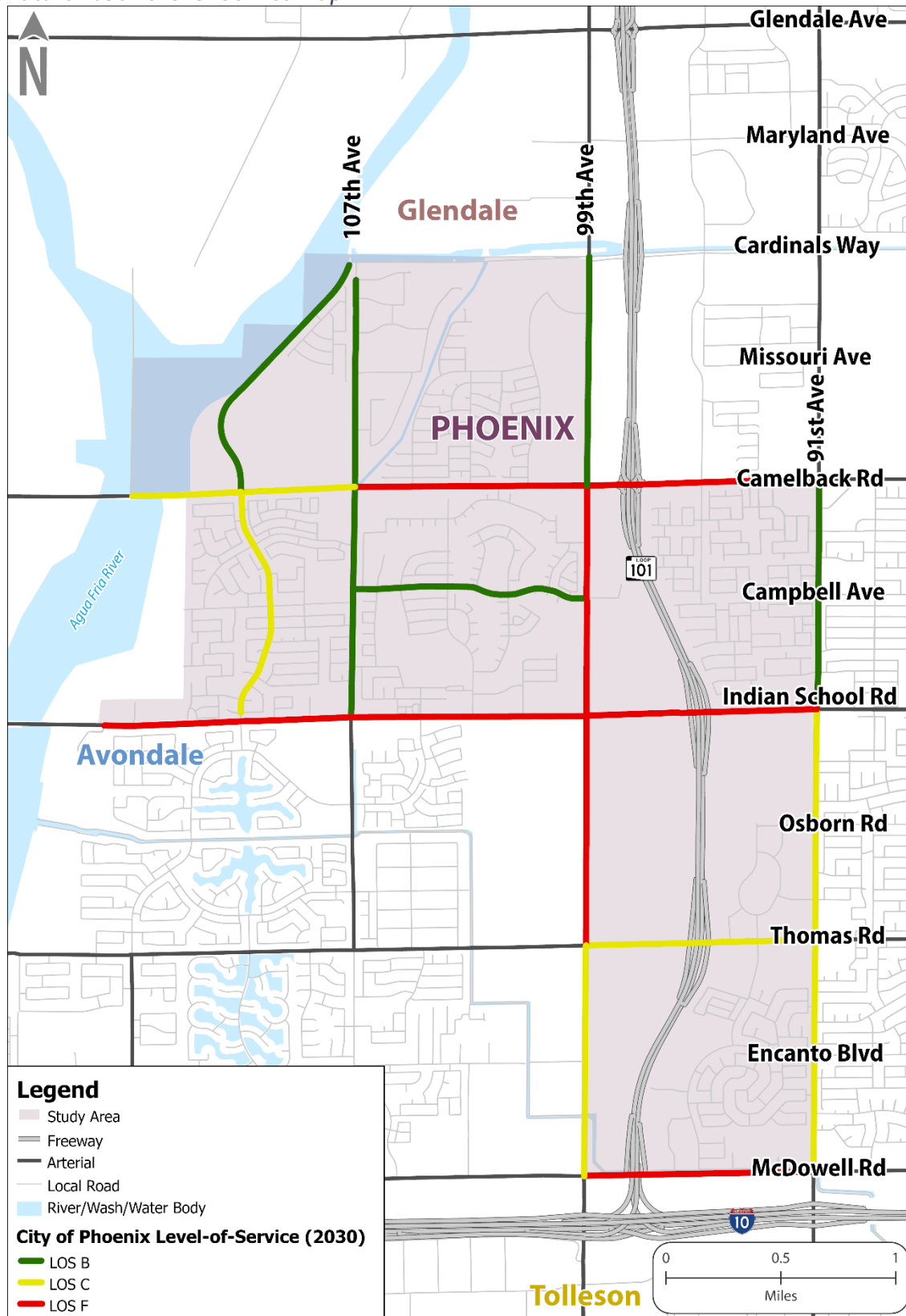
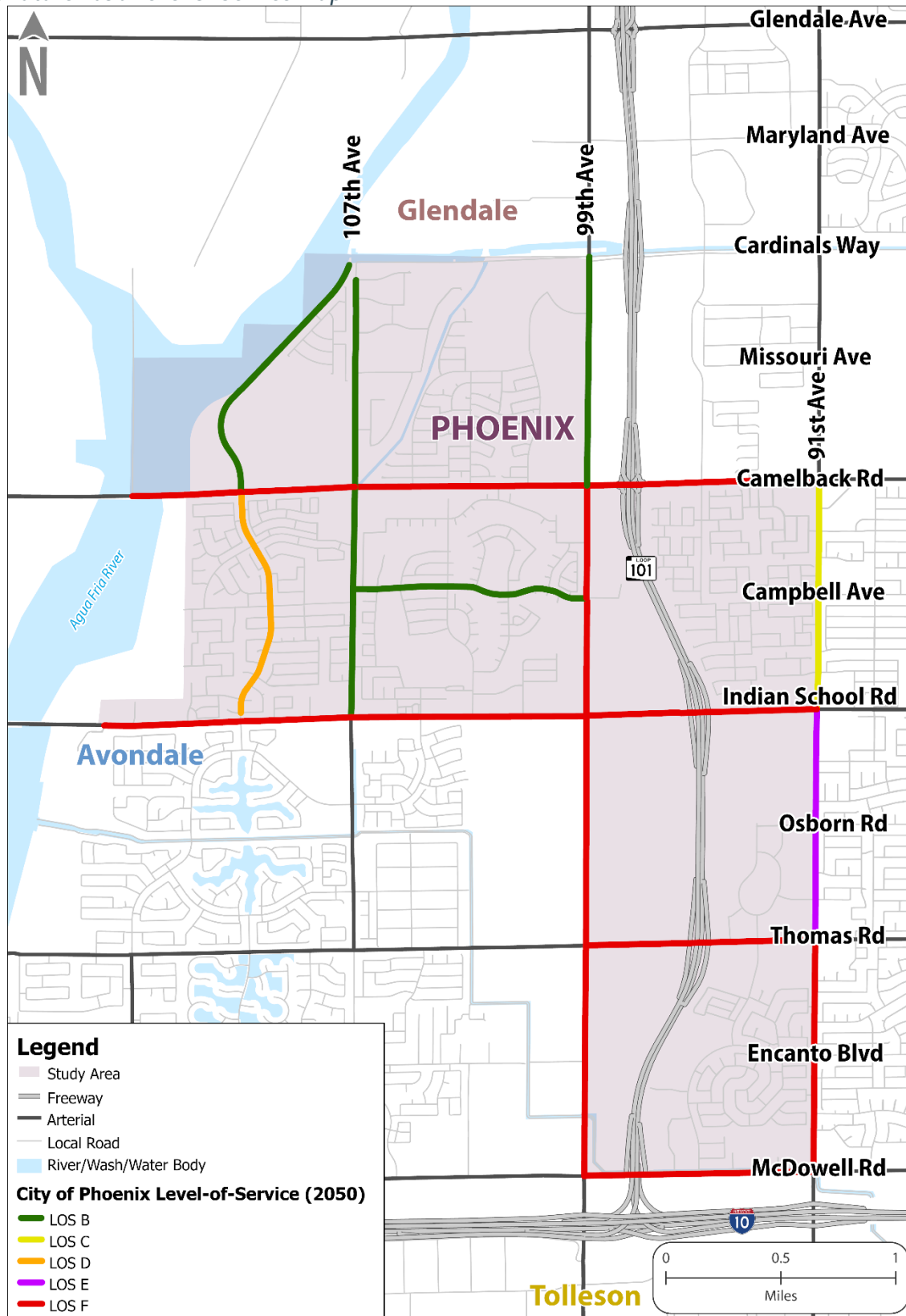


Figure 2-25: Future 2050 Level Of Service Map



Future Level of Traffic Stress (LTS)

Level of traffic stress (LTS) is an approach that quantifies the amount of discomfort that people feel when they bicycle in various roadway environments. The methodology was developed in 2012 by the Mineta Transportation Institute and San Jose State University. The LTS methodology assigns a numeric stress level to streets based on attributes such as traffic speed, traffic volume, number of lanes, frequency of parking turnover, ease of intersection crossings and others. When a street has a moderate or high level of stress, it may be a sign that bicycle infrastructure, like separated bike lanes or shared use paths, is needed to make it a place where more people will feel comfortable riding.

For a bicycle network to attract the broadest segment of the population, it must provide low-stress connectivity, defined by the methodology as “providing routes between people’s origins and destinations that do not require cyclists to use links that exceed their tolerance for traffic stress, and that do not involve an undue level of detour.” This tool will be used to identify roadway segments and crossings where a bicycle treatment is needed to reduce the stress level.

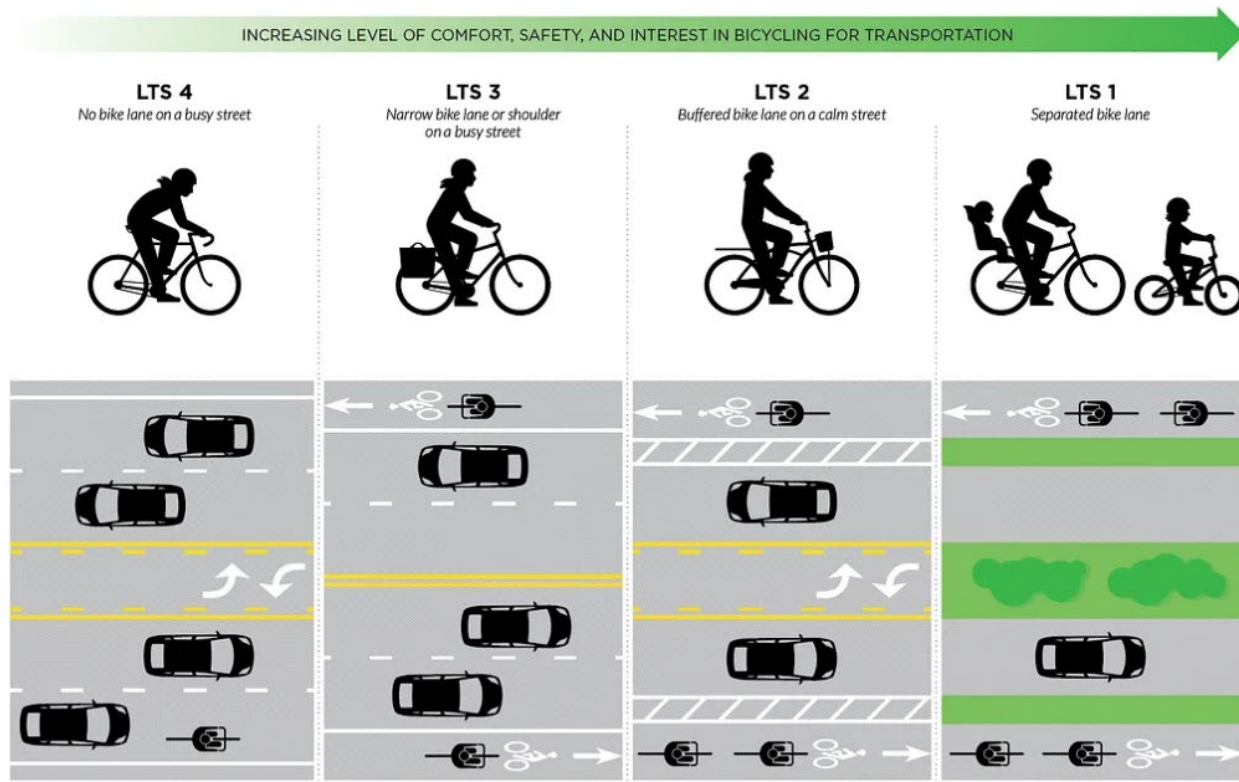
The LTS scoring framework is designed to correspond with the “Four Types of Bicyclists” categories with a range of LTS 1 to LTS 4 representing a spectrum from lowest stress to highest stress facilities. Corridors and intersections are classified into one of four LTS scores — LTS 1, LTS 2, LTS 3, and LTS 4, where 1 represents the lowest stress, and 4 represents highest stress and discomfort. At its core, as motor vehicle traffic volumes increase and the separation between a person bicycling and motor vehicle traffic decreases, the LTS scores show an increase in the level of stress. The LTS scores are mapped to illustrate the low stress connections and gaps throughout a given community.

As shown in **Figure 2-26** the most desirable bicycling score, LTS 1, is assigned to roads that would be suitable for most children to ride or suitable for inexperienced adults riding bicycles or families with small children. LTS 1 also applies to multi-use paths that are separated from motorized traffic. LTS 2 are roads that could be comfortably ridden by the general adult population. LTS 3 is assigned to roads that would be acceptable for bicycle travel by “strong and fearless” bicyclists, and LTS 4 represents roads that are only acceptable to “strong and fearless” bicyclists who better tolerate roadways with higher motorized traffic volumes and speeds.

The experience and level of comfort categories of riders that are best suited for each score are summarized below:

- LTS Score 1 – Bicyclists of All Ages and Abilities (most comfort/protection)
- LTS Score 2 – Most Adult Bicyclists
- LTS Score 3 – Experienced Bicyclists
- LTS Score 4 – Strong and Fearless (least comfort/protection)

Figure 2-26: Level of Traffic Stress Scale



Source: *Bend, Oregon Citywide Walking and Biking Safety Improvements*

The LTS methodology focuses on the following criteria for evaluating traffic stress on road segments, intersection approaches and unsignalized crossings. Segment LTS in the study area was calculated using the criteria found in **Table 2-6** for all arterial and collector roadways, while the intersection LTS was calculated using the criteria found in **Table 2-7** for all unsignalized intersections along arterial and collector roadways in the study area. For signalized intersections the LTS of the roadway is carried through the intersection.

The projected 2030 LTS analysis results for each arterial and collector roadway segment and intersection in the study area is found in **Table 2-8** and **Table 2-9**, and illustrated in **Figure 2-27**, while the projected 2050 LTS analysis results for the study area is found in **Table 2-10** and **Table 2-11**, and illustrated in **Figure 2-28**. For intersection LTS scoring, bi-directional bike lanes and street parking are counted as one lane each and added to the total number of travel lanes.

LTS results demonstrate the importance of assessing the bikeway network not only for connectivity but also for the ability to serve the diverse needs of all its users. To serve all types of people riding bicycles, a bikeway network should consist of continuous low-stress LTS 1 and LTS 2 segments and intersections. By prioritizing the locations that likely dissuade people from riding bicycles, the LTS analysis helps focus on identifying the improvements that will bring the high-stress LTS 3 and LTS 4 gaps down to low stress LTS 1 and LTS 2 levels, thereby removing the barriers to bicycling for a large proportion of the population.

While the LTS analysis focuses on bicycle travel, improvements for people riding bicycles generally translate into improved conditions for pedestrians, as well. This is particularly true for crossing conditions, as improvements are measured in terms of reduced exposure to motor vehicle travel speed and the number of travel lanes crossed. Once the LTS for an existing facility is identified the study team will identify which type(s) of bicyclists it would like to encourage to use the facility, the next step is to identify what type of bikeway will meet their needs.

High-quality, connected networks are comfortable for the majority of people and not just for experienced bicyclists; they attract a diversity of users, make bicycling a viable, inclusive, and safe mode for everyday transportation, and can reduce traffic congestion.

Table 2-6: Segment Level of Traffic Stress Scoring Criteria

LTS for Mixed Traffic Criteria								
Number of Lanes in each Direction	ADT	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50+ MPH
Two-Way with no Centerline	0 - 750	1	1	2	2	3	3	3
	751 - 1500	1	1	2	3	3	3	4
	1500 - 3,000	2	2	2	3	4	4	4
	3,000+	2	3	3	3	4	4	4
One Lane	0 - 750	1	1	2	2	3	3	3
	751 - 1500	2	2	2	3	3	3	4
	1500 - 3,000	2	3	3	3	4	4	4
	3,000+	3	3	3	3	4	4	4
Two Lanes	0 - 8,000	3	3	3	3	4	4	4
	8,000+	3	3	4	4	4	4	4
Three Lanes or More Lanes	All ADT	3	3	4	4	4	4	4
Bike Lanes with No Parking								
Number of Lanes in each Direction	Bike Lane Width	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50+ MPH
One Lane, no Centerline	6+ ft	1	1	2	2	3	3	3
	4 - 5 ft	2	2	2	2	3	3	4
Two Lanes	6+ ft	2	2	2	2	3	3	3
	4 - 5 ft	2	2	2	2	3	3	4
Three Lanes or More Lanes	Any Width	3	3	3	3	4	4	4
Bike Lanes Alongside Parking								
Number of Lanes in each Direction	Bike Lane Width	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50+ MPH
One Lane	15+ ft	1	1	2	3	4	4	4
	12 - 14 ft	2	2	2	3	4	4	4
Two Lanes	15+ ft	2	2	3	3	4	4	4
	12 - 14 ft	2	2	2	3	4	4	4
Other Multilane Road	Any Width	3	3	3	3	4	4	4

Table 2-7: Unsignalized Intersection Level of Traffic Stress Scoring Criteria

Posted Speed Limit on Street Being Crossed	Number of Lanes of Street Being Crossed					
	No Median Refuge			Median Refuge (≥ 6 ft. wide)		
	2 to 3	4 to 5	6+	2 to 3	4 to 5	6+
≤ 25	1	2	4	1	1	2
30	2	2.5	4	1	2	2.5
35	2.5	3	4	1	2.5	3
≥ 40	3	4	4	2	2.5	4

Source: Mekuria, Maaza C.; Furth, Peter G.; & Nixon, Hillary. "Low-stress bicycling and network connectivity." (2012).

Table 2-8: Projected 2030 Segment Level of Traffic Stress

Segment	Existing LTS	Total Lanes	2030 ADT*	Speed Limit (MPH)	Bike Lanes (Y/N)	Bike Lane Width (Feet)	Parking (Y/N)	2030 LTS
Camelback Road: Agua Fria River to 107th Avenue	LTS 3	4	34,017	45	Yes	5	No	LTS 3
Camelback Road: 107th Avenue to 99th Avenue	LTS 3	4	61,721	45	Yes	5	No	LTS 3
Camelback Road: 99th Avenue to 91st Avenue	LTS 4	5	55,384	40	No	N/A	No	LTS 4
Indian School Road: 113th Drive to 107th Avenue	LTS 4	4	42,170	45	No	N/A	No	LTS 4
Indian School Road: 107th Avenue to 99th Avenue	LTS 4	4	49,919	45	No	N/A	No	LTS 4
Indian School Road: 99th Avenue to 91st Avenue	LTS 4	4	36,157	45	No	N/A	No	LTS 4
Thomas Road: 99th Avenue to 91st Avenue	LTS 4	4	35,829	45	No	N/A	No	LTS 4
McDowell Road: 99th Avenue to 91st Avenue	LTS 4	4	61,019	45	No	N/A	No	LTS 4
North Ball Park Boulevard: Cardinals Way to Camelback Road	LTS 3	4	5,093	35	Yes	5	No	LTS 3
107th Avenue: Cardinals Way to Camelback Road	LTS 3	2	2,630	35	No	N/A	No	LTS 3
99th Avenue: Cardinals Way to Camelback Road	LTS 4	4	15,152	50	No	N/A	No	LTS 4
107th Avenue: Camelback Road to Indian School Road	LTS 3	4	16,885	40	Yes	5	No	LTS 3
99th Avenue: Camelback Road to Indian School Road	LTS 4	4	36,663	50	No	N/A	No	LTS 4
91st Avenue: Camelback Road to Indian School Road	LTS 4	4	19,293	45	No	N/A	No	LTS 4
99th Avenue: Indian School Road to Thomas Road	LTS 4	4	32,616	50	No	N/A	No	LTS 4
91st Avenue: Indian School Road to Thomas Road	LTS 3	4	27,668	40	Yes	5	No	LTS 3
99th Avenue: Thomas Road to McDowell Road	LTS 4	4	28,689	45	No	N/A	No	LTS 4
91st Avenue: Thomas Road to McDowell Road	LTS 3	4	29,253	40	Yes	5	No	LTS 3
Highland Avenue: West Campbell Avenue to 107th Avenue	LTS 3	2	1,500+	30	No	N/A	No	LTS 3
West Campbell Avenue: 113th Drive to 107th Avenue	LTS 3	2	1,500+	30	No	N/A	No	LTS 3
111th Avenue: Camelback Road to Indian School Road	LTS 2	2	8,578	25	Yes	5	No	LTS 2
105th Avenue: Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
103rd Avenue: Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3

Segment	Existing LTS	Total Lanes	2030 ADT*	Speed Limit (MPH)	Bike Lanes (Y/N)	Bike Lane Width (Feet)	Parking (Y/N)	2030 LTS
101st Avenue: Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
101st Avenue: Montebello Avenue to Missouri Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Missouri Avenue: 101st Avenue to 99th Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Montebello Avenue: 101st Avenue to 99th Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Missouri Avenue: 105th Avenue to 101st Avenue	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
West Campbell Avenue: 107th Avenue to 99th Avenue	LTS 2	2	4,682	25	Yes	5	Yes	LTS 2
103rd Avenue: Camelback Road to Indian School Road	LTS 2	2	1,500+	52	Yes	5	No	LTS 2
93rd Avenue: Thomas Road to Encanto Boulevard	LTS 2	4	1,500+	30	Yes	5	No	LTS 2
95th Avenue: Encanto Boulevard to McDowell Road	LTS 2	4	1,500+	30	Yes	5	No	LTS 2
Encanto Boulevard: 95th Avenue to 91st Avenue	LTS 2	2	1,500+	30	Yes	5	No	LTS 2

*On collector roads where traffic volume data is not available, it is assumed that over 1,500 vehicles will access these roadways in a day.

Table 2-9: Projected 2030 Intersection Level of Traffic Stress

Intersection	Existing LTS	Total Lanes	Median (Y/N)	Speed Limit (MPH)	Signalized (Y/N)	2030 LTS
North Ball Park Boulevard and Camelback Road	LTS 3	6	No	45	Yes	LTS 3
107th Avenue and Camelback Road	LTS 3	7	No	45	Yes	LTS 3
Camelback Road and 105th Avenue	LTS 4	6	No	45	No	LTS 4
Camelback Road and 103rd Avenue (West)	LTS 3	6	Yes	45	Yes	LTS 3
Camelback Road and 103rd Avenue (East)	LTS 3	6	No	45	Yes	LTS 3
Camelback Road and 101st Avenue	LTS 4	6	No	45	No	LTS 4
Camelback Road and 99th Avenue	LTS 4	8	No	45	Yes	LTS 4
Camelback Road and Loop 101	LTS 4	6	Yes	40	Yes	LTS 4
Camelback Road and 91st Avenue	LTS 4	8	No	45	Yes	LTS 4
Indian School Road and 111th Avenue	LTS 4	6	No	45	Yes	LTS 4
Indian School Road and 107th Avenue	LTS 4	7	No	45	Yes	LTS 4
Indian School Road and 103rd Avenue	LTS 4	5	No	45	Yes	LTS 4
Indian School Road and 99th Avenue	LTS 4	8	No	45	Yes	LTS 4
Indian School and Loop 101	LTS 4	7	Yes	45	Yes	LTS 4
Indian School Road and 91st Avenue	LTS 4	9	No	45	Yes	LTS 4
Thomas Road and 99th Avenue	LTS 4	8	No	50	Yes	LTS 4
Thomas Road and Loop 101	LTS 4	7	Yes	45	Yes	LTS 4
Thomas Road and 93rd Avenue	LTS 4	10	Yes	45	Yes	LTS 4
Thomas Road and 91st Avenue	LTS 4	10	No	45	Yes	LTS 4
McDowell Road and 99th Avenue	LTS 4	10	Yes	45	Yes	LTS 4
McDowell Road and 95th Avenue	LTS 4	4	No	45	No	LTS 4
McDowell Road and 91st Avenue	LTS 4	8	No	45	Yes	LTS 4
99th Avenue and Montebello Avenue	LTS 4	6	No	50	Yes	LTS 4
99th Avenue and Missouri Avenue	LTS 4	6	No	50	No	LTS 4
107th Avenue and Highland Avenue	LTS 4	6	No	40	No	LTS 4

Intersection	Existing LTS	Total Lanes	Median (Y/N)	Speed Limit (MPH)	Signalized (Y/N)	2030 LTS
107th Avenue and West Campbell Avenue (North)	LTS 4	6	No	40	No	LTS 4
107th Avenue and West Campbell Avenue (South)	LTS 4	6	No	40	No	LTS 4
99th Avenue and West Campbell Avenue	LTS 4	6	No	50	Yes	LTS 4
91st Avenue and Encanto Boulevard	LTS 3	6	No	40	Yes	LTS 3
103rd and West Campbell Avenue	LTS 2	4	No	25	No	LTS 2
West Campbell Avenue and 111th Avenue	LTS 2	4	No	30	No	LTS 2
103rd Avenue and Missouri Avenue	LTS 1	2	No	25	No	LTS 1
101st Avenue and Missouri Avenue	LTS 1	2	No	25	No	LTS 1
93rd Avenue and Encanto Boulevard	LTS 2	3	No	30	No	LTS 2
Camelback Road and 95th Avenue	LTS 4	7	No	40	Yes	LTS 4
McDowell Road and Loop 101	LTS 4	6	Yes	45	Yes	LTS 4
Indian School Road and 104th Drive	LTS 4	6	No	45	Yes	LTS 4

Table 2-10: Projected 2050 Segment Level of Traffic Stress

Segment	Existing LTS	Total Lanes	2050 ADT*	Speed Limit (MPH)	Bike Lanes (Y/N)	Bike Lane Width (Feet)	Parking (Y/N)	2050 LTS
Camelback Road from Agua Fria River to 107th Avenue	LTS 3	4	48,121	45	Yes	5	No	LTS 3
Camelback Road from 107th Avenue to 99th Avenue	LTS 3	4	87,312	45	Yes	5	No	LTS 3
Camelback Road from 99th Avenue to 91st Avenue	LTS 4	5	78,347	40	No	N/A	No	LTS 4
Indian School Road from 113th Drive to 107th Avenue	LTS 4	4	59,654	45	No	N/A	No	LTS 4
Indian School Road from 107th Avenue to 99th Avenue	LTS 4	4	70,616	45	No	N/A	No	LTS 4
Indian School Road from 99th Avenue to 91st Avenue	LTS 4	4	51,149	45	No	N/A	No	LTS 4
Thomas Road from 99th Avenue to 91st Avenue	LTS 4	4	50,685	45	No	N/A	No	LTS 4
McDowell Road from 99th Avenue to 91st Avenue	LTS 4	4	86,320	45	No	N/A	No	LTS 4
North Ball Park Boulevard from Cardinals Way to Camelback Road	LTS 3	4	7,204	35	Yes	5	No	LTS 3
107th Avenue from Cardinals Way to Camelback Road	LTS 2	2	3,720	35	No	N/A	No	LTS 3
99th Avenue from Cardinals Way to Camelback Road	LTS 4	4	21,433	50	No	N/A	No	LTS 4
107th Avenue from Camelback Road to Indian School Road	LTS 3	4	23,885	40	Yes	5	No	LTS 3
99th Avenue from Camelback Road to Indian School Road	LTS 4	4	51,864	50	No	N/A	No	LTS 4
91st Avenue from Camelback Road to Indian School Road	LTS 4	4	27,292	45	No	N/A	No	LTS 4

Segment	Existing LTS	Total Lanes	2050 ADT*	Speed Limit (MPH)	Bike Lanes (Y/N)	Bike Lane Width (Feet)	Parking (Y/N)	2050 LTS
99th Avenue from Indian School Road to Thomas Road	LTS 4	4	46,140	50	No	N/A	No	LTS 4
91st Avenue from Indian School Road to Thomas Road	LTS 3	4	39,140	40	Yes	5	No	LTS 3
99th Avenue from Thomas Road to McDowell Road	LTS 4	4	40,584	45	No	N/A	No	LTS 4
91st Avenue from Thomas Road to McDowell Road	LTS 3	4	41,382	40	Yes	5	No	LTS 3
Highland Avenue from West Campbell Avenue to 107th Avenue	LTS 3	2	1,500+	30	No	N/A	No	LTS 3
West Campbell Avenue from 113th Drive to 107th Avenue	LTS 3	2	1,500+	30	No	N/A	No	LTS 3
111th Avenue from Camelback Road to Indian School Road	LTS 2	2	12,135	25	Yes	5	No	LTS 2
105th Avenue from Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
103rd Avenue from Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
101st Avenue from Missouri Avenue to Camelback Road	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
101st Avenue from Montebello Avenue to Missouri Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Missouri Avenue from 101st Avenue to 99th Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Montebello Avenue from 101st Avenue to 99th Avenue	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
Missouri Avenue from 105th Avenue to 101st Avenue	LTS 3	2	1,500+	25	No	N/A	No	LTS 3
West Campbell Avenue from 107th Avenue to 99th Avenue	LTS 2	2	6,622	25	Yes	5	Yes	LTS 2
103rd Avenue from Camelback Road to Indian School Road	LTS 2	2	1,500+	25	Yes	5	No	LTS 2
93rd Avenue from Thomas Road to Encanto Boulevard	LTS 2	4	1,500+	30	Yes	5	No	LTS 2
95th Avenue from Encanto Boulevard to McDowell Road	LTS 2	4	1,500+	30	Yes	5	No	LTS 2
Encanto Boulevard from 95th Avenue to 91st Avenue	LTS 2	2	1,500+	30	Yes	5	No	LTS 2

*On collector roads where traffic volume data is not available, it is assumed that over 1,500 vehicles will access these roadways in a day.

Table 2-11: Projected 2050 Intersection Level of Traffic Stress

Intersection	Existing LTS	Total Lanes	Median (Y/N)	Speed Limit (MPH)	Signalized (Y/N)	2050 LTS
North Ball Park Boulevard and Camelback Road	LTS 3	6	No	45	Yes	LTS 3
107th Avenue and Camelback Road	LTS 3	7	No	45	Yes	LTS 3
Camelback Road and 105th Avenue	LTS 4	6	No	45	No	LTS 4
Camelback Road and 103rd Avenue (West)	LTS 3	6	Yes	45	Yes	LTS 3
Camelback Road and 103rd Avenue (East)	LTS 3	6	No	45	Yes	LTS 3
Camelback Road and 101st Avenue	LTS 4	6	No	45	No	LTS 4
Camelback Road and 99th Avenue	LTS 4	8	No	45	Yes	LTS 4
Camelback Road and Loop 101	LTS 4	6	Yes	40	Yes	LTS 4
Camelback Road and 91st Avenue	LTS 4	8	No	45	Yes	LTS 4
Indian School Road and 111th Avenue	LTS 4	6	No	45	Yes	LTS 4
Indian School Road and 107th Avenue	LTS 4	7	No	45	Yes	LTS 4
Indian School Road and 103rd Avenue	LTS 4	5	No	45	Yes	LTS 4
Indian School Road and 99th Avenue	LTS 4	8	No	45	Yes	LTS 4
Indian School and Loop 101	LTS 4	7	Yes	45	Yes	LTS 4
Indian School Road and 91st Avenue	LTS 4	9	No	45	Yes	LTS 4
Thomas Road and 99th Avenue	LTS 4	8	No	50	Yes	LTS 4
Thomas Road and Loop 101	LTS 4	7	Yes	45	Yes	LTS 4
Thomas Road and 93rd Avenue	LTS 4	10	Yes	45	Yes	LTS 4
Thomas Road and 91st Avenue	LTS 4	10	No	45	Yes	LTS 4
McDowell Road and 99th Avenue	LTS 4	10	Yes	45	Yes	LTS 4
McDowell Road and 95th Avenue	LTS 4	4	No	45	No	LTS 4
McDowell Road and 91st Avenue	LTS 4	8	No	45	Yes	LTS 4
99th Avenue and Montebello Avenue	LTS 4	6	No	50	Yes	LTS 4
99th Avenue and Missouri Avenue	LTS 4	6	No	50	No	LTS 4
107th Avenue and Highland Avenue	LTS 4	6	No	40	No	LTS 4
107th Avenue and West Campbell Avenue (North)	LTS 4	6	No	40	No	LTS 4
107th Avenue and West Campbell Avenue (South)	LTS 4	6	No	40	No	LTS 4
99th Avenue and West Campbell Avenue	LTS 4	6	No	50	Yes	LTS 4
91st Avenue and Encanto Boulevard	LTS 3	6	No	40	Yes	LTS 3
103rd and West Campbell Avenue	LTS 2	4	No	25	No	LTS 2
West Campbell Avenue and 111th Avenue	LTS 2	4	No	30	No	LTS 2
103rd Avenue and Missouri Avenue	LTS 1	2	No	25	No	LTS 1
101st Avenue and Missouri Avenue	LTS 1	2	No	25	No	LTS 1
93rd Avenue and Encanto Boulevard	LTS 2	3	No	30	No	LTS 2
Camelback Road and 95th Avenue	LTS 4	7	No	40	Yes	LTS 4
McDowell Road and Loop 101	LTS 4	6	Yes	45	Yes	LTS 4
Indian School Road and 104th Drive	LTS 4	6	No	45	Yes	LTS 4

Figure 2-27: Level of Traffic Stress (2030) Map

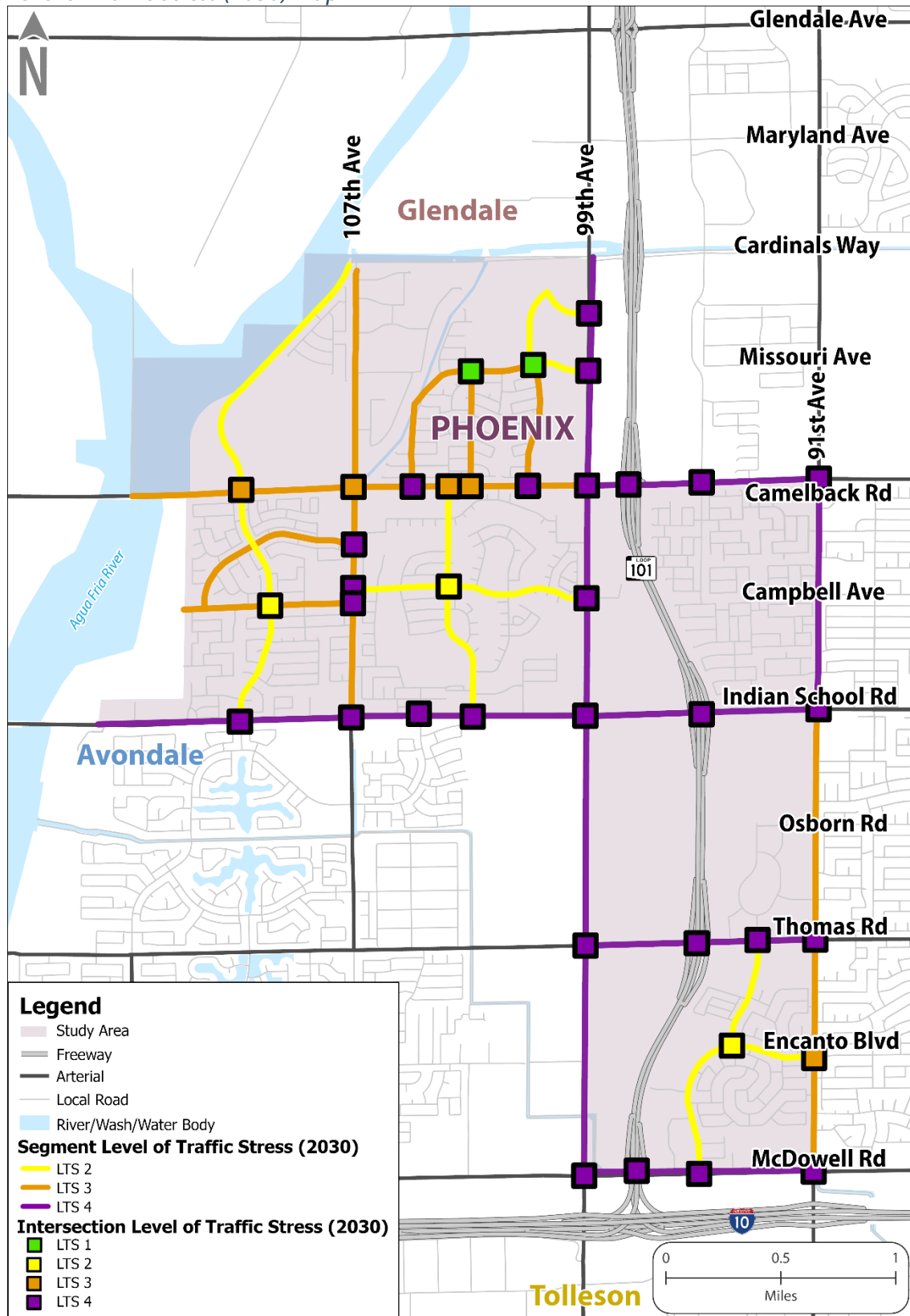
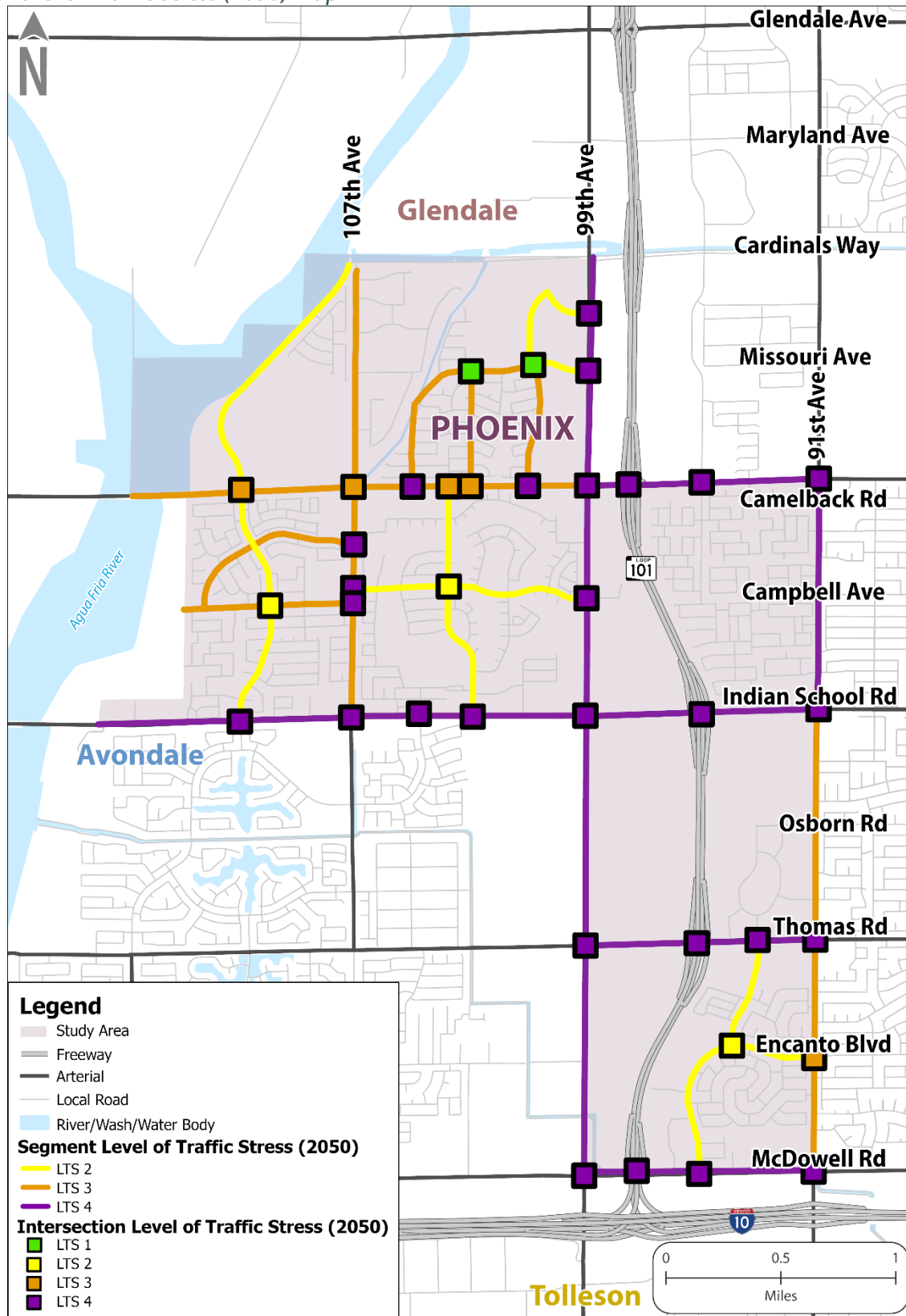


Figure 2-28: Level of Traffic Stress (2050) Map

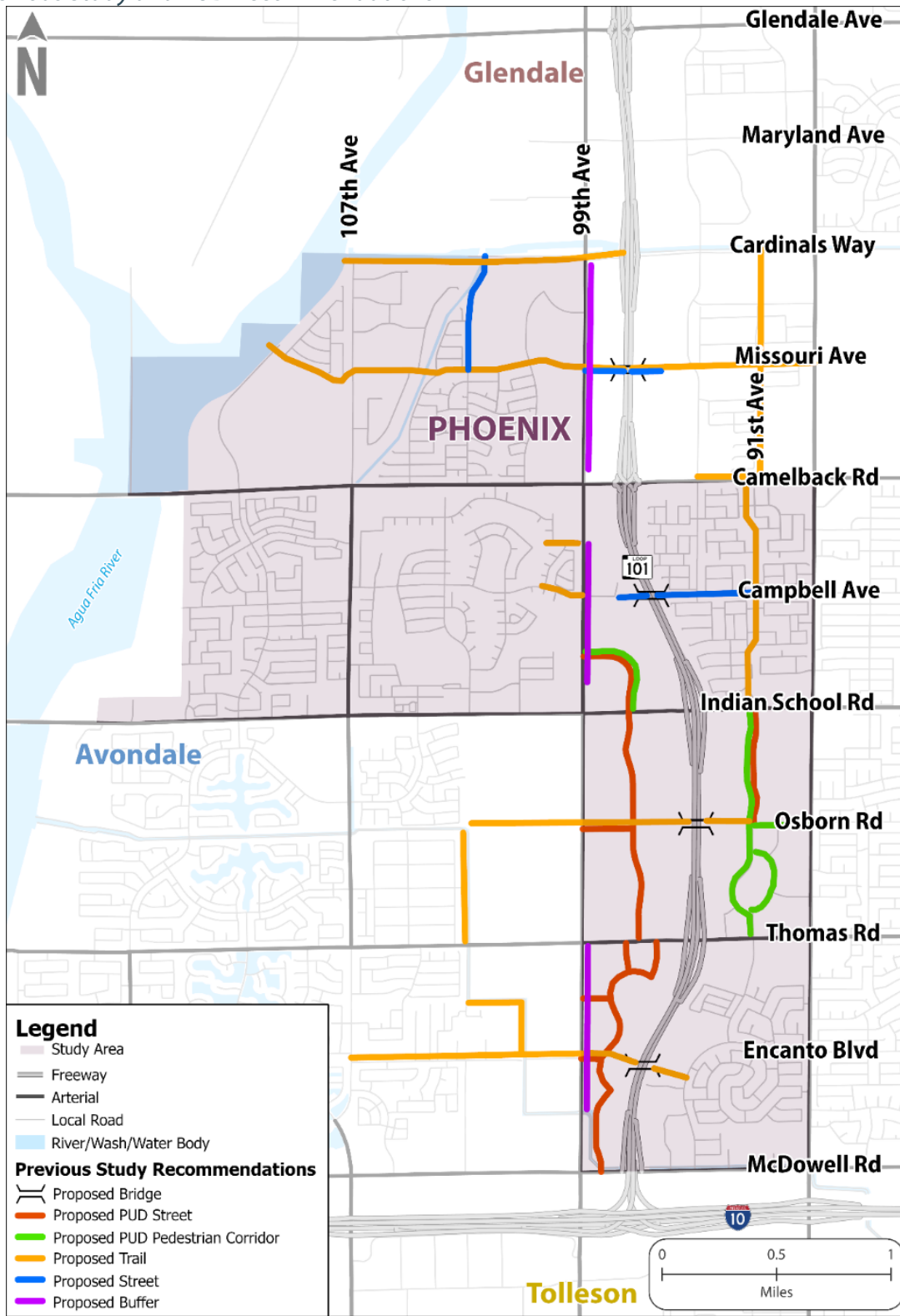


3 Proposed Transportation System

This section provides an overview of the types of recommended improvements within the WPTS study area. The proposed transportation system recommendations are categorized and summarized as follows:

- Previous Study Recommendations – Primarily recommendations that were identified from previous planning efforts including the 99th Avenue Compass Study (including an assessment of recommendations validity), Phoenix Active Transportation Master Plan, Key Corridors Master Plan (not formally adopted), Phoenix Road Safety Action Plan, Transit Oriented Development Strategic Policy Framework, Phoenix General Plan, Maryvale Village Character Plan, West Phoenix High-Capacity Transit Alternatives Analysis, West Valley Flexible Transit Study, Planned Unit Developments and Traffic Impact Statements. Compiled previously identified study area project recommendations are shown in **Figure 3-1**.
- Loop 101 Bicycle and Pedestrian Crossing Opportunities and Constraints – Highlights opportunities and constraints identified through conversations related to PUDs with the City Planning & Development Department associated with potential bike and pedestrian overpasses or underpasses of Loop 101 at Missouri Avenue, Campbell Avenue, Osborn Road and Encanto Boulevard identified as recommendations in the previously completed 99th Avenue Compass Study. PUD-specific opportunities and constraints are highlighted in **Figure 3-4** through **Figure 3-9**.
- Roadway Network – **Figure 3-10** shows primarily capacity improvements to meet forecasted travel demand needs and safety Infrastructure improvements studies of various roadways and intersections.
- Active Transportation and Mobility Infrastructure – **Figure 3-11** illustrates improvements to serve bicyclists and pedestrians.

Figure 3-1: Previous Study and PUD Recommendations



Planned Transit

The West Phoenix High-Capacity Transit Alternatives Analysis

Valley Metro is currently conducting a High-Capacity Transit (HCT) Alternatives Analysis study evaluating potential high-capacity transit (light rail or bus rapid transit) route options between Camelback Road on the north, McDowell Road on the south, Central Avenue on the east and 99th Avenue on the west. This analysis is studying how to improve connections to existing and or planned high-capacity transit. As shown in **Figure 3-2**, 10 potential HCT route options were evaluated under a series of seven diverse evaluation criteria. Eight of the ten options were screened out resulting in the red and green route identified as potential preferred alternatives. This analysis is ongoing and currently in the phase of identifying one preferred alternative by December of 2023.

Figure 3-2: West Phoenix High-Capacity Transit Alternatives Analysis Study Area

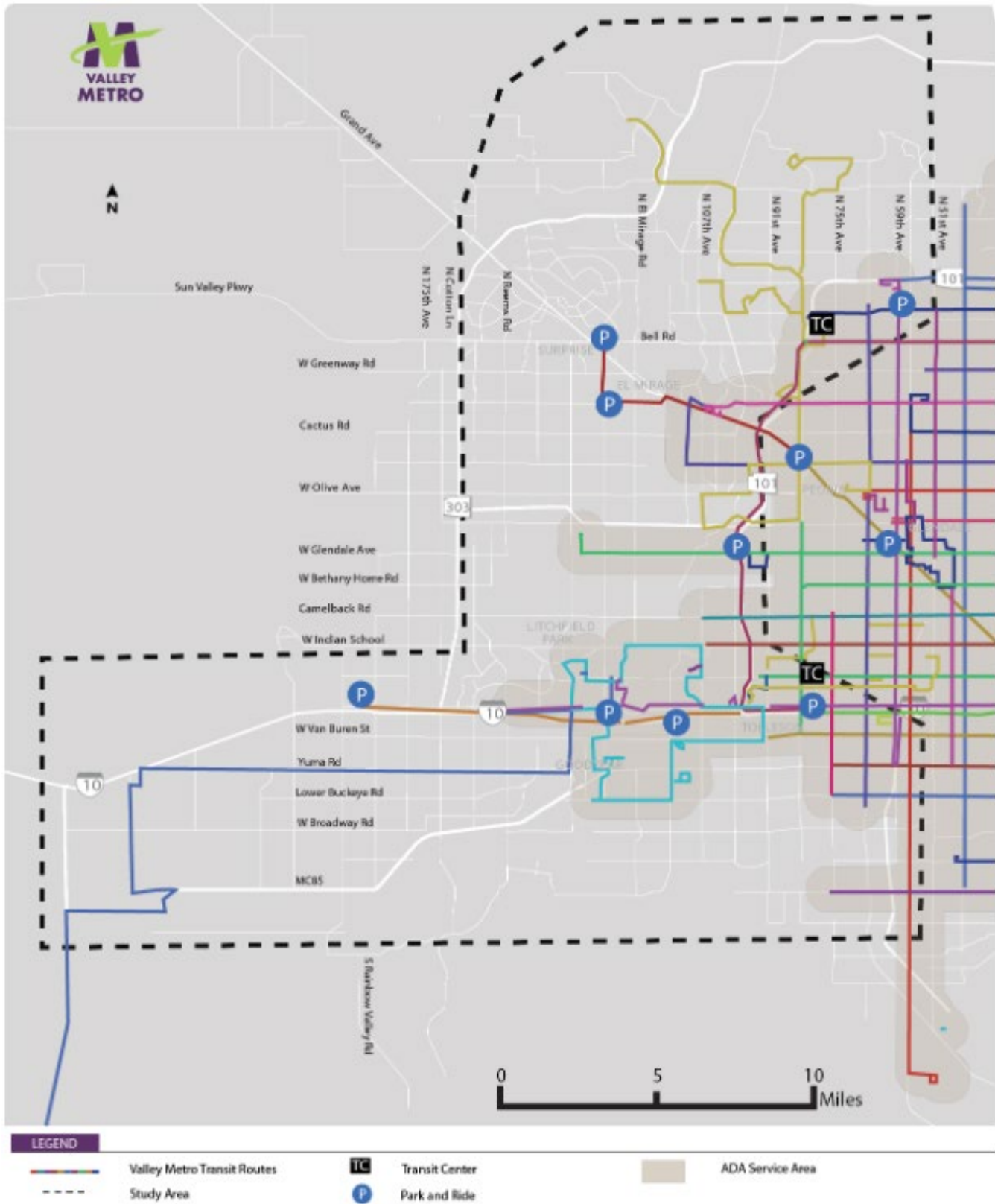


*Would require participation from neighboring communities

West Valley Flexible Transit Study

The West Valley Flexible Transit Study is exploring the potential for flexible transit services similar to Uber and Lift by providing on-demand service within a set zone. The current study area covers parts of 11 West Valley cities and county islands. As shown in **Figure 3-3** the West Phoenix Transportation study area is entirely encompassed by this study. This study is using travel demand modeling, land-use analysis and workforce commuting patterns to better understand the needs of the area. The study will provide recommendations for flexible transit service zones with accompanying service standards, cost estimates and ridership projections.

Figure 3-3: West Valley Flexible Transit Study Area



Loop 101 Bicycle and Pedestrian Crossings Opportunities and Constraints

The previously completed 99th Avenue Compass Study identified candidate crossings of Loop 101 via an overpass or underpass at Missouri Avenue, Campbell Avenue, Osborn Road and Encanto Boulevard. As part of the WPTS, the City elected to further explore the feasibility of crossings at these locations. The overall goal of additional analysis and interdepartmental coordination between City of Phoenix Street Transportation and the City Planning & Development Department was to identify opportunities to influence and/or make changes to master street plans identified in previously completed Planned Unit Development (PUD) submittals and/or Traffic Impact Statements to preserve the necessary right-of-way to accommodate easements and alignments of trail and/or roadway approaches to the candidate overpass and/or underpass locations as part of PUD development and future development approval processes.

In an effort to identify opportunities to provide enhanced connectivity over or under Loop 101 for people riding bikes, walking, or driving wheelchairs, a meeting was held between the City Street Transportation Department and the City Planning and Development Department to review all PUD and Traffic Impact Statements associated with the following future developments adjacent to the Loop 101 within the study area referenced in Tech Memo #1 – Current Conditions:

- Algodon Center
- Algodon Center BP-1
- Sheely Center
- Aldea Center

The meeting with the City of Phoenix Planning & Development Department focused on identifying opportunities to develop multimodal over and/or underpasses to accommodate connectivity across Loop 101. A synopsis of opportunities and constraints associated with each candidate over or underpass location is included below.

Missouri Avenue (City of Glendale East of Loop 101)

The document covering future development on the west side of Loop 101 along the Missouri Avenue alignment is the Aldea Center site plan. The Aldea Center Master Street Plan is shown in **Figure 3-4**. The Aldea Master Street Plan preserves the Missouri Avenue alignment up to 99th Avenue with a proposed bi-directional bike lane on Missouri Avenue. An opportunity does exist to extend Missouri to

Figure 3-4: Aldea Center Master Street Plan



Figure 3-5: Acero at the Stadium and Urban 95 PUD and Roadway Network



the west side of the Loop 101 as part of future development approvals, however, on the east side of the Loop 101 the City of Glendale has approved several developments including Acero at the Stadium

and the Urban 95 PUD with the proposed roadway network as shown in **Figure 3-5**. This approved roadway network has Missouri Avenue ending at a roundabout with Georgia Avenue within the PUD that negates any possibility of providing bicycle and pedestrian connectivity via an underpass or overpass of the Loop 101 because

there would not be a connection into or through the PUD to the larger City of Glendale and/or regional bike network.

Campbell Avenue

The document covering future development on the west side of Loop 101 along the Campbell Avenue alignment is the Algodon Center BP-1 Site Plan. The east side of the Loop 101 is actively being developed and/or previously developed. In the Algodon Center BP-1 Site Plan, Campbell Avenue is recommended to be extended from 99th Avenue as a collector roadway to Glenrosa Avenue in the site but does not propose to extend the collector to the edge of the Loop 101 on the eastern side of the development. Upon buildout there would be adequate right-of-way available to extend Campbell Avenue to a future over or underpass of the Loop 101 as shown in the Algodon Center BP-1 Site Plan in **Figure 3-6**.

Figure 3-6: Algodon Center BP-1 Site Plan



Figure 3-8: Residential Community: Campbell Avenue and North 93rd Avenue



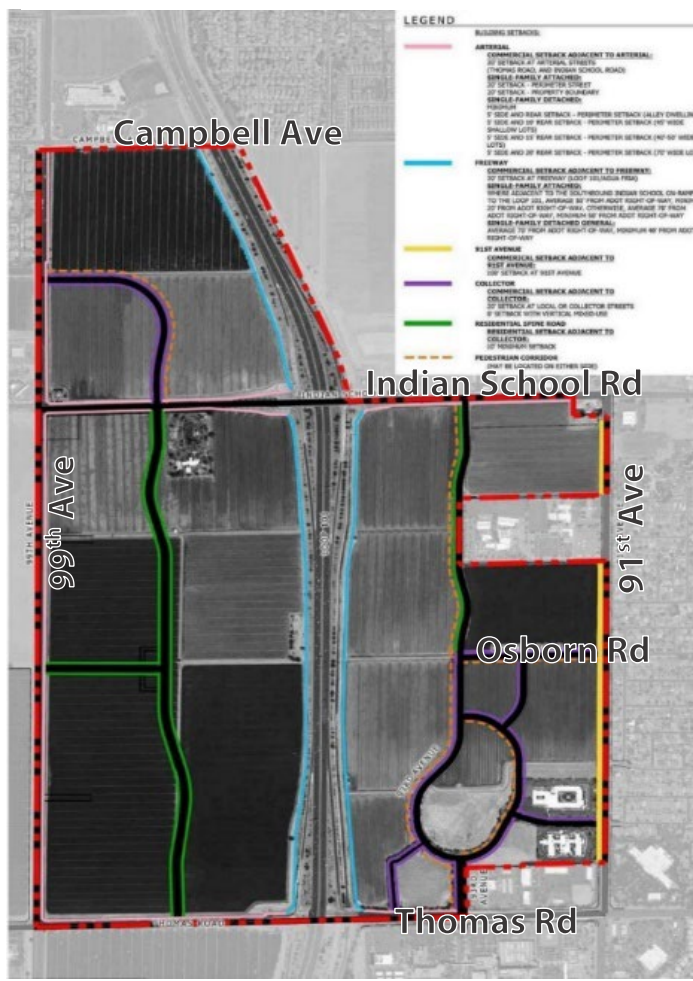
community gate the Campbell Avenue alignment is no longer a public roadway, and existing homes occupy the alignment that could have been used for a multimodal overpass or underpass approach, therefore a crossing of Loop 101 utilizing the Campbell Avenue alignment is not possible at the time of WPTS development.

Osborn Road

The document covering future development on the west and east side of Loop 101 along the Osborn Road alignment is the Algodon Center Planned Use Development Site Plan. The Algodon Center PUD has been approved by the City of Phoenix Planning & Development Department including the Master Street Plan as referenced in **Figure 3-8**. The Master Street Plan as approved does not extend the Osborn Collector Road through the site to the Loop 101 right-of-way for potential development of a multimodal overpass or underpass. Due to the already approved nature of this site plan, there is not an opportunity to extend Osborn Road to the west or to the east to the Loop 101 for connectivity to a future multimodal overpass or underpass.

To the east of Loop 101, active and previously completed developments are adjacent to the Campbell Avenue Collector roadway. In the existing condition, Campbell Avenue extends westward from 91st Avenue to the vicinity of North 93rd Avenue where there is currently a gate that controls access to a residential community as shown in **Figure 3-7**. West of the residential

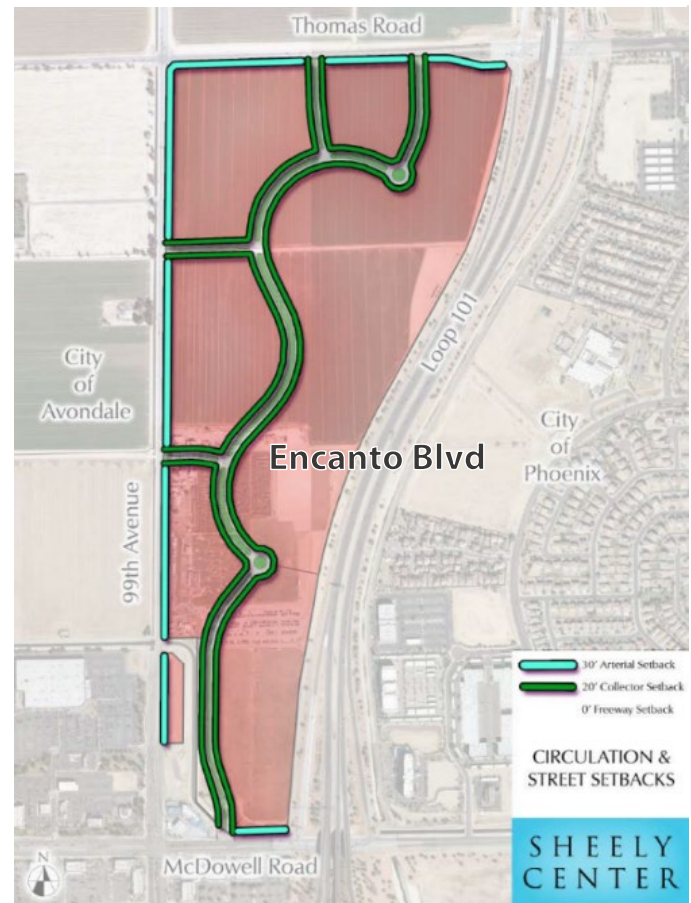
Figure 3-7: Algodon Center Planned Circulation



Encanto Boulevard

The document covering future development on the west side of Loop 101 along the Encanto Boulevard alignment is the Sheely Center PUD Site Plan. The Sheely Center PUD has been approved by the City of Phoenix Planning & Development Department including the Master Street Plan as referenced in **Figure 3-9**. The Master Street Plan as approved does not extend the Encanto Collector Road through the site to the Loop 101 right-of-way for potential development of a multimodal overpass or underpass. Due to the already approved nature of the site plan, there is not an opportunity to extend Encanto Boulevard to the east for connectivity to a future Loop 101 multimodal overpass or underpass.

Figure 3-9: Sheely Center Planned Circulation



Proposed Transportation Infrastructure

Proposed transportation infrastructure includes roadway network and multimodal infrastructure recommendations. In combination with the previous study recommendations, proposed transportation infrastructure will establish a framework for a diverse and seamless transportation network that connects study area residents and visitors with the regional transportation system while also creating efficient and safe options for travel within the study area.

The recommendations were developed in accordance with the City’s adopted SPDGM – as adopted on June 28, 2023, Ordinance # S-49991. All roadway, multimodal transportation, and mobility facility designs will include safe accommodation of roadway users of all ages and abilities in adherence to the City’s Complete Streets policy and ordinance. In final design, project managers should utilize additional resources to refine and enhance designs.

This section includes level one cost estimates (opinion of probable costs) for each recommended transportation project in the study area. As the proposed transportation infrastructure projects are reviewed and vetted by stakeholders and evaluated/prioritized in forthcoming phases of the study, more detailed level two planning-level cost estimates will be developed. “Planning-level” means that listed costs provide only a general guide for future planning when projects are prioritized and programmed. More detailed engineering estimates will be required in order to begin design work. All probable costs are reported in constant 2022 dollars. Roadway capacity, bike lanes, and sidewalk estimates utilize unit costs on a per-mile basis derived from various sources including the City of Phoenix, MAG, or MCDOT construction cost estimates that include estimated material, incidental and soft costs. Intersection capacity and operational/safety studies or evaluations at intersections and along corridors are identified as anticipated consultant costs.

Inventory of Proposed Roadway Network/Capacity Projects

The proposed roadway network includes a combination of new roads as a result of the various PUDs previously mentioned, a series of intersection capacity recommendations, roadway widening projects, and traffic calming applications. The proposed roadway network recommendations are included in **Table 3-1** and shown in **Figure 3-10**.

Almost all of the recommended roadway improvements would increase capacity and safety on key regional corridors: 91st Avenue, 99th Avenue, Camelback Road, Indian School Road, and McDowell Road. These capacity improvements are necessary due to the forecasted increase in traffic volumes for years 2030 and 2050. Each potential project involves enhancing intersection capacity or widening a roadway two or three lanes to accommodate forecasted demand and provide acceptable LOS D or better in horizon years. In addition, general operational and safety projects emerged from public and stakeholder input and analysis from Tech Memo #1. The operations and safety projects require additional analysis, further evaluation and studying before a formal recommended or countermeasure is suggested or deemed warranted.

Roadway Network Projects

Table 3-1 (Inventory of Proposed Roadway Network/Capacity Projects), **Table 3-2** (Inventory of Proposed Traffic Calming Projects), and **Table 3-3** (Inventory of Proposed Safety/Operations Studies) include the project name/type, description, issue(s) mitigated, and a level one costs estimate – opinion of probable costs. As part

of the future roadway network, newly proposed recommendations include a total of seven intersection improvement projects to address operations, nearly 28 lane miles of widened roadways, three miles of traffic calming with integrated low impact development (LID) applications, and 13 suggested safety/operations studies throughout the study area.

Table 3-1 Inventory of Proposed Roadway Network/Capacity Projects:

Project Name	Project Description	Issue Mitigated	Project Type	Length (Miles)	Opinion of Probable Cost
91st Avenue: Indian School Road to Thomas Road	Add two additional travel lanes (one in each direction)	Traffic congestion/delay	Roadway Capacity Project	1.00	\$6,699,000
91st Avenue: Encanto Boulevard to McDowell Road	Add two additional travel lanes (one in each direction)	Traffic congestion/delay	Roadway Capacity Project	0.49	\$3,297,000
99th Avenue: Camelback Road to McDowell Road	Add three additional travel lanes (one lane in each direction with a TWLTL)	Traffic congestion/delay	Roadway Capacity Project	3.00	\$23,398,000
Camelback Road: 113th Drive to 95th Avenue	Add two additional travel lanes (one lane in each direction)	Traffic congestion/delay	Roadway Capacity Project	2.48	\$16,554,000
Indian School Road: Copenhagen Drive to 91st Avenue	Add two additional travel lanes (one lane in each direction)	Traffic congestion/delay	Roadway Capacity Project	3.11	\$20,767,000
McDowell Road: 99th Avenue to 93rd Lane	Add two additional travel lanes (one lane in each direction)	Traffic congestion/delay	Roadway Capacity Project	0.65	\$4,330,000
McDowell Road: 93rd Lane to 91st Avenue	Add three additional travel lanes (2 eastbound, 1 westbound)	Traffic congestion/delay	Roadway Capacity Project	0.35	\$2,720,000
Thomas Road: 99th Avenue to 91st Avenue	Add two additional travel lanes (one lane in each direction)	Traffic congestion/delay	Roadway Capacity Project	1.00	\$6,665,000
99th Avenue and West Campbell Avenue Right-Turn Lanes	Install right-turn lanes at the 99th Avenue and Campbell Avenue intersection in the northbound, eastbound, and westbound directions.	High density traffic near Legacy Traditional School during morning drop off and evening pick up times.	Intersection Capacity	N/A	\$1,088,000
McDowell Road Intersection Capacity	Develop signal timing and coordination to address operational issues	Freeway entrances and traffic interchanges are extremely congested	Intersection Capacity	N/A	\$10,000
Thomas Road Intersection Capacity	Develop signal timing and coordination to address operational issues	Freeway entrances and traffic interchanges are extremely congested	Intersection Capacity	N/A	\$10,000

Project Name	Project Description	Issue Mitigated	Project Type	Length (Miles)	Opinion of Probable Cost
Indian School Road Intersection Capacity	Develop signal timing and coordination to address operational issues	Freeway entrances and traffic interchanges are extremely congested	Intersection Capacity	N/A	\$10,000
Camelback Road Intersection Capacity	Develop signal timing and coordination to address operational issues	Freeway entrances and traffic interchanges are extremely congested	Intersection Capacity	N/A	\$10,000
Indian School Road and Loop 101 Interchange Capacity Enhancements	The Southbound ramps at the Indian School and Loop 101 interchange will be restriped to provide a left turn lane, and shared left/thru/right turn lane, and a right turn lane, improving capacity for the right turn movements.	Future congestion at the Indian School and Loop 101 interchange is expected to increase to an unacceptable level due to rapid population growth.	Intersection Capacity	N/A	\$400,000

Table 3-2: Inventory of Proposed Traffic Calming Projects

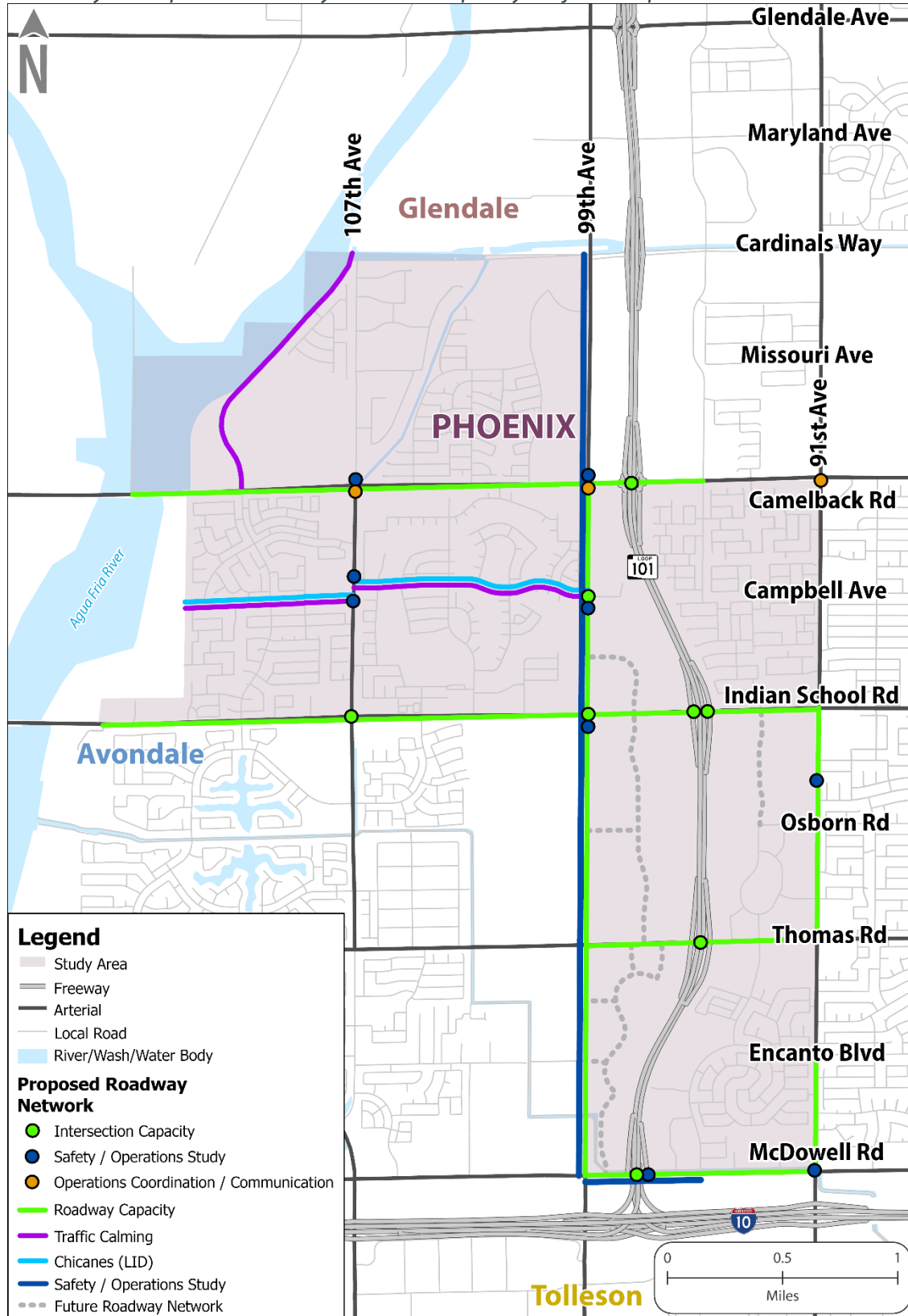
Project Name	Project Description	Issue Mitigated	Project Type	Length (Miles)	Opinion of Probable Cost
West Campbell Avenue Traffic Calming - 99th Avenue to 107th Avenue	Install two pairs of traffic calming chokers per Section 5.4.4 of the SPDGM: one pair between 107th Avenue and 106th Avenue and another pair approximately 450' east of 101 st Avenue. The chokers would include appropriately placed LID curb openings (Per Section 3.7.2 of the SPDGM: LID-02 and LID-03) to capture stormwater runoff to irrigate vegetation.	Speeding on West Campbell Avenue.	Traffic Calming	1.03	\$ 102,000
West Campbell Avenue Traffic Calming - 107th Avenue to West of 113th Drive	Install traffic calming center island application per Section 5.4.5 of the SPDGM at 111th Avenue and West Campbell Avenue. The center island would include appropriately placed LID curb openings (Per Section 3.7.2 of the SPDGM: LID-02 and LID-03) to capture stormwater runoff to irrigate vegetation.	Speeding on West Campbell Avenue	Traffic Calming	0.73	\$43,000
Ballpark Road Traffic Calming	Install traffic calming to address speeding issues	Reports of speeding and racing on Ballpark Boulevard.	Traffic Calming	1.25	\$20,000

Table 3-3: Inventory of Proposed Safety/Operations Studies

Project Name	Project Description	Issue Mitigated	Project Type	Length (Miles)	Opinion of Probable Cost
99th Avenue - Speed Study: Cardinals Way to McDowell Speed Study	Conduct a speed study	Speeding on 99th Avenue	Safety/Operations Study	N/A	\$20,000
McDowell Road: 99th Avenue to 95th Avenue	Analyze traffic volumes on McDowell Road at Loop 101	Traffic congestion/delay	Safety/Operations Study	N/A	\$25,000
McDowell Road and Loop 101 Operations Study	Traffic Study to identify potential mitigation of traffic back ups from McDowell Road intersection onto the Southbound Loop 101 off-ramp including 101 and I-10 traffic interchange backups that impact McDowell Road Loop 101 southbound exit	Large queues southbound 101 traffic and short distance to Loop 101 off ramp is a challenge at peak and throughout the day	Safety/Operations Study	N/A	\$20,000
107th Avenue and Camelback Road Operations Study	Speed and Pedestrian Clearance Intervals Study	107th Avenue and Camelback Road has been identified as a safety problem intersection for bicyclists and pedestrians.	Safety/Operations Study	N/A	\$25,000
99th Avenue and Indian School Operational Improvements Study	Conduct an intersection analysis to determine lane deficiencies and operational issues	99th Avenue and Indian School should be assessed for operational improvements	Safety/Operations Study	N/A	\$25,000
Copper King Elementary School - 107th Avenue and West Campbell Avenue Speed Study	Conduct a speed study to identify candidate solutions including changing speed limit during school hours, enforcement, speed feedback signs, etc.	At 107th Avenue and Campbell across from Copper King Elementary School, drivers were clocked going 62 mph, there is a need to reduce speeds.	Safety/Operations Study	N/A	\$25,000
91st Avenue and McDowell Intersection Operations Analysis	Conduct a turn lane analysis at the intersection to determine the need for additional turn lanes. Review/revise signal timing to address operational issues	Only one turn lane exists turning from 91st Avenue westbound onto McDowell Road long queuing and new QuickTrip adding to congestion on all	Safety/Operations Study	N/A	\$15,000

Project Name	Project Description	Issue Mitigated	Project Type	Length (Miles)	Opinion of Probable Cost
		four legs of this intersection.			
Camelback Road and 99th Avenue / Camelback Road and 107th Avenue Special Event Traffic Control	City of Phoenix Police Department coordination to control traffic during special events	During special events, traffic backs up at the Camelback Road/99th Avenue and 107th Avenue intersections.	Operations Coordination / Communication	N/A	TBD (Phoenix Police staff time)
Copper Canyon High School / 91st Avenue and Camelback Peak Time Traffic Control	Manual operation of signal during school arrival and departure times	The intersection of 91st Avenue and Camelback Road is severely backed up adjacent to the Copper Canyon High School between 6:30 a.m. to 9:00 a.m.	Operations Coordination / Communication	N/A	TBD (Glendale Traffic Operations Center monitoring or Glendale staff time)
99th Avenue and Camelback - Signal Timing Plans	Develop signal timing and coordination to address operational issues and determine the need for right-turn lanes.	Signal timing on 99th Avenue and Camelback is not appropriate. Backups during rush hour for westbound flows. Right turn lanes at intersections are needed	Safety/Operations Study	N/A	\$45,000
Copper King Elementary School Signal Warrant Analysis - 107th Avenue and West Campbell Avenue / Westbound Intersection Leg	Complete a signal warrant analysis to determine the need for a traffic signal.	Copper King Elementary School pick-up and drop-off congestion and safety concerns.	Safety/Operations Study	N/A	\$20,000
99th Avenue & West Campbell Avenue Intersection Traffic Study	Complete an intersection improvement study to analyze the need for left-turn phasing changes and signal timing changes	Intersection delay/operation issues	Safety/Operations Study	N/A	\$45,000
Pendergast Elementary School Ingress and Egress Road Safety Assessment (RSA)	Conduct a Road Safety Assessment at the Pendergrast Elementary School Ingress and Egress Driveway	Dangerous turning movements exist at pick-up and drop-off times associated with Pendergrast Elementary School main entrance	Safety/Operations Study	N/A	\$30,000

Figure 3-10: Inventory of Proposed Roadway Network/Capacity Projects Map



Proposed Active Transportation and Mobility Projects

Based upon the analysis and findings of Tech Memo #1, public and stakeholder input, a series of recommended multimodal facilities are being recommended within the study area that will provide connections to existing/planned regional trails or employment/recreation destinations inside and outside the study area. Improvements will also provide safe connectivity along arterials and collectors for pedestrians and bicyclists. Bicycle and/or pedestrian facility types, crossings and network expansion opportunities are identified in **Table 3-4** and **Figure 3-11**.

Many active transportation facilities currently exist along neighborhood streets and along major roads. The improvements proposed for major streets may influence the future development of bike lanes and other infrastructure. Many collector streets may constitute good, low-stress, low-volume active transportation routes now or in the future. These multimodal transportation recommendations, in support of other planning and policy documents, lay the foundation for expanding the active transportation network throughout the study area.

Table 3-4 includes the project name/type, description, issue(s) mitigated, and a level one cost estimate – opinion of probable cost. As part of the proposed multimodal transportation infrastructure, newly proposed recommendations include 19 miles of new sidewalks, nearly 30 lane miles of new bike lanes, two HAWK mid-block crossings and 27 bus stop improvements.

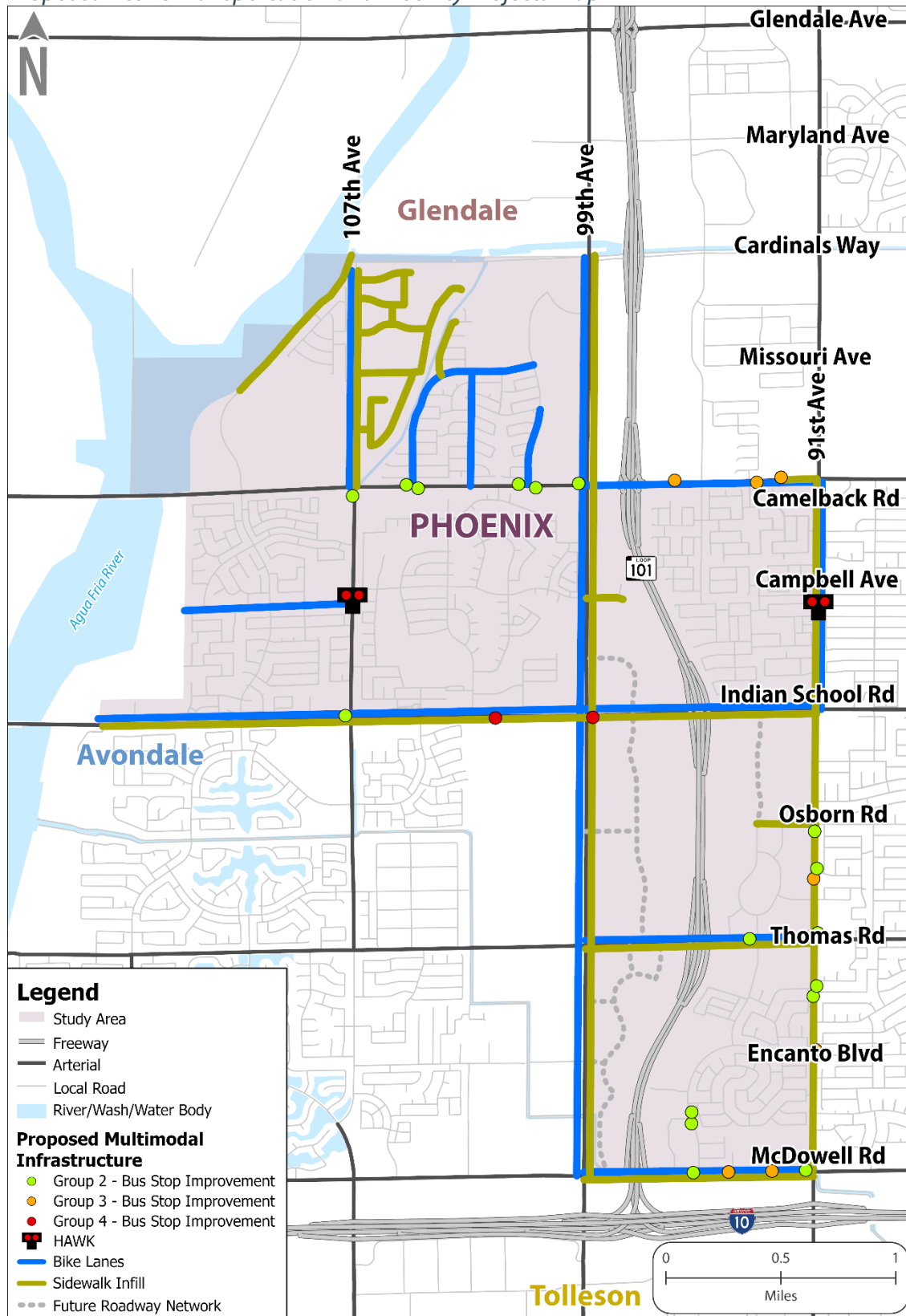
Table 3-4: Proposed Active Transportation and Mobility Projects

Project Name	Project Description	Issue Mitigated	Project Type	Length (miles)	Opinion of Probable Cost
West Campbell Avenue: 107th Avenue to West of 113th Avenue Bike Lanes	Install 8' buffered bike lanes between 107th Avenue and just west of 113th Drive	Gaps in bikeway network	Bike Lanes	0.73	\$256,000
107th Avenue: Bethany Home Road to Camelback Road Bike Lanes	Install 8' buffered bike lanes between Bethany Home Road and Camelback Road	Gaps in bikeway network	Bike Lanes	0.94	\$329,000
101st Avenue: Oregon Avenue to Camelback Road	Install 8' buffered bike lanes between Oregon Avenue and Camelback Road	Gaps in bikeway network	Bike Lanes	0.33	\$117,000
103rd Avenue: Missouri Avenue to Camelback Road	Install 8' buffered bike lanes between Missouri Avenue and Camelback Road	Gaps in bikeway network	Bike Lanes	0.50	\$175,000
105th Avenue: Missouri Avenue to Camelback Road	Install 8' buffered bike lanes between Missouri Avenue and Camelback Road	Gaps in bikeway network	Bike Lanes	0.40	\$142,000
Missouri Avenue: 105th Avenue to 101st Avenue	Install 8' buffered bike lanes between 105th Avenue and 101st Avenue	Gaps in bikeway network	Bike Lanes	0.52	\$183,000
Indian School Road: 99th Avenue to 91st Avenue	Install 8' buffered bike lanes between 99th Avenue and 91st Avenue	Gaps in bikeway network	Bike Lanes	1.00	\$351,000

Project Name	Project Description	Issue Mitigated	Project Type	Length (miles)	Opinion of Probable Cost
Indian School Road: 113th Drive to 99th Avenue	Install 8' buffered bike lanes between 113th Drive and 99th Avenue	Gaps in bikeway network	Bike Lanes	2.13	\$744,000
Thomas Road: 99th Avenue to 91st Avenue	Install 8' buffered bike lanes between 99th Avenue and 91st Avenue	Gaps in bikeway network	Bike Lanes	1.00	\$349,000
McDowell Road: 99th Avenue to 91st Avenue	Install 8' buffered bike lanes between 99th Avenue and 91st Avenue	Gaps in bikeway network	Bike Lanes	1.00	\$350,000
99th Avenue: Cardinals Way to Camelback Road	Install 8' buffered bike lanes between Cardinals Way and Camelback Road	Gaps in bikeway network	Bike Lanes	0.99	\$347,000
99th Avenue: Camelback Road to Indian School Road	Install 8' buffered bike lanes between Camelback Road and Indian School Road	Gaps in bikeway network	Bike Lanes	1.00	\$350,000
99th Avenue: Indian School Road to McDowell Road	Install 8' buffered bike lanes between Indian School Road and McDowell Road	Gaps in bikeway network	Bike Lanes	2.00	\$701,000
Camelback Road: 99th Avenue to 91st Avenue	Install 8' buffered bike lanes between 99th Avenue and 91st Avenue	Gaps in bikeway network	Bike Lanes	1.02	\$356,000
91st Avenue: Camelback Road to Indian School Road	Install 8' buffered bike lanes between Camelback Road and Indian School Road	Gaps in bikeway network	Bike Lanes	0.99	\$347,000
104th Drive Sidewalk Infill	Construct 5' sidewalk from Missouri Avenue to Montebello Avenue	Gaps in sidewalk network	Sidewalk infill	0.26	\$96,000
105th Lane Sidewalk Infill	Construct 5' sidewalk from Missouri Avenue to approximately 2,473' northeast	Gaps in sidewalk network	Sidewalk infill	0.44	\$330,000
107th Avenue Sidewalk Infill	Construct 5' sidewalk from Camelback Road to Bethany Home Road	Gaps in sidewalk network	Sidewalk infill	0.94	\$604,000
91st Avenue Sidewalk Infill	Construct 6-8' separated sidewalk from Indian School Road to Indianola Avenue	Gaps in sidewalk network	Sidewalk infill	3.01	\$230,000
99th Avenue Sidewalk Infill	Construct 6-8' separated sidewalk from 270' south of Indian School Road to McDowell Road.	Gaps in sidewalk network	Sidewalk infill	4.00	\$3,010,000
Ball Park Boulevard Sidewalk Infill	Construct 6-8' separated sidewalk from study area boundary to Camelback Ranch Driveway	Gaps in sidewalk network	Sidewalk infill	0.77	\$390,000
Camelback Road Sidewalk Infill	Construct 6-8' separated sidewalk from Copper Canyon High School southern Driveway to 91st Avenue	Gaps in sidewalk network	Sidewalk infill	0.15	\$160,000
Campbell Avenue Sidewalk Infill	Construct 5' sidewalk from 99th Avenue to 98th Avenue	Gaps in sidewalk network	Sidewalk infill	0.16	\$60,000
Colter Avenue Sidewalk Infill	Construct 5' sidewalk 107th Avenue to 106th Drive	Gaps in sidewalk network	Sidewalk infill	0.06	\$51,000

Project Name	Project Description	Issue Mitigated	Project Type	Length (miles)	Opinion of Probable Cost
Georgia Avenue Sidewalk Infill	Construct 5' sidewalk from 106 th Drive to the east at the cul-de-sac	Gaps in sidewalk network	Sidewalk infill	0.06	\$45,000
Indian School Road Sidewalk Infill	Construct 6-8' separated sidewalk from Horf Drive to 91st Avenue	Gaps in sidewalk network	Sidewalk infill	3.11	\$1,351,000
McDowell Road Sidewalk Infill	Construct 6-8' separated sidewalk from 91 st Avenue to 99 th Avenue	Gaps in sidewalk network	Sidewalk infill	1.00	\$539,000
Missouri Avenue Sidewalk Infill	Construct 5' sidewalk from 107th Avenue to 105th Lane	Gaps in sidewalk network	Sidewalk infill	0.28	\$213,000
Osborn Road Sidewalk Infill	Construct 5' sidewalk from 93 rd Avenue to 91st Avenue	Gaps in sidewalk network	Sidewalk infill	0.26	\$94,000
Rancho Drive Sidewalk Infill	Construct 5' sidewalk from 107 th Avenue to approximately 170' east of 106th Avenue	Gaps in sidewalk network	Sidewalk infill	0.23	\$186,000
San Miguel Avenue Sidewalk Infill	Construct 5' sidewalk from 107th Avenue to 105th Lane	Gaps in sidewalk network	Sidewalk infill	0.32	\$248,000
Solano Drive Sidewalk Infill	Construct 5' sidewalk from 107th Avenue to 106th Avenue	Gaps in sidewalk network	Sidewalk infill	0.20	\$159,000
Thomas Road Sidewalk Infill	Construct 6-8' separated sidewalk from 99th Avenue to Loop-101	Gaps in sidewalk network	Sidewalk infill	0.99	\$480,000
106th Avenue Sidewalk Infill	Construct 5' sidewalk from 106th Drive to Missouri Avenue	Gaps in sidewalk network	Sidewalk infill	0.81	\$604,000
Copper King Elementary School - 107th Avenue and West Campbell Avenue HAWK	Design and construct HAWK at 107th Avenue and West Campbell Avenue	Need for safe mid-block crossing for bicyclists, pedestrians, and school children.	HAWK	N/A	\$209,600
Westwind Elementary School - 91st Avenue and West Campbell Avenue HAWK	Design and construct HAWK at 91st Avenue and West Campbell Avenue	HAWK and/or signal associated with Westwind Elementary	HAWK	N/A	\$209,600
Bus Stop Amenities – Group 2: 18 bus stop locations	Design and construct a shade structure and add bench seating	Discomfort for pedestrians and cyclists using public transportation	Bus Stop Improvement	N/A	\$95,400
Bus Stop Amenities – Group 3: 7 bus stop locations	Design and construct a shade structure and concrete pad, and add bench seating	Discomfort for pedestrians and cyclists using public transportation	Bus Stop Improvement	N/A	\$45,500
Bus Stop Amenities – Group 4: 2 bus stop locations	Design and construct a shade structure and concrete pad, pave sidewalk as part of Indian School Road Sidewalk infill Project, and add bench seating	Discomfort for pedestrians and cyclists using public transportation	Bus Stop Improvement	N/A	\$13,000

Figure 3-11: Proposed Active Transportation and Mobility Projects Map



4 Next Steps

The recommendations within this report are preliminary and will be reviewed by the TAC, Maryvale Village Planning Committee and the public before being finalized. After the list of short-term and long-term recommendations are vetted a Final Report will be developed. The following is a list of next steps for the West Phoenix Transportation Study:

- **Technical Advisory Committee Meeting #3:** This meeting will share the findings and significance from the Future Conditions Report and will be utilized to discuss content and findings that need further attention, elaboration, or clarification.
- **Tech Memo #3 – Evaluation Criteria, Project Prioritization and Plan of Improvements:** The purpose and intent of Tech Memo #3 is to develop a methodology for the prioritization of potential projects and develop a comprehensive set of near-term (2030) and long-term (2050) projects including identification of potential implementation strategies and magnitudes of cost for each project/facility type.
- **Technical Advisory Committee Meeting #4:** This meeting will be utilized to share the findings of significance and preliminary project recommendations from Tech Memo #3 and will be utilized to discuss the content and findings that need further attention, elaboration, or clarifications.
- **Maryvale Village Planning Committee Project Briefing #2:** This briefing is intended to provide an opportunity for local stakeholders to discuss the rationale and application of the evaluation criteria process to rank projects and provide a summary overview of priority recommended policy modifications, roadway capacity, multimodal active transportation, and intersection improvement projects.
- **Public Open House Meeting #2:** This meeting will be utilized to obtain public input on the draft project recommendations for the short-term and long-term plan of improvements, phasing and planning level cost estimates through discussion and public feedback.
- **Draft Final and Final Transportation Study Report:** The Draft Final and Final Report will include revisions and comments received from the TAC, Maryvale Village Planning Committee and the public.