



AMARILLO AREA REGIONAL MULTIMODAL MOBILITY PLAN

Prepared by
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Expect More. Experience Better.



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INTRODUCTION

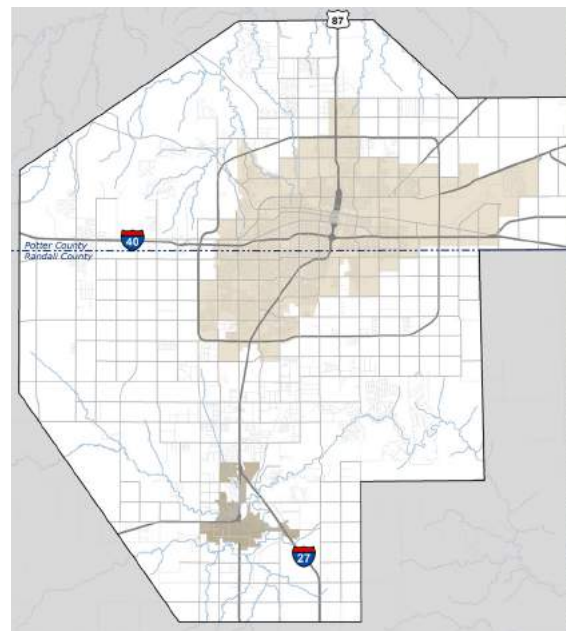
WHAT IS AMARILLO AREA IN MOTION?

The Amarillo Area Regional Multimodal Mobility Plan, also known as Amarillo Area in Motion (AAIM), is a strategic, multimodal mobility plan that will integrate and modernize the region's various mobility network plans into one comprehensive document. Mobility planning is a process that defines future improvements that will move people and goods to and from destinations in a safe and efficient manner. Effective multimodal mobility planning enhances the quality of life for residents and visitors to the region by creating options for accessing destinations and activity centers with or without a personal automobile.

The Amarillo Metropolitan Planning Organization (MPO) is a federally mandated administrative agency responsible for coordination of the highway, transit, and land use planning processes that are required to receive federal funds for highway and transit improvements. The purpose of the MPO is to provide local citizens and elected officials the opportunity to be involved in the transportation planning process at the regional scale. The Amarillo MPO Metropolitan Area Boundary (MAB) functions as the study area for the plan, shown in **Figure i-1**.

AAIM serves as a framework for making the necessary improvements to achieve a truly multimodal network within the Amarillo MPO. This plan provides a blueprint for the regional transportation system and identifies points of interest, gaps, future needs, and strategies for meeting those needs. This plan takes a systematic look at the region's street network and develop strategies for implementing new facilities that will accommodate vehicles, trucks, pedestrians, bicyclists, transit, and freight.

Figure i-1: Regional Map of Amarillo



DOCUMENT ORGANIZATION

The Table of Contents on page 3 is available as an overview of where specific items are located within the plan. The recommendations presented in this plan are organized into the following chapters:

1

PROCESS

Explains the planning process for AAIM by giving an overview of the project timeline, Oversight Committee, and public engagement.



2

VISION & GOALS

Introduces the driving vision and goals for the plan and explains how they were developed.



3

THOROUGHFARE NETWORK

Reviews the existing conditions of the study area's roadway network and recommends a regional Thoroughfare Plan for adoption.



4

SAFETY

Analyzes crash data to identify hot spots in the study area and provides recommended improvements to those areas.



5

BICYCLE & PEDESTRIAN

Provides enhanced network recommendations and an implementation toolbox for bicyclists and pedestrian in the study area.



6

TRANSIT, FREIGHT, & AVIATION

Reviews how these modes are currently affecting the region and how they should plan to expand in the future.



7

EMERGING TECHNOLOGY

Introduces how current innovations in traffic control and data can best be integrated into the region's practices.



8

IMPLEMENTATION

Summarizes the recommendations made in each chapter into one Implementation Matrix that specifies the timeline and responsible parties for each action.



CHAPTER 1: PROCESS



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COMMUNITY ENGAGEMENT

OVERSIGHT COMMITTEE & STAKEHOLDER MEETINGS

Amarillo Area in Motion's development was guided by a Project Oversight Committee which was structured to incorporate a diverse group of stakeholders in the MPO's area. Agencies represented in the Oversight Committee included the City of Amarillo, the City of Canyon, Randall County, Potter County, the Panhandle Regional Planning Commission (PRPC), and the Texas Department of Transportation (TxDOT). During the development of AAIM, seven Oversight Committee meetings were held to provide direction, feedback, and approval of various elements of the plan. A timeline of the Oversight Committee meetings is shown in **Figure 1-1**.

In addition to the Oversight Committee, other stakeholders were consulted during the planning process to provide direction on the plan's vision and goals. These stakeholders include the Amarillo MPO's Transportation Advisory and Policy Committees, Amarillo City Transit, TxDOT, and the public.

PUBLIC ENGAGEMENT

Residents of the Amarillo MPO were given the opportunity to provide feedback through a project website and two public open houses, one in January 2021 and one in [Insert Open House 2 Date]. The project website, created using *Social Pinpoint*, provided the public with a map survey that allowed users to place comments geographically on a map of the region, and a written survey that contained prompts on residents' mode choices and project preferences.

The results of the map survey can be found on page 9 and the written survey on page 10. These two surveys provided important context as to where residents wanted to see multimodal improvements prioritized, and what barriers existed for users on the current network.

- March 2020
- OC Meeting #1**
- Kick-Off & Branding

- June 2020
- OC Meeting #2**
- Social Pinpoint Walkthrough
 - Priority Corridors

- September 2020
- OC Meeting #3**
- Existing Conditions Report
 - Policy Framework

- November 2020
- OC Meeting #4**
- Thoroughfare Plan
 - Multimodal Strategy

- December 2020
- OC Meeting #5**
- Draft Chapters 1 & 2

- February 2021
- OC Meeting #6**
- Draft Chapters 3 - 6

- April 2021
- OC Meeting #7**
- Final Plan Review

Figure 1-1: Oversight Committee Meetings

MAP SURVEY RESULTS

The map survey portion of the public feedback initiative was open from June 2020 to January 2021 and provided users the opportunity to provide comments on the state of mobility in the study area. Users were asked to provide comments relating to one of the following eight categories: new road connections, new bicycle routes, new sidewalks, new transit stops, roadway safety problems, roadway congestion problems, intersection-related problems, or other. **Exhibit 1** shows a map of all submitted comments and **Figure 1-2** shows more detailed information on the feedback provided.

Figure 1-2: Map Survey Results

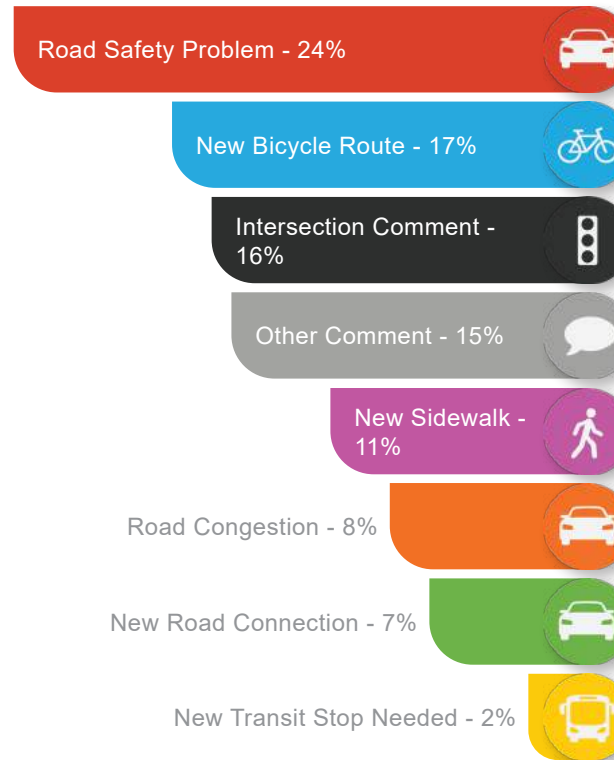
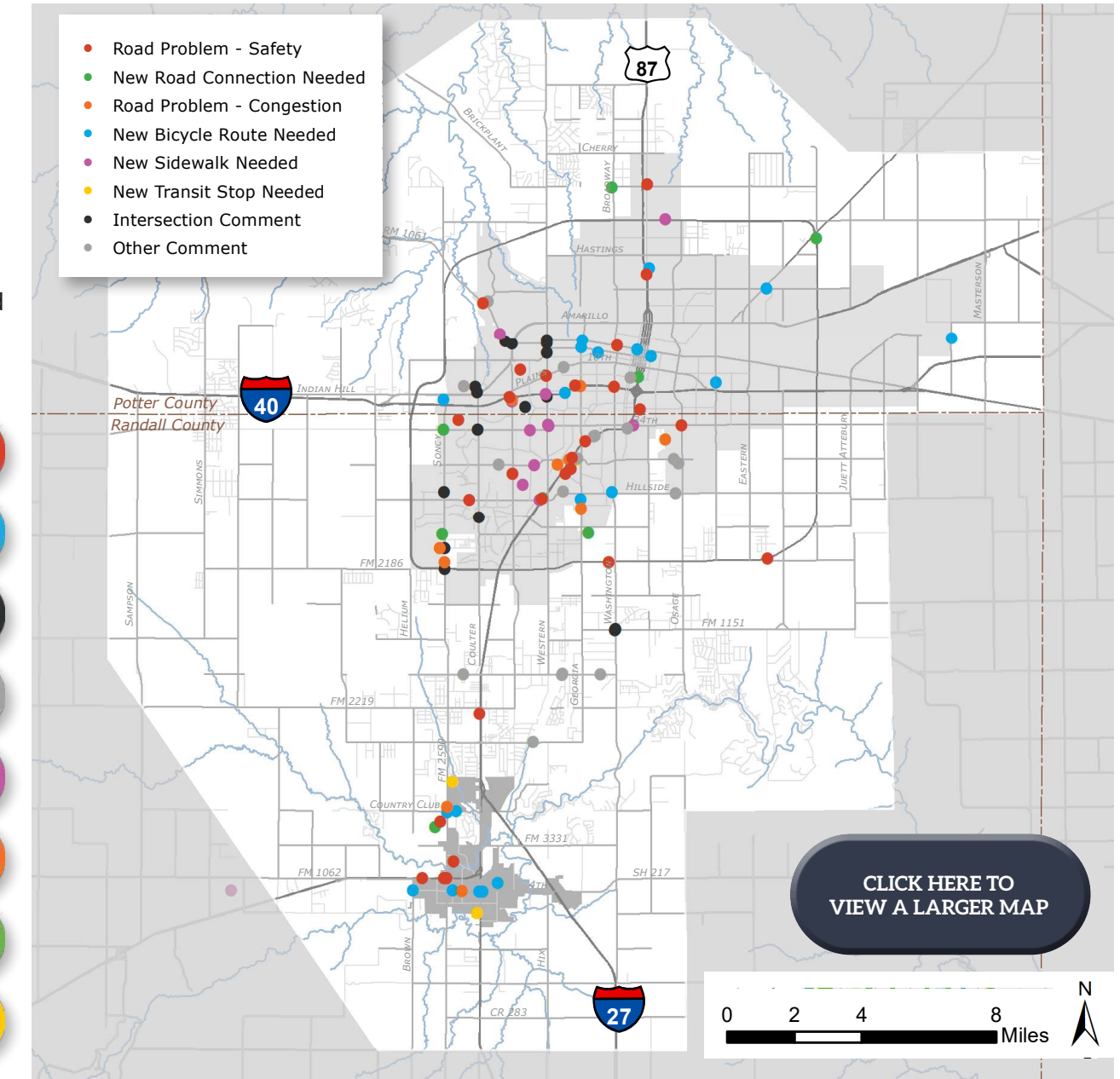


Exhibit 1: All Social Pinpoint Map Survey Comments



SOCIAL PINPOINT WRITTEN SURVEY

The written survey provided on the *Social Pinpoint* website acted as a companion to the map survey by providing residents with an opportunity to provide more specific feedback. Responses were limited to one per resident by requiring the user to provide their email address upon submission. The survey consisted of 19 questions focused on respondents' demographics, travel patterns, mode preferences, and project prioritization preferences.

Figure 1-3 summarizes some key takeaways from the written survey results.

Figure 1-3: Written Survey Results

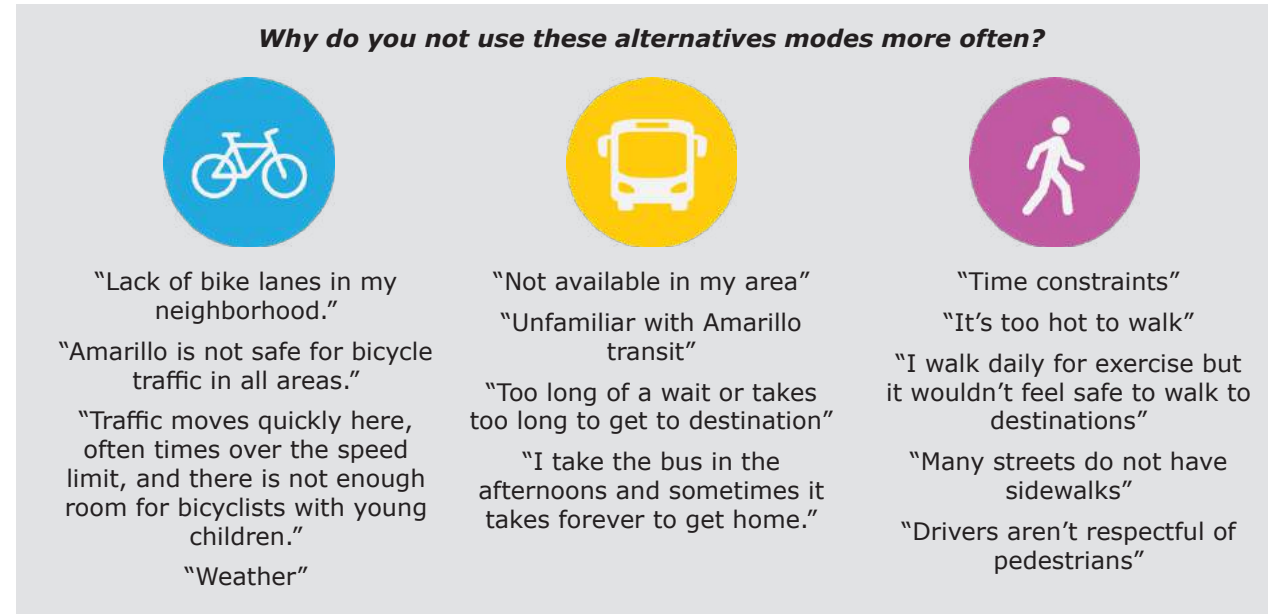


Figure 1-4: Photo from Open House 2



OPEN HOUSE EVENTS

The Open House events were hosted virtually on *Social Pinpoint* to present the progress of the plan to residents of the study area. Open House 1 was open to the public online from January 18-31, 2021 and presented the final Existing Conditions Report and the preliminary thoroughfare plan and bicycle network.

The second Open House event was held in-person in Amarillo on June 21st and in Canyon on June 22nd, 2021. This provided the public with an opportunity to preview the final draft document and provide comments before adoption in early July. For this round of public involvement, a virtual version was also made available to the public from June 15-29.

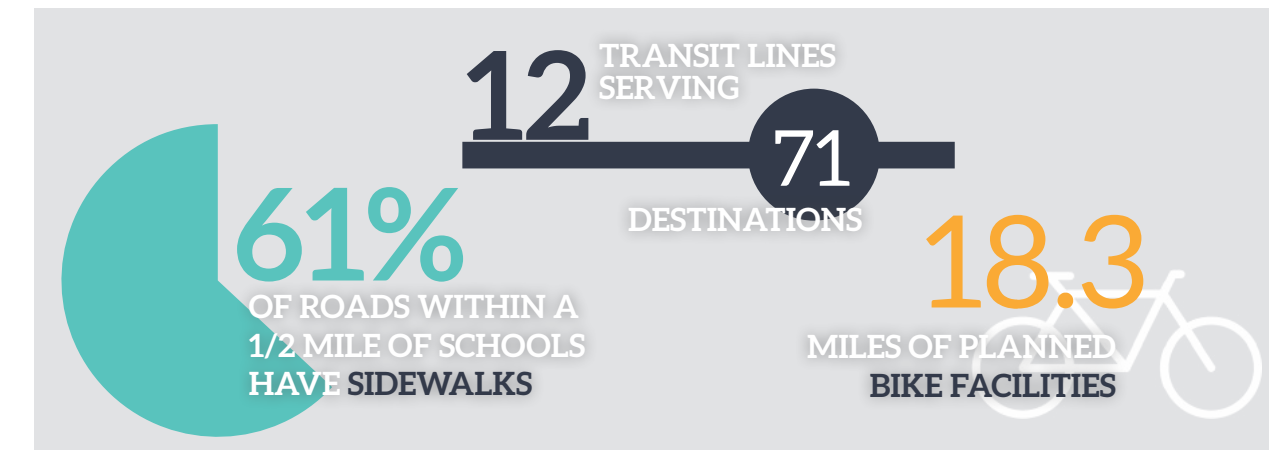
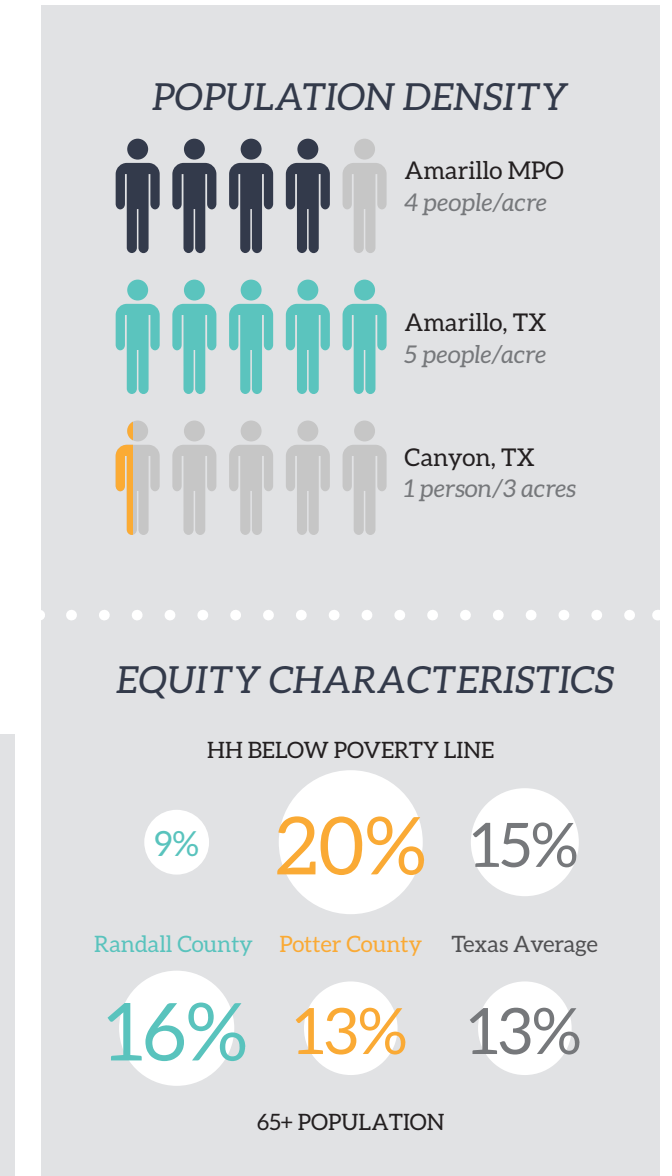
EXISTING CONDITIONS REPORT

The Existing Conditions Report was completed in October 2020 as an introductory document to the final plan. It is organized into two sections: History of Past Plans and State of the Region.

The first section of the report, History of Past Plans, reviews and summarizes twelve of the latest plans adopted throughout the region (**Figure 1-6** on page 12). These plans varied in scope from the statewide 2018 TxDOT Bicycle Tourism and Trails Study to a single neighborhood like the 2020 San Jacinto Neighborhood Plan. Each of these plans analyzed mobility gaps within the region and identified goals and action items supported by members of the public. By beginning the planning process with a review of these plans, the project built upon previous planning efforts throughout the region.

The State of the Region section of the report provides context on the existing conditions of several topic areas in the region. The topics covered in this section include population growth and density, vehicular safety and crashes, equity, schools, and the state of each transportation network covered in the final plan (thoroughfares, sidewalks, bicycle facilities, transit, and freight). **Figure 1-5** lists the major conclusions made during the State of the Region data analysis.

Figure 1-5: State of the Region Conclusions



CHAPTER 2: VISION & GOALS



PROJECT TIMELINE

An overview of the committee meetings, public engagement events, and other major project milestones is shown in the graphic below:



Plans Reviewed for the Existing Conditions Report:

- Amarillo Urban Mobility Plan (2006)
- City of Amarillo Downtown Strategic Action Plan (2008)
- City of Amarillo Comprehensive Plan (2010)
- Downtown Amarillo Design Standards (2010)
- Regionally Coordinated Public Transportation Plan (2017)
- North Heights Neighborhood Plan (2017)
- Texas Bicycle Tourism and Trails Study (2018)
- City of Canyon Comprehensive Plan (2018)
- West Texas A&M Campus Master Plan (2018)
- Barrio Neighborhood Plan (2018)
- Amarillo College Master Plan (2019)
- San Jacinto Neighborhood Plan (2020)

Figure 1-6: Past Plans List



VISION & GOALS

VISION DEVELOPMENT

The first step to creating a long-range plan is to establish a unifying overall vision. In the planning process, a vision is a statement that provides an image of the future the plan is working towards. The vision for AAIM was created by the Oversight Committee and approved by regional stakeholders.

"Amarillo Area in Motion seeks to establish a safe, comfortable, and connected multimodal transportation network and uses technology to provide a high level of service for all users."

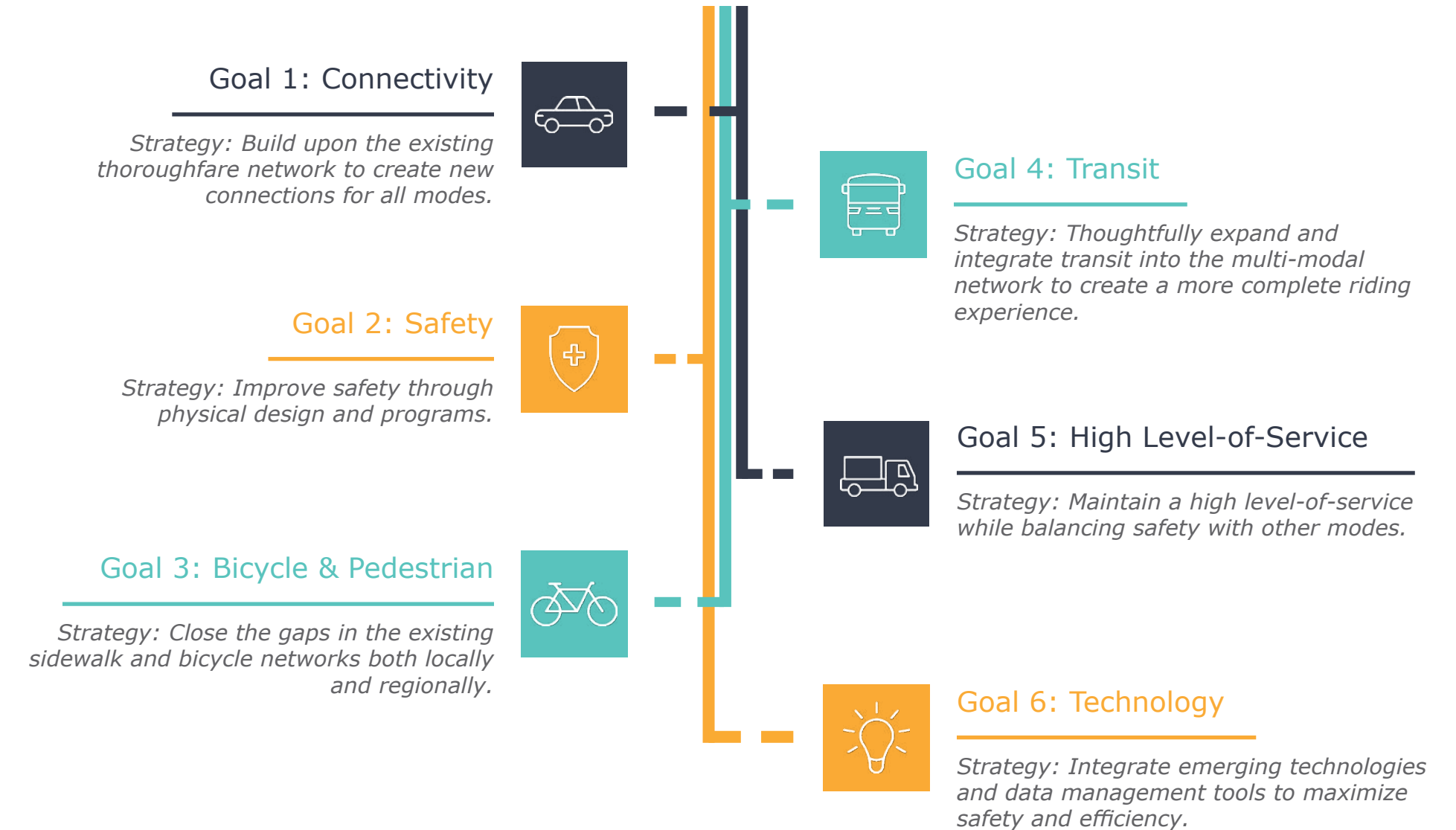
POLICY FRAMEWORK

Once the vision was established, the rest of the policy framework for the plan was built to support it. Since AAIM is a transportation plan that covers all modes and users, the vision was further refined into six goals that cover important subject areas of a multimodal plan. Each goal is supported by a list of objectives and actions as well as an over-arching strategy that summarizes these items. The relationships between the policy framework elements are shown in the graphic on page 15. The six goals for the Amarillo Area RMMP are:

1. **Connectivity** - A well-connected network of regional thoroughfares
2. **Safety** - Safe facilities for all modes
3. **Bicycle & Pedestrian** - A complete and comfortable bicycle and pedestrian network
4. **Transit** - Integrated transit
5. **High Level-of-Service** - Efficient travel for all modes of transportation
6. **Technology** - Innovative design and technology

More information on each goal's objectives and actions can be found in the subsequent chapters of the plan. A full overview of the plan's policy framework can be found in Chapter 8, where each goal, objective, and action are organized into one Implementation Matrix.

*"Amarillo Area in Motion seeks to establish a **safe**, comfortable, and **connected multimodal** transportation network and uses **technology** to provide a **high level-of-service** for all users."*



CHAPTER 3: THOROUGHFARE NETWORK



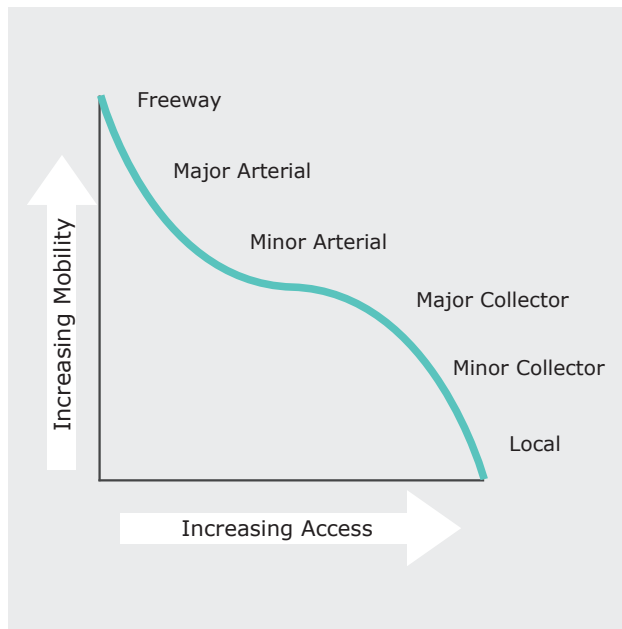
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INTRODUCTION

A thoroughfare network plan is an important tool that allows planning agencies to preserve future roadway corridors and acquire the necessary right-of-way to establish the region's thoroughfare network. To best serve the Amarillo Area MPO's future multi-modal transportation network, the development of this plan included a review and update of future thoroughfare alignments and classifications. This updated thoroughfare plan establishes the foundation for the expansion of the region's bicycle, pedestrian, transit, vehicular, and freight networks, and provides the starting point for developing recommended improvements to existing facilities.

Figure 3-1: Conceptual Roadway Functional Hierarchy



Source: FHWA

The first section of this chapter reviews the region's existing Thoroughfare Plan and examines the growth that has happened in the region since its adoption. This background information is essential in determining where investments in new infrastructure should be prioritized. The process for updating this thoroughfare plan is then described to provide understanding of the relationship between the current and proposed thoroughfare plans. The Thoroughfare Plan is comprised of two sets of recommendations: the thoroughfare plan network map and the proposed roadway cross sections. The network map identifies where future roads should be built as well as identifying the functional classification of each road. The goal of a roadway classification system is to balance the two major needs of roadway users:

- **Mobility** - the need to move large distances
- **Access** - the need to reach destinations

Roadway classification levels range from high mobility/low access highways to low mobility/high access local roads. **Figure 3-1** shows the relationship between mobility and access in a functional classification system. Having a well-defined hierarchy in a road network helps to streamline the design standards for roadways, making it easy to navigate for users.

A list of objectives and actions is presented in the final section of this chapter. While the Thoroughfare Plan itself presents a complete vision for the future of the region's roadway network, those listed actions are recommended for the MPO to initiate to support the plan's implementation and relevance.

EXISTING THOROUGHFARE PLAN

The Amarillo MPO Thoroughfare Plan was created during the MPO's transportation plan development. It established five road classifications: freeways, expressways, arterials, collectors, and local roads. The goal of this initial plan is to combine both the City of Amarillo and the City of Canyon's thoroughfare plans into one network for the region, and to ensure that the areas outside of the two cities are being accounted for as well. The Amarillo MPO's existing thoroughfare plan is shown in **Exhibit 2** on page 19.

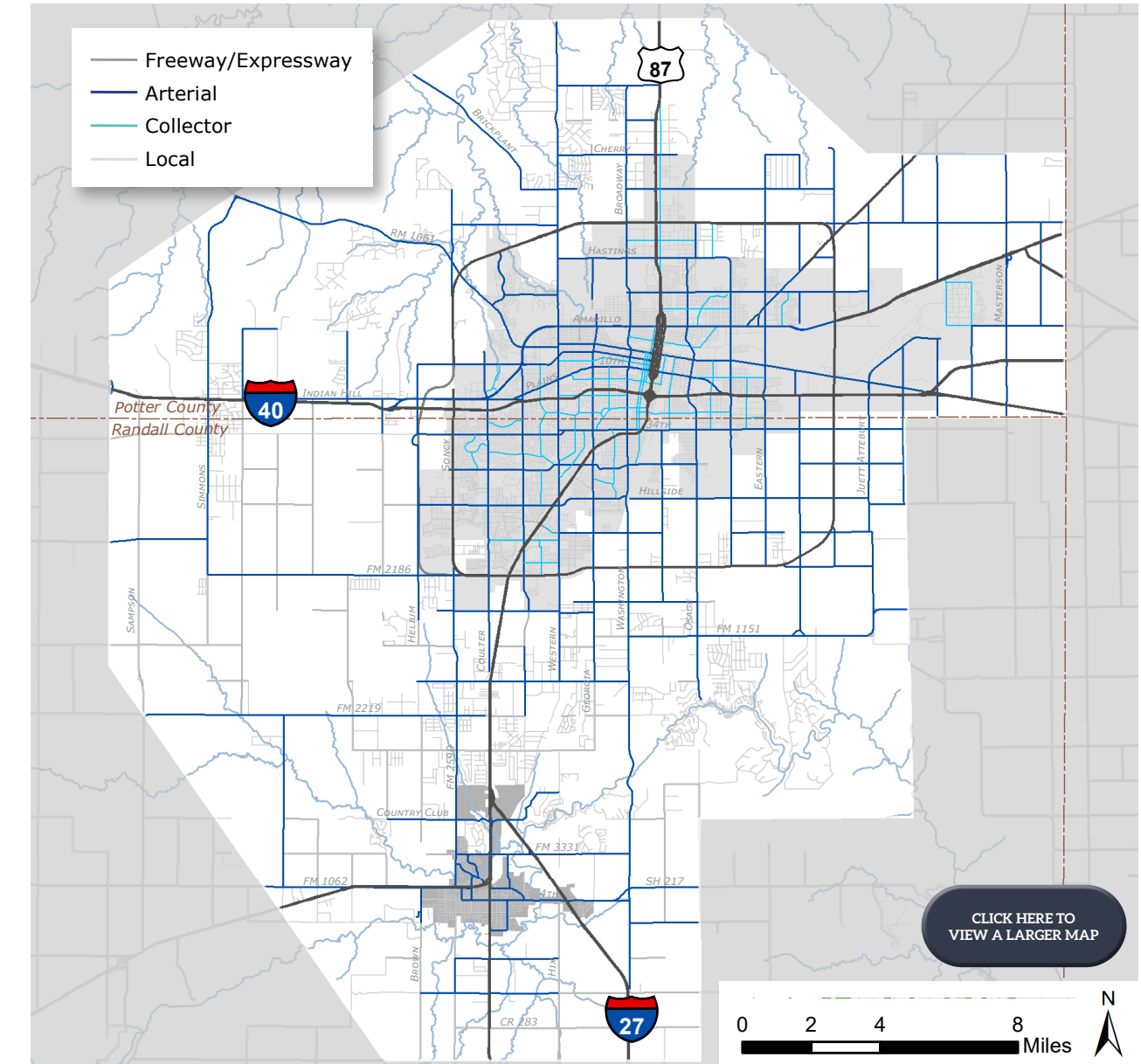
One of the items addressed in the update includes splitting the arterial classification into two subclasses: Primary and Secondary Arterial. This allows for future road projects to be better prioritized, as it provides clarity as to which roads are truly "primary" in their use, thus requiring more investment or attention. Additionally, more roads in the county areas were added to the MPO's thoroughfare plan as arterials. This establishes a stronger road hierarchy system in the rural areas to better suit the future context of these roads as development continues in the future.

One major strength of this plan and in the Amarillo MPO's road network is the consistent use of a large grid pattern in its arterials. Grid networks allow for more flexible route options, allowing traffic to disperse easily across the network. Additionally, a grid street network is more pedestrian friendly allowing pedestrians to navigate and connect homes to destinations more easily than in a

curvilinear street network. The geometry of a city's road network is a difficult thing to correct if it's not done well when it is first built. Therefore, the established grid street pattern in the Amarillo region is a major strength that is easy to build upon during the thoroughfare plan update process. Furthermore, one of the major updates in the new thoroughfare plan includes expanding this grid network out in the county areas, creating more possible routes between the major cities in the region.

The final major change made during the thoroughfare plan update process was to eliminate 90-degree bends on continuous rural roads. These types of sharp turns done at high speeds with no intersection control are a safety risk for users, especially when they are not expected by the driver. To prevent these issues in the future, many of these sharp bends are split-up and replaced with an intersection instead.

Exhibit 2: Existing Thoroughfare Plan

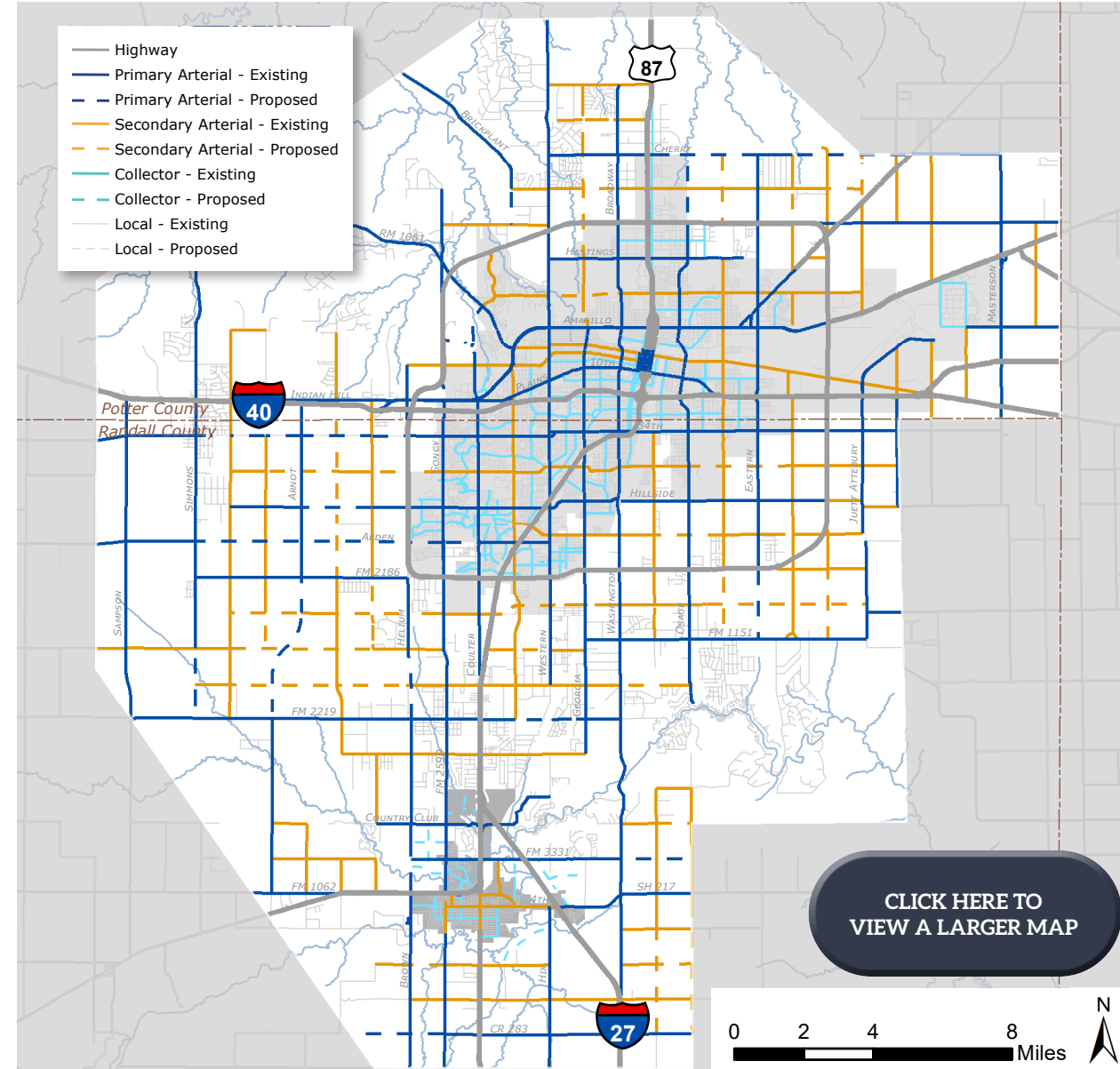


PROPOSED MASTER THOROUGHFARE PLAN

As mentioned in the previous section, the existing thoroughfare plan identified four road classifications ranging from Freeways to Local roads. For the thoroughfare plan update, these same classifications are used to organize the MPO's roads into a hierarchy system. At the beginning of the updating process, the roads within the two major cities were modified to match their most recent thoroughfare plans. After that was done, the next step was to evaluate how these new networks interacted on a regional scale, and how to improve these connections.

Special attention was given to the northwestern section of Randall County, as it is currently experiencing new development bleeding out from the southwest portion of Amarillo. The new Proposed Master Thoroughfare Plan for the Amarillo MPO region is shown in **Exhibit 3**.

Exhibit 3: Proposed Thoroughfare Plan



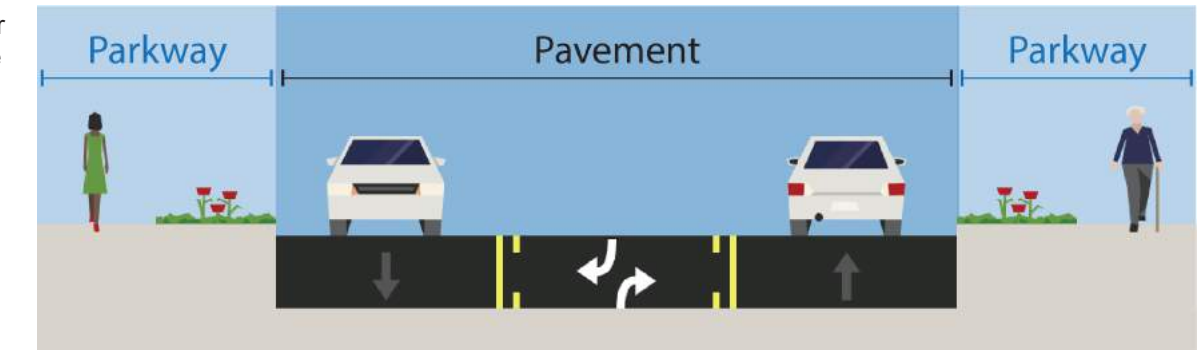
CROSS SECTIONS

In addition to identifying where new roads should be built, a Thoroughfare Plan also aims to improve the roadway network by designing cross sections for each road classification. The proposed thoroughfare plan for the region has three road classifications to design sections for: Primary Arterial, Secondary Arterial, and Collector. Highways and Freeways are also important to design for, however, these roads are owned by the Texas Department of Transportation (TxDOT), not the local jurisdiction. All other roads shown in the thoroughfare plan are classified as local and do not have any planned expansions.

RIGHT-OF-WAY

It is important to consider that a standard right of way (ROW) width is assumed for each road classification, however, not every road may have this ROW reserved today. By adopting these standard designs and widths, the MPO can plan ahead for future projects and acquire the necessary ROW in advance of a road's expansion. Additionally, just because a roadway does not currently match its proposed cross section does not mean that it should be modified right away. It simply means that if traffic grows to a point that necessitates an expansion, there is a plan in place to ensure that future widening projects are approved and built efficiently.

Figure 3-2: Cross Section Components Diagram



CROSS SECTION COMPONENTS

When designing a road's cross section there are two sections of the roadway to consider: the pavement and the parkway (**Figure 3-2**). The pavement section refers to the portion of the road that exists on the inside of the curb. This area is reserved mostly for motorized vehicles such as cars or buses. In some cases when traffic volumes are lower, there may also be bicycle facilities or on-street parking planned within the pavement section. Medians are also an important tool used within the pavement section that increase separation between the two directions of traffic, therefore improving the feeling of safety for its users.

The parkway area of a cross section refers to the area outside the curb to the edge of the ROW. This area tends to be more flexible in its design as there is a wider range of facilities that can be built

in this area. Because of this, the Amarillo MPO's thoroughfare plan reserves the parkway area of the standard cross sections as flex space. For this flex space there are four possible utilization options: sidewalk, transit stop, separated bike lane, or sidepath (**Figure 3-6** on page 23). As the name suggests, the choice of which option to use is flexible and will likely vary project to project. In addition to these facilities, extra parkway width will sometimes be needed for additional utilities or drainage. When available, extra width should be acquired in the parkway to ensure that all of these elements can be accommodated in the final roadway design. The proposed roadway cross sections, as well as these flex space options for the Thoroughfare Plan are shown on page 22.

PRIMARY ARTERIAL

Primary Arterials provide mobility to nearby areas outside the city while also providing access to major developments. Within the MPO, these roads act as the spines of the network, forming a large grid that allows users to move long distances within the region. They have the highest need for access management since they are carrying the largest volumes of vehicles. **Figure 3-3** shows an example of how Primary Arterials fit into the layout of a typical regional area.

Both the standard and rural cross sections for Primary Arterials reserve 120 feet of total ROW (**Figure 3-6** on page 23). In the standard section, there are 6 travel lanes and a 16-foot median laid out across 92 feet of pavement width. The remaining 14 feet of parkway in the standard cross section design is reserved as flex space. The rural cross section design for Primary Arterials also includes a 16-foot center turn lane or median but has 4 travel lanes instead of 6. The rural section also differs by having an 8-foot paved shoulder in lieu of curb and gutter. Lastly, the remaining 20 feet of parkway width are reserved mostly for drainage.

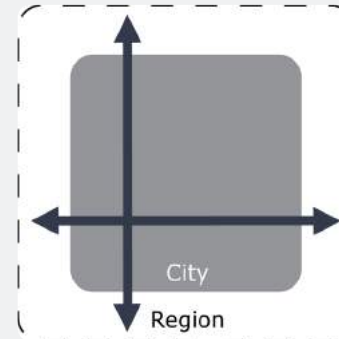


Figure 3-3: Primary Arterial Diagram

SECONDARY ARTERIAL

Secondary Arterials provide connections between major developments and neighborhoods and are best suited for roads with moderate speeds. The purpose of a Secondary Arterial in the road network is to connect neighborhoods and developments to the Primary Arterials. These roads tend to provide balance between mobility and access, usually accommodating both in their design, sometimes necessitating access management at major intersections. **Figure 3-4** shows an example of how Secondary Arterials fit into the layout of a typical urban area.

The cross sections for Secondary Arterials are laid out within 120 feet of total ROW width (**Figure 3-6** on page 23). The standard cross section is a 4-lane divided design with 16 feet of flex space and 10 feet of drainage and utility space on each side. For the rural cross section, the 16 feet in the middle is reserved temporarily as a center turn lane with 2 travel lanes on each side. This rural section, like the Primary Arterial, has an 8-foot paved shoulder and a drainage area in the remaining parkway width. The rural secondary arterial reserves 120 feet of ROW for future expansion to four lanes, but it is likely this expansion will happen when an urban section is created.



Figure 3-4: Secondary Arterial Diagram

COLLECTOR

Roads that are used primarily to connect users within neighborhoods are classified as Collectors. Collectors provide a high amount of access but a low amount of mobility compared to arterials or highways. Access management is less of a priority on these roadways because they are lower in speed and ROW width. **Figure 3-5** shows an example of how collectors fit into the layout of a typical neighborhood area.

Both of the cross sections for collectors are laid out within 80 feet of ROW. The standard cross section is 3-lane undivided with 9 extra feet on the outside that can be used either as on-street parking or as a buffered bike lane. The rural cross section is a 2-lane undivided design with 4-foot paved shoulders. The remaining 23.5 feet of parkway width is reserved for drainage. **Figure 3-6** on page 23 shows the standard and rural cross sections for Collector roads.

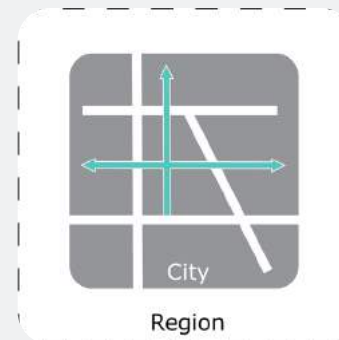


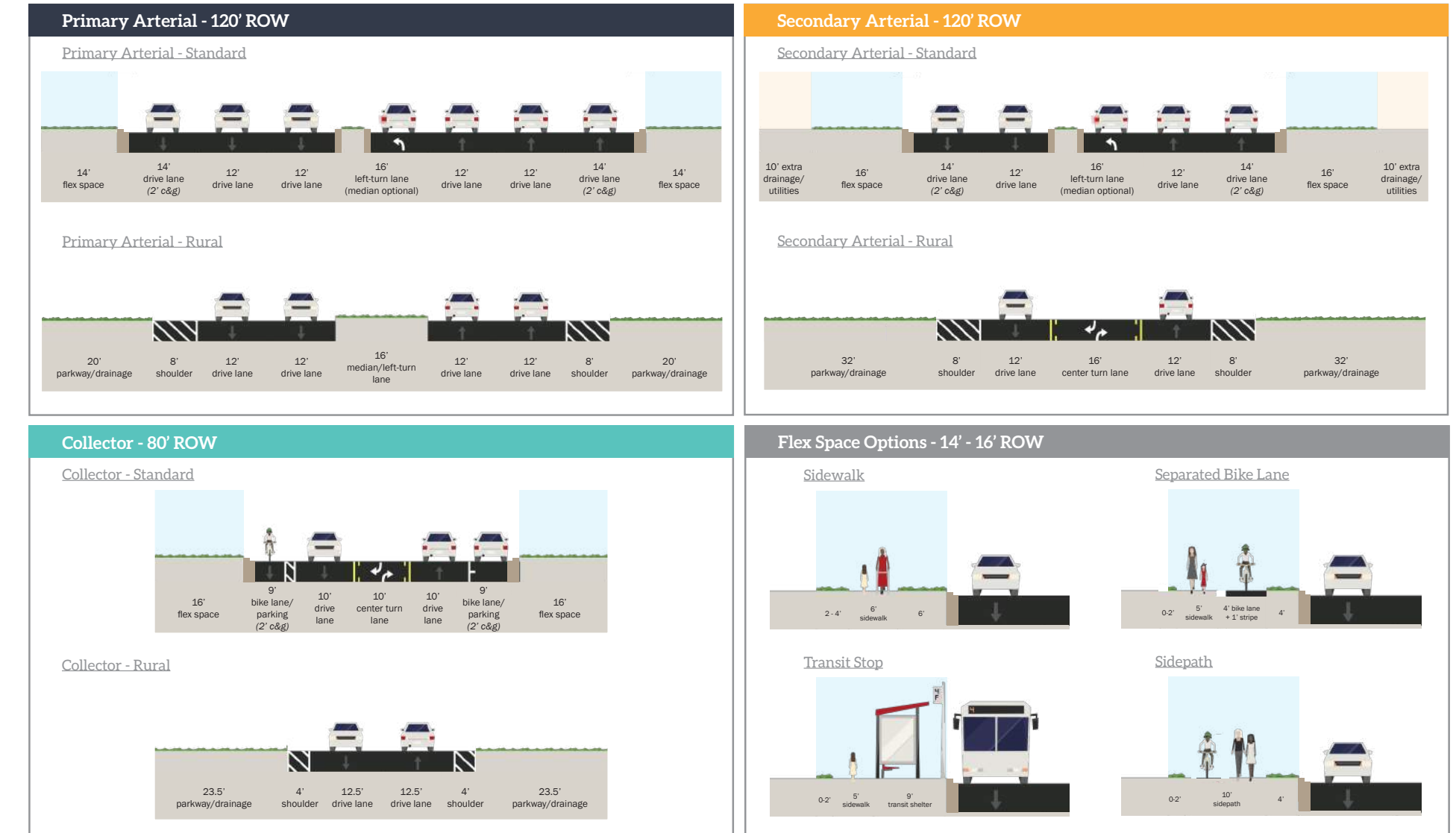
Figure 3-5: Collector Diagram

FLEX SPACE

As mentioned previously, the parkway portion of the proposed standard cross sections is reserved as flex space. This approach provides multiple options for multi-modal facilities that all fit within the same amount of ROW. In total, four flex space options were designed for the thoroughfare plan with the following transportation facilities in mind: sidewalk, transit stop, separated bike lane, and

sidepath. Between all three road classifications, this flex space is either 14 or 16 feet wide. The layouts for each of these flex space options are shown in **Figure 3-9**. As mentioned previously, the parkway width is also needed for utility and drainage purposes, meaning that extra width may sometimes be necessary in order to fit everything in the parkway. When new roadways are being designed, coordination with these utility agencies will be necessary to ensure that all of these considerations are being met.

Figure 3-6: Thoroughfare Plan Cross Sections



CONTEXT SENSITIVE DESIGN

The Amarillo MPO region is made up of many different contexts and land uses ranging from urban to rural. Due to the fact that specific roadway designs are not suitable for every context, it is important to always take a road's context into consideration before approving its final roadway design. To account for road context, each classification's cross section has two versions, standard and rural. The standard cross section is meant to be the ultimate design, however, for many of the roads outside of the cities of Amarillo and Canyon, this design may provide too much capacity compared to its current needs. For these roads, the rural cross section applies better as a middle point to expanding the roadway. In turn, by not over-building these roadways overall project costs are reduced, allowing the extra savings to be reserved for other projects that may be needed in the future.

In addition to the alternate rural roadway design, context is further explained in the following sections. These sections identify common land use contexts in the region as well as their unique design attributes. As mentioned previously, these contexts should always be considered before a new roadway project's design is approved to ensure that the proposed improvements are appropriate for the road's current function.



DOWNTOWN CONTEXT

Streets located in the downtown areas of the Amarillo MPO are oriented more around their destinations. They are typically retail-oriented, with more generous parkway widths that prioritize pedestrians over vehicles. Speed limits are lower and lane widths are narrower than standard streets to encourage drivers to exercise caution in these areas. While the height of buildings varies within downtown, building facades are typically located at the edge of the right-of-way creating a more urban character. On-street parking is permitted as well to allow drivers to access destinations more easily.



NEIGHBORHOOD CONTEXT

Neighborhood context streets serve the purpose of getting users to and from their homes. They typically have more travel lanes and width than the standard section to accommodate the heavier traffic volumes that occur during the AM and PM peak hours. Neighborhood streets should have ample landscaping that compliments the character of the residential developments, and commercial buildings are typically lower scale and set back from the street creating a more suburban character. Bicycle and pedestrian facilities should also be prioritized in these areas for residents to use recreationally.



INDUSTRIAL CONTEXT


On roads located in an industrial context, many aspects of the cross section will change. The buildings in these areas are low in scale but with a large footprint and a large setback from the road to allow for trucks to have ample space. The lane widths and driveway widths of these roads should be widened to accommodate these trucks, and outside lanes should be even wider for turning movements or possible on-street parking. For access purposes, all roads should have an undivided cross section. If more room is needed to accommodate these modifications, extra width can be taken from the flex space, as there is less demand for bicycle and pedestrian facilities compared to a residential area.

OBJECTIVES & ACTIONS

During the development of AAIM, several goals were developed to establish intentions for each section of the final plan. The purpose of these goals was to ensure that the plan itself has a life beyond its adoption. The implementation phase is the most important part of any long-range plan, so it is important that any resulting objectives and actions are carried out after the plan is adopted.

This process began with determining high-level goals as themes for the plan. A strategy was then identified for each one to further explain how the plan would approach each of the goals. Multiple objectives were agreed then upon that focus on several of the possible problems each goal would need to address. Finally, for each objective, a list of actions was developed to specify step-by-step how the MPO would achieve these objectives.

The Thoroughfare Plan portion of the project is centered around Goal 1, Connectivity. This goal aims to achieve a well-connected network of regional thoroughfares by building upon the existing thoroughfare network to create new connections for all modes. The objectives and actions for Goal 1 are listed in the table to the right.

Goal 1. Connectivity - A well-connected network of regional thoroughfares Strategy: Build upon the existing thoroughfare network to create new connections for all modes. 	
Objective 1.1. Utilize multimodal design and connectivity as an emphasis when planning and designing new thoroughfares.	Action 1.1.1. Prioritize new road constructions that builds upon the existing grid network of regional thoroughfares. Action 1.1.2. Incorporate context-sensitive roadway design by considering the relationships between land use and transportation.
Objective 1.2. Incorporate multimodal design into the existing thoroughfares.	Action 1.2.1. Identify and redesign thoroughfares that can be retrofitted to include multimodal facilities, including opportunities for right-sizing roadways with excess vehicular capacity. Action 1.2.2. Identify areas where right-of-way can be acquired to connect critical multimodal facilities. Action 1.2.3. Update existing design standards to include consideration for land use context and multimodal elements such as bike lanes, sidewalks, and transit facilities.
Objective 1.3. Develop an access management policy for commercial corridors in Amarillo & Canyon.	Action 1.3.1. Identify future candidate corridors for raised median installation. Action 1.3.2. Develop revised access spacing criteria and right-turn lane requirements to ensure more connected multimodal facilities along major roads. Action 1.3.3. Emphasize providing cross access for commercial properties instead of additional driveways.

CHAPTER 4: SAFETY



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CRASH STATISTICS & TRENDS

Figure 4-1 shows the number of crashes per year from 2015-2019, along with the fatality rates of all crashes both within the MPO and the State of Texas. The first set of data shows an upward trend of crashes with 5,569 occurring in 2015 and 6,575 in 2019. The only year where this total crash number went down from the previous year was in 2017. One interesting trend to note is that in 2019, the highest year for number of crashes, the fatality rate was not the region's highest. This trend should be maintained, because while the number of crashes is directly linked to an area's population

size, the number of resulting fatalities from these crashes is something that can be prevented through countermeasures. Compared with the state of Texas, the fatality rates in the Amarillo MPO were similar, except in 2016 where Amarillo's fatality rate was 0.11% higher than the state's overall. This was the MPO's highest rate and has continually decreased since then.

In addition to studying trends in the MPO's crash rates, it is also important to understand the common contributing factors of crashes. **Figure 4-2** shows

the top five common contributing factors for crashes in the study area. According to this data, the most common contributing factor was slowing/stopping, or rear-end collisions.

INTRODUCTION

For residents in the study area, safety is their number one priority. According to the Center for Disease Control (CDC), motor vehicle crashes are a leading cause of death in the United States, accounting for more than 35,000 fatalities in the last year. To ensure that safety concerns in the region's network are addressed comprehensively, this chapter and resulting set of goals has been established for the purpose of addressing safety.

The first step in addressing safety for the Amarillo MPO was to conduct an analysis on the region's crash history from the last five years (2015-2019) including both crash severity and leading causes of crashes. This analysis helped the project team understand the existing state of safety for the region, as well as what projects and policy recommendations would best solve these safety

problems. During this process, two crash heat maps were created: one for all crashes in the study area and another for just bicycle and pedestrian-related crashes. These maps were then used to identify what areas of the region had the highest need for safety investments.

The recommendations for this chapter are split into three sections: Intersection Safety Countermeasures, Regional Improvements, and the Objectives and Actions. Each of these sections identifies different ways the MPO can approach the problem of safety through either projects, programs, or policies. All three sets of recommendations are important individually, but combined they provide a comprehensive strategy for the region to improve its transportation network and protect the safety of area residents.

FOR RESIDENTS IN THE STUDY AREA, SAFETY IS THEIR NUMBER ONE PRIORITY:

- 68% of survey respondents ranked **SAFETY** in their top 2 project priorities
- About 40% of map survey comments included the words **"SAFETY"** or **"DANGEROUS"**

Figure 4-1: Crash Trends by Year (2015-2019)

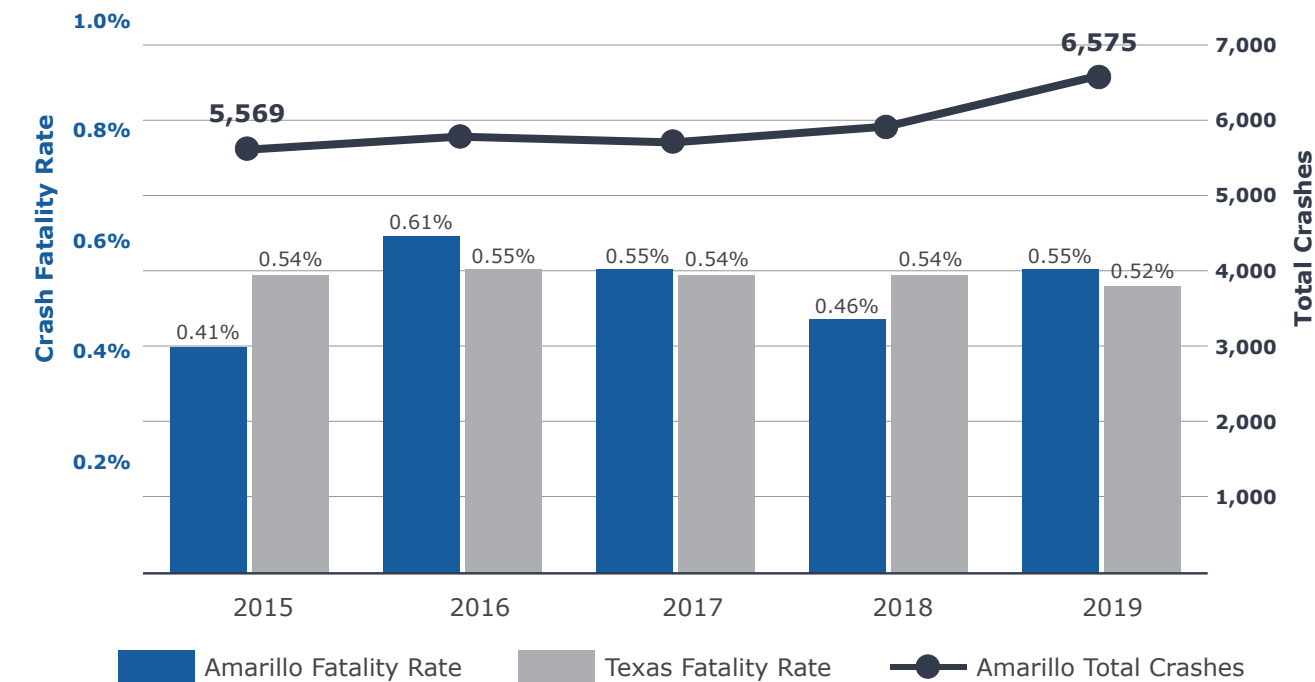
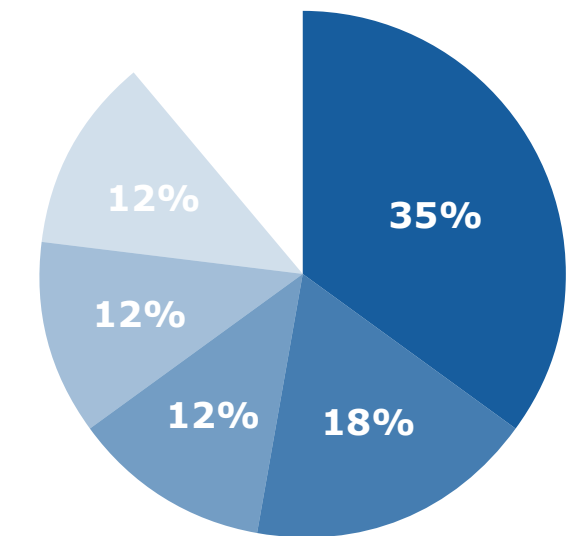


Figure 4-2: Leading Factors of Crashes



1. Slowing/Stopping (35%)
2. One Vehicle (18%)
3. Attention Diverted (12%)
4. Passing or Changing Lanes (12%)
5. Construction (12%)

CRASH HEAT MAPS

Exhibit 4 shows the heat map that was created from all crashes reported in the study area in the last five years. When looking at the results, one clear pattern that emerges is the clustering of crashes at the intersections of main arterials, especially around high-volume highways. Because of this trend, it was determined that intersection safety countermeasures should be a priority in the plan's recommendations. While most of the darkest spots on the heat map seem like the most likely candidates for these countermeasures, it is important to note that this crash heat map does not take the manner of collision into account. The next section of this chapter explains in further detail how the intersection project locations were selected.

The locations of bicycle and pedestrian crashes were also an important piece of information for this multimodal plan, so a second heat map was created with just crashes involving these modes (**Exhibit 5** on page 31). From this map, it is easier to pick out corridors within the study area that have the highest crash rates. These corridors were discussed when drafting the future bicycle network and what amount of separation these facilities should have. Additionally, the darkest area on this second heat map, Amarillo Blvd, was chosen to be a pedestrian priority area. This means that extra attention was given to this corridor and specific improvements are recommended to enhance the safety and comfort of pedestrians. More information on the proposed bicycle network and these pedestrian priority areas can be found in Chapter 5, beginning on page 39.

Exhibit 4: Vehicular Crash Heat Map

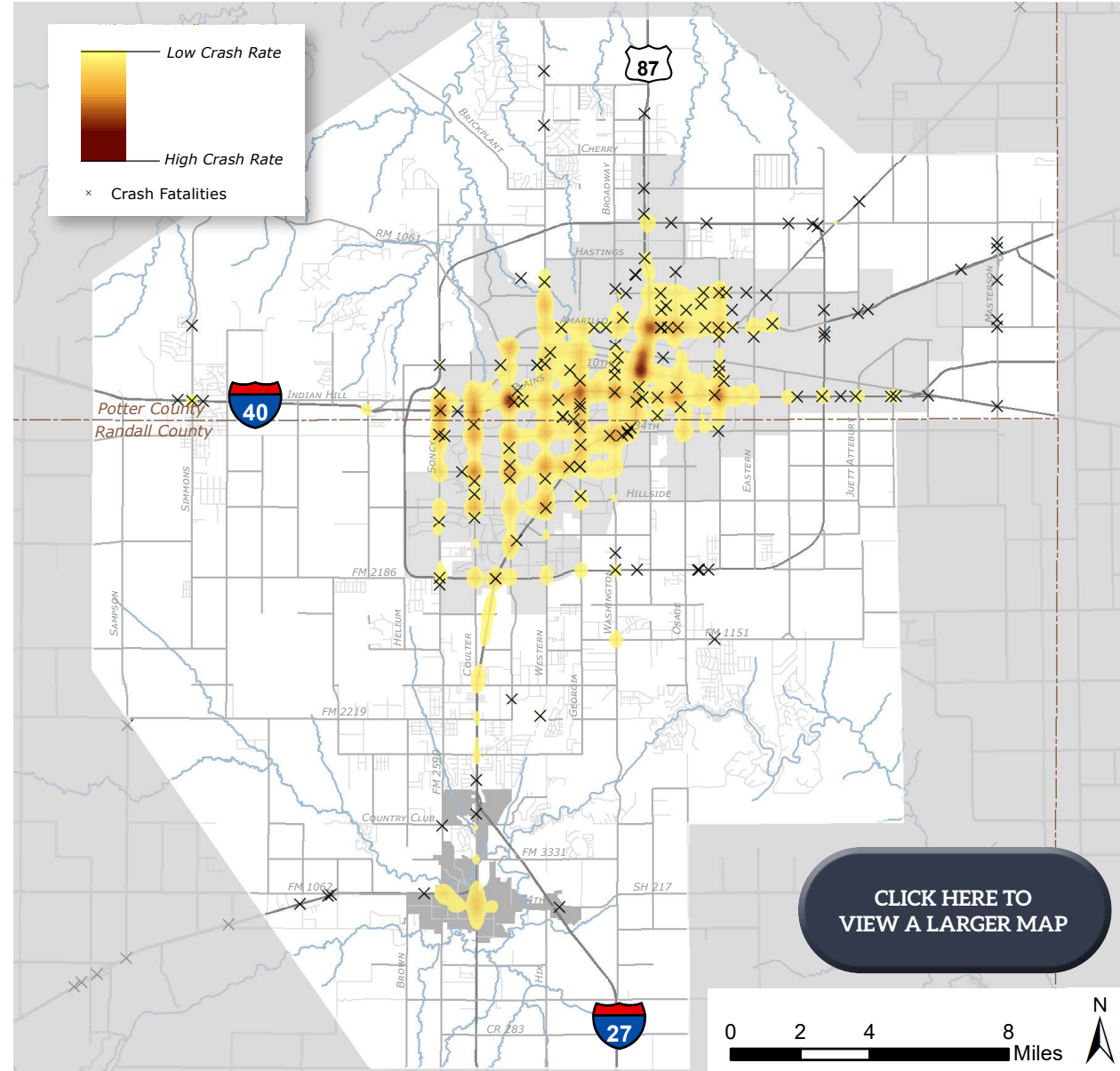
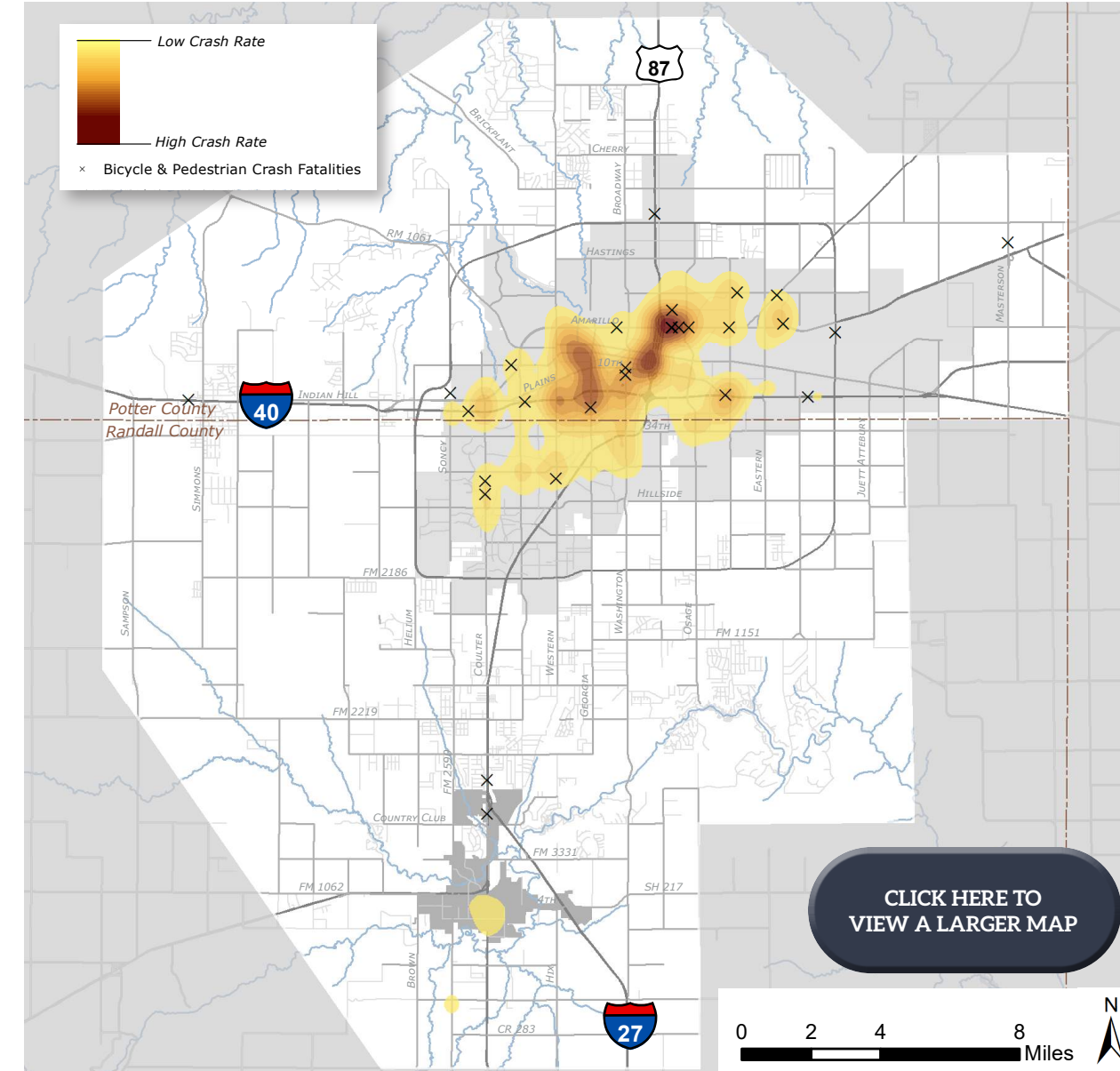


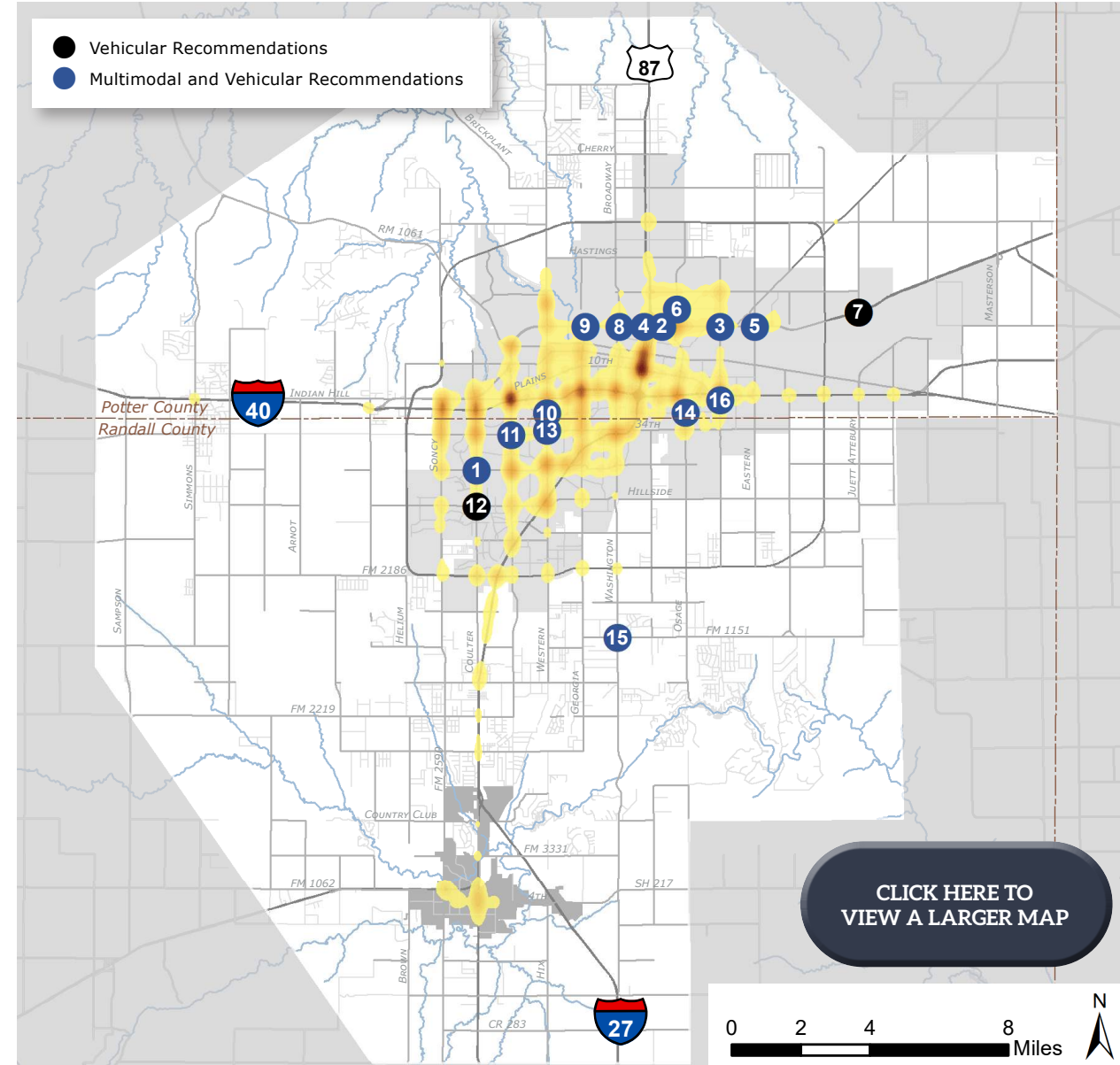
Exhibit 5: Bicycle & Pedestrian Crash Heat Map



With an improved perspective on the state of safety and crashes in the Amarillo region, several sets of recommendations were compiled that address these identified problems through the implementation of either projects, programs, or policies. It is worth noting that most types of transportation improvements also achieve the same goal either directly or as a side effect. This section of the chapter will describe the recommendations that were identified with safety as the primary need for improvement.

INTERSECTION SAFETY PROJECTS

Exhibit 6: Intersection Safety Project Locations



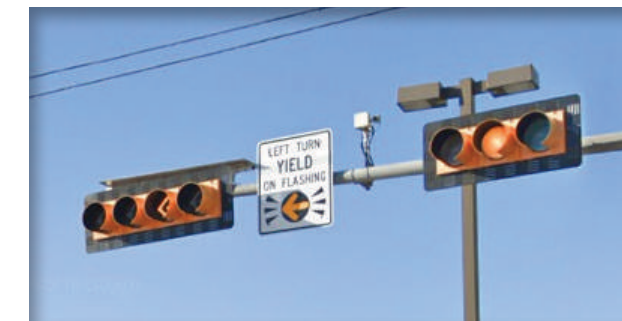
Intersections are among the most common locations for vehicular crashes due to the high interaction between vehicles travelling in opposing movements. The problem of how to safely move vehicles through intersections has always been a popular topic in the world of traffic engineering, and many intersection control advancements have been researched to mitigate these risks. For the purposes of this plan, a study was conducted of the region's intersections that had the highest crash history to develop a short list of intersection improvement projects. The criteria for these intersections was pulled from TxDOT's Highway Safety Improvement Program (HSIP) Guidelines for identifying project candidates for those federal grants. During this process several data points were collected for every intersection in the study area including:

- The number of collisions categorized as either "At Intersection" or "Head to Head Collision"
- The severity of these collisions, most importantly fatal, severe injury, or non-incapacitating injury for all modes
- The location of the intersection in relation to TxDOT's statewide system of roadways
- The preliminary cost-benefit analysis of proposed improvements

After this data collection was complete, sixteen intersections were identified as candidates for intersection safety improvements. A map of these intersections is shown in **Exhibit 6** and they are listed in **Figure 4-3** on page 35. Please note that the numbers for these intersections function just as identifiers, and do not put these projects into an order of priority.

RECOMMENDED SAFETY COUNTERMEASURES

Once the locations were identified in the MPO's roadway network, an analysis was conducted on each location to determine which safety countermeasures would be most appropriate. Overall, there were nine countermeasures recommended among the sixteen project locations: flashing yellow arrows, audible pedestrian signals, pavement markings, signal detection hardware, pedestrian hybrid beacons, replacing or installing a traffic signal, advanced warning signage, and replacing a pedestrian signal. A matrix of these recommendations is shown in **Figure 4-3** on page 35.



INSTALL FLASHING YELLOW ARROWS

To improve continuous flow operations along the major thoroughfares of the MPO's road network, it is recommended that certain signalized intersections implement flashing left-turn yellow arrows. This tool permits drivers to turn left outside of the normal green arrow phase, allowing more vehicles to make their turn. However, they also restrict these left turns to be yielding to cross traffic, making drivers more aware of any vehicles also approaching the intersection. Flashing yellow arrows should also be accompanied by improved signage to inform drivers of the change.



INSTALL RADAR DETECTION

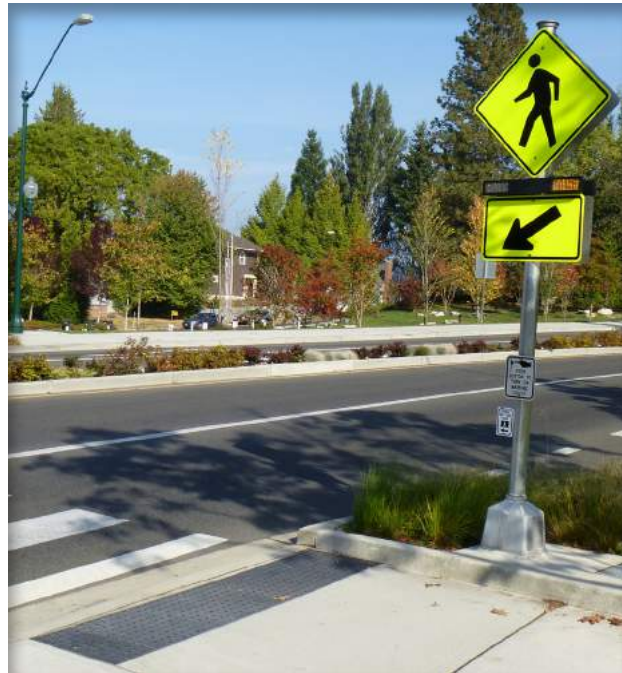
As established in the previous descriptions, an intersection that is operating with the latest traffic control technology is also safer for users. Detection technology refers to the equipment used at signalized intersections that detects how many vehicles are at each approach. This type of technology has evolved over the years, with radar detection being the most recently recommended technology.

INSTALL OR REPLACE PAVEMENT MARKINGS

Pavement markings have always been an important tool in roadway design. They help delineate lane widths, locations of non-vehicular facilities, and are a clear form of communication to drivers as to where they are and are not permitted to travel. At intersections, pavement markings tell drivers where to stop, where bicyclists and pedestrians are permitted to cross, and sometimes are used to clearly communicate the path of a left turn through a large intersection. In cases where pavement markings are faded or are not updated to the latest local and/or state standards, it can be confusing as to where vehicles or pedestrians are permitted to be, causing safety risks for all users.

INSTALL ADVANCED WARNING SIGNAGE

Advanced warning signage helps communicate warnings along roadways with special conditions to its users. For example, on a roadway with a curve that obstructs sight distance, it may be difficult for drivers to anticipate an approaching stop sign. The installation of an advanced warning sign for this stop would prevent drivers from speeding through this intersection or from stopping at an unsafe speed.



INSTALL AUDIBLE PEDESTRIAN SIGNALS (APS)

Audible pedestrian signals (APS's) are installed at important intersection crosswalks for pedestrians to have a clear indication of when they are permitted to cross. APS's are vital to the safety of pedestrians with sight impairments; however, this is not their only utility. These signals enhance the safety of all users because they improve communication between conflicting modes. For example, a vehicle needing to make a right turn at a red light will be more aware of crossing pedestrians when the driver hears the APS activate and count down during their crossing phase.

INSTALL/REPLACE PEDESTRIAN SIGNALS

Pedestrian signals are very commonly used at signalized intersections to help pedestrians cross large volume roads efficiently. It should be standard that every signal connecting pedestrian facilities should have a designated pedestrian signal as well. It is recommended that any intersection that is missing this hardware should have it installed or replaced in situations where it is existing but in disrepair.

INSTALL/REPLACE TRAFFIC SIGNALS

Traffic signals are inherently tied to intersection safety because of their ability to control the movements of conflicting vehicles. All-way stops are useful in making sure every vehicle has a turn to move through the intersection, however, they become quite inefficient if traffic volumes become too large. The installation of a new traffic signal is an important thing to study and, when warranted, can largely improve an intersection's level-of-service and safety.

PEDESTRIAN HYBRID BEACONS (PHB) AND MID-BLOCK CROSSINGS

For more information on PHB's and mid-block crossings, please refer to pages 5 and 9 of the Bicycle and Pedestrian Toolbox document.

Figure 4-3: Intersection Safety Recommendation Matrix

Intersection	Install Flashing Yellow Arrow	Install/Replace Pavement Markings	Install Detection	Replace Existing Signal Head	Install Advanced Warning Signage	Install Traffic Signal	Install APS	PHB/Mid-Block Crossing	Replace Pedestrian Signal
1. SW 45th Ave at S Coulter St	●	●	●				●		
2. Highway 60 at N Grant St								●	
3. Highway 60 at N Grand St	●	●	●	●			●		
4. Business I-40 at N Polk St	●	●	●	●			●		
5. Highway 60 at N Eastern St	●	●	●	●			●		
6. N Mirror St at NE 15th Ave	●	●	●	●			●		
7. Business I-40 at Folsom Rd					●				
8. Business I-40 at N Hughes St	●	●	●	●			●		
9. Business I-40 at N McMasters St	●	●	●	●			●		
10. Olsen Blvd at S Western St	●						●		●
11. W 34th Ave at Bell St	●	●	●	●			●		
12. S Coulter St at Hillside Rd	●		●						
13. SW 34th Ave at S Western St	●	●	●	●			●		
14. S Osage St at 27th Ave	●	●	●				●		●
15. FM 1151 and FM 1541	●	●	●			●	●		
16. SE 19th Ave at Grand St	●	●	●				●		●

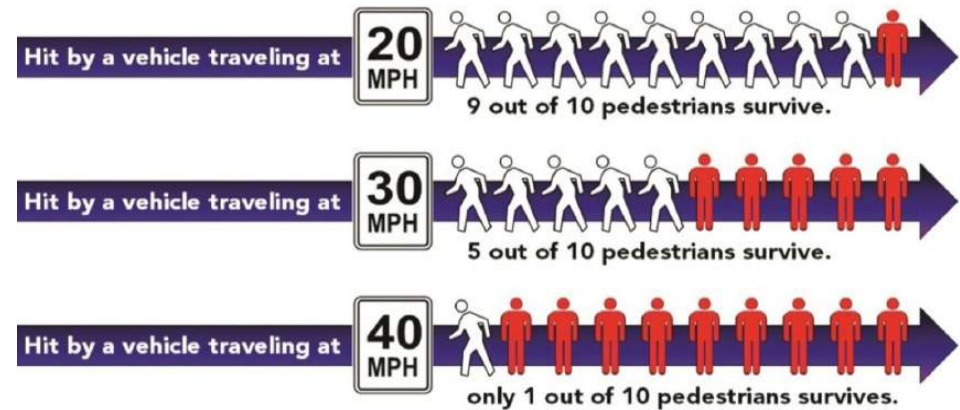
OTHER SAFETY CONSIDERATIONS

While it is easy to categorize all of the projects in this plan into one of the six goals or topic areas, all are dependent on each other. Most of the recommended improvements in this plan are intended to improve the safety of transportation in the region, whether it be directly or indirectly. The following sections provide descriptions on how each of the later chapters in this document is focused on improving safety.

SPEED MANAGEMENT

Speed management and reducing speeds is the foundation of the development of a safety program. Safe speed is especially important to help protect the most vulnerable users of the road - pedestrians. **Figure 4-4** shows the relationship between speed limits and pedestrian fatality rates. Ensuring these safe speeds occur in high pedestrian activity areas is a critical component of proactively preventing pedestrian fatalities. Possible traffic calming projects should be considered in high-pedestrian areas, such as neighborhoods.

Figure 4-4: Fatality Rates at Different Vehicular Speeds



Source: FHWA Pedestrian Safety Strategic Plan Background Report

THOROUGHFARE PLAN UPDATE

Safety was a central theme during the Master Thoroughfare Plan update process, especially in the roadway cross section designs. One of the first decisions made when designing these sections was to recommend the addition of a left-turn median on every new primary and secondary arterial roadway. Medians not only provide improve safety by providing a physical separation between opposing travel directions, but they are also an important tool used in the access management process. Access management refers to the practice of controlling access to destinations on busy streets that allow for safer and more organized traffic flow. More information on access management as a strategy can be found in the Bicycle and Pedestrian Toolbox.

MULTIMODAL IMPROVEMENTS

Safety and multimodal transportation work in close relation to each other. Safe facilities are comfortable for multimodal users, therefore encouraging more people to use them. As a result, more multimodal usage detracts from vehicle usage, which makes the roadway even safer and more comfortable. To help improve the safety and comfort of multimodal facilities, the Master Thoroughfare Plan recommends that sidewalks and bicycle facilities be widened and moved into the flex space to be further separated from vehicular traffic. For more information on how multimodal comfort and safety is incorporated into the recommendations of this plan, please reference the Bicycle & Pedestrian Toolbox.

CONGESTION MANAGEMENT

The Congestion Management Process (CMP) is federally mandated to help larger urban areas analyze and manage traffic congestion. As defined in

federal regulation, the CMP will apply to the Amarillo MPO after being designated as a Transportation Management Area (TMA). The goal of the CMP is to provide for effective management and operation of the existing transportation system and identify areas where improvements are most needed. It is intended to provide an enhanced linkage to the planning process and the environmental review process that is based on cooperatively developed travel demand reduction and operational management strategies and capacity increases.

TECHNOLOGICAL ADVANCEMENTS

As the Amarillo MPO study area grows, balancing mobility safely and efficiently will become more complex. The recent development of several new technologies is creating exciting opportunities for providing and managing transportation services. By examining the emerging technologies, advanced data collection and management methods that are on the horizon, the transportation agencies in the Amarillo MPO study area can make decisions now that will help maximize traffic operations and safety, simultaneously.

OBJECTIVES & ACTIONS

The objectives and actions for this chapter are centered around Goal 2. Safety. This goal focuses on achieving a network that has safe facilities for all modes. The primary strategy for achieving this goal is to improve safety through physical design and programs. The objectives and actions for Goal 2 are listed in the matrix below.

Goal 2. Safety – safe facilities for all modes Strategy: Improve safety through physical design and programs.	
Objective 2.1. Reduce severe injuries and fatalities caused by crashes.	<ul style="list-style-type: none"> Action 2.1.1. Develop a safety action plan to identify a list of improvement projects. Action 2.1.2. Monitor crash hotspots to determine areas for possible future investment. Action 2.1.3. Dedicate capital funds for projects classified as safety improvements.
Objective 2.2. Focus investments on areas with high bicycle & pedestrian activity and needs.	<ul style="list-style-type: none"> Action 2.2.1. Develop a Safe Routes to School Program. Action 2.2.2. Target transportation safety improvements within socially or economically vulnerable areas.
Objective 2.3. Increase cultural awareness about safe driving & riding.	<ul style="list-style-type: none"> Action 2.3.1. Establish a regionwide safety education initiative focused on promoting a culture of safe practices for bicycling, walking, and driving. Action 2.3.2. Partner with TxDOT, the cities of Canyon and Amarillo, and the Independent School Districts in the region to increase awareness of safety in transportation.

CHAPTER 5: BICYCLE & PEDESTRIAN



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INTRODUCTION

Amarillo Area in Motion is a long-range multimodal mobility plan. This means that the strategy for improving the region's bicycle and pedestrian networks is one developed carefully and comprehensively. While these two modes of transportation frequently share the benefits of the other's improvement or expansion, they do have different sets of needs. To provide recommendations that satisfy those varying needs, the bicycle and pedestrian networks were improved upon using separate approaches and strategies.

This chapter is organized into four subsections that explain the process and recommendations shared between the bicycle and pedestrian networks.

- **The Bicycle and Pedestrian Toolbox** – identifies and explains the various facility types and strategies, or tools, recommended by this plan for implementation
- **Pedestrian Recommendations** – prioritize where sidewalk gaps should be addressed according to a need-based analysis, and present conceptual pedestrian improvement plans for seven Pedestrian Priority Areas
- **Bicycle Recommendations** – document the development of the updated bicycle network for the MPO area and the network's level of comfort analysis
- **Objectives and Actions** – establish a policy framework centered around the implementation of these improvements

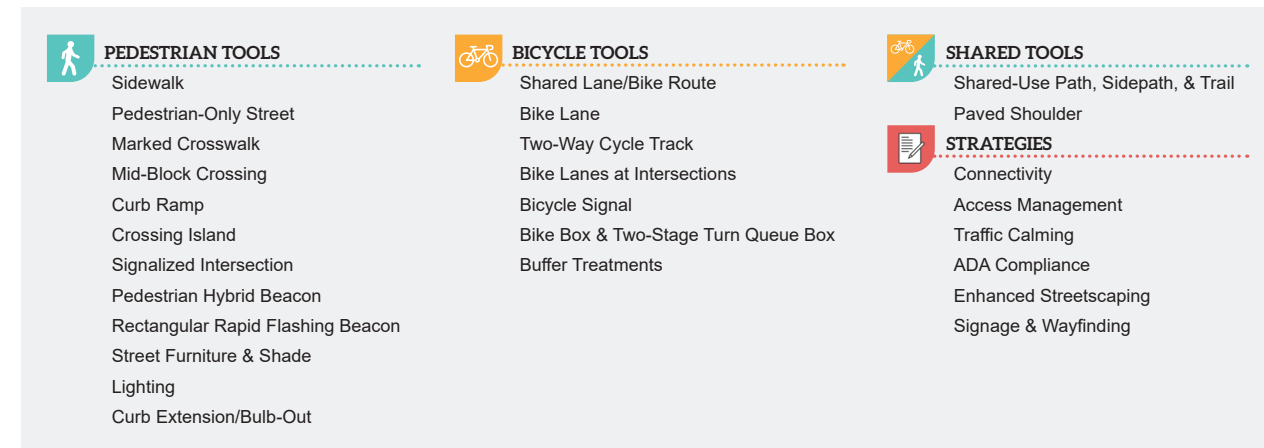
BICYCLE & PEDESTRIAN TOOLBOX

To guide the future development of multimodal improvements in the study area, a range of bicycle and pedestrian tools were compiled as a toolbox for the MPO to reference. Creating a range of tools enables the MPO to plan for a variety of contexts and settings that users may encounter on either network. This section of the chapter summarizes the Toolbox to give the reader a better understanding of the types of facilities that will be used for the implementation of the proposed multimodal networks.



The full toolbox document provides a concise yet comprehensive summary for every recommended tool with the following information:

- Definition and Example Photos
- Design Guidelines
- Benefits
- Considerations
- Safety, Cost, and Feasibility Ratings (scale of 1-5)



Figure 5-1: Bicycle & Pedestrian Tools & Strategies



PEDESTRIAN TOOLS - WALKWAYS





	Sidewalk	Sidewalks are the standard pedestrian facility that provide a designated space for people to walk or use wheelchairs to get from one place to another.
	Pedestrian-Only Street	Pedestrian-only streets are sections of the roadway network where vehicle activity is either prohibited or restricted so that pedestrians may use the space for recreational or leisure activities, including but not limited to walking or running, shopping, sitting, and dining.


PEDESTRIAN TOOLS - CROSSING FACILITIES

	Marked Crosswalk	Marked crosswalks are designated locations where pedestrians can cross a roadway. These facilities are generally installed at intersections. Motorized vehicles are expected to yield to pedestrians when they are using a crosswalk.
	Mid-Block Crossing	Mid-block crosswalks are marked crosswalks that are installed at mid-block locations between intersections to provide pedestrians with designated crossing opportunities along a given block.




BICYCLE & PEDESTRIAN TOOLBOX (CONTINUED)

PEDESTRIAN TOOLS - CROSSING FACILITIES (CONTINUED)

	<p>Curb Ramp</p>	<p>Curb ramps are sloped facilities that provide transitions between sidewalks and roadways, particularly at pedestrian crossing facilities. The designs of curb ramps are critical for all pedestrians, but particularly for people with disabilities.</p>
	<p>Crossing Island</p>	<p>Crossing islands, also known as pedestrian refuge islands, are medians located mid-crosswalk; these medians provide a space for pedestrians to wait safely as they cross a multilane roadway or intersection in phases.</p>
	<p>Signalized Intersection Considerations</p>	<p>The primary purpose of a signalized intersection is to move traffic. It can be difficult for pedestrians to navigate, but there are techniques to improve the pedestrian experience at signalized intersections such as pedestrian signals, leading pedestrian intervals, and improved turning lanes.</p>
	<p>Pedestrian Hybrid Beacon</p>	<p>Pedestrian Hybrid Beacons (PHB) are signalized pedestrian crossings that control automobile traffic during designated pedestrian crossing intervals. These facilities are installed either midblock or at intersections that do not have existing traffic signals, like some T-intersections. The beacon remains off and traffic can flow freely through the crossing space until a pedestrian activates it.</p>




	<p>Rectangular Rapid Flashing Beacon</p>	<p>Rectangular Rapid Flashing Beacons (RRFBs) are activated pedestrian crossings that alert automobile drivers to the presence of pedestrians crossing a roadway. These facilities are installed either midblock or at intersections that do not have existing traffic signals, like some T-intersections. The beacons remain off and traffic can flow freely through the crossing space until a pedestrian activates the beacons. RRFBs do not control automobile traffic, but instead provide a warning to approaching drivers that pedestrians may be crossing. These facilities include pedestrian crossing signage and rectangular beacons that flash more rapidly and at a brighter intensity than standard beacons.</p>
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PEDESTRIAN TOOLS - ENHANCED SAFETY & COMFORT





	<p>Street Furniture and Shade</p>	<p>Street furniture refers to elements that are placed within the pedestrian realm, particularly on sidewalks, that provide enhanced safety and comfort for pedestrians as they pass through the space. It can include elements such as benches, trash receptacles, street trees, planters, water fountains, and transit shelters. In hot climates such as Amarillo, street furniture, trees and other overhead amenities can provide shade that creates an environment that encourages walking when temperatures are higher.</p>
	<p>Lighting</p>	<p>Pedestrian and street lighting allows people to quickly and easily identify objects during times of low light or nighttime, resulting in a safer environment. Pedestrian lighting is a crucial element in providing a safe multimodal environment and ensures that a pedestrian environment is used frequently and safely.</p>
	<p>Curb Extensions/Bulb-Outs</p>	<p>Curb extensions, also known as bulb-outs, are facilities that extend the sidewalk or curb line further into the streetscape than standard curbs, thereby reducing the width of the roadway in locations where pedestrians are crossing.</p>

BICYCLE & PEDESTRIAN TOOLBOX (CONTINUED)




BICYCLE TOOLS - BIKEWAYS






	Shared Lane/ Bicycle Route	Shared lanes are a type of bicycle facility that denote where a bicyclist may legally share the road with vehicles. This type of facility is recommended for local streets only where pavement width is limited. Shared lanes have a low level of comfort rating for users because they do not provide any separation from motorists.
	Bicycle Lane	Bike lanes are one-way facilities that typically carry bicycle traffic in the same direction as adjacent motor vehicle traffic. Bike lanes are provided for the exclusive or preferential use of bicyclists on a roadway and are identified through signage, striping, or other pavement markings. When there is sufficient roadway width, a buffer should be striped between a bike lane and travel lane to provide additional comfort for users. This buffer increases the level of comfort for bicyclists.
	Two-Way Cycle Track	A two-way cycle track is a type of on-street separated bicycle facility that is designed for two directions of travel. By separating cyclists from motor traffic, cycle tracks can offer a higher level of comfort than bike lanes and are more attractive to a wider spectrum of the public.

BICYCLE TOOLS - CROSSING FACILITIES

	Bicycle Lanes at Intersections	Designing intersections with bicycle facilities should reduce conflict between bicyclists (and other road users) and motorists by heightening the level of visibility, denoting a clear right-of-way, and facilitating awareness with competing modes. Intersection treatments can resolve both queuing and merging maneuvers for bicyclists and can be coordinated with timed or specialized signals.
	Bicycle Signal	Bicycle signals facilitate the movements of bicycle traffic through intersections. They increase the safety at intersections by restricting the movements of different vehicles and preventing potential conflicting movements.
	Bike Box/Two-Stage Turn Queue Box	A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side cycle track or bike lane, or right turns from a left side cycle track or bike lane.
<h3>BICYCLE TOOLS - ENHANCED SAFETY & COMFORT</h3>		
	Buffer Treatments	One way to increase the bicyclist's experience is to utilize enhanced buffer treatments beyond striping. Buffers that provide more physical separation will increase the bicyclist's comfort level. Common buffer treatments include vertical delineators, concrete barriers, raised pavement markers, and planter boxes. Buffer treatments can also serve as a tool for beautification, integrating art and place-making elements into a streetscape.

BICYCLE & PEDESTRIAN TOOLBOX (CONTINUED)

SHARED TOOLS		
	Shared-Use Path/ Sidepath/ Trail	<p>Shared-use paths, sidepaths, and trails function similarly to each other. They are physically separated from motorized vehicles, either by a landscaped buffer or a barrier, and can follow either a roadway or independent alignment.</p> <p>These facilities are particularly useful when roadway width is limited and providing an on-street bike facility is not possible. These paths are designed for two-way travel, and in addition to bicyclists, path users may include pedestrians, skaters, or other non-motorized vehicles.</p>
	Paved Shoulders	<p>Standard bicycle facilities and sidewalks may not always be feasible to install, particularly in rural areas. In these contexts, paved shoulders can provide a space for bicyclists and pedestrians to travel. Paved shoulders are directly connected to the adjacent roadway and exist in the extra pavement width usually required for shoulder space.</p>
STRATEGIES		
	Connectivity	<p>Connectivity plays a major role in making every mode of transportation more efficient and accessible for users. For bicyclists and pedestrians, connectivity means building networks (bicycle lanes and sidewalks) that frequently intersect and connect to other bike lanes and sidewalks. This connectivity allows pedestrians and cyclists to access more destinations more efficiently. Several best practices exist that help make cities and communities more connected and user-friendly.</p>

	Access Management	<p>Access management refers to the strategy local governments can utilize to control where roadway users enter and exit areas of high demand such as commercial or employment centers. Good access management minimizes crashes that are caused by vehicles making unsafe turning movements, failing to yield to bicyclists and pedestrians, or unpredictable driver behavior.</p>
	Traffic Calming	<p>Some roadways discourage pedestrian uses due to roadway design that allows unsafe driving behaviors. Traffic calming is a method of promoting responsible driving behavior through street design without relying on traffic control devices such as signals, signs, or police enforcement. If implemented correctly, these design strategies can reduce traffic speeds, frequency and severity of crashes, and noise level.</p>
	ADA Compliance	<p>The Americans with Disabilities Act (ADA) was passed in 1990, prohibiting discrimination based on disability and defining design standards that promote access for individuals with disabilities. Enforcing ADA compliance ensures that the infrastructure in a community is inclusive and accessible to people of all abilities. ADA compliance is not just a strategy for cities to implement, but a federal law with requirements that need to be a priority both for new construction and when upgrading existing pedestrian facilities.</p>
	Enhanced Streetscaping	<p>Streetscaping is an approach to supporting multiple functions of the space between the street and property line as well as an increased investment in landscaping and building materials to make the street more attractive and visually interesting. Investing in streetscaping promotes a lively street environment that adds economic value by enabling private commercial activity to spill into the public realm.</p>
	Signage & Wayfinding	<p>Wayfinding involves the strategic placement of signage or other markers that help people, especially visitors, find their way to a destination, including entertainment districts, monuments or museums, universities, or natural features. Wayfinding is also used for navigating bike routes and shared use paths or trails. It can also be a tool for branding and marketing certain areas of a city.</p>

PEDESTRIAN RECOMMENDATIONS

Pedestrian safety and comfort are priorities that have historically not been well addressed in Texas cities. For most of these cities, infrastructure investments have been largely focused on improving vehicular operations over projects that give priority to the pedestrian. However, numerous studies in recent years have proven that active transportation modes, when used regularly, provide a multitude of positive impacts to the wellbeing of residents. **Figure 5-2** below illustrates some of the numerous benefits to be gained from living in a walkable environment.

One of the most important objectives of this plan is to identify projects and strategies for the MPO to make the Amarillo region more pedestrian-friendly, and in-turn provide a better place to live for its residents. The pedestrian recommendations in this plan are divided into two sections:

- 1. Sidewalk Gap Prioritization** – began with a full inventory of the sidewalk networks of the cities of Amarillo and Canyon. Once it was determined where sidewalk gaps exist today, a set of criteria for prioritization was developed to sort these gaps into three tiers of priority.
- 2. Pedestrian Focus Areas** – takes a closer look at some of the areas in the MPO with the highest need for pedestrian improvements and presents site-level plans for how to increase pedestrian comfort.

Figure 5-2: The Benefits of Walkability

THE BENEFITS OF WALKABILITY

- Active commuting modes, such as walking or bicycling, are linked to lower rates of stroke and heart disease. (Source: *Journal of the American Heart Association*)
- One mile of walking translates to 2/3 of the recommended 60 minutes of physical activity each day. (Source: *Safe Routes Partnership*)
- Increased physical activity is linked to higher academic achievement according to multiple studies. (Source: *Safe Routes Partnership*)
- Choosing an active transportation mode over driving lowers a person's risk of diabetes and obesity. (Source: *US National Library of Medicine National Institutes of Health*)
- More attractive, safe, and walkable streets increase community livability (Source: *Forkenbrock and Weisbrod 2001*)
- Increases in perceived safety from crime are associated with more physical activity. (Source: *RESIDE Study*)

SIDEWALK GAP PRIORITIZATION

The Amarillo Area, like many Texas cities, faces a major problem in their pedestrian network due to a lack of connected sidewalks. Different eras of development established different policies regarding sidewalks resulting in a disconnected and incomplete network. While there has been a recent movement to require the installation of sidewalks in all new developments, this alone does not solve the problem. To help address this issue, a sidewalk gap prioritization process was developed to help the MPO identify what areas have the highest need for investment in the Amarillo area. The gaps sorted into the high priority tier of this process are highlighted in the Full Project List section of Chapter 8.

To score these identified sidewalk gaps into tiers of priority, the study area was divided into 500-foot hexagonal areas. These areas were then scored based on seven criteria (**Figure 5-3** on page 49). Once scored, the hexagonal areas were then sorted into one of three priority tiers (low, medium, and high), based on their overall score. Gaps identified as low priority are ones that only meet one criterion, medium priority gaps meet two to three, and high priority gaps meet four or more of the seven criteria. **Exhibit 7** on page 49 shows the results of this prioritization process mapped across the study area.

Exhibit 7: Sidewalk Gap Prioritization Results

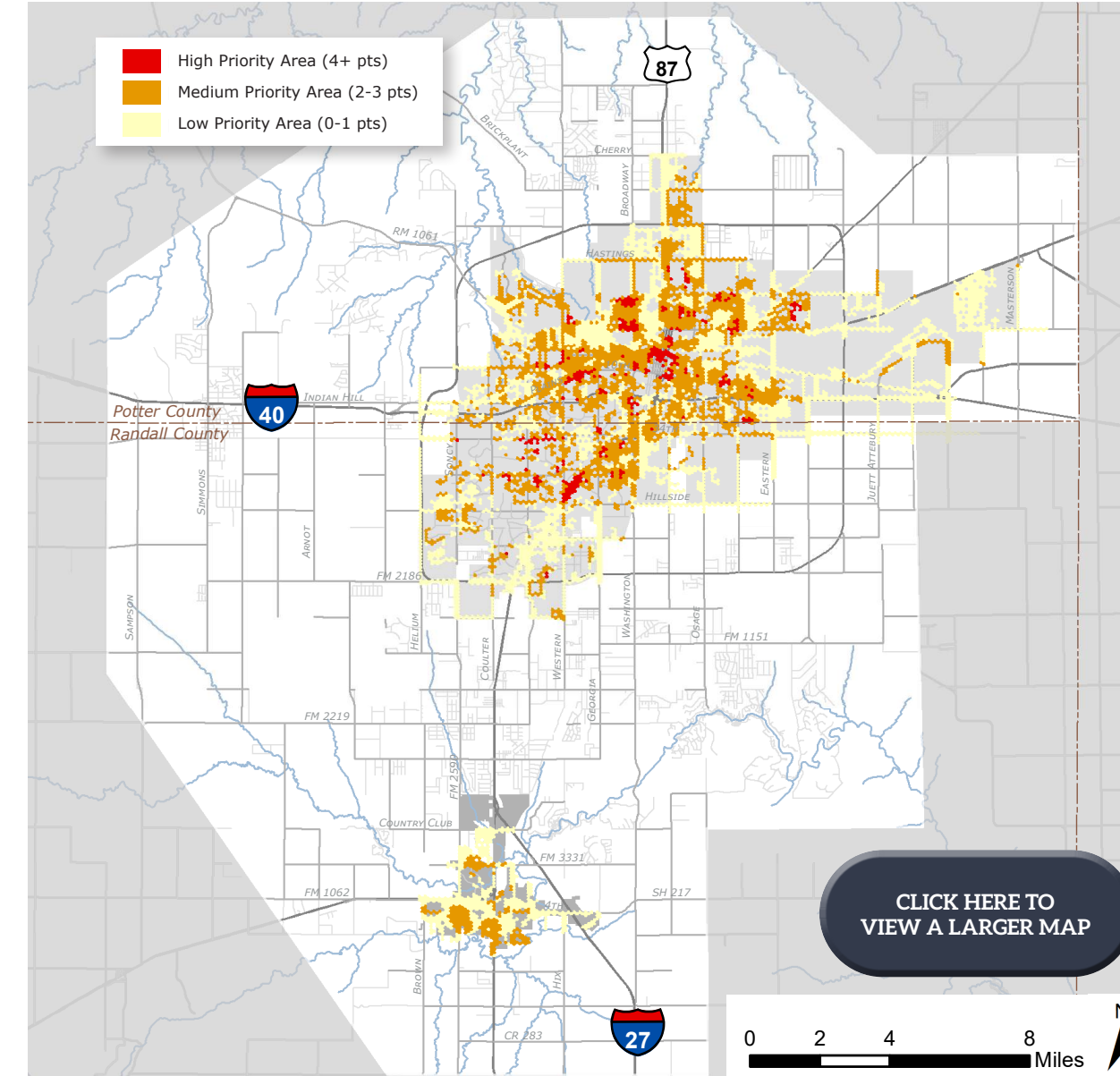


Figure 5-3: Prioritization Criteria

Criteria	Pts
PARKS & SCHOOLS	2
1. Is the area within a quarter mile of a park?	1
2. Is the area within a quarter mile of a school?	1
TRANSIT	1
3. Is there a transit stop in the area?	1
DESTINATIONS	1
4. Does the area serve a major traffic generator?	1
EQUITY	3
5. Is it a majority-minority area (MMA)?	1
6. Do more than 40% of households have a person with a disability?	1
7. Are the property values in the area below the region's average?	1

TOTAL POSSIBLE PTS: 7

PEDESTRIAN FOCUS AREAS

In addition to the sidewalk gap prioritization, other areas in the region were identified as needing a more detailed approach to improving pedestrian safety and comfort. These seven Pedestrian Focus Areas were identified for various reasons throughout the plan’s development (**Exhibit 8** on page 51). The following section provides a deeper understanding into why each of these focus areas were chosen and presents their recommended improvements based on the pedestrian tools in the toolbox.

1. PALO DURO HIGH SCHOOL NEIGHBORHOOD

Pedestrian Focus Area 1 is the neighborhood surrounding Palo Duro High School. Much of this neighborhood was originally built without sidewalks or crossing facilities. This area has a high amount of potential for pedestrian improvements because of the multiple parks and schools located in this area, including the high school. **Figure 5-4** on page 52 shows the recommended pedestrian improvements for the Palo Duro High School neighborhood.

2. E AMARILLO BLVD FROM HUGHES TO RIDGEMERE

This section of Amarillo Blvd was chosen due to the high number of pedestrian related crashes on the corridor. There are currently two PHBs approved from TxDOT to be installed on this roadway. The goal of this Pedestrian Focus Area is to include additional pedestrian safety recommendations to complement the installation of these two pedestrian signals. **Figure 5-5** on page 53 shows the planned improvements for E Amarillo Blvd from Hughes to Ridgemere.

3. CARVER ELEMENTARY SCHOOL NEIGHBORHOOD

The neighborhood around Carver Elementary School in Amarillo was chosen as a Pedestrian Focus Area based on the results of the sidewalk gap heat map. Areas around schools are a top priority for pedestrian improvements because of the funding available from the Federal Highway Administration’s (FHWA’s) Safe Routes to School Program. This neighborhood scored high on almost every category in the sidewalk gap prioritization criteria, thereby identifying it as a strong candidate for these focus area plans. **Figure 5-6** on page 54 shows the recommended pedestrian improvements for this neighborhood.

4. WASHINGTON ST FROM 10TH TO WOLFLIN

Washington St was identified by the Oversight Committee as a commercial corridor that would be a good candidate for a redesign based on existing safety concerns. While part of this section is included in Chapter 8 as a Priority Corridor, other strategies were identified to improve the safety of pedestrians, specifically. These recommendations are shown on **Figure 5-7** on page 55.

5. COULTER RD FROM 45TH TO HILLSIDE

Pedestrian Priority Area 5 is a section of Coulter Rd in the southwest area of Amarillo. This corridor is a major connector between the commercial development occurring in this part of the city, the surrounding neighborhoods, and John Stiff Memorial Park. This area is recommended as a priority area to increase the pedestrian connectivity between all three of these various destinations. **Figure 5-8** on page 56 shows the recommendations for Coulter Rd from 45th Ave to Hillside Rd.

6. HILLSIDE RD FROM COULTER TO STAR LN

When collecting information in the field at the beginning of the project, Hillside Rd was identified as an arterial with a neighborhood context that could benefit from enhanced pedestrian connectivity. Large arterial roads can become barriers to pedestrians because of their high speeds and wide crossing widths. To help prevent this, the recommendations on Hillside Rd focus on increasing crossing comfort for pedestrians (**Figure 5-9** on page 57).

7. 4TH AVE FROM 16TH TO RUSSELL LONG BLVD

This primary arterial in Canyon is the central east-west corridor connecting major destinations across the city. This corridor, like Washington St, is also identified as a Priority Corridor in Chapter 8, so the recommendations presented in this section are not the only multimodal improvements included in this plan. The Pedestrian Focus Area plan for 4th Ave is shown in **Figure 5-10** on page 58.

Exhibit 8: Pedestrian Focus Area Locations

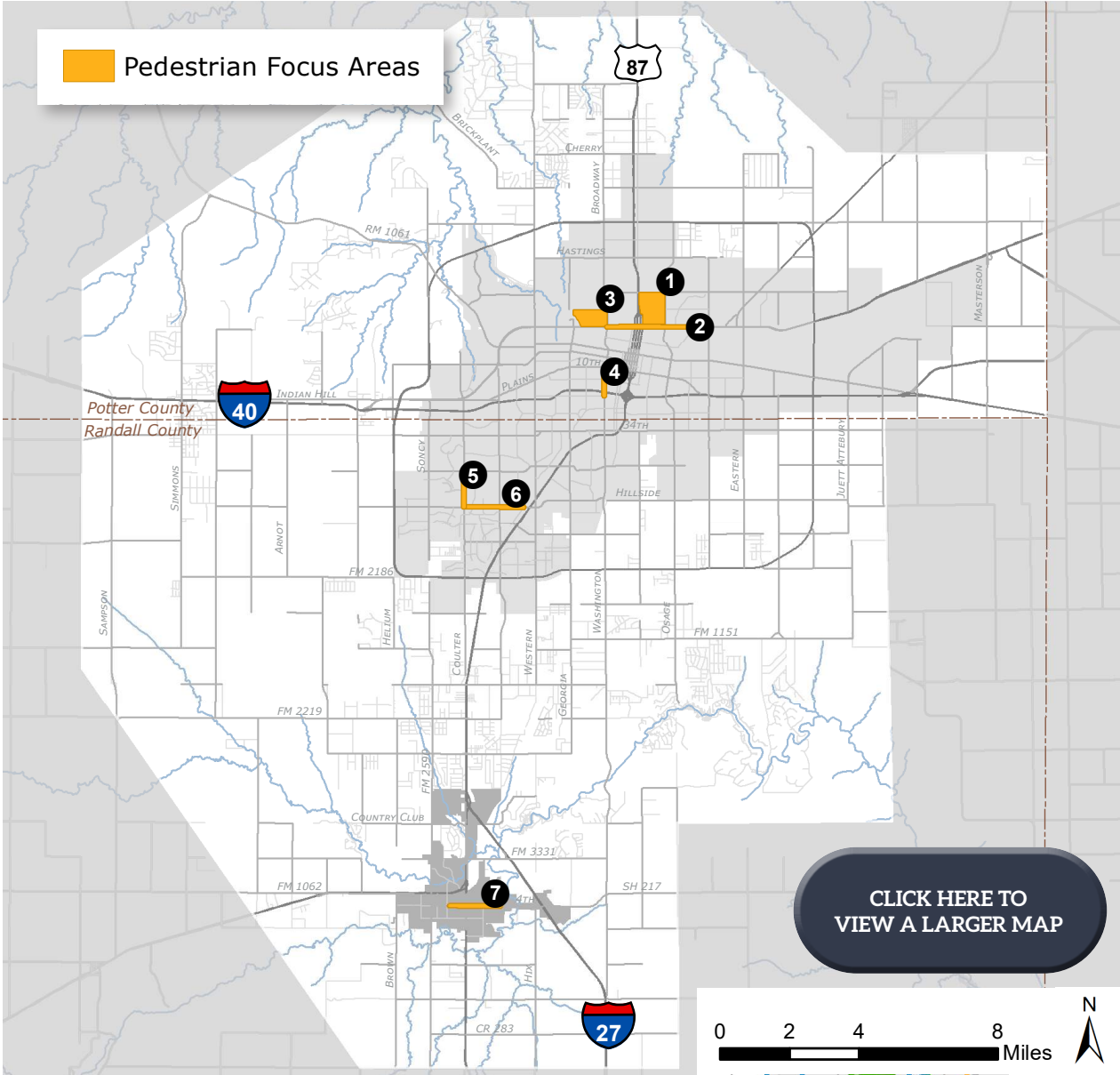
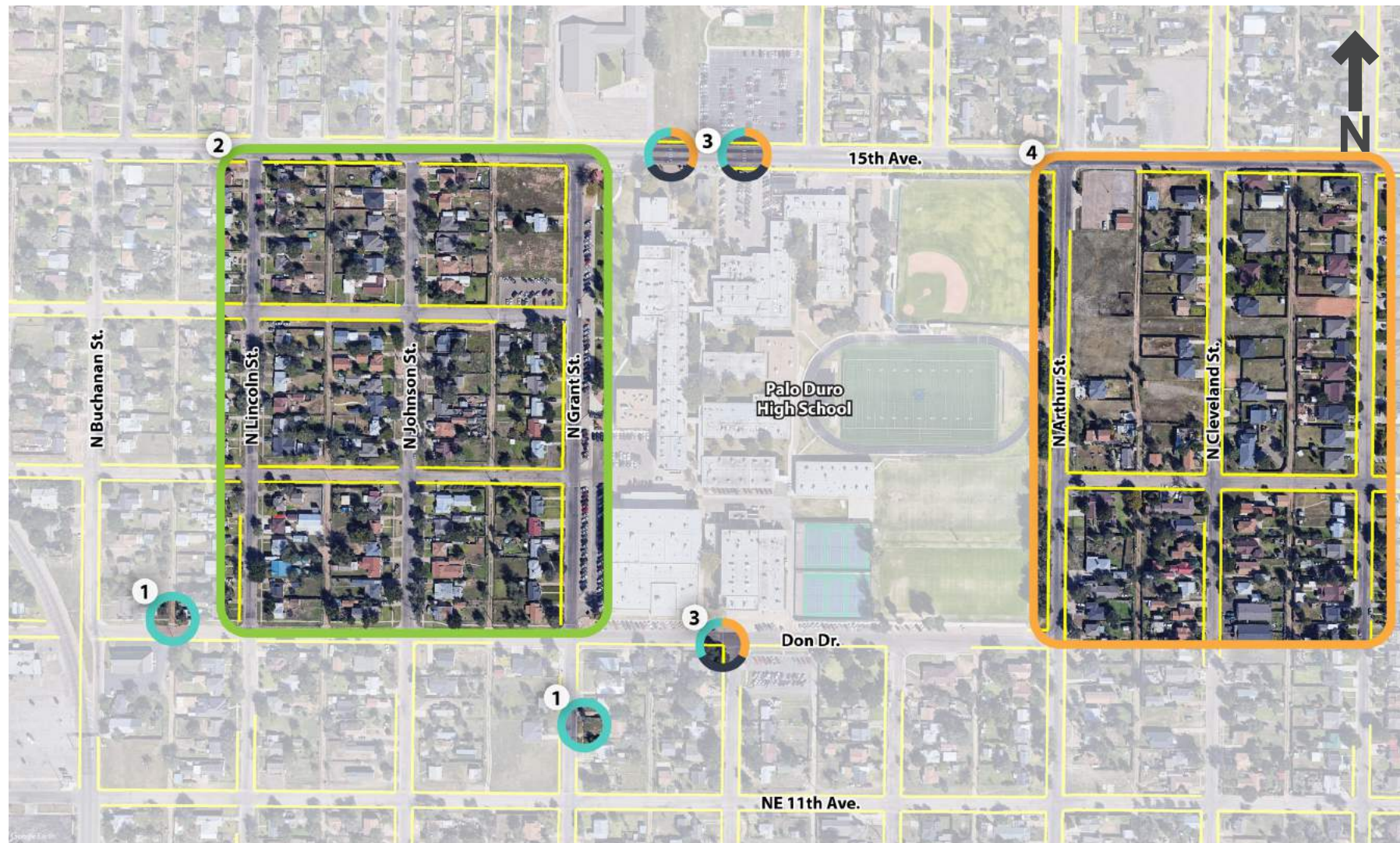


FIGURE 5-4. PALO DURO HIGH SCHOOL NEIGHBORHOOD



- ADA Compliance
 - Connectivity
 - Facility Upgrade
 - Facility Installation
 - No Existing Sidewalks
- 1** Poor sidewalk conditions and abrupt grade changes in some areas have created potentially inaccessible segments. Aim to spot treat sidewalk infrastructure issues as necessary to maintain ADA compliance.
 - 2** Some blocks in the neighborhood west of the school have sidewalk segments and some do not. Enhance sidewalk network connectivity by closing gaps between nearby facilities.
 - 3** Install ADA-compliant curb ramps at existing pedestrian crossings where curbs are present. There is also potential to upgrade one or more of the crossings adjacent to the school to RRFBs.
 - 4** There is a lack of sidewalks along the east side of the school and in the neighborhoods surrounding the school. Identify locations for new sidewalks to improve pedestrian safety.

FIGURE 5-5. E AMARILLO BLVD FROM HUGHES TO RIDGEMERE



- Facility Installation
 - Access Management
 - ADA Compliance
 - No Existing Sidewalks
- 1** Identify potential locations for the installation of Pedestrian Hybrid Beacons west of US 87.
 - 2** Install marked crosswalks on all sides of the intersection.
 - 3** Install a crossing island on the west side of the intersection.
 - 4** Install a marked crosswalk, pedestrian signals, and curb ramps on the south side of the intersection and a crossing island on the east side of the intersection.
 - 5** Install marked crosswalks, pedestrian signals, and curb ramps on the west and north sides of the intersection.
 - 6** Install marked crosswalks, pedestrian signals, and curb ramps on the west, north, and south sides of the intersection.
 - 7** Numerous driveways on the south side of the corridor in this area create an unsafe and disjointed pedestrian environment. Remove and/or consolidate driveways where possible.
 - 8** Install marked crosswalks on the west, north, and east sides of the intersection.
 - 9** Improve the condition and drainage at curb ramps at pedestrian crossings to comply with ADA standards.

FIGURE 5-6. CARVER ELEMENTARY SCHOOL NEIGHBORHOOD



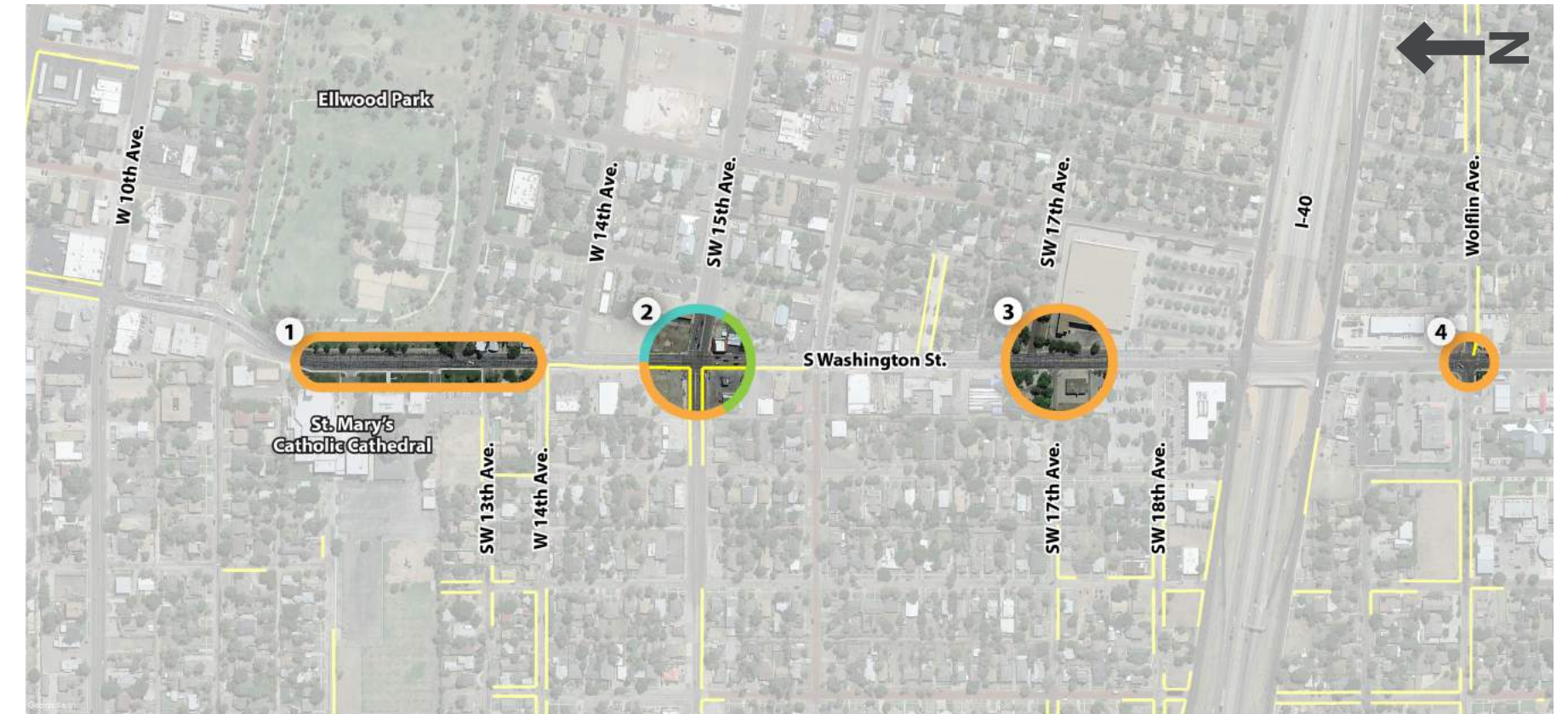
- ADA Compliance
- Facility Installation
- Facility Upgrade
- No Existing Sidewalks

1 Some intersections in the area lack curb ramps on one or more corners. Install and improve curb ramps to comply with ADA standards.

2 Upgrade the crosswalk on the north side of the school to RRFBs.

3 There is a lack of sidewalks throughout the area, including around the perimeter of the school campus. Install sidewalks to create a designated pedestrian network that provides safe walking spaces.

FIGURE 5-7. WASHINGTON ST FROM 10TH TO WOLFLIN



- Facility Installation
- ADA Compliance
- Connectivity
- No Existing Sidewalks

1 Install a pedestrian crossing facility across S Washington St. Potential crossing locations include between St. Mary's Catholic Cathedral and Ellwood Park or between the neighborhoods just south of there, near SW 13th Ave. For any location chosen, a standard marked crossing, RRFBs, or PHBs may be appropriate facility options.

2 Install marked crosswalks at the intersection of SW 15th Ave. and S Washington St. Additionally, sidewalks in this area are disconnected and in poor condition. Improve conditions of existing sidewalk facilities to comply with ADA standards and fill in gaps in the network.

3 Install a pedestrian crossing facility across S Washington St. where it intersects SW 17th Ave. This intersection has curb ramps that lead from the sidewalks out onto S Washington St. despite the absence of a designated crossing facility. Alternatively, these curb ramps could be removed and a mid-block crosswalk could be installed at the bus stop between SW 17th Ave. and SW 18th Ave. For either alternative, a standard marked crossing, RRFBs, or PHBs may be appropriate facility options.

4 Install a marked crosswalk on the east side of the intersection at S Washington St. and Wolflin Ave.

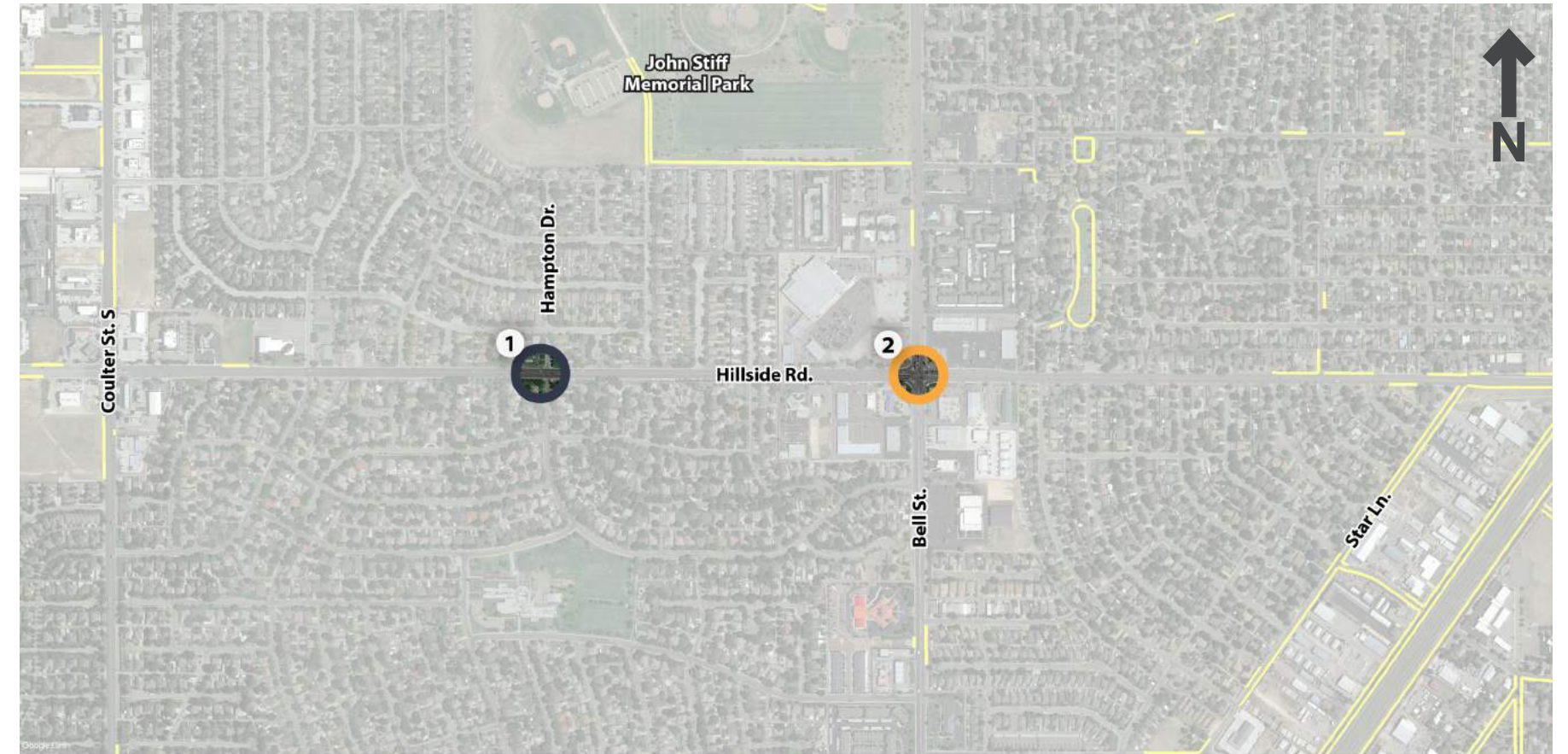
FIGURE 5-8. COULTER RD FROM 45TH TO HILLSIDE



- Facility Installation
- Connectivity
- No Existing Sidewalks

- 1** Install crosswalks across the intersection at the entrance to John Stiff Memorial Park to provide a designated pedestrian crossing space and improve the safety of pedestrian access to the park.
- 2** Increase pedestrian connectivity between John Stiff Memorial Park and the neighborhoods south and southwest of there by installing sidewalks along Coulter St. S or installing a shared-use path between the neighborhoods and the existing path around McDonald Lake in the park. Installing a path would also provide connections to the Southwest Amarillo Public Library northeast of the lake.
- 3** Install crossing islands at the midpoints of the crosswalks on the west, south, and east sides of the intersection.

FIGURE 5-9. HILLSIDE RD FROM COULTER TO STAR LN



- Facility Upgrade
- Facility Installation
- No Existing Sidewalks

- 1** Upgrade the mid-block crosswalk near Hampton Dr. to RRFBs or PHBs.
- 2** Install marked crosswalks on each side of the intersection and across each right turn bay at the intersection.

FIGURE 5-10. 4TH AVE FROM 16TH TO RUSSELL LONG BLVD



- Enhanced Streetscaping
- Facility Installation
- Facility Upgrade
- No Existing Sidewalks

- 1** Improve pedestrian safety and comfort by implementing enhanced streetscape components. Install enhanced crosswalks at the intersection of 16th St. and 4th Ave. paved with red bricks to match the Randall County building. Install additional enhanced streetscaping components like street furniture and vegetation like street trees and planters with foliage. These improvements can also contribute to a sense of place in the downtown area.
- 2** Explore the potential to upgrade to PHBs from the existing RRFBs connecting the West Texas A&M University campus to a parking lot just west of 25th St.
- 3** There is a lack of sidewalks along 4th Ave. east of West Texas A&M University, despite the presence of a neighborhood on the south side of 4th Ave. Install sidewalks along 4th Ave. in this area to create the opportunity for any students living in the neighborhood to walk to campus safely.

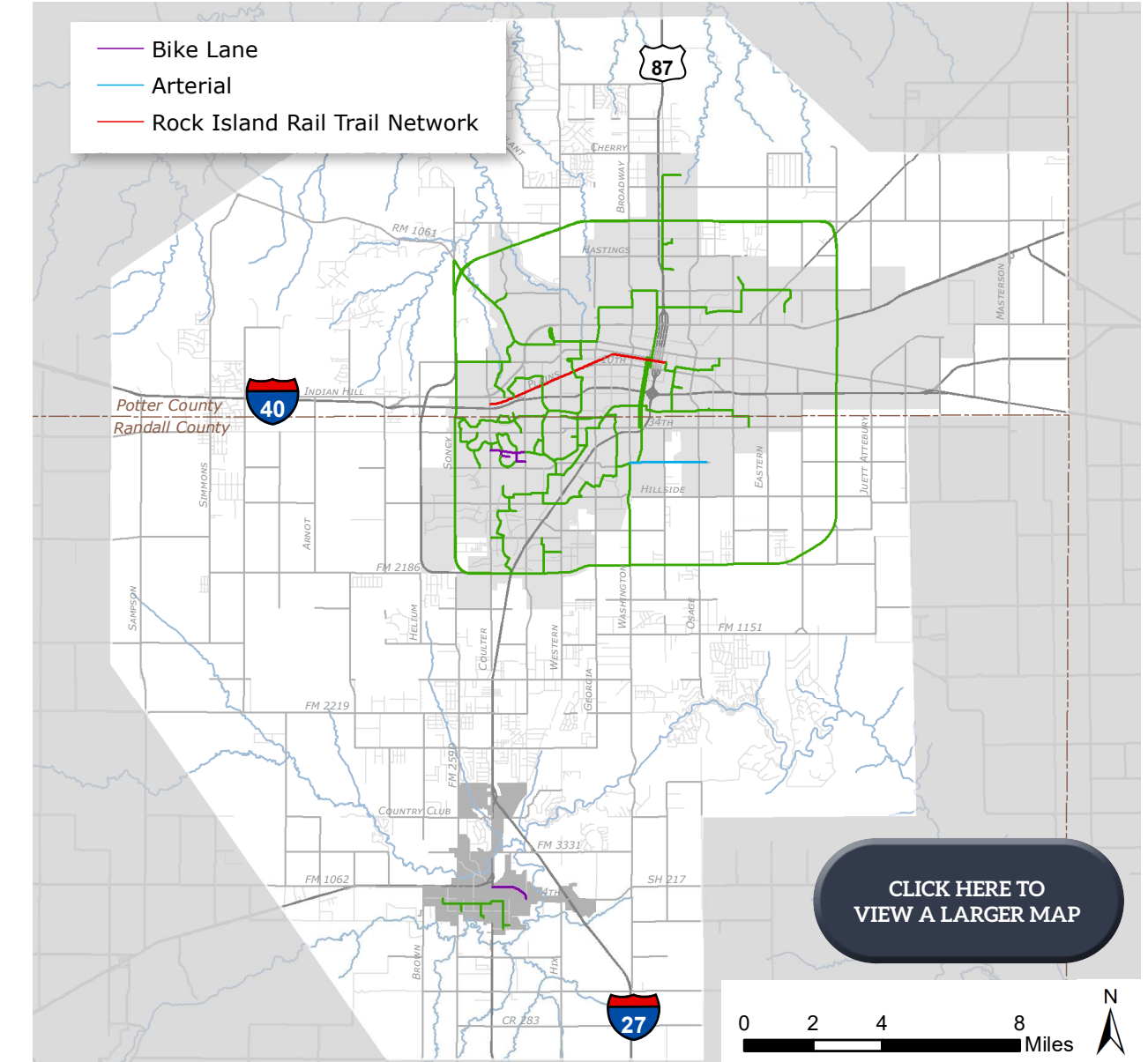
BICYCLE RECOMMENDATIONS

EXISTING BICYCLE NETWORK

The existing bicycle network in the Amarillo region consists mostly of bicycle routes, apart from a few major facilities (**Exhibit 9**):

- **Rock Island Rail Trail** – named after the Rock Island Railroad Line, this sidepath trail extends nearly four miles across the northwestern portion of Amarillo with various amenities such as trailheads and shade facilities. An additional section of 6th Avenue is identified as a bicycle route connector for the Rock Island Rail Trail Network.
- **Russell Long Blvd Bicycle Lanes** – these bicycle lanes were completed around the time of this plan’s initiation and provide separated facilities on the north side of West Texas A&M’s campus.
- **Loop 335 Bicycle Route** – As a major highway project in the region, Loop 335’s completion will be a big accomplishment for connectivity around the city of Amarillo for both vehicles and bicyclists.

Exhibit 9. Existing Bicycle Network

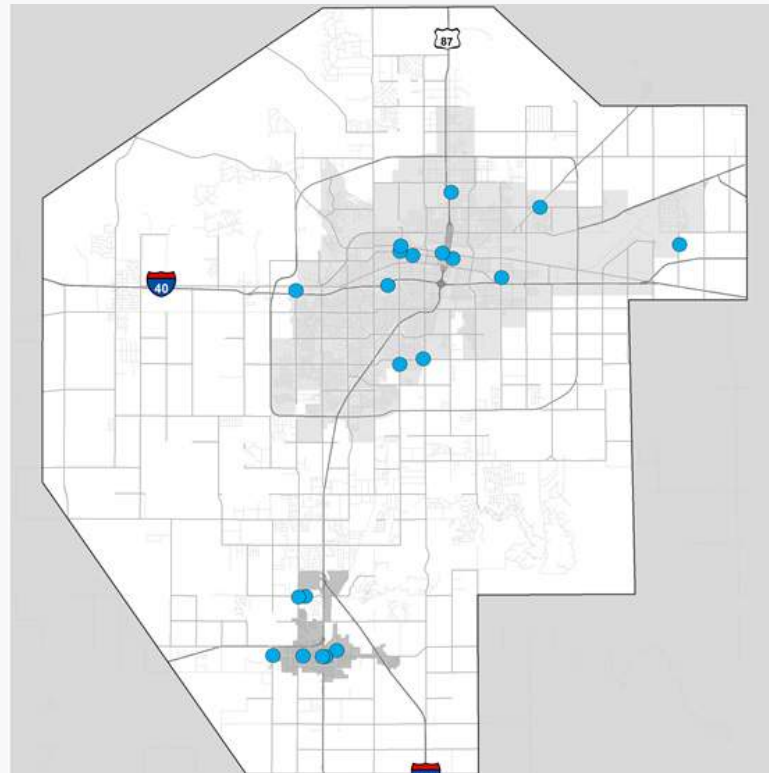


PROPOSED BICYCLE NETWORK

The process for developing the updated Amarillo Area bicycle plan can be divided into four steps:

STEP 1

Figure 5-11. Social Pinpoint Bicycle Comments

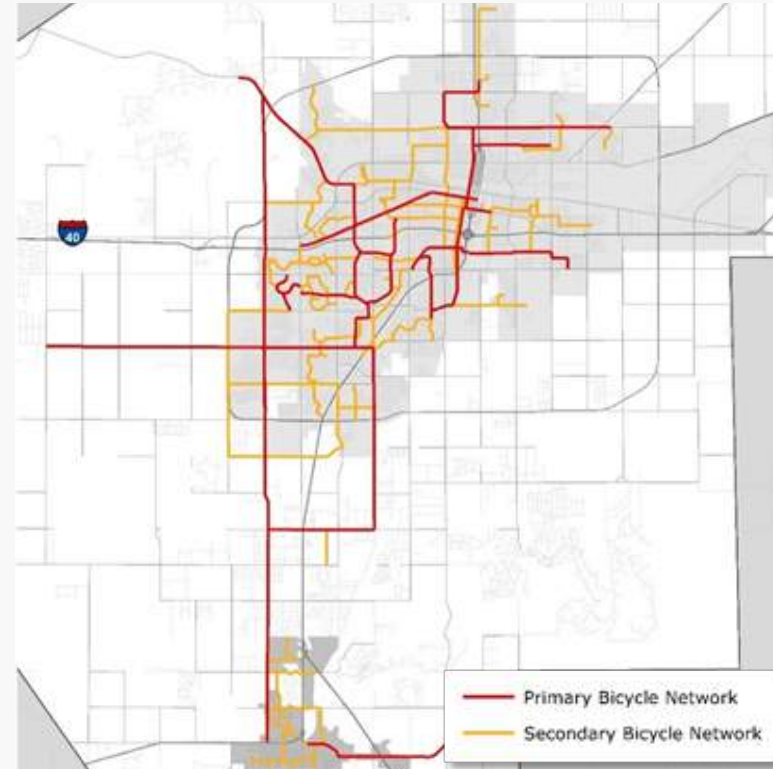


Step 1. Identify New Connections

Beginning with the existing bicycle network and comments from both the public and oversight committee, new connections were evaluated and added to the network. A map of the bicycle-related comments gathered on the Social Pinpoint website is shown in **Figure 5-11**.

STEP 2

Figure 5-12. Primary & Secondary Network

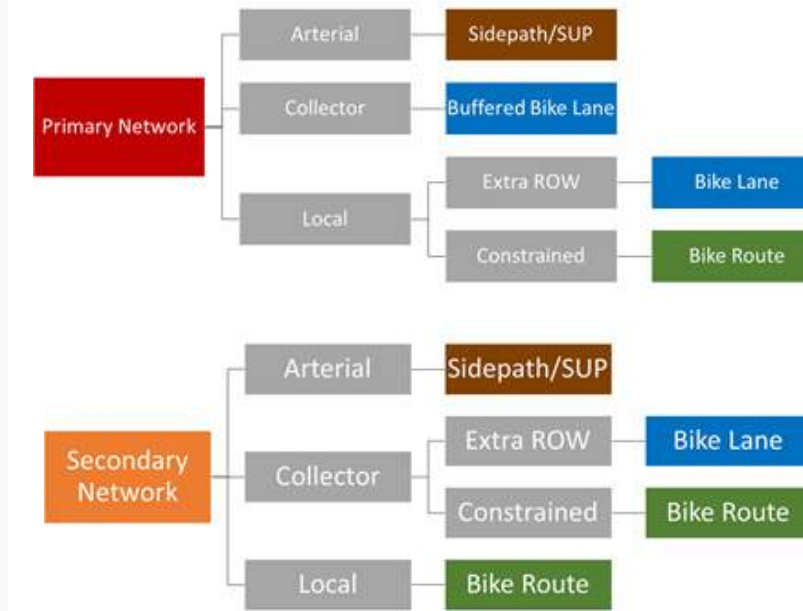


Step 2. Identify Primary and Secondary Routes

Once it was determined where new bicycle facilities would be located, the next step was to evaluate how they functioned in the region overall. To do this, all bicycle facilities were sorted into two networks: a primary network for longer more regional connections, and a secondary network for shorter destination-oriented connections. **Figure 5-12** shows a map of these identified primary and secondary networks.

STEP 3

Figure 5-13. Facility Type Decision Trees

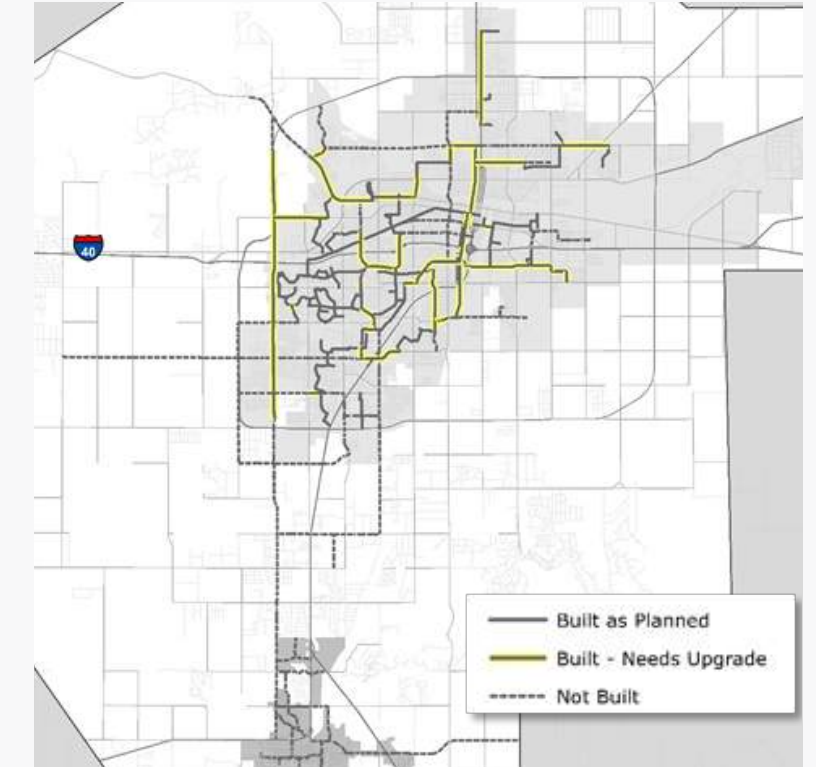


Step 3. Assign Facility Type

With all the proposed facilities classified based on their function, the next step was to assign what their ultimate facility type would be. To do this, a facility type decision tree was created that took several attributes into account before determining what the most appropriate bicycle facility type would be (**Figure 5-13**). This tree resulted in four possible facility recommendations: sidepath, buffered bike lane, bike lane, or bike route. For more information on these facility types and their design standards, please reference the Bicycle and Pedestrian Toolbox.

STEP 4

Figure 5-14. Bicycle Facility Construction Status

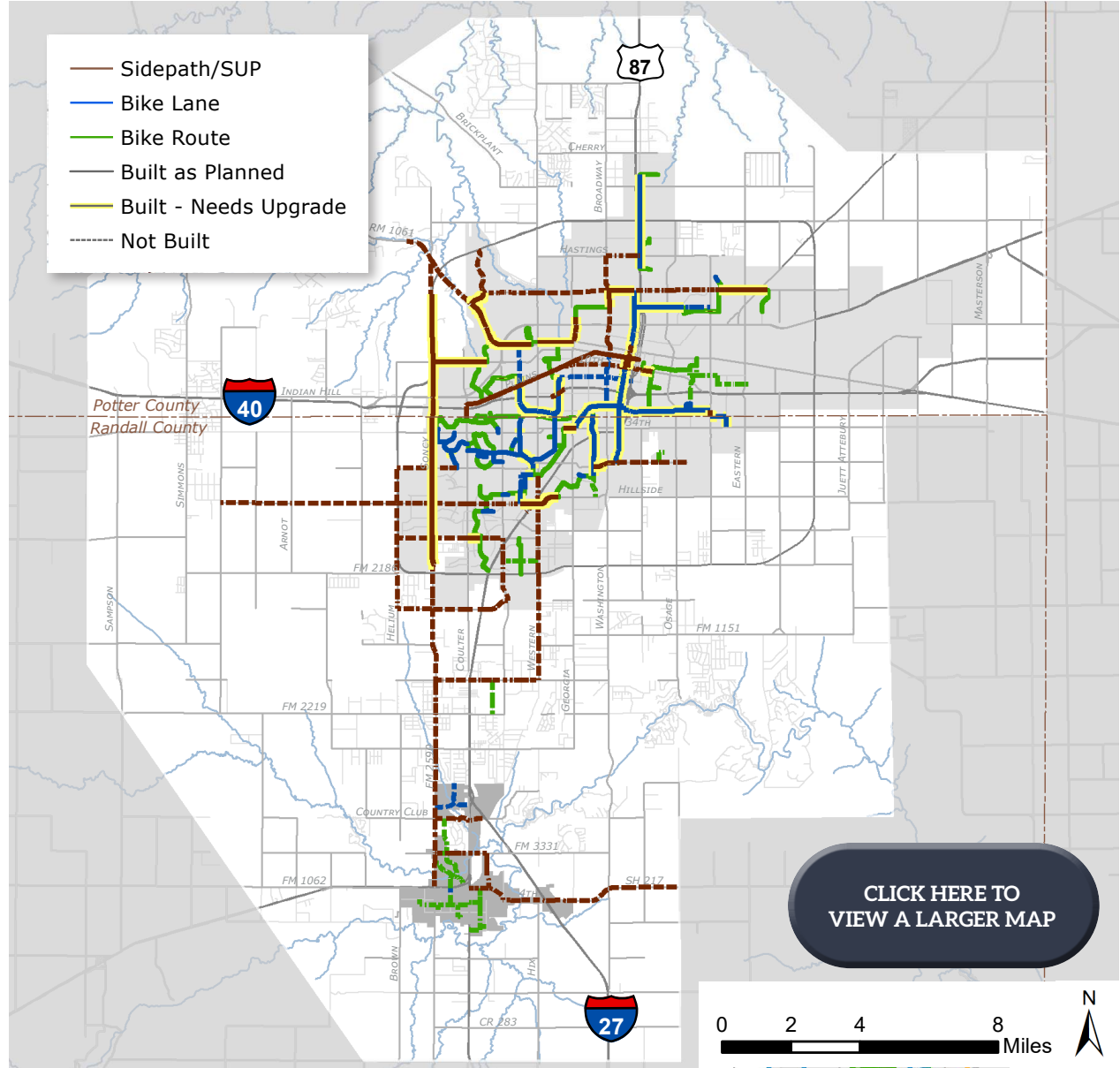


Step 4. Determine Construction Status

Once each road on the network was assigned a type future facility, the final step was to compare these recommendations against the current network. One of three conclusions on the facility's construction status was gathered: new facility, needs upgrade, or built out. A map of each facility's construction status is shown in **Figure 5-14**.

FINAL BICYCLE NETWORK

Exhibit 10. Proposed Bicycle Network



The resulting bicycle network for the region recommends three types of bicycle facilities to enhance connectivity and comfort for users: sidepaths, bicycle lanes, and bicycle routes. These three facility types work similarly to the roadway classification system, in that they were chosen based on the roadway’s ultimate function in the overall network.

Sidepath facilities are located on arterial roads and provide the highest level of separation between bicyclists and other vehicles. This high level of separation is important because these routes mostly serve a high mobility function in the network, therefore also having higher speeds. Bicycle lanes are located on-street along lower speed roads, and are a popular tool also used for road diets because they repurpose extra pavement width that is not needed for cars. The third facility type, bicycle routes, are recommended only for local streets with the lowest speed limits. These facilities are most common in residential neighborhoods where visibility is high, and bicyclists feel more comfortable. For more information on the design standards for each of these facilities, please refer to the Bicycle and Pedestrian Toolbox.

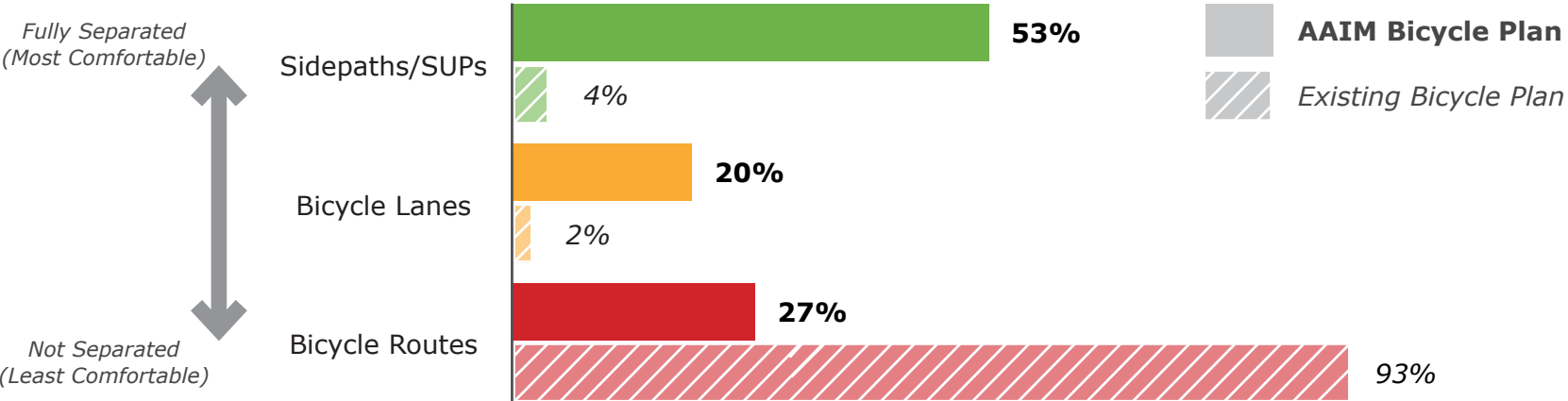
The City of Amarillo’s existing bicycle network is fairly adequate in its approach to providing access within neighborhoods through the use of bicycle routes. To build upon this network, some roads are recommended to have facility upgrades that enhance the comfort level of users. New connections are also added to the network that establish loops around the city as well as connecting major destinations and facilities to one another. For example, the Rock Island Rail Trail is recommended to extend into downtown Amarillo by adding bicycle facilities to 6th Avenue. This project is one of twelve corridor projects proposed in the Priority Corridors section of Chapter 8.

In the City of Canyon, new bicycle facilities had been recently constructed around West Texas A&M campus when this mobility plan first began. It is important for the new bicycle network to build upon the needs of bicyclists in the city, so it is proposed that 4th Avenue be redesigned to include on-street bicycle lanes. This connection was heavily supported in the public input process, as it will provide a clear and safe connection from the city to

Palo Duro Canyon - a popular destination for active tourists. Once the connections between Amarillo and Canyon were determined, the third goal of the draft bicycle network was to identify regional connectors that increased connectivity around the MPO region. The main corridors identified for this purpose include Tascosa Rd, FM 2590, FM 1541, and Western St.

When this process began, the Amarillo MPO region had a very different balance of planned facilities, with bicycle routes being the most common. After this update, the new plan has much more separated facilities than before. **Figure 5-15** shows the breakdown of facility types in the existing and new plan. The final proposed bicycle network map is shown in **Exhibit 10** on page 62.

Figure 5-15. Amount of Separation in the Existing & Proposed Bicycle Plans



LEVEL OF COMFORT ANALYSIS

A bicycle network could encompass every road in the region and still not be well used by bicyclists because it is not comfortable. For roadway users, it is best if each mode of transportation is separated from the others, as this increases the safety for each mode. Therefore, bicycle facilities that are more separated from vehicular traffic are more comfortable and, as a result, encourage more users to the network. It can be said that the

success of a bicycle network depends highly on the bicyclists’ level of comfort. To examine the resulting proposed bicycle network, a level of comfort analysis was conducted to ensure that the proposed improvements would be well-used in the future. This analysis began by defining four levels of comfort based on the spectrum of skill levels found in the cycling community. These levels were numbered from 1-4 with level 1 being the most

comfortable (for users of all ages and abilities) and 4 being the least comfortable (for enthused and confident riders). Once these levels were identified, each possible facility type was sorted into one of these comfort levels. **Figure 5-13** shows the road conditions that were defined to classify the bicycle network facilities by comfort. The final step in this analysis was to calculate the amount of facilities in each of the four levels of

comfort, with the goal being to minimize the number classified in levels 3 and 4. In the end, over 90% of the proposed bicycle network is classified as level 2 or higher on the level of comfort scale, meaning

it will likely be well-used by a variety of residents in the region. **Figure 5-16** breaks down each level of comfort in detail and **Exhibit 11** shows a map of the final network by level of comfort.

Exhibit 11. Bicycle Level of Comfort Map

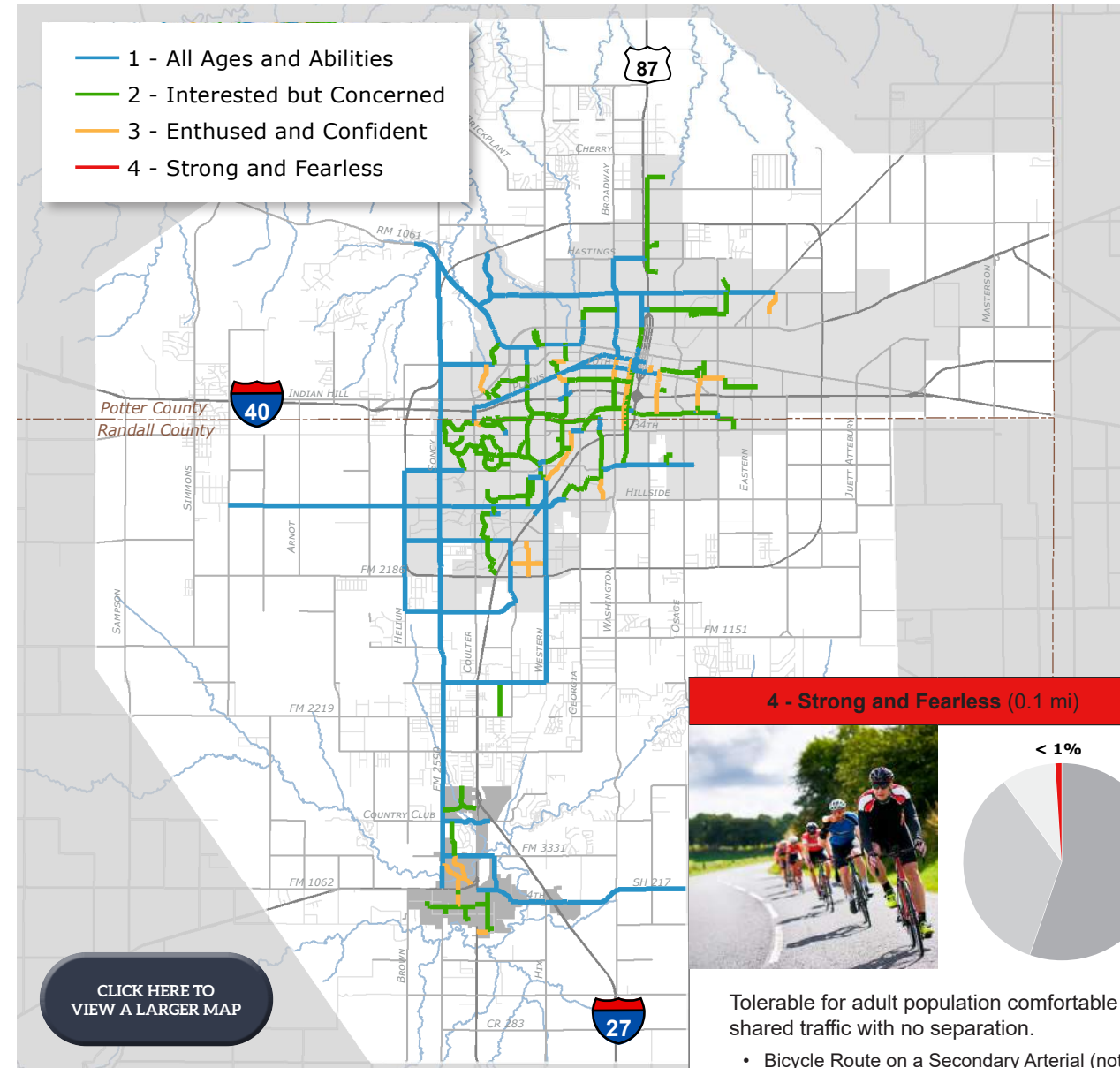
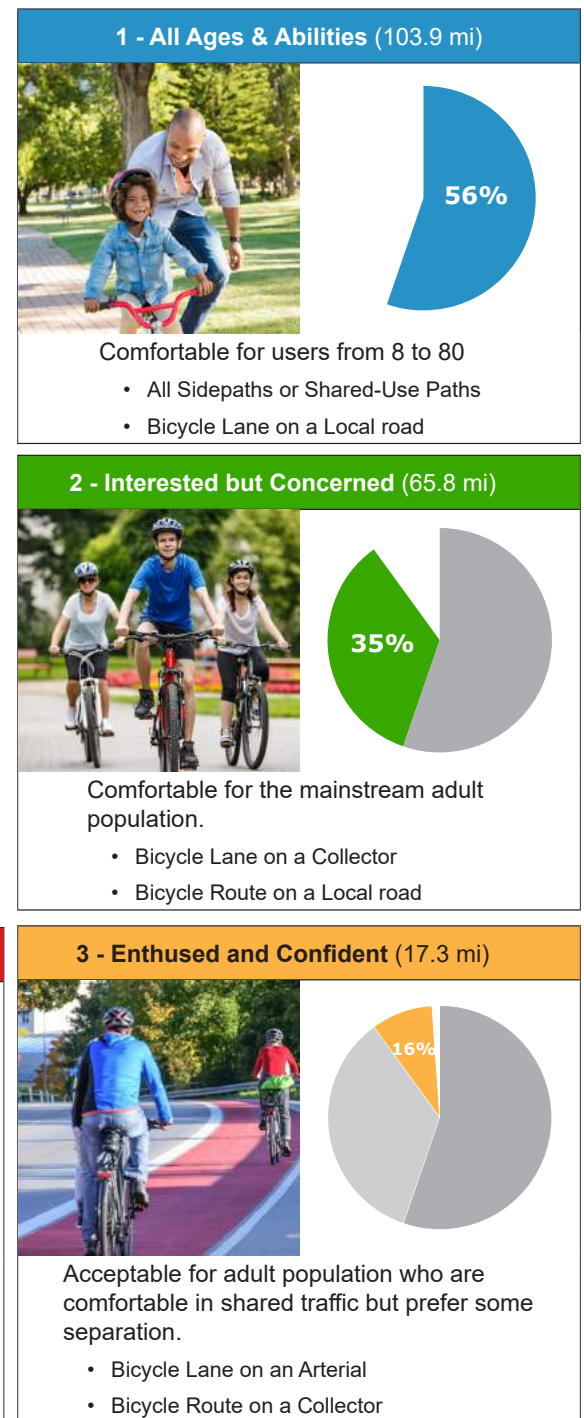


Figure 5-16. Level of Comfort Results



OBJECTIVES & ACTIONS

This Bicycle & Pedestrian Chapter of the plan is centered around Goal 3. This goal focuses on achieving a complete and comfortable bicycle and pedestrian network for the region. The primary strategy for achieving this goal is to close the gaps in the existing sidewalk and bicycle networks both locally and regionally. The objectives and actions for Goal 3 are listed in the matrix below.

<p>Goal 3. Bicycle & Pedestrian – A complete and comfortable bicycle and pedestrian network. Strategy: Close the gaps in the existing sidewalk and bicycle networks both locally and regionally.</p>
<p>Objective 3.1. Create a fully continuous sidewalk network within Amarillo and Canyon city limits.</p> <p>Action 3.1.1. Prioritize sidewalk and bicycle facility projects in the CIP that would connect two sections of the existing network.</p> <p>Action 3.1.2. Increase funding for sidewalks.</p> <p>Action 3.1.3. Focus new sidewalk construction in areas of the region identified as high priority sidewalk gap areas.</p>
<p>Objective 3.2. Establish regional bicycle routes along existing county roads.</p> <p>Action 3.2.1. Expand FM 2590 (Soncy Rd) and SH 217 to include off-street bike lanes designed for regional movement.</p> <p>Action 3.2.2. Create an Amarillo Area MPO regional bicycle network map to advertise and promote the new regional routes.</p>
<p>Objective 3.3. Create a new bicycle network wayfinding program.</p> <p>Action 3.3.1. Update existing signage as new bicycle routes are established.</p> <p>Action 3.3.2. Create separate bicycle network maps for both Amarillo and Canyon as part of the MPO regional bicycle network advertising initiative.</p> <p>Action 3.3.3. Establish a wayfinding program focused on culturally connecting Rock Island Rail Trail, Historic Route 66, and Downtown Amarillo as one cohesive network.</p>



CHAPTER 6: TRANSIT, FREIGHT, & AVIATION



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INTRODUCTION

One of the goals of Amarillo Area in Motion is improving regional connectivity, which makes improving the existing transit, freight, and aviation services and resources vital. Improving regional and local connectivity will require ensuring:

- **Transit** services provide access to work, school, medical services and shopping;
- **Freight** activity can move freely, easily, and safely through the freight network; and
- **Aviation** services offer connections to major destinations that are affordable, safe, and convenient to all passengers.

By improving these services, the Amarillo area will not only improve its connectivity but will ensure residents have access to needed services and bolster the local economy.

TRANSIT

Expanding and enhancing transit services is one of the major goals of this plan and the region. The U.S. Census Bureau estimated in 2018 that 73% of the Amarillo area workforce travel less than 10 miles to work (Amarillo – Texas Economy, 2018), which represents a large portion of the population that would most likely benefit from enhanced transit services.

For effective mobility, it is vital to ensure transit services are integrated into the multimodal network. This helps increase connectivity with other modes of transportation, such as biking or walking, and ensure connections are accessible to all users, therefore improving the overall rider experience from the beginning to the end.

To ensure these components of mobility are facilitated, both access and implementation barriers need to be identified and addressed to ensure riders of all abilities have convenient, safe, and secure access. More technology and innovative service delivery options continue to emerge in the field of transit that build upon the efficiency, effectiveness, and safety of services. The city will need to seamlessly integrate these tools to offer high-quality and convenient transit service to the residents of the region.



Figure 6-1. Amarillo Transit & Panhandle Community Services

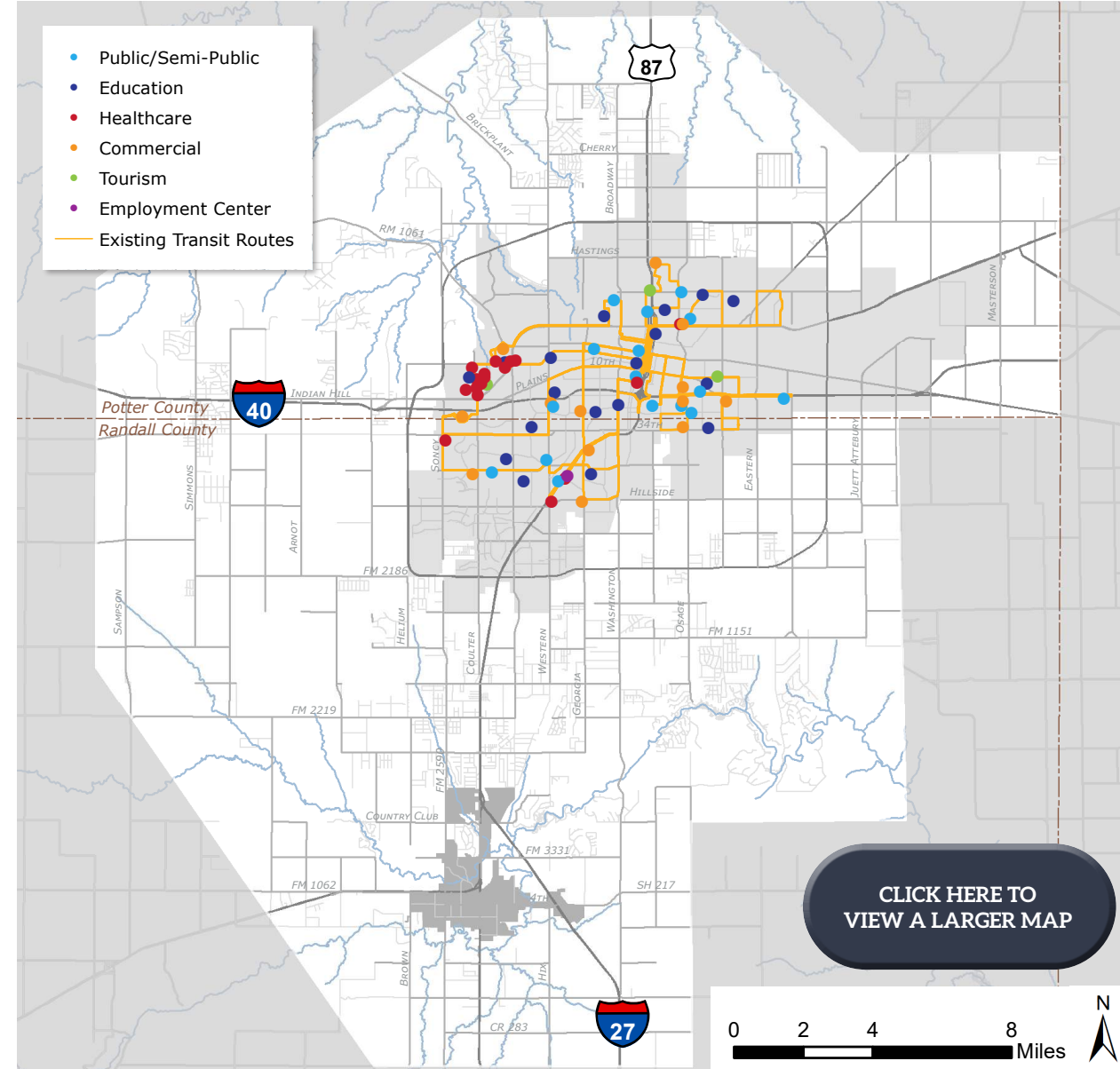
EXISTING TRANSIT NETWORK

Fixed route transit in the Amarillo MPO study area is offered within the city limits of Amarillo. In previous plans it has been identified that transit ridership in the city is not common for residents. There are two paratransit services that serve the region. Amarillo City Transit (ACT) offers complimentary paratransit service in the city and Panhandle Community Transit is the regional rural transit provider that provides curb-to-curb shuttle services to non-urban areas throughout the Texas panhandle. “Spec-Trans” is an additional transit service offered by the city that provides on-demand shuttle service for those who cannot use fixed-route services due to a physical impairment.

The fixed route transit network consists of 13 bus routes that serve 71 locations of varying type (**Exhibit 12** on page 70). Span of service exists from 6:20 AM to 7:00 PM, although service hours have been shifted due to the impact on ridership resulting from COVID-19. From September of 2018 to August 2019, Amarillo Transit had recorded over 318,000 riders, averaging 0.31 riders per mile. This compares very similarly to transit agencies in Midland-Odessa (0.33 riders per mile) and Killeen – Copperas Cove/Harker Heights (0.47 riders per mile).

The locations serviced on this system can be sorted into the following six categories of land use:

Exhibit 12. Locations Served by Existing Transit Routes



Education - schools and libraries

Healthcare - hospitals, clinics, and other health-related businesses

Employment center - the regional call center

Commercial - shopping centers & big box stores

Tourism - downtown centers, festival sights, & other event related locations

Public/Semi-Public - government buildings, nonprofits, & churches

RIDER & PUBLIC SURVEYS

To improve transit service in the city, ACT conducted a public engagement survey in 2017. Understanding transit is not a straightforward and simple concept, so the engagement focused on educating the public and riders about using the system and other transit best practice. The program consisted of several engagement techniques including focus groups, community meetings, paper surveys on-board and mailed, electronic surveys, and an online interactive map. Several common themes resulted from these efforts:

- **Availability** - "Does the bus run when and where I need it?" Many respondents frequently mentioned the need for extended hours of service.
- **Frequency** - "How often does the bus come to my stop?" Respondents indicated the need for a Sunday services
- **Reliability** - "Does the bus arrive when it is supposed to?" This was the most common complaint from riders and focus group participants.

In addition to this public engagement program, Legal Aid of Northwest Texas conducted an Amarillo City Transit satisfaction survey to gauge the residents transit experience in Amarillo, and to help better understand current challenges, opportunities for improvement to the infrastructure and current service. The Panhandle Regional Planning Commission (PRPC) continues to engage the riders and the public to help address any questions or concerns with the current service.

FIRST-LAST MILE (FLM) ANALYSIS

Transit trips initiate and end with a variety of modal choices including parking, drop offs, walking, biking, and wheeling. These users are more likely to use active transportation, to access their destinations, even if that means walking a few hundred feet from the bus stop to the grocery store or pedaling a few miles to their job. However, people are generally willing to walk a quarter mile, or even up to half mile for frequent transit service depending on the infrastructure and system in place. As such, improvements to sidewalks, curbsides, and bike lanes help improve the overall connectivity to the system. These walking and biking trips to and from transit service are referred to as the first/last mile (FLM) trips. Ensuring that safe, comfortable walking and biking facilities are available to transit stops is crucial to a successful transit system.

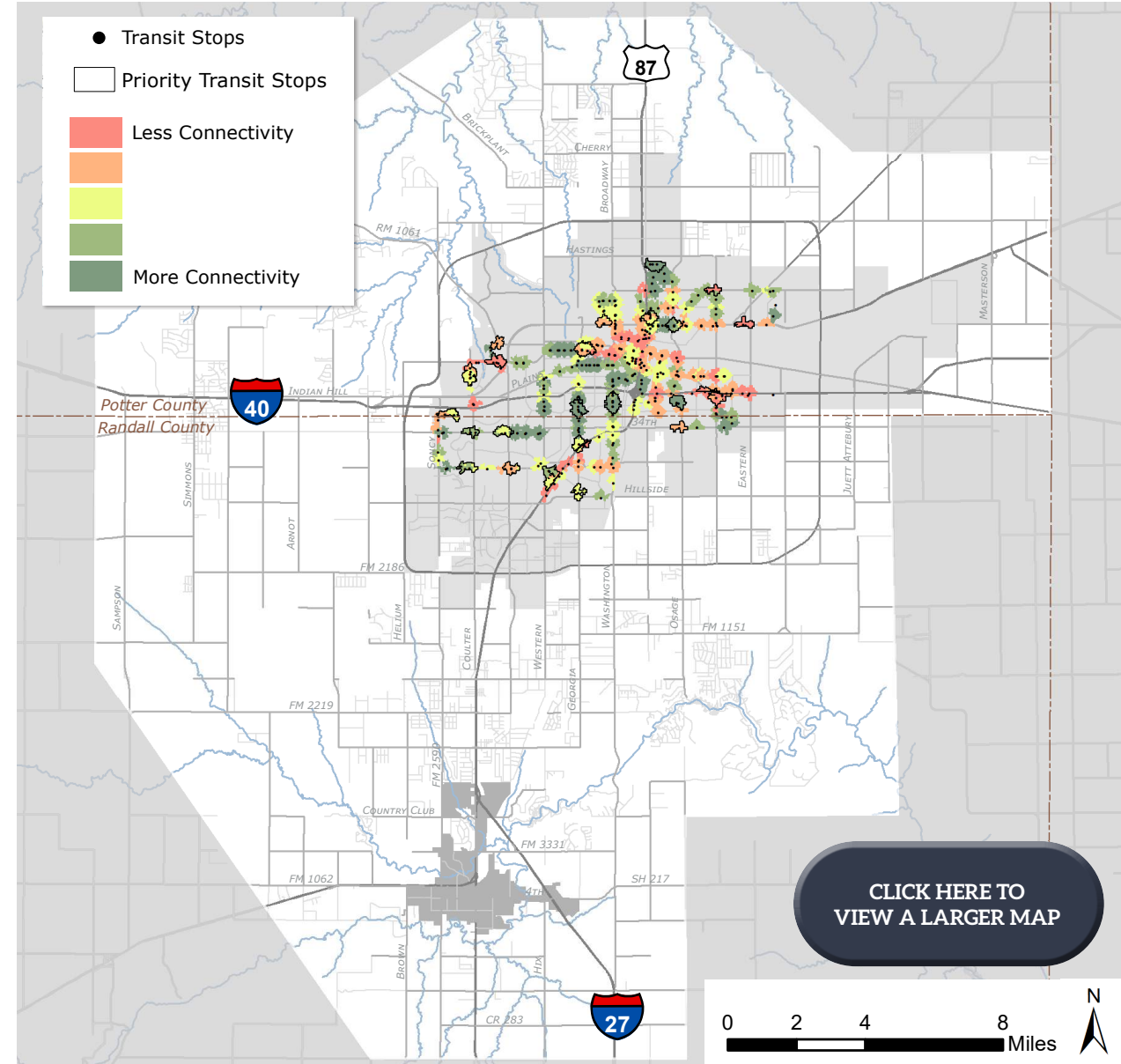
To obtain a high-level understanding of where active transportation connections exist within a quarter mile of transit stops, and where improvements may be needed, a FLM analysis was conducted. Within a quarter mile walking distance of transit stops within the Amarillo MPO study area, the analysis measured three important infrastructure and operational elements:

1. Availability and condition of sidewalks
2. Local streets with low speed
3. Low traffic streets that suitable for on-street bicyclists

These facilities were reviewed in proportion to the total available roadway with the assumption that all streets should be made available to bicyclists or pedestrians. The results of this analysis are shown

in **Exhibit 13** where red areas show less walking and biking connectivity to transit stops, and green shows higher connectivity. Stops outlined in black are priority stops determined by Amarillo Transit.

Exhibit 13. Bicycle and Pedestrian Connectivity within a Quarter Mile of Transit



The map shows lower connectivity in the downtown Amarillo area along routes 44 and 12 especially between Amarillo Boulevard to the north and West 6th Avenue to the south. To the east, route 31 along Southeast 10th Avenue and route 33 along I-40 have lower walking and biking connectivity. Ten priority stops with the lowest connectivity are shown in **Figure 6-2**. These locations are recommended for further study to identify future infrastructure improvements that will create safe, comfortable paths to access transit service. The Bicycle and Pedestrian Toolbox can be used to determine improvements that fit each unique priority stop location.

Figure 6-2. Top Priority Transit Stops with Low Walking & Biking Scores

Route	Stop	Stop Description
11	30	SW 9th Ave at North Entrance to VA Hospital
11	17	SW 9th Ave @ Amarillo College West Campus
11	18	SW 9th Ave & Quail Creek Dr
11	29	1215 S Coulter St
23	13	Amarillo Blvd & N Eastern St (East Amarillo Blvd Market)
23	20	Amarillo Blvd & Fritch Hwy
31	22	Interstate 40 & S Grand St (Walmart)
33	10	Interstate 40 & S Grand St (Walmart)
33	18	Interstate 40 & Tee Anchor Blvd (Amarillo Value Inn)
42	25	Canyon Dr & S Georgia St (Walmart)

TRANSIT RECOMMENDATIONS

IMPROVING ACCESSIBILITY

Improving transit accessibility means ensuring future service has the proper amount of coverage to meet all community needs and identifying infrastructure conditions that may be impeding access to current service. Not only is it important that users have easy access to transit stops, but it is also important that this access supports all modes of transportation including pedestrians, bicyclists, and vehicles. By ensuring that current infrastructure provides multimodal access, a transit agency can extend the reach of the system by increasing the convenience for all users to get to the first stop, and to get home from the last stop. By ensuring more modes of travel have access to transit services in Amarillo, the market reach for transit services will increase, and it is likely that more people will choose transit over driving.

Not only is it vital to provide this multimodal access to users, but it is also vital to ensure that access is comfortable, convenient, and safe. Identifying different possible service barriers, and corresponding facility improvements, can encourage more residents that otherwise would rely on a personal vehicle to utilize transit. Continuing to gather feedback from riders and community groups will be essential to verify identified barriers that may be discouraging ridership. There are commonly two types of barriers that hinder the quality or expansion of transit services: access and implementation.

SHORT-TERM RECOMMENDATIONS

Recommendations with the possibility of being implemented within the next five years are considered short-term recommendations. For the City of Amarillo, short-term recommendations include:

- Target transit stop infrastructure/facilities improvements
 - Invest in sidewalk improvements and bike lanes
- Review funding resources as transit system expands services
 - Financing transit operations will change from small to large urban with the potential reduction in operating funds estimated to occur in FY23/24
 - Pinpoint a sustainable funding options and local partners
- Connect the multimodal transfer center to the Rock Island Rail Trail
 - Proposed location at 6th Ave. & Bowie St. west of downtown
 - Current transfer facility has limited capacity causing buses to park along US 87
- Create a connection to the West Texas A&M campus in downtown Amarillo to the main campus in Canyon.
- Develop service to new employment centers at 24th and the 335 loop and Farmers at Georgia.
- Improve transit services to the southwest sector of the City.

MISSING KEY ROUTES

There are two key areas identified in the study area that would greatly benefit from the establishment of additional transit routes. The two routes identified in **Figure 6-3** would provide service to the City of Canyon and direct access to the Rick Husband Amarillo International Airport. Many students would benefit from a possible commuter route extending to Amarillo from the West Texas A&M campus in Canyon. Also, although some ground services are available at the airport, such as rideshare, having a direct and reliable transit connection to the airport would improve accessibility and align with regional economic development goals set forth in the Airport Master Plan. As population growth and additional development occurs through the study area, transit service should be re-evaluated to continue to properly serve the needs of the community.

Figure 6-3. Proposed Transit Routes

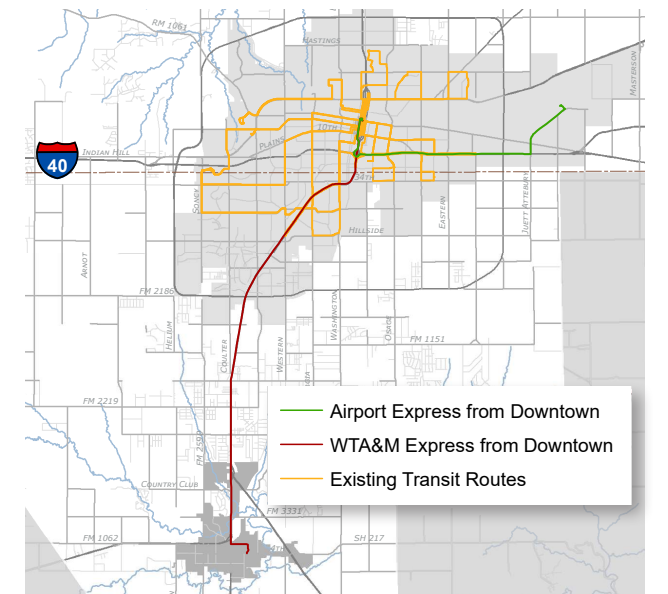
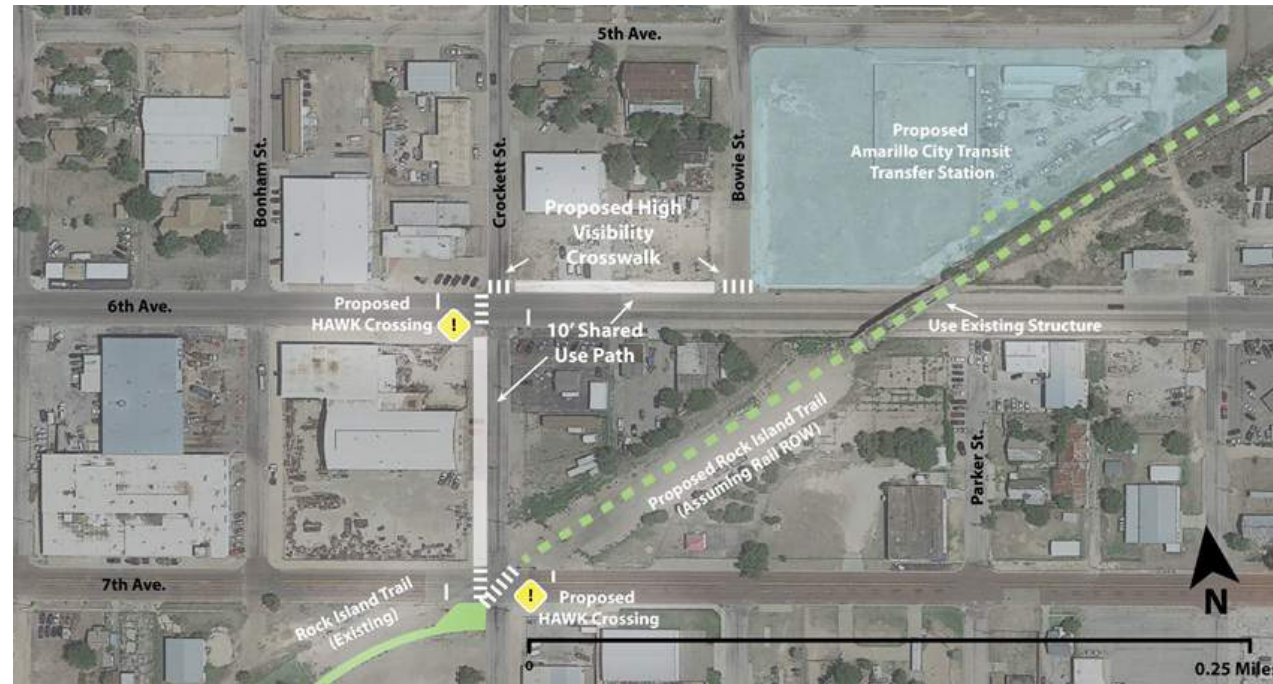


Figure 6-4. Rock Island Trail Extension to Proposed Transfer Station



EXTENSION OF ROCK ISLAND TRAIL

The Rock Island Trail, a four-mile, multi-use trail named after the railroad line that historically ran parallel to the trail alignment, currently spans from Coulter Street north of I-40 to Crockett Street and SW 7th Avenue. The trail should be extended 0.3 mile northeast to connect with the Multimodal Transfer Station estimated to be completed in fall of 2022. while also benefitting the overall connectivity of downtown Amarillo. Additionally, the trail could

be extended - to downtown taking advantage of the unused rail line. (Figure 6-4).

Elements of this trail extension would be complemented by pedestrian crossing enhancements such as high visibility crosswalks, HAWK crossings, and a shared use path along 6th Avenue, thus improving pedestrian safety within the downtown area.

LONG-TERM RECOMMENDATIONS

Recommendations anticipated to take longer than five years to implement are considered long-term recommendations. For the City of Amarillo, long-term recommendations include:

- Develop service standards that measure performance in relation to service reliability, system productivity, and communications of service information.
- Coordinate with local medical and social services providers to develop partnerships on transit service to locations such as medical centers, community centers, and senior/assisted living centers.
- Identify opportunities to transition to electric vehicles/bus replacement as vehicles age
- Integrate emerging technologies and data management tools to maximize safety and efficiency
 - Use emerging vehicle technologies to increase safety and efficiency.
 - Build enhanced traffic control infrastructure to support connected and automated vehicle technologies such as software to track ridership and on-time performance.
 - Consider an autonomous circulator shuttle that connects residents to entertainment locations, educational institutions, health care services, airports or other high travel locations.
 - Use communication technologies, sensors and traffic control devices to improve safety and traffic flow.

FREIGHT

EXISTING NETWORK

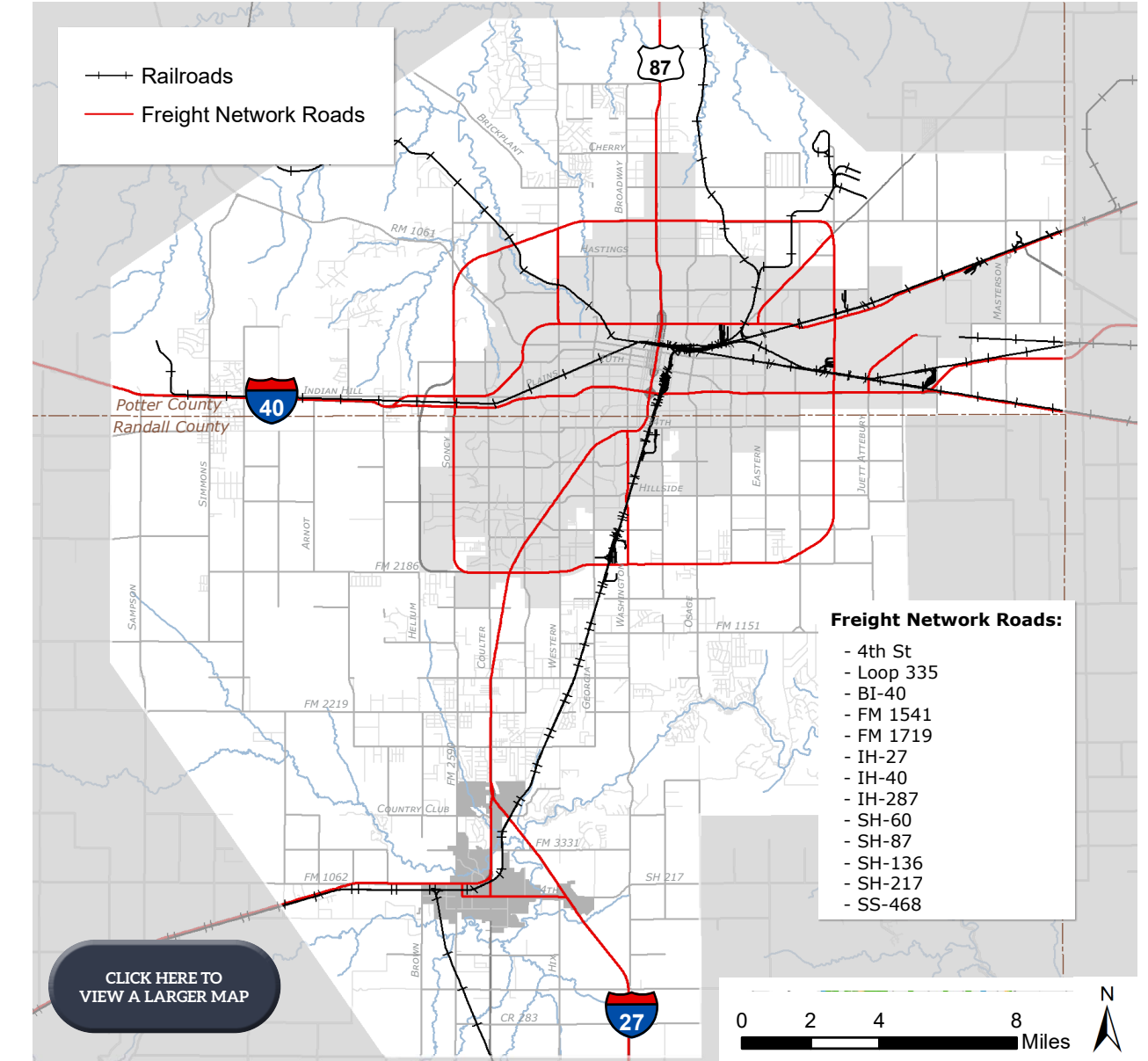
RAILROAD

The establishment of Amarillo and the economic growth of the Amarillo metropolitan area have been closely tied to its location on key freight networks. Because of its location on major east-west and north-south railroads in the 1890's, Amarillo emerged as the principal city of the Texas Panhandle, and a major center for shipping cattle. What are now major lines of the Burlington Northern and Santa Fe (BNSF) Railroad still provide direct service to Chicago, Los Angeles, Denver, Phoenix, Kansas City, Dallas, Seattle, Vancouver, Memphis, St. Louis, and Pensacola. These mainlines also terminate at the ports of Houston, San Diego, and Galveston. The BNSF Southern Transcon Railroad, the main line of the BNSF between Los Angeles and Chicago, is the primary route for BNSF's intermodal franchise. The rail line operates a large intermodal facility in Amarillo that handles about 30,000 containers and trailers each year. The Union Pacific-Southern Pacific railroad also has rights to use BNSF tracks in the Amarillo area. Some of the key issues facing railroad operations in the Amarillo metropolitan area are congested intermodal facilities for rail-truck transfers and safety and delay at at-grade highway-rail crossings.

NATIONAL HIGHWAY SYSTEM

The location of the Amarillo Area MPO is also at the intersection of IH-27 and IH-40 making it an important part of the nation's freight movement by truck. Both highways are parts of the National Highway Freight Network and the Texas Highway Freight Network. IH-27 is also a part of the high-

Exhibit 14. Amarillo Freight Network



priority Ports-to-Plains Trade Corridor that runs from the Mexico-Texas border to Denver, Colorado. The Ports-to-Plains Trade Corridor was first listed as a Congressional High Priority Corridor in Intermodal Surface Transportation Efficiency Act (ISTEA) in

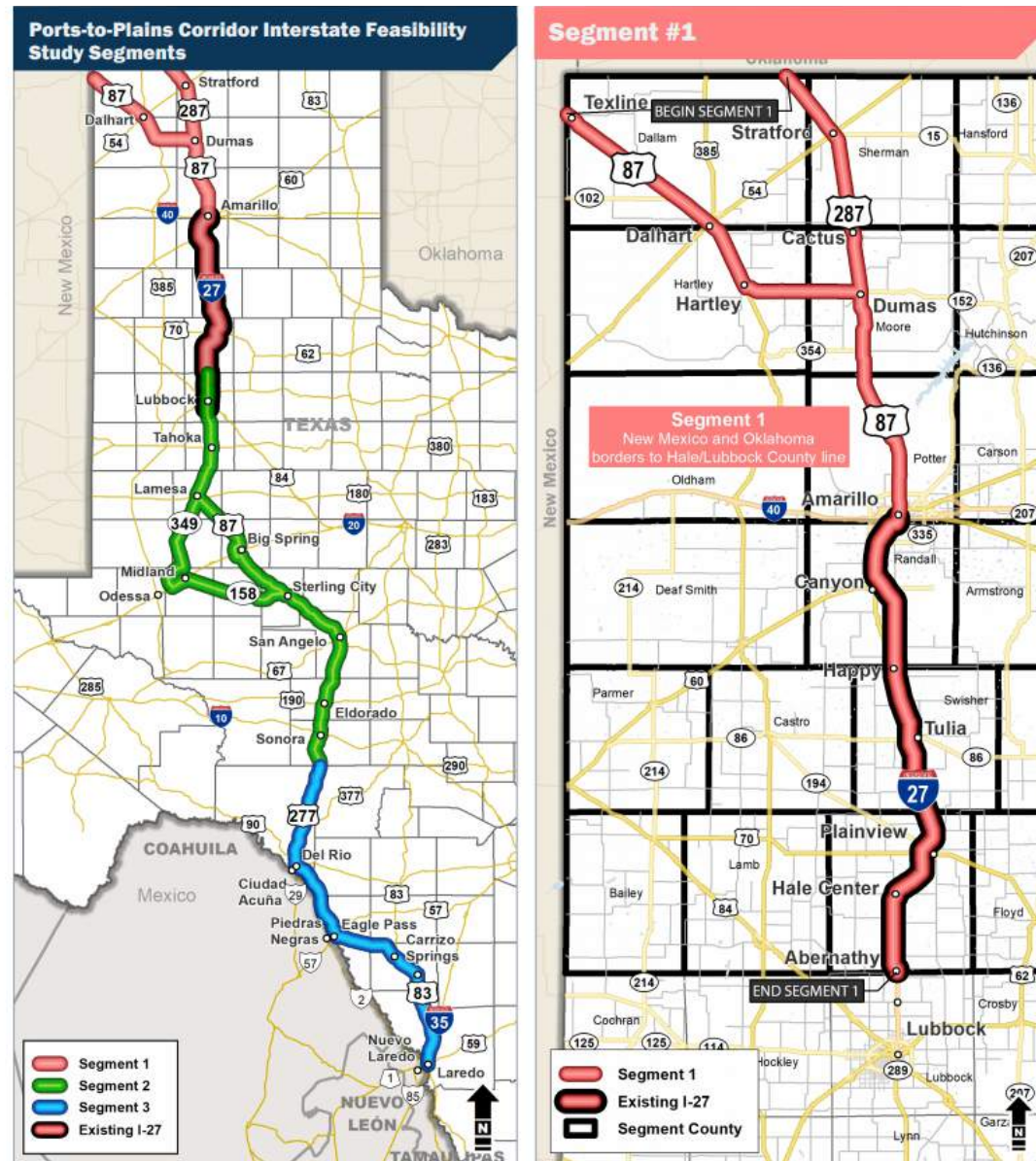
1991. Also, on the Texas Highway Freight Network within the Amarillo metropolitan area and the Canyon area are US Highways 60, 87, & 287, and Texas Highways 136, State Loop 335, FM 1541, FM 1719. Key issues related to truck freight

movement in the Amarillo metropolitan area are highway congestion during peak commute periods, vertical clearance at some older grade-separated interchanges and intersections, truck parking, truck impacts on roadway surfaces, and conflicts between truck operations and neighborhoods and local commercial districts.

along segment #1 through Amarillo, concentrated mainly along IH-27, over the next several decades. It is estimated that truck tonnage will grow by 59% and the total volume of freight will reach 77 million tons in 2050, the highest estimate of the corridor's segments. This will lead to increased truck volumes diverted to local corridors and nearby parallel routes.

strategies including improving incident response timing and systems, road improvements (such as fixing bottleneck points), improving traveler information systems and delivery, and improved data collection methods.

Figure 6-5. Ports-to-Plains Interstate Feasibility Study Segments



FREIGHT NETWORK & FREIGHT ACTIVITY

Two of the major corridors in the Amarillo TxDOT district (IH-40 and IH-27) have 20-50% of their Average Annual Daily Traffic (AADT) volume attributed to truck traffic. Because of the large share of truck traffic on these corridors, it is vital that Amarillo ensure they remain free of major congestion so that deliveries can be made on reliable and timely schedules.

PORTS-TO-PLAINS CORRIDOR

A key component of future freight activity in the Amarillo area is the Ports-to-Plains Corridor. The Ports-to-Plains Corridor was designated as a high priority corridor intended to provide the efficient transportation of goods and people running north-south from Mexico, through West Texas, Oklahoma, New Mexico, Colorado and ultimately to Canada and the Pacific Northwest. The corridor connects and integrates important economic generators to international trade, energy production and agriculture. Segment #1 runs through Amarillo along US-87/IH-27 and connects to key Texas trade gateways of Laredo, Eagle Pass, and Del Rio. **Figure 6-5** displays the limits of Segment #1 in relation to the corridor.

A Segment #1 Committee was formed with local leadership to study, analyze, and provide segment-specific recommendations, which were finalized in a committee report. Key highlights from the report anticipate a significant amount of freight activity

Upon completion of the study, the following recommendations were made by the Segment #1 Committee:

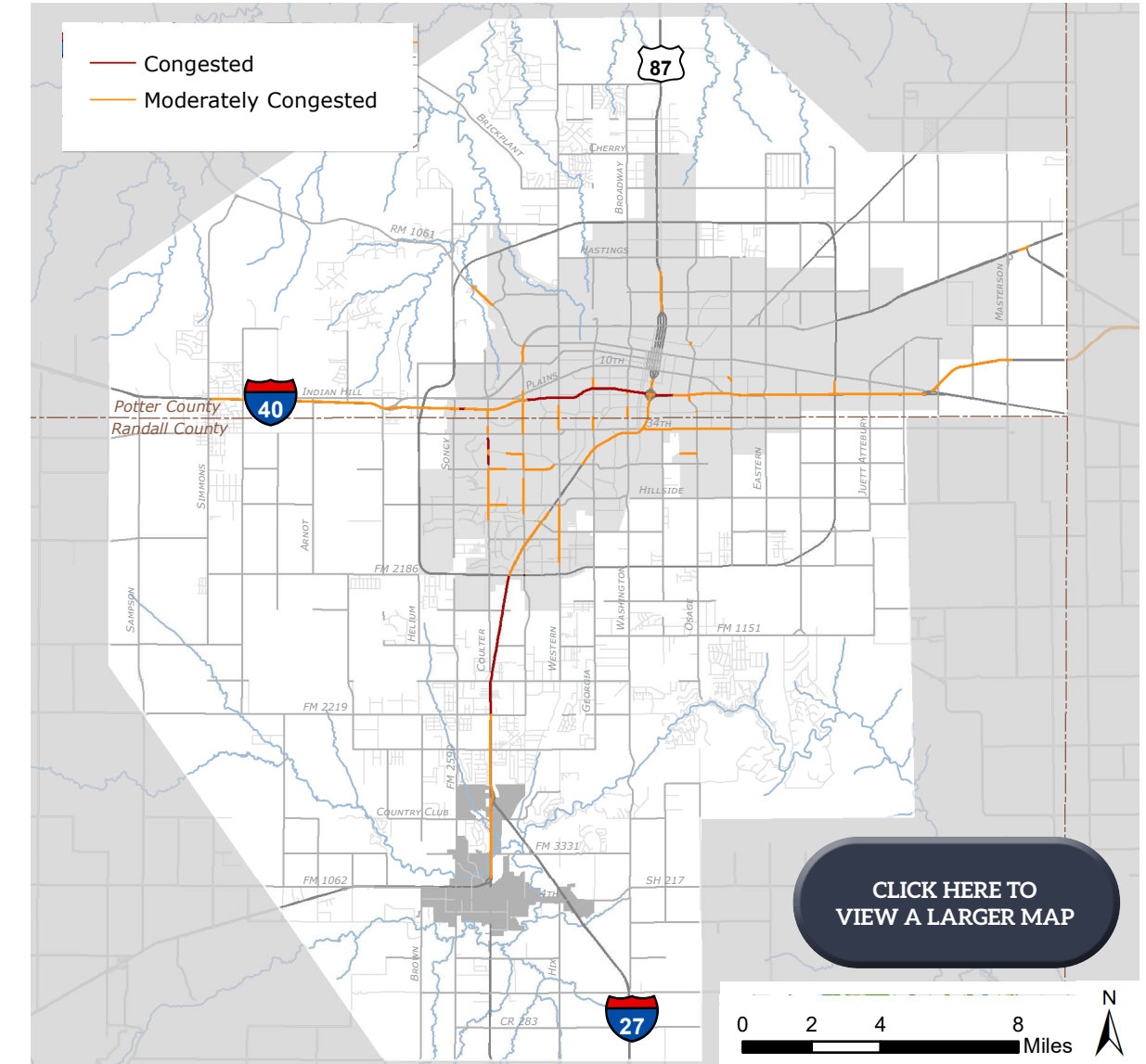
- Interstate upgrade projects that would extend IH-27 by upgrading the existing primarily two-lane corridor to an interstate level facility.
- Relief route projects around communities where upgrading the existing facility to interstate standards would create significant adverse impacts.
- Safety and operational improvements along the corridor that are effective and low-cost strategies to improve safety on the existing corridor and compliment the interstate upgrade.

Additional policy and general recommendations were made by the committee to help plan and prepare for the freight activity along the segment.

CONGESTED INTERMODAL FACILITIES

TxDOT projects congestion and moderate congestion to increase by 2039 on the majority of the freights network segments within the Amarillo study area, and especially on IH-40 and IH-27 (**Exhibit 15**). These projections should support the data-driven decisions made within the Amarillo district to help combat future congestion and optimizing travel times on the transportation network. This data is vital to informing policy decisions and prioritizing investments to support strategies that help reduce delay and improve travel time reliability. These investments should support

Exhibit 15. Projected Traffic Congestion



SAFETY ACCESS

One of the major aspects of safety for large trucks is adequate and safe parking along their routes. Parking facilities provide drivers with an opportunity to rest comfortably, which helps prevent accidents involving fatigued drivers. The Amarillo district has the largest amount of parking (publicly owned) in the state of Texas. Peak truck parking demand in the Amarillo district is expected to increase by 61% by 2050, and corridors in the district are already starting to experience negative impacts from the expected increase. The district recorded 78 crashes involving parked trucks from 2013-2017, and 4%

Figure 6-6. Trucks Parked on I-40 Near Amarillo



involved a fatality. Of the corridors in Texas, the Texas Statewide Parking Study identified I-40 west of Amarillo as being a corridor with consistently high priority safety needs. **Figure 6-6** provides a snapshot of truck parking near Amarillo with two privately owned parking centers where the study indicates driver utilized primarily for short breaks. The corridor falls within the low capacity and high safety needs, indicating there may be a need for increased law enforcement or signage directing truck drivers to available parking. Within the Amarillo district there are 439 miles of roadway with medium to high priority truck parking needs.

RAIL CROSSINGS/NOISE

There are just over 80 at-grade rail crossings within the city limits of Amarillo and Canyon. At-grade rail crossings in urban areas can present a safety hazard, as they can create a conflict between trains and roadway users, which consistently represents one of the largest sources of injuries and fatalities for railroads. Without the proper signalization and signage to warn users of oncoming trains, these crossings can prove to be fatal. In Potter County, there have been 138 accidents/incidents at railroad crossings within the last ten years, four of which resulted in a fatality. Of these accidents, the majority were a result of a vehicle driving through the gates. The latest accidents reported to Federal Railroad Administration (FRA), were at Amarillo S. Yard, Zita, and Umbarger stations.

Additionally, rail crossings in urban areas can create a nuisance for residents as they generate large amounts of noise. The FRA mandates that all locomotives use horns at public highway-rail grade crossings, but a waiver can be filed to establish a quiet-zone or partial quiet zone. However, the approval of a quiet zone requires the implementation of additional safety measures, which could include

channelizing vehicle and pedestrian travel paths, adding median gates, or an alternative wayside horn that has a smaller, more focused sound footprint. These improvements would not only abate noise, but also improve overall safety of pedestrian crossings. Amarillo may be able to benefit from the momentum created by the establishment of the quiet zones that were approved for the City of Canyon and went into effect in October of 2015.

RECOMMENDATIONS

The freight network in Amarillo is a vital part of the local and regional economy, which in turn connects to the national freight network. It is a priority to ensure that freight movement throughout the network on major corridors is free flowing, without delay, and maintains safe facilities for truck drivers to stop at. Strategies to facilitate these concepts include:

Short-Term Recommendations

- Continue coordination with the Ports-to-Plains Segment #1 Committee
- Prioritize crossings as part of the CIP
 - Create a toolbox of intersection design best practices aimed at solving capacity & safety
- Improve designation and signage of truck routes and hazardous material routes

Long-Term Recommendations

- Optimize intersection capacity and flow to minimize congestion
- Reduce impediment to freight movement and conflicts with other modes
- Enhance roadway design and traffic control to reduce conflict with freight movement
 - Invest in new wayfinding and traveler information for truck drivers
- Anticipate future truck parking needs and consider them in relation to safety concerns and key freight generators

AVIATION

Aviation may not directly impact the daily travel patterns of a large majority of Amarillo residents, but when supported correctly, it can become a major economic driver for a region. Creating reliable and well-connected aviation services is a vital piece of the mobility network for the Amarillo Area to ensure residents can get to where they need to go, while attracting tourists and regional business partners. To understand the overall passenger experience at the airport, an analysis was conducted related to the following items:

- History of Rick Husband Amarillo International Airport;
- The recent 2016 Airport Master Plan;
- The connections to the airport (street, transit, and technology);
- Current and projected enplanements/operations;
- Current and projected traffic to and from the airport, business developments; and
- Visitor drop-off/pick-up experience.

Figure 6-7. Rick Husband Amarillo International Airport



EXISTING AVIATION NETWORK

Rick Husband Amarillo International Airport (**Figure 6-7**) is the primary public airport within the Amarillo urban area and is located east of downtown Amarillo. The airport has been operating as a publicly owned airport since 1941, but only operated under the name of Rick Husband since 2003. Because of its central location within the Texas Panhandle, Amarillo is a hub where six primary highway arteries meet within the city and according to TxDOT congestion data, IH-40 & IH-27, as well as US 287 all currently show moderate congestion, which is forecasted to increase slightly over time.

The Rick Husband International Airport is classified as a non-hub primary commercial service airport, enplanes over 350,000 passengers annually, and maintains two freight forwarding air cargo operations through FedEx and UPS. Major operators in contract with the Rick Husband International Airport as of June 2020 include Southwest Airlines (160 operations), Mesa Airlines (133 operations), Skywest Airlines (58 operations), Ameriflight (53 operations), and NetJets Inc. (22 operations).

There are over 50 passenger flights provided daily by American, Southwest, and United Airlines to Dallas, Houston, Phoenix, and Denver. Additionally, the airport houses Bell and International Aerospace Coatings, which are two significant companies in the aviation industry. Rick Husband's aircraft inventory consists of:

- 45 aircraft based on the field
- 21 single engine airplanes
- 15 multi engine airplanes
- 8 jet airplanes
- 1 helicopter

PROJECTED ENPLANEMENTS/ OPERATIONS

FAA's Terminal Area Forecast indicated a continuous decline in enplaned passengers up until 2016, after which total enplanements were projected to grow at compounded annual growth rate (CAGR) of 1.3% until 2035, and an average of 1.4% per year after (Figure 6-8). Total commercial aircraft operations are forecast to grow by a CAGR of 2.4% from 2016 to 2023, then slowing to 1.5% until 2035.

BUSINESS PARK

The Airport has 300 acres of developable land that is adjacent to the runway/taxiway system and is suitable as a business park. The Amarillo Economic Development Corporation also has an additional 500 acres of developable land adjacent to the Airport's land.

GROUND SERVICES

The Rick Husband International Airport has a single provider of ground services, TAC Air AMA. Ground services take care of the needs of aircraft once they have landed, as they make their way to the terminal, and ensure the aircraft is ready for its next takeoff.

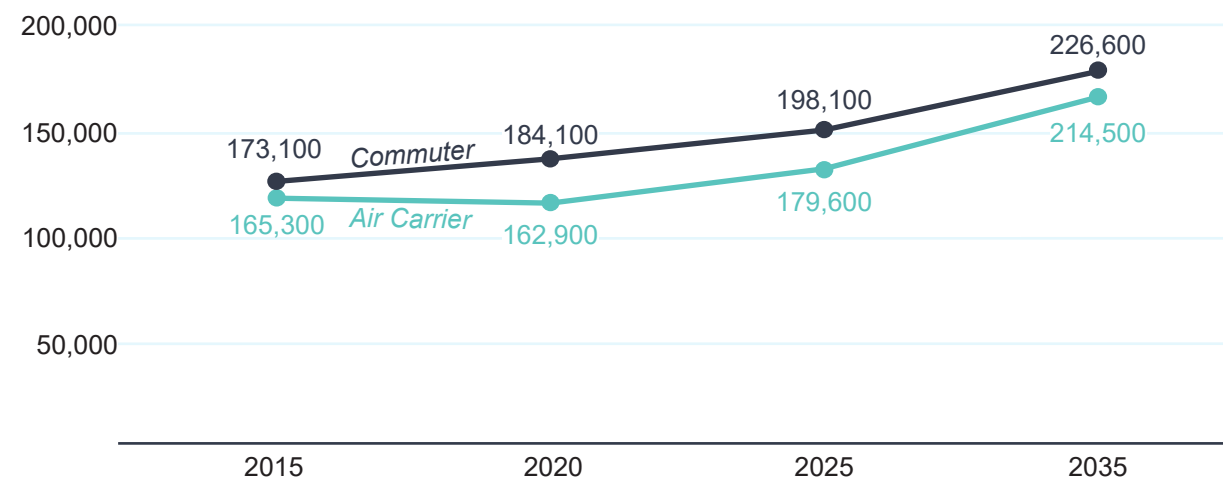
As part of this partnership with TAC Air-AMA, many updates have been planned to not only improve ground services at Rick Husband, but also improve the comfort, convenience, and security of the flight staff at the airport between flights. This also offers expanded opportunities for business development with both passenger and non-passenger related endeavors.

"TAC Air-AMA offers award-winning ground services, quick turns and the most competitive prices on Jet-A and Avgas aviation fuel at Rick Husband International Airport in Amarillo, Texas. AMAzing updates coming! NEW State of the Art Aviation Terminal to include: Expanded Lobby, Refreshment Zone, Conference Room, Pilot's Lounge, Military Lounge & Situation Room, Tactical Equipment Storage, Shower Room, Sleep Rooms, Crew Cars, Street Side Covered Entrance, Ramp Side Secured Entrance and Concierge Service for Local Hospitality and Travel Needs."

(<https://thearnoldcos.com/tac-air/ama>)

These updates tie in with and support the recommendations made for the Rick Husband International Airport, as part of AAIM.

Figure 6-8. Projected Enplaned Passenger Terminal Area Forecast (2015-2035)



CONNECTIONS AND ACCESS TO AIRPORT

The main access points to the airport terminal and general parking are from Interstate 40 from the south. When accessing from the interstate, travelers must navigate through several minor roadways including Airport Boulevard, Rosenwald Drive, North Lakeside Drive, Southeast 3rd Ave. Peak hour passenger numbers were used to estimate traffic volumes in the 2016 master plan update due to lack of traffic volume data on nearby roadways. The analysis concluded the current roadways are sufficient to handle the estimated volumes through the planning horizons. However, needed access improvement directly surrounding and within the airport were identified. The study indicated the following key areas to be addressed:

- Improved wayfinding along Airport Boulevard and other Airport access roads
- Identification of locations for a commercial vehicle staging area to help alleviate congestion on the terminal curb front upper and lower levels
- Identification of covered parking locations within existing parking facilities
- Identification of expansion area for rental car ready/return parking spaces
- Identification of expansion area for rental car Quick Turn Around

The Airport Development Plan (ADP) recommended improvements based on input from the Planning Advisory Committee, airport users, public workshops, and Airport staff. The improvements that addressed the key areas mentioned above can be viewed in Figure 6-9 on page 81.

In addition, the regional connection recommended in the previous transit section will provide enhanced opportunities for Amarillo residents to travel to and from the airport, while offering the option for reduction in parking needs and more choices for the traveler.

AVIATION RECOMMENDATIONS

To improve overall access and connectivity as projected traffic is expected to increase, the airport should be proactive by continuing to improve passenger accommodations in terms of transportation and overall experience and adhere to access improvements identified in the International Airport Master Plan Update.

Short-Term Recommendations

Due to lack of transit services to the airport, and its location 10 miles east of downtown Amarillo, most travelers are generally traveling by car through

means of carshare or driving alone. To improve public transportation options and combat increasing roadway congestion, it is recommended the airport partner with ACT to create a direct connection from the airport to downtown, where passengers can make transfers as needed. Creating this transit connection will introduce a more affordable option for travel to and from the airport, while reducing the need for parking space that could be utilized for other purposes, such as expanded space for current commercial tenants. Establishing this

transit connection creates an opportunity for the airport to prepare their facilities not only for safe and comfortable transit boarding, but also for changing transportation technologies that could be vital in the movement of travelers, such as autonomous cars and shuttles. Additional short-term recommendations include:

- Improved access and wayfinding
- New FBO Executive Terminal (Early 2021)
- Airport maintenance facility improvements

Long-Term Recommendations

Additionally, the airport must be proactive by engaging with the most recent innovations in passenger security, safety, comfort, and convenience. Some of potential improvements to consider include:

- Improved body scanners/screening
- E-Passports
- Facial recognition software
- Contactless/touchless travel (especially important in the face of COVID-19)
- Updated wayfinding systems

In line with feedback received during stakeholder and public meetings, and along with the objectives listed in the Amarillo International Airport Master Plan, Amarillo in Motion recommends the following objectives and actions to be taken in the future:

- Taxiway rehabilitations and reconfigurations
- Additional hangar and apron construction

Figure 6-9. Airport Improvements from the 2016 Master Plan



CHAPTER 7: EMERGING TECHNOLOGY



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INTRODUCTION

As the Amarillo MPO study area grows, maintaining mobility safely and efficiently will become more complex. With growth comes higher traffic volumes, a more complex mix of modes on the transportation system, more points of conflict, and a need for more sophisticated methods of evaluating and managing transportation needs. Rapid development of a broad range of technologies in vehicle guidance, monitoring systems, automated data collection systems, artificial intelligence, traffic management software, communication systems, and data management tools is creating new and exciting opportunities for how transportation services are provided and managed. By examining the emerging technologies and advanced data collection and management methods that are on the horizon, the transportation agencies in the Amarillo MPO study area can make decisions now that will help maximize the value of the emerging capabilities as they become available.

TxDOT's Amarillo District is in the process of developing a Transportation Systems Management and Operations (TSMO) Program Plan in partnership with the other transportation agencies in the district. TSMO is an approach to improving mobility for all modes of transportation, by integrating planning and design with operations and maintenance, to manage the transportation network holistically, and optimize existing and future infrastructure. Many of the options considered in this chapter can be elements of a district TSMO program. In addition, the Amarillo MPO is expected to become a Transportation Management Area (TMA), as the 2020 Census will indicate that the population in the MPO area has exceeded 200,000 which is the threshold for this designation by TxDOT. This will trigger a requirement that the MPO

prepare a Congestion Management Process (CMP). A CMP is a systematic and regionally accepted approach for managing congestion that provides accurate, up-to-date information on transportation system performance, and assesses alternative strategies for congestion management that meet State and local needs. The emerging technologies and advanced data collection and data management methods explored in this chapter can be beneficial elements of the region's TSMO Program Plan and CMP. Considering them now, as part of AAIM, can be an important step in achieving the goals of all three planning efforts.

EMERGING TECHNOLOGIES

CURRENT STATUS AND NEEDS

The transportation agencies in the Amarillo area have actively explored ways to use emerging technologies to improve the safety, efficiency, and comfort of the area's transportation system. Over the last three years, the City of Amarillo has rebuilt its traffic signal system at a cost of roughly \$3.5 million. This process has included updating controllers and development of wireless communications. The City has signals at 264 intersections, and roughly 200 of them are coordinated. Signals in the downtown area are fixed time but are coordinated. All the signals within the city limits of Amarillo are controlled and maintained by the City, including those on TxDOT roadways. TxDOT operates and maintains signals outside of Amarillo, including those in Canyon. The City of Amarillo and TxDOT utilize the same Siemens software, so either party could take over operation of the other's signals if needed.

The City of Amarillo has pan-tilt-zoom video cameras at 100 locations. By the end of 2021, the City will have radar and video detection with the capability of detecting pedestrians and bicycles near intersections or crosswalks, enhancing its ability to collect information on activity near signals by all modes. The city will be able to use the detection equipment at 70 to 100 locations and is currently evaluating the preferred.

The City of Amarillo has the capability for pre-empting signals for emergency-response vehicles at 90 intersections using an Opticom GPS System. The City also has four emergency signals in front of fire stations that turn the traffic signals to red to allow fire trucks to get out of the station more easily. Finally, the city has a Traffic Management Center (TMC) where it monitors signal operations

and CCTV cameras. There is strong interest in expanding the TMC over time, but the city does not have any plans to enhance its capabilities in the short term. The TMC is located next to the Emergency Management center and provides the capability to communicate with all the city's signals and cameras in the field.

The TxDOT District has a small TMC that is primarily oriented to monitoring CCTV cameras. The agency is very interested in expanding it over time, and would like to have more control of its signals and have more capability for remote monitoring and modification of settings. TxDOT is also very interested in getting more sophisticated cameras that will provide more data collection capabilities to be able to capture counts of pedestrians, bicyclists, motorcycles, cars, and trucks by classification.

There is a strong desire on the part of TxDOT and the local governments to maintain or improve the safety of travelers on the region's transportation facilities. This has resulted in significant interest in technology applications that provide warnings of potential conflicts, or information to help travelers avoid potentially dangerous situations. In addition to systems designed to warn motorists of the presence of bicyclists or pedestrians, there is also interest in weather and flood warning systems that could alert drivers to the possibility of extreme weather or roads that are closed because of flooding, ice on the roads, or high winds. Although it is an immediate priority, there is longer-term interest in end-of-queue warning systems to alert drivers of stopped or slow-moving traffic ahead that has resulted from congestion or a collision. Queue warning systems use real-time traffic detection to identify queues and roadside dynamic message signs (DMS) to display



the warnings. These systems are appropriate for freeways or roads that are frequently congested and where queues occur frequently in predictable locations (e.g., near a major interchange).

Because of concern for roadway safety, staff from the TxDOT District and the cities believe that consideration should be given to future application of speed warning systems. Speeding has been identified statewide as a significant factor in highway fatalities and serious injuries. Although it is not suggested for immediate consideration on the major arterials and freeways in the Amarillo area, there is support for consideration of it in the future.

RECOMMENDATIONS FOR EMERGING TECHNOLOGIES

Based on the current status of technology use in the Amarillo area and the interests of staff from the area's transportation agencies, the following short-term and long-term actions are recommended:



Pedestrian and Bicyclist Detection, Notification, and Warnings

To promote a safer travel environment for pedestrians and bicyclists, the cities and TxDOT should pursue the development of video- or radar-based bicycle and pedestrian detection systems at high-conflict intersections to notify drivers, activate warning signs, or adjust crossing time if pedestrians or cyclists are present.



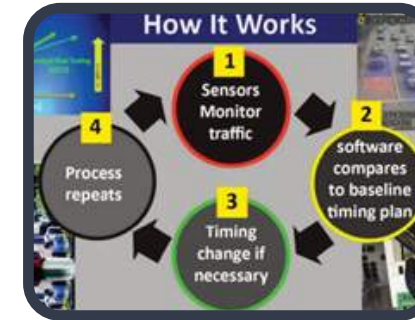
Expanded Regional Traffic Management Center (TMC)

To promote a more efficient and collaborative approach to traffic management in the Amarillo area, the cities and TxDOT should explore opportunities to develop a regional, multi-agency TMC and expand the functionality for more system monitoring, remote control of traffic signals, and emergency response.



Speed Warning System

As part of the statewide effort to reduce traffic fatalities, the Amarillo area transportation agencies should consider future use of radar to detect vehicle speeds and LED displays to indicate speeds in excess of the speed limit to oncoming drivers.



Adaptive Signal Timing

As the Amarillo area transportation agencies acquire real-time data on traffic patterns and turning movement volumes at intersections, the cities and TxDOT should explore the potential benefits and costs of adaptive signal timing, which automatically adjusts signal timing in response to the traffic patterns and volumes being detected.



Signal Infrastructure-to-Vehicle Communications

As the capability for communicating with connected vehicles improves over time and the number of connected vehicles increases, the cities and TxDOT should consider technology for warnings of red lights or queues at intersections or other safety functions to support connected vehicle technology.



Pilot Test of Autonomous Shuttle

As the capability for autonomous vehicle operation improves over time, the Amarillo MPO and its partner agencies should consider a pilot test of an autonomous shuttle. This could occur in a relatively controlled environment like the West Texas A&M University in Canyon or on one of the Amarillo College campuses, and function as a downtown Amarillo shuttle or as a new service in the regional transit network. Similar pilot tests have been conducted in Texas in the cities of Arlington and Frisco and on the campuses of Texas A&M (College Station) and Texas Southern University (Houston).



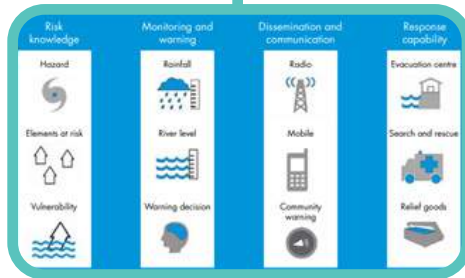
Roadway Design, Infrastructure, & Maintenance to Support Safe Automated & Autonomous Vehicle Operations

As the capability for automated and autonomous vehicle operation improves over time, the agencies responsible for designing, constructing, and maintaining the area's roads should consider modifying their practices to support the safe operation of automated and autonomous vehicles.



End-of-Queue Warning System

As traffic volumes increase in the Amarillo area and congestion becomes more common, the MPO and the transportation agencies in the area should consider future use of queue warnings to inform drivers about stopped or slow traffic ahead to provide vehicles more time to slow down safely. Queue warning systems use real-time traffic detection to identify queues and roadside dynamic message signs (DMS) to display the warnings.



Weather and Flood Warning Systems

Consider developing a multi-agency weather and flood warning system that assembles the best available information on severe weather events (rain, sleet, snow, tornados, or high winds) and provides warning to drivers and other travelers. The system should include a coordinated system for determining road closures due to weather or flooding and suggested alternative routes.

Long-Term
(10-20 years)

Short-Term
(Next 10 years)

ADVANCED DATA COLLECTION AND DATA MANAGEMENT

CURRENT STATUS AND NEEDS

There is currently limited use of advanced data collection or management methods in the Amarillo area. The TxDOT District has used Bluetooth readers to get data on travel times and origin-destination patterns but has significant interest in the use of commercial data sets, like INRIX, HEAR, StreetLight, and AirSage, to acquire this type of data eliminating the need to maintain Bluetooth readers and to invest the manpower in locating readers and processing the data. TxDOT has recently negotiated a statewide agreement with INRIX and StreetLight that will allow the district to use their data. Additionally, the District has significant interest in obtaining more sophisticated cameras that will produce more data and better video images.

TxDOT's Bridge Division has recently been given permission to explore the use of drones for bridge inspections. The section is very interested in continuing to explore the use of drones for inspections, crash-site documentation, and other data collection opportunities. High winds are a problem for drone operation in the Amarillo area, so most applications would have to be tethered rather than fully remote-controlled, which might limit its applicability.

The City of Amarillo has recently acquired software called VUEWorks that could

potentially be useful for maintaining an inventory of facilities and equipment and for scheduling maintenance and upgrades and recognizing when work is done. The City is about 50% of the way to having the software installed and tested.

The Amarillo MPO has utilized big data in the form of the National Performance Measure Research Data Set (NPMRDS) made available by the Federal Highway Administration (FHWA). The MPO has significant interest in tapping into other sources of big data, such as INRIX and StreetLight, to support its Congestion Management Process (CMP). As mentioned previously, the MPO expects to be reclassified as a Transportation Management Area (TMA) because the MPO area population will exceed 200,000 residents. As a result of the redesignation, the MPO will have to meet more stringent requirements for a data-driven CMP.

RECOMMENDATIONS



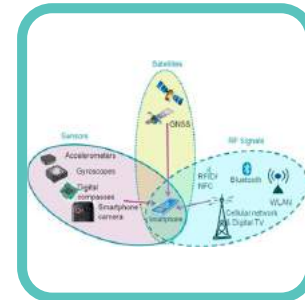
Automated Traffic Signal Performance Monitoring (ATSPM)

As adequate data collection systems are implemented to support it, the cities and TxDOT should develop or install an ATSPM system to provide the capability to evaluate signal timing and make improvements where appropriate.

*Short-Term
(Next 10 years)*

Real-time Traffic Data Capture by Signal System Equipment

The cities and TxDOT should continue to research, procure, install, and use signal system equipment that will provide real-time traffic data. This type of data will support the evaluation of the performance of the signal system and eventually support adaptive signal timing. Archived data will also be useful in planning and support the MPO's Congestion Management Process.



Use of "Big Data"

The Amarillo MPO should work with its member agencies to take full advantage of available low cost and free sources of data derived from cell phones, navigation systems, and other devices with location-based applications. In addition to the NPMRDS already in use, the Amarillo MPO should collaborate with TxDOT to acquire data from INRIX, StreetLight, and Waze available through statewide contracts negotiated with these providers. These sources will provide valuable historical data on traffic volumes, speed, travel time, and origin-destination patterns. The Amarillo MPO and its partners should continue to monitor the availability of transportation data from big data sources and consider how it might be used to improve transportation planning and system management.

Advanced Video-Based Data Collection

The cities and TxDOT should continue to research, procure, install, and use advanced video-based data collection to provide data on the movement of vehicles/people by all modes including cars, trucks, motorcyclists, bicyclists, and pedestrians. This type of data will be useful for signal timing, signal priority, warning systems, and long-range planning for special facilities for specific modes.



Regional System Performance Data Dashboard

As data on travel and traffic volumes, speeds, and origin-destination patterns are acquired through the other steps outlined, the Amarillo MPO should work collaboratively with its partners to develop a regional system performance data dashboard to make the data available to all the agencies that can benefit from it. The dashboard could be used to identify areas of need such as locations of recurring congestion, high crash rates, or high truck volumes. The dashboard could be an integral part of the MPO's future CMPs.



Asset Management and ITS Performance Monitoring Systems

TxDOT has recently launched a statewide effort to assist its districts in asset management. Tools are being provided to help the districts maintain an inventory of their transportation assets and to store information about the specifications, age, and condition of those assets. The management systems can also be used to predict the need for cost-effective maintenance that can prolong the useful life of the asset or identify when a replacement may be needed to avoid a breakdown in the transportation system operations. Specialized asset management software has recently been developed for ITS assets.

*Long-Term
(10-20 years)*

Unmanned Aerial Vehicles (Drones) for Data Collection

Each of the transportation agencies should monitor the development of and regulations regarding use of drone technology and explore the opportunities to use the technology to collect information more safely and cost-effectively. Drones have been used by transportation agencies throughout the US for bridge inspections, crash scene investigations, and data collection at locations that are difficult to reach in person.



IMPLEMENTATION CONSIDERATIONS

The opportunities considered in this chapter differ from those in other chapters because they are less focused on transportation infrastructure (roads, sidewalks, bike routes, railroad lines, etc.) and services (bus routes), and more focused on transportation management and data management. With this focus on management comes challenges for achieving optimal performance and funding. The recommendations in this chapter could most effectively and efficiently be implemented in a cooperative and collaborative effort by the Amarillo area agencies.

INTERAGENCY COOPERATION & COLLABORATION

New technologies or management methods are typically most cost-effective when they are introduced on a cooperative basis by the agencies that will benefit from the investments, and in a coordinated way that results in the systems operating most effectively together. As the transportation agencies in a region may have different objectives for how they manage their facilities and services, compromise may be necessary to get the best possible results. Pursuing system management strategies in the Amarillo MPO area is likely to require some

reorientation of thinking about how decisions related to transportation investment are made. TxDOT has recently launched a statewide program to encourage Transportation System Management and Operations (TSMO) within its districts, and the Amarillo District is in the process of developing a TSMO Program Plan.

The Amarillo MPO is also responsible for maintaining the regional CMP and many of the recommendations in this chapter are directly relevant to its organization. Because the MPO is also soon to transition to a Transportation

Management Area there will be more emphasis in the CMP on defining, identifying, managing, and evaluating congestion throughout the region's transportation network. The recommendations in this chapter should be considered for inclusion in the TxDOT District's TSMO Program Plan and the Amarillo MPO's CMP.

FUNDING & PROGRAMMING

Funding and programming of emerging technologies and advanced data management methods are often difficult in a multimodal, multi-jurisdictional, and inter-agency setting. There may be no existing funding programs specifically oriented to the type of management strategies being pursued, so innovative thinking may be required to find new ways to cooperatively fund the improvements within the MPO area. It can also be difficult to justify

introducing new technologies or management methods when they are first introduced, and local decision-makers are not yet convinced of their merits or cost-effectiveness.

To address these funding challenges, the Amarillo MPO should coordinate closely with TxDOT and its other partners to develop a stronger regional approach to funding and programming technologies and advanced data collection and management


methods that will benefit the region as a whole and should do it as part of an overall program for transportation system management and operations.

OBJECTIVES & ACTIONS

The recommendations in this chapter support the Vision of Amarillo Area in Motion.

“Amarillo Area in Motion seeks to establish a safe, comfortable, and connected multi-modal transportation network that uses technology to provide a high level of service for all users.”

The recommendations also help meet all six of the plan's goals to some degree, but with particular emphasis on the Technology goal:

Goal 6. Technology – Innovative Design & Technology Strategy: Integrate emerging technologies and data management tools to maximize safety and efficiency. 	
Objective 6.1. Use emerging vehicle technologies to increase safety and efficiency.	<ul style="list-style-type: none"> Action 6.1.1. Build enhanced traffic control infrastructure to support connected and automated vehicle technologies. Action 6.1.2. Create an autonomous circulator shuttle that connects downtown to the Historic Route 66 area.
Objective 6.2. Use communication technologies, sensors, and traffic control devices to improve safety and traffic flow.	<ul style="list-style-type: none"> Action 6.2.1. Incorporate an enhanced traffic management center to optimize signal coordination. Action 6.2.2. Install pedestrian and bicycle sensors and warnings at key crossing locations.
Objective 6.3. Use advanced methods for collecting, organizing, and using data to improve decision making and transportation system performance.	<ul style="list-style-type: none"> Action 6.3.1. Research and incorporate advanced data collection methods. Action 6.3.2. Create a transportation “Big Data” warehouse. Action 6.3.3. Develop a data dashboard for system performance monitoring.

CHAPTER 8: IMPLEMENTATION



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INTRODUCTION

Creating a clear implementation strategy for Amarillo Area in Motion ensures that the overarching vision and goals lead to meaningful improvement after its adoption. There are multiple elements that factor into the successful implementation of a plan's recommendations such as:

- What actions should be taken to implement these recommendations?
- How can the MPO secure funding for these actions?
- Who should the MPO partner with to complete them?
- When should the MPO be expected to complete these actions?

This chapter aims to address these implementation elements for both types of recommendations this plan offers: projects and policies.

The project-based recommendations in this plan include anything that involves physical construction or improvement of the MPO's transportation network. These projects are listed in the first section of this chapter below.

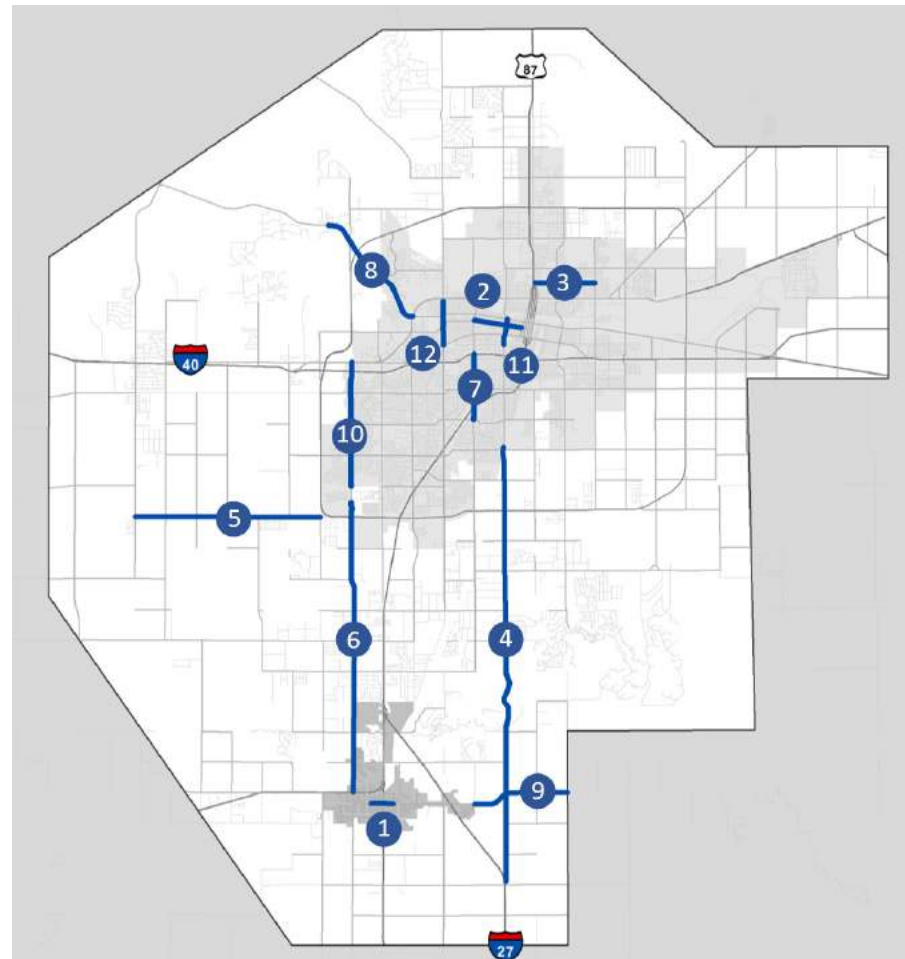
The policy-based recommendations consist of the objectives and actions that have been listed at the end of each chapter. The second section of this chapter summarizes them all into one implementation matrix on page 110.

PROJECTS

The previous chapters of this plan outline a wide variety of project-based recommendations. However, each of these projects have been focused mostly on improving one mode at a time. There are many major corridors in the region that are candidates for multiple improvements to enhance comfort for many modes of transportation. These corridors were identified as Priority Corridors at the beginning of the planning process and were given special attention on their recommended improvements. Each corridor project is summarized in the next section and has a corresponding project summary sheet that details the full scope of proposed improvements (pages 96-107).

In addition to the Priority Corridors, this section will summarize the rest of the project-based recommendations in **Exhibit 17** on page 108. The goal of this map is to centralize all of the projects recommended as part of this plan to aid in their implementation after its adoption.

Figure 8-1. Priority Corridor Map



PRIORITY CORRIDORS

1. 4th Avenue from 17th Street to 26th Street (Canyon, TX)

4th Avenue is the major east-west corridor connecting two major destinations in the City of Canyon: Downtown and West Texas A&M Campus. This project aims to transform this corridor into a destination street by adding on-street bicycle lanes, improved walkability, and enhanced streetscaping.

2. 6th Avenue from Georgia Street to S Buchanan Street (Amarillo, TX)

6th Avenue is a major corridor that connects Amarillo City Hall and passing through the Historic Route 66 district. This project aims to enhance multimodal improvements on this roadway to encourage connectivity between these two major destinations and improve the transit appearance along this popular corridor.

3. NE 15th Avenue/NE 16th Avenue from N Pierce Street to N Grand Street (Amarillo, TX)

This section of 15th/16th Avenue Palo Duro High School, Martin Road Park, and the surrounding neighborhood in northeast Amarillo. With a limited amount of right-of-way, this corridor currently has no sidewalks. This project aims to provide a comfortable bicycle facility that acts as a buffer for sidewalks, thereby also enhancing walkability.

4. FM 1541 from SW 58th Avenue to SH 217 (Randall County)

FM 1541 provides an uninterrupted route between Amarillo and Canyon east of IH-27. This project is split into two phases: Phase 1 is a widening from SW 58th Ave to McAfee Rd and Phase 2 recommends a corridor study from McAfee Rd to SH 217 to evaluate multimodal facilities in a constrained portion of the roadway.

5. FM 2186 from Bushland Road to Helium Road (Randall County)

FM 2186 is a corridor recommended for its regional significance because it serves as the main route between Amarillo and the county area to the west. This project recommends prioritizing this corridor as a widening project to match its AAIM thoroughfare plan cross section in two phases.

6. FM 2590 from FM 2186 to N 2nd Avenue (Randall County)

FM 2590 provides an uninterrupted connection west of IH-27 between the cities of Amarillo and Canyon. This project recommends widening this roadway to match the rural AAIM thoroughfare plan section and to implement a 10-foot paved shoulder as a TxDOT regional bicycle facility. Several intersections are also set to have additional turning lanes built as part of this project.

7. Georgia Street from IH-40 to SW 45th Avenue (Amarillo)

This section of Georgia Street is a heavily used commercial corridor in south Amarillo. To help improve multimodal access and safety along this roadway, implementation of an enhanced median, improved sidewalks, and transit facilities.

8. Tascosa Road from Judd Boulevard to W Amarillo Boulevard (Amarillo/Potter County)

Tascosa Road, or RM 1041, is the arterial that connects Amarillo to Bishop Hills, along with multiple other residential subdivisions. This road is recommended to have two 10-foot sidepaths constructed along with a central median to allow bicyclists and pedestrians to utilize this regional connector comfortably.

9. SH 217 from Georgia Street to Palo Duro Canyon (Randall County)

SH 217 connects the City of Canyon to Palo Duro Canyon State Park. This is a major regional destination, especially for active tourists. To help visitors access this destination, a 12' bicycle trail is recommended to be built along this corridor.

10. Soncy Road from W Amarillo Boulevard to FM 2186

This section of Soncy Road extends upwards from FM 2590 creating a major north-south connection. This portion has heavier traffic volumes and has a more commercial context, so it is recommended that this road be enhanced with a full median and 10' sidepaths on each side for multimodal comfort.

11. Washington Street/Adams Street from SW 6th Avenue to SW 15th Avenue (Amarillo, TX)

This portion of Washington/Adams Street runs parallel to Downtown Amarillo. To help establish a loop for the bicycle facilities by connecting this existing bike lanes on 15th to the proposed facilities on 6th Avenue, it is recommended that this corridor implement a road diet by installing on-street bicycle lanes.

12. Western Street from SW 15th Avenue to NW 4th Avenue (Amarillo, TX)

The northern half of Western St was identified in the *Social Pinpoint* survey as needing more bicycle and pedestrian safety improvements. It is recommended that this corridor install on-street bicycle lanes along with continuous sidewalks. The outside parkway width may vary depending on the available right-of-way.

4TH AVENUE

FROM 17TH STREET TO 26TH STREET

Project Overview

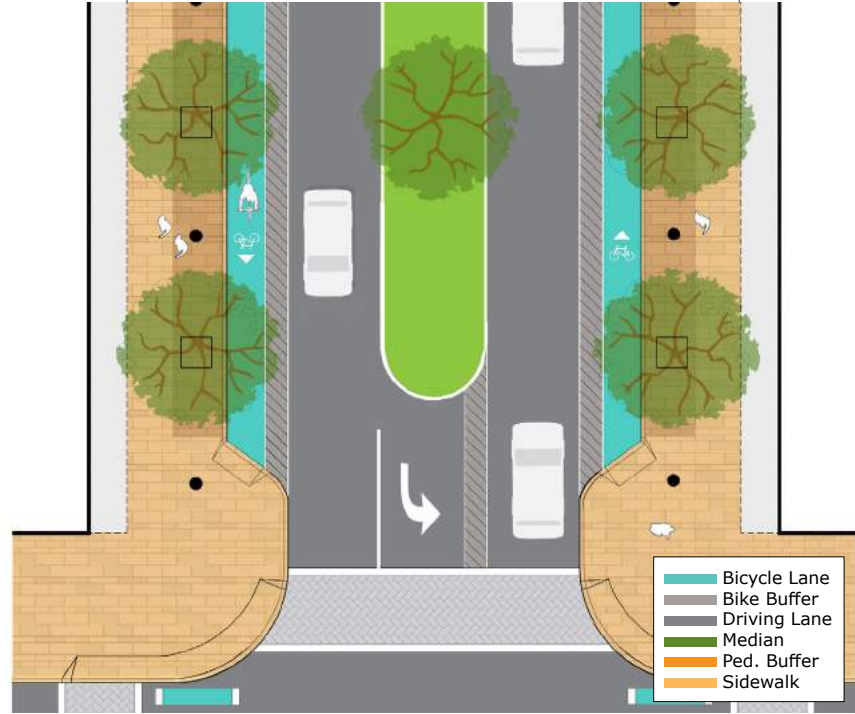
4th Avenue is the major East-West corridor connecting two major destinations in the City of Canyon: Downtown and West Texas A&M Campus. This project aims to transform this corridor into a destination street by adding on-street bicycle lanes, improved walkability, and enhanced streetscaping.

Information

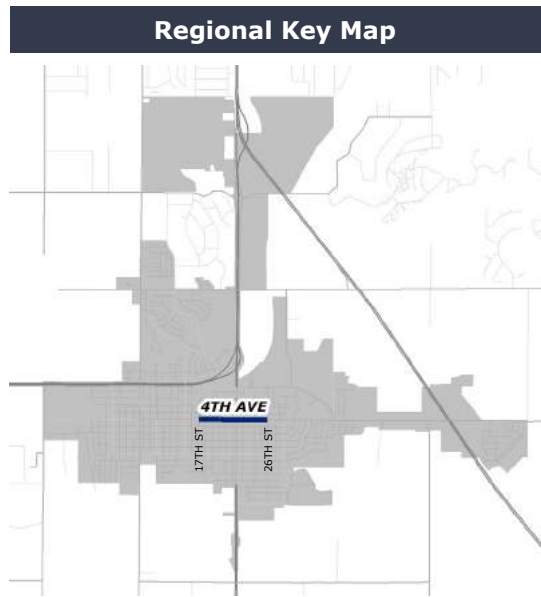
Location	City of Canyon
Length	0.72 mi
Cross Section	2-Lane Divided
Functional Class	Secondary Arterial

Design Standards

Right-Of-Way	80'
Pavement Width	2 x 21'
Travel Lanes	2
Pedestrian Facility	6' Sidewalk
Bicycle Facility	6' Bike Lanes
Median/Turn Lane	14'
Transit	None
Vehicle Mobility	Low
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on final design constraints.



6TH AVENUE

FROM GEORGIA STREET TO S BUCHANAN STREET

Project Overview

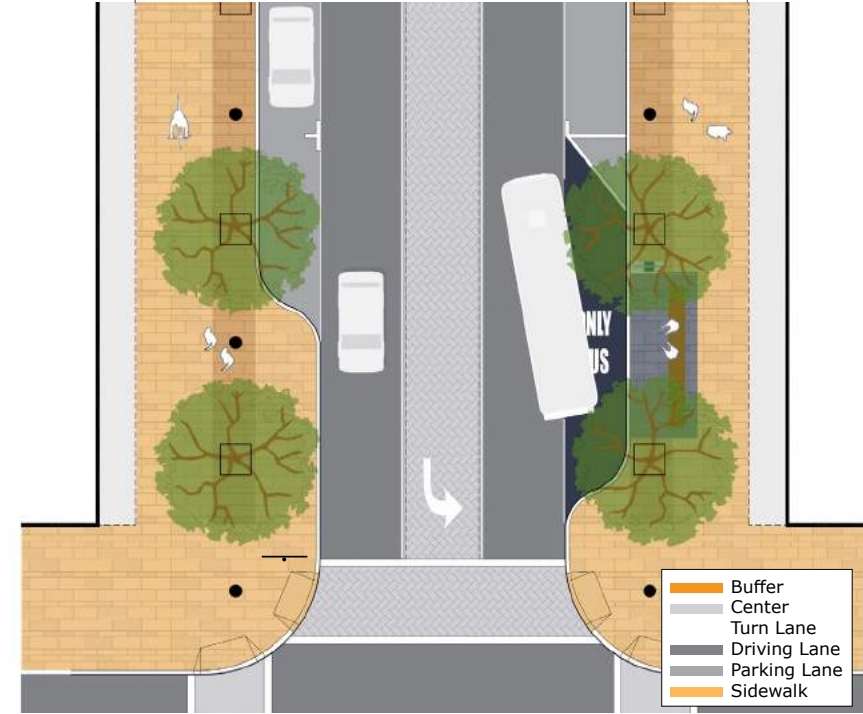
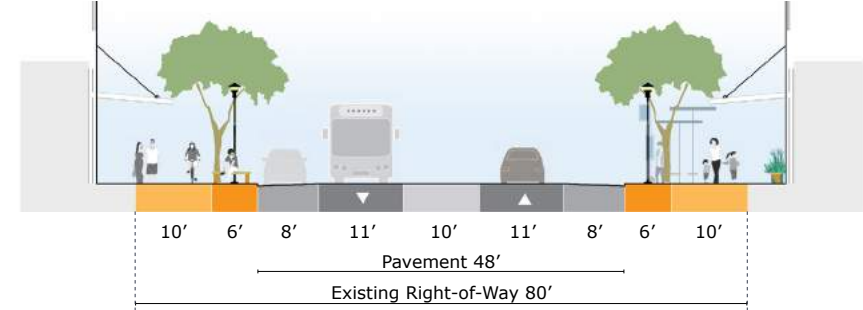
6th Avenue is a major corridor that connects Amarillo City Hall and passing through the Historic Route 66 district. This project aims to enhance multimodal improvements on this roadway to encourage connectivity between these two major destinations, and improve the transit appearance along this popular corridor.

Information

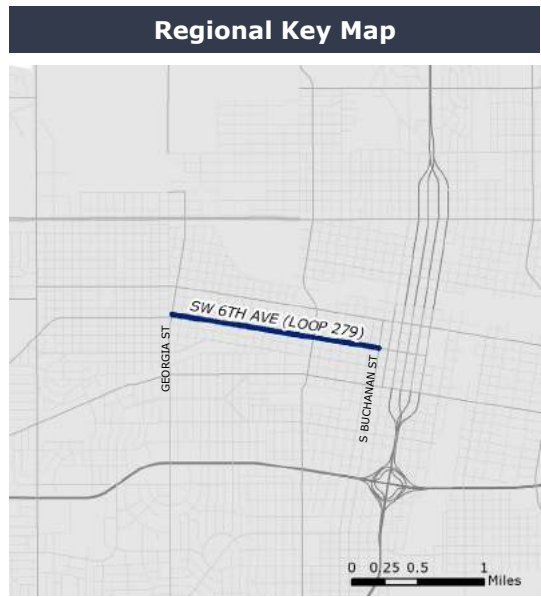
Location	City of Amarillo
Length	2.0 mi
Cross Section	3-Lane Undivided
Functional Class	Secondary Arterial

Design Standards

Right-Of-Way	80'
Pavement Width	48'
Travel Lanes	2
Pedestrian Facility	10' Sidepath
Bicycle Facility	10' Sidepath
Median/Turn Lane	10' TWLTL
Transit	Yes
Vehicle Mobility	Medium
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on final design constraints.



15TH/16TH AVENUE

FROM NORTH PIERCE STREET TO NORTH GRAND STREET

Project Overview

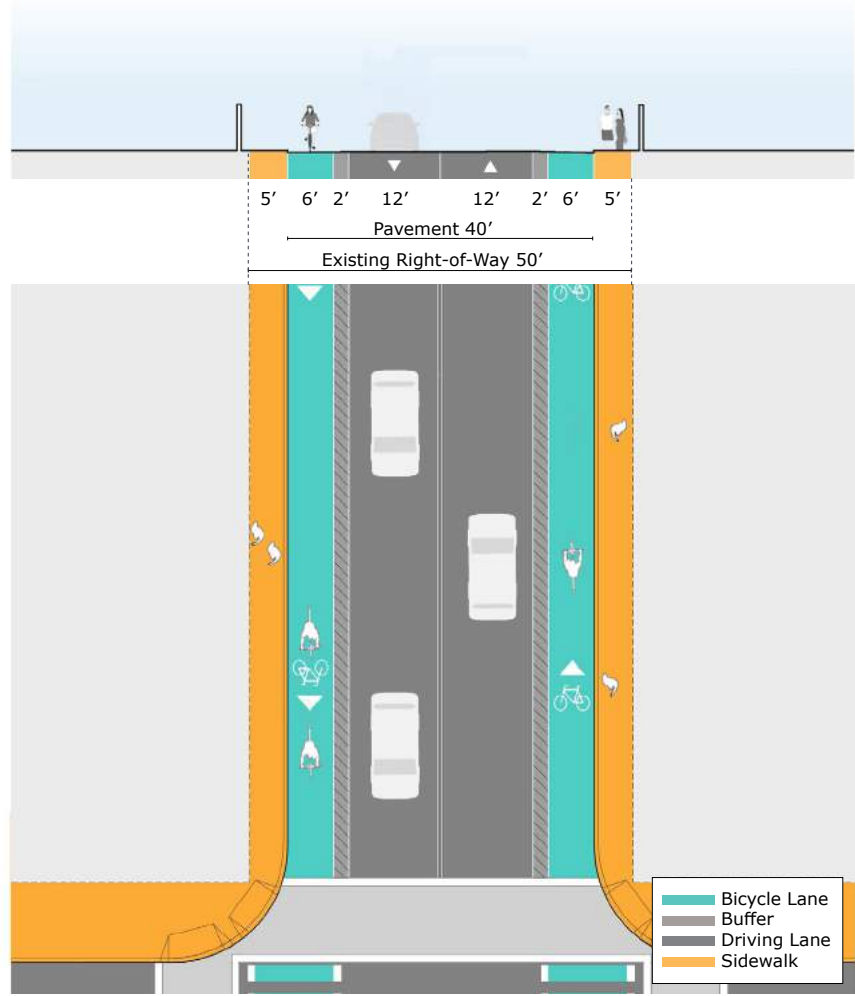
This section of 15th/16th Avenue connects multiple major schools and parks in northeast Amarillo. With a limited amount of right-of-way, this corridor currently has no sidewalks. This project aims to provide a comfortable bicycle facility that acts as a buffer for sidewalks, thereby also enhancing walkability.

Information

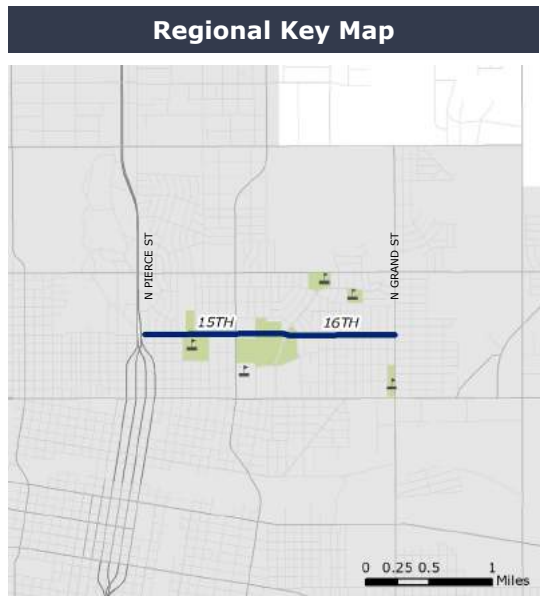
Location	City of Amarillo
Length	2.0 mi
Cross Section	2-Lane Undivided
Functional Class	Collector

Design Standards

Right-Of-Way	50'
Pavement Width	40'
Travel Lanes	2
Pedestrian Facility	5' Sidewalk
Bicycle Facility	6' Bike Lanes
Median/Turn Lane	None
Transit	None
Vehicle Mobility	Low
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



FM 1541

FROM SW 58TH AVENUE TO SH 217

Project Overview

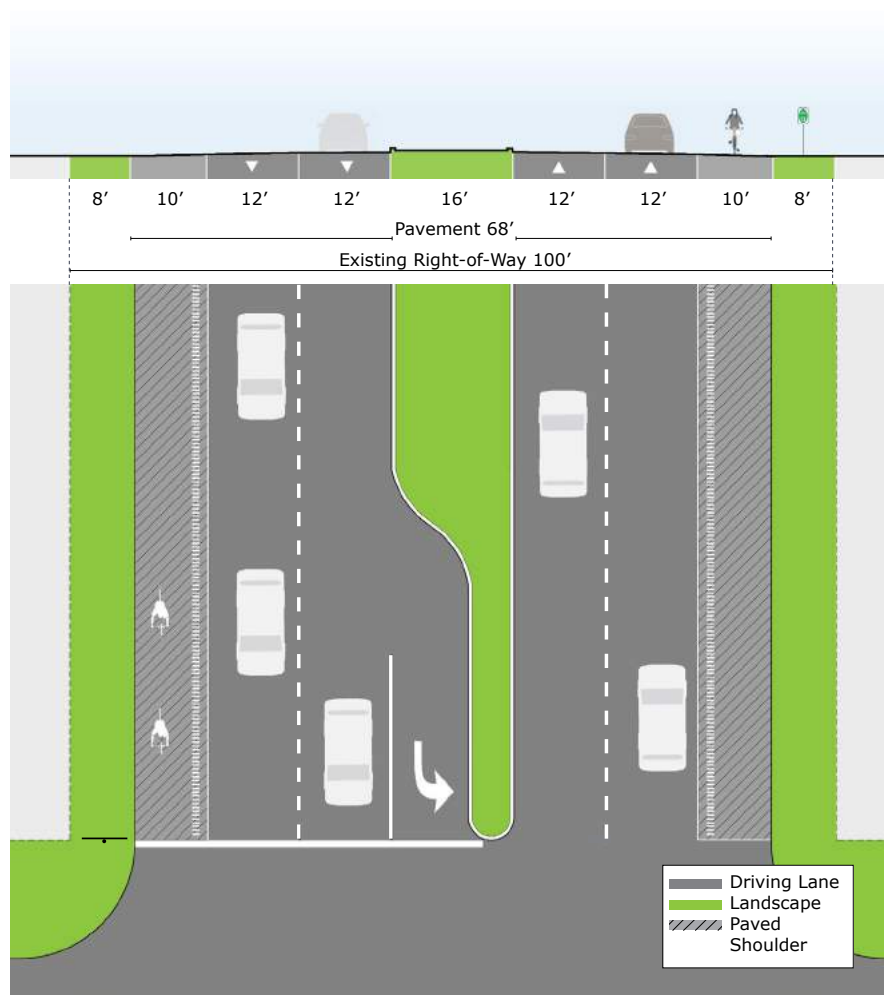
FM 1541 provides an uninterrupted route between Amarillo and Canyon east of IH-27. This project is split into two phases: Phase 1 is a widening and Phase 2 recommends a corridor study to evaluate multimodal facilities in a constrained portion of the roadway.

Information

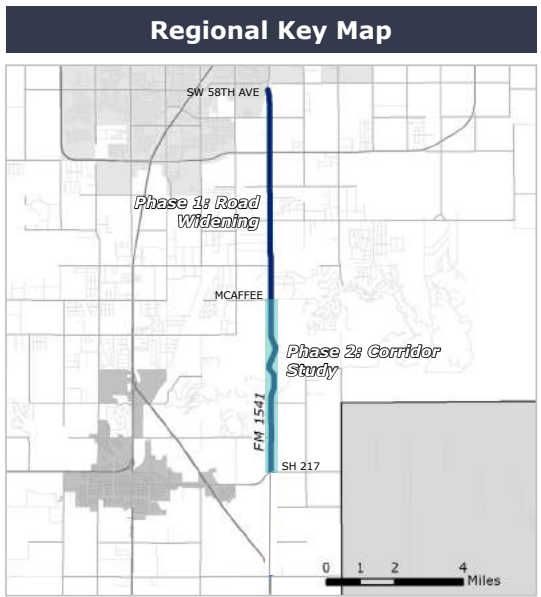
Location	Randall County
Length	14.2 mi
Cross Section	4-Lane Divided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	100'
Pavement Width	2 x 34'
Travel Lanes	4
Bicycle Facility	Paved Shoulder
Median/Turn Lane	16'
Transit	No
Vehicle Mobility	High
Pedestrian Mobility	Low
Bicycle Mobility	Medium



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



FM 2186

FROM BUSHLAND ROAD TO HELIUM ROAD

Project Overview

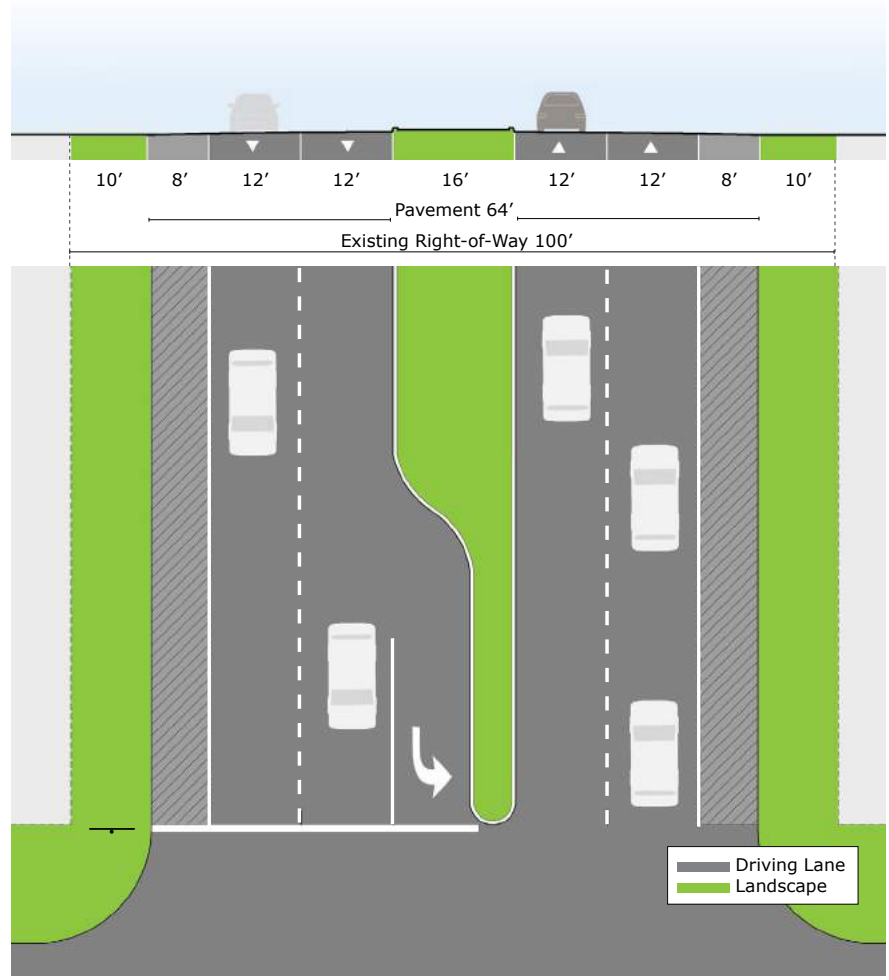
FM 2186 is a corridor recommended for its regional significance, serving as the main route between Amarillo and the county area to the west. This project recommends prioritizing this corridor as a widening project to match its MTP cross section in two phases.

Information

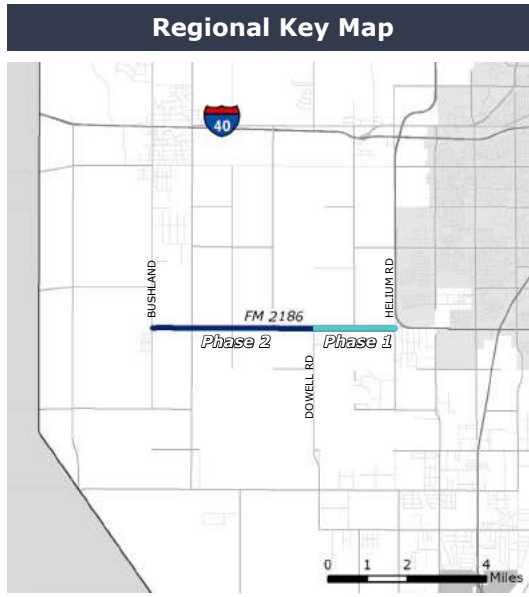
Location	Randall County
Length	6.1 mi
Cross Section	4-Lane Divided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	100'
Pavement Width	64'
Travel Lanes	4
Pedestrian Facility	8' Paved Shoulder
Median/Turn Lane	16'
Transit	None
Vehicle Mobility	High
Pedestrian Mobility	Low
Bicycle Mobility	Low



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



FM 2590

FROM FM 2186 TO N 2ND AVENUE

Project Overview

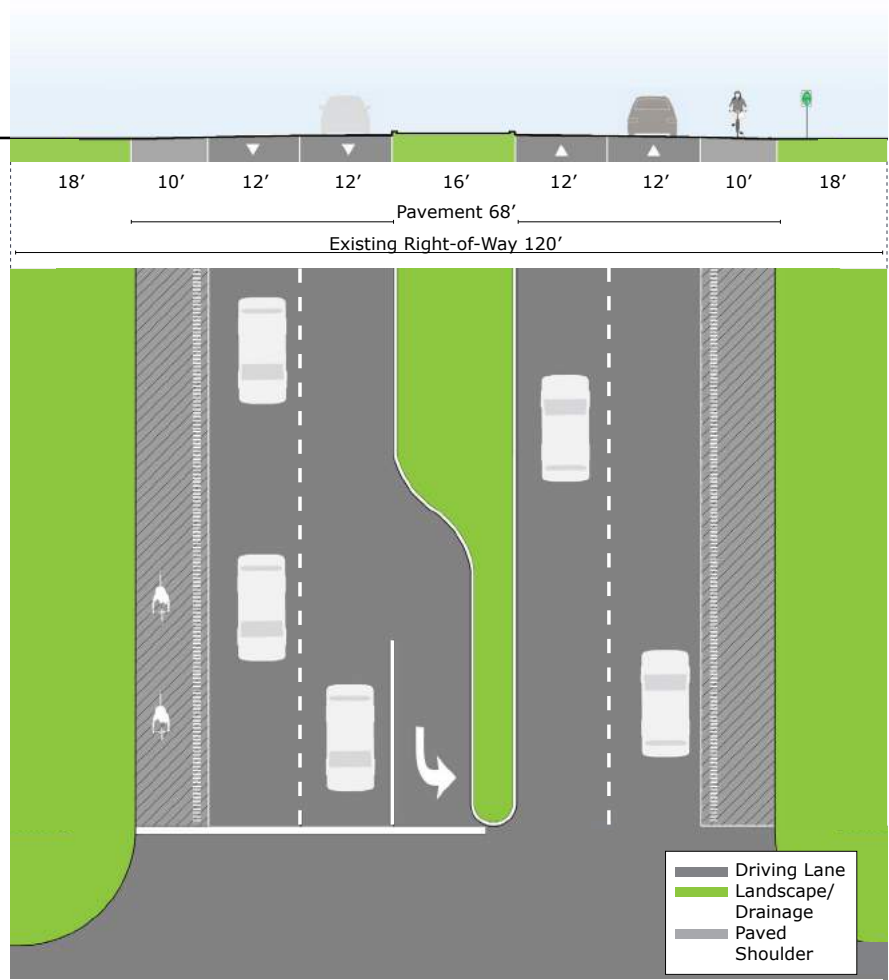
FM 2590 provides an uninterrupted connection west of IH-27 between the cities of Amarillo and Canyon. This project recommends widening this roadway to match the rural MTP section and to implement a 10-foot paved shoulder as a regional bicycle facility. Several intersections are also set to have additional turning lanes built as part of this project.

Information

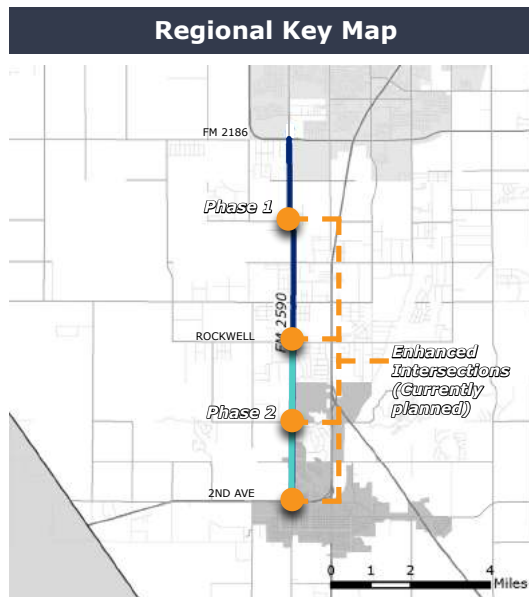
Location	City of Amarillo
Length	9.1 mi
Cross Section	4-Lane Divided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	120'
Pavement Width	68'
Travel Lanes	4
Bicycle Facility	10' Paved Shoulder
Median/Turn Lane	16'
Transit	None
Vehicle Mobility	High
Pedestrian Mobility	Low
Bicycle Mobility	Medium



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



GEORGIA STREET

FROM IH 40 TO SW 45TH AVENUE

Project Overview

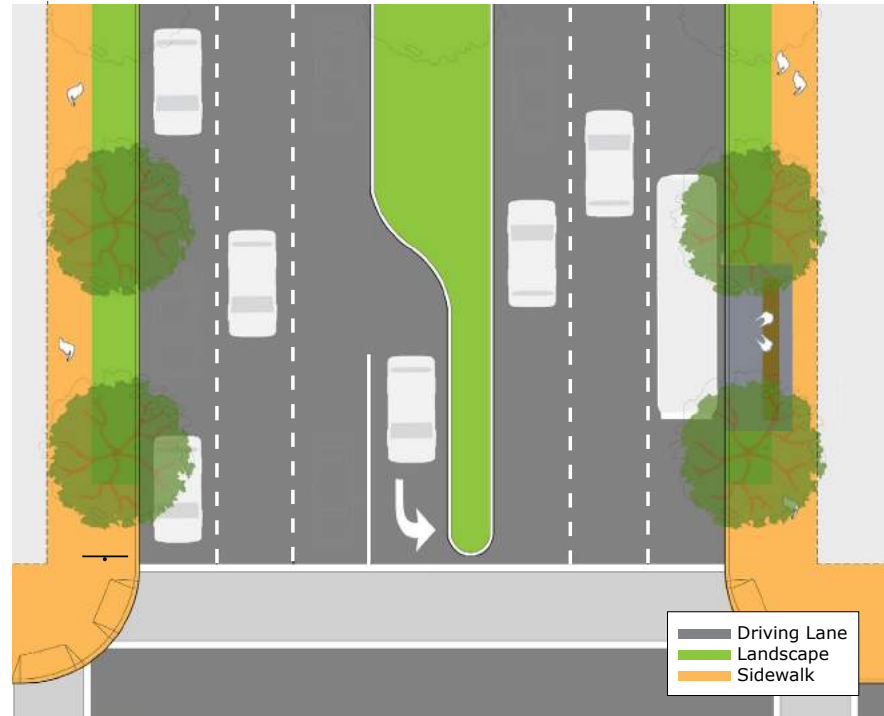
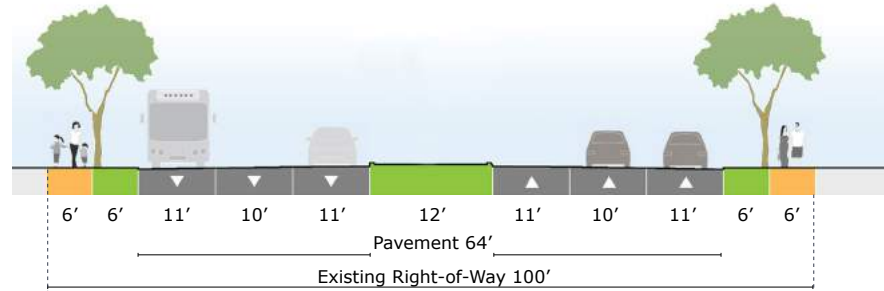
This section of Georgia Street is a heavily used commercial corridor in south Amarillo. To help improve multimodal access and safety along this roadway, implementation of an enhanced median, improved sidewalks, and transit facilities.

Information

Location	City of Amarillo
Length	2.2 mi
Cross Section	6-Lane Divided
Functional Class	Primary Arterial

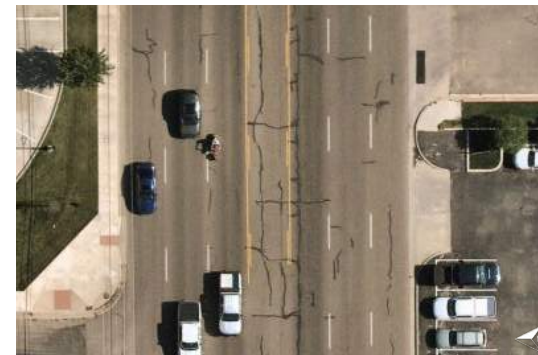
Design Standards

Right-Of-Way	100'
Pavement Width	2x32'
Travel Lanes	6
Pedestrian Facility	6' Sidewalk
Median/Turn Lane	12'
Transit	Yes
Vehicle Mobility	High
Pedestrian Mobility	High
Bicycle Mobility	Low



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.

Existing Project Aerial



Regional Key Map



TASCOSA ROAD

FROM BISHOP HILLS TO W AMARILLO BOULEVARD

Project Overview

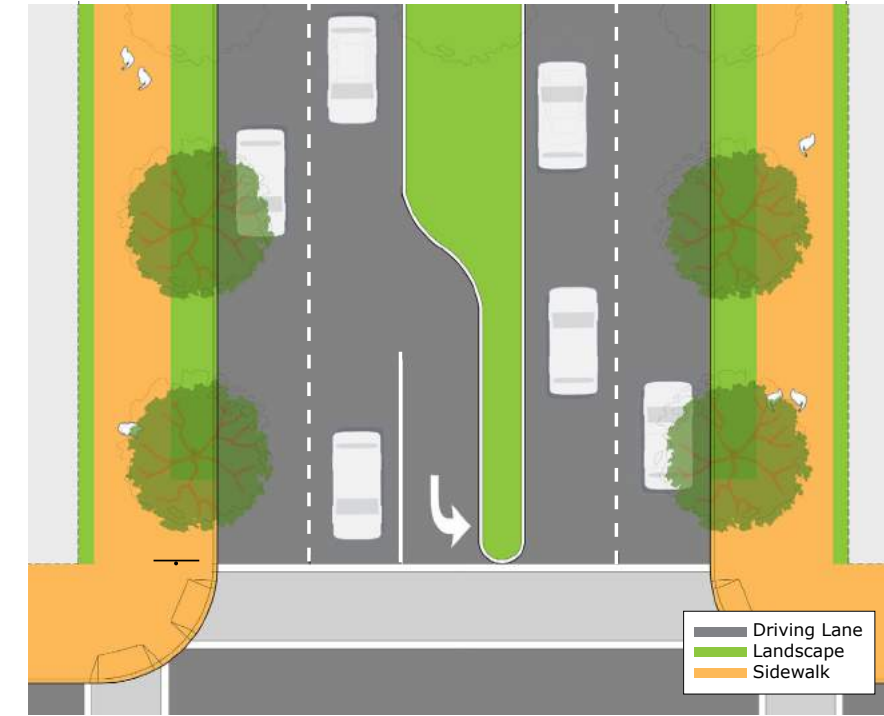
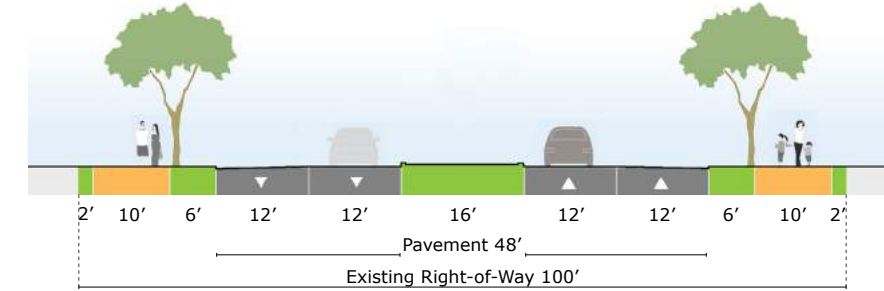
Tascosa Road, or RM 1041, is the arterial that connects Amarillo to Bishop Hills, along with multiple other residential subdivisions. This road is recommended to have two 10-foot sidepaths constructed along with a central median to allow bicyclists and pedestrians to utilize this regional connector comfortably.

Information

Location	City of Amarillo
Length	4.2 mi
Cross Section	4-Lane Divided
Functional Class	Primary Arterial

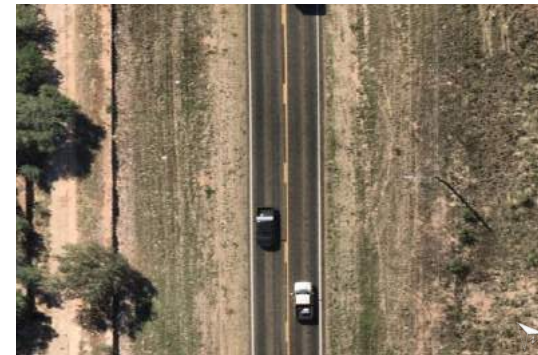
Design Standards

Right-Of-Way	100'
Pavement Width	2x24'
Travel Lanes	4
Pedestrian Facility	10' Sidepath
Bicycle Facility	10' Sidepath
Median/Turn Lane	16'
Transit	None
Vehicle Mobility	High
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.

Existing Project Aerial



Regional Key Map



SH 217

FROM GEORGIA STREET TO PALO DURO CANYON

Project Overview

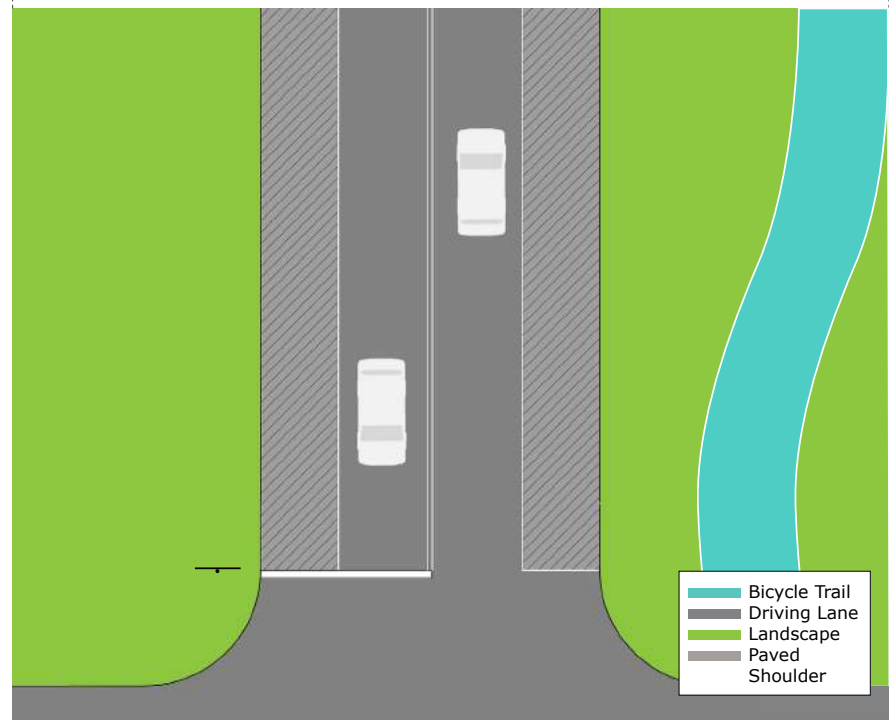
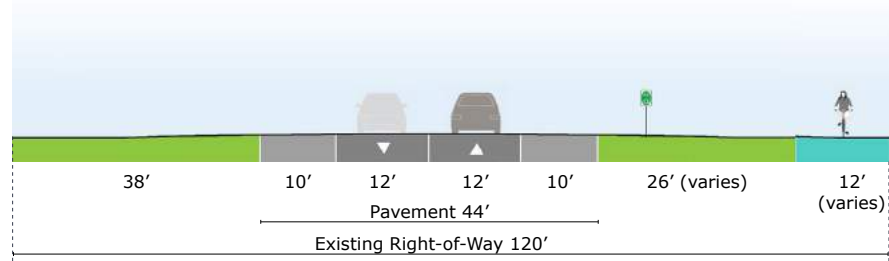
State Highway 217 connects the City of Canyon to Palo Duro Canyon State Park. This is a major regional destination, especially for active tourists. To help visitors access this destination, a 12' gravel trail is recommended to be built along this corridor.

Information

Location	Randall County
Length	8.1 mi
Cross Section	4-Lane Divided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	120'
Pavement Width	44'
Travel Lanes	2
Bicycle Facility	12' Trail
Median/Turn Lane	None
Transit	None
Vehicle Mobility	High
Pedestrian Mobility	Low
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



SONCY ROAD

FROM SL 335 TO SL 335W

Project Overview

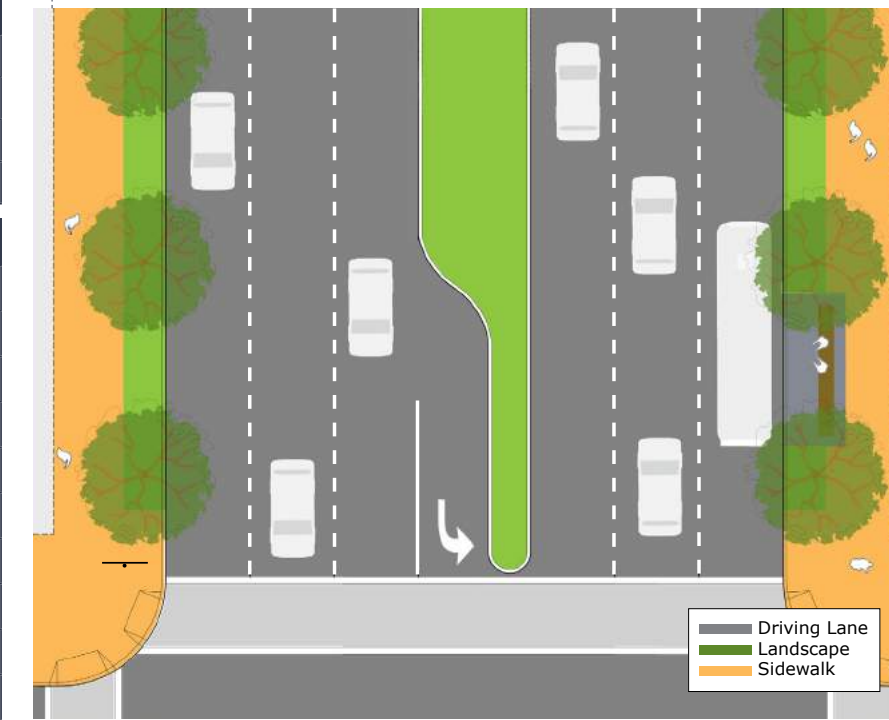
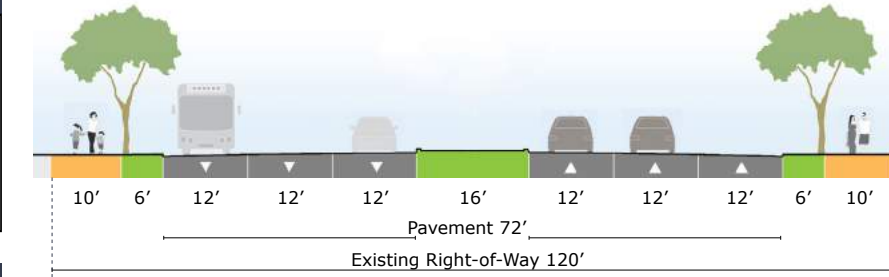
This section of Soney Road extends upwards from FM 2590 creating a major N-S connection. This portion has heavier traffic volumes and has a more commercial context, so it is recommended that this road be enhanced with a full median and 10' sidepaths on each side for multimodal comfort.

Information

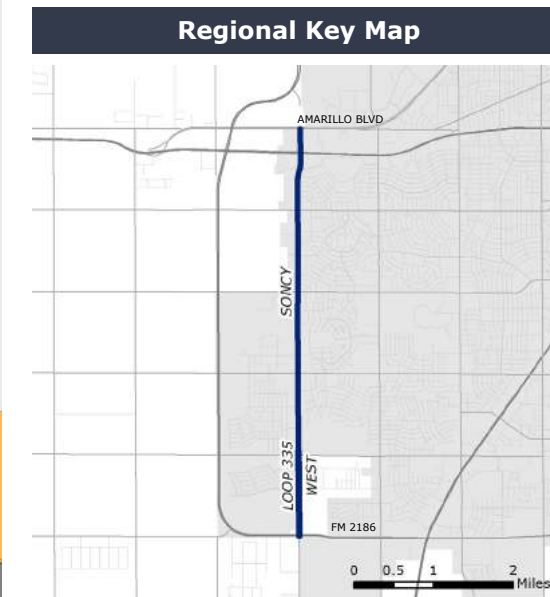
Location	City of Amarillo
Length	5.1 mi
Cross Section	6-Lane Divided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	120'
Pavement Width	2x36'
Travel Lanes	6
Pedestrian Facility	10' Sidepath
Bicycle Facility	10' Sidepath
Median/Turn Lane	16'
Transit	Yes
Vehicle Mobility	High
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



WASHINGTON STREET/ADAMS

FROM 6TH AVENUE TO 15TH AVENUE

Project Overview

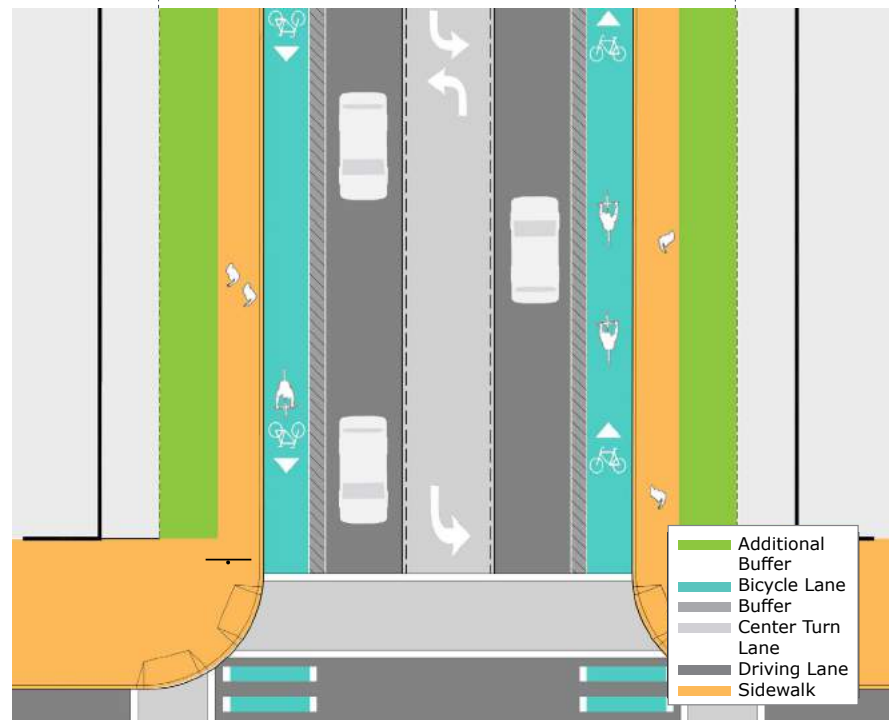
This portion of Washington/Adams Street runs parallel to Downtown Amarillo. To help establish a loop for the bicycle facilities in this area, it is recommended that this corridor implement a road diet by installing on-street bicycle lanes.

Information

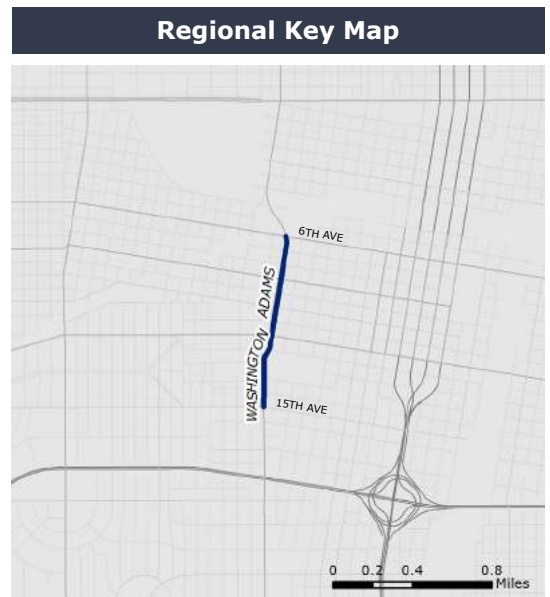
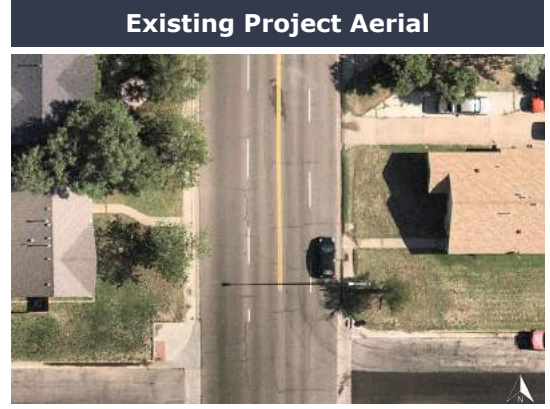
Location	City of Amarillo
Length	1.1 mi
Cross Section	4-Lane Undivided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	75'
Pavement Width	48'
Travel Lanes	2
Pedestrian Facility	6' Sidewalk
Bicycle Facility	6' Bike Lane
Median/Turn Lane	12' TWLTL
Transit	Yes
Vehicle Mobility	Medium
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.



WESTERN STREET

FROM NW 4TH AVE TO SW 15TH AVE

Project Overview

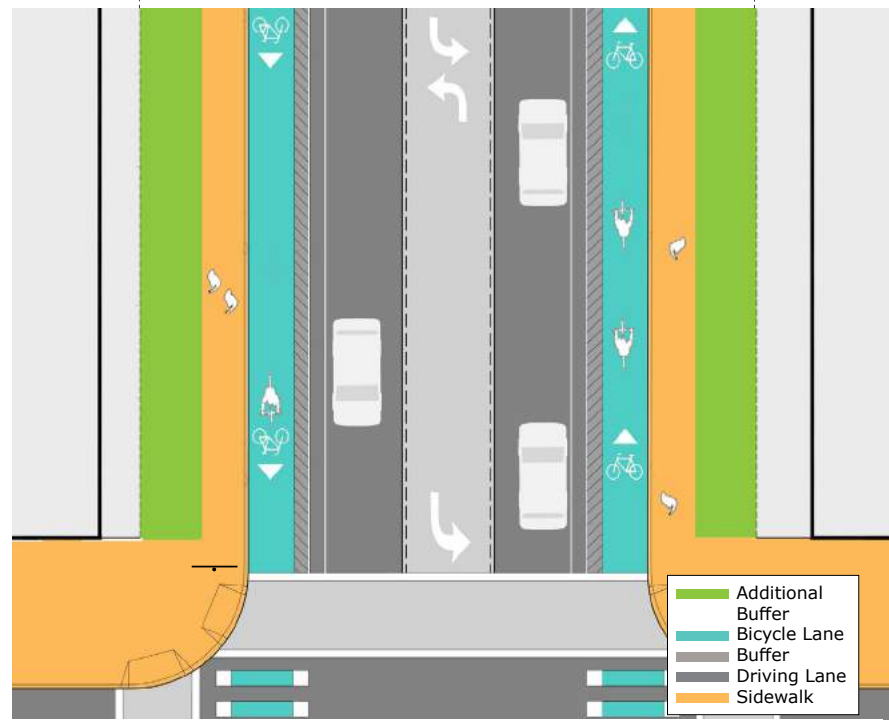
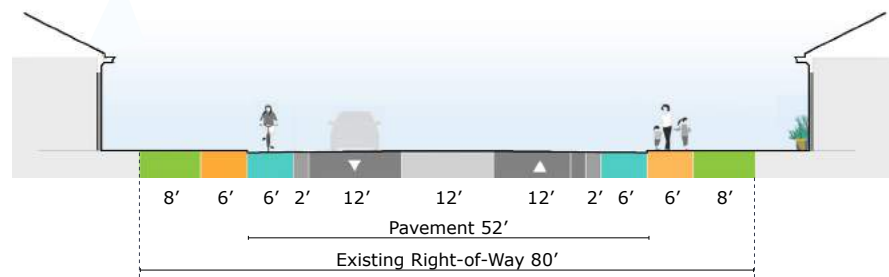
The northern half of Western St was identified in the *Social Pinpoint* survey as needing more bicycle and pedestrian safety improvements. It is recommended that this corridor install on-street bicycle lanes along with continuous sidewalks. The outside parkway width may vary depending on the available right-of-way.

Information

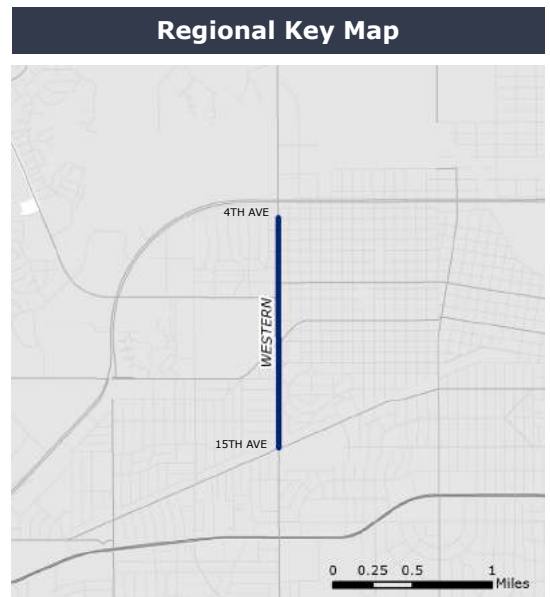
Location	City of Amarillo
Length	1.5 mi
Cross Section	3-Lane Undivided
Functional Class	Primary Arterial

Design Standards

Right-Of-Way	80'
Pavement Width	52'
Travel Lanes	2
Pedestrian Facility	6' Sidewalk
Bicycle Facility	6' Bike Lanes
Median/Turn Lane	12' TWLTL
Transit	None
Vehicle Mobility	Medium
Pedestrian Mobility	High
Bicycle Mobility	High



Roadway design is conceptual and is subject to change based on ROW constraints, utility conflicts, drainage requirements, public involvement, and funding availability.

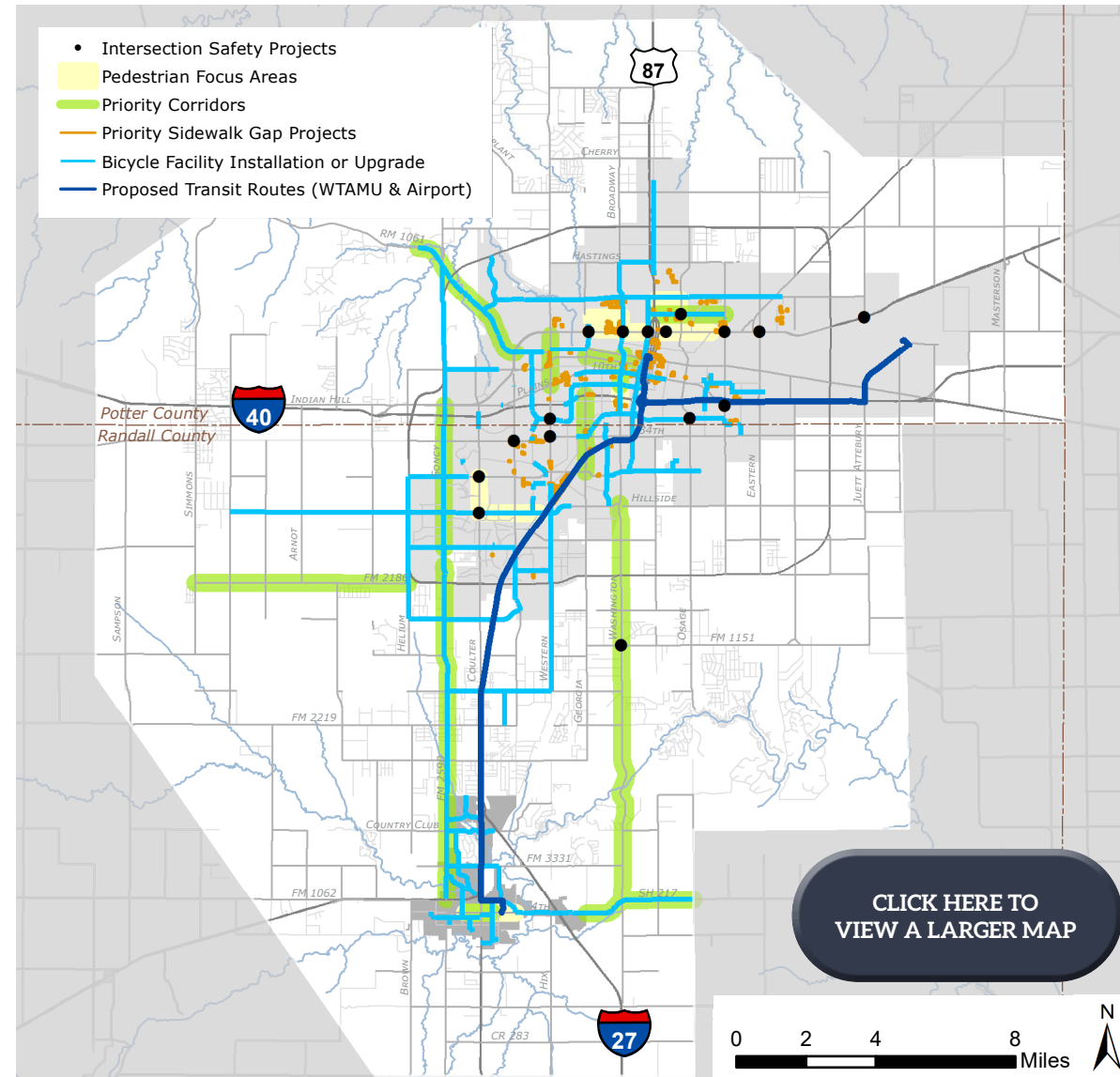


FULL PROJECT LIST

Each chapter of this plan has recommended a set of projects to solve the current needs of each mode of transportation in the region. **Exhibit 17** shows the locations of the following recommended projects:

- **Intersection Safety Projects (Chapter 3)** – These 16 intersections were identified by evaluating crash history as well as the cost-benefit ratio for the proposed improvements.
- **Pedestrian Focus Areas (Chapter 5)** – As part of the pedestrian strategy, these focus areas were given site level plans for improving pedestrian safety and comfort.
- **Multimodal Priority Corridors (Chapter 8)** – As mentioned in the previous section.
- **High Priority Sidewalk Gaps (Chapter 5)** – The second part of the pedestrian strategy evaluated sidewalk gaps within the region using 7 criteria and sorted them into three priority tiers (high, medium, and low).
- **Proposed Bicycle Facilities and Facility Upgrades (Chapter 5)** – Part of the proposed regional bicycle network involved determining construction status for each bicycle facility. These projects are the ones identified as needing to be built or needing an upgrade.
- **Proposed Additional Transit Routes (Chapter 7)** – Two new transit routes were recommended that connect Downtown Amarillo to WTAMU campus as well as Rick Husband Airport.

Exhibit 17. Full Project Map



PROJECT FUNDING SOURCES

The projects recommended as part of this plan take a holistic approach to improving the region's transportation network. Each chapter provides a diverse set of recommendations that can be viewed independently of one another. However, as a plan for a singular region, sometimes these projects cannot find their way to construction due to a lack of funding. Therefore, if Amarillo in Motion presents a holistic approach to transportation, then a holistic approach to funding is also required. Below is a list of possible funding sources that the recommended projects would be eligible for sorted by project type:

SAFETY

Highway Safety Improvement Program (HSIP)
Texas HSIP funds are available for safety projects aimed at reducing traffic fatalities and serious injuries. Bike lanes, roadway shoulders, crosswalks, intersection improvements, underpasses and signs are examples of eligible projects. Projects in high-crash locations are most likely to receive funding. States that have identified bicycle safety and pedestrian safety as Emphasis Areas are more likely to fund bicycle and pedestrian safety projects. HSIP funds are available through TxDOT and is available to TxDOT staff and local governments.

Non-Profits
Pursuing grants to improve places and trails including but not limited to AARP, Blue Cross Blue Shield, CIGNA World of Difference Grant Program, Robert Wood Johnson Foundation, and the Rails to Trails Conservancy.

Road to Zero Funding
The Texas Department of Transportation (department) to work toward the goal of reducing the number of deaths on Texas roadways by half by the year 2035 and to zero by the year 2050. TxDOT has allocated \$600 million to Road to Zero projects in Category 8 funding with \$120 million focused on intersection improvements.

Safe Routes to School
A national program aimed at making it safer for students to walk and bike to school and funds projects that improve safety for these modes.

Transportation Alternatives Set-Aside (Cat. 9)
Funding available once designated a TMA involving smaller-scale transportation projects such as: pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvement, environmental mitigation related to stormwater, and habitat connectivity.

GROWTH

Bond Programs
Using debt issuance to large expenditures for roadway projects at one time. Bonds may be submitted as propositions and are voted on by the public.

Developer Agreement
Reimbursing or sharing the cost of development that is determined to have a positive impact on the City. Also known as Chapter 380 Agreements

Economic Development Corporation
Partner with the EDC funds to invest into infrastructure as a catalyst for growth or redevelopment initiatives

Impact Fees
A one-time charge assessed to new development to have growth pay for growth.

Tax Increment Reinvestment Zone (TIRZ)
A type of special district that is created to attract new investment to areas that need revitalization through Tax Increment Financing (TIF). TIF is a type of financing local governments can use to pay for improvements to help bring investment into an area by redirecting some of the ad valorem tax from the property within the TIRZ to pay for improvements such as major transportation investments. The City of Amarillo currently has two of these – one in their Center City and one in East Gateway.

MAINTENANCE

General Fund
City and Counties allocate property taxes to fund most street maintenance. This funding level should correspond to a pavement maintenance plan to ensure the roads do not fall into disrepair.

Street Maintenance Fee
A source of revenue to fund street system maintenance based on use of the street system by residential and commercial properties, usually put on the water bill.

Transportation Management Areas (TMA)
A TMA is an urban area representing a population over 200,000 according to the Bureau of the Census and designated by the Secretary of the U.S. Department of Transportation, or DOT. An MPO in a TMA has an advantage for funding opportunities and project implementation due to the increased complexity and needs brought by a larger urban area.

Category 7 Funding
This funding source is part of the Surface Transportation Program, becomes accessible once an MPO is recognized as a TMA. Applies to TMA transportation direct funding to local priority projects.

POLICIES

The policy portion of the implementation strategy links directly to the plan’s vision and goal framework. As presented in Chapter 2, the vision and goals were the starting point in determining the overarching theme of the plan. Once that framework was developed, the next steps were to determine objectives and actions that further planned out

how the MPO would work to achieve these goals. Each of the previous chapters has introduced these actions as they relate to the chapter’s respective subjects. In this section, all of these actions have been combined into one matrix with the addition of two major implementation elements:

- When to complete the action (on a scale from short-term to long-term), and
- What agencies the MPO should partner with to ensure its completion.

This Implementation Matrix is shown in **Exhibit 18** below:

Exhibit 18. Implementation Matrix

Goal 1. A well-connected network of regional thoroughfares	Short Term (1-3 yrs)	Medium Term (4-10 yrs)	Long Term (10+ yrs)	Partner Agencies
<i>Objective 1.1. Utilize multimodal design and connectivity as an emphasis when planning and designing new thoroughfares.</i>				
Action 1.1.1. Prioritize new road constructions that build upon the existing grid network of regional thoroughfares.	X			Amarillo, Canyon, Potter, Randall
Action 1.1.2. Incorporate context-sensitive roadway design by considering the relationships between land use and transportation.	X			Amarillo, Canyon, Potter, Randall
<i>Objective 1.2. Incorporate multimodal design into the existing thoroughfares.</i>				
Action 1.2.1. Identify and redesign thoroughfares that can be retrofitted to include multimodal facilities, including opportunities for right-sizing roadways with excess vehicular capacity.		X		Amarillo, Canyon
Action 1.2.2. Identify areas where right-of-way can be acquired to connect critical multimodal facilities.	X			Amarillo, Canyon
Action 1.2.3. Update existing design standards to include consideration for bike lanes, sidewalks, and transit facilities.		X		Panhandle Transit, Amarillo, Canyon
<i>Objective 1.3. Develop an access management policy for commercial corridors in Amarillo and Canyon.</i>				
Action 1.3.1. Identify future candidate corridors for raised median installation.	X			TxDOT, Amarillo, Canyon
Action 1.3.2. Develop revised access spacing criteria and right-turn lane requirements.		X		TxDOT, Amarillo, Canyon
Action 1.3.3. Emphasize providing cross access for commercial properties instead of additional driveways.		X		Amarillo, Canyon
<i>Objective 1.4. Improve vehicular circulation in Downtown Amarillo.</i>				
Action 1.4.1. Conduct an evaluation of one-way street and multimodal facilities within Downtown Amarillo.	X			Amarillo

Goal 2. Safe facilities for all modes	Short Term (1-3 yrs)	Medium Term (4-10 yrs)	Long Term (10+ yrs)	Partner Agencies
<i>Objective 2.1. Reduce severe injuries and fatalities caused by crashes.</i>				
Action 2.1.1. Develop a safety action plan to identify countermeasures.	X			TxDOT
Action 2.1.2. Monitor crash hotspots to determine areas for future investment.			X	TxDOT
Action 2.1.3. Dedicate capital funds for projects classified as safety improvements.			X	TxDOT
<i>Objective 2.2. Focus investments on areas with high bicycle & pedestrian activity and needs.</i>				
Action 2.2.1. Develop a Safe Routes to School Program.		X		School Districts, TxDOT
Action 2.2.2. Target transportation safety improvements within areas identified as Equity Opportunity Areas.		X		Neighborhood Associations, Amarillo, Canyon
<i>Objective 2.3. Increase cultural awareness about safe driving & riding.</i>				
Action 2.3.1. Establish a regionwide safety education initiative focused on promoting a culture of safe practices for bicycling, walking, and driving.			X	School Districts, Neighborhood Associations, Amarillo, Canyon
Action 2.3.2. Partner with TxDOT, the cities of Canyon and Amarillo, and the Independent School Districts in the region to increase awareness of safety in transportation.			X	TxDOT, Amarillo, Canyon, School Districts
Goal 3. A complete and comfortable bicycle and pedestrian network				
<i>Objective 3.1. Create a fully continuous sidewalk network within Amarillo and Canyon city limits .</i>				
Action 3.1.1. Prioritize sidewalk and bicycle facility projects in the CIP that would connect two sections of the existing network.	X			Amarillo, Canyon
Action 3.1.2. Increase funding for sidewalks.		X		Amarillo, Canyon
Action 3.1.3. Focus new sidewalk construction in areas of the region identified as Equity Opportunity Areas.		X		Amarillo, Canyon
<i>Objective 3.2. Establish regional bicycle routes along existing county roads.</i>				
Action 3.2.1. Expand FM 2590 (Soncy Rd) and SH 217 to include bike facilities designed for regional movement.	X			TxDOT
Action 3.2.2. Create an Amarillo Area MPO regional bicycle network map to advertise and promote the new regional routes.	X			TxDOT
<i>Objective 3.3. Create a new bicycle network wayfinding program.</i>				
Action 3.3.1. Update existing signage as new bicycle routes are established.		X		TxDOT, Amarillo, Canyon
Action 3.3.2. Create separate bicycle network maps for both Amarillo and Canyon as part of the MPO regional bicycle network advertising initiative.		X		Amarillo, Canyon

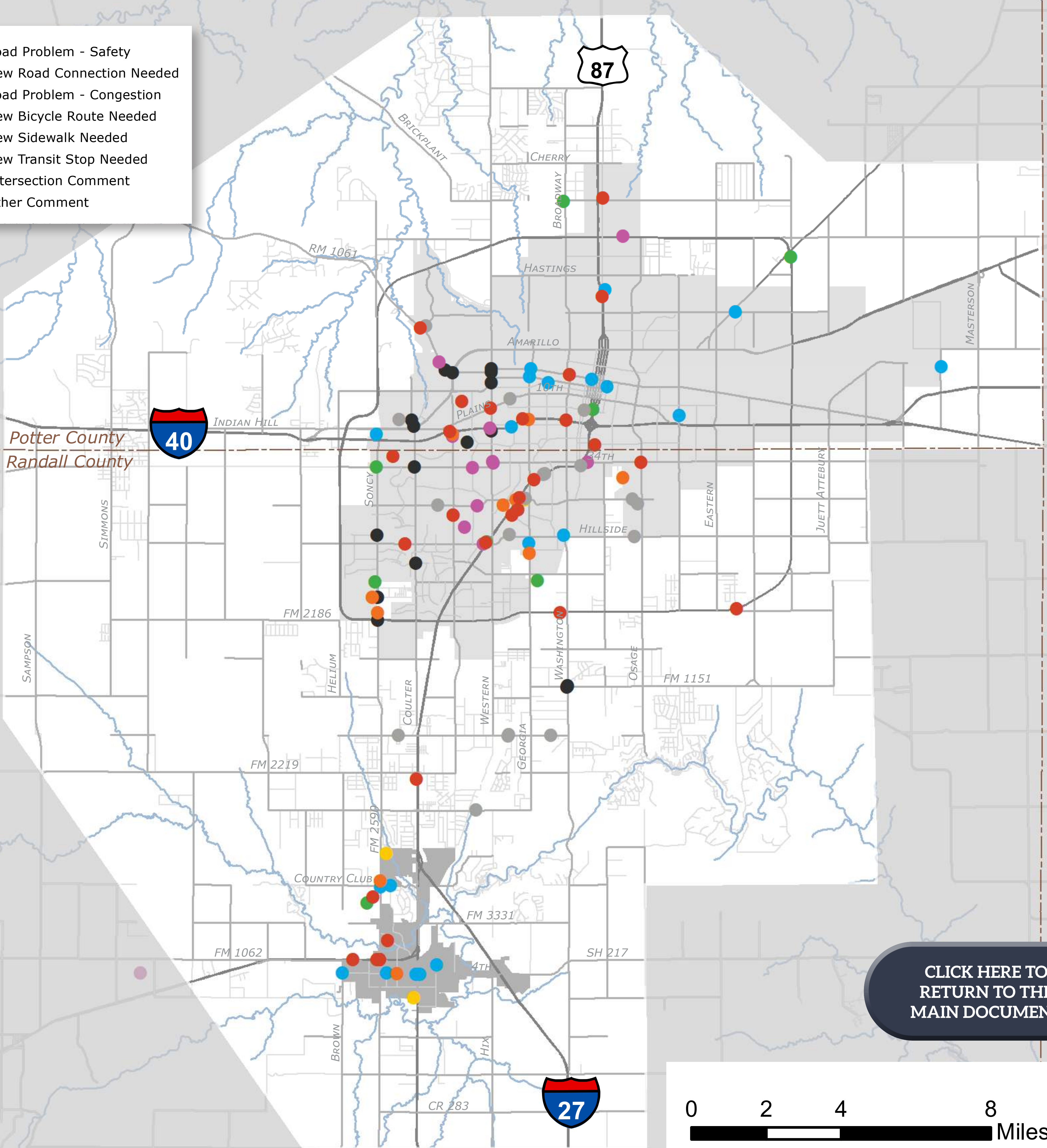
Exhibit 18. Implementation Matrix (Cont.)

Goal 4. Innovative design & technology	Short Term (1-3 yrs)	Medium Term (4-10 yrs)	Long Term (10+ yrs)	Partner Agencies
<i>Objective 4.1. Use emerging vehicle technologies to increase safety and efficiency.</i>				
Action 4.1.1. Build enhanced traffic control infrastructure to support connected and automated vehicle technologies.		X		TxDOT, Amarillo, Canyon
Action 4.1.2. Create an autonomous circulator shuttle that connects downtown to the Historic Route 66 area.			X	Panhandle Transit, Amarillo
<i>Objective 4.2. Use communication technologies, sensors and traffic control devices to improve safety and traffic flow.</i>				
Action 4.2.1. Incorporate an enhanced traffic management center to optimize signal coordination.			X	TxDOT, Amarillo
Action 4.2.2. Install pedestrian and bicycle sensors and warnings at key crossing locations.	X			TxDOT, Amarillo, Canyon
<i>Objective 4.3. Use advanced methods for collecting, organizing and using data to improve decision making and transportation system performance.</i>				
Action 4.3.1. Research and incorporate advanced data collection methods.		X		TxDOT, Amarillo, Canyon
Action 4.3.2. Create a transportation “Big Data” warehouse.			X	TxDOT, Amarillo, Canyon
Action 4.3.3. Develop a data dashboard for system performance monitoring.	X			TxDOT, Amarillo, Canyon
Goal 5. Integrated Transit				
<i>Objective 5.1. Improve transit access and experience for riders.</i>				
Action 5.1.1. Identify concentrations of Transit-Dependent Populations, total population, employment, and destinations and compare them to existing service to identify any gaps in service.	X			Panhandle Transit
Action 5.1.2. Develop design and placement standards for bus stops to ensure they are readily accessible to existing bicycle and pedestrian networks and are ADA compliant.		X		Panhandle Transit
Action 5.1.3. Develop service standards that measure performance in relation to service reliability, system productivity, and communications of service information.		X		Panhandle transit
Action 5.1.4. Develop partnerships with local medical and social services providers to coordinate transit service to locations such as medical centers, community centers, and senior/assisted living centers.		X		Panhandle Transit, School Districts, Medical Providers, Amarillo, Canyon
Action 5.1.5. Develop a mobile app for transit users that is integrated with other local transportation providers such as Lyft, Uber, taxi services, and bicycle share entities so that customers can seamlessly navigate first/last mile transportation options.			X	Panhandle Transit

Goal 5. Integrated Transit (Cont.)	Short Term (1-3 yrs)	Medium Term (4-10 yrs)	Long Term (10+ yrs)	Partner Agencies
<i>Objective 5.2. Increase regional transit connectivity between Canyon and Amarillo.</i>				
Action 5.2.1. Conduct a market analysis to determine the level of demand for transit service between Canyon and Amarillo.		X		Panhandle Transit
Action 5.2.2. Form a partnership with Panhandle Transit to coordinate service provision between Canyon and Amarillo.		X		Panhandle Transit
Goal 6. High level of service for both vehicular and freight traffic				
<i>Objective 6.1. Optimize intersection capacity and flow to minimize congestion.</i>				
Action 6.1.1. Prioritize intersection improvements as part of the Capital Improvement Plan.	X			Amarillo, Canyon, Potter, Randall
Action 6.1.2. Create a toolbox of intersection design best practices aimed at solving capacity and safety related issues.		X		TxDOT, Amarillo, Canyon
<i>Objective 6.2. Reduce impediment to freight movement and conflicts with other modes.</i>				
Action 6.2.1. Enhance roadway design and traffic control to reduce conflict between freight movement and other traffic.		X		TxDOT
Action 6.2.2. Improve designation and signage of truck routes and hazardous material routes.		X		TxDOT, Amarillo, Canyon, Potter, Randall
Action 6.2.3. Invest in new wayfinding and traveler information for truck drivers			X	Amarillo, Canyon, Potter, Randall

Exhibit 1: All Social Pinpoint Map Survey Comments

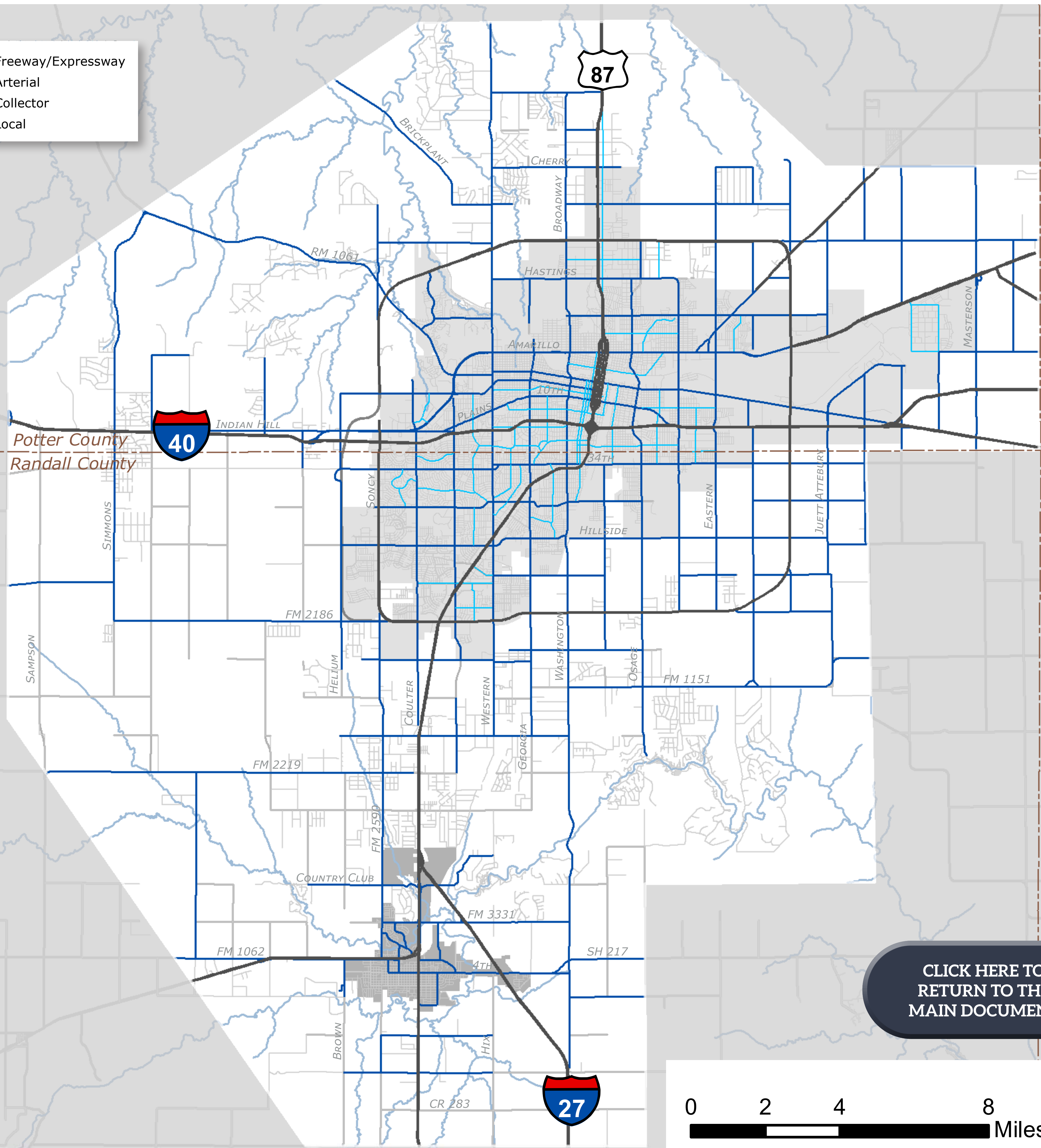
- Road Problem - Safety
- New Road Connection Needed
- Road Problem - Congestion
- New Bicycle Route Needed
- New Sidewalk Needed
- New Transit Stop Needed
- Intersection Comment
- Other Comment



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Exhibit 2: Existing Thoroughfare Plan

- Freeway/Expressway
- Arterial
- Collector
- Local

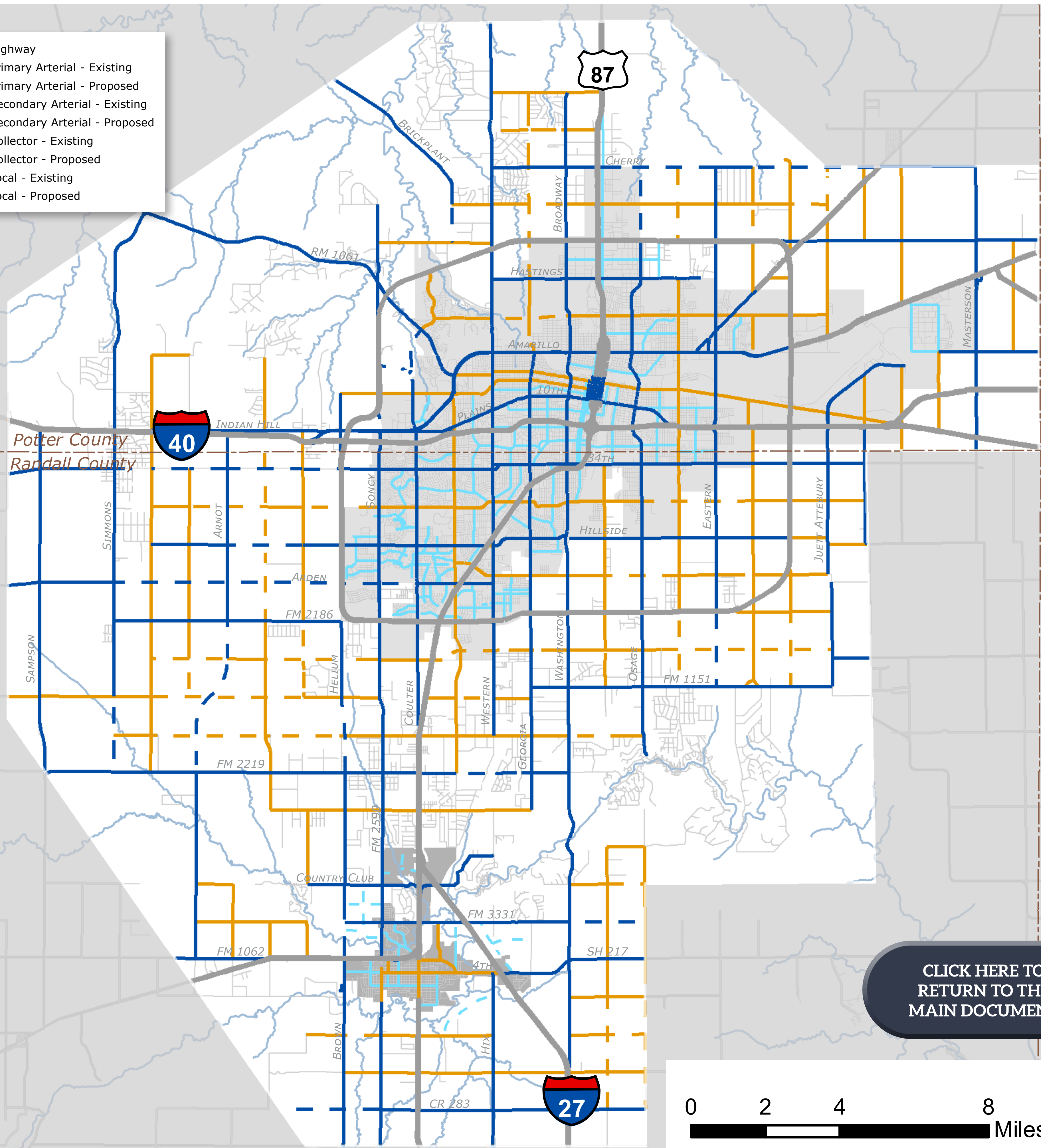


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Exhibit 3: Proposed Thoroughfare Plan

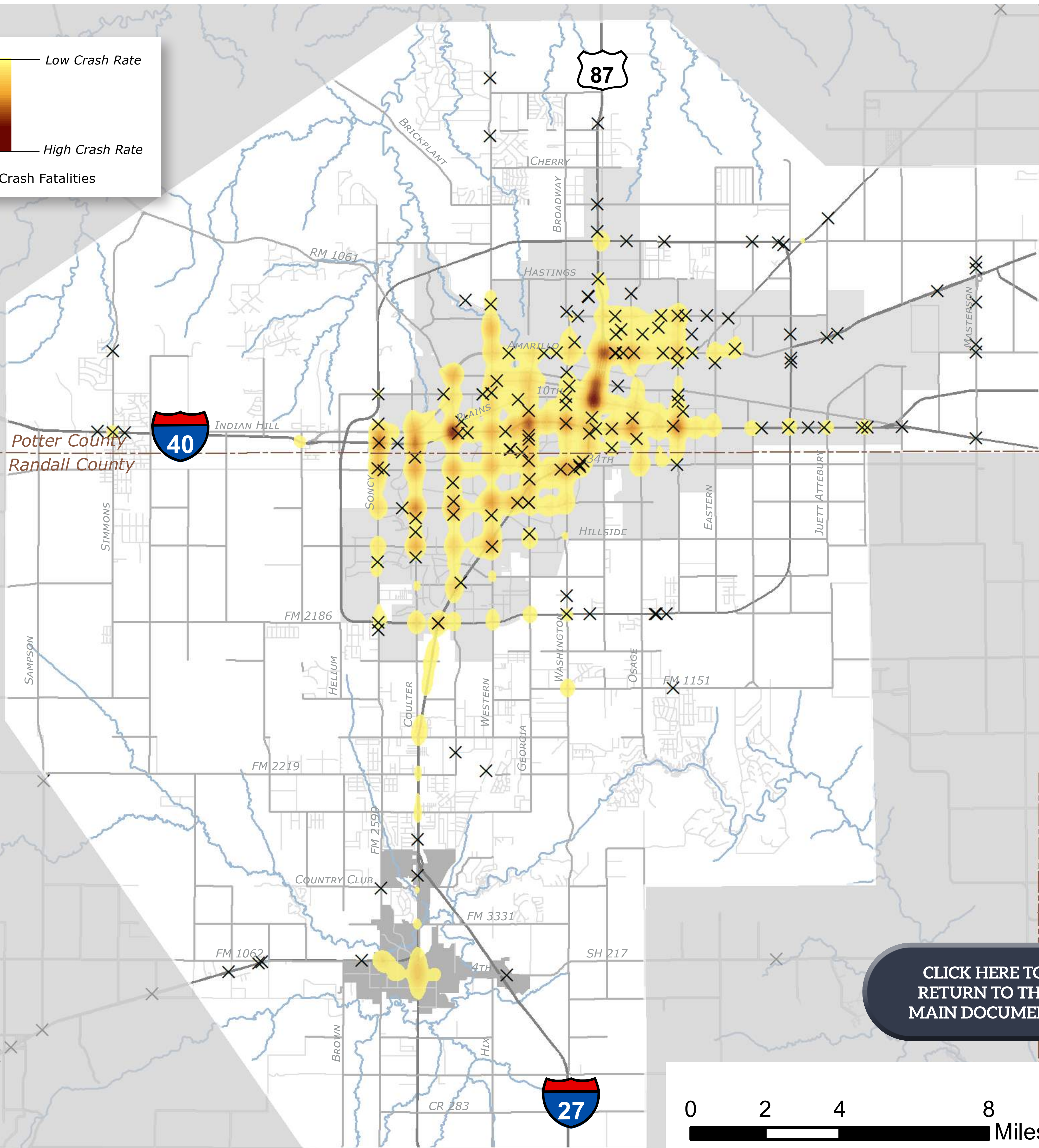
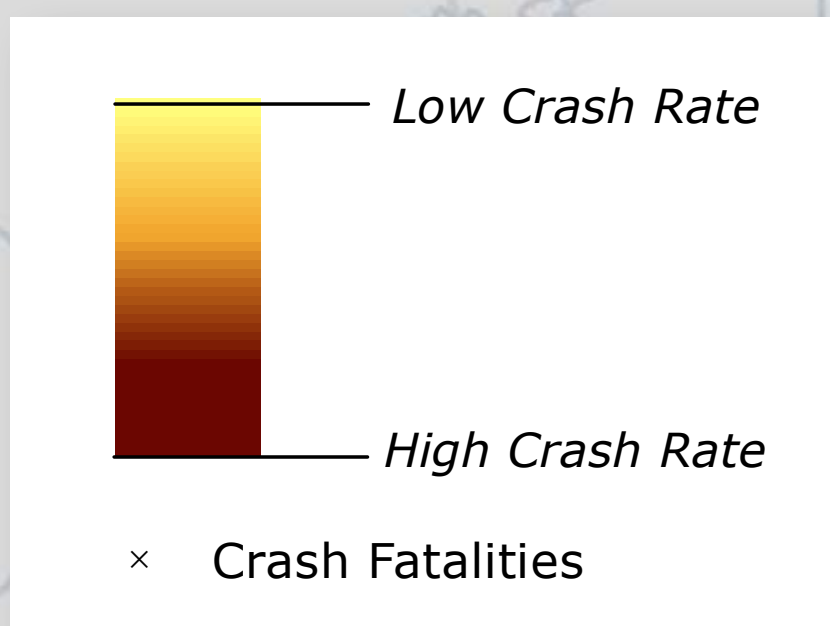
- Highway
- Primary Arterial - Existing
- Primary Arterial - Proposed
- Secondary Arterial - Existing
- Secondary Arterial - Proposed
- Collector - Existing
- Collector - Proposed
- Local - Existing
- Local - Proposed



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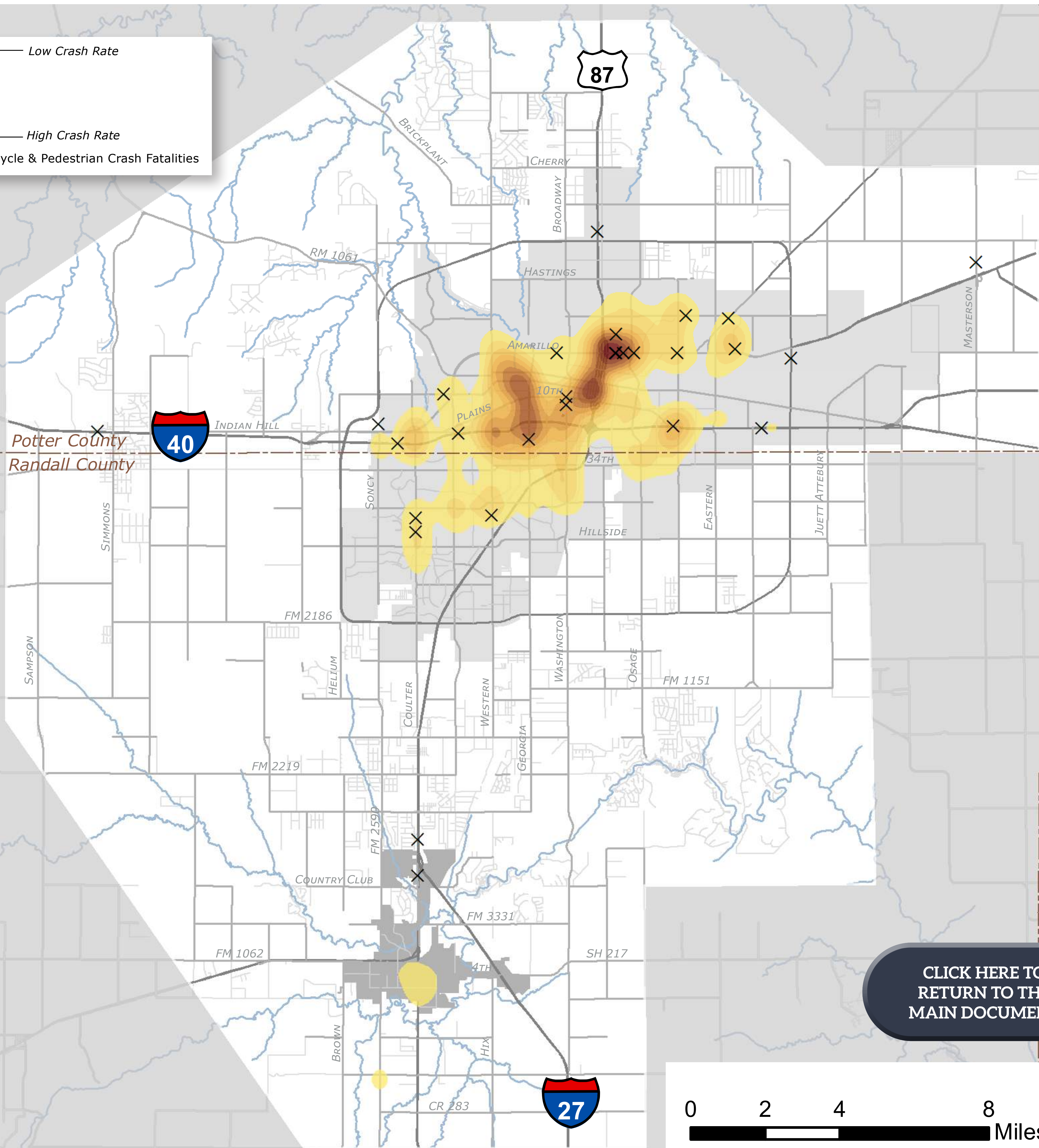
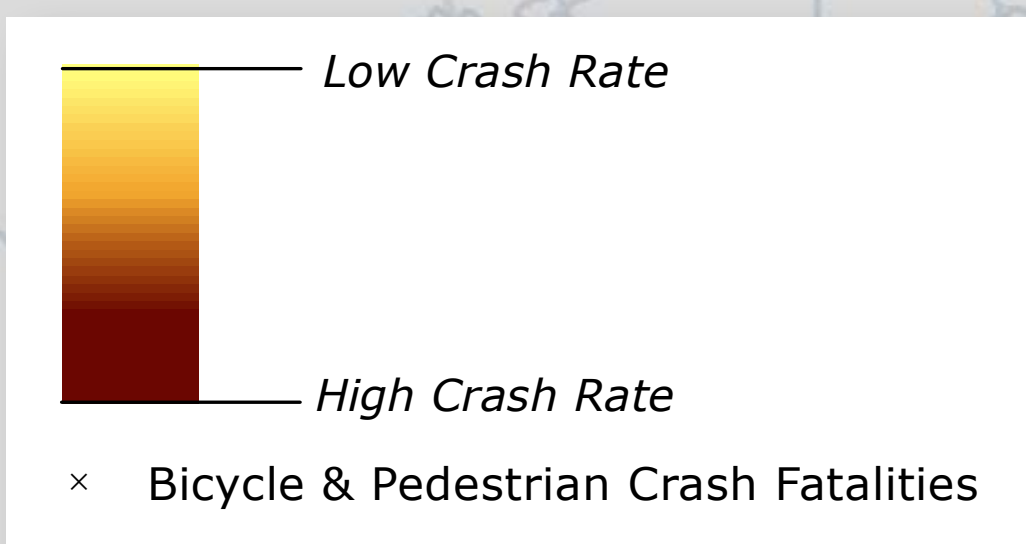
Exhibit 4: Vehicular Crash Heat Map



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Exhibit 5: Bicycle & Pedestrian Crash Heat Map

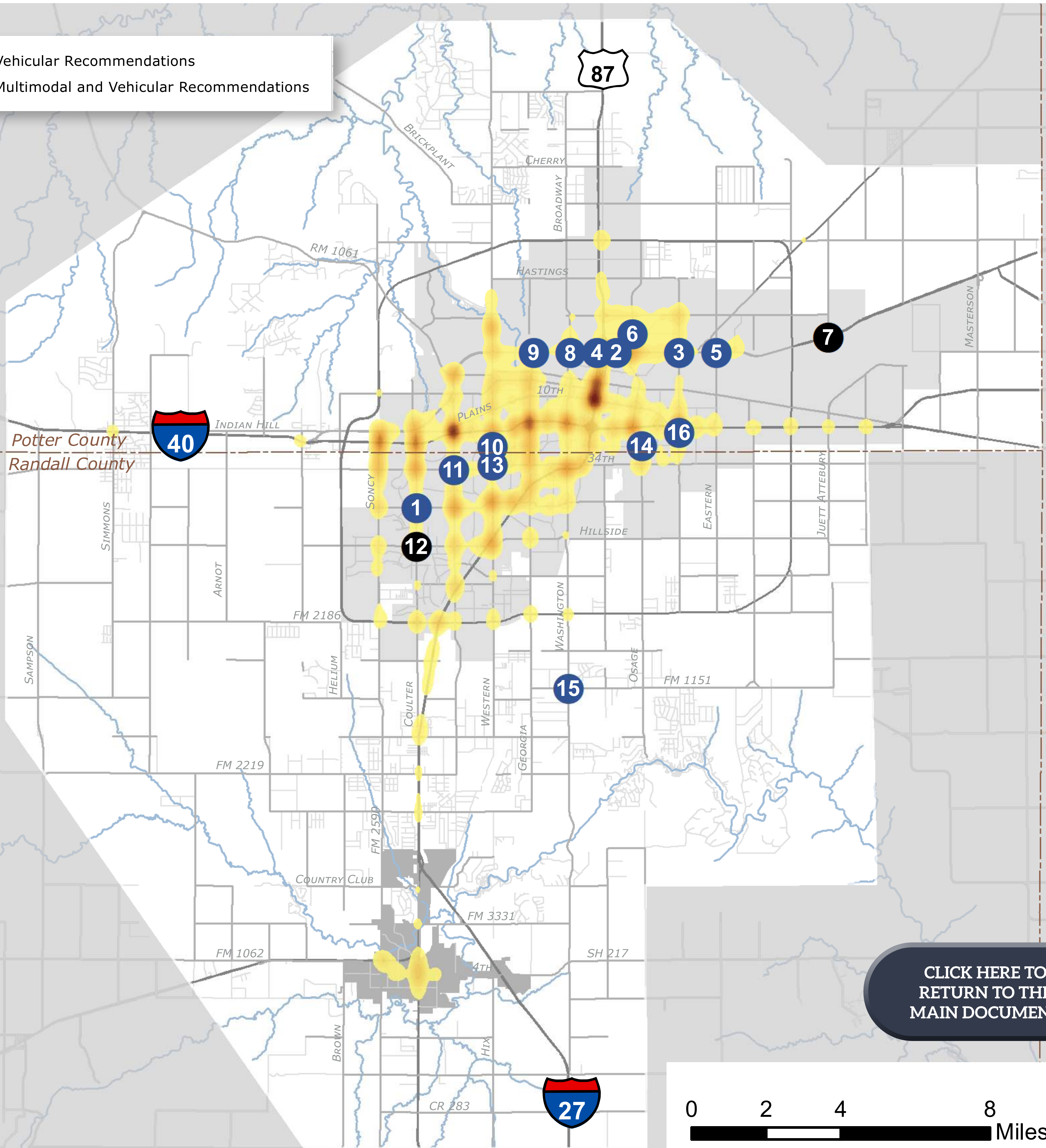


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Exhibit 6: Intersection Safety Project Locations

- Vehicular Recommendations
- Multimodal and Vehicular Recommendations

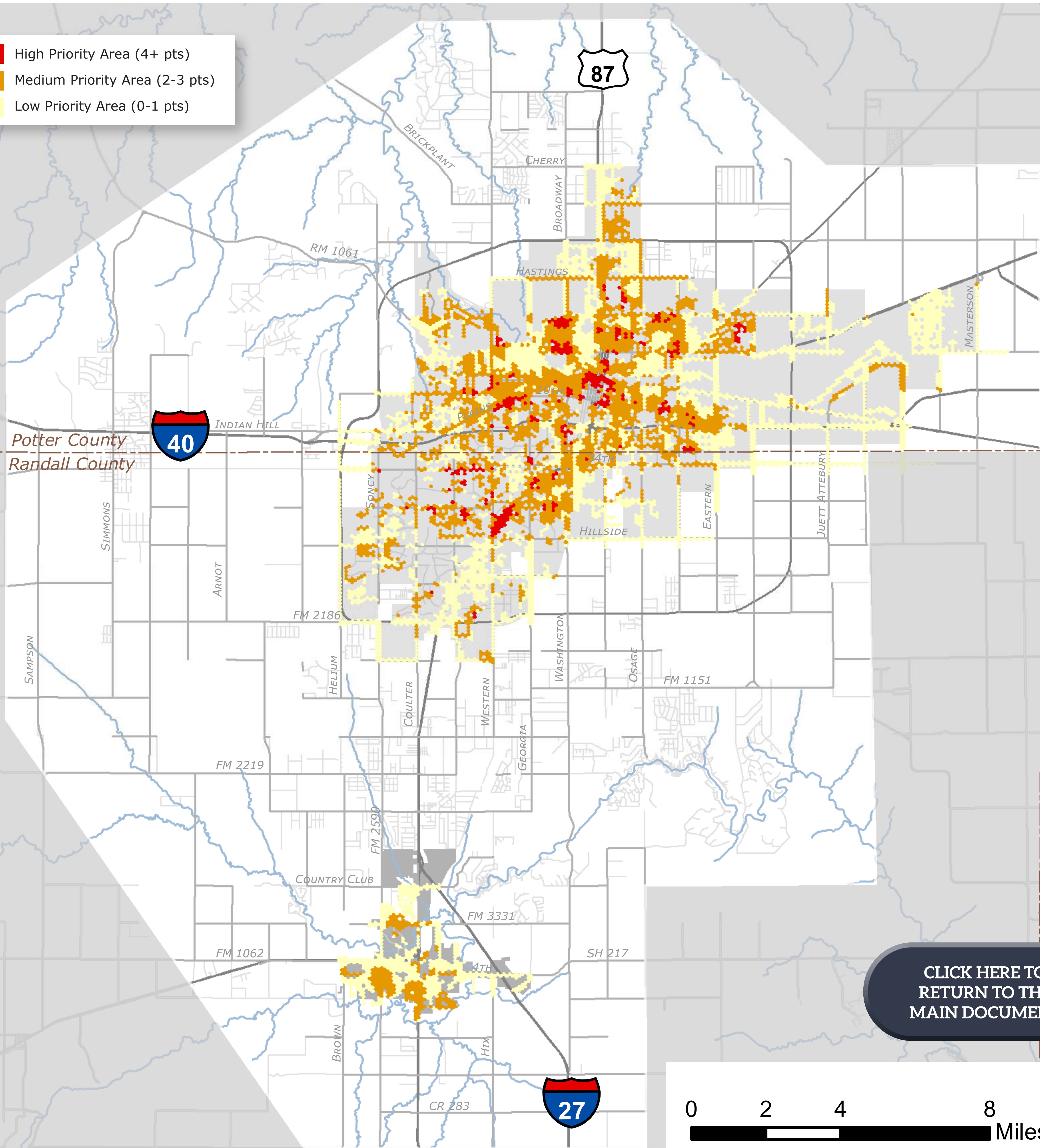


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Exhibit 7: Sidewalk Gap Prioritization Results

- High Priority Area (4+ pts)
- Medium Priority Area (2-3 pts)
- Low Priority Area (0-1 pts)

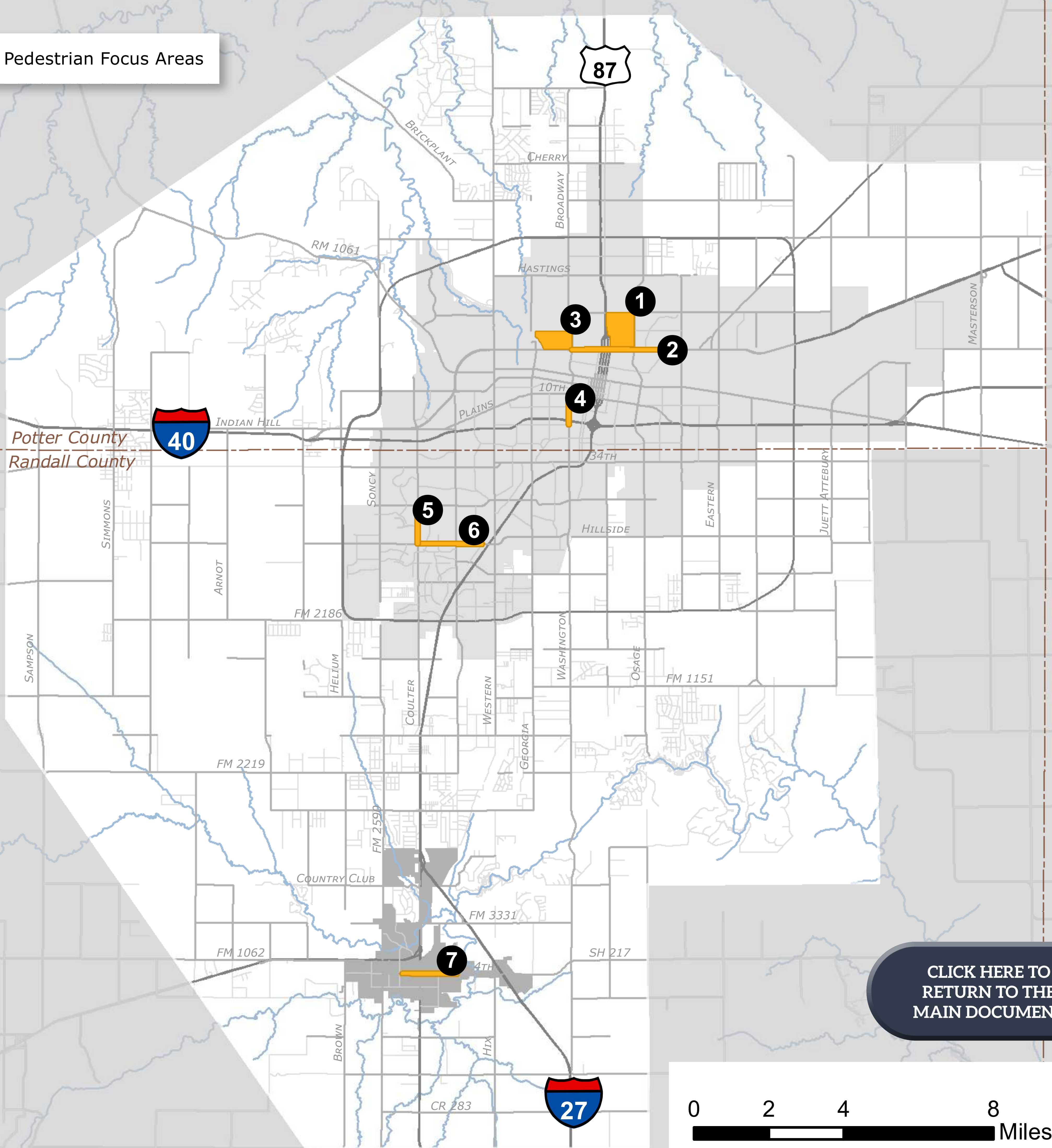


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Exhibit 8: Pedestrian Focus Area Locations




 Pedestrian Focus Areas

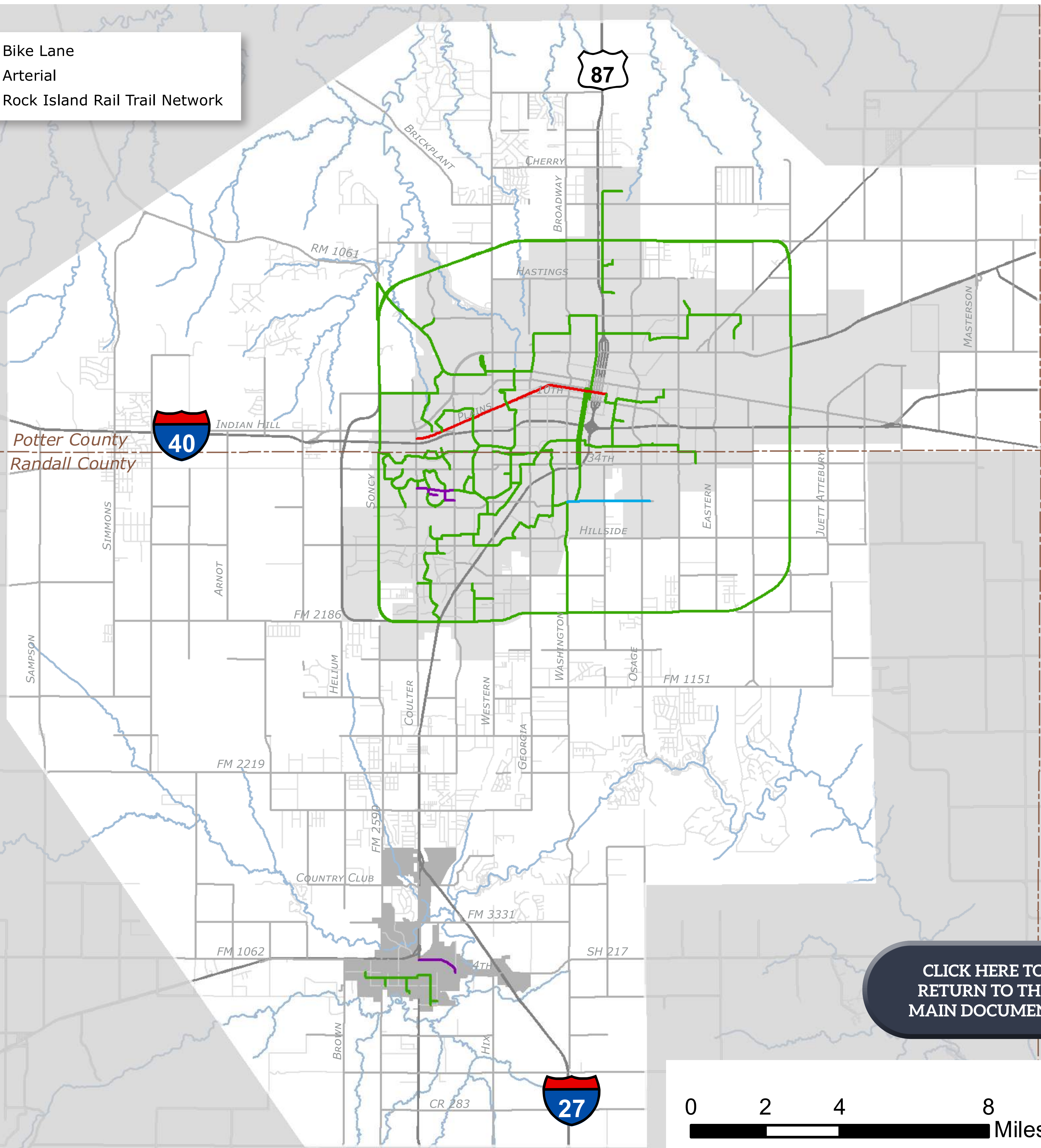


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Exhibit 9. Existing Bicycle Network

-  Bike Lane
-  Arterial
-  Rock Island Rail Trail Network



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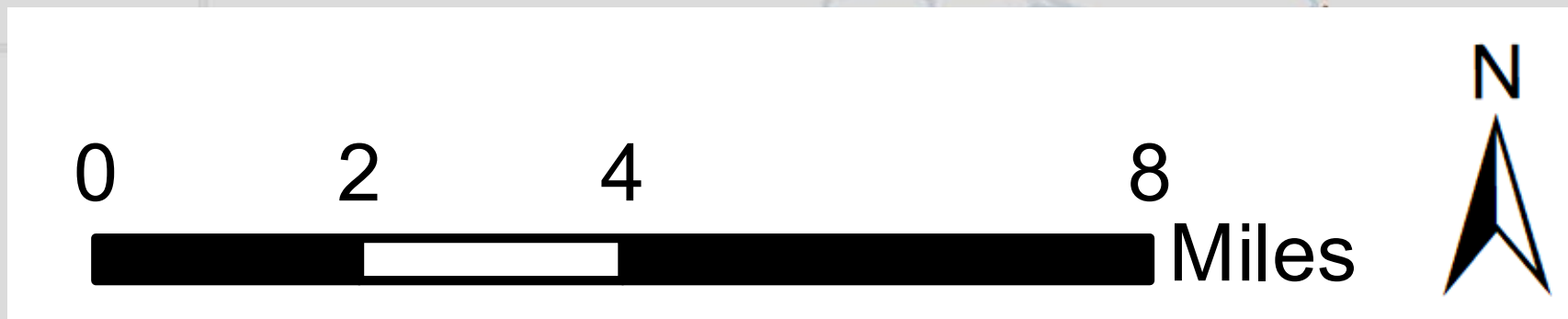
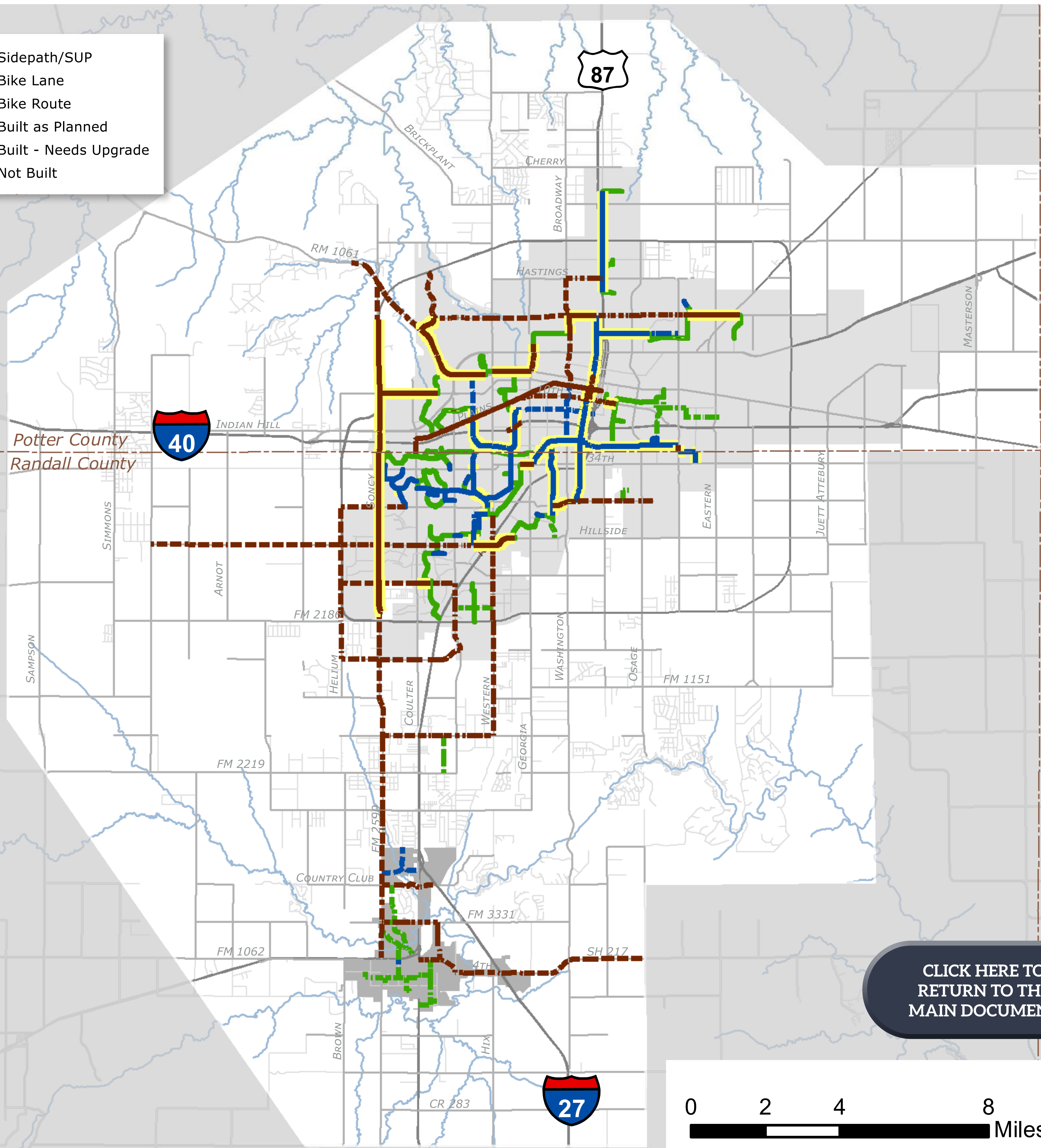


Exhibit 10. Proposed Bicycle Network

- Sidepath/SUP
- Bike Lane
- Bike Route
- Built as Planned
- Built - Needs Upgrade
- Not Built

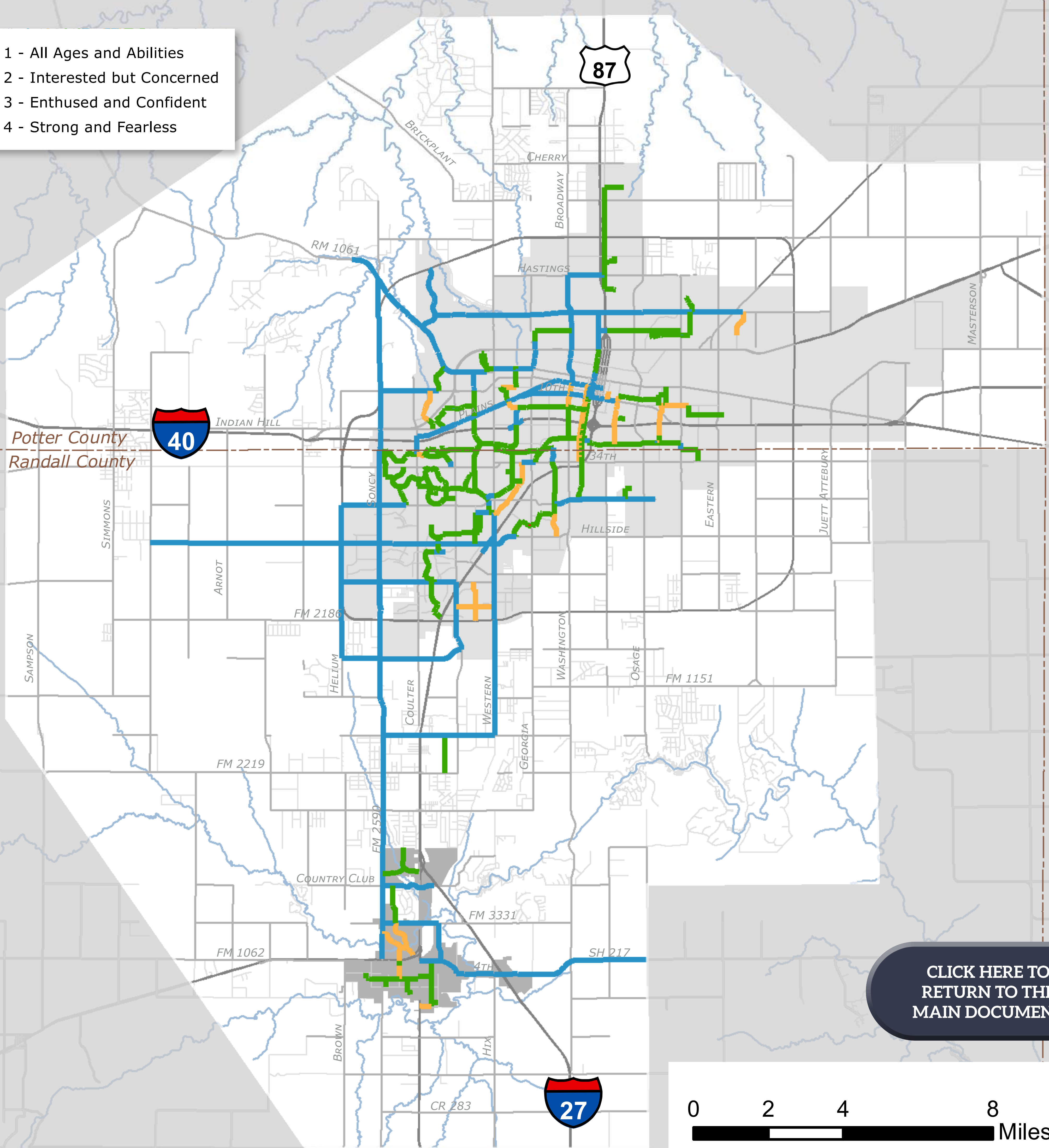


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Exhibit 11. Bicycle Level of Comfort Map

- 1 - All Ages and Abilities
- 2 - Interested but Concerned
- 3 - Enthused and Confident
- 4 - Strong and Fearless

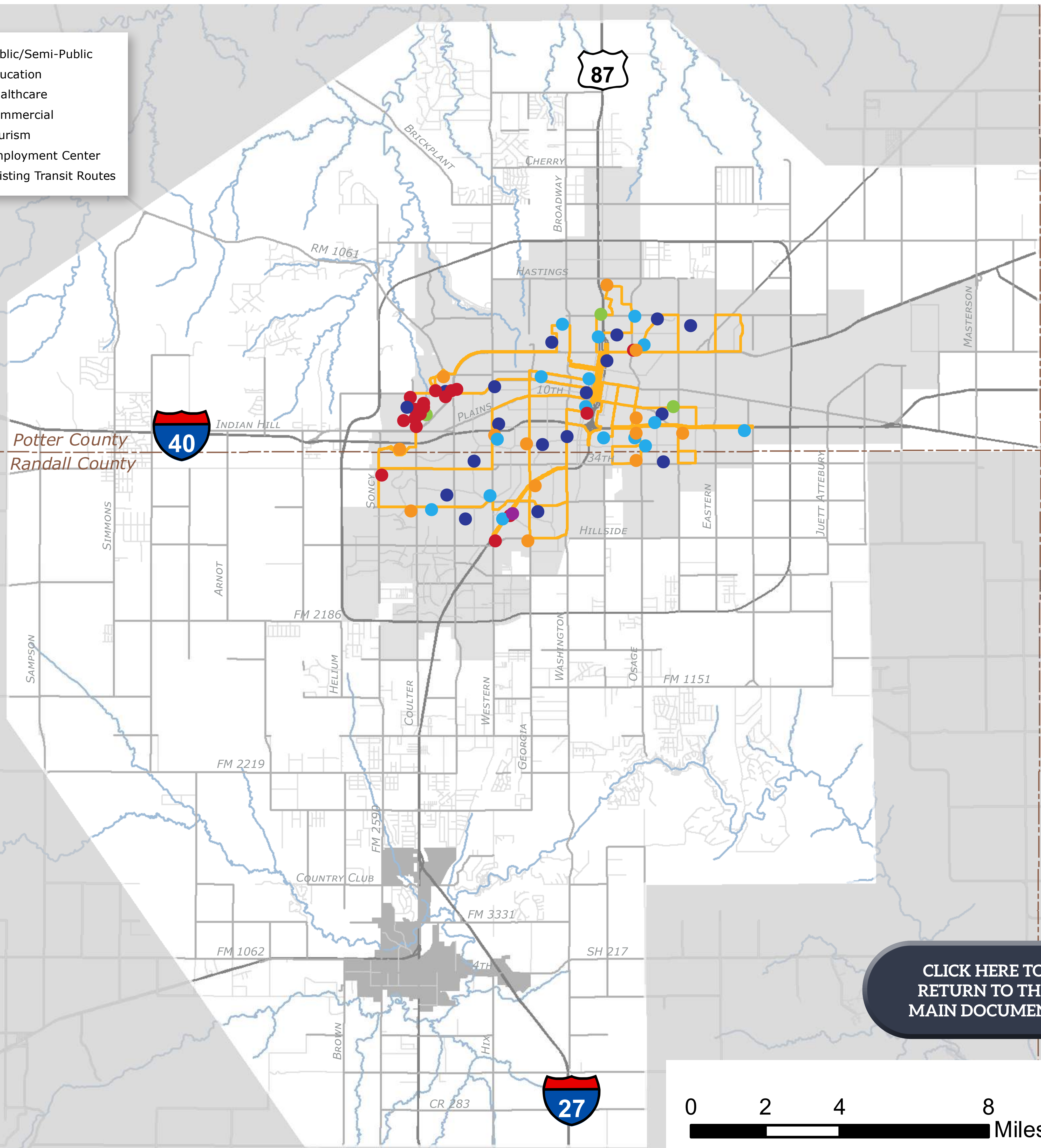


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Exhibit 12. Locations Served by Existing Transit Routes

- Public/Semi-Public
- Education
- Healthcare
- Commercial
- Tourism
- Employment Center
- Existing Transit Routes



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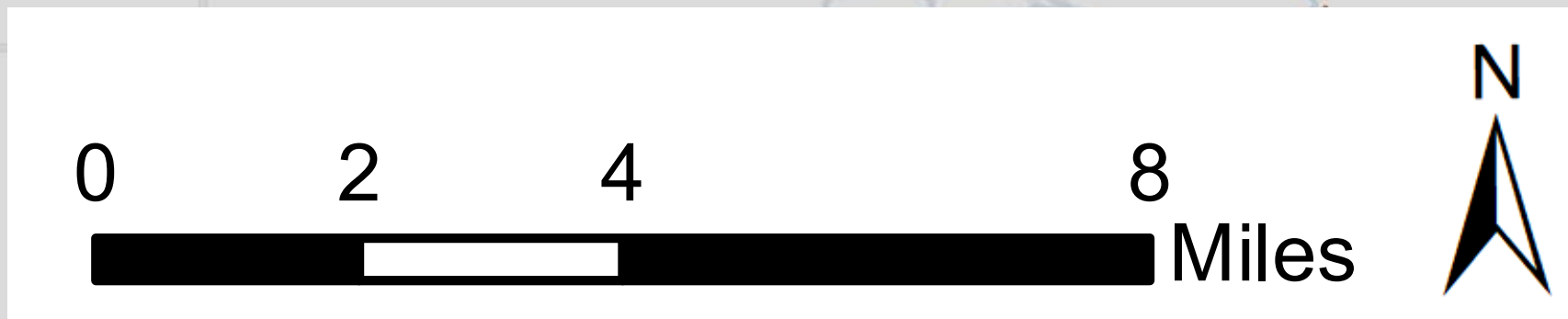


Exhibit 13. Bicycle & Pedestrian Connectivity within a Quarter Mile of Transit

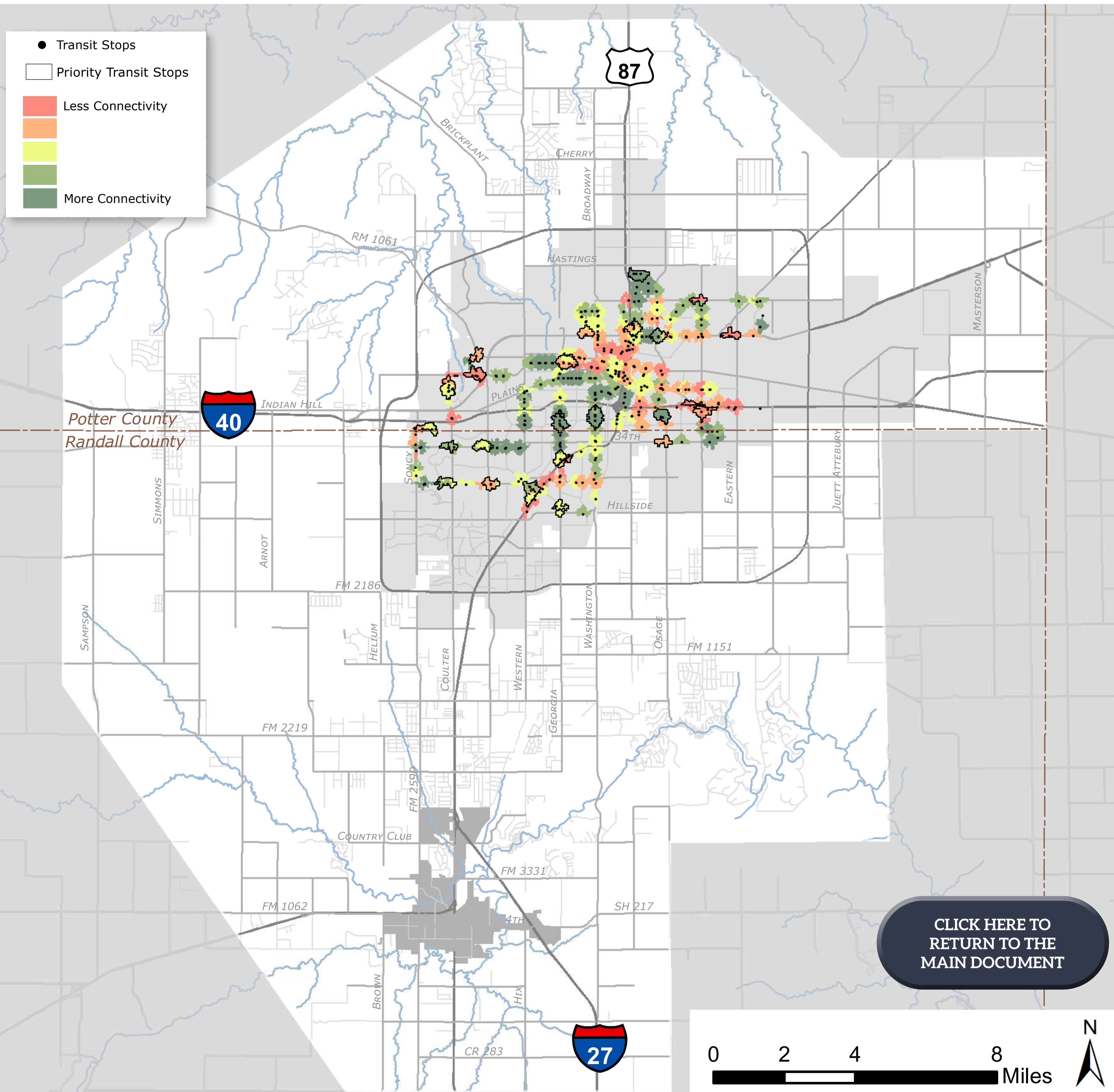
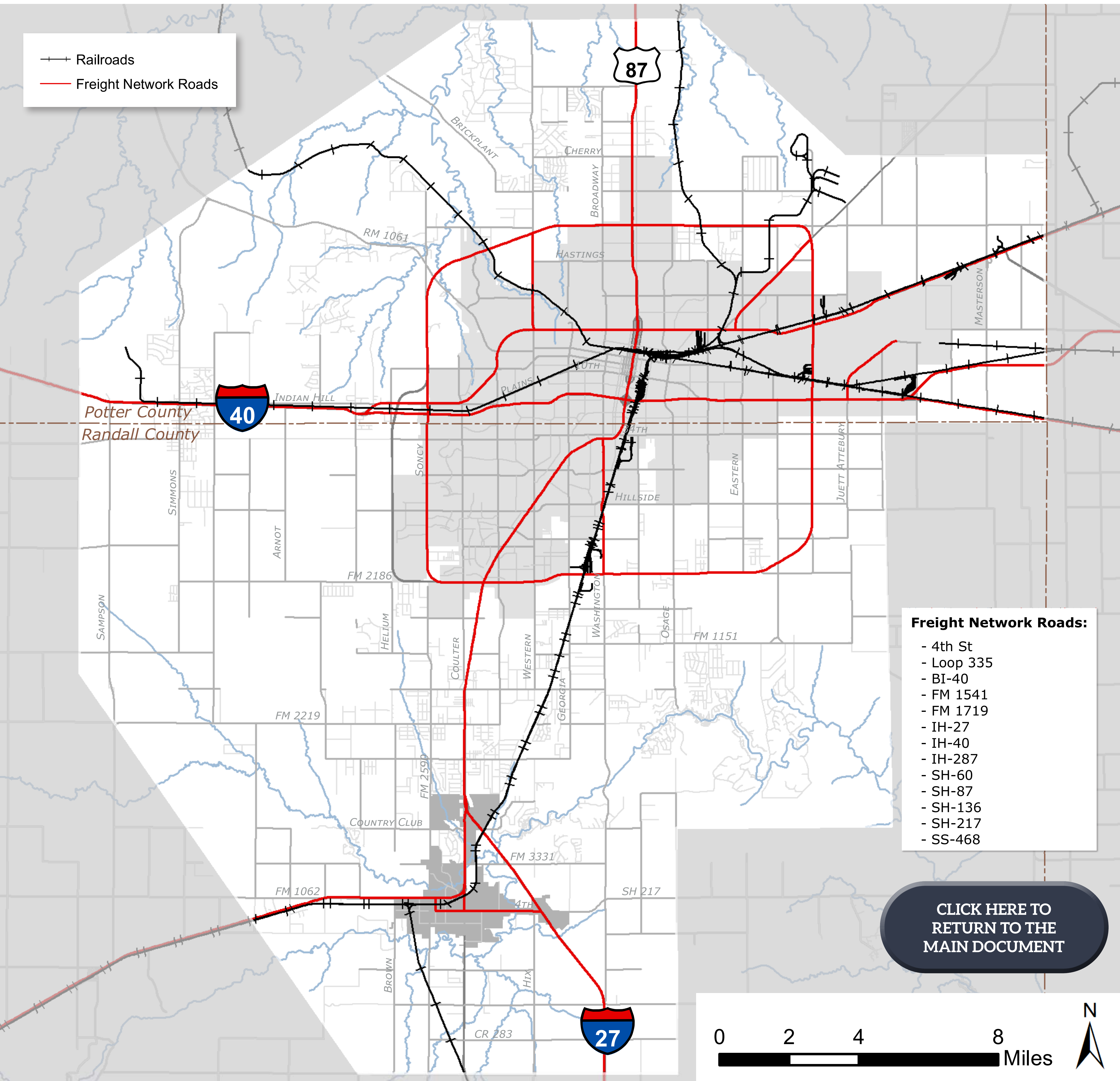


Exhibit 14. Amarillo Freight Network

- +— Railroads
- Freight Network Roads



Freight Network Roads:

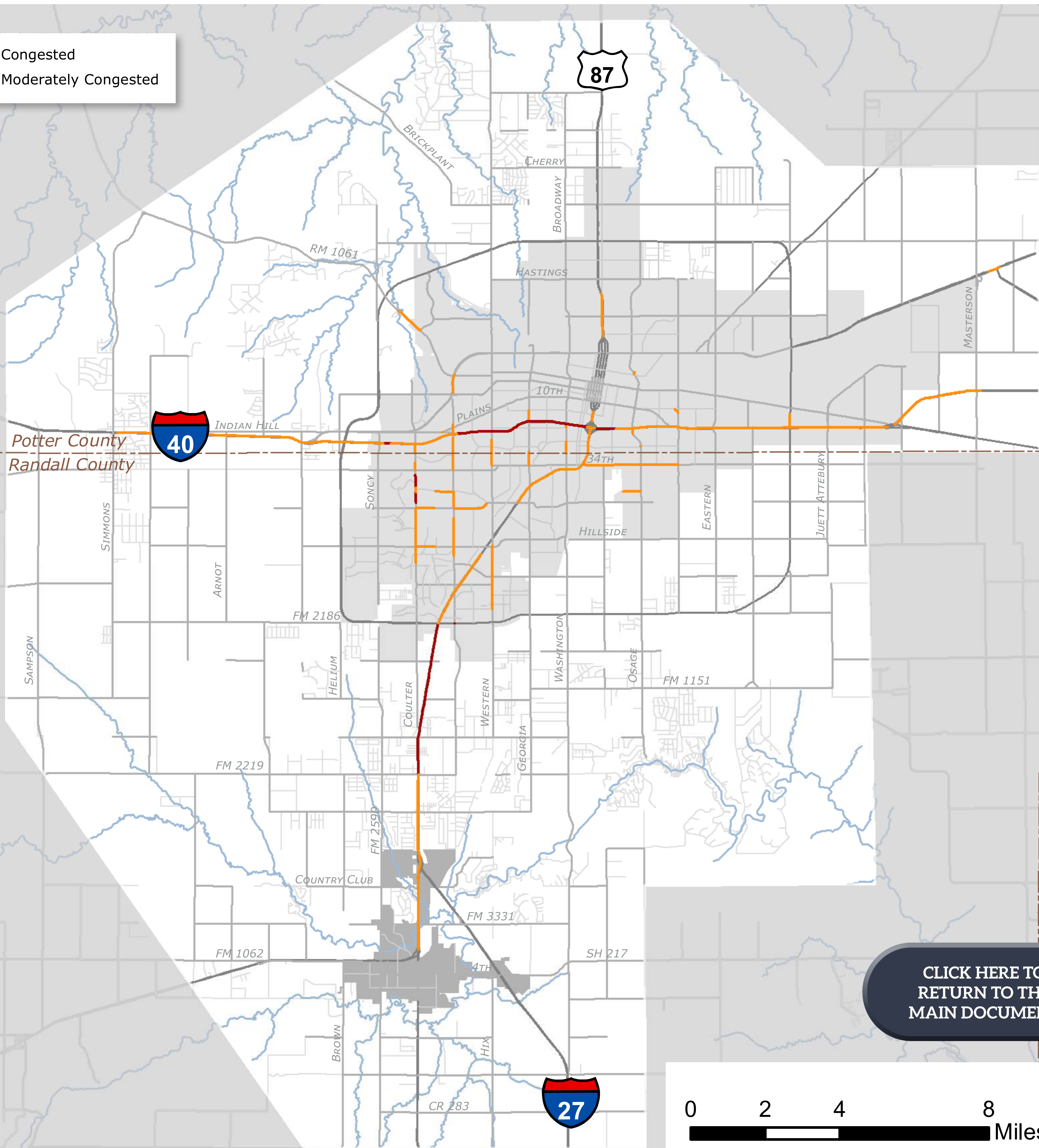
- 4th St
- Loop 335
- BI-40
- FM 1541
- FM 1719
- IH-27
- IH-40
- IH-287
- SH-60
- SH-87
- SH-136
- SH-217
- SS-468

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Exhibit 15. Projected Traffic Congestion

- Congested
- Moderately Congested

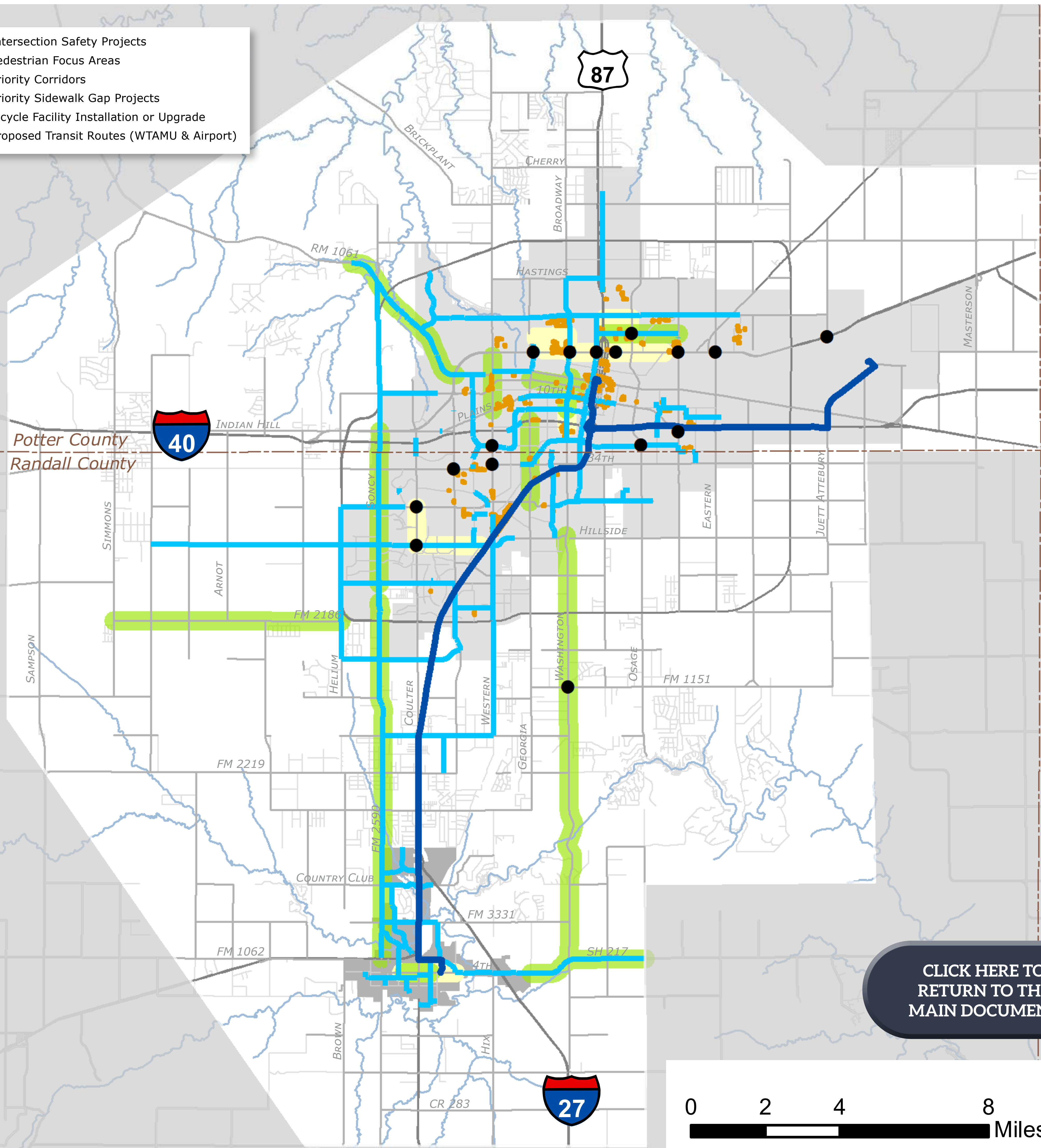


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Exhibit 16. Full Project Map

- Intersection Safety Projects
- Pedestrian Focus Areas
- Priority Corridors
- Priority Sidewalk Gap Projects
- Bicycle Facility Installation or Upgrade
- Proposed Transit Routes (WTAMU & Airport)



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