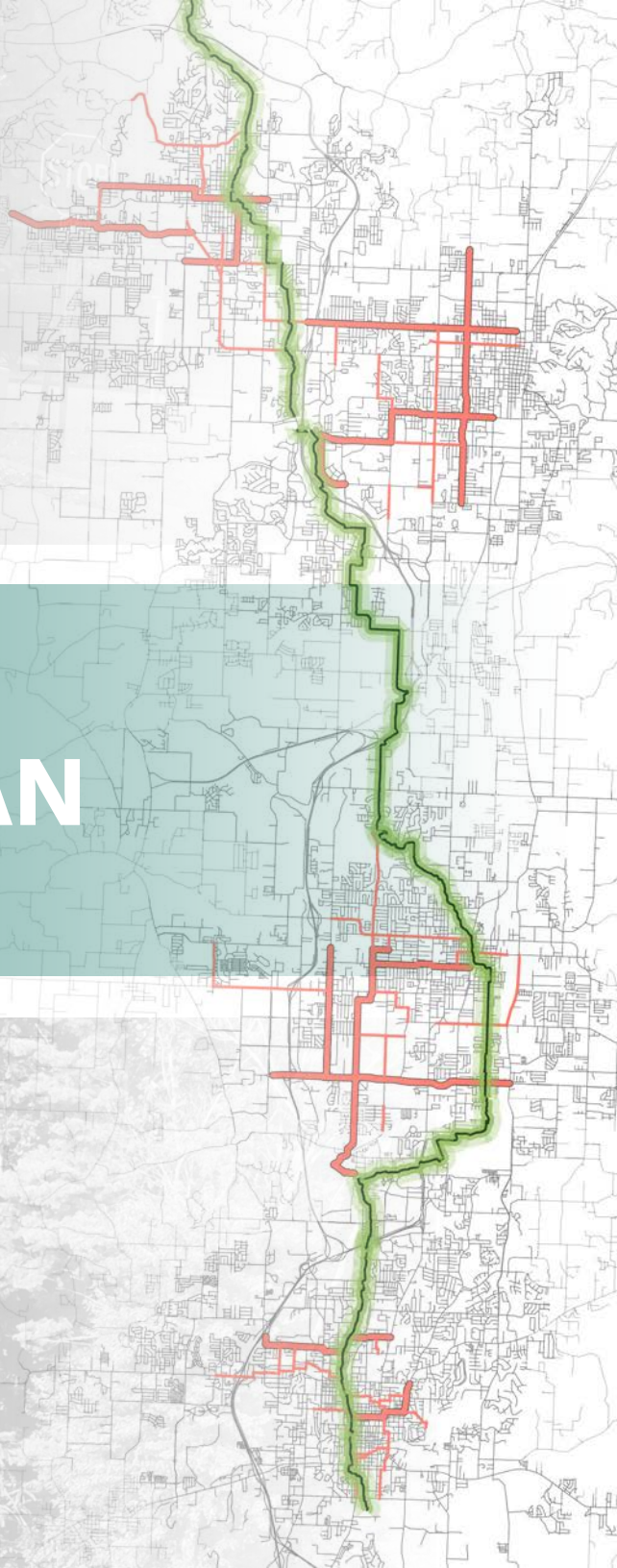

NWA
BIKE INFRASTRUCTURE PLAN

TARGETED BICYCLING PRIORITY NETWORK

AUGUST 2019

NWA ACKNOWLEDGMENTS

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INTRODUCTION

PURPOSE OF THE PLAN

Northwest Arkansas desires to be one of America's top regions for active transportation and recreation and has made major strides toward achieving this. From the Razorback Regional Greenway to world-class mountain biking, Northwest Arkansas is emerging as a bicycling destination of choice. The Northwest Arkansas Regional Bicycle and Pedestrian Master Plan highlighted the vision and goals that communities continue to strive toward.

NWA Bicycle and Pedstrian Master Plan Vision

"Northwest Arkansas' trail and roadway system will comfortably, safely, and efficiently accommodate bicycle and pedestrian transportation. The linking of local and regional attractions will make the area a world-class bicycle and pedestrian destination. Walking and bicycling will become a common, enjoyable, and viable transportation and recreation choice that promotes active living and a high quality of life in Northwest Arkansas." Source Executive Summary-1 and 1-3

"Every community in the region is unique and will develop in its own way – but will do so with a common vision of becoming more walkable, bikeable and livable places for residents, visitors, and businesses in NWA." Source Eexecutive Summary-4

Not only are people visiting the region, but when you combine great outdoor attractions with a robust economy, ample employment opportunities, and reasonable housing prices, people are deciding to call Northwest Arkansas home.

Although there have been efforts to increase connectivity and safety for people that bicycle and walk, the majority of active transportation and recreation trips are centered on the existing Razorback Regional Greenway, a 37.5-mile shared use paved trail connecting the larger region. This plan is focused on strategic recommendations for on- and off-street bicycle facilities that not only connect to the central spine of the Razorback Regional Greenway, but also link key destinations in a variety of municipalities, including but not limited to downtowns, schools, parks, employment centers, town centers, mountain bike trail systems, and other existing/planned bicycle facilities.

Using The Plan

While this plan leverages previous planning efforts to develop a priority network, it goes beyond simply lines on a map and dives into the design of specific corridor projects. Corridor design concepts were developed to illustrate how bicycle facilities could be implemented to expand the existing network, provided similar world-class facilities to people bicycling for active transportation as those that are provided to people exploring the miles and miles of mountain bike trails. Specific design recommendations are provided to prepare projects for more detailed design.

The NW Arkansas Bike Infrastructure Plan was led by the Northwest Arkansas Regional Planning Commission (NWARPC), developed as a resource for each municipality and for the region as a whole. Focusing on implementation, the plan combines national best practices and preferred cross sections for bicycle facility design with local knowledge of specific corridors, desirable routes, and destinations that are lacking connectivity. Recommendations have been paired with design guidance to ensure that even specific bikeway design elements can be implemented along corridors or in spot locations across the region. The following sections describe the workshop with local stakeholders and several meetings with a steering committee to identify, refine, and conceptually design corridors.

NACTO TRAINING

Regional and local staff, design professionals, and major employers were offered education and provided input for the Plan through a multi-day training workshop (November 6-8, 2018). The workshop provided education on bicycle facilities and the opportunities that may be available based upon national design guidance, including the National Association of City Transportation Officials (NACTO) Urban Street Design Guide and Bikeway Design Guide. The training was held at the Jones Center in Springdale, AR and focused on building participants' technical understanding and knowledge of a variety of bicycle facility types and how, when, and why they should be implemented.

A total of 68 participants were provided with a broad understanding of bicycle facility design, the workshop was customized to include information from a variety of design resources, including but not limited to:

- 2016 Federal Highway Administration (FHWA) Achieving Multimodal Networks, Applying Design Flexibility & Reducing Conflicts Report
- 2009 Manual on Uniform Traffic Control Devices (MUTCD)
- 2015 MassDOT Separated Bike Lane Planning and Design Guide
- Update to the 2012 American Association of State Highway Transportation Officials (AASHTO) Bicycle Design Guide

The workshop not only offered presentations showing examples of bicycle facilities in a variety of contexts, questions were addressed throughout the multi-day workshop by instructors. Presentations were tailored to provide detail on local and regional issues regarding safety, connectivity, and street design. Attendees participated in a bicycle tour to experience the comfort or lack thereof on a variety of bicycle facility types in Springdale. The workshop concluded with a real-world exercise that allowed participants to work with a small group to identify and illustrate how they would make a key connection for people on bicycles along a critical corridor within the region.

DESIGN APPROACH

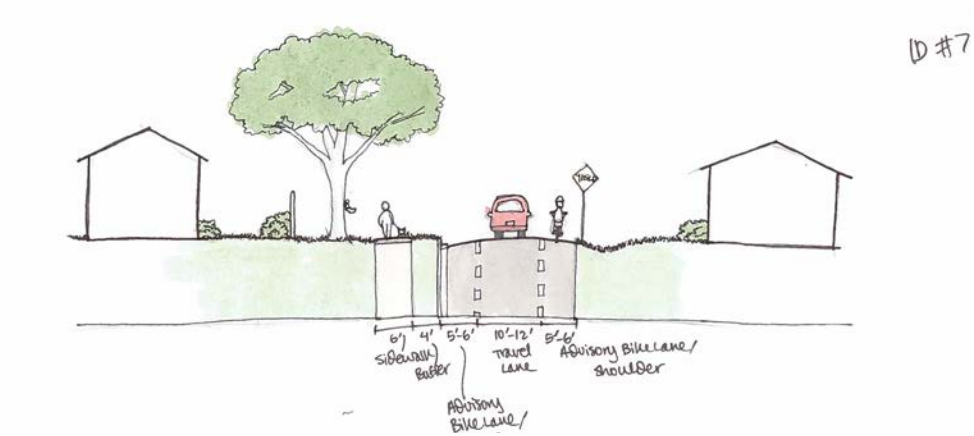
Along with the multi-day workshop, the project team worked with a steering committee throughout the planning process. The steering committee included municipal representatives, design professionals, advocacy organizations, and major employer representatives. Meetings were held at milestones throughout the project and the steering committee was instrumental in the corridor selection and refining concept designs. A brief description of each meeting is included below:

- **Project Kickoff (October 4, 2018) –** A kickoff meeting was held to discuss the NACTO workshop, project expectations, and deliverables.
- **Corridor Selection (January 11, 2019) –** A variety of corridors were identified by the project team based upon destinations/generators throughout the region. The steering committee reviewed the corridors and selected eleven to move forward to design concepts.
- **Draft Concept Review (March 11, 2019) –** Draft concept designs for all eleven corridors were presented to the steering committee along with an explanation of facility selection and destinations connected. Comments made by the steering committee were incorporated into the final design concepts.
- **Draft Report Presentation (May 13, 2019) –** The draft report was presented

After the corridor selection meeting, the project team conducted an internal workshop (February 5-7, 2019) to develop preliminary designs for all eleven corridors. This multi-day workshop considered the following factors to determine the appropriate bicycle facilities to recommend:

- Street characteristics (number of lanes, speed limit, etc.);
- Land use context;
- Adjacent destinations;
- Traffic volumes;
- Existing/planned bicycle facilities; and
- Potential users.

The hand-drawn concepts and corresponding cross sections resulting from the internal workshop were presented to the municipal engineers/ representatives for Bentonville, Rogers, Springdale, Johnson, and Fayetteville. Comments received on facility types, intersection design, and typical cross section dimensions were incorporated into the final concept design for the corridors.



Bikeway Facility Selection: Shared Use Paved Trail or Protected Bike Lanes

Shared use paved trails have been implemented throughout Northwest Arkansas to increase mobility for people walking and bicycling. These trails function as both recreational and utilitarian transportation corridors. While the network of shared use paved trails expands, on-street bikeway facilities are limited, and these facilities often consist of shared roads with shared lane markings. As Northwest Arkansas increases in population and strives to meet needs of the region through a world-class bicycle network, a variety of safe and connected bicycle facility types should be considered.

Bikeway facility selection should always consider safety, design users, trip purpose, expected user volume, and land use context. While increasing separation from vehicular traffic is recommended in all contexts, the urban and urban core areas (as well as higher density suburban and rural town settings) may benefit from separating bicyclists from pedestrians. These land use contexts generally have higher rates of walking and bicycling; their roadway network and land use patterns lend themselves to shorter trips. In these contexts, bikeway facilities that are separated from the sidewalk, such as protected bike lanes are preferred to minimize conflicts with pedestrians and to maximize comfort for both pedestrians and bicyclists to encourage and support additional use. Shared use paved trails should be limited as a design solution in lieu of protected bike lanes to locations where volumes of bicycling and walking are currently low and are expected to remain low and it is not desired to provide a high comfort bikeway. As context changes or volumes of bicycling and walking increase, existing shared use paved trails should be evaluated to determine if increased width or separating the bikeway is appropriate.

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2

PRIORITY NETWORK DEVELOPMENT

NETWORK DEVELOPMENT

The implementation of bicycle facilities in Northwest Arkansas has progressed over the last several years, and a robust network is envisioned. This plan focused on developing a priority network to move planning recommendations into design and forward to construction. The Northwest Arkasas Regional Bicycle and Pedestrian Master Plan recommended a robust network of bicycle and pedestrian facilities that, if implemented, would transform the active transportation and recreational landscape for the region. Leveraging the infrastructure recommendations made for the region, this plan proposes an implementable priority network to connect local destinations and develop concept designs for several critical corridors.

The following sections review the development of the priority network and the identification of the corridors that were selected for concept design.

DEVELOPING A PRIORITY NETWORK

The priority network was established to connect major destinations both locally and regionally. With the Razorback Regional Greenway as the central spine, network recommendations were developed to connect the existing regional system. Although the network does recommend a variety of alignment and bicycle facilities, the priority network was not developed to replace a municipal bicycle/pedestrian master planning effort.

Safety and connectivity were prioritized for recommendations to ensure that the network facilitates a low-stress bicycling environment. Other factors that were considered in the development of the priority network include:

Directness

Minimizing distances and trip times

Cohesion

Reducing distances between parallel and intersecting bicycle routes

Attractiveness

Routes take people through lively areas and connect them to places where they want to be

Unbroken Flow

Intersections were prioritized to reduce the perception of barriers and minimize wait times

Once a preliminary network was developed, the steering committee vetted the network and identified specific corridors for concept design. The priority network was refined to propose strong connections to and from each of the key corridors. Table 2-1 shows the variety of bicycle facilities recommended by the corridor design concepts connecting multiple land use contexts and destinations within each community. Corridor design concepts will serve as templates for local municipalities, providing multiple bicycle facility types, some that have been constructed in Northwest Arkansas and others that have not. Along with the design concepts, the implementation plan and design guidance are provided as a resource for local staff for immediate implementation and developing projects for years to come.

Table 2-1: *Bicycle Facility Types by Corridor and Community*

FACILITY TYPE	BENTONVILLE	ROGERS	SPRINGDALE	FAYETTEVILLE
Shared Slow Street	Coler Creek-Downtown Connector			
Neighborhood Greenway	Coler Creek-Downtown Connector, 8th St. Bikeway			Mission-Razorback Connector
Yield Roadway / Advisory Shoulder	Coler Creek-Downtown Connector			
Bike Lane		13th St. Bikeway		
Shared Use Paved Trail (1 side)	Coler Creek-Downtown Connector, C St. Link, 8th St. Bikeway	13th St. Bikeway, Olive St. Trail, Crosstown Trail	Springdale-Johnson Bikeway, 40th St-Downtown Connector, Don Tyson Trail	Mission-Razorback Connector, Three Trails Bikeway
Shared Use Paved Trail (2 sides)			40th St-Downtown Connector	
Directional Protected Bike Lanes	Coler Creek-Downtown Connector	13th St. Bikeway	Springdale-Johnson Bikeway, 40th St-Downtown Connector	Mission-Razorback Connector, Three Trails Bikeway
Two-Way Protected Bike Lane	C St. Link, 8th St. Bikeway			

The Northwest Arkansas Regional Bicycle and Pedestrian Master Plan included over 1,700 miles of recommendations bikeway and shared use facilities for communities throughout the region. The priority network targets key connections within Northwest Arkansas and consists of 88 indivudual projects and over 100 miles of proposed bikeway facilities.

Table 2-2 details the number of projects and the total lane miles for the prioirty network. Projects have been identified along the priority network as a continuous length of a single bicycle facility type. Project termini were located at transitions to a new bikeway types or at a local destination.

The maps on the following pages illustrate the priority network throughout the region along with the corridors identified for concept design. Concept designs are discussed in more detail in the following chapter.

Table 2-2: *Priority Network Projects and Lane Miles by Facility Type*

FACILITY TYPE	NUMBER OF PROJECTS	TOTAL LANE MILES
Advisory Shoulder / Yield Street	9	4.73
Bike Lanes	4	4.21
Neighborhood Greenway	16	7.54
Shared Use Paved Trail	37	50.89
Directional Protected Bike Lanes	17	33.23
Two-Way Protected Bike Lane	4	1.57
Shared Slow Street	1	0.19
TOTALS	**88**	**102.36**

NW ARKANSAS

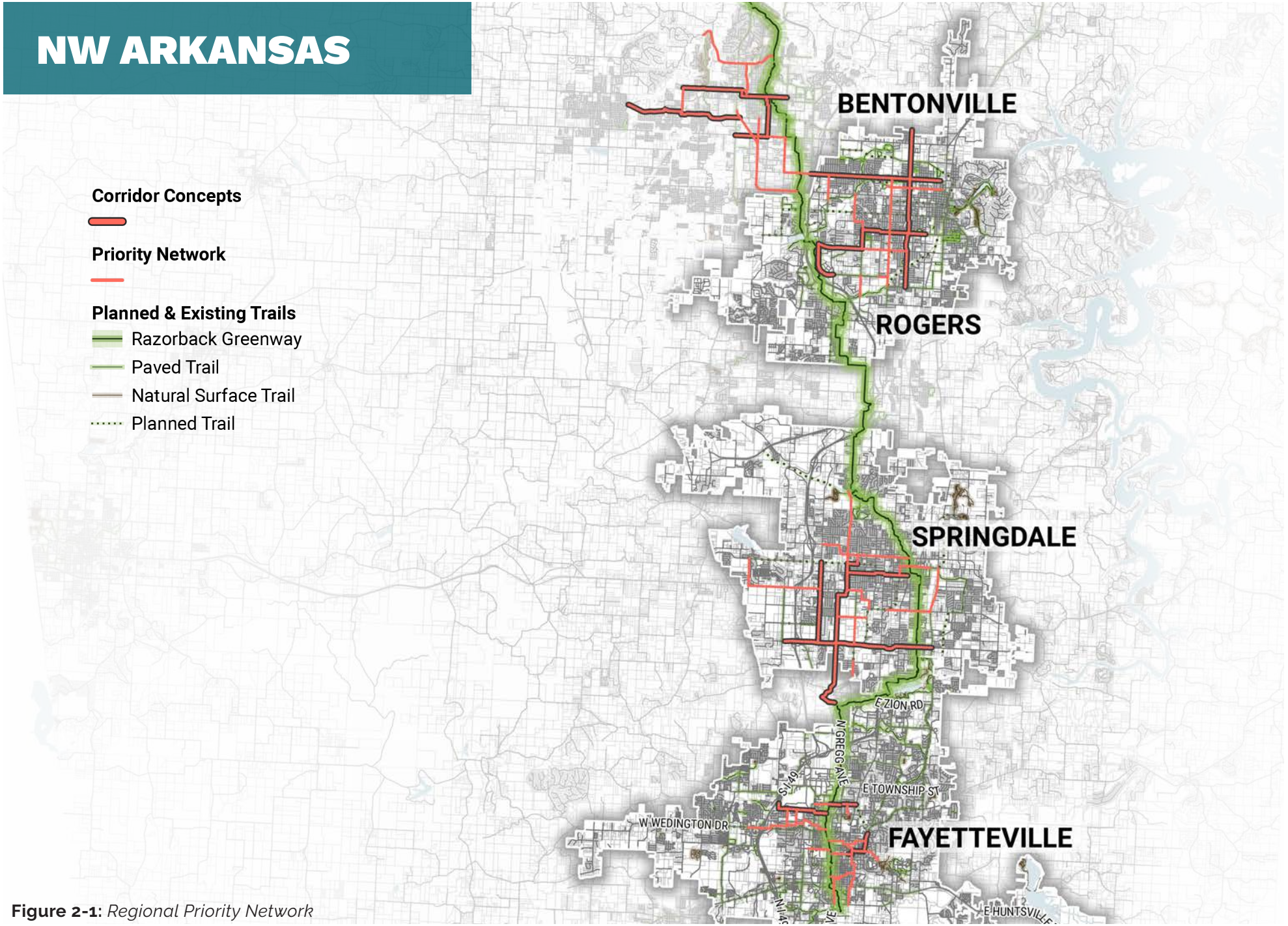


Figure 2-1: *Regional Priority Network*

BENTONVILLE

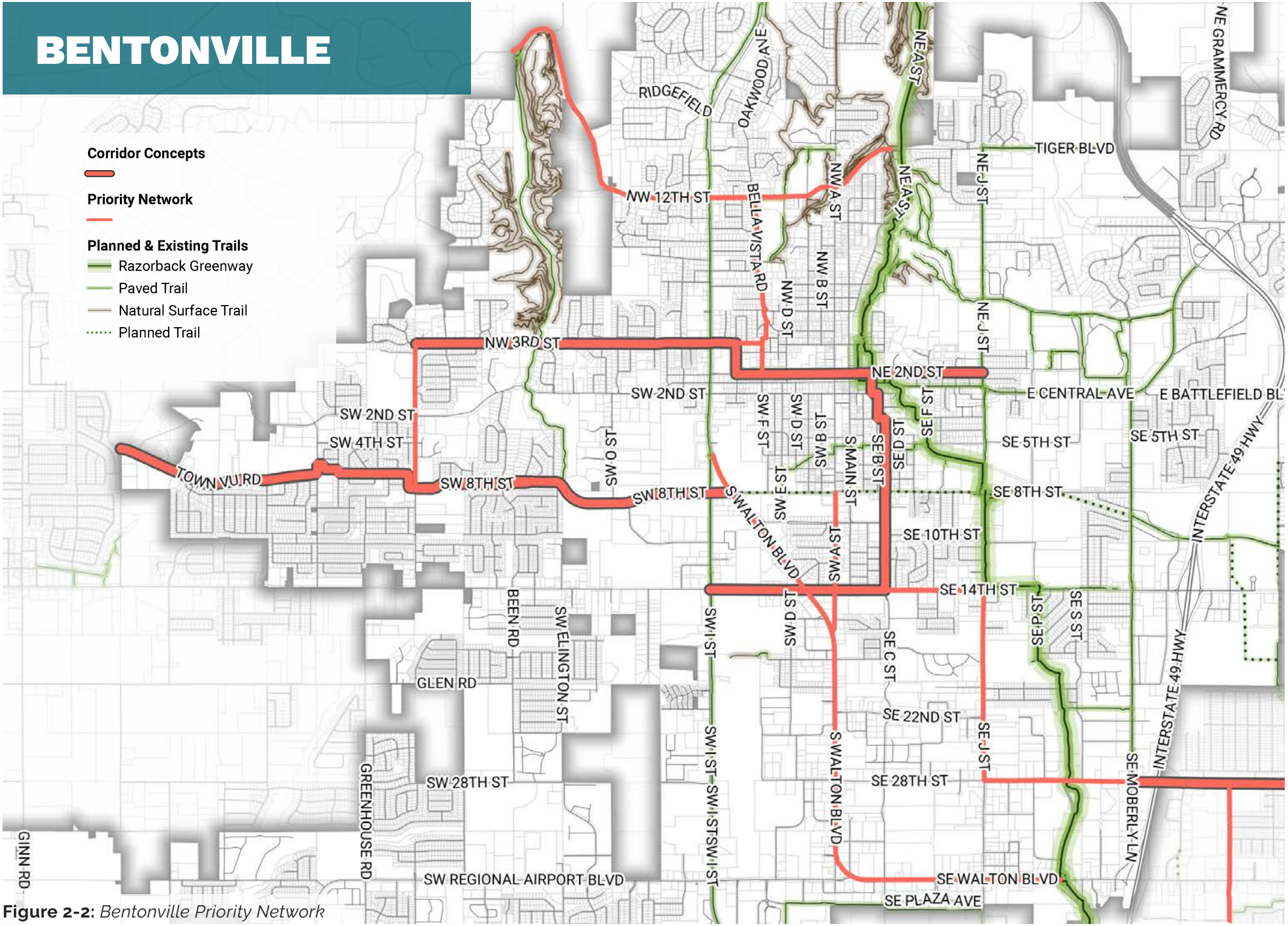


Figure 2-2: *Bentonville Priority Network*

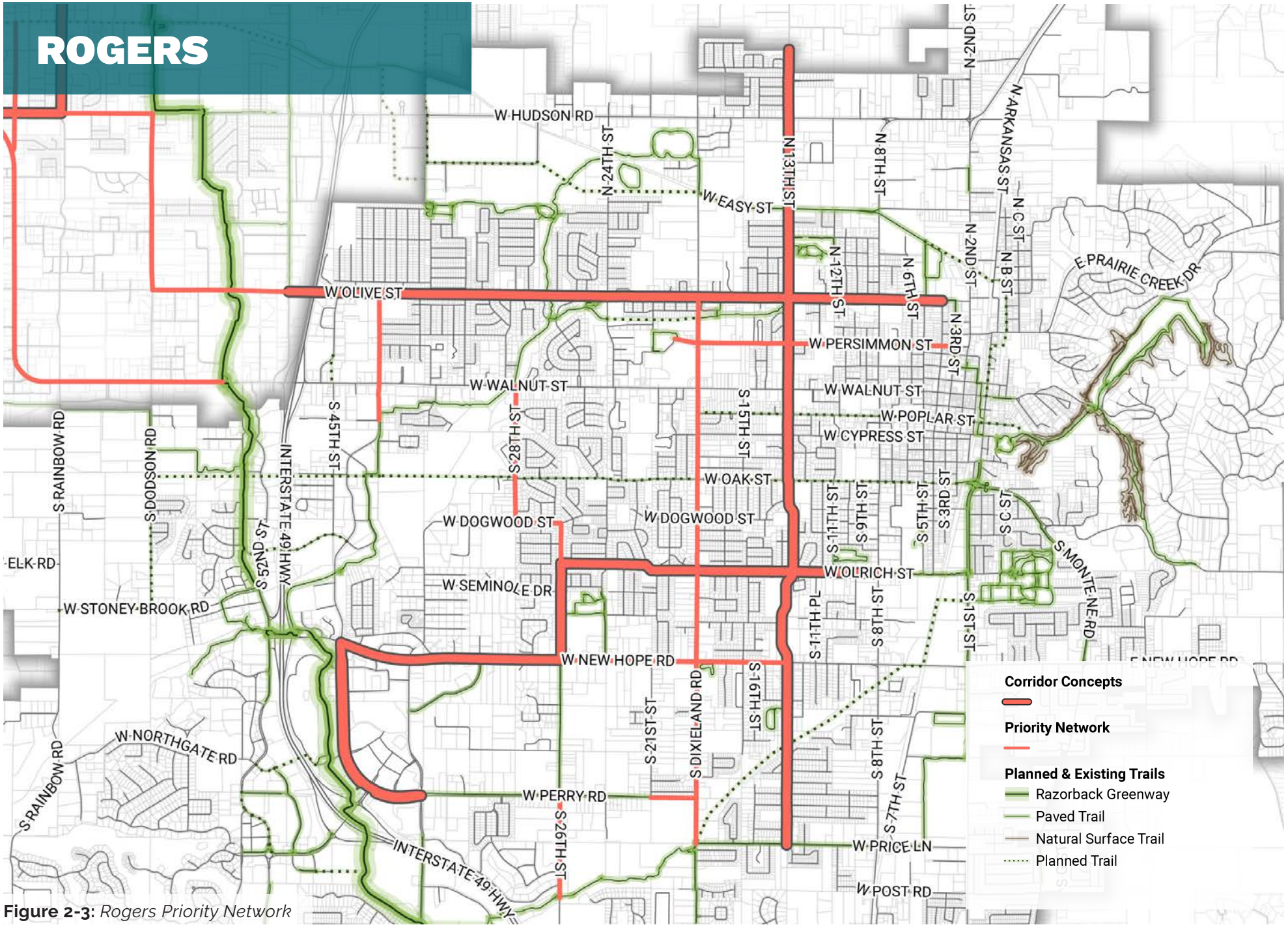


Figure 2-3: *Rogers Priority Network*

SPRINGDALE

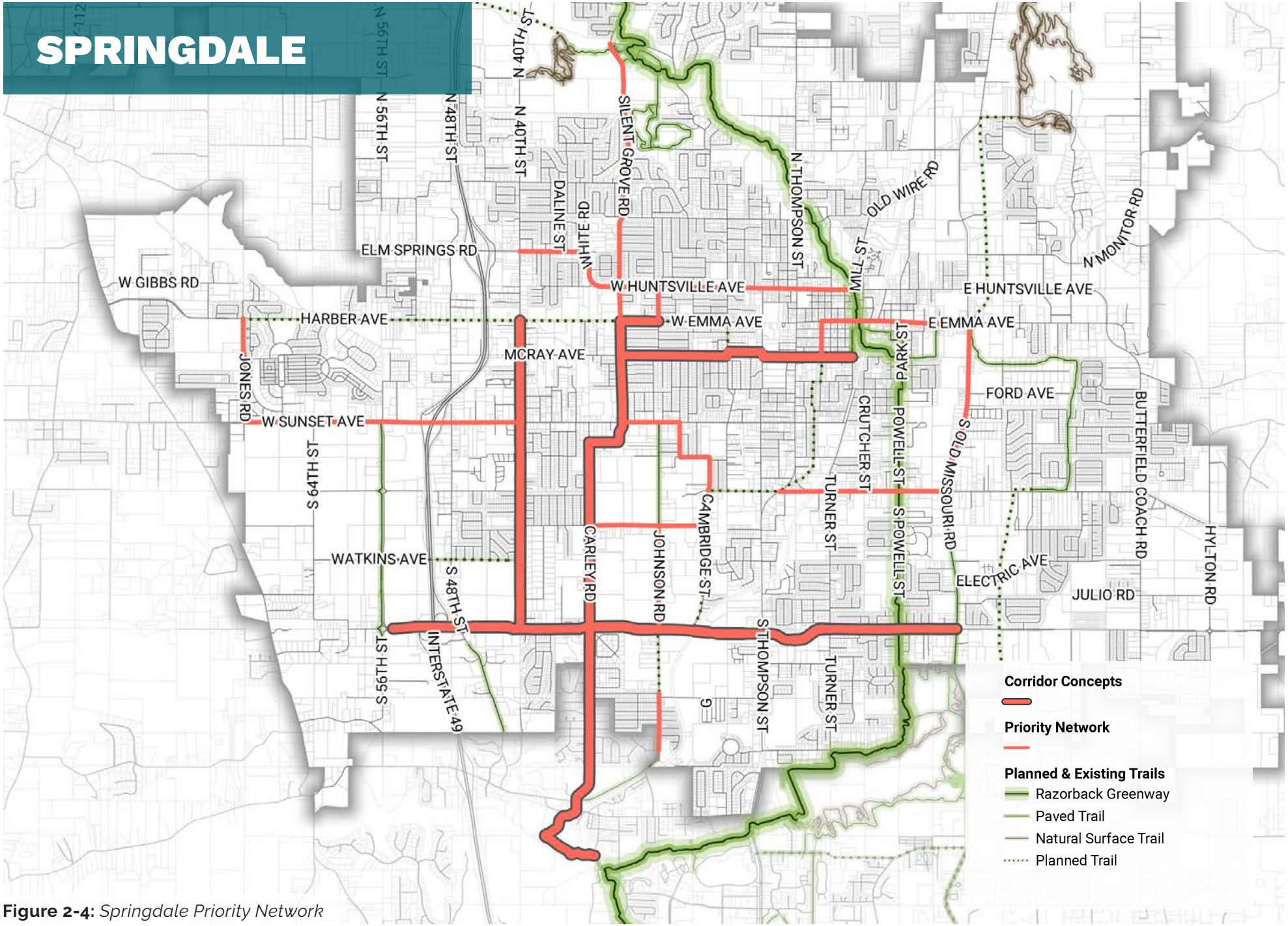


Figure 2-4: *Springdale Priority Network*

FAYETTEVILLE

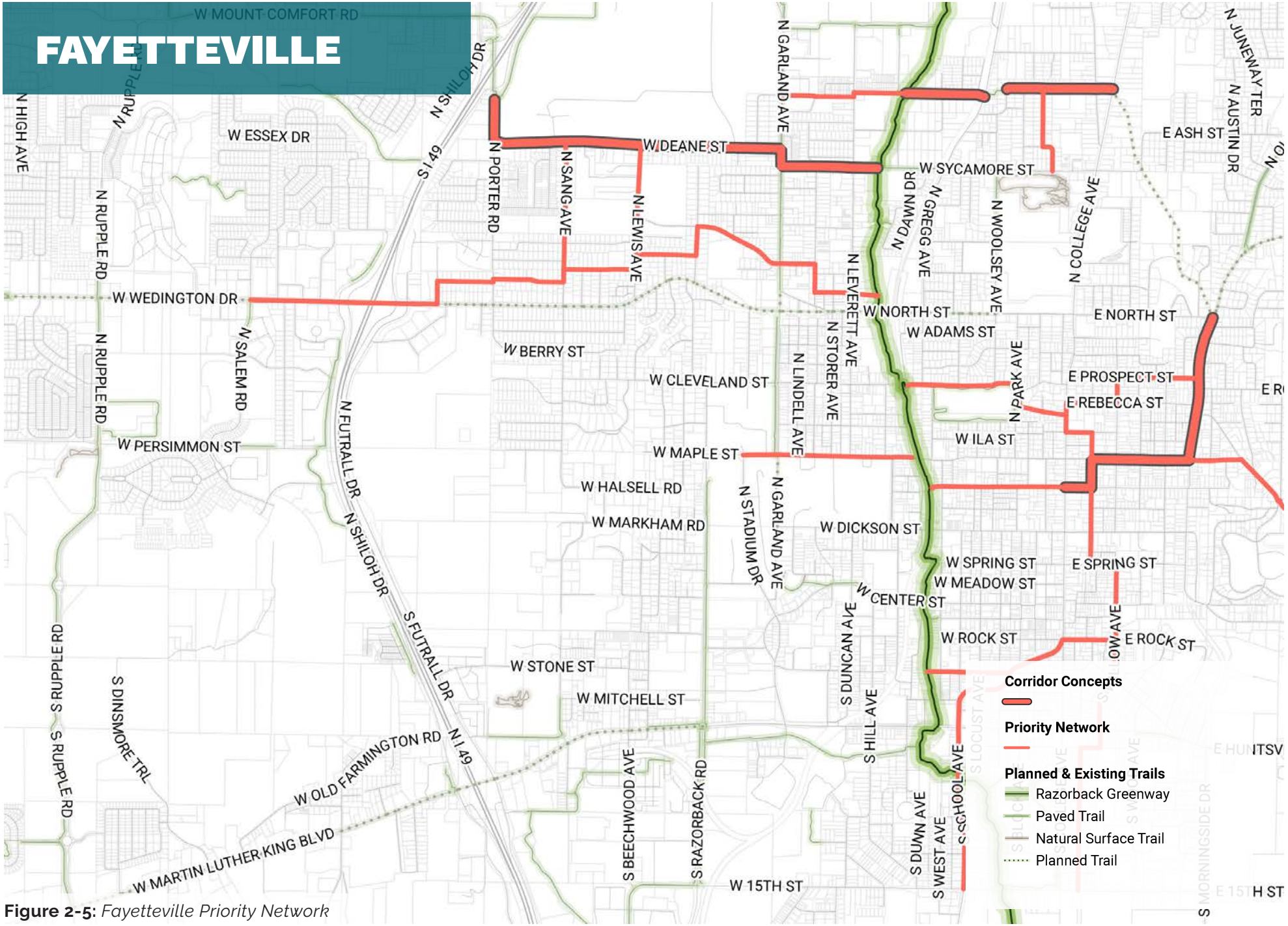
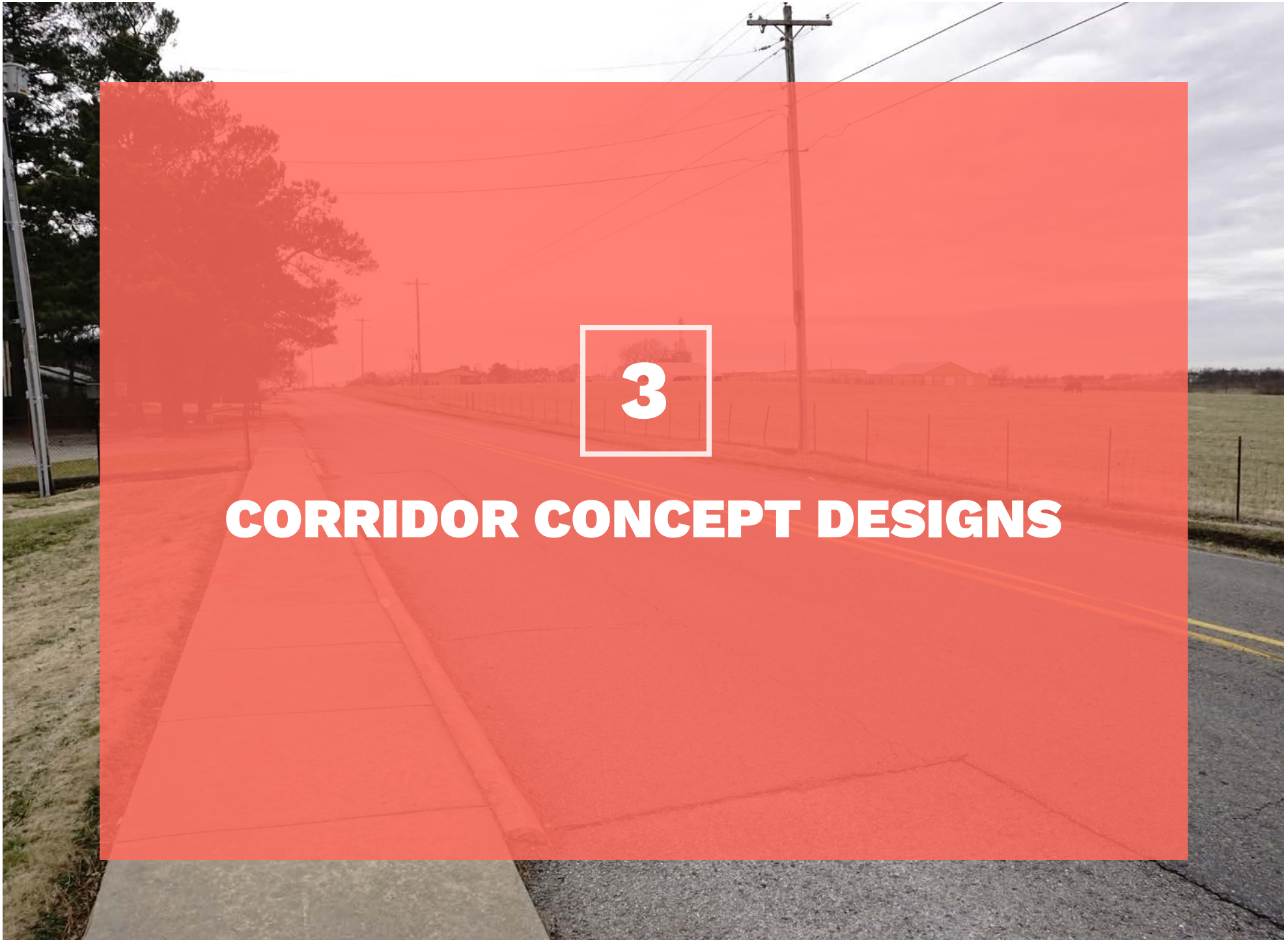


Figure 2-5: *Fayetteville Priority Network*



3

CORRIDOR CONCEPT DESIGNS

INTRODUCTION

Corridor design concepts were developed along eleven corridors with a variety of street characteristics and land use contexts. Although concepts were not drawn for the entirety of each corridor, facility types were identified. Each of the corridor design concepts in this chapter were strategically selected to connect local and regional destinations. The specific location for design concepts were established based upon the location meeting one or more of the following criteria:

- Example of typical intersection with bicycle facility crossings;
- Complex intersection within the community; and/or
- Transition from one bicycle facility type to another.

BENTONVILLE

Bentonville, like all communities in Northwest Arkansas, has a variety of key destinations. Three corridor concepts have been developed to enhance safety and connectivity throughout the community. Each corridor provides a critical link to local destinations, offering more direct routes between the regional greenway and residential and commercial uses within the city.

Figure 3-1: *Bentonville Corridor Facility Map*

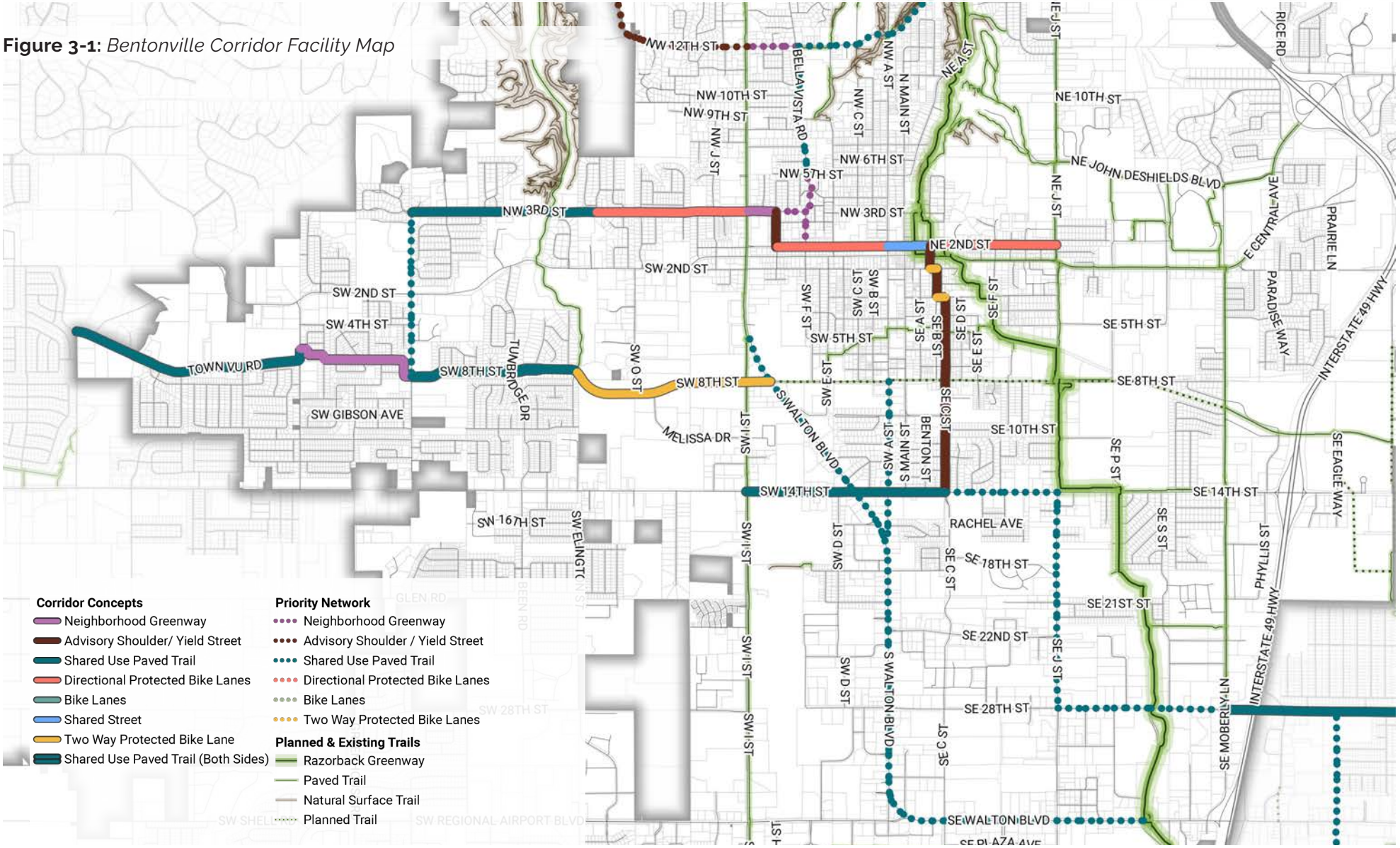
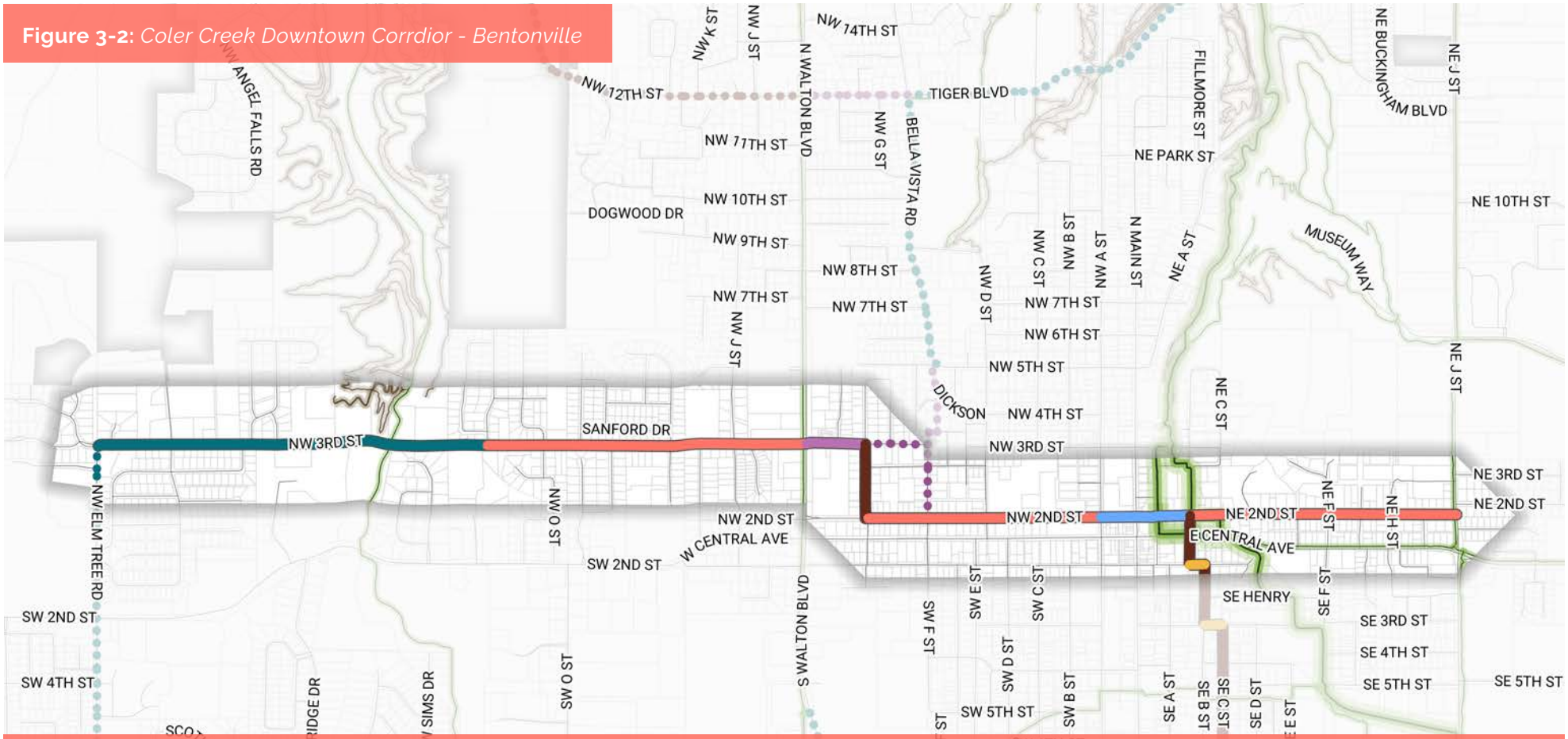


Figure 3-2: *Coler Creek Downtown Corrdior - Bentonville*



Coler Creek - Downtown Connector

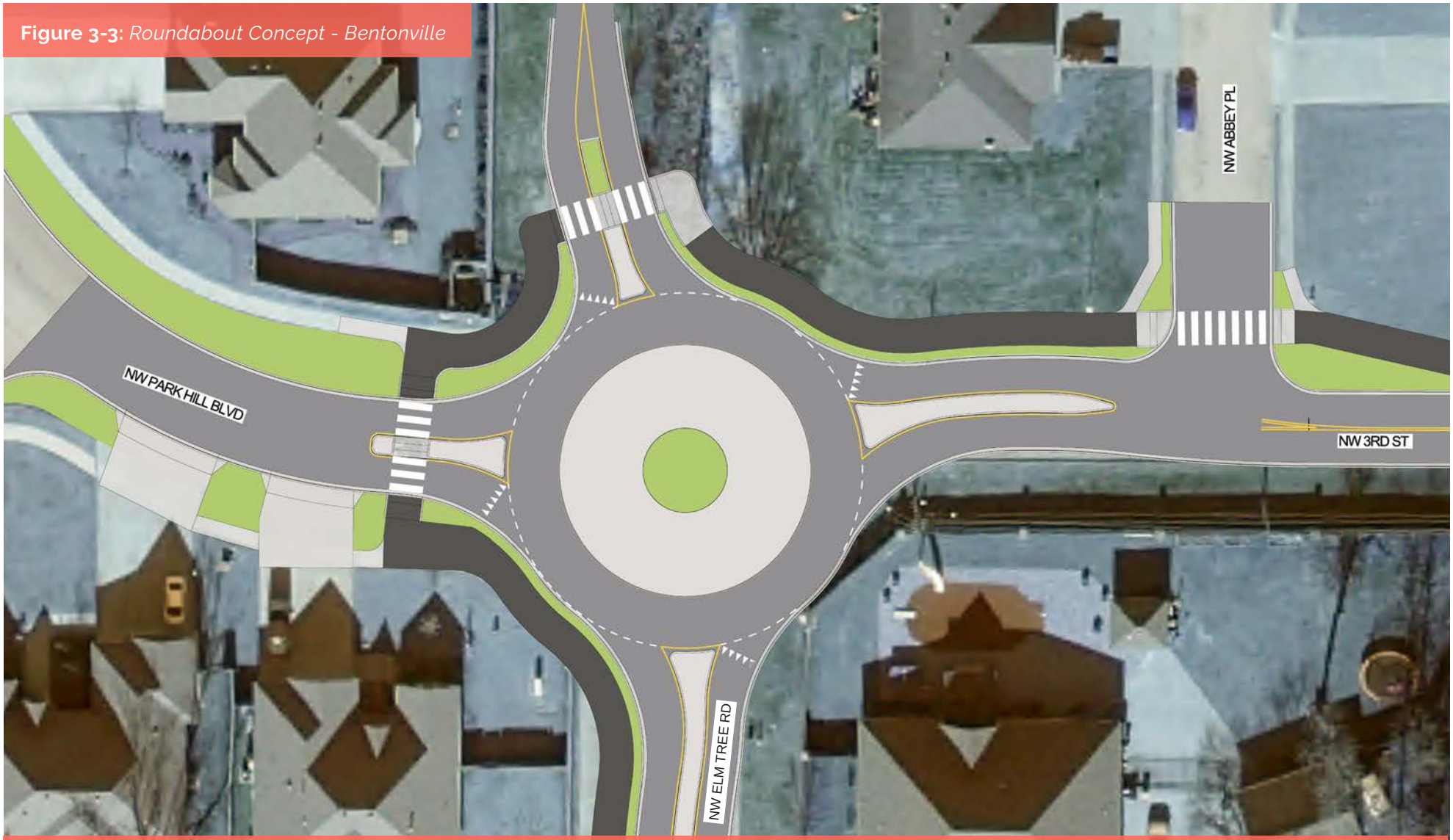
The Coler Creek - Downtown Connector provides connection to neighborhoods on the west side of Walton Boulevard from Downtown Bentonville and the Razorback Regional Greenway. This 3-mile corridor includes bicycle and pedestrian facilities that appeal to users for short daily trips or recreational opportunities at parks along the way.

The corridor provides connection to:

- Merchants Park;
- Elm Tree Elementary School;
- Coler Creek Park;
- Downtown Bentonville; and
- Razorback Regional Greenway.

Bicycle facilities transition along the corridor based upon existing street characteristics and a variety of land use contexts. A shared use paved trail is proposed along with a roundabout at the intersection of NW 3rd Street and NW Elm Tree Road. A transition to directional protected bike lanes with short neighborhood greenway and advisory shoulder facilities allow direct access to Downtown Bentonville. A shared slow street concept is recommended as this corridor traverses the Bentonville City Square and transitions again to directional protected bike lanes to the east after intersecting the Razorback Regional Greenway.

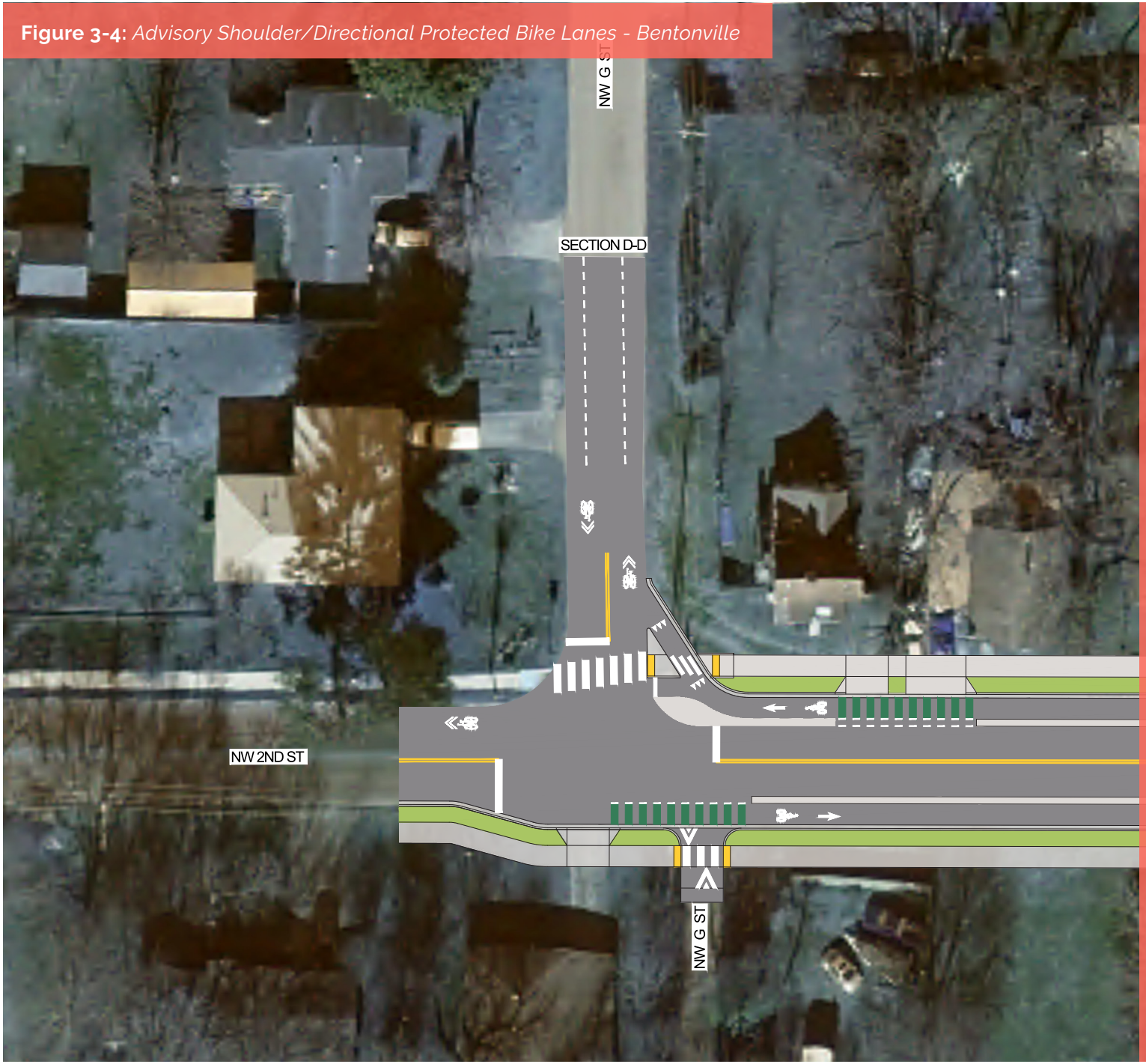
Figure 3-3: *Roundabout Concept - Bentonville*



Key design features include:

- Median refuge islands for all shared use paved trail crossings.
- Option for mountable truck apron or additional landscaping on interior roundabout.

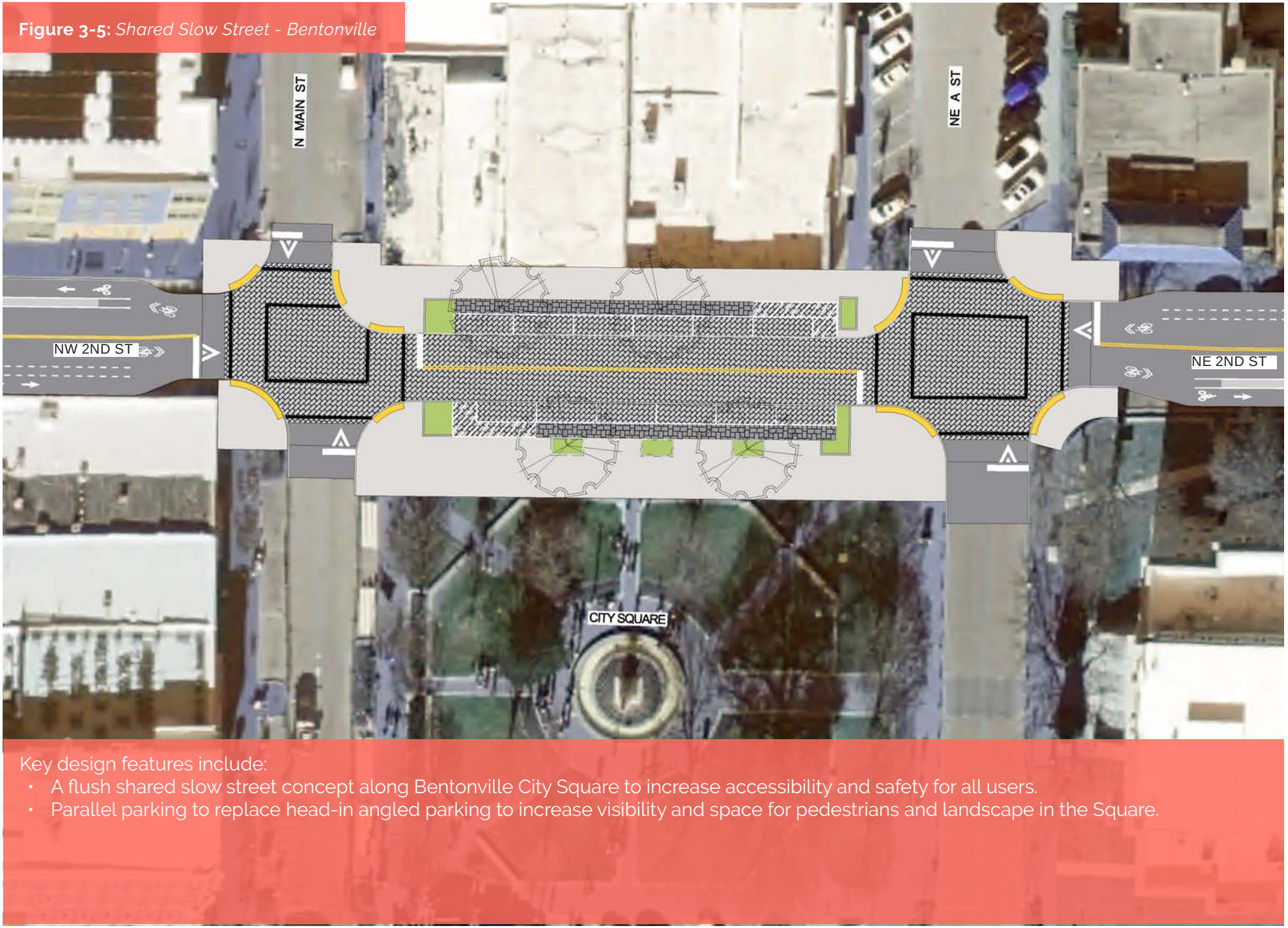
Figure 3-4: *Advisory Shoulder/Directional Protected Bike Lanes - Bentonville*



Key design features include:

- Advisory shoulder to directional protected bike lanes transition.
- Conflict markings for intersections/driveways.

Figure 3-5: *Shared Slow Street - Bentonville*



Key design features include:

- A flush shared slow street concept along Bentonville City Square to increase accessibility and safety for all users.
- Parallel parking to replace head-in angled parking to increase visibility and space for pedestrians and landscape in the Square.

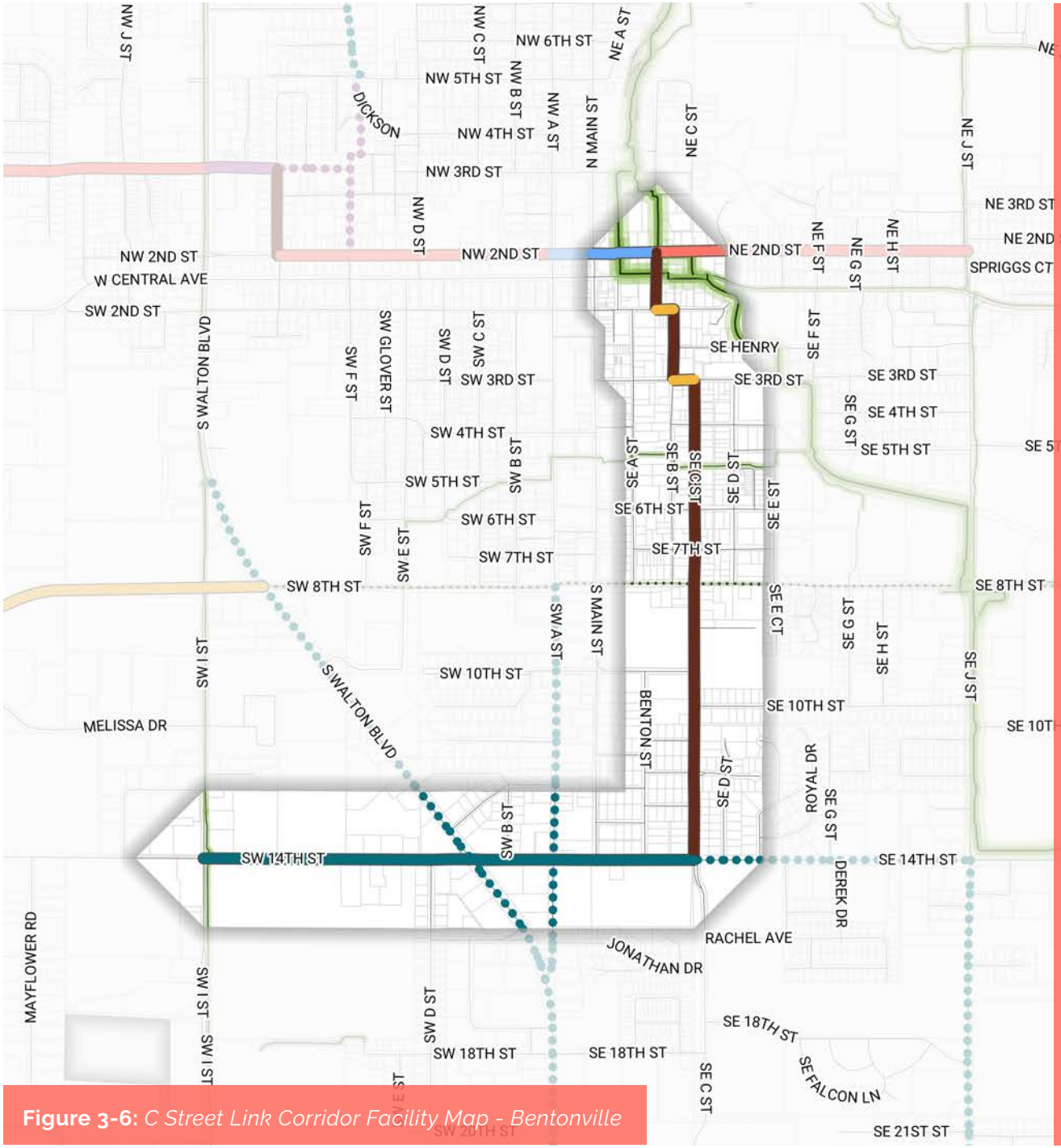


Figure 3-6: *C Street Link Corridor Facility Map - Bentonville*

C Street-14th Street Link

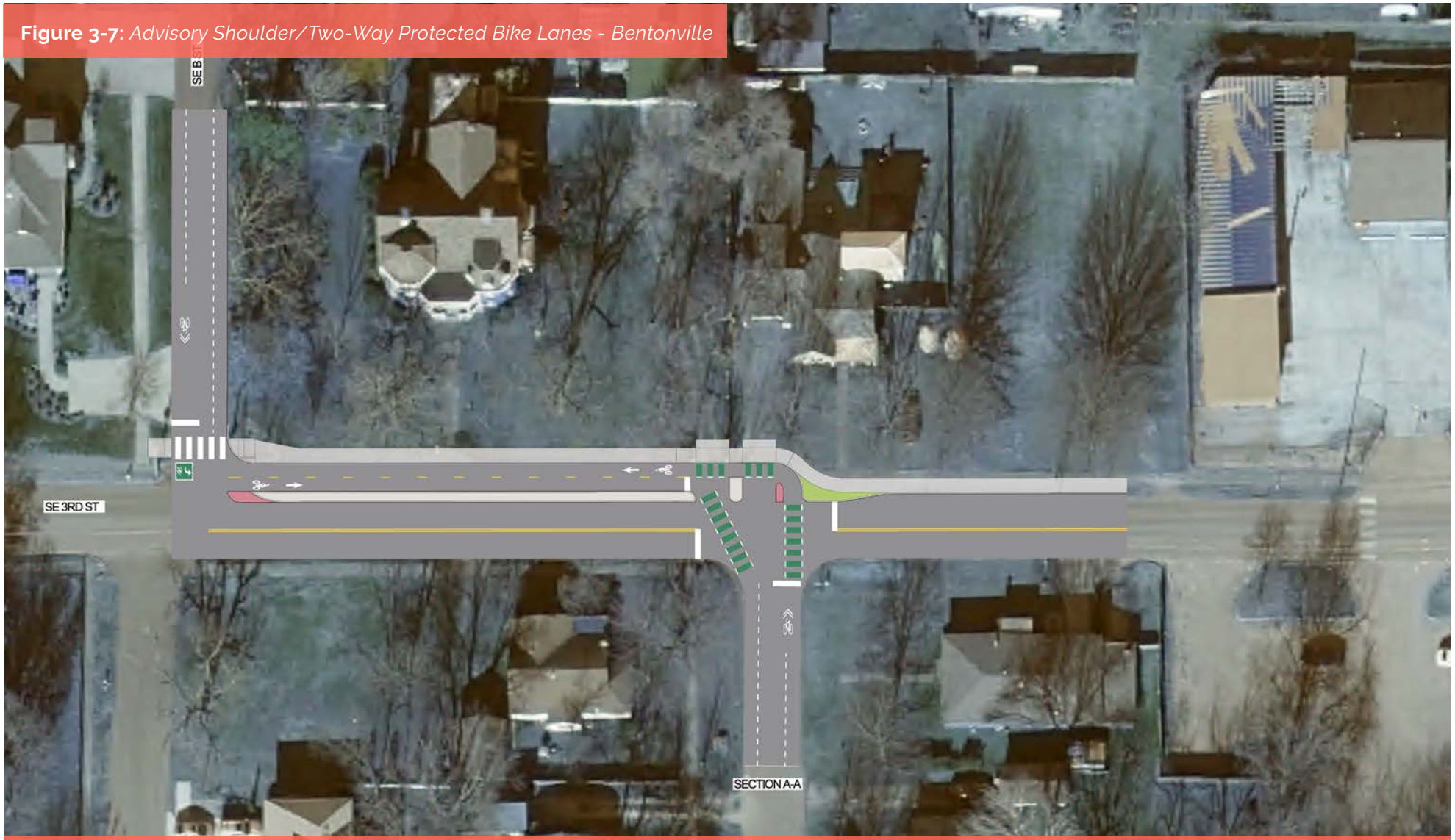
The C Street-14th Street Link features connections to multiple schools south of Downtown Bentonville and extends 2.1 miles along SW I Street and into downtown on SE C Street. The corridor features bicycle and pedestrian facilities that allow for both short daily trips and connection to regional recreational facilities.

The corridor provides connection to:

- Bentonville Community Center;
- Downtown Bentonville;
- Mary Mae Elementary School; and
- Thaden School.

Bicycle facilities transition along the corridor based upon existing street characteristics and a variety of land use contexts. A shared use paved trail is proposed along SW 14th Street beginning with the connection to an existing paved trail at SW I Street. At SE C Street, advisory shoulders are proposed to accommodate the limited paved roadway width and right-of-way. The advisory shoulder facilities provide a direct connection with downtown. The northbound advisory shoulders on SE B Street terminate at the intersection with the Coler Creek-Downtown Connector east of the City Square, where there are proposed directional protected bike lanes.

Figure 3-7: *Advisory Shoulder/Two-Way Protected Bike Lanes - Bentonville*



Key design features include:

- Transition facilities on the east-west connections for the two intersection jogs as the corridor nears downtown. On SE 3rd Street and SE 2nd Street, the design features two-way protected bike lanes with introduction of a three-way stop.
- Accommodations to maintain access to existing driveways across from SE C Street at the three-way stop. A two-stage left turn box with green conflict markings on the advisory shoulder for additional guidance for users.

Figure 3-8: *Shared Use Crossings - Bentonville*

Key design features include:

- Ramps up and down from the advisory shoulders to the corner mixing zones.
- Median refuge for the east-west trail crossing at the intersection of SE C Street and SW 14th Street.

Figure 3-9: *Shared Use Paved Trail at Major Intersection - Bentonville*

Key design features include:

- Median refuge for trail crossing at S Walton Boulevard.
- Raised crosswalk for slip lane from S Walton Boulevard to SW 14th Street to increase pedestrian visibility and decrease vehicular turning speeds.

8th Street Bikeway

The 8th Street Bikeway actively connects existing pedestrian facilities to new development, extending 4.2 miles along Town Vu Road and into Bentonville on SW 8th Street. The corridor is comprised of bicycle and pedestrian facilities that provide connections to existing trails while also providing alternatives for local and longer commuter friendly trips. The corridor provides connection to:

- Applegate Trail;
- Heritage Trail;
- New Walmart Home Office; and
- Centerton residential areas.

Bicycle facilities transition along the corridor based on existing street configurations and the variety of land use contexts. A shared use paved trail is proposed along the south side of Town Vu Road beginning with connections to the residential area at Allen Road and continuing to SW Tater Black Road. At SW Tater Black Road and SW Town Vu Road the shared use paved trail transitions to a neighborhood greenway with increased traffic calming measures, striping, and sidewalks. Shared use paved trail is reintroduced at SW Elm Tree Road and provides connection to the existing trail. From the existing trail, the shared use paved trail transitions into a two-way protected bicycle facility allowing higher speeds for bicycle traffic while also providing a wide sidewalk for the pedestrian user. The two-way facility is maintained through SW I Street and S Walton Boulevard providing connections to existing shared use paths heading into Bentonville.

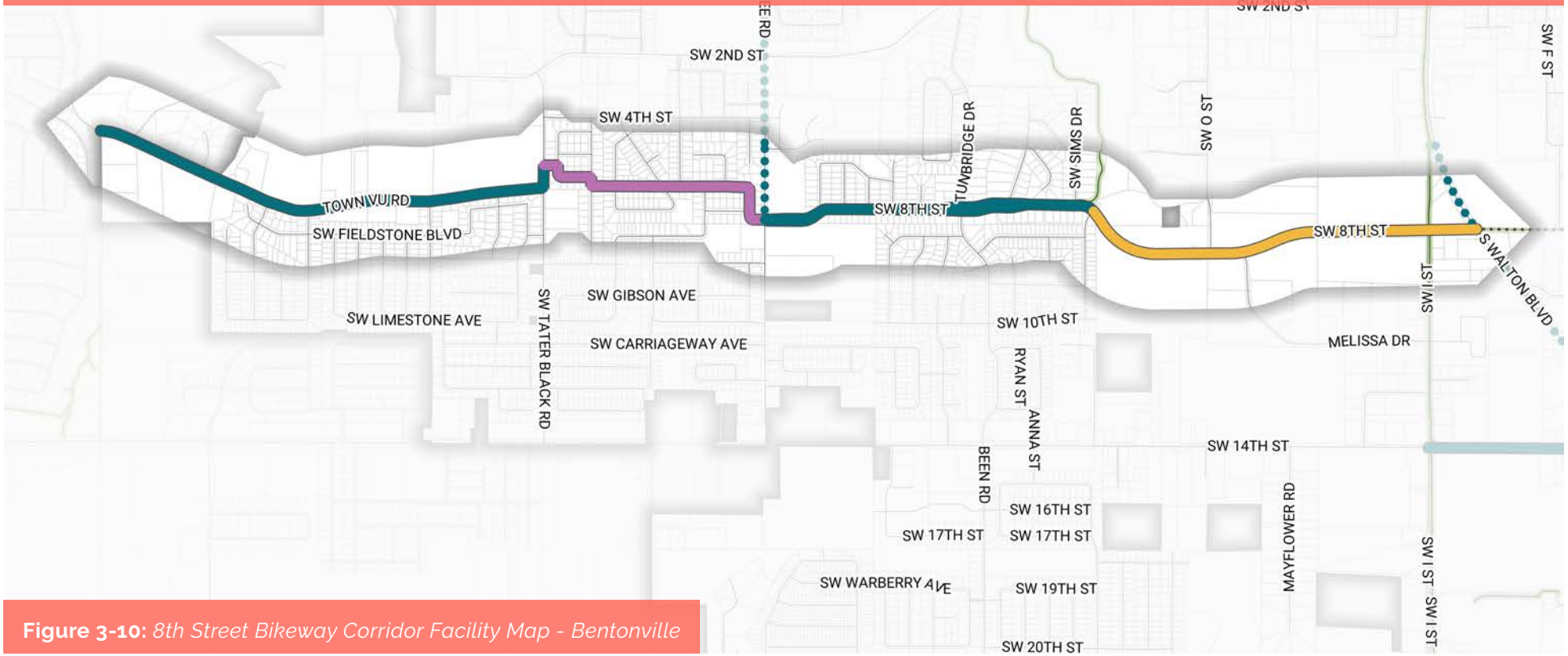


Figure 3-10: *8th Street Bikeway Corridor Facility Map - Bentonville*

Key design features include:

- Bicycle user ramps down to signed and striped neighborhood greenway through the residential areas on SW Town Vu Road.
- Raised crosswalk for shared use paved trail crossing SW Tater Black Road.
- Mountable truck apron to acomodate right turns for larger vehicles.

Figure 3-11: *Shared Use Paved Trail/Neighborhood Greenway - Bentonville*

Key design features include:

- Shared use paved trail which maximizes offset from vehicular traffic in rural and expected high-volume areas.
- Median pedestrian refuge at SW Arrowhead Drive, along with the recommended relocation of existing Rectangular Rapid Flashing Beacons (RRFBs),

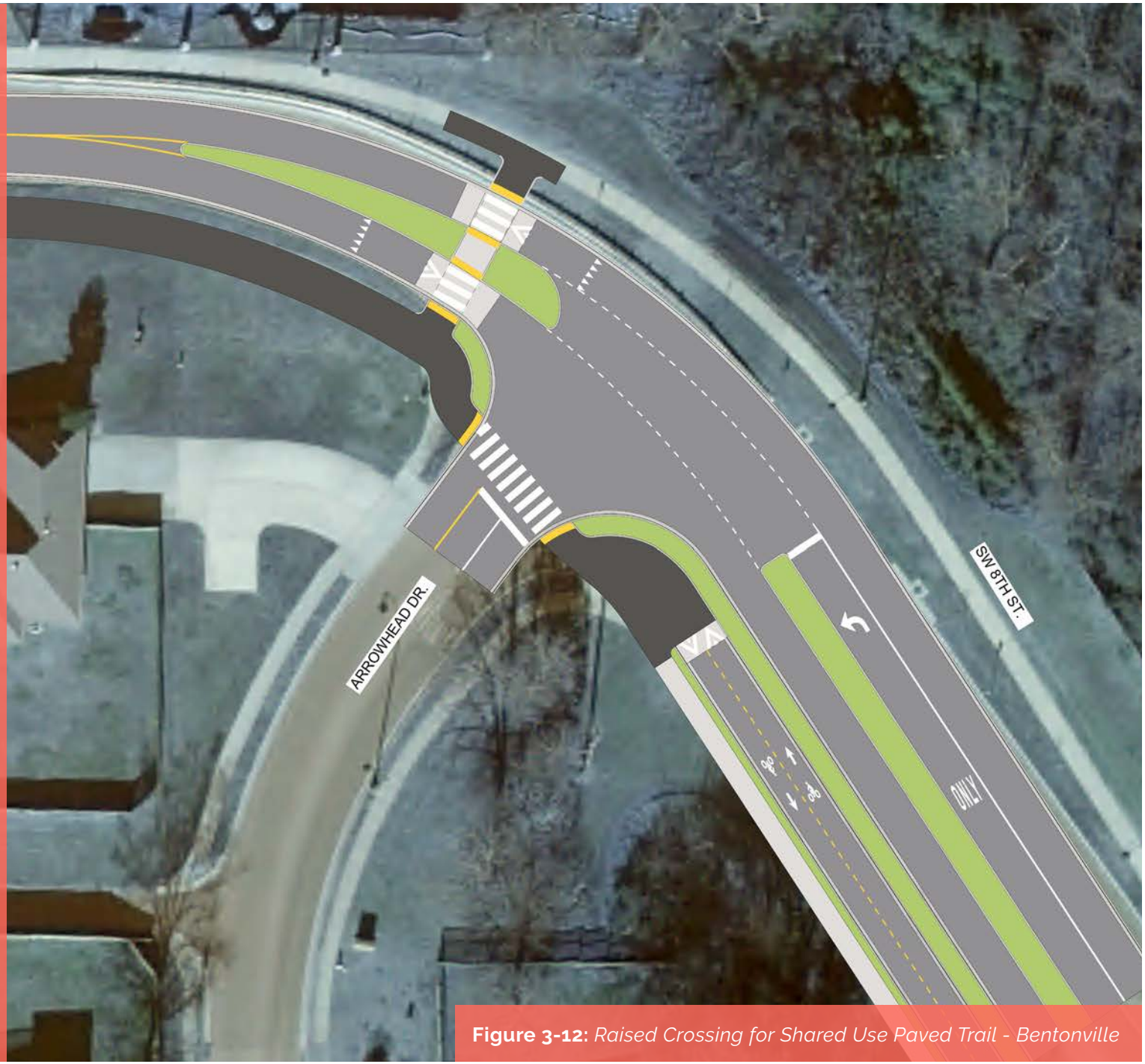


Figure 3-12: *Raised Crossing for Shared Use Paved Trail - Bentonville*

Key design features include:

- Transitions to two-way protected bike lane to separate users due to expected speeds with minimal conflict points along SW 8th Street. Separation is maintained and provides connection to existing shared use paved trail along SW I Street and SW 8th Street east of S Walton Boulevard.
- Reallocation of existing travel lanes to accomodate two-way protected bike lane.
- Conflict markings for protected bike lanes at intersections.

Figure 3-13: *Two-Way Protected Bike Lane at Major Intersection - Bentonville*

Key design features include:

- Reduced corner radii to promote slower turning movements at intersections while also reducing multimodal crossing distances.
- Mountable truck apron to acomodate right turns for larger vehicles.
- Conflict markings for protected bike lanes at intersections.

Figure 3-14: *Two-Way Protected Bike Lane at Walton Boulevard - Bentonville*

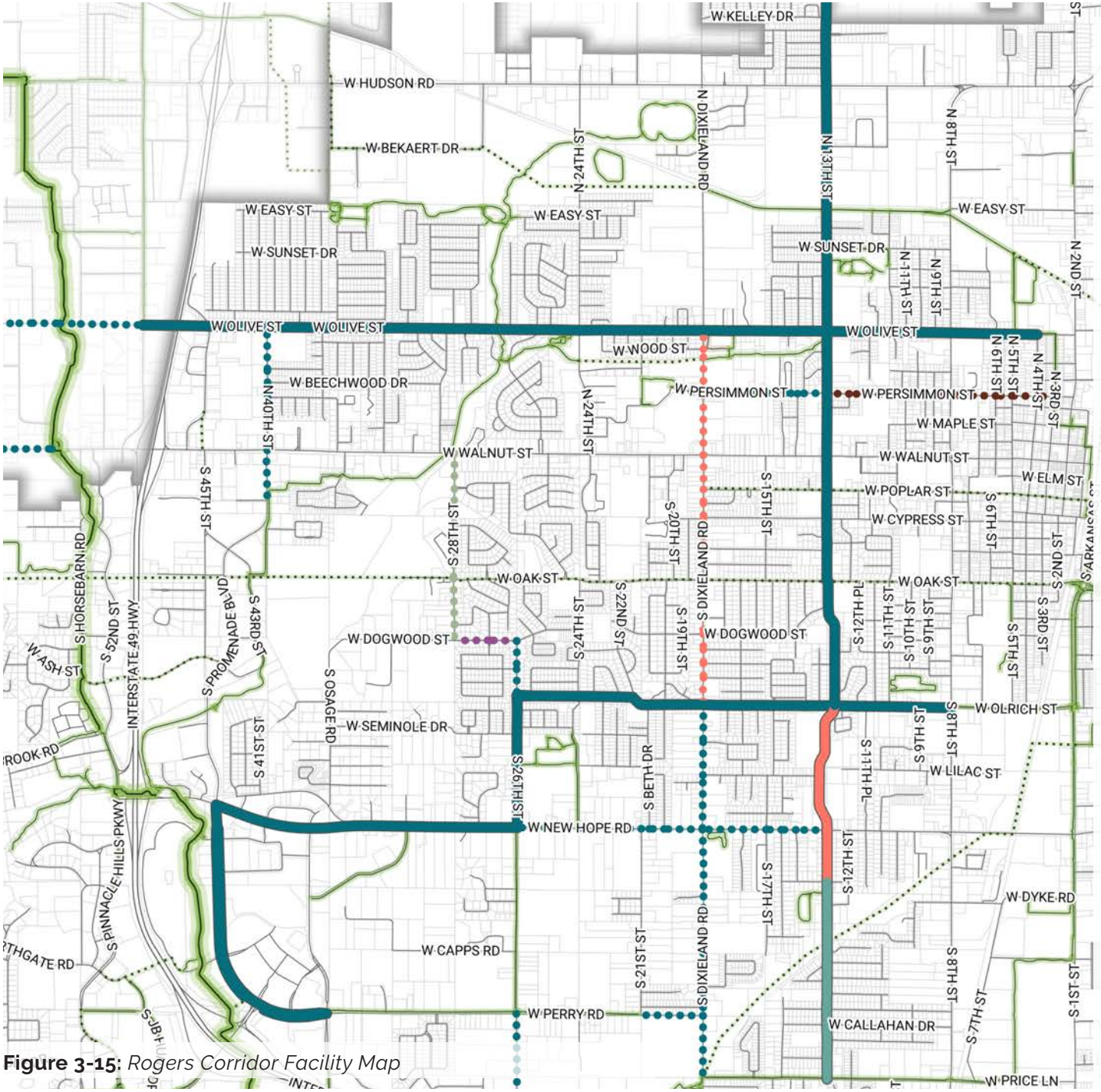


Figure 3-15: *Rogers Corridor Facility Map*

ROGERS

Recommended bicycle and pedestrian facilities in Rogers extend through large portions of the community and link a variety of destinations and contexts. Each of the three corridor concepts increase the overall connectivity within the City of Rogers and build upon the growing network of non-motorized infrastructure that is either existing or planned. The City has already completed several projects that provide shared use paved trails for residents and visitors; the corridor concepts expand on the types of facilities provided through recommendations that separate users by mode in strategic locations.

Corridor Concepts
- Neighborhood Greenway
- Advisory Shoulder/ Yield Street
- Shared Use Paved Trail
- Directional Protected Bike Lanes
- Bike Lanes
- Shared Street
- Two Way Protected Bike Lane
- Shared Use Paved Trail (Both Sides)

Priority Network
- Neighborhood Greenway
- Advisory Shoulder / Yield Street
- Shared Use Paved Trail
- Directional Protected Bike Lanes
- Bike Lanes
- Two Way Protected Bike Lanes

Planned & Existing Trails
- Razorback Greenway
- Paved Trail
- Natural Surface Trail
- Planned Trail

13th Street Bikeway

A 4.4 mile facility, the 13th Street Bikeway runs along N 13th Street, with a northern terminus of Stratton Road and ending to the south at W Price Lane. This bikeway makes a critical connection to the proposed east-west Olive Street Trail. The context along the corridor varies between commercial and residential with critical connections being made to parks, schools, and churches.

The corridor provides connections to:

- Northwest Park;
- Greer Lingle Middle School;
- Elmwood Middle School; and
- Bonnie Grimes Elementary School.

The proposed design features a shared use paved trail along the east side of N 13th Street for the northern limits of the corridor. The path transitions to street-level, one-way protected bike lanes. Sidewalks are recommended adjacent to the bicycle facilities. The transition of facility is due to change in land use context and being the only connection to both Bonnie Grimes Elementary School and Elmwood Middle School. Special attention is paid to maintain priority for multimodal users through physical separation, traffic calming measures, and maintaining raised crossings throughout the school zone.

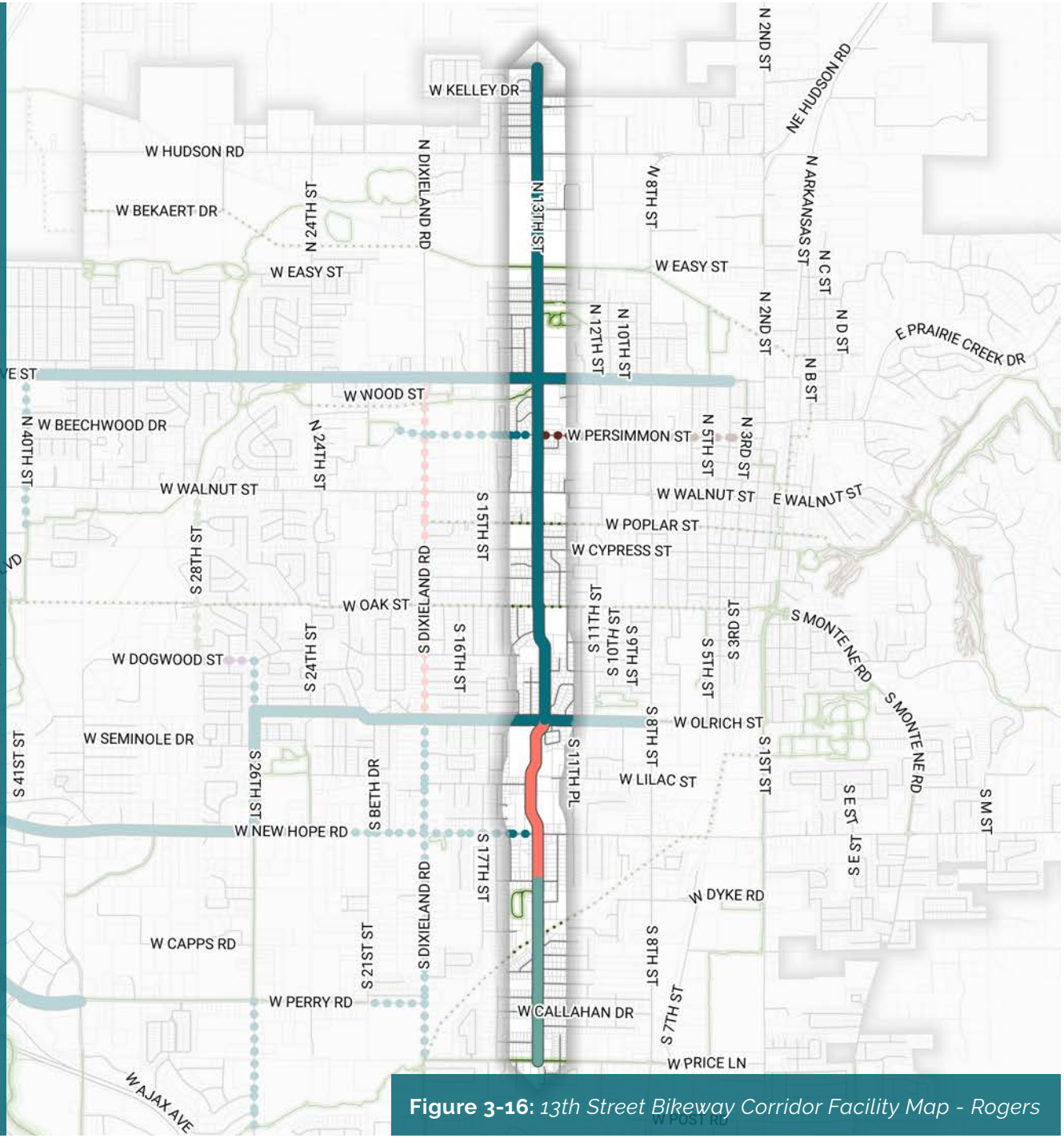


Figure 3-16: *13th Street Bikeway Corridor Facility Map - Rogers*

Key design features include:

- Maintained separation for multimodal users throughout the corridor as land use context varies.
- Designated bicycle, pedestrian, and vehicular zones which offer an additional degree of separation for users.
- Raised crossings at all points of ingress and egress into the schools.

Figure 3-17: *Directional Protected Bike Lanes Crossing Slip Lane - Rogers*

Key design features include:

- Maintained separation for multimodal users throughout the corridor as land use context varies.
- Designated bicycle, pedestrian, and vehicular zones which offer an additional degree of separation for users.
- Maintained protection and separation through the New Hope Road intersection by reducing turning radii and introducing corner refuge islands.
- Raised pedestrian crossing to elevate the pedestrian and slow turning traffic, while maintaining the existing right turn slip lane at New Hope Road.

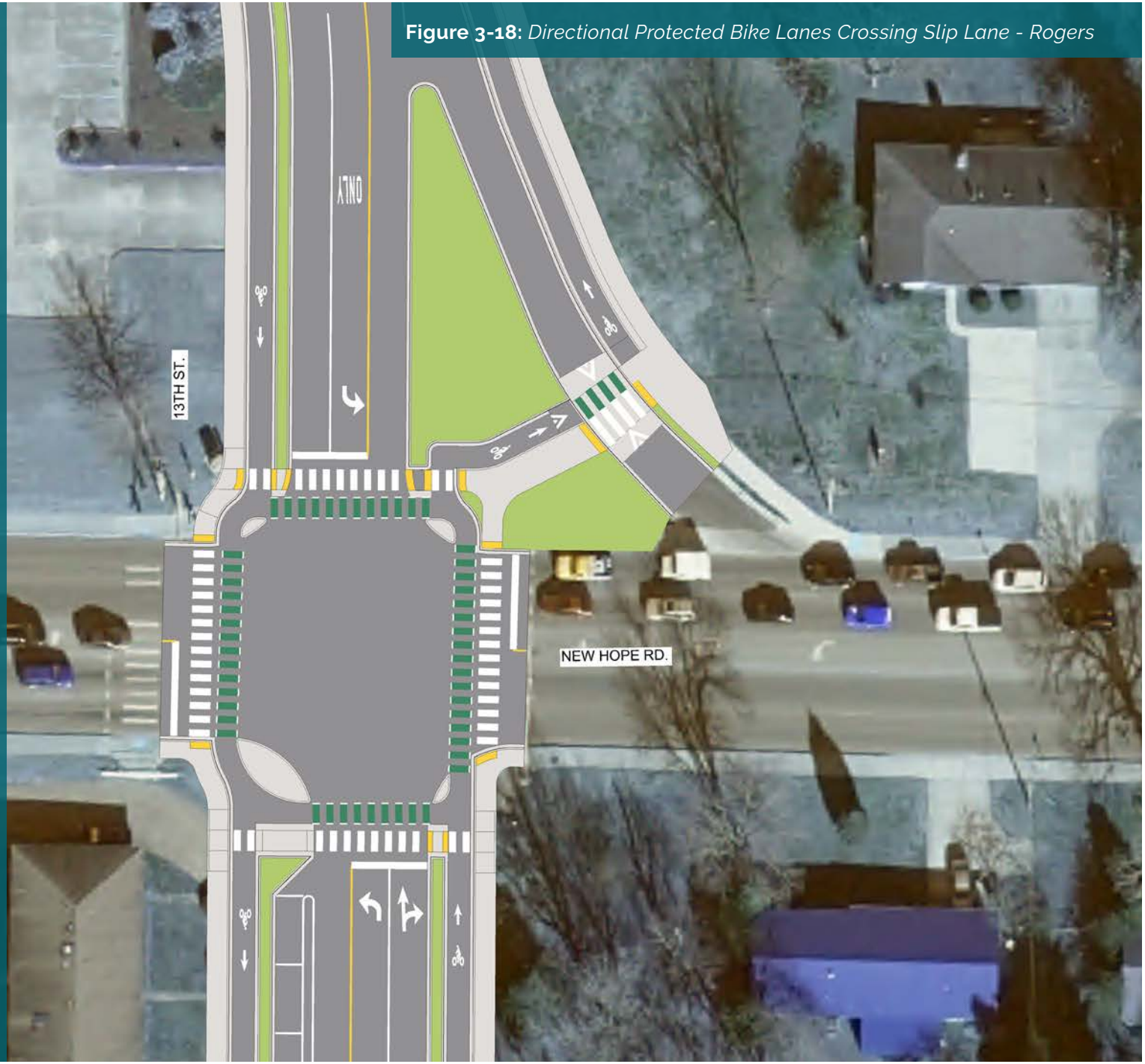


Figure 3-18: *Directional Protected Bike Lanes Crossing Slip Lane - Rogers*

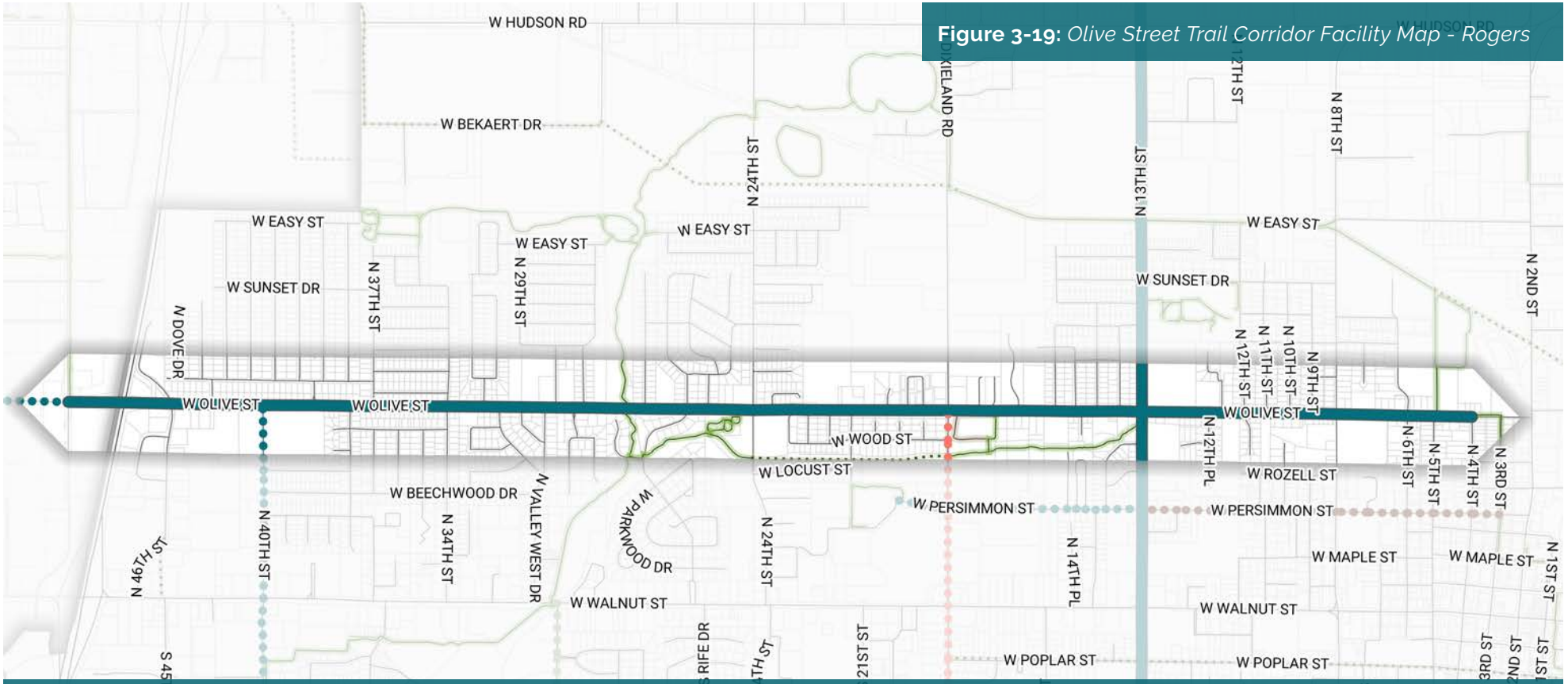


Figure 3-19: *Olive Street Trail Corridor Facility Map - Rogers*

Olive Street Trail

The Olive Street Trail connects Bentonville and Rogers. It is 3.6 miles long and runs adjacent to SE 28th Street in Bentonville and W Olive Street in Rogers, connecting to the existing facilities at SE Moberly Lane and heading east to N 3rd Street. This corridor makes the critical connection over Interstate 49, ultimately connecting to the proposed 13th Street Bikeway and at the Rogers Activity center.

The corridor provides connection to:

- Bentonville trails;
- SE Moberly Lane;
- Reagan Elementary School;
- Greer Lingle Middle School; and
- Rogers Activity Center.

The proposed recommendations feature retrofitting the existing facility over Interstate 49 to include a shared use paved trail. Through a reduction in lane widths, a shared path provides connection along SE Moberly Lane continuing east along the northside of W Olive Street. Given the high speed and volumes along Olive Street, especially within the influence of the Interstate, a protected facility is the preferred alternative. Roundabouts at N 13th Street and N 3rd Street reduce vehicular delay while also providing short, accessible crossings for multimodal users.

Figure 3-20: *Shared Use Paved Trail Crossing Bridge - Rogers*

Key design features include:

- Enhanced shared use paved trail crossings in all quadrants of the intersection at SE Moberly Lane and SE 28th Street.
- Multimodal alternatives within the existing bridge width across Interstate 49.

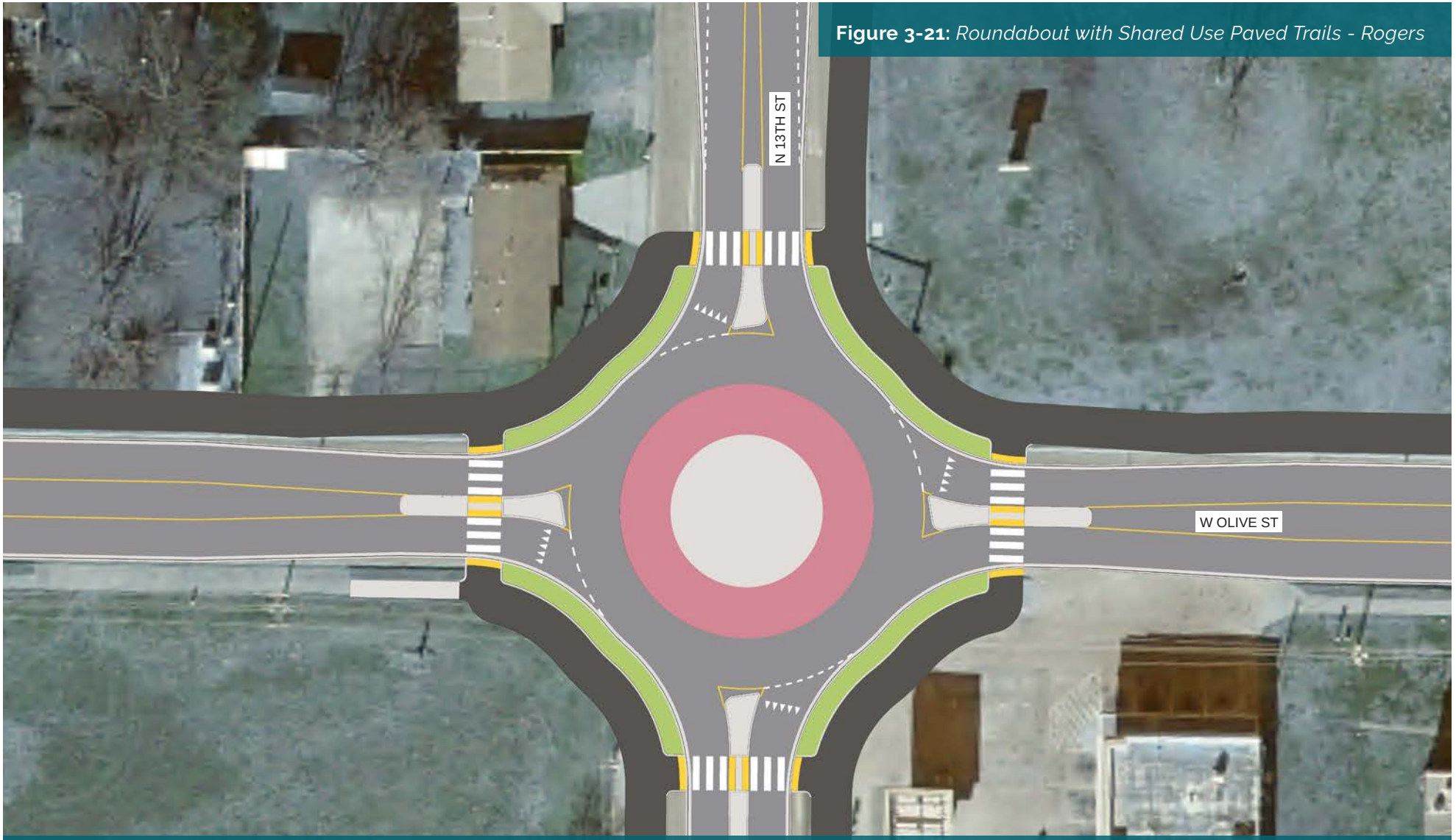


Figure 3-21: *Roundabout with Shared Use Paved Trails - Rogers*

Key design features include:

- Roundabouts which reduce delay and provide safe, continuous routes for bicycle and pedestrian users as an alternative to signalized intersections. The use of mountable truck aprons allows for circulation speeds of all users to be reduced while accommodating truck movements throughout the corridor.
- Median refuge islands for pedestrian crossings on all roundabout approaches.

Key design features include:

- Roundabouts which reduce delay and provide safe, continuous routes for bicycle and pedestrian users as an alternative to signalized intersections. The use of mountable truck aprons allows for circulation speeds of all users to be reduced while accommodating truck movements throughout the corridor.
- Raised crossing across W Olive Street connecting proposed shared use paved trail with the existing network adjacent to the Rogers Activity Center.
- Median refuge islands for pedestrian crossings on all roundabout approaches.

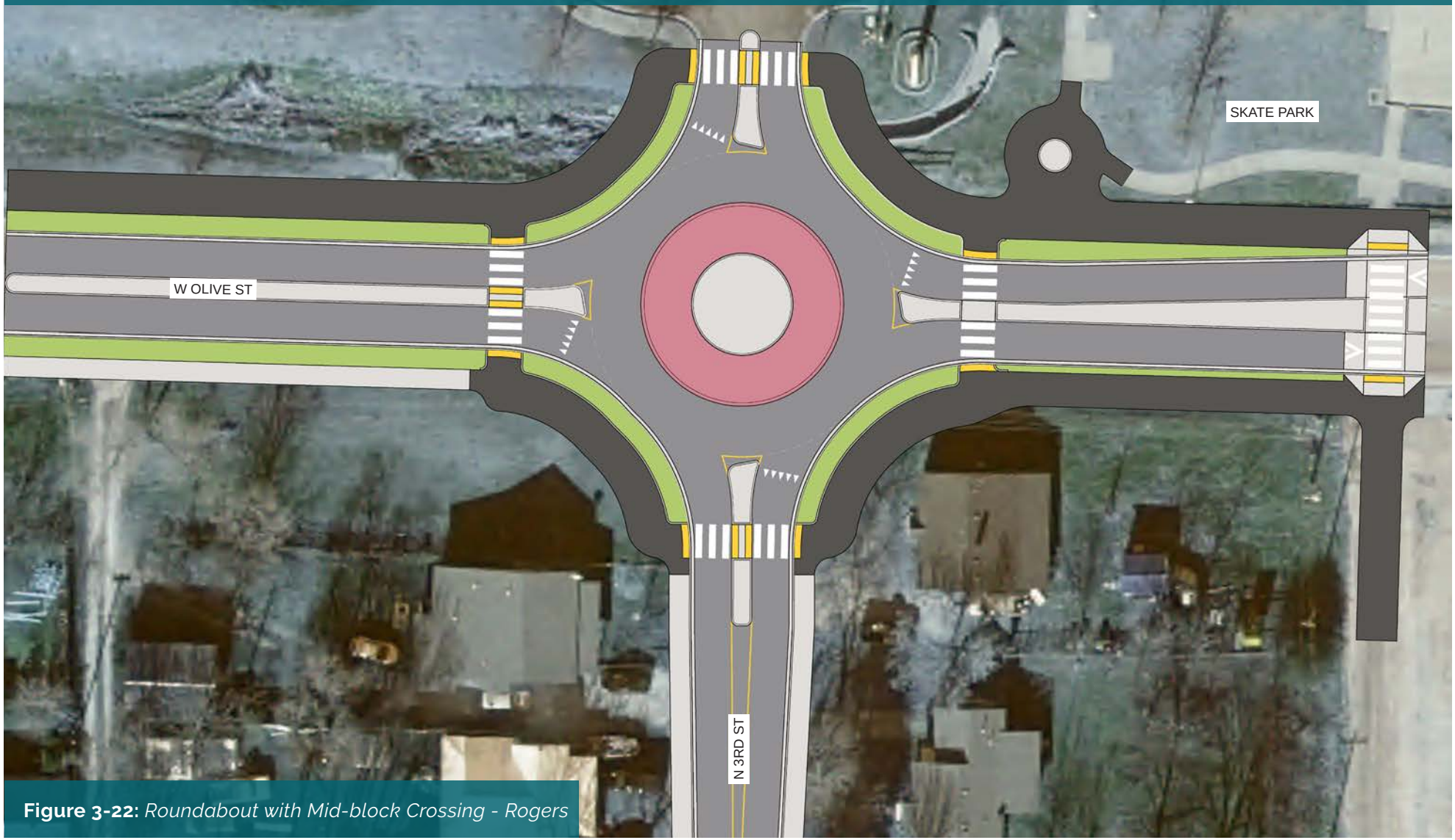


Figure 3-22: *Roundabout with Mid-block Crossing - Rogers*

Crosstown Trail

The Crosstown Trail is 4.7 miles long, begins at the Pinnacle Hills Promenade and terminates near Veterans Park. The west end of the corridor at Promenade Avenue is primarily commercial with the remainder of the corridor being low-density residential.

The corridor provides connection to:

- Rogers Aquatics Center;
- Elmwood Middle School;
- Mercy Hospital Northwest Arkansas;
- Razorback Greenway; and
- Rogers Heritage High School.

The proposed design features a shared use paved trail for the entire length of the corridor with additional connections to existing trails and intersection with the 13th Street Bikeway. A shared use paved trail is the preferred facility type for the sections along Promenade Boulevard and New Hope Road given the traffic speed and volume. Along 26th Street, and W Olrich Street paved trails are proposed on the west and south sides respectively to minimize driveway crossings and conflicts while remaining within the existing right-of-way.

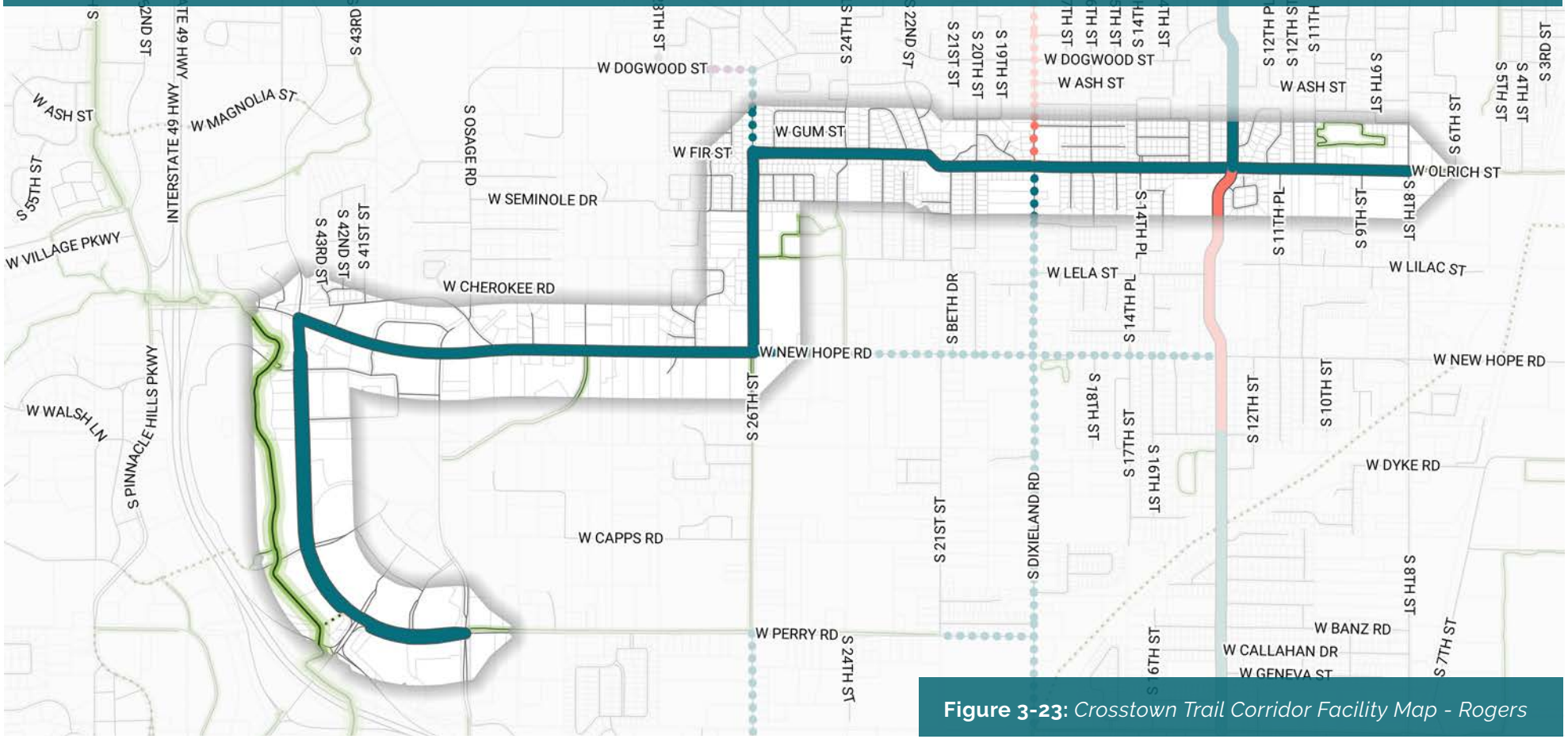


Figure 3-23: *Crosstown Trail Corridor Facility Map - Rogers*

Key design features include:

- Raised driveway and minor street crossings - most important at Promenade Avenue where there are frequent higher-volume commercial driveways.
- Mountable truck apron to acomodate right turns for larger vehicles.

Figure 3-24: *Shared Use Paved Trail near Shopping Center - Rogers*

Key design features include:

- Continuation of the trail along the south side of Olrich Street allowing an easy connection to existing sidewalks at the Elmwood Middle School, which is also on the south.

Figure 3-25: *Shared Use Paved Trail Intersection - Rogers*

Key design features include:

- Raised crossing and curb extension at intersection of S 26th Street and W Olrich Street.
- Three-way stop to improve the comfort and safety of the crossing.

Figure 3-26: *Raised Crossing for Shared Use Paved Trail - Rogers*

Key design features include:

- Mountable truck aprons added to all corners of intersection with 8th Street, with a significant apron on the southeast corner with the large existing radius.
- Widened corners at 8th Street to create mixing zones that allow users route options depending on the traffic light phase. The trail transitions from the south side to the north side of Olrich Street at this intersection, providing a connection to the existing trail that ties into the High School and Veterans Park.

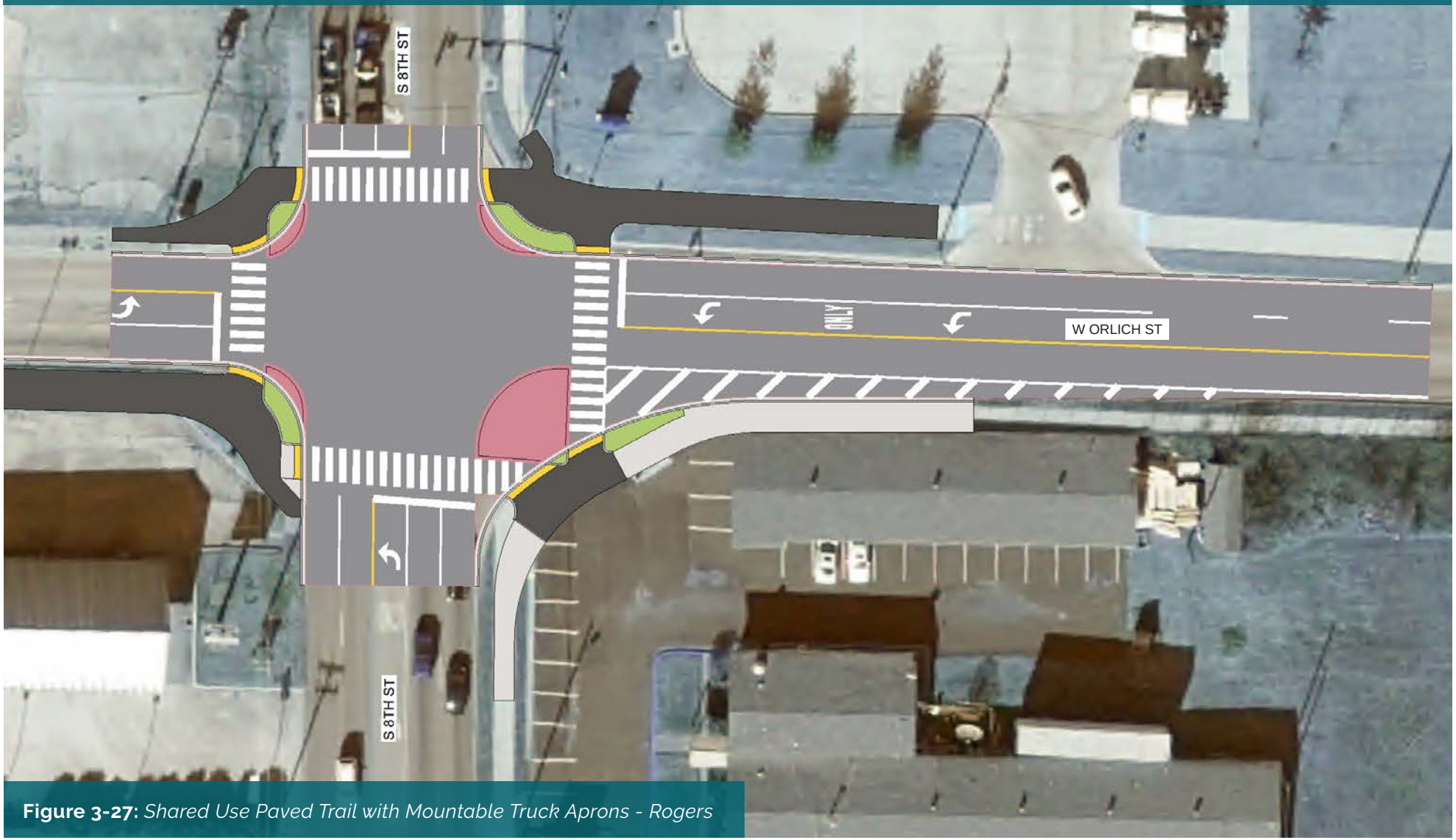


Figure 3-27: *Shared Use Paved Trail with Mountable Truck Aprons - Rogers*

SPRINGDALE

Three concept corridors were developed for the City of Springdale that extend from to the west and south of downtown. Each of these corridors connect to major destinations and can become active transportation corridors as well as essential links to the Razorback Regional Greenway. Several bicycle and pedestrian facility types are recommended to accommodate users of all ages and abilities on a low-stress network. Proposed corridor designs considered existing conditions, major employers, and proposed development during facility selection and concept design.

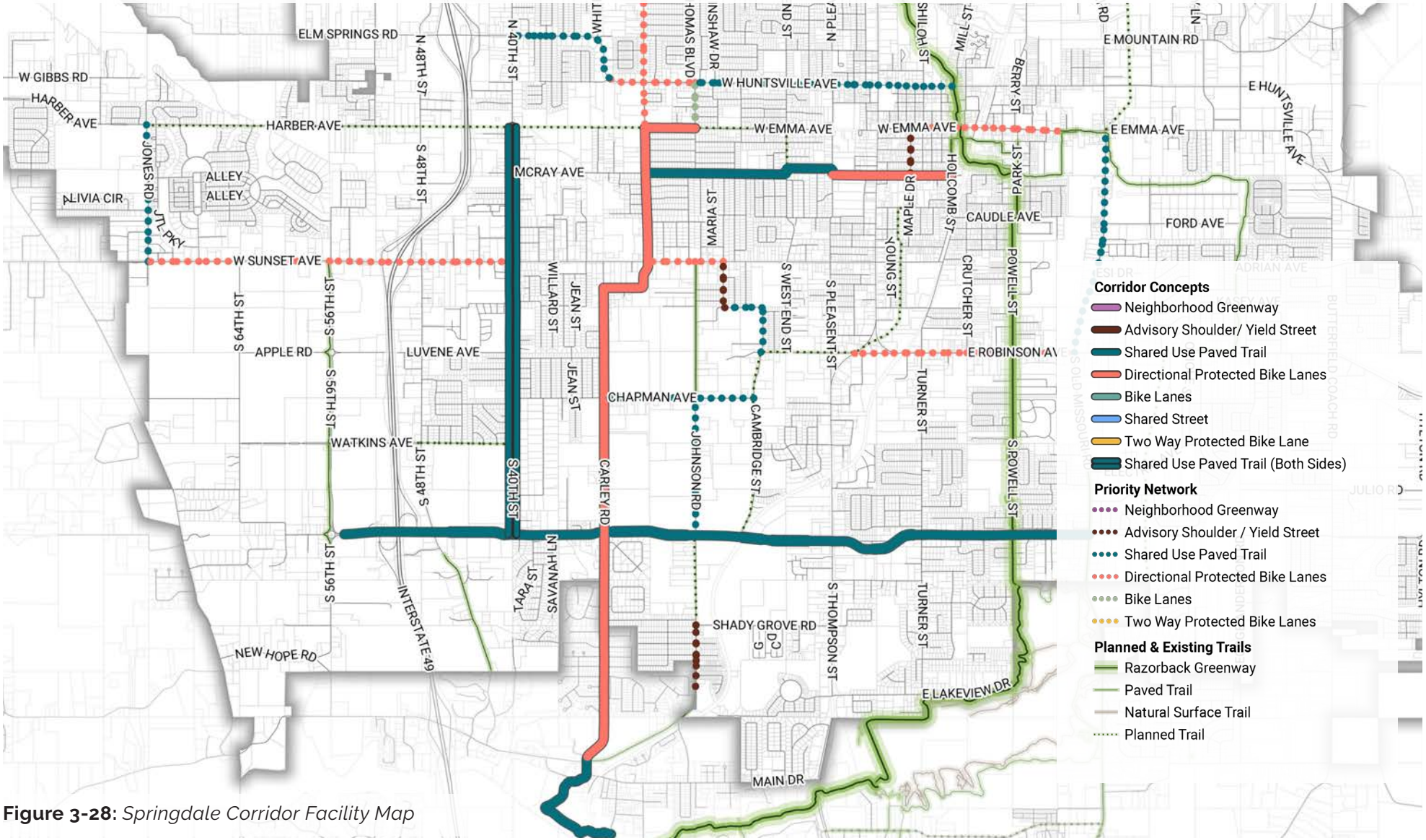


Figure 3-28: *Springdale Corridor Facility Map*

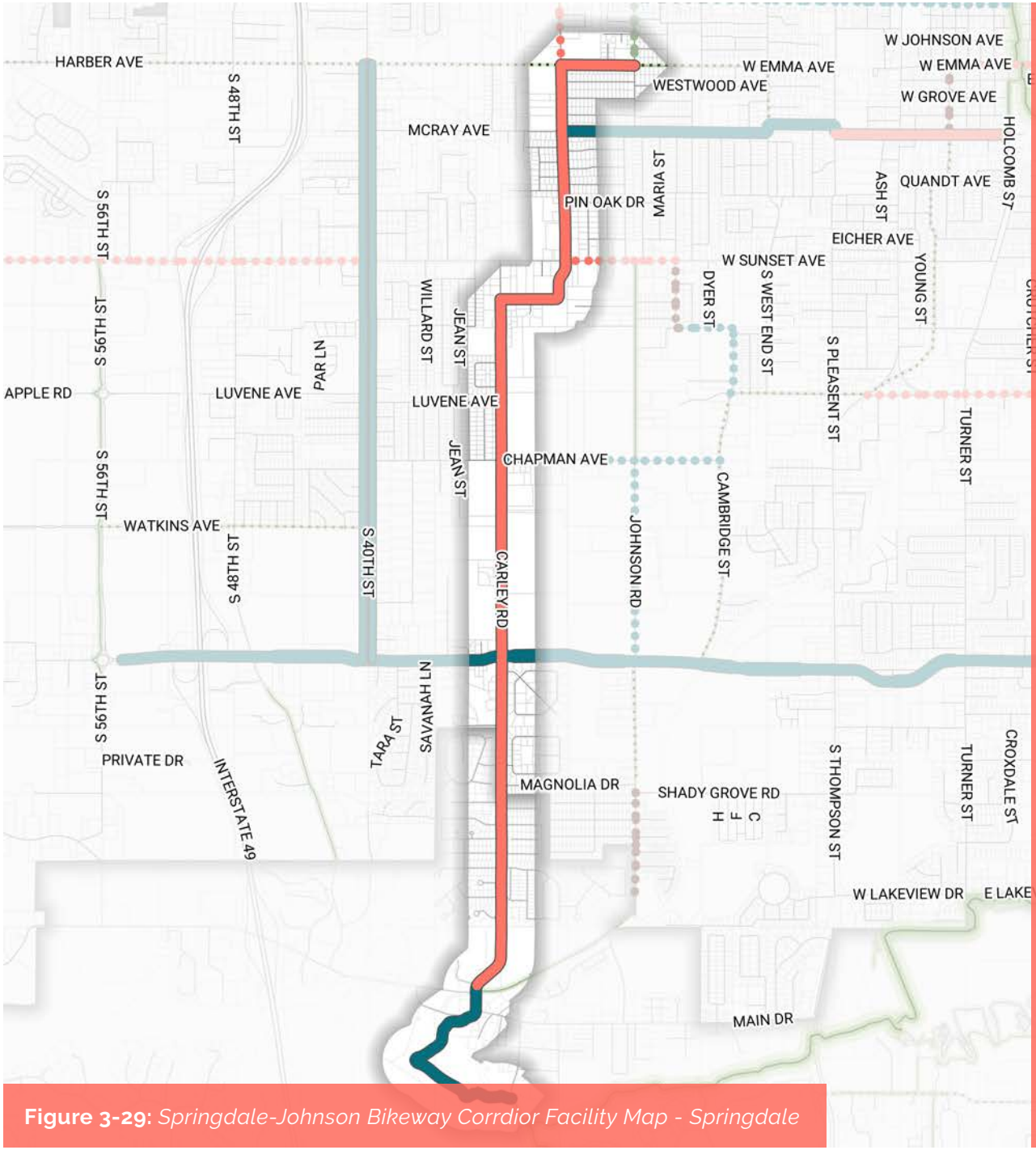


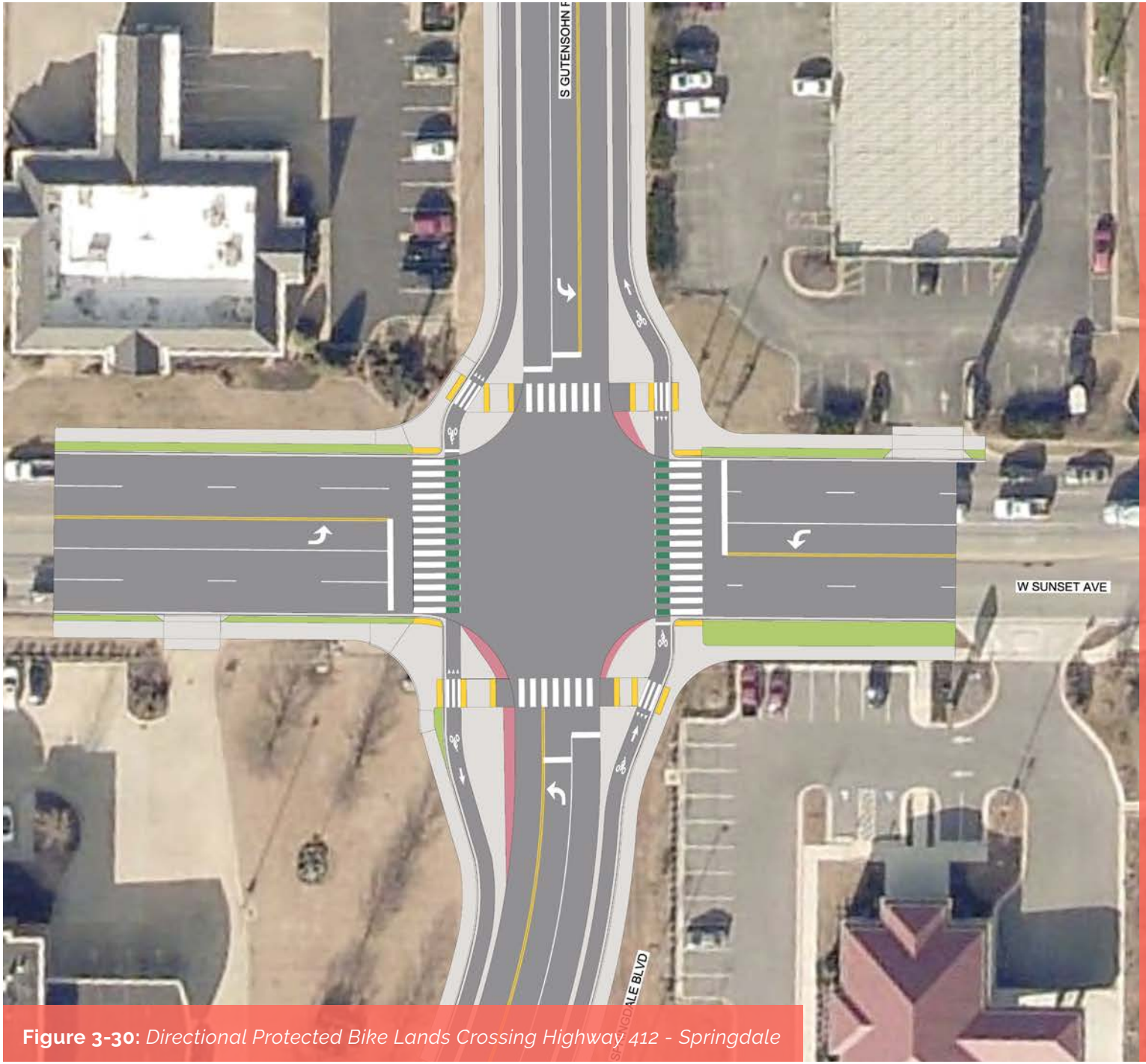
Figure 3-29: *Springdale-Johnson Bikeway Corrdior Facility Map - Springdale*

Springdale-Johnson Bikeway

This corridor is a direct route between the City of Springdale and the neighboring community of Johnson to the south. A majority of this 4.8-mile corridor is along Carley Road with major crossings at W Sunset Avenue (Highway 412) and Johnson Mill Boulevard. Adjacent land uses range from residential neighborhood, to rural open space, to a developing town center. The corridor provides connections to:

- Downtown Springdale;
- Johnson Square; and
- Clear Creek Trail.

This is one of two proposed corridor concepts providing north-south connectivity within Springdale. Based upon the existing conditions along each corridor, variation in bicycle facility type was recommended. Directional protected bike lanes along Carley Road are extended across W Sunset Avenue and continue to intersect Emma Avenue. At Johnson Mill Boulevard, directional protected bike lanes transition to a shared use paved trail to meander through existing open space and join the Clear Creek Trail.



Key design features include:

- A protected intersection at W Sunset Boulevard and S Gutensohn Road that provides separate crossings for bicycles and pedestrians and corner refuge islands to decrease turning speeds.
- Curb radii to allow for truck (WB-40) turning movements on and off W Sunset Avenue.
- Mountable truck apron to acomodate right turns for larger vehicles.

Figure 3-30: *Directional Protected Bike Lands Crossing Highway 412 - Springdale*

Key design features include:

- Median refuge for bicycles and pedestrians at the intersection of Carley Road and Springdale Boulevard.
- Raised crossing for bicycles and pedestrians to cross Springdale Boulevard.
- Mountable truck apron for right turn onto Springdale Boulevard to accommodate delivery trucks to nearby businesses.

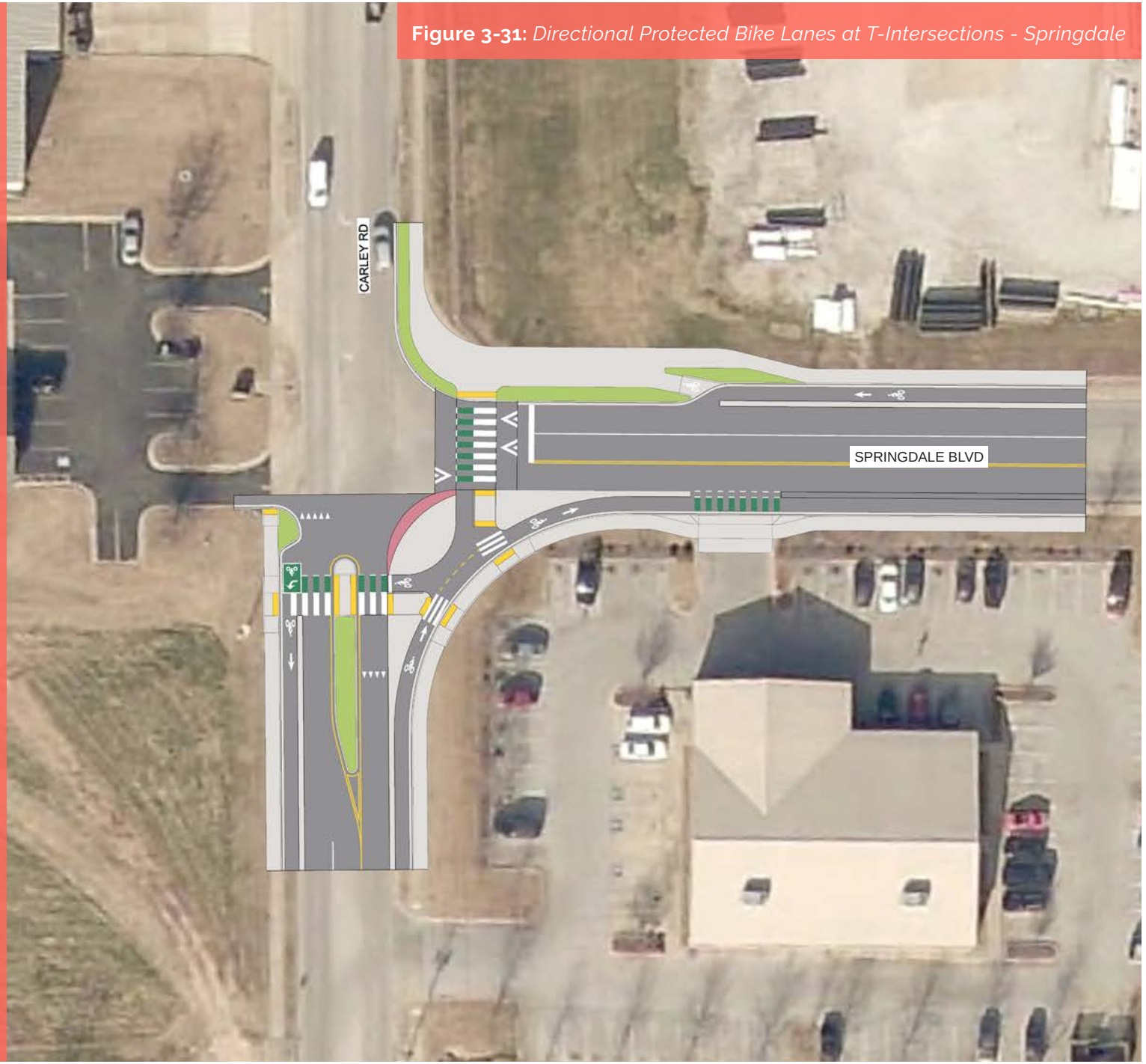
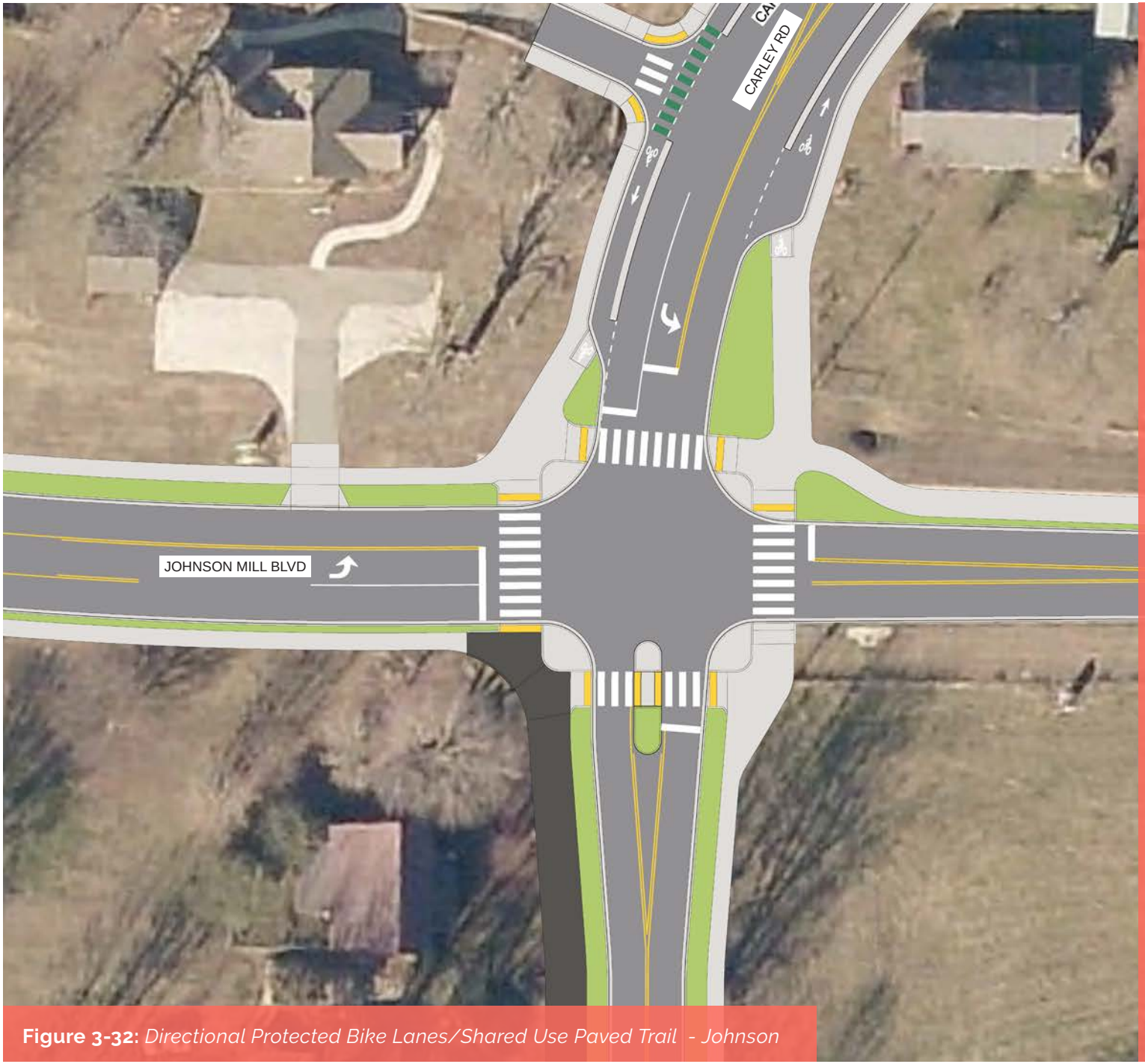


Figure 3-31: *Directional Protected Bike Lanes at T-Intersections - Springdale*

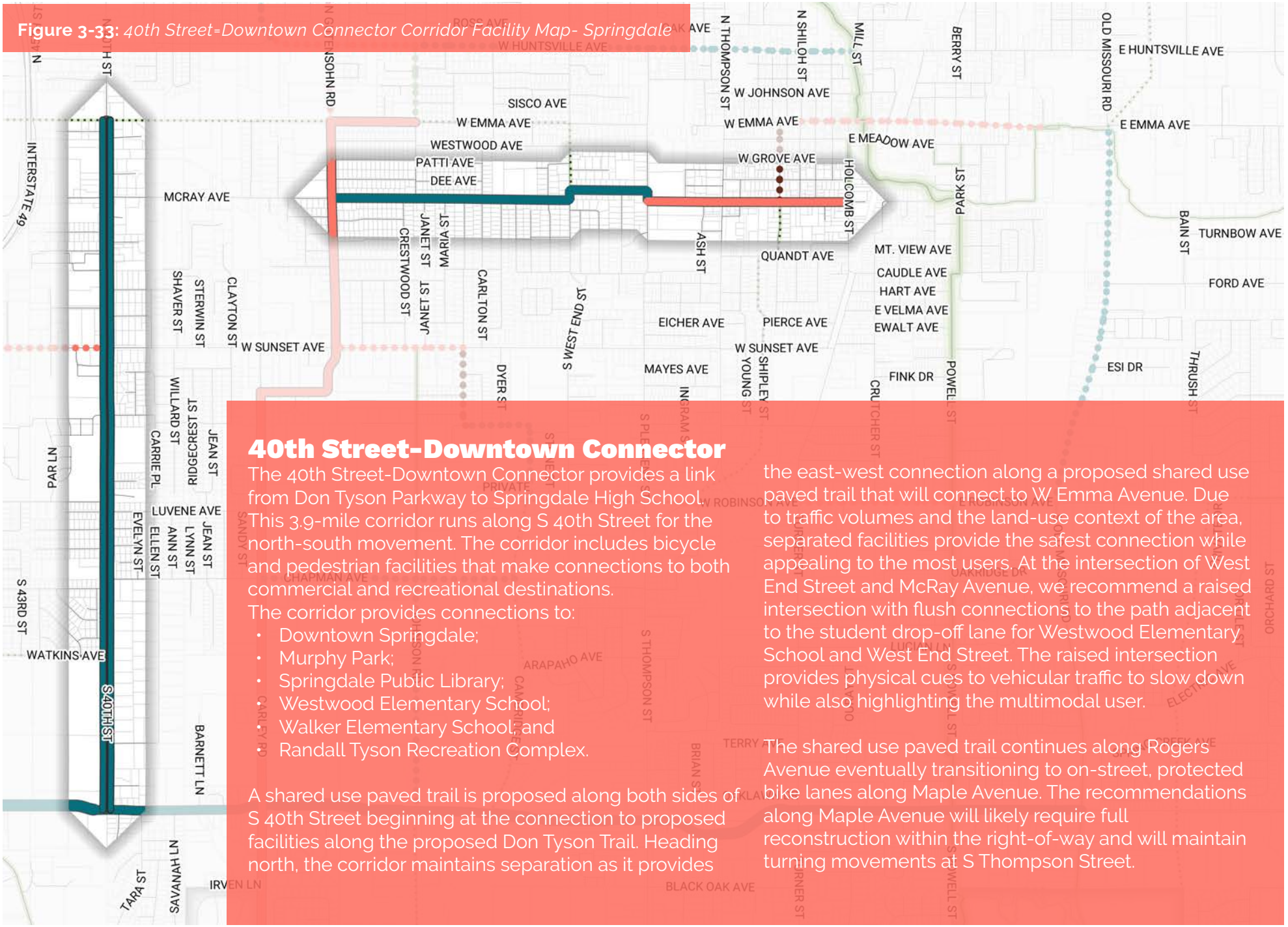


Key design features include:

- Conflict markings for protected bike lanes at intersections/driveways.
- Shared use crossing and mixing zone for bicycles and pedestrians at Carley Road and Johnson Mill Boulevard.
- Transition from directional protected bike lanes to shared use paved trail.

Figure 3-32: *Directional Protected Bike Lanes/Shared Use Paved Trail - Johnson*

Figure 3-33: *40th Street-Downtown Connector Corridor Facility Map- Springdale*



40th Street-Downtown Connector

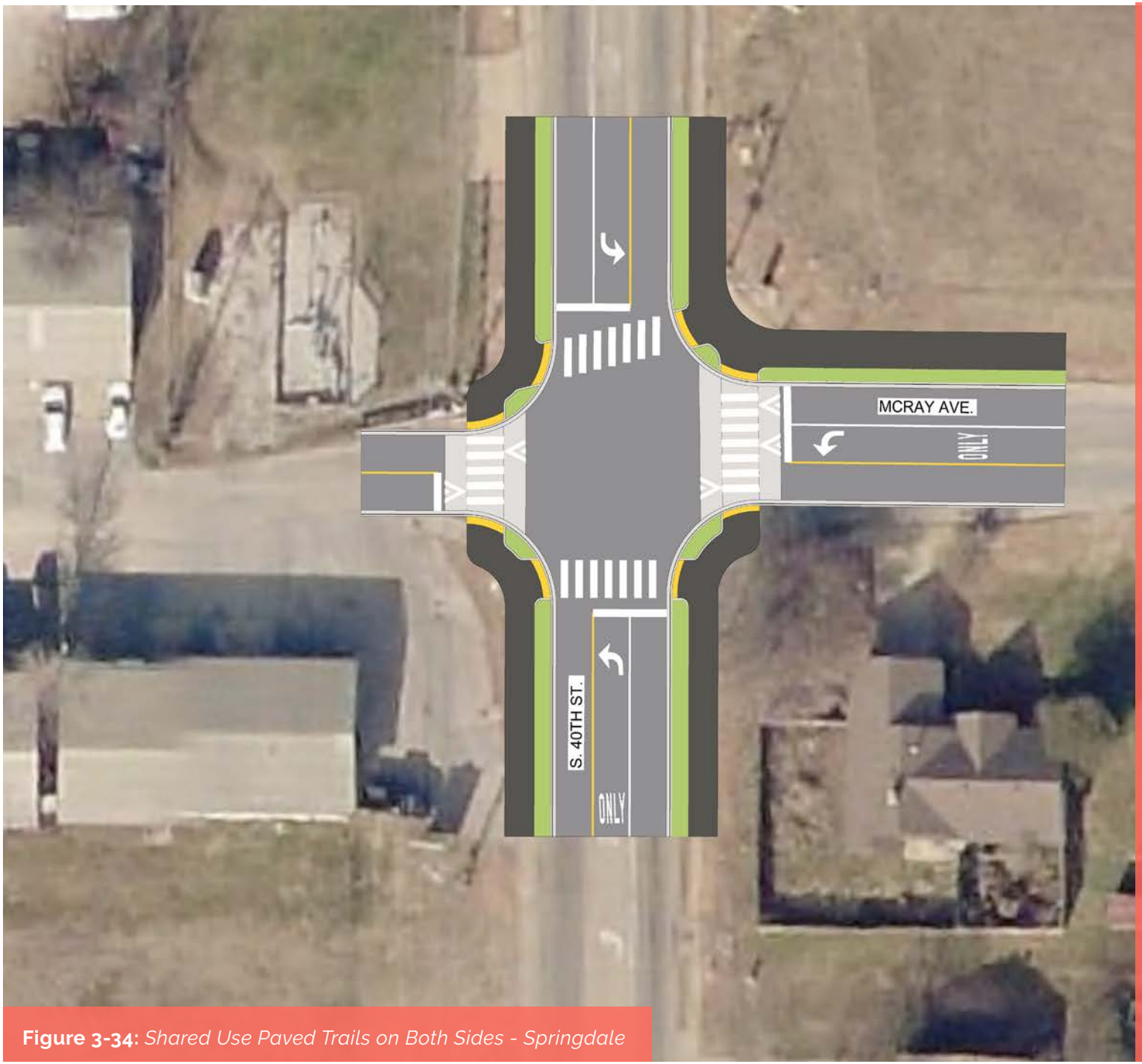
The 40th Street-Downtown Connector provides a link from Don Tyson Parkway to Springdale High School. This 3.9-mile corridor runs along S 40th Street for the north-south movement. The corridor includes bicycle and pedestrian facilities that make connections to both commercial and recreational destinations.

The corridor provides connections to:

- Downtown Springdale;
- Murphy Park;
- Springdale Public Library;
- Westwood Elementary School;
- Walker Elementary School; and
- Randall Tyson Recreation Complex.

A shared use paved trail is proposed along both sides of S 40th Street beginning at the connection to proposed facilities along the proposed Don Tyson Trail. Heading north, the corridor maintains separation as it provides the east-west connection along a proposed shared use paved trail that will connect to W Emma Avenue. Due to traffic volumes and the land-use context of the area, separated facilities provide the safest connection while appealing to the most users. At the intersection of West End Street and McRay Avenue, we recommend a raised intersection with flush connections to the path adjacent to the student drop-off lane for Westwood Elementary School and West End Street. The raised intersection provides physical cues to vehicular traffic to slow down while also highlighting the multimodal user.

The shared use paved trail continues along Rogers Avenue eventually transitioning to on-street, protected bike lanes along Maple Avenue. The recommendations along Maple Avenue will likely require full reconstruction within the right-of-way and will maintain turning movements at S Thompson Street.



Key design features include:

- Shared use paved trail crossings for all directions at the intersection of S. 40th Street and McRay Avenue. Raised crossings provided for crossing McRay Avenue.

Figure 3-34: *Shared Use Paved Trails on Both Sides - Springdale*

Key design features include:

- Raised intersection at the intersection of McRay Avenue and West End Street provides physical and visual cues that this is a shared space between all users. Raised intersection provides direct connection to the shared use path running along the north side of McRay Avenue terminating at Westwood Elementary School and along the east side of West End Street.

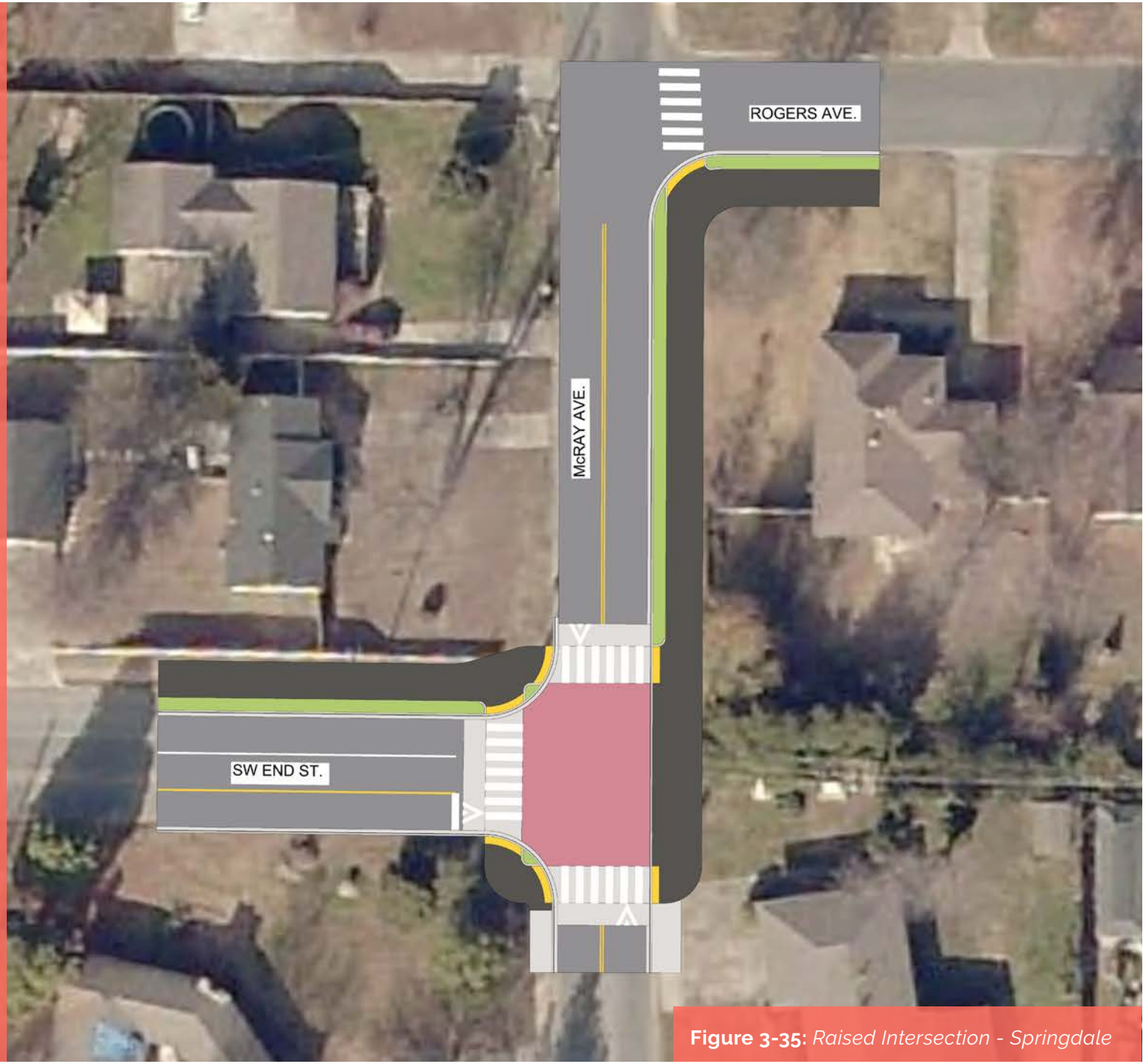


Figure 3-35: *Raised Intersection - Springdale*

Key design features include:

- Transition from directional protected bike lanes to shared use paved trail at three-way intersection.
- Bicycle and pedestrian facilities separate at the intersection of Maple Avenue. Separation allows for higher volumes of users and provides a safe, protected connection extending into Downtown Springdale.

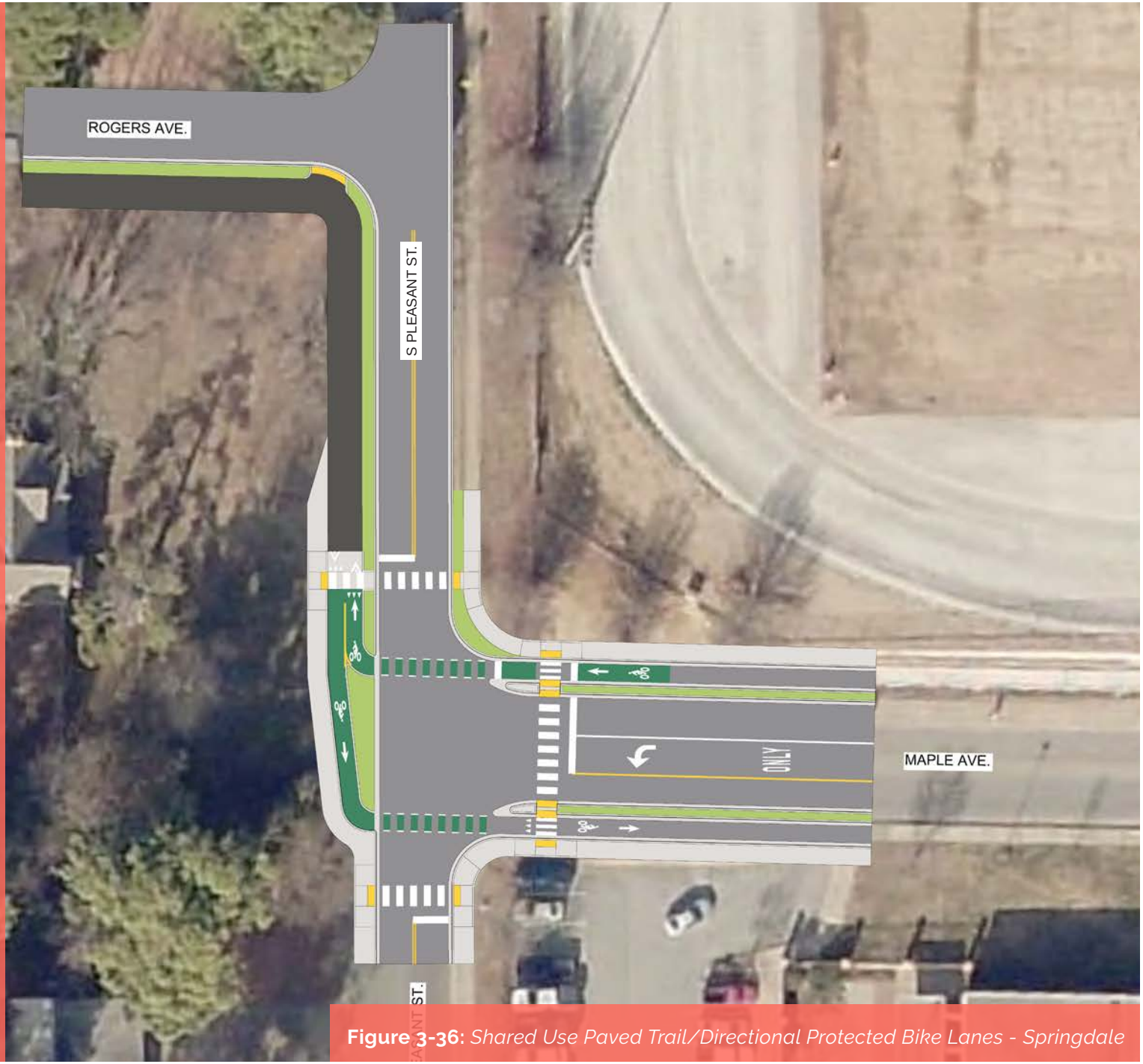


Figure 3-36: *Shared Use Paved Trail/Directional Protected Bike Lanes - Springdale*

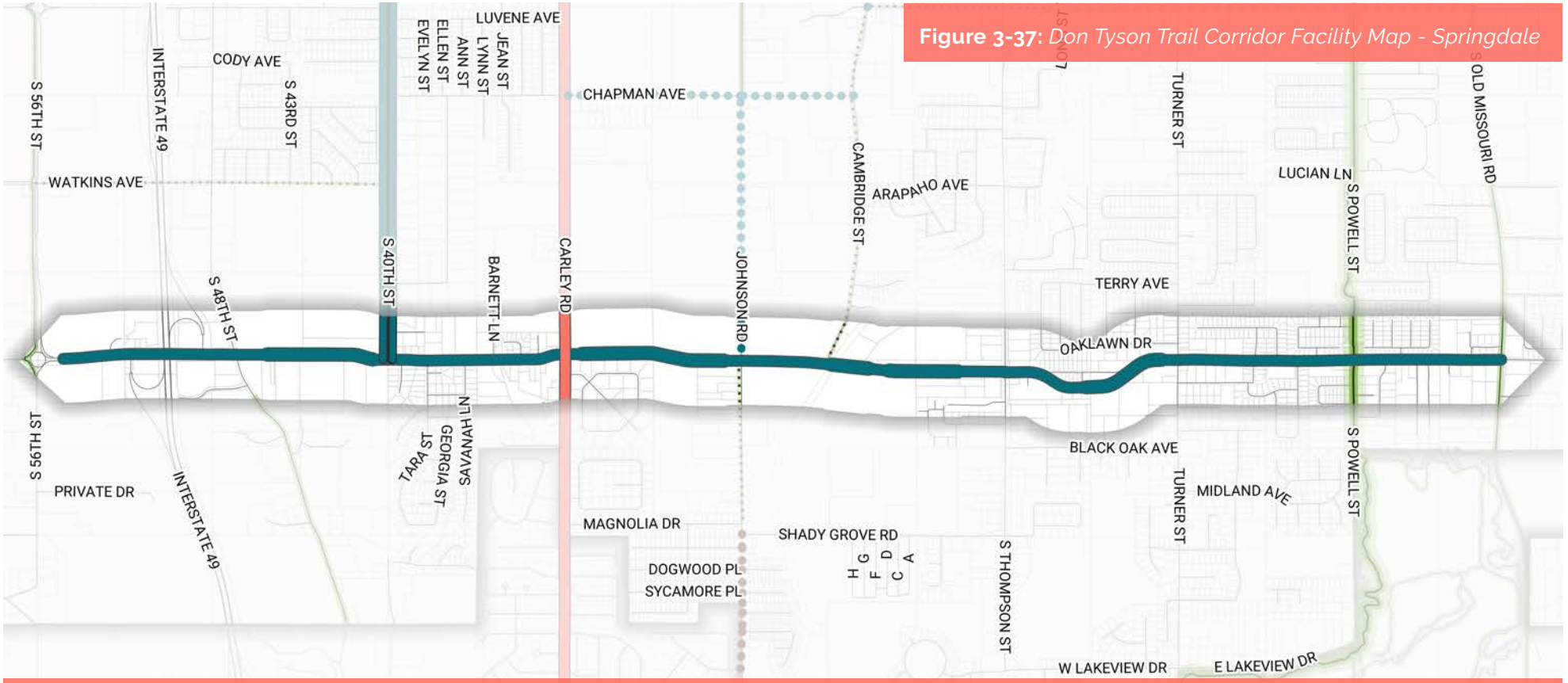


Figure 3-37: *Don Tyson Trail Corridor Facility Map - Springdale*

Don Tyson Trail

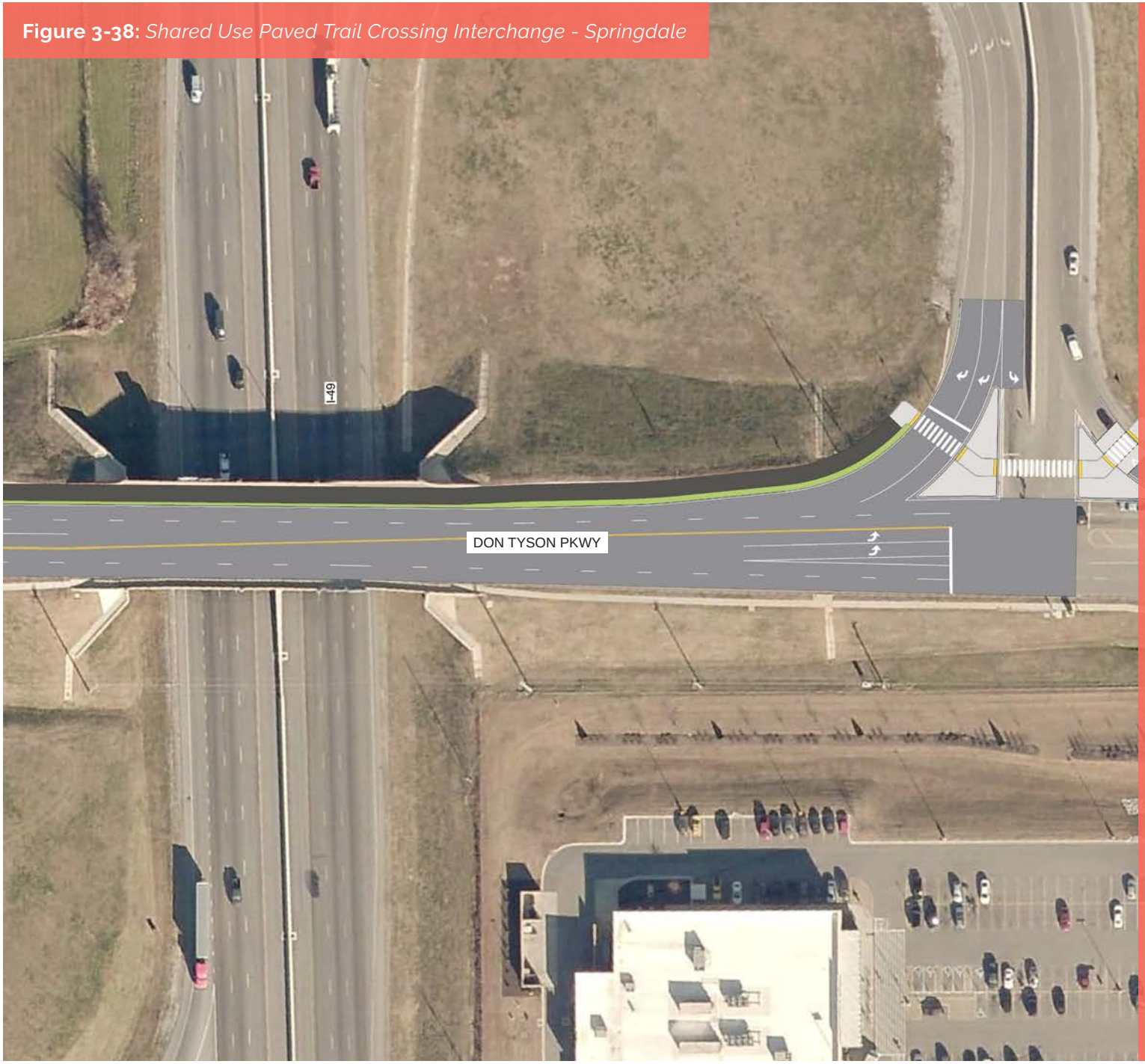
The Don Tyson Trail is aligned with Don Tyson Parkway between S 56th Street to S Old Missouri Road for a total length of 4.1 miles. At the west end it crosses Interstate 49 connecting to the recently constructed roundabout at 56th Street. The corridor is primarily bounded by residential area outside of the intersection with S Thompson Road which is a commercial arterial street.

The corridor provides connection to:

- Arvest Ballpark;
- Helen Tyson Middle School;
- Tyson Foods; and
- Razorback Regional Greenway.

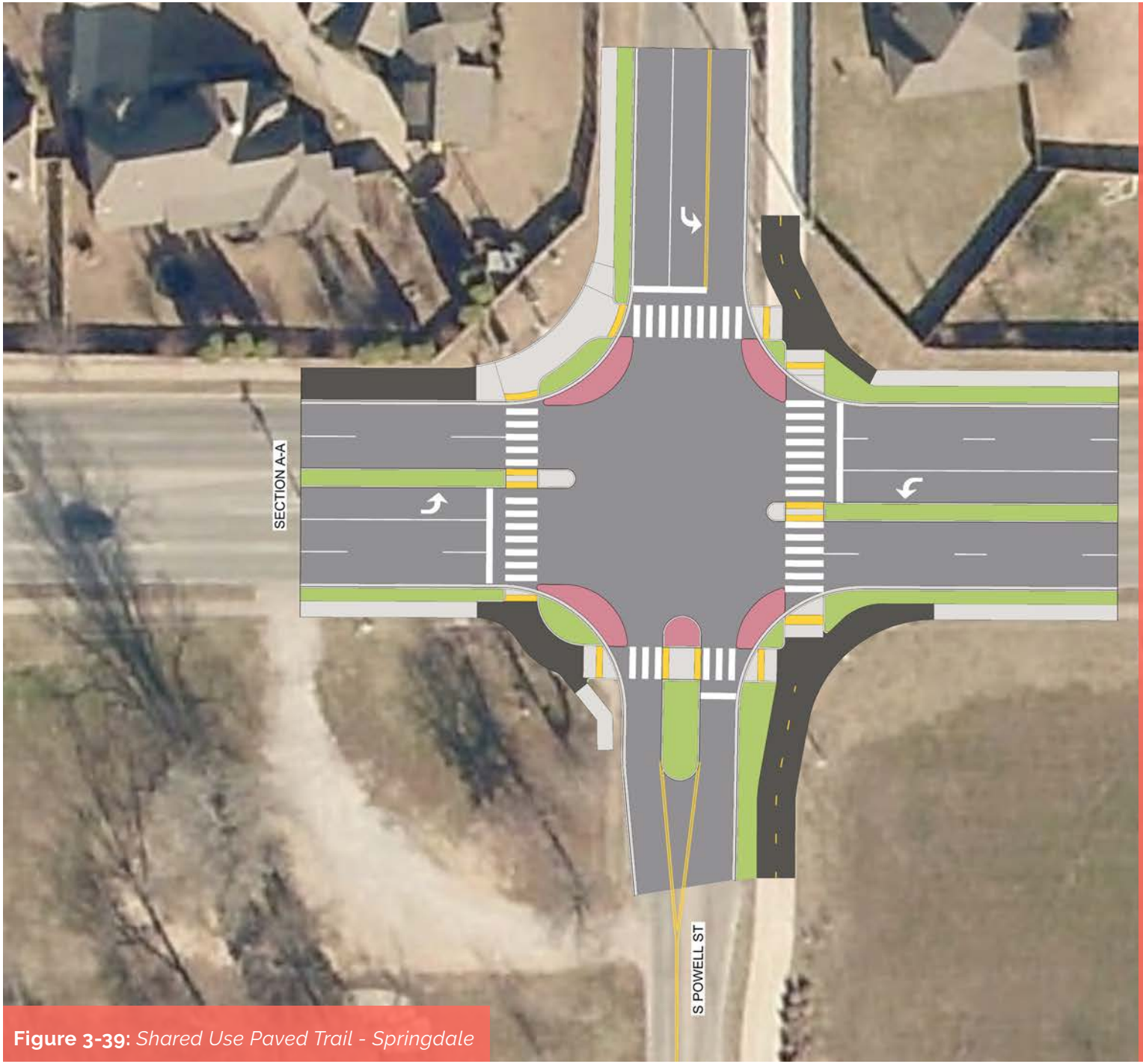
Given the residential character, existing right-of-way, speed limit, and grade constraints, a shared use paved trail is proposed for the length of the corridor. While the bridges over the interstate and railroad are constraining, reducing lane widths will allow the trail to be accommodated. The corridor ties into a shared use paved trail at each end and the 40th Street-Downtown Connector. It is important to note that there are multiple sections of retaining wall adjacent to the existing sidewalk and landscaped center median which could impact flexibility for lane reconfiguration or major extension of existing curb lines.

Figure 3-38: *Shared Use Paved Trail Crossing Interchange - Springdale*



Key design features include:

- A raised crossing at the on-ramp to Interstate 49 and a tightened off-ramp lane arrangement to reduce crossing distance.
- Travel lane narrowing at the bridge over Interstate 49 to widen the paved trail on the north side to at least ten feet with a two-foot buffer.

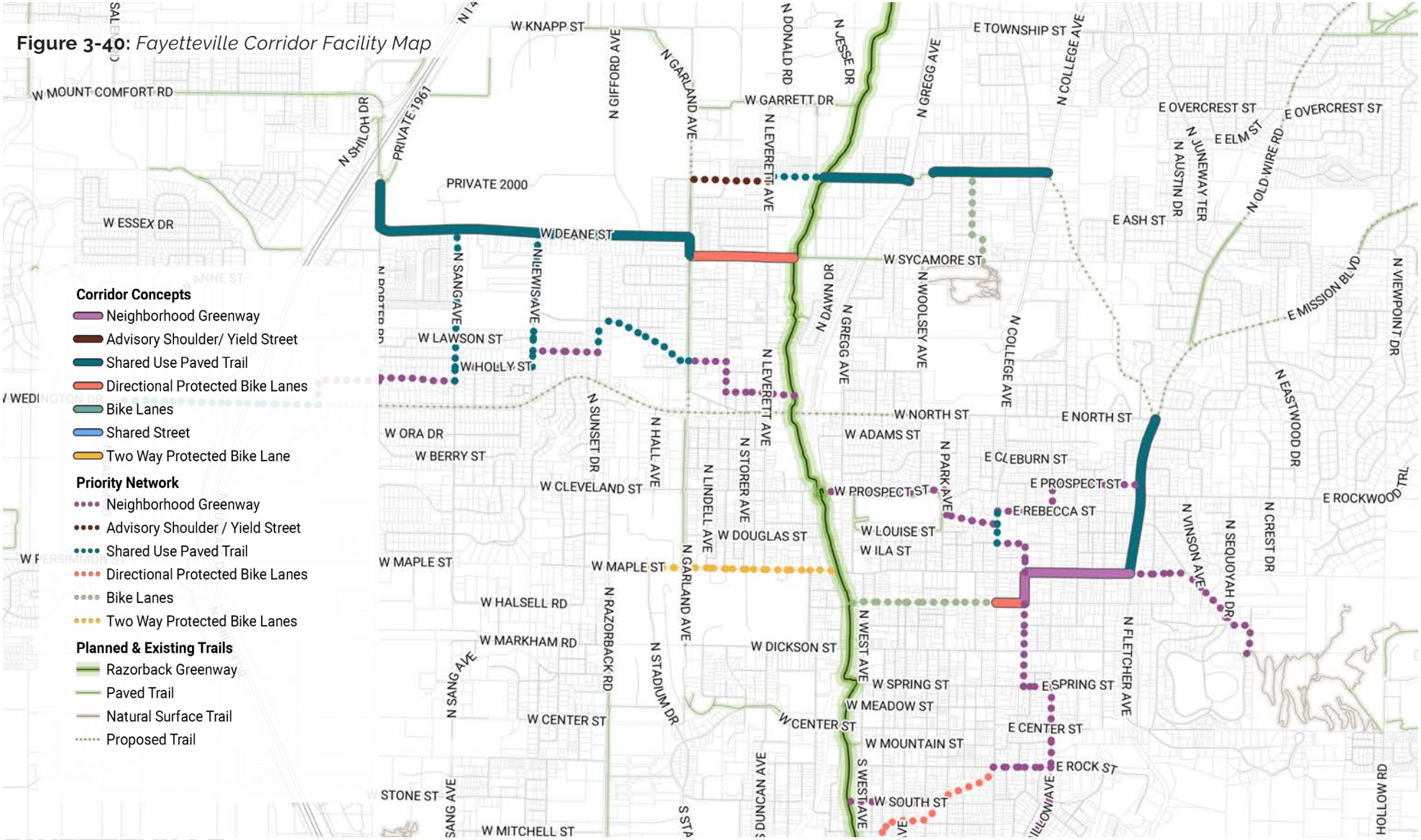


Key design features include:

- Widened corners or mixing zones at S Powell Street to allow for an improved connection to the Razorback Regional Greenway.
- Median refuge islands on the south, west, and east legs with truck aprons on each corner, given the crossing distances at the Powell Street intersection. Given the crossing distances at the Powell St intersection, median refuge islands are proposed on the south, west, and east legs. Truck aprons are proposed on each corner.

Figure 3-39: *Shared Use Paved Trail - Springdale*

Figure 3-40: *Fayetteville Corridor Facility Map*



FAYETTEVILLE

There are several on-going efforts within the City of Fayetteville to improve bicycle and pedestrian mobility. As part of this plan, two corridor concepts were developed to extend existing infrastructure and make connections along key routes that are safe, comfortable, and direct. Major intersection crossings were addressed as part of the concept design. Although intersections can be seen as a barrier to connectivity, the concept designs identified several treatments to promote world-class bicycle and pedestrian facilities on specific corridors in Fayetteville that can be a resource for intersection design throughout the region.

Figure 3-41: *Three Trails Bikeway Corridor Facility Map - Fayetteville*

City staff should have the flexibility to update the facility type illustrated in the corridor concepts based upon design users, consistency of facility, and/or existing conditions. Shared use paved trails, sidepaths, directional protected bike lanes, or two-way protected bike lanes could be interchangeable based upon the context and assessment by the City during implementation.

Three Trails Bikeway

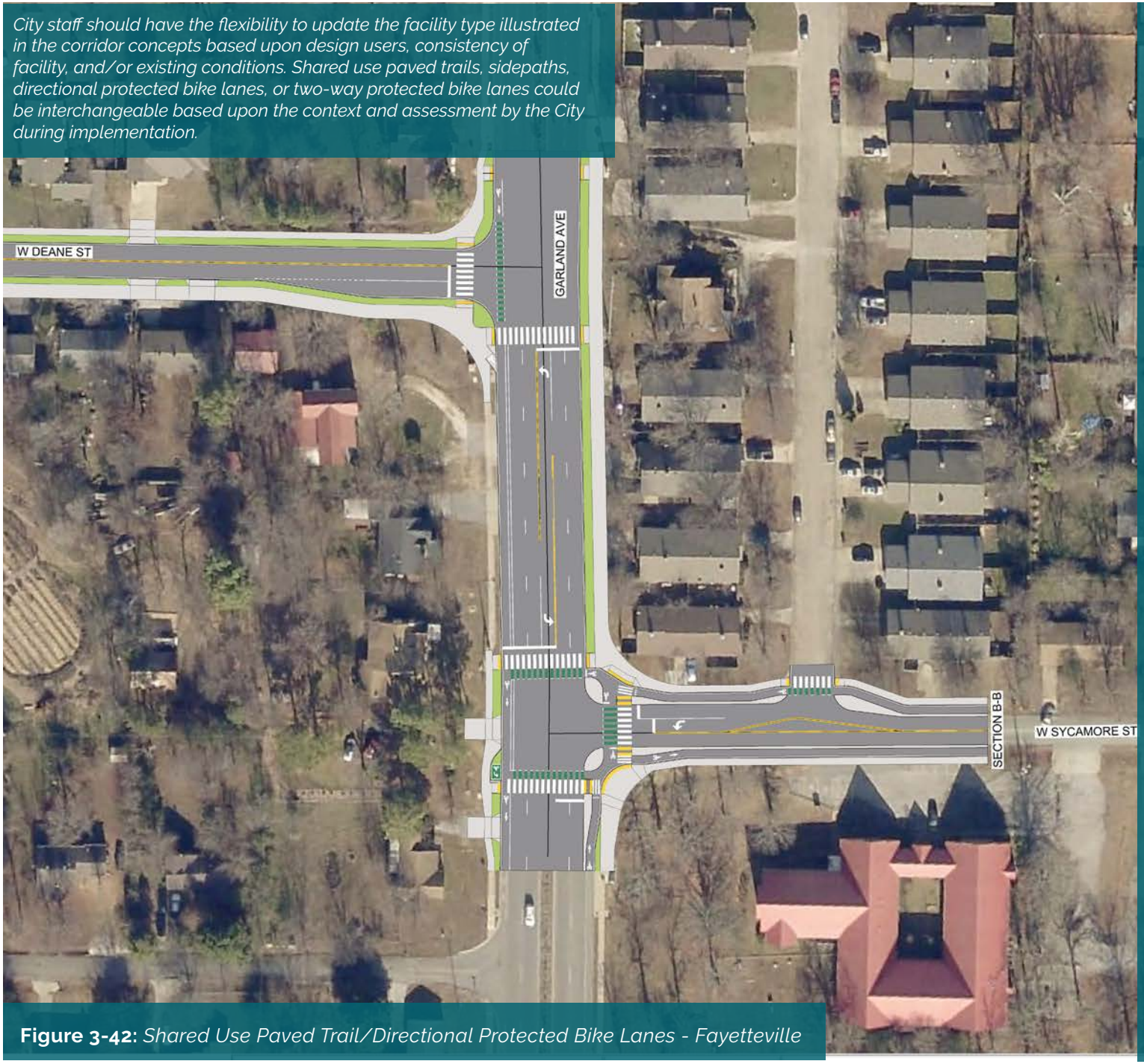
The Three Trails Bikeway is comprised of two segments in northwest Fayetteville split by the Scull Creek Trail. The 2.2-mile corridor provides critical bicycle and pedestrian connections to two existing trails and a third planned trail in addition to recreational facilities, residential neighborhoods, and schools.

The key destinations include:

- Mt. Comfort Road;
- Scull Creek Trail;
- Meadow Valley Trail;
- Lewis Soccer Complex; and
- Woodlawn Junior High School.

Given the existing street characteristics and land use along Deane Street, a shared use paved trail is proposed along the south side of the street. The soccer complex and residences are predominately located on the south side of the street. The shared use paved trail transitions to directional protected bike lanes at Sycamore Street. The existing southbound bike lane on N Garland Avenue could remain with the east side bike lane being replaced with a section of trail. In the future, the trail on the east side could extend farther north and south from the proposed corridor. The protected lanes on Sycamore Street continue to the intersection with the Scull Creek Trail. In addition to the bike lanes, the design includes filling in sidewalk gaps. The eastern corridor segment begins at the intersection of the Scull Creek Trail and W. Poplar Street. Directional protected bike lanes are proposed with a transition to a shared use paved trail along E. Poplar Street on the east side of the Razorback Regional Greenway.

City staff should have the flexibility to update the facility type illustrated in the corridor concepts based upon design users, consistency of facility, and/or existing conditions. Shared use paved trails, sidepaths, directional protected bike lanes, or two-way protected bike lanes could be interchangeable based upon the context and assessment by the City during implementation.



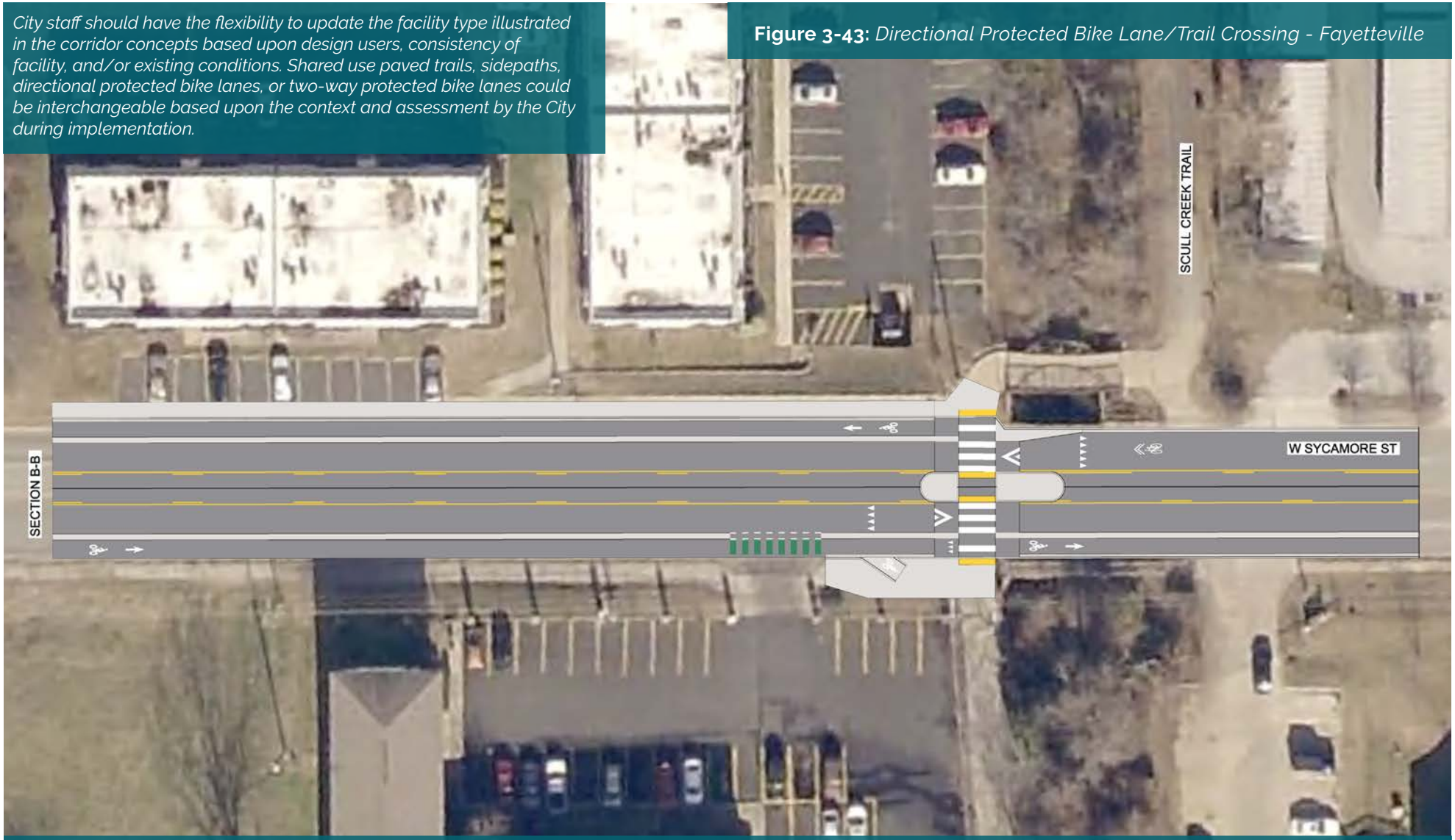
Key design features include:

- Conflict markings for protected bike lanes at intersections/driveways.
- Protected intersection at N Garland Street and W Sycamore Street with a two-stage turn queue box for eastbound travel on bicycles.

Figure 3-42: *Shared Use Paved Trail/Directional Protected Bike Lanes - Fayetteville*

City staff should have the flexibility to update the facility type illustrated in the corridor concepts based upon design users, consistency of facility, and/or existing conditions. Shared use paved trails, sidepaths, directional protected bike lanes, or two-way protected bike lanes could be interchangeable based upon the context and assessment by the City during implementation.

Figure 3-43: *Directional Protected Bike Lane/Trail Crossing - Fayetteville*



Key design features include:

- Raised crossing at the corridor intersections with The Scull Creek Trail.
- Reallocation of existing pavement between N Leverett Avenue and N Gregg Avenue to provide directional protected bike lanes.
- Ramps from eastbound protected bike lane for shared use mid-block crossing.

Key design features include:

- Raised crossings for driveways and streets along the paved trail on E Poplar Street.
- Existing speed humps maintained along E Poplar Street.
- Continued trail through angled parking in front of Woodlawn Junior High School with curb reconstruction and restriping the northern parking spaces.

Figure 3-44: *Shared Use Paved Trail at School - Fayetteville*

City staff should have the flexibility to update the facility type illustrated in the corridor concepts based upon design users, consistency of facility, and/or existing conditions. Shared use paved trails, sidepaths, directional protected bike lanes, or two-way protected bike lanes could be interchangeable based upon the context and assessment by the City during implementation.

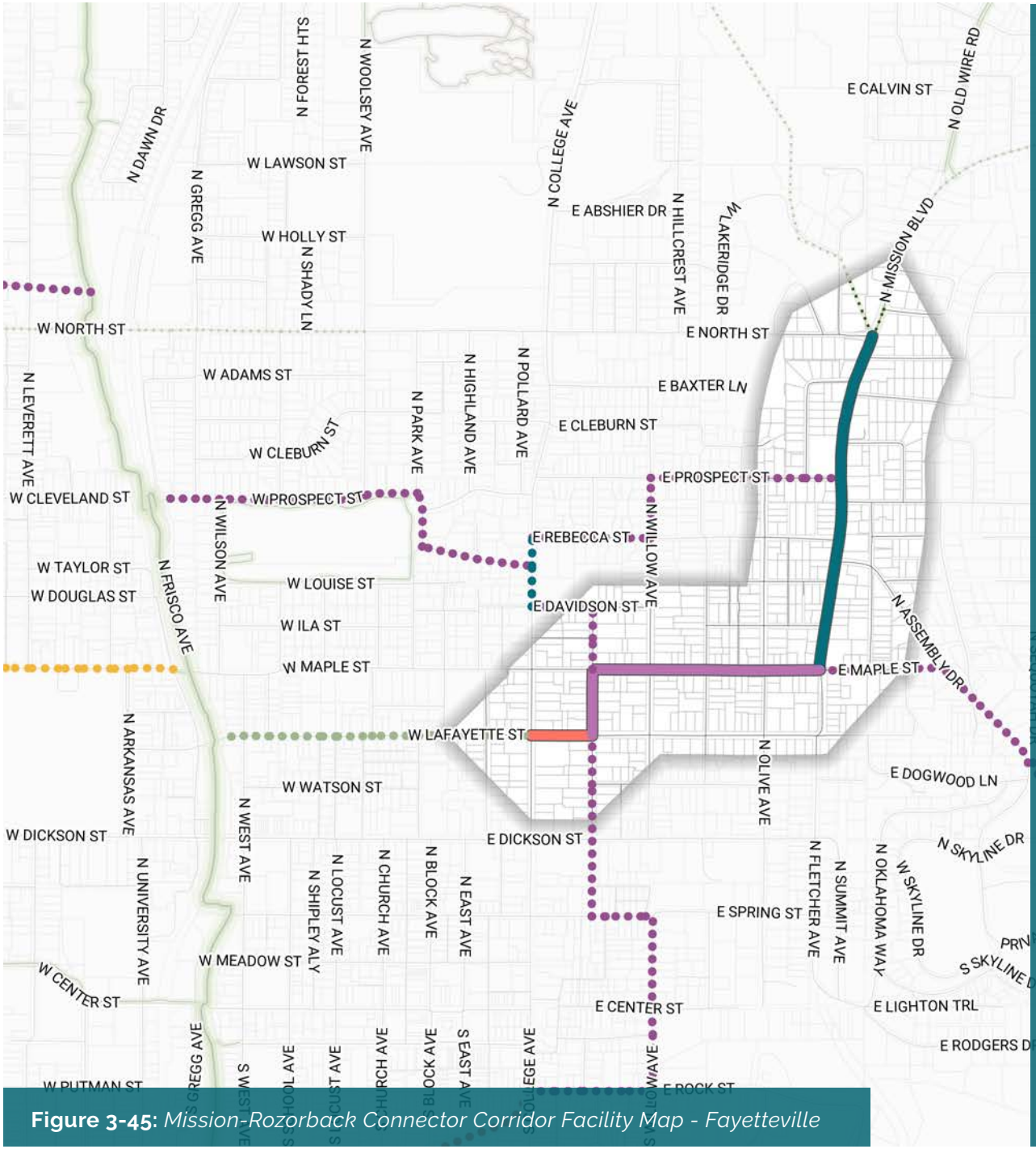


Figure 3-45: *Mission-Rozorback Connector Corridor Facility Map - Fayetteville*

Mission-Razorback Connector

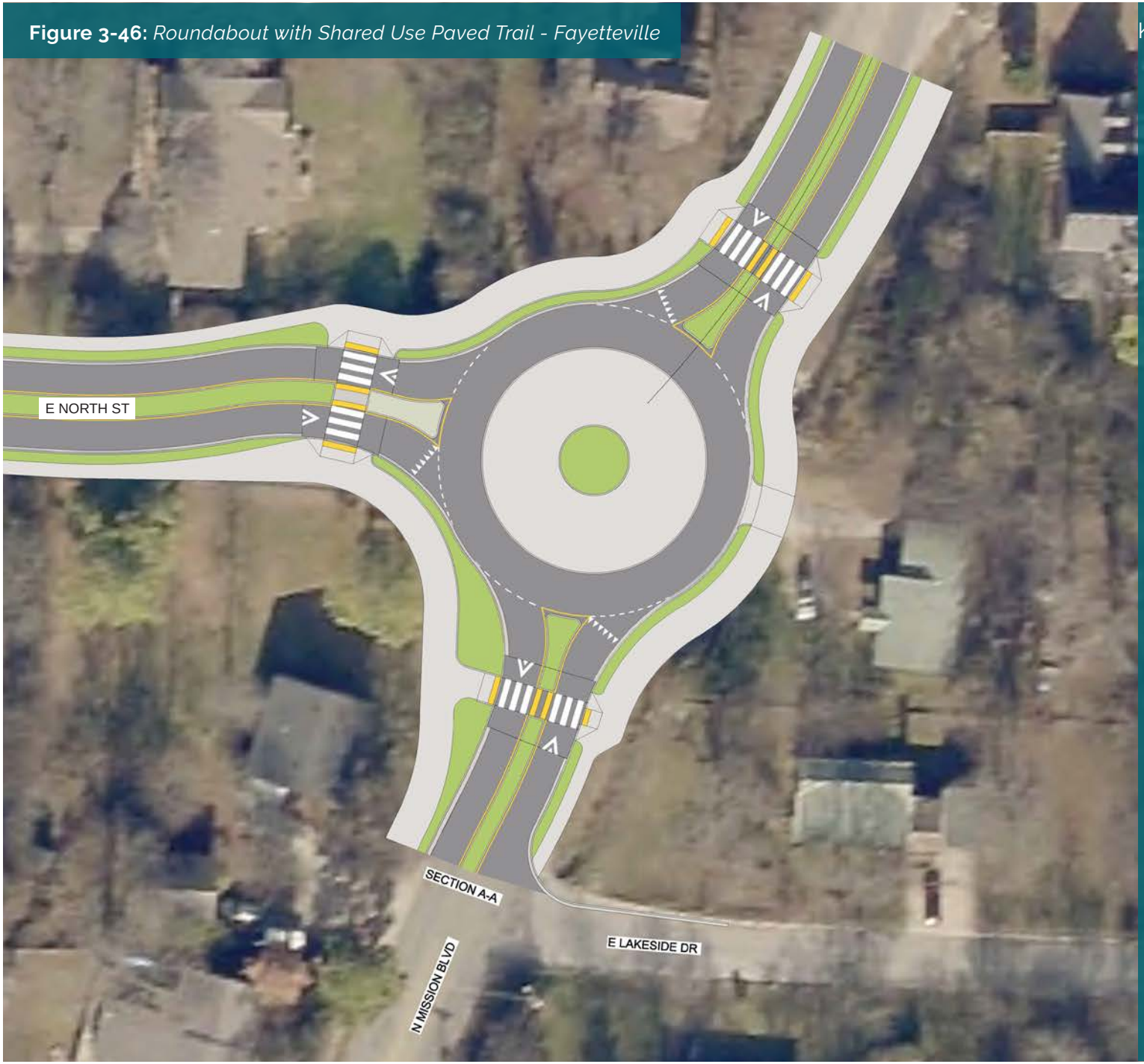
Using N Mission Boulevard and W Lafayette Street, this corridor connects residential neighborhoods northeast of the urban core directly to the University of Arkansas and the Razorback Regional Greenway. This 1-mile corridor provides a clear bicycle route through downtown with multiple local destinations within blocks of the proposed facility and only minutes from the historic square.

Key destinations include:

- Downtown Fayetteville;
- Razorback Regional Greenway;
- Mission Boulevard and E North Street; and
- University of Arkansas

Connecting into existing and planned bicycle and pedestrian facilities was a critical factor in determining the corridors for concept design. Existing shared use paved trail along N Old Wire Road and planned facilities along E Mission Boulevard drove the design of the proposed roundabout at the N Mission Boulevard/E North Street intersection. A neighborhood greenway facility is proposed along Maple Street before transitioning to directional protected bike lanes along Lafayette Street to College Avenue and a bicycle climbing lane that contines to the greenway.

Figure 3-46: *Roundabout with Shared Use Paved Trail - Fayetteville*



Key design features include:

- Wide shared use paved trail around the entire roundabout at N Mission Boulevard and E North Street to allow multidirectional travel.
- Raised crossings and median refuge islands for bicycles and pedestrians on all approaches of the roundabout.

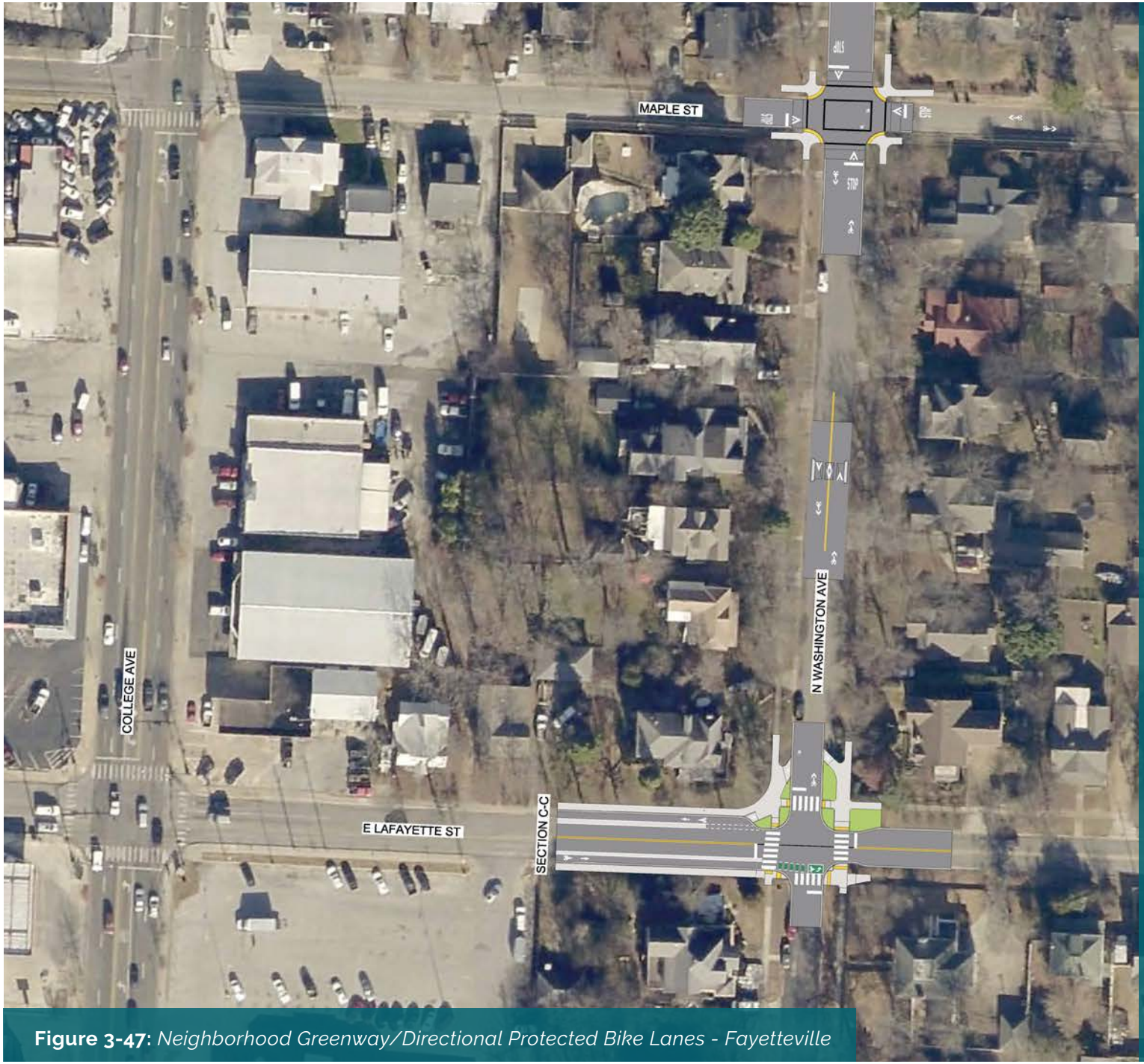


Figure 3-47: *Neighborhood Greenway/Directional Protected Bike Lanes - Fayetteville*

Key design features include:

- Narrowing travel lanes to eleven feet to reduce crossing distances at stop controlled and unsignalized intersections.
- Ramps from neighborhood greenway to bicycle and pedestrian mixing zone for transition to potential directional protected bike lanes toward College Avenue.
- Raised intersection at Maple Street and Washington Street to reduce speeds for neighborhood greenway turning movements.

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4

IMPLEMENTATION

IMPLEMENTATION PLAN

With nearly 1,800 miles of shared use and bicycle facilities recommended in the Northwest Arkansas Regional Bicycle and Pedestrian Master Plan, it is easy to be overwhelmed with where to start establishing a connected, low stress network. The process employed to develop the Bicycle Infrastructure Network was specifically designed to look beyond the vastness of these recommendations, focusing simply on what needs to be accomplished now. The project team worked with stakeholders to determine today's critical corridors for bicycle travel, zeroing in on targeted actions that can be immediately taken to realize real change for bicycling in Northwest Arkansas.

While completing the network planning and conceptual design process was important and necessary, implementation of projects identified in this document is the ultimate desired outcome. To this end, an implementation framework has been crafted, including:

- **Cost Estimates** by typical cross section that can be applied to the larger priority network as additional corridors are advanced;
- **Network strategies** for each community to move recommendations to reality;
- **Priority Network Plans** present the broader network that should be pursued once the initial corridor concepts have been implemented; and
- **Variables that Influence Facility Type Selection** outline the areas that individual local governments should consider when selecting bicycle facility types to best suit the needs of their community.

COST ESTIMATES

Order-of-magnitude opinion of probable costs by linear foot were generated for each typical cross section developed for the priority corridors. These costs were developed on a linear foot basis for the bikeway facility, so they can be utilized in the future as additional priority corridors are considered for implementation. In the network strategy that is presented later in this chapter, the linear foot costs have been applied to each recommended project based on its total length.

Costs were developed by identifying pay items and establishing rough quantities. Unit costs are based on 2019 dollars and were assigned based on historical cost data from the Arkansas Department of Transportation (ArDOT) and other sources. Please note that the estimates do not include any costs for easements, right-of-way acquisition, utility relocation, general roadway improvements, major drainage modifications, or ongoing maintenance. A 20% contingency has been included. The estimates are intended to be general and used for planning purposes. Construction costs will vary based on the ultimate project scope (i.e., potential combination or segmentation of projects) and economic conditions at the time of construction. Planning level cost estimates are provided to adequately prepare local and regional staff to budget the funding necessary to complete each project based upon facility type. The planning level costs are intended to be higher than the detailed design cost to ensure projects have enough funding from the start through the budgeting or grant process. Table 4-1 presents linear foot costs by cross section for each bikeway type.

Table 4-1: *Linear Foot Cost by Cross Section*

CROSS SECTION	NOTES	COST PER LINEAR FOOT
A1: Shared Slow Street	At existing grade	$561.00
A2: Shared Slow Street	Flush street w/decorative pavers	$2,100.00
B1: Neighborhood Greenway	Restriping, no parking	$19.00
B2: Neighborhood Greenway	Restriping w/parking	$29.00
C: Yield Roadway/Advisory	Restriping	$11.00
D: Directional Bike Lanes	Restriping	$29.00
E1: Shared Use Paved Trail	One side, new curb and gutter, no buffer	$132.00
E2: Shared Use Paved Trail	One side, existing curb and gutter, grass buffer	$101.00
F1: Shared Use Paved Trail	Both sides, new curb and gutter, no buffer	$242.00
F2: Shared Use Paved Trail	Both sides, existing curb and gutter, grass buffer	$195.00
G1: Directional Protected Bike Lanes	Reallocating existing right-of-way	$308.00
G2: Directional Protected Bike Lanes	Roadway widening, modifying existing drainage	$370.00
G3: Directional Protected Bike Lanes	Roadway widening, moving drainage	$453.00
H1: Two-way Protected Bike Lane	Reallocating existing right-of-way	$258.00
H2: Two-way Protected Bike Lane	Roadway widening	$240.00


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TARGETED BICYCLE NETWORK STRATEGIES

Two-page network strategies have been created for each community to advance the projects within its jurisdiction. These are intentionally succinct to allow them to be "torn out" of the plan and used as a checklist to move projects forward. The first page of each network strategy details individual priority projects that should be advanced. Individual projects follow the intent and vision of the Northwest Arkansas Regional Bicycle and Pedestrian Master Plan, which had ample public vetting. Individual projects have been developed closely with local municipal staff to ensure they have the buy-in of those who will be directly responsible for their implementation. If projects cannot be completed in their entirety, smaller priority segments have been identified and listed in each network strategy. The second page outlines community-specific key first steps and top challenges, as well as ideas for implementation strategies, tools, and resources that can be crafted for each community. These were initially conceived through brainstorming with the steering committee and have been refined for inclusion in each network strategy.

Table 4-2: *City of Bentonville Network Strategy*

PROJECT	CONNECTIONS	FACILITY TYPES	LENGTH	ESTIMATED COST
Coler Creek-Downtown Connector	• Merchants Park • Elm Tree Elementary School • Coler Creek Park • Downtown Bentonville • Razorback Regional Greenway	• Shared use paved trail • Directional protected bike lanes • Neighborhood greenway • Advisory shoulders • Shared slow street (flush) • Roundabout	3.0 miles	$5,836,775
C Street-14th Street Link	• Bentonville Community Center • Downtown Bentonville • Mary Mae Elementary School • Thaden School	• Shared use paved trail • Advisory shoulders • Two-way protected bike lane • Raised crossing • Median refuge	2.1 miles	$670,258
8th Street Bikeway	• Applegate Trail • New Walmart Home Office • Centerton residential areas	• Shared use paved trail • Neighborhood greenway • Two-way protected bike lane • Raised crossings	4.2 miles	$3,887,409
		TOTAL	**9.3 miles**	

IF COMPLETE CORRIDORS CANNOT BE IMMEDIATELY IMPLEMENTED, **IMPLEMENT THESE SEGMENTS FIRST**

PRIORITY	CORRIDOR	SEGMENT DESCRIPTION
B1	**8th Street Bikeway**	• Raised mid-block crossing at intersection of Arrowhead Drive and SW 8th Street connecting to new trail (Coler Creek) • Two-way protected bike lane on SW 8th Street between Arrowhead Drive and SW 1st Street shared use paved trail • Includes reallocation of right-of-way but can be fit within existing curbs
B2	**Coler Creek-Downtown Connector**	• Advisory shoulders on NW G Street for one block between NW 3rd Street and NW 2nd Street • Directional protected bike lanes NW 2nd Street between NW G Street and the Bentonville City Square
B3	**C Street-14th Street Link**	• Advisory shoulders along SE C Street and SE B Street between SE 14th Street (Hwy 102) and downtown • Two-way protected bike lanes along short offset on SE 2nd Street and SE 3rd Street

FIRST 3 STEPS

What are the **First 3 Steps** that should be taken to implement one of Bentonville's recommended projects?

1. Advance conceptual design to full concept for the entire project; line drawing is sufficient; need basic detail to be able to understand project extents, opportunities, and challenges
2. Perform boundary and topographic survey
3. Identify funding; consider local, state, federal, and private sources

TOP CHALLENGES

What are Bentonville's **Top Challenges** to implementing its recommended projects?

1. Securing funding
2. Working with ArDOT; this includes anything on, crossing, or in proximity to their system; response times slow projects
3. Gaining public support and buy-in
4. Solving drainage and utility issues

STRATEGIES, TOOLS, AND RESOURCES

The City of Bentonville and the NWARPC should work together to craft **Strategies, Tools, and Resources** that will assist in implementation.

- Compile available statistics, benchmarks, and performance measures for similar facilities to assist in "selling" projects to engineers, ArDOT, and the public. Specific information on usage/new riders, improved connectivity, and return on investment should be documented. As facilities are implemented, document before/after data to benchmark success.
- Collect graphics, photographs, and videos of similar facilities "in action." These will demonstrate the utility of various facility types and help to educate elected officials, City personnel, ArDOT staff, and the public on the advantages of having a connected network.
- Institute a campaign of educational sessions and materials to improve understanding and support of various facility types. Such could include transportation "academy" information sessions, white papers, brochures, and online resources

Table 4-3: *City of Rogers Network Strategy*

PROJECT	CONNECTIONS	FACILITY TYPES	LENGTH	ESTIMATED COST
13th Street Bikeway	• Northwest Park • Greer Lingle Middle School • Elmwood Middle School • Bonnie Grimes Elementary School	• Shared use paved trail • Directional protected bike lanes • Roundabout • Raised crossing	4.4 miles	$4,590,177*
Olive Street Trail	• Reagan Elementary School • Greer Lingle Middle School • Rogers Activity Center	• Shared use paved trail • Roundabouts (2) • Median refuge • Raised crossing	3.6 miles	$4,442,763*
Crosstown Trail	• Rogers Aquatics Center • Elmwood Middle School • Mercy Hospital Northwest Arkansas • Razorback Greenway • Rogers Heritage High School	• Shared use paved trail • Raised crossings	4.7 miles	$2,576,619
		TOTAL	**12.7 miles**	

IF COMPLETE CORRIDORS CANNOT BE IMMEDIATELY IMPLEMENTED, **IMPLEMENT THESE SEGMENTS FIRST**

PRIORITY	CORRIDOR	SEGMENT DESCRIPTION
R1	**13th Street Bikeway**	• New Hope Road protected intersection with slip lane • Shared use paved trail on school property as short-term solution until directional protected bike lanes are installed • School to school protected bike lanes would be next priority (New Hope Road to Olrich Street)
R2	**Olive Street Trail**	• Olive Street and 3rd Street roundabout • Mid-block raised crossing on Olive Street for alley connection to downtown
R3	**Crosstown Trail**	• Olrich Street and 8th Street intersection with mountable truck aprons • Connect to existing shared use paved trail on east side of 8th Street • Continue shared use paved trail along Olrich Street to the west as next phase (south side)

* Cost includes roundabouts for each project. Proposed roundabout at 13th Street and Olive Street will serve both bikeway corridors.

FIRST 3 STEPS

What are the **First 3 Steps** that should be taken to implement one of Rogers' recommended projects?	1. Prioritize bicycle network projects in relation to other City of Rogers' planned projects 2. Identify funding; consider local, state, federal, and private sources 3. Build political will to implement priority projects through education and "selling" of the benefits of a connected bicycle network

TOP CHALLENGES

What are Rogers' **Top Challenges** to implementing its recommended projects?	1. Obtaining right-of-way, coordinating utilities, and managing the real estate implications of projects 2. Securing funding 3. Political backlash based on the impacts of bicycle projects

STRATEGIES, TOOLS, AND RESOURCES

The City of Rogers and the NWARPC should work together to craft **Strategies, Tools, and Resources** that will assist in implementation.	• Develop a Safe Routes to School (SRTS) partnership to advance priority projects. By working with the Rogers School District to emphasize the benefits of SRTS and connectivity between neighborhoods and schools, the City can build support, identify funding, and implement priority projects. • Compile available statistics, benchmarks, and performance measures for similar facilities to assist in "selling" projects to engineers, ArDOT, and the public. Specific information on usage/new riders, improved connectivity, and return on investment should be documented. As facilities are implemented, document before/after data to benchmark success. • Leverage Northwest Arkansas' success at being a regional community. By working together and continuing to embrace regionalism, it is possible to claim and build on everyone's accomplishments. Just as the Razorback Regional Greenway has provided a regional recreational experience, it can also serve as a strong spine for connecting a broader transportation network through the implementation of priority projects. Adjacent communities collaborating on priority projects will be essential for building support and implementing priority projects.

Table 4-4: *City of Springdale Network Strategy*

PROJECT	CONNECTIONS	FACILITY TYPES	LENGTH	ESTIMATED COST
Springdale-Johnson Bikeway	• Downtown Springdale • Johnson Square • Clear Creek Trail	• Directional protected bike lanes • Shared use paved trail • Median refuges • Raised crossing	4.8 miles	$8,423,203
40th Street-Downtown Connector	• Downtown Springdale • Murphy Park • Springdale Public Library • Westwood Elementary School • Walker Elementary School • Randall Tyson Recreation Complex	• Shared use paved trail • Raised intersection • Raised crossings	3.9 miles	$3,998,828
Don Tyson Trail	• Arvest Ballpark • Helen Tyson Middle School • Tyson Foods • Razorback Regional Greenway	• Shared use paved trail • Median refuges	4.1 miles	$2,218,012
			TOTAL	**12.8 miles**

IF COMPLETE CORRIDORS CANNOT BE IMMEDIATELY IMPLEMENTED, **IMPLEMENT THESE SEGMENTS FIRST**

PRIORITY	CORRIDOR	SEGMENT DESCRIPTION
S1	**Springdale-Johnson Bikeway**	• Intersection of Carly Road and Johnson Mill Boulevard with shared use crossings to connect directional protected bike lanes to Johnson Square • Continue shared use paved trail south into Johnson, connecting to Clear Creek Trail
S2	**40th Street-Downtown Connector**	• Shared use paved trail along McRay Avenue, S. West End Street, Rogers Avenue, and S. Pleasant Street to connect Westwood Elementary School to protected bike lanes along Maple Avenue
S3	**Don Tyson Trail**	• Shared use paved trail on north side of Don Tyson Parkway between S. 56th Street and S. 48th Street; fits within existing bridge width • Interchange improvements, including ramps, raised crossing, and Helen Tyson Middle School connection

FIRST 3 STEPS

What are the **First 3 Steps** that should be taken to implement one of Springdale's recommended projects?

1. Work with adjacent jurisdictions to implement priority projects that connect communities
2. Build community buy-in and political will to implement priority projects through education and "selling" of the benefits of a connected bicycle network
3. Identify funding; consider local, state, federal, and private sources

TOP CHALLENGES

What are Springdale's **Top Challenges** to implementing its recommended projects?

1. Increasing elected officials understanding of the benefits of a connected bicycle network
2. Gaining public buy-in in the face of project impacts (i.e., specifically right-of-way acquisition)
3. Securing funding

STRATEGIES, TOOLS, AND RESOURCES

The City of Springdale and the NWARPC should work together to craft **Strategies, Tools, and Resources** that will assist in implementation.

- Institute a campaign of educational sessions and materials to improve understanding and support of various facility types. Such could include transportation "academy" information sessions, white papers, brochures, and online resources.
- Compile available statistics, benchmarks, and performance measures for similar facilities to assist in "selling" projects to engineers, ArDOT, and the public. Specific information on usage/new riders, improved connectivity, and return on investment should be documented. As facilities are implemented, document before/after data to benchmark success.
- Collect graphics, photographs, and videos of similar facilities "in action." These will demonstrate the utility of various facility types and help to educate elected officials, City personnel, ArDOT staff, and the public on the advantages of having a connected network.
- Leverage Northwest Arkansas' success at being a regional community. By working together and continuing to embrace regionalism, it is possible to claim and build on everyone's accomplishments. Just as the Razorback Regional Greenway has provided a regional recreational experience, it can also serve as a strong spine for connecting a broader transportation network through the implementation of priority projects. Adjacent communities collaborating on priority projects will be essential for building support and implementing priority projects.

Table 4-5: *City of Fayetteville Network Strategy*

PROJECT	CONNECTIONS	FACILITY TYPES	LENGTH	ESTIMATED COST
Mission-Razorback Connector	• Downtown Fayetteville • Razorback Regional Greenway • Mission Boulevard • E. North Street • University of Arkansas	• Shared use paved trail • Neighborhood greenway • Directional protected bike lanes • Roundabout • Raised intersetion/crossings	1 mile	$1,813,100
Three Trails Bikeway	• Mt. Comfort Road • Scull Creek Trail • Meadow Valley Trail • Lewis Soccer Complex • Woodlawn Junior High School	• Shared use paved trail • Directional protected bike lanes • Median refuge • Raised crossing	2.2 miles	$2,677,600
		TOTAL	**3.2 miles**	

IF COMPLETE CORRIDORS CANNOT BE IMMEDIATELY IMPLEMENTED, **IMPLEMENT THESE SEGMENTS FIRST**

PRIORITY	CORRIDOR	SEGMENT DESCRIPTION
F1	**Three Trails Bikeway**	• Protected intersection at Garland Avenue and W. Sycamore Street and directional protected bike lanes east on Sycamore to Razorback Greenway, including reallocation of the right-of-way along W. Sycamore Street • Option for shared use paved trail on Garland Avenue for short section between W. Sycamore Street and W. Deane Street
F2	**Mission-Razorback Connector**	• Neighborhood greenway connecting Mission Boulevard to E. Lafayette Street • Traffic calming (raised intersection) at Maple Street/N. Washington Avenue intersection • Traffic calming (speed humps) along Maple Street and N. Washington Avenue

FIRST 3 STEPS

What are the **First 3 Steps** that should be taken to implement one of Fayetteville's recommended projects?

1. Build community buy-in and political will to implement priority projects through education and "selling" of the benefits of a connected bicycle network, emphasizing increased safety (i.e., address distracted users and protecting most vulnerable users)
2. Perform detailed design
3. Consider timing through the scheduling of project implementation

TOP CHALLENGES

What are Fayetteville's **Top Challenges** to implementing its recommended projects?

1. Mitigating potential loss of parking
2. Implementing traffic calming on neighborhood greenways
3. Gaining political buy-in; need for education

STRATEGIES, TOOLS, AND RESOURCES

The City of Fayetteville and the NWARPC should work together to craft **Strategies, Tools, and Resources** that will assist in implementation.

- Compile strategies, guidance, and national best practices regarding on-street parking placement, replacement, and mitigation of loss due to the implementation of bicycle facilities. Specifically, document the return on investment of bicycle infrastructure and its comparison to the economic impact of the loss of on-street parking.
- Utilize and build on the traffic calming guidelines presented in this document. Educate elected officials and community members on the appropriate use of various traffic calming countermeasures.
- Leverage new facilities to generate excitement and momentum for future projects. Plan ribbon cuttings, celebrations, and public outreach/media campaigns to highlight the benefits of new facilities and a more connected network. As facilities are implemented, document before/after data to benchmark success.

PRIORITY NETWORK PLANS

Once the initial corridors presented in the network strategies have been implemented, local governments should begin moving forward the broader priority network that was identified and presented as part of Chapter 3. While these corridors are only dotted lines on maps at this time and have not been developed to the same level of detail as the eleven corridor concepts, this document provides the tools necessary to advance them to implementation. Using the cross section by facility type templates, cost estimates, and design guidance included in this document, communities can formulate the composition of these improvements and funding necessary to implement additional corridors.

VARIABLES THAT INFLUENCE FACILITY TYPE SELECTION

Through the development of the priority network and corridor concepts, it is apparent that a host of bicycle facility types exist and should be customized to each community's distinct needs. Not only will certain facility types "fit" certain communities better, but as a community changes, so should its bicycle facilities. All facilities should respond to the community they serve, while always providing safe and accessible facilities. There are several variables that should be considered when selecting appropriate bicycle facility types.

Each community should evaluate if the proposed bikeway type and alignment is appropriate when funding is available and a more detailed assessment or feasibility study is conducted.

Policy Changes

Policies that guide land use and mobility are generally updated every decade, or as significant changes occur within a community. Various policy changes that could dictate changes in a bicycle facility include:

- **Vision** – A community's vision provides an overarching guide to how a community will grow over a set timeframe. Bikeway projects are often initiated in communities with a stated vision or goal to increase bicycle mode share. Funding is easier to secure with a stated and adopted community supported vision.
- **Complete Streets Initiatives** – Many communities are adopting Complete Streets policies. Complete Streets are roadways designed and operated to provide safe and comfortable access for all roadway users, regardless of age, ability, income, social status, or mode choice. Implementation of a Complete Streets policy communicates that the community supports all modes of transportation through investment in a transportation system that benefits all. Less intensive facilities, like advisory shoulders, may be an initial starting point on many low-volume, low-stress streets as part of a Complete Streets policy. Once a policy has traction, a community may feel empowered to implement more robust, separated facilities. Additionally, sometimes communities use more ambitious projects to promote the benefits of a Complete Streets policy, even in such a policy's infancy.
- **Safe Routes to School (SRTS)** – SRTS programs are designed to enable and encourage school-aged children (K-8 grades) to walk or bike to school, and to make doing so more appealing. There are various levels in which a community and their schools can be involved in this program. Creating a policy with resources to encourage schools to participate in an SRTS program can lead to the identification of gaps in bicycle and pedestrian facilities. Funding for projects identified through SRTS can help transition more modest striped facilities into separated facilities along corridors where the need is greater.

Funding

The selection of facility types may be about need, but it can also be about making the most of available funding. Fully separated bike lanes may not be warranted due to current or projected demand in some communities. In other communities, dedicated funding sources for separated bicycle facilities may not be available. Setting a vision that supports a multimodal approach to transportation is a first step, followed by funding to implement that vision. Equally important to funding is the public messaging of how that funding is spent and the return on investment that is achieved. It is important to note that return on investment is not just about money; return on investment is realized through a host of outcomes, including improved safety, health, connectivity, equity, quality of life, and economics.

Transportation and Land Use Conditions

Different transportation and land use conditions can impact the number and types of bicyclists, ultimately determining the preferred bikeway typology. Conditions that could dictate the type of bicycle facility or facility enhancement could include:

- **Vulnerable Populations –** Areas with a high concentration of children (schools, parks, etc.) and seniors may warrant a separated bicycle facility, even where motor vehicle speeds and volumes are low. These groups may have less confidence in their bicycling abilities or, in the case of children, may be less visible.
- **Higher Density Nodes –** Higher density nodes usually have a mix of land uses which generally lead to shorter distances between destinations and higher rates of walking and bicycling. These locations benefit from separation of bicycle and pedestrian facilities and between bicycle and vehicle lanes.
- **Traffic Vehicle Mix –** Areas with high volumes of trucks and/or buses can increase risk and discomfort for bicyclists. Providing a buffer between a vehicle travel lane and a bike lane along theses corridors and intersections can improve visibility and safety.
- **Curbside Activity –** Conflicts in areas with parked cars or temporarily stopped vehicles can present a risk to the bicyclist. Exposure to curbside loading and unloading can force bicyclists into vehicle travel lanes or into opening doors. Similarly, the presence of street furniture, trash carts, yard debris, and other curbside elements can impact the comfort of bicyclists. Corridors with a consistently high curbside activity may justify protected bicycle facilities.
- **High Peak Hour Volumes –** Some corridors regularly experience high peak hour traffic volumes. At times, this can also occur with peak volumes of bicyclists. Separation of these modes will improve safety and comfort for all modes.

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DESIGN GUIDANCE

FACILITY DESIGN PHILOSOPHY

The material in this section serves as a guide for designing bicycle and pedestrian infrastructure. This document can be used to help engineers and planners understand important considerations as they design safe and comfortable infrastructure in Northwest Arkansas.

POTENTIAL BICYCLE USERS

Why design bicycle infrastructure using these guidelines? Estimates show[1] that most of the US population—upwards of 51-56%—would like to bicycle for some trips but are uncomfortable interacting with typical vehicular traffic. This group, the "Interested but Concerned" category, are most comfortable cycling separated from motorized vehicles.

Conversely, only about 4-7% of the US population are classified as "Highly Confident" bicyclists. They are comfortable sharing the road with motorized vehicles. In the middle, approximately 5-9% are in the "Somewhat Confident" category, comfortable bicycling for short distances with motorized vehicles.

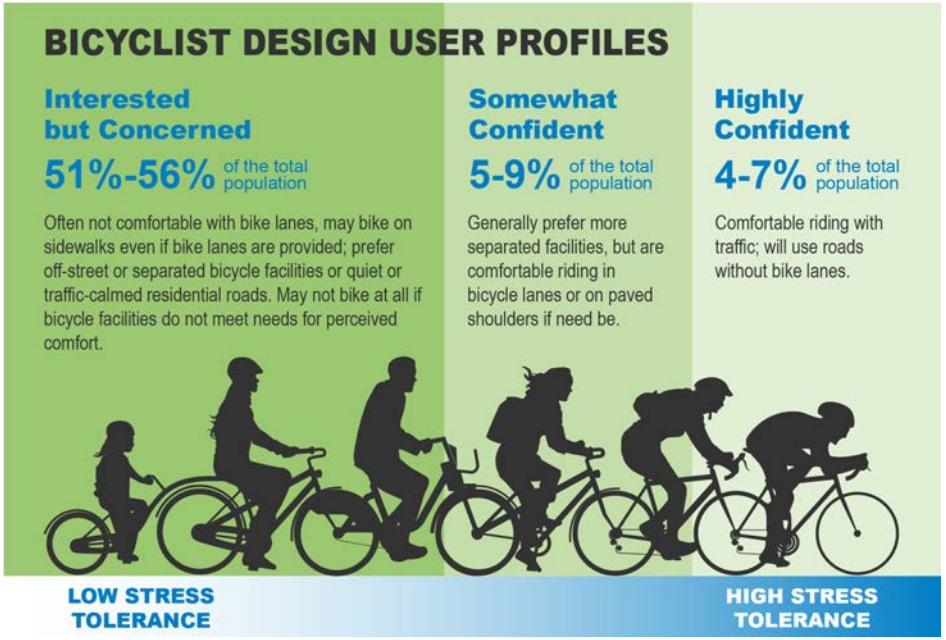
If the goal of the Northwest Arkansas MPO is to increase bicycling, it is important to select facility types that will allow more people to feel comfortable bicycling for trips. Less confident bicyclists (i.e., "interested but concerned," and "somewhat confident") prefer physical separation as traffic volumes and speeds increase.

FACILITY TYPE OVERVIEW

The appropriate bicycle facility types vary based on context, roadway widths, speed, and right of way; not all facilities are suitable for all roadway scenarios and contexts. This section provides design guidance for the following facility types:

- Advisory Shoulder
- Neighborhood Greenway
- Shared Slow Street
- Bike Lanes
- Shared Use Paved Trail
- Directional Protected Bike Lanes
- Two-Way Protected Bike Lanes

Figure 5-1: *Bicycle User Profiles*



1 Dill, D. and N. McNeil. Revisiting the Four Types of Cyclists. In Transportation Research Record 2587. TRB, National Research Council, Washington, DC, 2016.

PLANNED CORRIDORS

The corridors in the plan should be designed to be safe for all ages and abilities and to be appropriate for their contexts. Not all facilities are appropriate for all contexts; for example, a shared use paved trail on both sides of the roadway may not be feasible or an appropriate use of space in an urban setting.

Table 5-1 below identifies the corridor concepts include several bicycle facility types and traverse multiple land use contexts. This table should be used to as a reference when designing the bicycle and pedestrian facilities in this plan.

Table 5-1: *Corridor Concepts by Facility Type and Context*

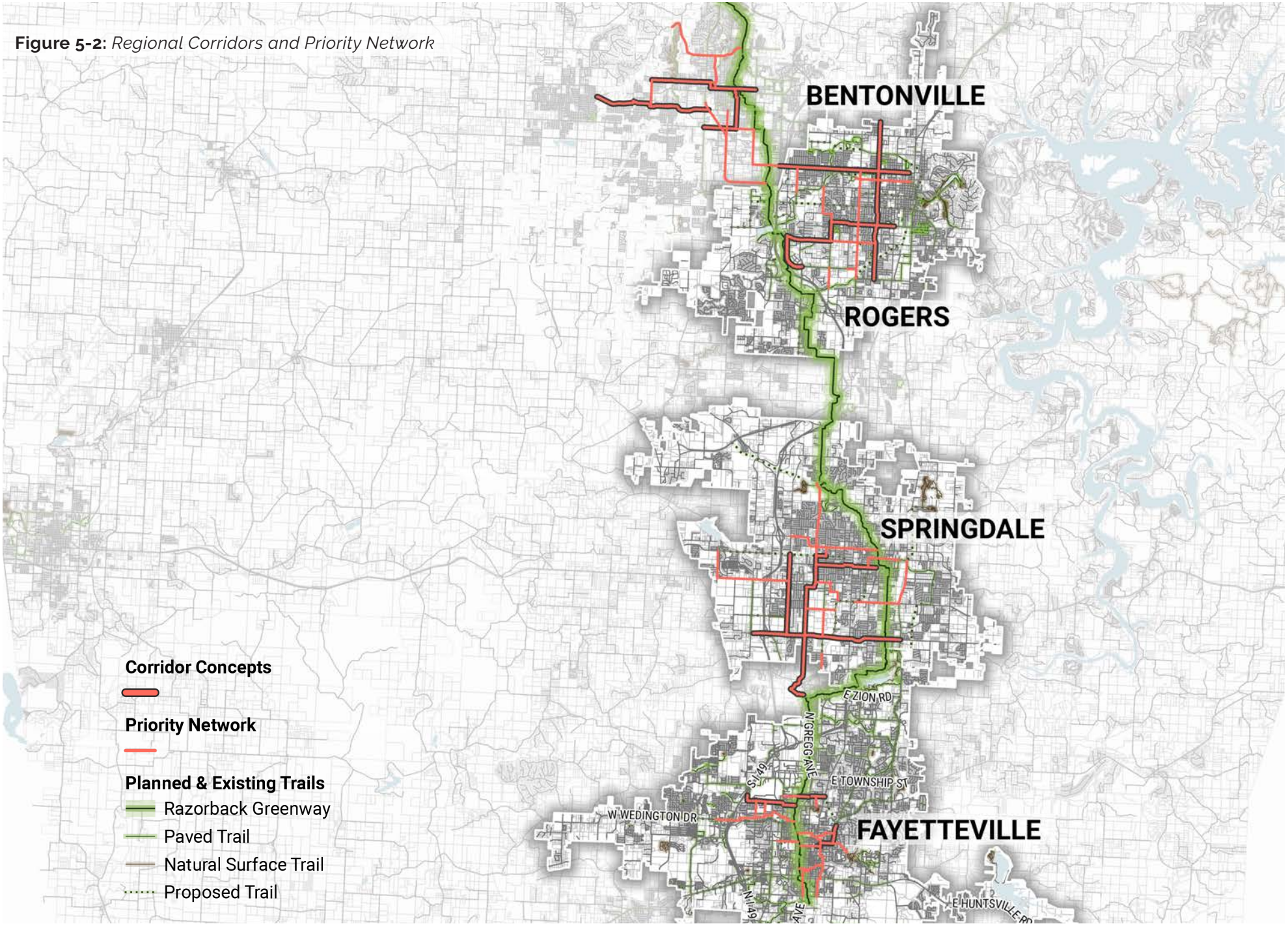
FACILITY TYPE	LAND USE CONTEXT			
	URBAN	SUBURBAN		RURAL
	2-4 Lanes	2-3 Lanes	4+ Lanes	2-4 Lanes
Shared Slow Street	Coler Creek-DT Connector			
Neighborhood Greenway		Mission-Razorback Connector		8th St. Bikeway
Yield Roadway / Advisory Shoulder	Coler Creek-DT Connector, C St. Link	C St. Link		
Shared Use Paved Trail (1 side)	Three Trails Bikeway	Mission-Razorback Connector, Three Trails Bikeway, Coler Creek-DT Connector, 8th St. Bikeway, 13th St. Bikeway, Olive St. Trail, Crosstown Trail, 40th St.-DT Connector	C St. Link, Olve St. Trail, Crosstown Trail, Don Tyson Trail	Three Trails Bikeway, 8th St. Bikeway, Springdale-Johnson Bikeway
Shared Use Paved Trail (2 sides)		Olive St. Trail, 40th St.-DT Connector		
Directional Protected Bike Lanes	Mission-Razorback Connector, Three Trails Bikeway, Coler Creek-DT Connector, 40th St.-DT Connector	Mission-Razorback Connector, Three Trails Bikeway, 13th St. Bikeway, Springdale-Johnson Bikeway	13th St. Bikeway	Springdale-Johnson Bikeway
Two-Way Protected Bike Lane	C St. Link	8th St. Bikeway	8th St. Bikeway	

What is Land Use Context?

A roadway or land use context describes and characterizes the landscape, building form and placement, and roadway network design. This plan identifies three context types:

- Urban: The urban context is charavcterized by historic street networks, high development density, and a mix of land uses. This context is highly favorable toward walking, often features slower vehicular speeds and on-street parking.
- Suburban: This context is comprised largely of single-family residential homes and some multi-family apartments, and auto-oriented commercial development, all with off-street parking.
- Rural: Featuring the least amount of development, the rural context has large lots, single-family homes, agricultural uses, large recreational spaces and undeveloped land. Small islands of denser development around a street network (i.e., rural towns) are also common.

Figure 5-2: *Regional Corridors and Priority Network*



DESIGN GUIDANCE

ADVISORY SHOULDERS AND PAVED SHOULDERS

Paved shoulders and advisory shoulders are rural bicycle and pedestrian facilities that make use of existing or added roadway shoulders for people on bicycles. Paved shoulders are additional pavement widths outside of the travel lanes. Advisory shoulders are paved space for people walking and bicycling on roadways where there is not enough space for typical bike lanes; the facility creates a yield situation in which motorists are able to use the entire roadway when bicyclists and pedestrians are not present but must yield to oncoming traffic when they are present.

Where 4-foot or wider paved shoulders exist already, it is acceptable or potentially desirable to mark them as bike lanes in various circumstances, such as to provide continuity between other facilities. Where a roadway does not have shoulders already, they can be retrofitted to the existing shoulder when the road is resurfaced or reconstructed. In some instances, adequate shoulder width can be provided by narrowing travel lanes—also known as a "lane diet."

CONSIDERATIONS

- If shoulders are marked as bike facilities, they must also be designed as bike lanes at intersections.
- There are several situations in which additional shoulder width should be provided:
  - » *Motor vehicle speeds exceeding 50 mph,*
  - » *Moderate to heavy volumes of traffic, and/or*
  - » *Above-aver¬age use by people bicycling and walking.*
  - » *The placement of rumble strips on paved shoulders may significantly degrade the functionality of paved shoulders for bicyclists.*

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GUIDANCE

- If poorly designed, rumble strips placement impacts the safety and function of paved shoulders. Rumble strips should be placed as close to the edge line as is practicable. Where rumble strips are present, gaps of at least 12' should be provided every 40-60'.
- Use at least 5' paved shoulders where guardrails, curbs, or other roadside barriers are present.
- For more stressful roadway conditions, shoulder width should be increased to a minimum of 6.5'.
- Advisory shoulders should be at least 6' wide. Only in places with constrained right-of-way, a minimum of 4' is acceptable.
- The center travel lane on roadways with advisory shoulders should between 13' and 18'. Additional width in the center travel lane may encourage excessive vehicle speeds. Only in places with constrained right-of-way, 10' travel lanes are acceptable.
- Paved shoulders at intersections can transition to on street bicycle lanes, separated bike lanes, or shared use paths.

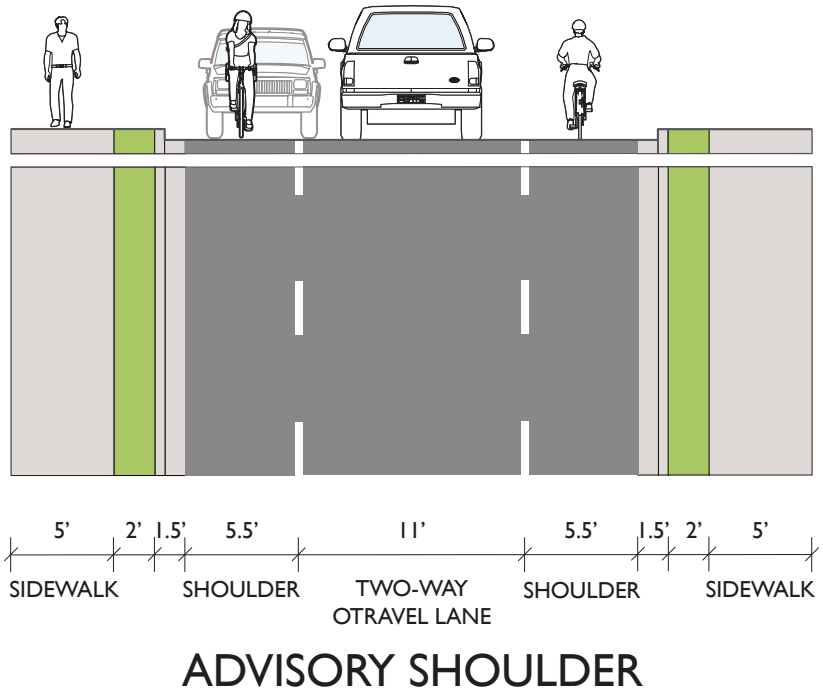
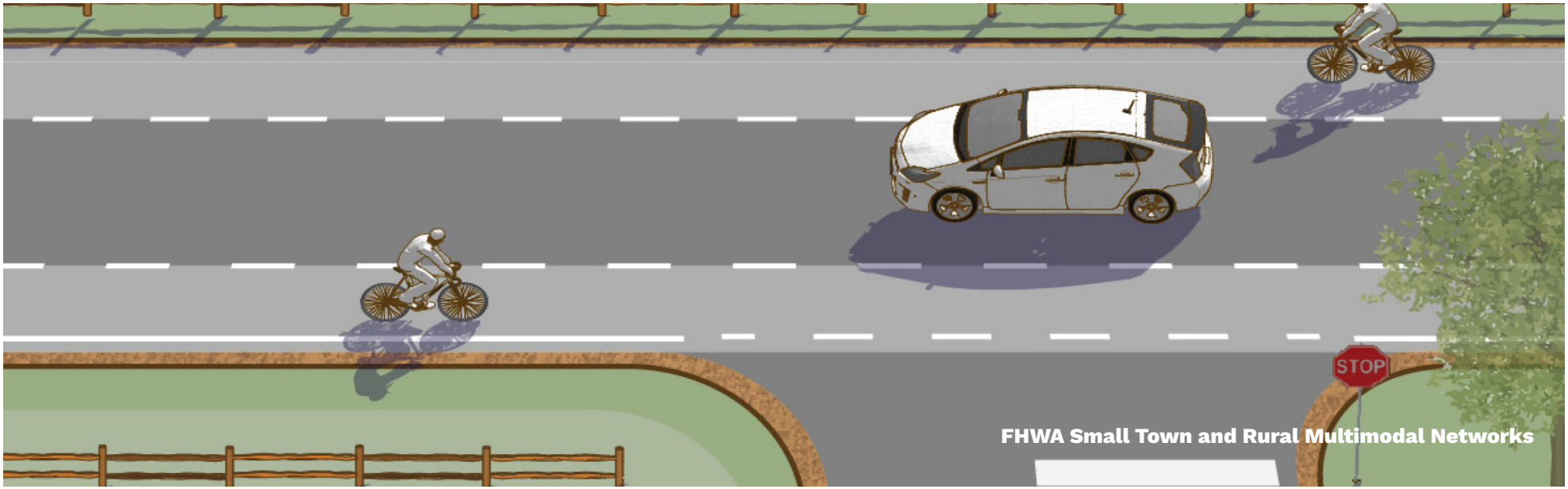


Figure 5-3: *Advisory Shoulder Graphic*



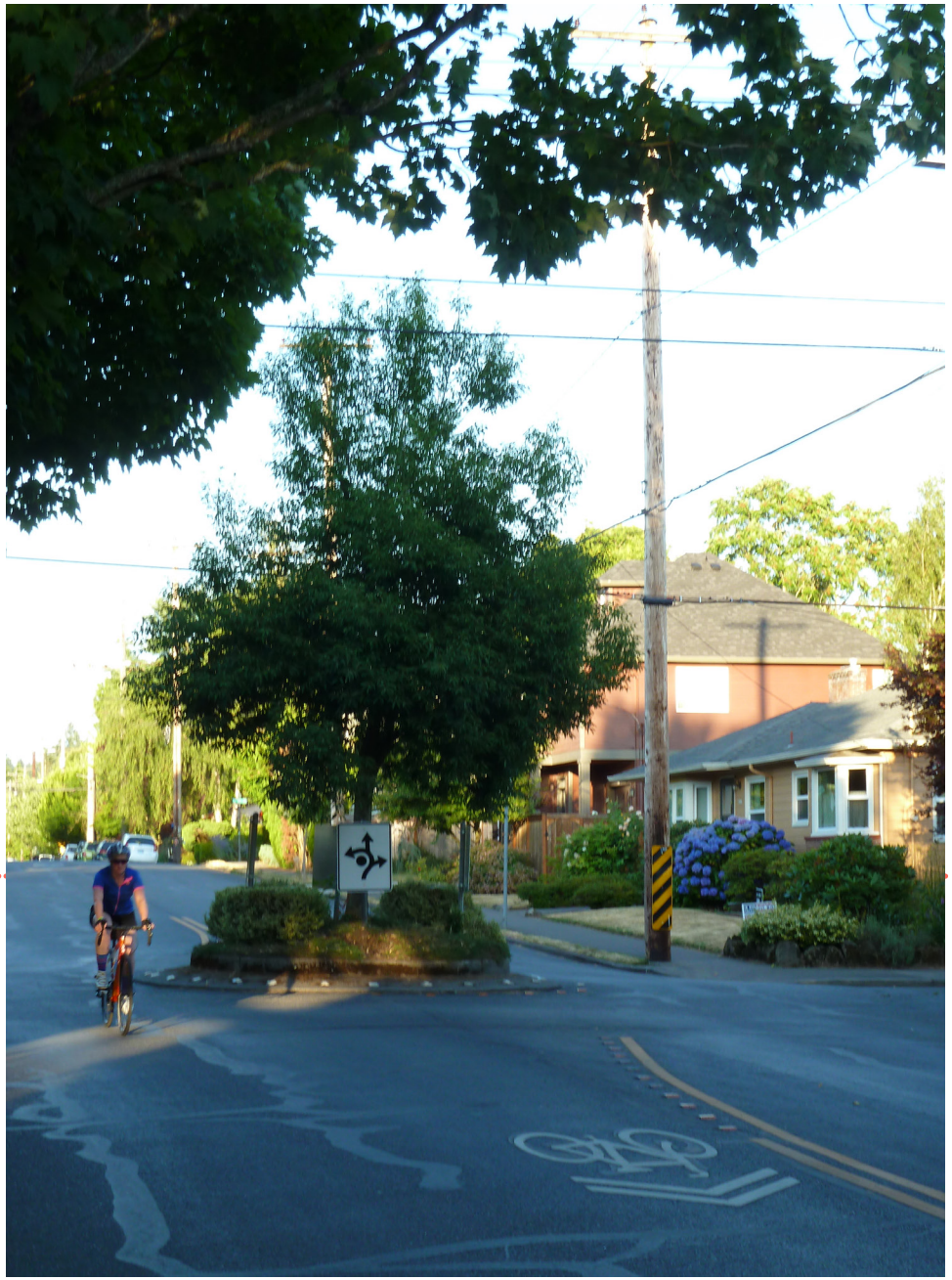
NEIGHBORHOOD GREENWAYS

Neighborhood greenways are suitable for quiet streets, often through residential neighborhoods, and they should be attractive to all ages and abilities. These treatments are designed to prioritize bicycle and pedestrian through-travel, while discouraging motor vehicle traffic and maintaining relatively low motor vehicle speeds. Treatments vary depending on context, but often include elements of traffic calming, including traffic diverters, speed attenuators such as speed humps or chicanes, pavement markings, and signs. Neighborhood greenways are also known as neighborhood bicycle boulevards, and neighborhood bikeways, among other locally-preferred terms.

Many cities already have signed bike routes along neighborhood streets that provide an alternative to traveling on high-volume, high-speed arterials. Applying bicycle boulevard treatments to these routes makes them more suitable for bicyclists of all abilities and can reduce crashes as well.

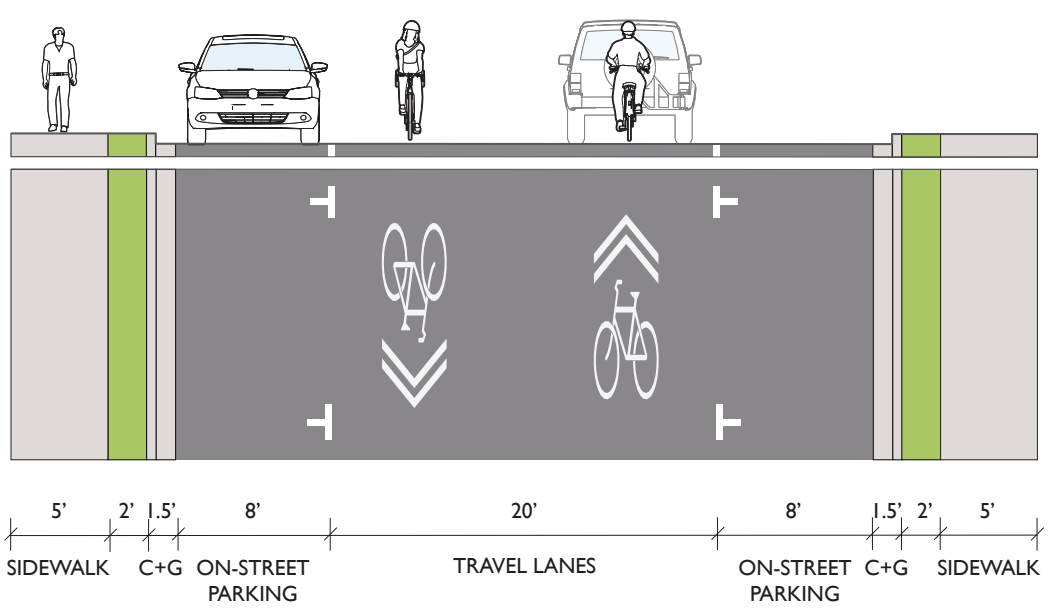
CONSIDERATIONS

- Stop signs or traffic signals should be placed along the bicycle boulevard in a way that prioritizes the bicycle movement, minimizing stops for bicyclists whenever possible.
- Additional treatments for major street crossings may be needed, such as median refuge islands, rapid flash beacons, curb extensions, bicycle signals, and HAWK or half signals.
- Horizontal traffic calming treatments (curb extensions, neck downs, etc.) should be designed to deflect motor vehicle traffic without forcing bicyclists into traffic or into a curb.

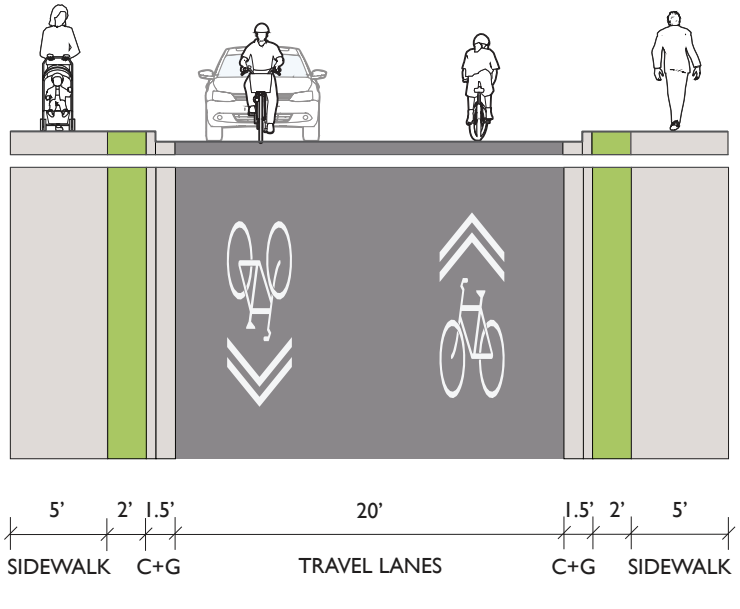


GUIDANCE

- Roadways up to 14' are suitable for neighborhood greenways. Wider travel lanes can encourage higher motorist speeds.
- The Maximum Average Daily Traffic (ADT) for Neighborhood Greenways is 3,000 with the preferred ADT being at or below 1,000.
- Target speeds for motor vehicle traffic are typically around 20 mph; there should be no greater than a 15-mph speed differential between bicyclists and vehicles.



NEIGHBORHOOD GREENWAY



NEIGHBORHOOD GREENWAY

SHARED SLOW STREET

Neighborhood greenways are suitable for quiet streets, often through residential neighborhoods, and they should be attractive to all ages and abilities. These treatments are designed to prioritize bicycle and pedestrian through-travel, while discouraging motor vehicle traffic and maintaining relatively low motor vehicle speeds. Treatments vary depending on context, but often include elements of traffic calming, including traffic diverters, speed attenuators such as speed humps or chicanes, pavement markings, and signs. Neighborhood greenways are also known as neighborhood bicycle boulevards, and neighborhood bikeways, among other locally-preferred terms.

Many cities already have signed bike routes along neighborhood streets that provide an alternative to traveling on high-volume, high-speed arterials. Applying bicycle boulevard treatments to these routes makes them more suitable for bicyclists of all abilities and can reduce crashes as well.

CONSIDERATIONS

- Stop signs or traffic signals should be placed along the bicycle boulevard in a way that prioritizes the bicycle movement, minimizing stops for bicyclists whenever possible.
- Additional treatments for major street crossings may be needed, such as median refuge islands, rapid flash beacons, curb extensions, bicycle signals, and HAWK or half signals.
- Horizontal traffic calming treatments (curb extensions, neck downs, etc.) should be designed to deflect motor vehicle traffic without forcing bicyclists into traffic or into a curb.

GUIDANCE

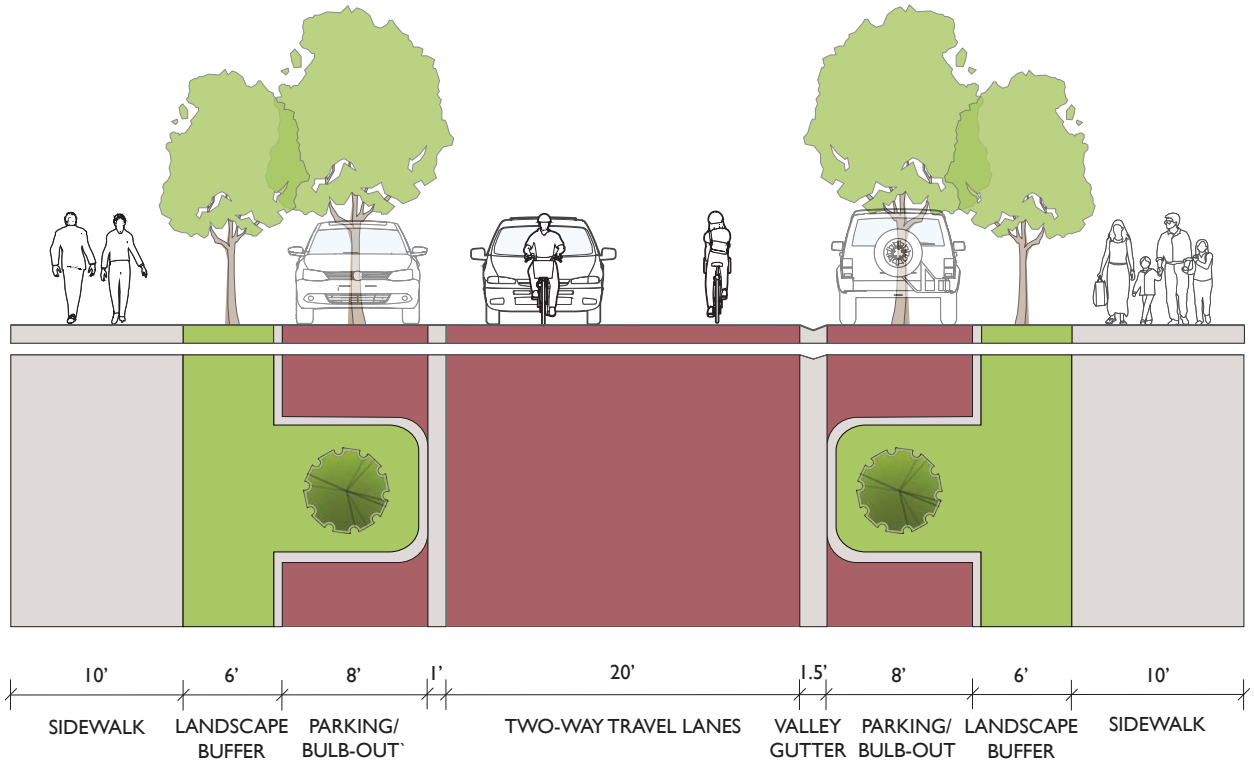
- Roadways up to 14' are suitable for neighborhood greenways. Wider travel lanes can encourage higher motorist speeds.
- The Maximum Average Daily Traffic (ADT) for Neighborhood Greenways is 3,000 with the preferred ADT being at or below 1,000.
- Target speeds for motor vehicle traffic are typically around 20 mph; there should be no greater than a 15-mph speed differential between bicyclists and vehicles.

SPEED-RELATED TERMS & HOW THEY APPLY TO SHARED SLOW STREETS

Target speed – This is the highest speed at which vehicles should operate on a roadway consistent with the level of multimodal activity and adjacent land uses; at this speed, the roadway provides both mobility for motor vehicles and a safe environment for pedestrians, bicyclists, and public transit users (ITE, 2010). In the context of a shared slow street, the target speed is the speed above which a motor vehicle operator would not feel comfortable driving.

Design speed – In the context of a shared slow street, the design speed should be the same as the maximum target speed. The geometry and design criteria used for the street should produce a speed that is no higher than the target speed.

Legal speed limit – This is the speed at which motor vehicles are legally allowed to operate. In some areas this is set at a regional or state level and may be higher than the target speed on a shared slow street. While ideally the speed limit and target speed should match, it is more important to design the street to produce the desired low speeds, regardless of the legal speed limit. In cases where the target speed is lower than the speed limit, the speed limit should not be posted.



SHARED SLOW STREET

BIKE LANES

Bike lanes provide exclusive space for bicyclists in the roadway using lines and symbols on the roadway surface. Bike lanes are typically for one-way travel and are normally provided in both directions on two-way streets and/or on one side of a one-way street; however, two-way bike lanes can be considered in some circumstances.

Bicyclists are not required to remain in a bicycle lane when traveling on a street; they may leave the bicycle lane as necessary to make turns, pass other bicyclists, or to otherwise position themselves. Bike lanes may also be part of temporary solutions that, as funds and space become available, will eventually become a more highly protected facility.

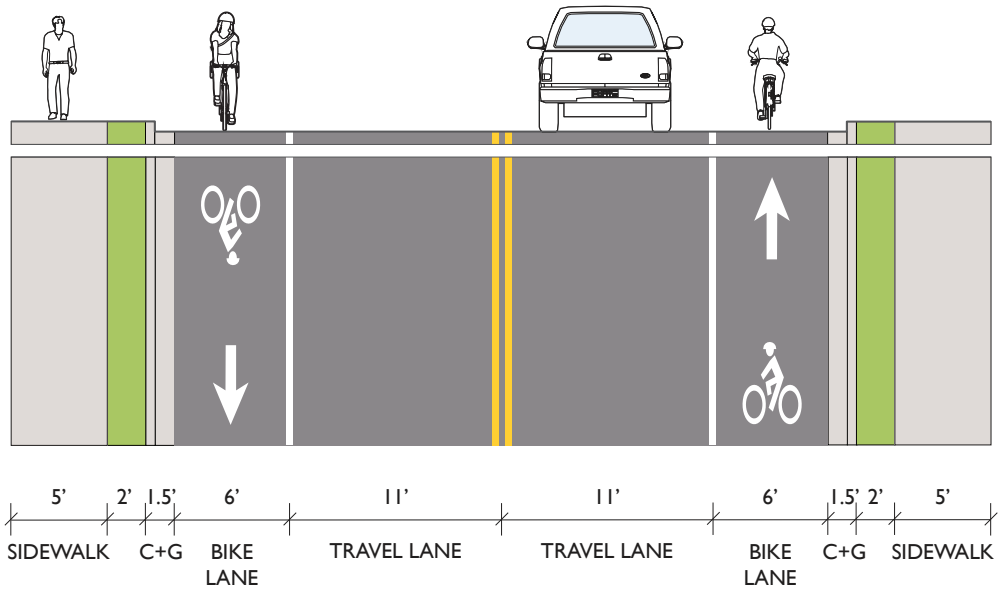
Stopping, standing, and parking in bike lanes may be problematic in areas of high parking demand and deliveries, es¬pecially in commercial areas, but this behavior should be strictly prohibited. In places where delivery vehicles or others regularly need to park, alternative bicycle lane routes should be considered.

CONSIDERATIONS

- Bike lanes are typically installed by reallocating existing street space.
- These facilities can be used on one-way or two-way streets.
- Wider bike lanes or buffered bike lanes are preferable at locations with high parking turnover.
- Bike lanes are likely not appropriate on higher speed, higher volume roadways.

GUIDANCE

- The minimum width of a bike lane adjacent to a curb or parking is 5' exclusive of a gutter, but the desirable width is 6'.
- If 8' or greater is available for a bike lane, consider implementing buffered or separated bike lanes instead. Increased protection encourages more people to use the facility.
- Parking T's or hatch marks can highlight the door zone on constrained corridors with high parking turnover to guide bicyclists away from doors.
- Bike lane striping should be continued through intersections.
- Conflict pavement markings should be considered at driveways and intersections



BIKE LANE

LIFE OF A BIKE LANE

Permanent separation designs provide a high level of protection and often have greater potential for placemaking, quality aesthetics, and integration with features such as green stormwater infrastructure. Agencies often implement permanent separation designs by leveraging private development (potentially through developer contribution), major capital construction, and including protected bike lanes in roadway reconstruction designs.

Permanent separation designs can be expensive, even prohibitively so. Separated bike lanes have been implemented in many cases as low-cost retrofit or demonstration projects (e.g. using flex posts and paint within the existing right-of-way). These projects allow for quick implementation, responsiveness to public perception and on-going evaluation. Separation types for short-term separated bike lane designs often include non-permanent separation, such as flexible delineator posts, planters or parking stops. Pilot projects allow the implementing agency to:

- Test the separated bike lane configuration for bicyclists and traffic operations,
- Evaluate public reaction, design performance, and safety effectiveness,
- Make changes if necessary, and
- Transition to permanent design as funds become available.

BICYCLE CLIMBING LANES

Bicycling can be intimidating in places where there are topography challenges. Steep hills can often deter people bicycling, especially when there is no bicycle infrastructure. Typically, people bicycle slower uphill than they would in a less strenuous environment, and they may swerve more notably while exerting additional effort to get up a hill. In places where there are steep changes in terrain, bicyclists benefit from a bicycle climbing lane. Bicycle climbing lanes make or expand delineated space for bicyclists in hilly conditions to help people feel more comfortable to bicycle at their desired speed with additional space.

Bicycle climbing lanes may be implemented for bicyclists in settings where there is no existing bike lane at steep grades. By creating a non-continuous bike lane on the uphill direction on the roadway, bicyclists are given their own space.

Bicycle climbing lanes may also be implemented in the form of expanding existing bicycle lanes. The wider bike lane creates additional separation from faster, motorized traffic. It also allows for more able bicyclists to pass others while remaining in delineated space.

To give bicyclists additional comfort on roads with higher speed differentials, protected climbing lanes may be appropriate. Protected climbing lanes provide horizontal and vertical separation between motorized traffic and the bike lane. Flex posts or other physical separators (like concrete curbs) help people to feel even more comfortable when bicycling slower up hills.

CONSIDERATIONS

- Climbing lanes should not be used as a substitution for safer, more connected, and more protected infrastructure. If roadway conditions warrant a separated facility or buffered facility, a climbing lane alone may not be appropriate to protect bicyclists from motorized traffic.
- When vertical separation is introduced, this should be maintained the entire uphill direction. If constrained right of way exists, vertical elements can be disconnected or eliminated on the downhill direction, but consider continuing the flex post or curb where feasible.
- Climbing lanes may increase connectivity through more direct routing and a more cohesive network.

GUIDANCE

- Generally, designers should consider adding climbing lanes at grades of 5% of higher. Less experienced bicyclists would benefit from having climbing lanes on roadways of 2% or higher; so in communities where there are many people who are less confident bicyclists, consider lowering the standard.
- Climbing lanes that create non-continuous bike lanes uphill should be at least 6 feet wide like a standard bike lane. Only in constrained right-of-way situations should the bike lane be 5 feet.
- Where there are existing bike lanes, climbing lanes should create an additional 2- 5 feet of climbing space.
- Where possible, end climbing lanes at intersections; this allows bicyclists to choose to continue in a bike lane (where applicable) or to move into mixed traffic.

SHARED USE PAVED TRAIL

A shared use paved trail is a two-way facility that is grade-separated from motor vehicle traffic and used by people walking, wheeling, and bicycling. Shared use paved trails are often called trails when located in an independent alignment (such as a greenbelt or abandoned railroad), When they are follow roadways, they are often called sidepaths. Sidepaths may be desirable along high-volume or high-speed road¬ways, where accommodating the targeted type of bicyclist within the roadway in a safe and comfortable way is impractical. Many people express a strong preference for separating walking and bicycling from motor vehicle traffic when compared to on-street bikeways.

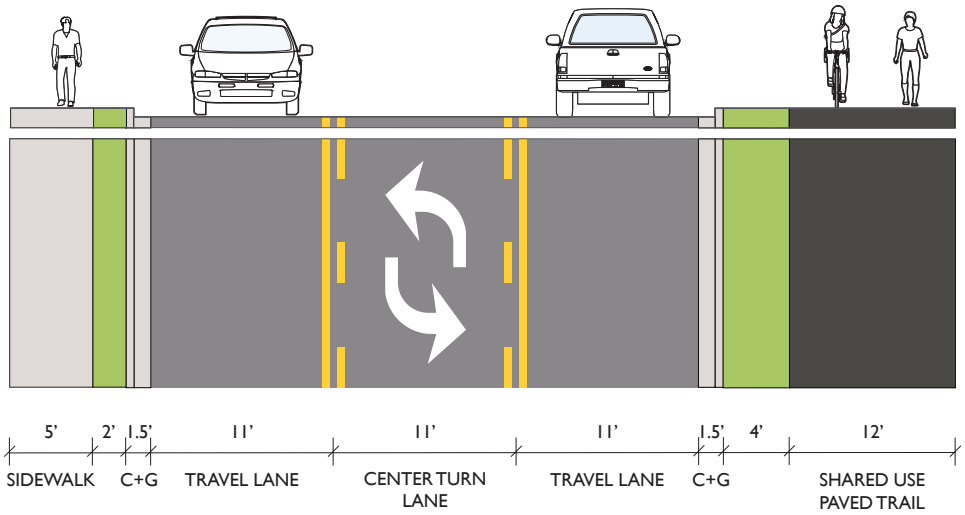
Trail material and width should be determined based on three main characteristics: the number of users, the types of users, and the differences in their speeds. For example, a trail that is used by higher-speed bicyclists and children walking to school may experience conflicts due to their difference in speeds. By widening the trail to provide space to accommodate passing movements, conflicts can be reduced. Also, it can be useful to include soft surface parallel paths alongside hard surface paths; softer surfaces are preferred by some users, such as runners and walkers.

CONSIDERATIONS

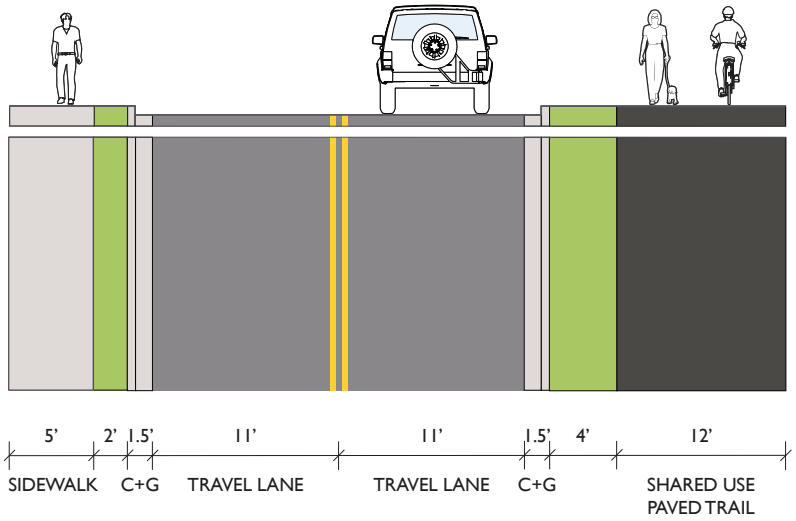
- Shared use paved trails may present increased conflicts between trail users and motor vehicles at intersections and driveway crossings. Conflicts can be reduced by minimizing the number of driveway and street crossings present along a trail and otherwise providing high-visibility crossing treatments.
- Shared use paved trails should not always be considered a substitute to accommodating more confident bicyclists within the roadway. They usually have a lower cyclist design speed than on-street facilities and may not be best for more confident bicyclists who desire to travel at greater speeds. Contextual judgment is required in selecting and designing these facilities.

GUIDANCE

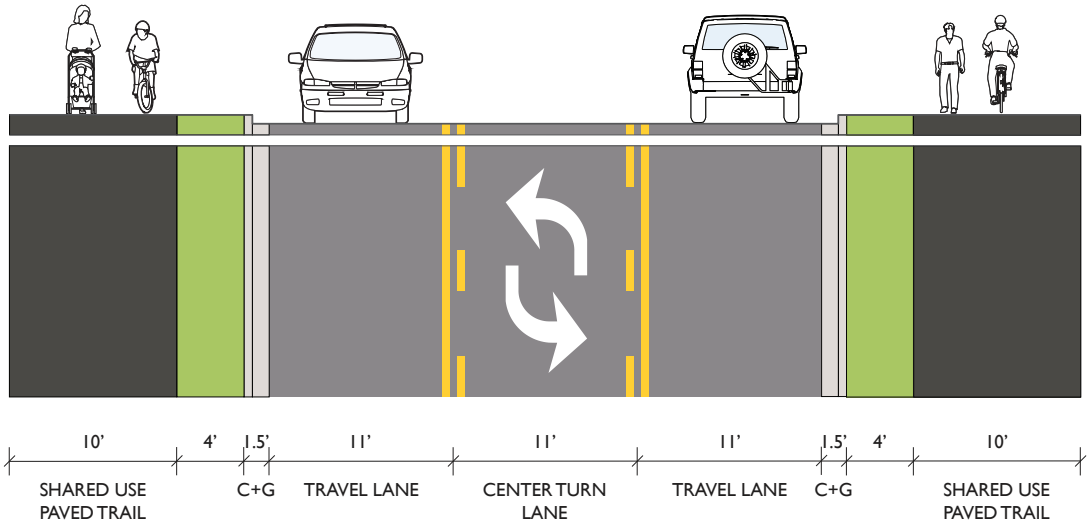
- Shared use paved trail widths should be between 10'–12' feet.
- Widths as narrow as 8' are acceptable for short distances under physical constraint. Warning signs should be considered at these locations.
- A minimum of 11' is required for users to pass with a user traveling in the other direction. It may be beneficial to separate bicyclists from pedestrians by constructing parallel paths for each mode.
- For sidepaths, allow a buffer of 6' where possible. A minimum of 4' between vehicular travel and the sidepath is acceptable in constrained conditions .
- Paths must be designed according to state and national standards. This includes establishing a design speed (typically 18 mph) and designing path geometry accordingly. Consult the AASHTO Guide for the Development of Bicycle Facilities for guidance on geometry, clearances, traffic control, railings, drainage, and pavement design.
- Along the path, vertical objects should be set back at least 2' from the edge of the path to protect users.



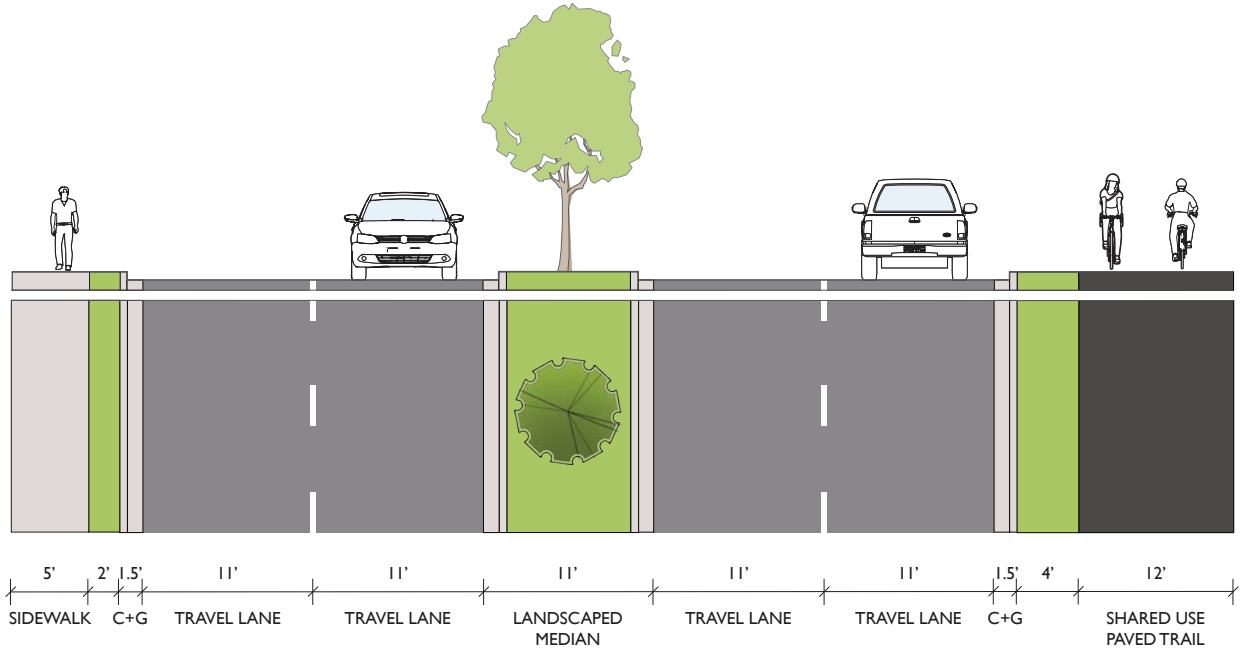
SHARED USE PAVED TRAIL
3 Lanes



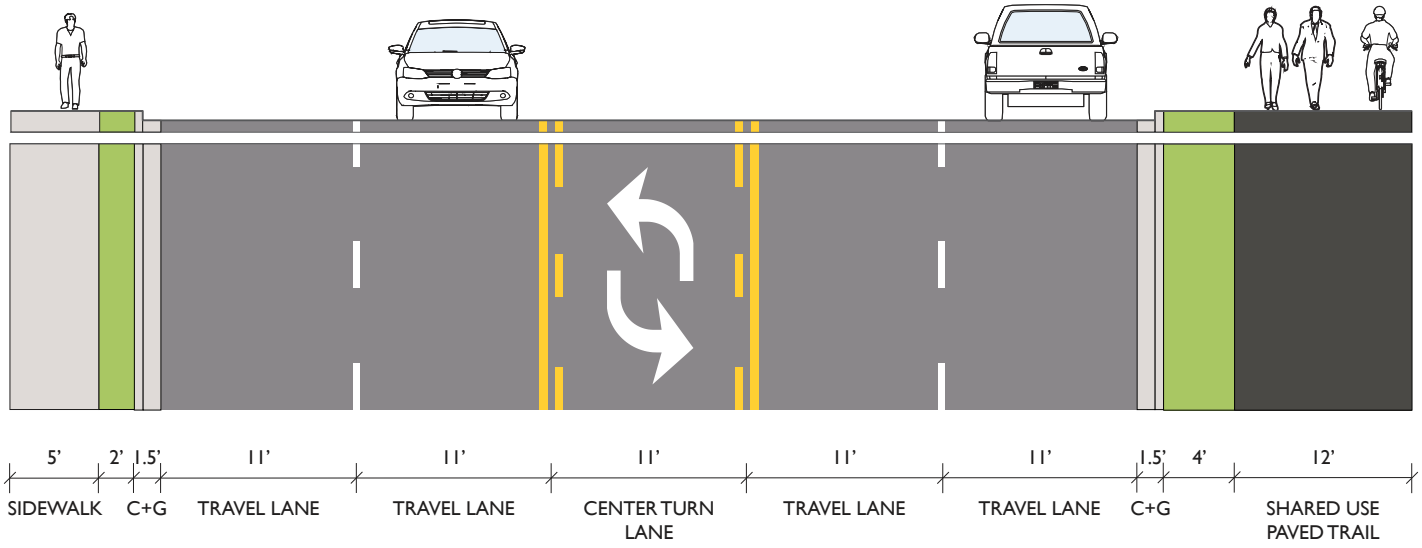
SHARED USE PAVED TRAIL
2 Lanes



SHARED USE PAVED TRAILS
3 Lanes - Both Sides



SHARED USE PAVED TRAIL
4 Lanes



SHARED USE PAVED TRAIL
5 Lanes

TWO-WAY AND DIRECTIONAL PROTECTED BIKE LANES

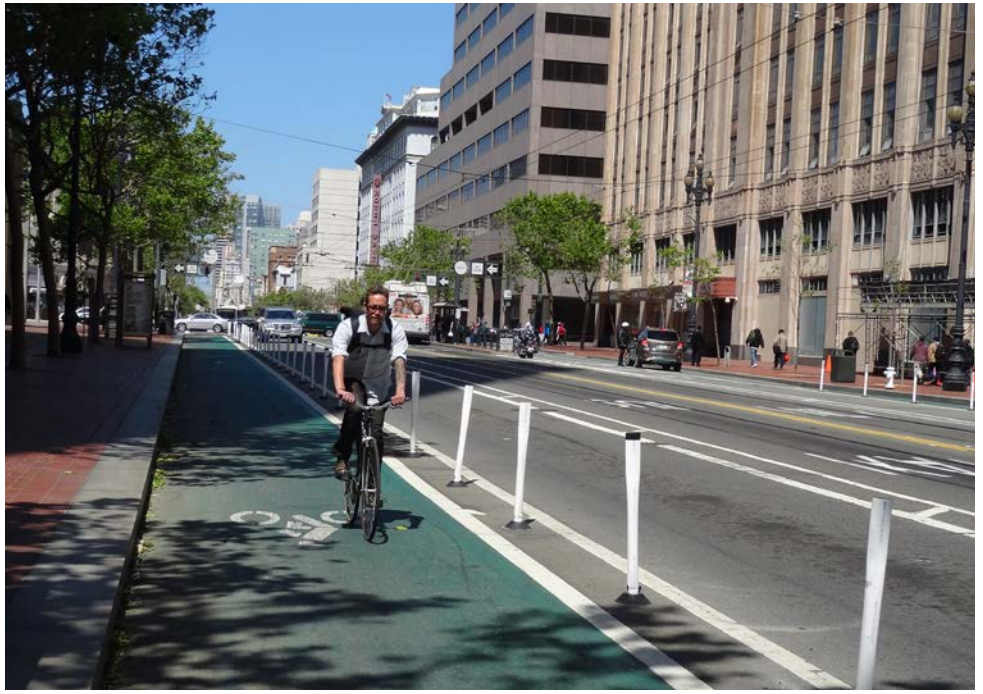
Protected bike lanes are an exclusive bikeway facility type on one or both sides of the street that combines the user experience of a shared use path with the on-street infrastructure of a conventional bike lane. They are separated from motor vehicle traffic while also being distinct from the sidewalk.

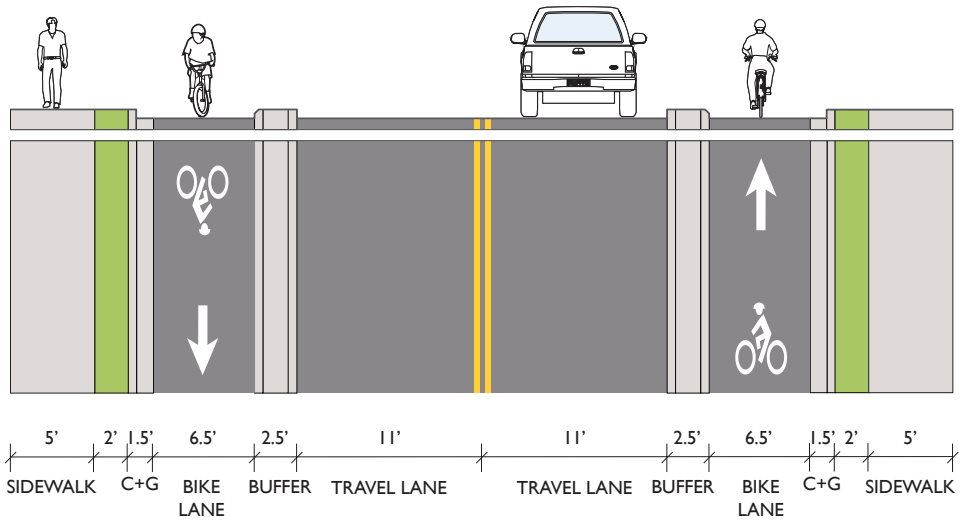
Protected bike lanes are preferred over shared use paths in higher density areas, commercial and mixed-use development, and near major transit stations or locations where pedestrian volumes are anticipated to exceed 200 people per hour on a shared use path.

Protected bike lanes are more attractive to a wider range of bicyclists than striped bikeways on higher volume and higher speed roads. They eliminate the risk of a bicyclist being hit by an opening car door and prevent motor vehicles from driving, stopping or waiting in the bikeway. They also provide greater comfort to pedestrians by separating them from bicyclists operating at higher speeds.

Directional protected bike lanes are generally less expensive and easier to implement then two-way protected bike lanes but at intersections they may need to transition to merge zones to allow vehicles to turn right. Directional separated bike lanes in the direction of motorized travel also provide intuitive and simplified transitions to existing bike lanes and shared travel lanes.

Two-way protected bike lanes exist on only one side of the street and more resemble shared use paved trails. This may require special attention to transition the contra-flow bicyclist into existing bike lanes and shared travel lanes. Additionally, depending on context, motorists may not expect bicyclists to approach crossings from both directions. For this reason, two-way protected bike lanes may require detailed treatments at alley, driveway, and cross street crossings to enhance the safety of these crossings.

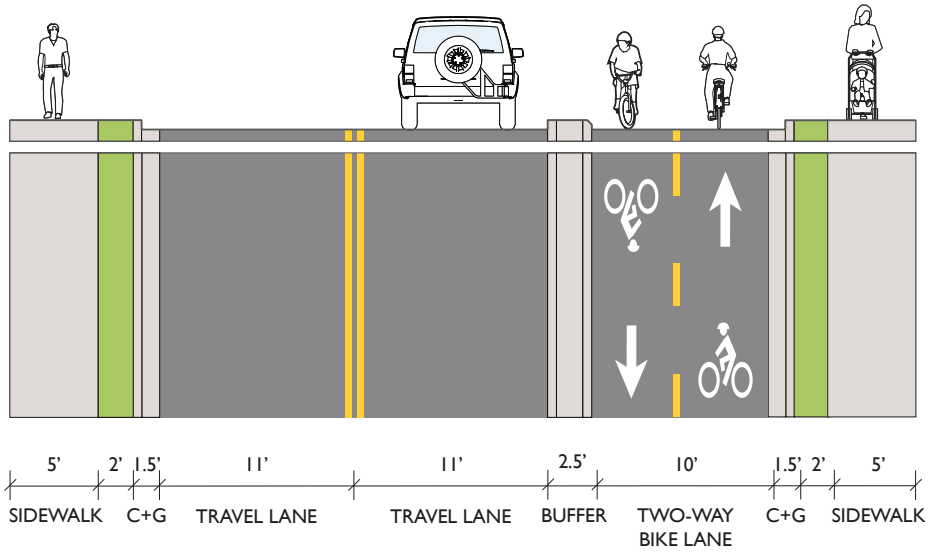




DIRECTIONAL PROTECTED BIKE LANES
2 Lanes

CONSIDERATIONS

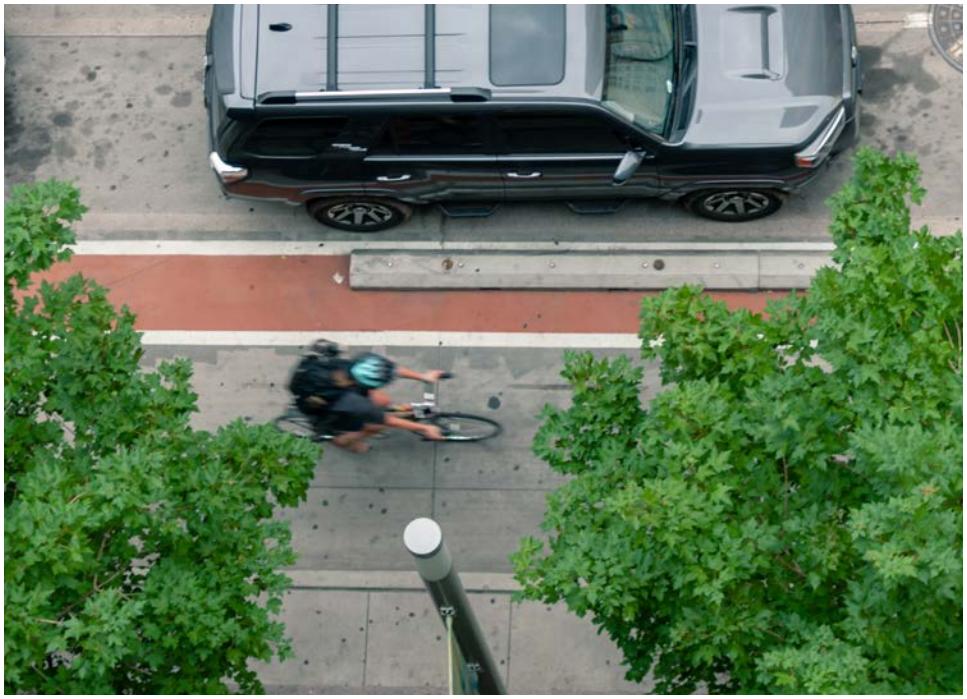
- Protected bike lanes can provide different levels of separation:
  - » *Protected bike lanes with flexible delineator posts ("flex posts") alone offer the least separation from traffic and are appropriate as interim solution.*
  - » *Protected bike lanes that are raised with a wider buffer from traffic provide the greatest level of separation from traffic but will often require road reconstruction.*
  - » *Protected bike lanes that are protected from traffic by a row of on-street parking offer a high-degree of separation.*
- Beveled curbs are often used in separated bike lane design. The angle on the bevel is designed to reduce pedal strike hazards for bicyclists. In some cases, they can be mountable for sidewalk/shared space access. Bevel curbs have a 1:1 slope, and mountable curbs have a maximum slope of 1:4.

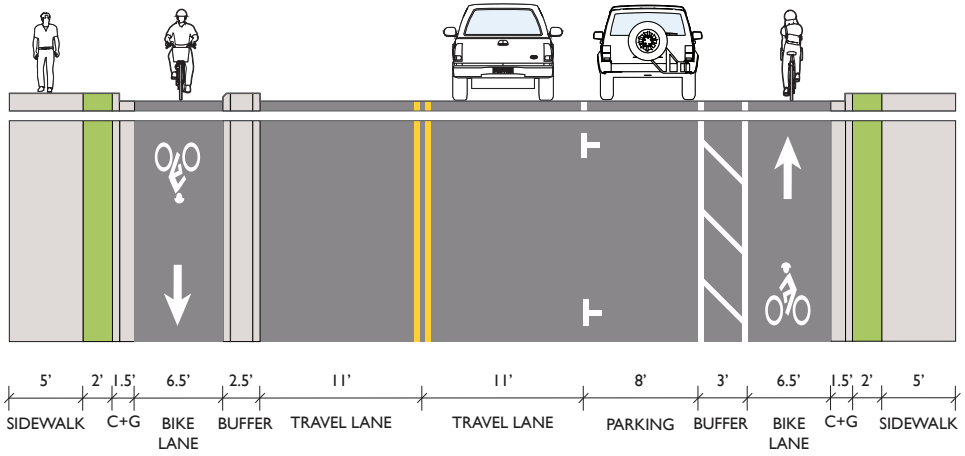


TWO-WAY PROTECTED BIKE LANE
2 Lanes

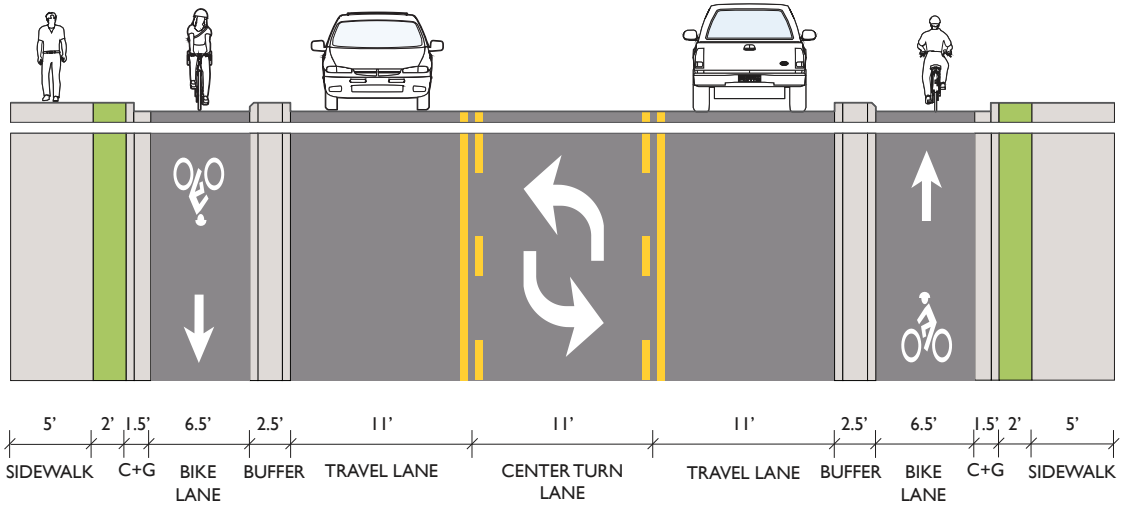
GUIDANCE

- Protected bike lanes can generally be considered on any road with one or more of the following characteristics:
  - » *3 lanes or more traffic lane*
  - » *Posted speed limit of 30 mph or more*
  - » *Traffic: 9,000 vehicles per day or more*
  - » *Frequent on-street parking turnover*
  - » *Frequent (or likely frequent) bike lane obstruction*
  - » *And/or bus routes or truck routes*

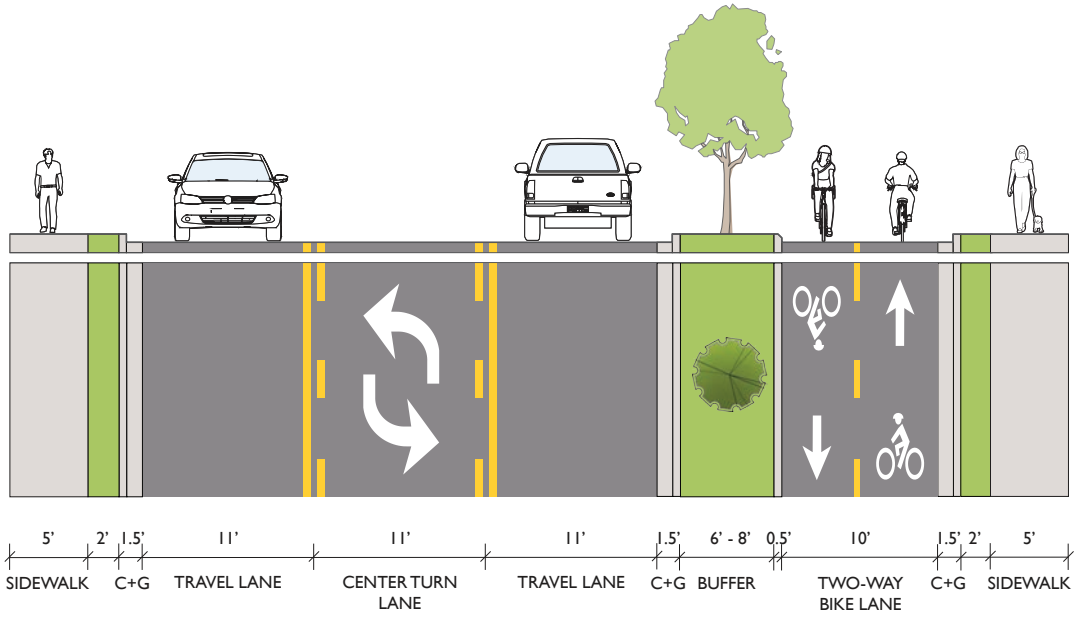




DIRECTIONAL PROTECTED BIKE LANES
2 Lanes - Parking One Side



DIRECTIONAL PROTECTED BIKE LANES
3 Lanes



TWO-WAY PROTECTED BIKE LANE
3 Lanes

TRAFFIC CALMING ELEMENTS

Traffic calming elements serve to slow motorist traffic. They are most often applied in shared slow street settings, but many of these elements can be used on roadways with higher posted speeds to lower their design speeds. The purpose of slowing traffic is two-fold. First, creating slower-speed roadways limits the likelihood of a crash by giving all users (regardless of mode) longer to react to others in the roadway. Second, lowering speeds reduces the likelihood of pedestrian and bicyclists fatalities and/or serious injuries significantly.

Horizontal traffic calming measures reduce speeds by effectively narrowing lanes, signaling the motorists to drive slower and with caution; narrower conditions require more careful maneuvering around fixed objects and when passing bicyclists or oncoming automobile traffic. Some treatments may slow traffic by creating a yield condition where one motorist must wait to pass.

- **Curb extensions and neckdowns:** Also known as neckdowns, bulb-outs, or bump-outs, curb extensions are created by extending the sidewalk at corners or mid-block. They to increase safety and provide extra space along sidewalks for users and amenities. They also provide extra space along sidewalks for users and amenities.
- **Mid-block crossings:** In cases where distances between intersections are long, mid-block crossings provide safe crossings for people walking and wheeling. At long street crossings they are often paired with median refuge islands.
- **Chicanes:** Chicanes deflect motorists mid-block by causing the travel lanes to weave, slowing traffic. The size of chicanes will vary based on the targeted design speed and roadway width.
- **Neighborhood traffic circles:** Like chicanes, these facilities also deflect motorist traffic but at intersections as opposed to mid-block. Roundabouts are also safer for pedestrians due to the low speed at which drivers enter the intersection.
- **Median refuge islands (with noses):** Median refuge islands are raised refuge points that allow safe multi-stage crossings of wide streets. "Noses," or extensions of the island past the crosswalks slow turning movements at intersections by minimizing the motorists' turning radius.
- **Hardened centerlines:** Like median refuge island noses, hardened centerlines slow left turning movements at intersections by effectively reducing a vehicle's turning radius. Slower speeds give drivers more time to react to people walking, bicycling, or wheeling. Flexible posts, concrete medians, or other vertical elements are added along the roadway centerline to discourage high-speed turning movements.

Vertical traffic calming elements also compel motorists to drive slowly, which increases bicycle and pedestrian user comfort. These treatments are typically used where other types of traffic controls are less frequent, for instance along a segment where stop signs may have been removed to ease bicyclist travel.

- **Speed cushions and speed humps:** By effectively creating raised sections of roadway, speed cushions and speed humps require motorists to drive slowly in order to be comfortable.
- **Raised crosswalks:** Raised crosswalks should function like speed humps while simultaneously providing a safe, marked crossing for pedestrians. Raised crosswalks may often be paired with curb extensions to limit the conflict point's distance.

Neighborhood Traffic Circle

- A typical curb extension extends the approximate width of a parked car (or about 6' from the curb).
- Restrict parking within 20' of an intersection for improved visibility.

Curb Extension

- Mid-block crossings should be 250' to 300' away from a signalized intersection.
- Crosswalks should be at least 10' wide or up to 25; in places with high pedestrian volumes.

High Visibility Crosswalk

- Chicanes must provide 20 feet of width curb-to-curb at a minimum to accommodate emergency vehicles.

Chicanes

- The radius of a neighborhood traffic circle should not exceed 90'.

Neighborhood Traffic Circle

- Islands should be at least 6' wide, with a preferred width of 8' to more effectively accommodate wheelchairs and bicyclists where needed.
- Consider islands where crossing distances are greater than 50', or in neighborhoods as an additional traffic calming method.

Median Refuge

- Designers must be mindful of truck movements at intersections with hardened centerlines.

Hardened Centerlines

- Speed humps should be 12' -22' wide (perpendicular to the roadway), with a rise of 3" above the roadway.

Speed Cushion

- Speed humps are not necessary on all neighborhood bikeways but should be considered on any road with measured or observed speeding issues (50th percentile of traffic exceeding 25mph.)\
- Speed humps should be 12' -22' wide (perpendicular to the roadway), with a rise of 3" above the roadway.

Raised Crosswalk

BIKE SIGNALS

Bike signals at intersections are traffic control devices that provide additional guidance for bicyclists at signalized intersections. They support existing signals by delineating bicycle-specific movements, like leading bicycling intervals. They should also support existing on-street bicycle infrastructure, such as bike lanes or bike boxes at intersections.

CONSIDERATIONS

- If the travel patterns through the intersection are unusual, bike signals should be supported by intersection markings.
- Passive articulation of the signals is most convenient for bicyclists, but push-button activation is also acceptable in locations where it is easily accessible for people on bikes.
- Signal timing should provide adequate time for bicyclists to navigate through the intersections with appropriate clearing times.

GUIDANCE

- Bike signals heads are usually instead alongside pedestrian heads in a clearly visible space from the roadway.
- When bike signals are used to give leading bicycle intervals at intersections, right turn on red movements for motorists should be prohibited to maintain bicyclist safety.

MID-BLOCK PEDESTRIAN SIGNALS

Pedestrian signals at intersections are traffic control devices that provide additional guidance for bicyclists at signalized intersections. They draw attention to pedestrians as they are crossing mid-block.

- **High-intensity activated crosswalk (HAWK) signals:** HAWK signals are a type of hybrid signal intended to allow pedestrians and bicyclists to stop traffic to cross high-volume arterial streets. HAWK signals are appropriate at long street crossings or at mid-block crossings with high volumes, and at places where there is notable demand pedestrian crossing. HAWKS should be considered in mid-block crossings with high traffic volumes (9,000 AADT or more) and where speed limits are 40 miles per hour or greater.
- **Rectangular rapid flashing beacons:** These beacons, RRFBs, are user-articulated flashing lights and accompany pedestrian crossing signage that highlight crosswalks at intersections or at mid-block crossings. They are often used in conjuncture with other types of traffic calming, like curb extensions or median refuge islands.

Detection at Pedestrian Signals

Often RRFBs and HAWK signals are user-actuated (meaning that they require people to activate the signal). Pedestrian signals can also use passive detection, which uses technology to detect people's presence and trigger the signal. Passive detection may be appropriate in places where there are high pedestrian volumes. Passive detection can be achieved using photosenor bollards, infrared cameras, video detection, or other technology.

OTHER RESOURCES

The following publications provide additional information for planning and designing safe, comfortable active transportation infrastructure in various contexts.

- Massachusetts Department of Transportation's (MASSDOT) Separated Bike Lane Planning and Design Guidance
- Federal Highway Administration's (FHWA) Separated Bike Lane Planning and Design Guide
- FHWA's Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts
- FHWA's Incorporating On-Road Bicycle Networks into Resurfacing Projects
- National Association of City Transportation Officials' (NACTO) Urban Street Design Guide
- NACTO's Transit Street Design Guide
- NACTO's Urban Bikeway Design Guide
- American Association of State Highway and Transportation Officials' (AASHTO) Guide for the Development of Bicycle Facilities (new for 2017)
- AASHTO's Guide for the Planning, Design, and Operations of Pedestrian Facilities

APPENDIX: COST ESTIMATES

DETAILED PROBABLE COST

The following tables detail probable costs for the types of bicycle and pedestrian facilities recommended in the NW Bike Infrastructure Plan. Several of the facility types include variations based upon different land use contexts or facility design alternatives. Categorizing facility costs in this manner should provide more accurate project estimates to budget for design and construction.

The costs presented in the tables are planning-level estimates for eachfacility; more detailed costs should be calculated at the time of design based on individual project criteria and constraints. Where applicable, costs reflect a bicycle facility on one side of the roadway. It is also important to note that costs are based on ArDOT bid unit prices for the Spring of 2019; construction costs should be adjusted for inflation at the time of implementation. Please note that the estimates do not include any costs for easements, right-of-way acquisition, utility relocation, general roadway improvements, major drainage modifications, or ongoing maintenance.

The following assumptions apply to each of the detailed probable cost tables in this Appendix and are categories by item number.

Table 5-2: *Probable Cost Assumptions*

ITEM NO.	PROBABLE COST ASSUMPTIONS
ITEM 1.0	SAWCUT & REMOVAL: Assume $1 per LF to remove existing paving for bulb outs, protected bike lane buffers, or new road base construction.
ITEM 2.0	CURB & GUTTER: Assume standard curb and gutter including dirtwork = $22.00 per LF. Multiply by number of curb/gutters within each street cross section.
ITEM 3.0	PAVEMENT: Assume standard 3" asphalt ($15/SY) + 8" base ($12/SY) + dirtwork ($1/SF) = $4 per SF. Multiply by pavement width within each street cross section.
ITEM 3.0A	PAVEMENT OVERLAY: Mill existing surface course and overlay with 1.5" surface course = $1/SF
ITEM 4.0	STRIPING: Assume the cost per LF will include sharrows, turning lanes, and thru lanes = $1 per LF. Multiply by number of stipe lines within each street cross section.
ITEM 5.0	SIDEWALK: Assume a 4" thick concrete sidewalk including dirtwork = $6.00 per SF. Multiply by the total sidewalk widths within each street cross section.
ITEM 6.0	RAISED BUFFER: Assume concrete median, 6" thick concrete including dirtwork = $8.00 per LF. Curb and gutter priced separately, see Item 2.0.
ITEM 7.0	DRAINAGE: Assume replacement of trunk line average 24" pipe the lenth of the improvements. $70.00/LF for a 24" RCP, where trunk line remains and existing structures are modified use $10/LF
ITEM 8.0	STREET LIGHTS: Assume $3500 per pedestrian light, spaced at 60' o.c. = $58.30 per LF. Multiply by the number of rows of pedestrian lights (example: one for each side of street, plus one in the median = 3 rows)
ITEM 9.0	SOD: Assume and average of $0.50 per SY = approximately $0.60 per LF. Multiply by the total width of sod/buffer areas within the street cross section.
ITEM 10.0	TREES: Assume $500 per 4" caliper tree, spaced 30' o.c. Multiply by the number of rows of trees (example: one for each side of street, plus one in the median = 3 rows), due to driveways and intersections, reduce average spacing to 120' o.c., use $5/LF
ITEM 11.0	IRRIGATION: Assume an average of $1.50 per SF = 1.50 per LF. Multiply by the total width of sod/buffer areas within the street cross section.
ITEM 12.0	TREE WELLS & PLANTERS: Assume $1500 per tree grate spaced at 30' o.c. = $50 per LF. Assume 24' long x 6' wide area of pavers between grates = 144 SF at $6 per SF every 30 LF = $28.80 per LF. $50/LF tree grates + $28.80/LF pavers = $78.80 or $79 per LF.
ITEM 13.0	PAVERS: VEHICULAR
ITEM 14.0	PAVERS: PEDESTRIAN
ITEM 15.0	WAYFINDING SIGNAGE: Assume $600 per sign, every 200' = $3/LF per one direction of travel (1 direction of travel = 1 row)
ITEM 16.0	CLEARING & GRUBING: Assume $50,000/MI
RIGHT OF WAY ACQUISITION & UTILITLY RELOCATION COSTS ARE NOT INCLUDED	

Table 5-3: *Shared Slow Street - Linear Foot Cost*

SHARED SLOW STREET					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	4.0	$4.00
2.0	CURB & GUTTER	ROWS	$22.00	4.0	$88.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	20.0	$120.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	1.0	$70.00
8.0	STREET LIGHTS	ROWS	$58.30	1.0	$58.30
9.0	SOD	WIDTH	$0.60	16.0	$9.60
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	16.0	$24.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	2.0	$6.00
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$80.18
	TRAFFIC CONTROL		3%		$11.91
	ENGINEERING		12%		$58.81
COST PER LINEAR FOOT OF STREET					**$560.80**

Table 5-4: *Shared Slow Flush Street- Linear Foot Cost*

SHARED SLOW STREET					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	4.0	$4.00
2.0	CURB & GUTTER	ROWS	$22.00	4.0	$88.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	20.0	$120.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	1.0	$70.00
8.0	STREET LIGHTS	ROWS	$58.30	1.0	$58.30
9.0	SOD	WIDTH	$0.60	16.0	$9.60
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	16.0	$24.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	40.0	$1,120.00
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	2.0	$6.00
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$304.18
	TRAFFIC CONTROL		3%		$45.51
	ENGINEERING		12%		$220.09
COST PER LINEAR FOOT OF STREET					**$2,099.68**

Table 5-5: *Neighborhood Greenway - Linear Foot Cost*

NEIGHBORHOOD GREENWAY					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	2.0	$8.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	0.0	$-
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	2.0	$6.00
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$2.80
	TRAFFIC CONTROL		3%		$0.42
	ENGINEERING		8%		$1.34
COST PER LINEAR FOOT OF STREET					**$18.56**

Table 5-6: *Neighborhood Greenway with Parking - Linear Foot Cost*

NEIGHBORHOOD GREENWAY WITH PARKING					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	0.0	$-
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	2.0	$6.00
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$4.40
	TRAFFIC CONTROL		3%		$0.66
	ENGINEERING		8%		$2.11
COST PER LINEAR FOOT OF STREET					**$29.17**

Table A-1: *Yield Roadway / Advisory - Linear Foot Cost*

YIELD ROADWAY / ADVISORY					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	2.0	$8.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	0.0	$-
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$1.60
	TRAFFIC CONTROL		3%		$0.24
	ENGINEERING		8%		$0.77
COST PER LINEAR FOOT OF STREET					**$10.61**

Table A-2: *Directional Bike Lanes - Linear Foot Cost*

DIRECTIONAL BIKE LANES					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	0.0	$-
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	2.0	$6.00
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$4.40
	TRAFFIC CONTROL		3%		$0.66
	ENGINEERING		8%		$2.11
COST PER LINEAR FOOT OF STREET					**$29.17**

Table A-3: *Shared Use Paved Trail (Constrained) - Linear Foot Cost*

SHARED USE PAVED TRAIL (CONSTRAINED)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	2.0	$2.00
2.0	CURB & GUTTER	ROWS	$22.00	1.0	$22.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	0.0	$-
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$17.80
	TRAFFIC CONTROL		3%		$2.61
	ENGINEERING		12%		$13.90
COST PER LINEAR FOOT OF STREET					**$132.31**

Table A-4: *Shared Use Paved Trail- Linear Foot Cost*

SHARED USE PAVED TRAIL					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	0.0	$-
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	4.0	$2.40
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	4.0	$6.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$14.68
	TRAFFIC CONTROL		3%		$2.20
	ENGINEERING		12%		$10.57
COST PER LINEAR FOOT OF STREET					**$100.85**

Table A-5: *Shared Use Paved Trail (Two Sides Constrained) - Linear Foot Cost*

SHARED USE PAVED TRAIL (TWO SIDES CONSTRAINED)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	2.0	$44.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	0.0	$-
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	20.0	$120.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	0.0	$-
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	0.0	$-
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$33.80
	TRAFFIC CONTROL		3%		$5.07
	ENGINEERING		12%		$25.42
COST PER LINEAR FOOT OF STREET					**$242.29**

Table A-6: *Shared Use Paved Trail (Two Sides)- Linear Foot Cost*

SHARED USE PAVED TRAIL (TWO SIDES)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	0.0	$-
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	0.0	$-
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	20.0	$120.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	8.0	$4.80
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	8.0	$12.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$28.36
	TRAFFIC CONTROL		3%		$4.25
	ENGINEERING		12%		$20.42
COST PER LINEAR FOOT OF STREET					**$194.83**

Table A-7: *Directional Protected Bike Lanes (Road Diet) - Linear Foot Cost*

DIRECTIONAL PROTECTED BIKE LANES (ROAD DIET)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	8.0	$8.00
2.0	CURB & GUTTER	ROWS	$22.00	4.0	$88.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	12.0	$12.00
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	4.0	$32.00
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	4.0	$2.40
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	4.0	$6.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$44.88
	TRAFFIC CONTROL		3%		$6.49
	ENGINEERING		12%		$32.31
COST PER LINEAR FOOT OF STREET					**$308.09**

Table A-8: *Directional Protected Bike Lanes (Modified Curb) - Linear Foot Cost*

DIRECTIONAL PROTECTED BIKE LANES (MODIFIED CURB)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	4.0	$88.00
3.0	PAVEMENT	WIDTH	$4.00	12.0	$48.00
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	4.0	$32.00
7.0	DRAINAGE	ROWS	$70.00	1.0	$10.00
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	4.0	$2.40
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	4.0	$6.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$52.48
	TRAFFIC CONTROL		3%		$7.87
	ENGINEERING		12%		$38.87
COST PER LINEAR FOOT OF STREET					**$370.62**

Table A-9: *Directional Protected Bike Lanes (Road Widening) - Linear Foot Cost*

DIRECTIONAL PROTECTED BIKE LANES (ROAD WIDENING)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	4.0	$88.00
3.0	PAVEMENT	WIDTH	$4.00	12.0	$48.00
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	4.0	$32.00
7.0	DRAINAGE	ROWS	$70.00	1.0	$70.00
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	4.0	$2.40
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	4.0	$6.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$64.48
	TRAFFIC CONTROL		3%		$9.67
	ENGINEERING		12%		$47.51
COST PER LINEAR FOOT OF STREET					**$453.06**

Table A-10: *Two-way Protected Bike Lane (Road Diet) - Linear Foot Cost*

TWO-WAY PROTECTED BIKE LANE (ROAD DIET)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	2.0	$2.00
2.0	CURB & GUTTER	ROWS	$22.00	3.0	$66.00
3.0	PAVEMENT	WIDTH	$4.00	0.0	$-
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	12.0	$12.00
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	10.0	$60.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	3.0	$24.00
7.0	DRAINAGE	ROWS	$70.00	0.0	$-
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	4.0	$2.40
10.0	TREES	ROWS	$5.00	0.0	$-
11.0	IRRIGATION	WIDTH	$1.50	4.0	$6.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	0.0	$-
	CONTINGENCY		20%		$37.68
	TRAFFIC CONTROL		3%		$5.59
	ENGINEERING		12%		$27.13
COST PER LINEAR FOOT OF STREET					**$258.80**

Table A-11: *Two-way Protected Bike Lane (Road Widening) - Linear Foot Cost*

TWO-WAY PROTECTED BIKE LANE (ROAD WIDENING)					
ITEM	**DESCRIPTION**	**MEASUREMENT**	**COST/UNITS**	**QUANTITY**	**COST/FOOT**
1.0	SAWCUT & REMOVAL	WIDTH	$1.00	0.0	$-
2.0	CURB & GUTTER	ROWS	$22.00	2.0	$44.00
3.0	PAVEMENT	WIDTH	$4.00	10.0	$40.00
3.0A	PAVEMENT OVERLAY	WIDTH	$1.00	0.0	$-
4.0	STRIPING	ROWS	$4.00	4.0	$16.00
5.0	SIDEWALK / SIDEPATH / PAVED TRAIL	WIDTH	$6.00	5.0	$30.00
6.0	RAISED PROTECTED BIKE LANE BUFFER	WIDTH	$8.00	0.0	$-
7.0	DRAINAGE	ROWS	$70.00	1.0	$20.00
8.0	STREET LIGHTS	ROWS	$58.30	0.0	$-
9.0	SOD	WIDTH	$0.60	6.0	$3.60
10.0	TREES	ROWS	$5.00	1.0	$5.00
11.0	IRRIGATION	WIDTH	$1.50	6.0	$9.00
12.0	TREE WELLS AND PAVERS	ROWS	$79.00	0.0	$-
13.0	PAVERS - VEHICULAR TRAFFIC	WIDTH	$28.00	0.0	$-
14.0	PAVERS - PEDESTRIAN TRAFFIC	WIDTH	$18.00	0.0	$-
15.0	WAYFINDING SIGNAGE	ROWS	$3.00	0.0	$-
16.0	CLEARING & GRUBBING	ROWS	$0.10	3.0	$9.00
	CONTINGENCY		20%		$33.52
	TRAFFIC CONTROL		3%		$5.03
	ENGINEERING		12%		$25.21
COST PER LINEAR FOOT OF STREET					**$240.36**

Table A-12: *Traffic Calming Elements - Unit Costs*

TRAFFIC CALMING ELEMENTS			
ITEM	**DESCRIPTION**	**UNITS**	**COST/UNIT**
1.0	RAISED INTERSECTION	EA	$52,000.00
2.0	MID-BLOCK CROSSING	EA	$5,000.00
3.0	CURB EXTENSIONS	EA	$6,500.00
4.0	PEDESTRIAN SIGNALS (SINGLE APPROACH)	EA	$3,900.00
5.0	RECTANGULAR RAPID FLASH BEACON (2)	EA	$13,000.00
6.0	HIGH INTENSITIY ACTIVATED CROSSWALK (2)	EA	$97,500.00
7.0	RAISED CROSSING	EA	$20,000.00
8.0	CHICANE	EA	$9,750.00
9.0	ADA CURB RAMP	EA	$2,600.00
10.0	RAISED MEDIAN	LF	$7,1.50
11.0	NEIGHBORHOOD TRAFFIC CIRCLE	EA	$9,750.00
12.0	MEDIAN PEDESTRIAN REFUGE	EA	$7,500.00
13.0	CROSSWALK - STANDARD	EA	$1,950.00
14.0	CROSSWALK - HIGH VISIBILITY	EA	$2,600.00
15.0	SINGLE-LANE ROUNDABOUT	EA	$1,250,000.00