



# WACO

## CITY-WIDE TRAILS MASTER PLAN



FEBRUARY 2023





# WACO

## CITY-WIDE TRAILS MASTER PLAN





## ACKNOWLEDGMENTS

The 2022 Waco City-Wide Trails Master Plan was developed by the City of Waco with the technical assistance of Halff Associates, Inc. A special thanks goes out to the numerous community members, landowners, business owners, community leaders and others for their insight and support throughout the duration of this study. The following individuals are recognized for their significant contributions to the preparation of the Master Plan update.

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### APPENDICES

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### ABBREVIATIONS

ADA = Americans with Disabilities Act	MPO = (Waco) Metropolitan Planning Organization
ADAAG = Americans with Disabilities Act Accessibility Guidelines	MUDs = Municipal Utility Districts
AASHTO = American Association of State Highway and Transportation Officials	NACTO = National Association of City Transportation Officials
CIP = Capital Improvements Program	NPS = National Parks Service
CDBG = Community Development Block Grant	OPCC = Opinions of Probable Construction Costs
CMAQ = Congestion Mitigation and Air Quality Improvement Program	PARC = (Waco) Parks and Recreation Department
COOP = Community Outdoor Outreach Program	PROWAG = (US Access Board) Public Rights-of-Way Accessibility Guidelines
FHWA = Federal Highway Administration	RTCA = The Rivers, Trails, and Conservation Assistance Program
FTA = Federal Transit Administration	STBG = Surface Transportation Block Grant Program
IMBA = International Mountain Biking Association	SUPLOS = (FHWA) Shared-use Path Level of Service Calculator
ITE = Institute of Transportation Engineers	TA = Transportation Alternatives (Program)
LAB = League of American Bicyclists	TAC = Trails Advisory Committee
LEP = Limited English Proficiency	TPWD = Texas Parks and Wildlife Department
LMI = Low-to-moderate Income	TXDOT = Texas Department of Transportation
LOS = Level of Service	USACE = United States Army Corps of Engineers
LWCF = Land and Water Conservation Fund	
MCC = McLennan Community College	



# CHAPTER 1: WHY PLAN FOR TRAILS?

The **Waco City-wide Trails Master Plan** (the “Plan”) was initiated by the City of Waco Parks and Recreation Department (PARD) to serve as a road map for building an interconnected network of trails designed to expand recreation and transportation options for area residents.

**Chapter 1, Why Plan For Trails?** describes the benefits of trails and of developing a comprehensive network of hiking, biking and paddling trails throughout the Waco metropolitan area. This chapter defines various trail typologies and the users that they serve, provides a summary of the planning process, and introduces the Plan’s vision and guiding principles.

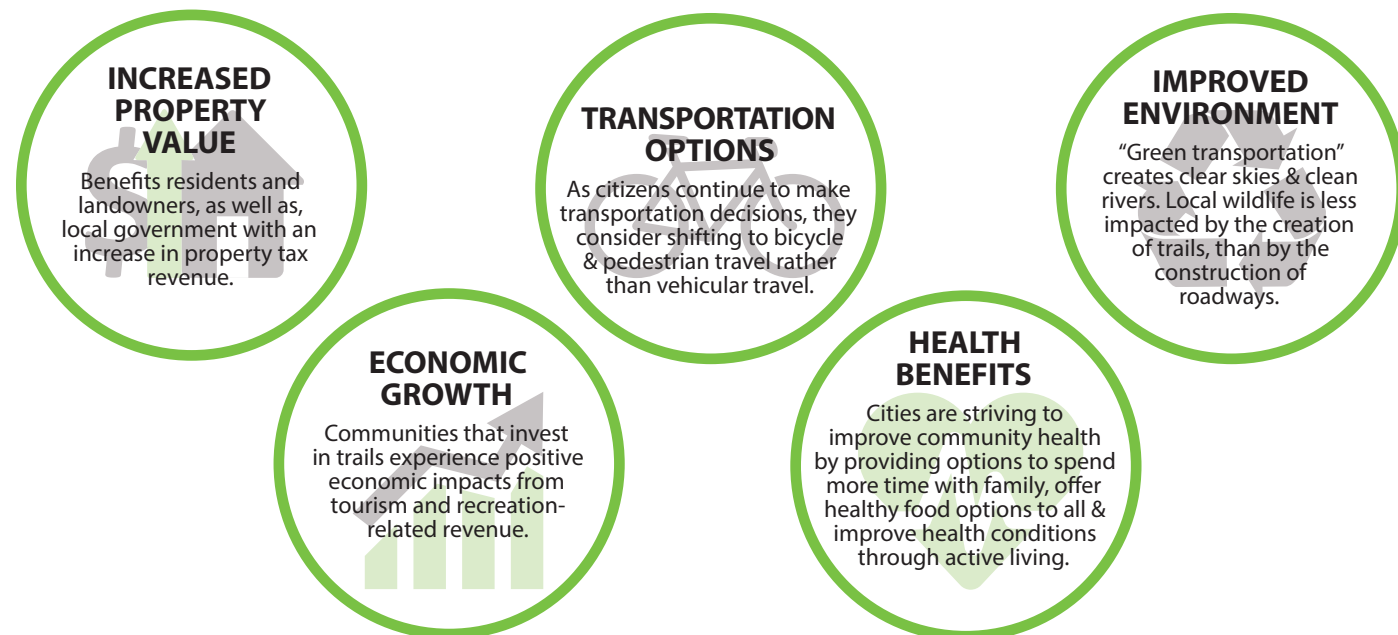
**WHY PLAN FOR TRAILS?.....PAGE 3**  
**SCOPE OF THE PLAN.....PAGE 7**  
**BUILDING OUR TRAILS MASTER PLAN.....PAGE 12**  
**OUR VISION.....PAGE 14**

## WHY PLAN FOR TRAILS?

The planning, design, and development of a comprehensive trails system serves tremendous value to the broader community. Communities across the United States and throughout the world are investing in trails as a key contribution for promoting overall livability. Local, regional and national investment in trails reflects a community's commitment to promote health, safety, and welfare. Not only are trails needed for recreation, but in many communities they are utilized as essential components of the bicycle and pedestrian transportation network.

Public trails build community at a human scale and support physical, social and economic prosperity across a community, regardless of class, economic status, age or ability. **The Primary Benefits of Trails**, summarizes the positive impacts that an interconnected network of multi-use trails can have on a community. Communities across Texas recognize that outdoor recreation supports and contributes to a high quality of life, as well as, attracting and sustaining employers and families. Investing in outdoor infrastructure attracts employers and active workforces, ensuring those communities thrive economically and socially.

### THE PRIMARY BENEFITS OF TRAILS



“TRAILS HAVE MULTIPLE VALUES AND THEIR BENEFITS REACH FAR BEYOND RECREATION. TRAILS CAN ENRICH THE QUALITY OF LIFE FOR INDIVIDUALS, MAKE COMMUNITIES MORE LIVABLE, AND PROTECT, NURTURE, AND SHOWCASE AMERICA’S GRANDEUR BY TRAVERSING AREAS OF NATURAL BEAUTY, DISTINCTIVE GEOGRAPHY, HISTORIC SIGNIFICANCE, AND ECOLOGICAL DIVERSITY. TRAILS ARE IMPORTANT FOR THE NATION’S HEALTH, ECONOMY, RESOURCE PROTECTION AND EDUCATION.”

-AMERICAN TRAILS



An interconnected multi-use trail network within the City of Waco provides residents the ability to move from destination to destination without getting in a car. Recreation opportunities are also improved when the trail network includes diverse trail types that cater to multiple interests and are accessible for people of all abilities.

“IN TEXAS, OUTDOOR RECREATION GENERATES \$52.6 BILLION IN CONSUMER SPENDING ANNUALLY, 411,000 DIRECT JOBS, \$15.8 BILLION IN WAGES AND SALARIES, AND \$3.5 BILLION IN STATE AND LOCAL TAX REVENUE.”

-OUTDOOR INDUSTRY ASSOCIATION



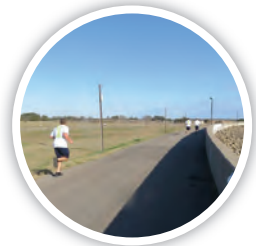
## OUR TRAIL USERS

Trails attract a wide variety of users. Planning and design considerations for trails in Waco must consider the needs and preferences of all types of users. A thorough understanding is developed by identifying the preferences, challenges and limitations impacting several groups within the community. Though each group has a specific set of needs, Waco strives to define shared aspects of each group in order to develop a multi-purpose trails system that most effectively meets the overlapping needs of users. Common trails users include:



### WALKERS

Pedestrians typically utilize trails for recreation purposes, and many categorize themselves as “walkers.” The economic appeal generated through accessibility make walking a popular recreation activity for the general public and an important resource for the commuting public. Trail connections between neighborhoods and nearby destinations add to the feasibility and desirability of walking.



### RUNNERS/JOGGERS

Trail networks provide an ideal setting for runners and joggers seeking opportunities for fitness, sport, and leisure. Trails with minimum widths of 10-12 feet ensure there is space for runners and joggers to conveniently and safely pass other users while also providing space for group recreation activities.



### EQUESTRIANS

Equestrian users, or horseback riders may use trails for recreational use. Typically, equestrian users prefer loose or compacted dirt trails in order to protect horse hooves. Equestrian use is permissible on many types of recreational trails, and can sometimes be accommodated on paths parallel to hard-surface and urbanized metropolitan multi-use trails.



### IN-LINE SKATERS & SKATEBOARDERS

Paved multi-use trails that accommodate pedestrians and bicyclists are likely to attract in-line skaters and skateboarders as well. The needs and preferences of skaters are typically the same as pedestrians and bicyclists.



### MOTORIZED USERS

Some trails systems, especially in rural areas, also accommodate all-terrain vehicles (ATVs). Within urbanized areas, multi-use trails are seeing increasing usage by individuals using electric-assist bicycles, motorized scooters and other electric vehicles. State statutes and local ordinances can manage acceptable motorized use on a community’s trails system.



## BICYCLISTS

Trails systems generally support four distinct categories of bicyclists based on age, ability, and interest and including: basic to advanced, children or seniors, and/or off-road bicycling enthusiasts. A connected trail system, either through on-street, off-street or both, provides opportunities to access a variety of destinations for all ages and abilities, and can provide recreational trails for specialized bicycling interests.

### BICYCLIST DESIGN USER PROFILES

The Federal Highway Administration (FHWA) identifies three bicyclist design user profiles to describe the experience and comfort level of adults in using different types of bicycle facilities. Bicycle design user profiles include those adults who are “Interested but concerned,” “Somewhat confident” and “Highly confident” and were used to inform recommended bikeway design in the **Waco Metropolitan-Area Active Transp. Plan** (2019).

Over fifty (50) percent of the adult population interviewed to determine bicycle user design profiles was classified as “Interested but concerned” - meaning that they would prefer to ride on off-street or separated bicycle facilities. Many of the trails proposed in this Plan will encourage bicycling among those residents of Waco who may otherwise be apprehensive about the bicycling environment in the City.



See the **U.S. FHWA Bikeway Selection Guide (2019)** for more information on bicyclist design user profiles.



### PADDLERS

Trail users, utilizing equipment such as kayaks, canoes or paddle boards, may use nearby water features for recreational use. Many paddling trails connect to on-shore multi-use trails for access to boat launches, and other trail amenities. Typically, paddling enthusiasts prefer stream and river corridors where motorized boat traffic is limited in volume to allow for a more serene natural riverine, lagoon or marshland experience.



### PEOPLE/PERSONS WITH DISABILITIES

Many trail systems accommodate trail users who utilize a walker, wheelchair, stroller, or similar wheeled assistive device. Accessibility and safety are the main priorities for people/persons with disabilities. This user group may use trails for recreation and transportation but may not be equipped to utilize some specialized recreation facilities such as rugged hiking trails or single-track mountain biking trails.

## SCOPE OF THE PLAN

The Plan provides a framework for community-wide multi-use trail connectivity linking destinations within Waco and adjacent communities to enhance the following for residents and visitors:

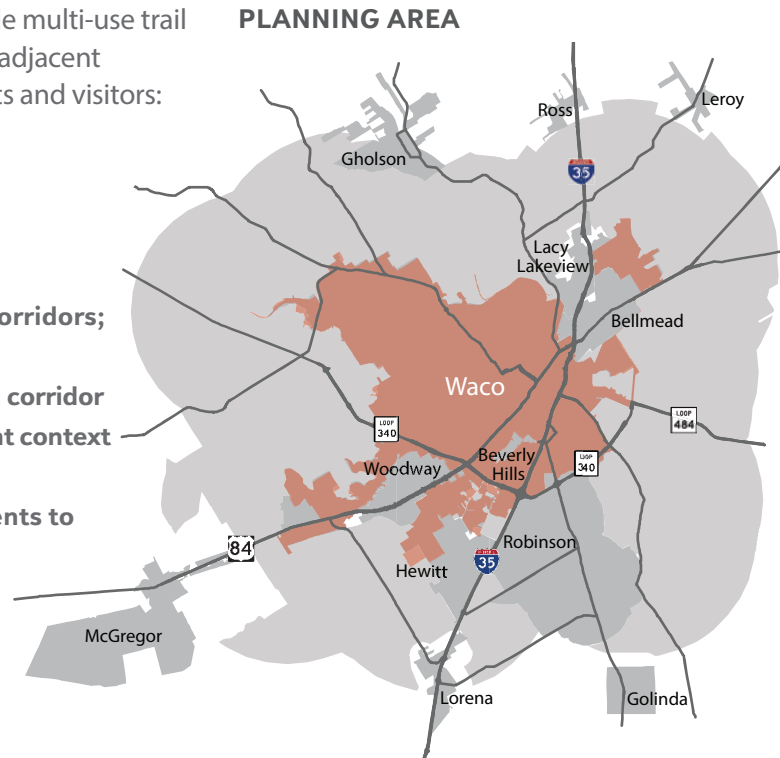
- Active transportation;
- Recreation; and
- Quality of life opportunities.

The Plan strives to consider the following:

- Both on-street and off-street multi-use trail corridors; identify priority corridors;
- Define appropriate facility options for each trail corridor segment based on the surrounding development context and user needs and preferences; and
- Identify methods for leveraging trail investments to build local “active tourism” opportunities.

The Plan incorporates an implementation program which recommends investment priorities, associated costs, funding options, and plan administration and monitoring.

The planning area for this initiative includes the entirety of the city limits, including the extraterritorial jurisdiction, and considers linkages to surrounding communities.



## PLAN COMPONENTS

This Plan consists of five chapters:

<h3>1 WHY PLAN FOR TRAILS?</h3> <p>This chapter provides a summary of the benefits of developing a comprehensive trail network for the Waco community. In addition, it defines key terms and describes trail typologies to be used throughout the planning document.</p>	<h3>2 YOUR TRAILS SYSTEM TODAY</h3> <p>This chapter summarizes the existing conditions of trails throughout Waco, while providing network analysis in narrative and map formats. Demographic background information is also discussed in this chapter.</p>	<h3>3 WACO'S FUTURE TRAILS SYSTEM</h3> <p>This chapter identifies proposed connections and trail enhancements within and around the Waco metropolitan area, including potential links to surrounding communities.</p>
<h3>4 TRAILS SYSTEM DESIGN STANDARDS</h3> <p>This chapter provides design guidelines about developing quality trails and adequately accommodating trail users in a variety of built and natural environments.</p>	<h3>5 IMPLEMENTING OUR VISION</h3> <p>This chapter provides key actions that should be taken to build a trails network in Waco. It explores management, partnerships and tools, as well as, the recommended prioritization of projects.</p>	



## TRAIL TYPOLOGIES

Many distinct trail types can exist within a community - all of which are designed to serve varying purposes, interests and user groups. In fact, there is no universal definition for most types of trails and the terminology used to classify trails can be as diverse as the communities where they are located. A broad definition for ‘trail’ provided by American Trails accurately describes the broad network of trails that may be found in Waco today.

“ A TRAIL IS A TRAVEL WAY ESTABLISHED EITHER THROUGH CONSTRUCTION OR USE AND IS PASSABLE BY AT LEAST ONE OR MORE OF THE FOLLOWING, INCLUDING BUT NOT LIMITED TO: FOOT TRAFFIC, STOCK, WATERCRAFT, BICYCLES, IN-LINE SKATES, WHEELCHAIRS, CROSS-COUNTRY SKIS, OFF-ROAD RECREATION VEHICLES SUCH AS MOTORCYCLES, SNOWMOBILES, ATVS AND 4-WHEEL DRIVE VEHICLES.”

-AMERICAN TRAILS

For planning purposes, this report distinguishes between trails that are: **A)** Designed to serve dual recreation and transportation functions versus those that are; **B)** Primarily intended to meet a recreational need. **Please note that the descriptions of each trail type referenced herein are intended to provide only a general guide to common trail characteristics.** Some of the identified facilities have formal definitions consistent with the most recent American Association of State Highway and Transportation Officials (AASHTO) Green Book; or from National Association of City Transportation Officials (NACTO). Where noted, please also reference **Appendix A: Glossary of Terms.**

## METROPOLITAN TRAILS

Metropolitan trails are designed to support general recreation and fitness activities while also providing access to important community destinations. Metropolitan trails can be linked together to create an interconnected system of bicycle and pedestrian routes and facilities that form an important component of a community's larger active transportation network.



### ROADSIDE TRAILS (ROADWAY CORRIDORS)

**Description.** A hard-surface pathway running parallel to a roadway and primarily designed to accommodate bicyclists and pedestrians. Also referred to as a sidepath.<sup>1</sup>

**Location.** Within or directly adjacent to a street right-of-way.

**Primary User Groups.** Bicyclists, pedestrians, and other human-powered recreation and transportation modes (e.g. in-line-skating, skateboarding, etc.).

**Design<sup>2</sup>: Materials.** Asphalt or concrete.

**Dimensions.** Common width of 10' - 12'

### GREENWAY TRAILS (NON-ROADWAY CORRIDORS)

**Description.** A hard or soft-surface pathway often located within or parallel to streams, drainage corridors, utility easements, railways, and environmentally sensitive lands and typically designed to accommodate bicyclists and pedestrians. Also referred to as a shared use path<sup>3</sup>.

**Location.** Within a designated easement, right-of-way, greenway, linear park or other public lands.

**Primary User Groups.** Bicyclists, pedestrians, and other human-powered recreation and transportation modes (e.g. in-line-skating, skateboarding, etc.).

**Design: Materials.** Asphalt, concrete, decomposed granite or other permeable surface.

**Dimensions.** Common width of 10' - 12'



### FEEDER PATHS

**Description.** A hard or soft-surface pathway of limited distance that creates direct connections between residential areas and other trip origins, and adjacent/proximate destinations or the community's primary shared-use trails, sidewalks or bicycle network.

**Location.** Within a designated easement, right-of-way, or other dedicated lands.

**Primary User Groups.** Bicyclists, pedestrians, and other human-powered recreation and transportation modes (e.g. in-line-skating, skateboarding, etc.).

**Design: Materials.** Asphalt, concrete, decomposed granite or other permeable surface.

**Dimensions.** Common width of 6' - 10' (but should vary according to anticipated levels of congestion).

1 American Association of State Highway and Transportation Officials, *Guide for the Development of Bicycle Facilities*, 2012 (Washington, DC), 1-4.  
 2 General characteristics. See Chapter 4, *Trails System Design Standards* for recommendations specific to the Waco city-wide trails network.  
 3 American Association of State Highway and Transportation Officials, *Guide for the Development of Bicycle Facilities*, 2012 (Washington, DC), 1.

## RECREATIONAL TRAILS

Recreational trails are designed to support various recreation and fitness activities including, hiking, jogging, biking, horse-back riding, paddling and more. Although some recreational trails can be shared among multiple types of users, many are custom designed to support specialized user groups. Some recreational trails may connect community destinations, but their utility as a transportation facility is often limited or incidental.



### SPECIAL-USE TRAILS

**Description.** Purpose-built trails designed to accommodate the recreational interests of specific user groups. Although often designed and incorporating features with a principal user in mind, some secondary user groups may not be expressly excluded.

**Primary User Groups.** Varies. See examples below and on page 11.

### SPECIAL-USE TRAIL EXAMPLES



#### HIKING TRAILS

**Description.** Natural surface trails often located in areas of open space or wilderness and designed to promote experiential pedestrian use.

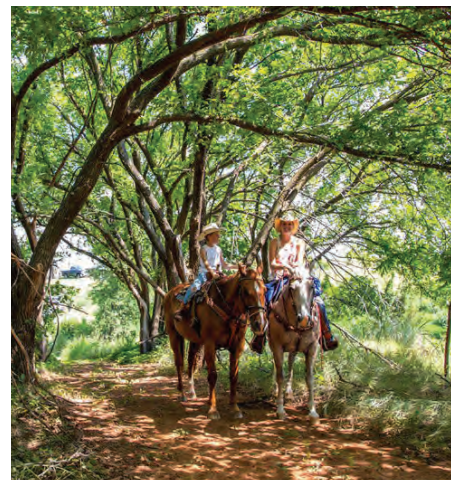
**Primary User Groups.** Varies.



#### MOUNTAIN BIKING TRAILS

**Description.** Natural or constructed off-road trails designed to accommodate a range of mountain biking experiences. Mountain biking trails may take different forms including cross-country, downhill, flow, or skills parks depending on the interests of individual riders.

**Primary User Groups.** Mountain bicyclists.



#### EQUESTRIAN TRAILS

**Description.** Natural or other soft surface trails designed to accommodate horseback riding.

**Primary User Groups.** Horseback riders.

## RECREATIONAL TRAILS (CONT.)



### PADDLING TRAILS

**Description.** Water trails designed for paddling and floating activities including canoeing, kayaking and tubing

**Primary User Groups.** Canoeists, kayakers.



### SITE AMENITY TRAILS

**Description.** Hard or soft surface pathways designed to promote fitness and recreation within a park or other activity center, but which are not necessarily configured to provide transportation linkages between community destinations.

**Primary User Groups.** Bicyclists, pedestrians, in-line skating, etc.

## GREENWAYS

A greenway is a corridor of land, which may include natural or man-made features such as streams, drainage channels, or utility easements, and may be preserved for environmental protection or recreational use. Greenways are often left undeveloped to protect natural habitats or other sensitive environmental areas, improve flood management and water quality, and may provide open space or vegetative buffers between land uses. **The terms “greenway” and “trail” are not synonymous.** Rather, greenways may contain trails that provide access to nature within the corridor, and/or routes for bicycling and walking between community destinations. Greenways are sometimes referred to as “linear parks” when public entities accommodate recreational uses within the corridor.



*Waco Creek and adjacent embankments may serve as a greenway that supports future trail infrastructure.*

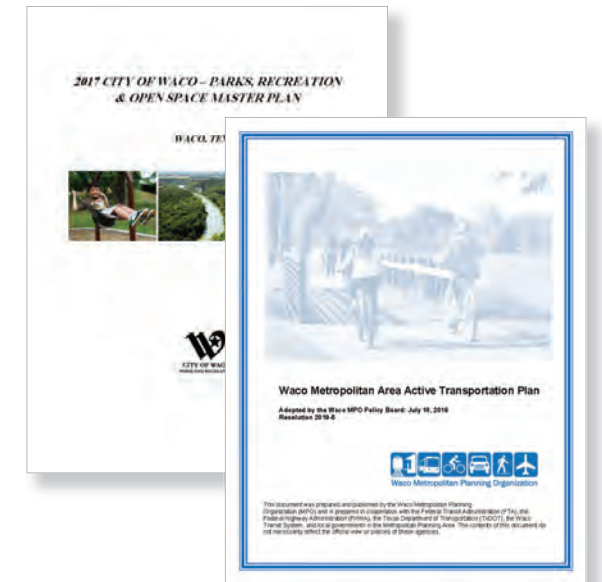
## BUILDING OUR TRAILS MASTER PLAN

### USING THIS PLAN

A number of planning efforts addressing active transportation and recreation in Waco have been conducted by the City and the Waco Metropolitan Planning Organization (the “MPO”). This Plan strives to fill the gap of a trail-specific plan, while drawing upon the plan goals and objectives of past studies. Primary local plans and studies referenced by this Plan include, but are not limited to:

- 2017 Parks, Recreation and Open Space Master Plan
- The City Plan - Waco Comprehensive Plan 2040 (2016)
- Connections 2045: Waco Metropolitan Transp. Plan (2020)
- Waco Metropolitan-Area Active Transp. Plan (2019)
- Waco Downtown Transportation Study (2014)
- Imagine Waco: A Plan for Greater Downtown (2010)

The **Waco City-wide Trails Master Plan** does not replace Waco’s recent park, recreation or transportation planning initiatives - rather, it augments the adopted and applicable long-range master plans of the City and MPO. More specifically, this Plan serves as a framework for enhancing the City of Waco’s trail network through identifying existing and future trail needs, areas of improvement for existing trails, and future trail phasing.



### THE PLANNING PROCESS

The **Waco City-wide Trails Master Plan** was conducted under the oversight of the Waco PARD and a Trails Advisory Committee appointed by the City of Waco. Plan recommendations and priority projects are derived from an inclusive stakeholder and public outreach process. The **Project Timeline** below describes the four primary phases of the planning initiative that took place in 2021.

#### PROJECT TIMELINE



#### PHASE 1 GATHER (JAN-MAY 2021)

Initial data compilation, research and interviews with key community stakeholders.



#### PHASE 2 ENVISION (MAY-JUNE 2021)

Public outreach activities and analysis of existing conditions, and community needs and preferences.



#### PHASE 3 COMPOSE (JUNE 2021-APRIL 2022)

Confirmation of findings and preparation of recommendations.



#### PHASE 4 APPROVE (MAY-AUG. 2022)

Development of an action plan for investing in trail development.



City staff collecting resident ideas for trail building at one of eight intercept survey “pit stops.”

## PUBLIC OUTREACH AND ENGAGEMENT

The Plan included an extensive public outreach effort designed to collect feedback from a diverse and sizable group of residents living in and around Waco. In-person activities and virtual outreach tools were utilized throughout the project to provide a variety of methods in which to engage the public. Key findings from public and stakeholder outreach activities are distributed throughout **Chapter 2, Existing Conditions**. Consolidated results of all public outreach and engagement activities can be found in **Appendix ##: Public Engagement Summary**.

### IN-PERSON OUTREACH activities included:

- **Focus Groups.** Staff facilitated four stakeholder meetings to identify important city recreation and transportation needs.
- **Intercept Survey.** City staff established eight intercept survey “pit stops” in May and June of 2021 to ask trail users about their preferences and needs related to trails.
- **Public Info Booths.** Two public info booths were set up in September of 2021 to solicit feedback on Plan recommendations.

### VIRTUAL OUTREACH activities included:

- **Project Web-page.** The City of Waco created and maintained a project web-page which provided an overview of the Plan, provided access to public participation events and activities, and served as a document repository.
- **Online Public Survey.** A survey asking about public trail usage was administered from April through June of 2021.
- **Virtual Interactive Map.** An on-line map allowing participants to describe what they like about existing trails and to identify new trail corridors was administered in July and August of 2021.
- **On-line Presentations.** Posted to the project website to provide the public with ongoing updates.

## TRAILS ADVISORY COMMITTEE

As a part of this Plan, an ad-hoc group of staff and citizens was formed by the City to serve as a Trails Advisory Committee (TAC). Membership was comprised of representatives of community transportation, recreation, human services, environmental and economic interests and included many individuals already serving on similar City or MPO boards (to encourage consistency with existing planning documents).

The TAC met four times during the project and served as a review body that provided guidance throughout the Plan development. The TAC confirmed the Master Plan vision, reviewed interim concepts and recommendations and provided feedback on the draft report.



Public outreach advertisements were designed to be fun and encourage resident participation and feedback.

“WACO WILL BUILD A NETWORK OF TRAILS THROUGHOUT THE METROPOLITAN AREA THAT WILL ESTABLISH INTERCONNECTED AND CONTINUOUS CORRIDORS TO PROMOTE OUTDOOR RECREATION, PERSONAL FITNESS AND WELLNESS, FACILITATE NON-MOTORIZED TRANSPORTATION AND HIGHLIGHT THE NATURAL AND CULTURAL RESOURCES OF OUR COMMUNITY.”

CITY OF WACO'S VISION FOR TRAILS

## THE WACO CITY-WIDE TRAILS SYSTEM: OUR VISION

**OUR VISION FOR TRAILS** in the Waco metropolitan area blends our aspirations for improving community health, prosperity and well-being through improved access to recreational amenities and transportation options. Our vision statement (above) is supported by six (6) guiding principles that define the diverse network of recreational and metropolitan trails that we will build throughout Waco to enhance the immediate and long-term quality of life of our current and future residents. The vision statement and guiding principles were derived from public input (e.g., stakeholder meetings and online survey) and reviewed by the TAC committee.

### GUIDING PRINCIPLES: OUR TRAILS WILL...

- |  |  |  |
|--|--|--|
| <p><b>1 BE CONNECTED AND ACCESSIBLE.</b></p> <p>We will build a trails network, in partnership with other organizations, that creates convenient local and regional connections, and is equitably distributed and accessible relative to those corridors that are financially feasible to develop.</p> | <p><b>2 BE COMFORTABLE AND EFFICIENT.</b></p> <p>We will incorporate safe design features into our trails that incentivize their use as a feasible non-motorized transportation option and an extension of the metropolitan area's broader network of bicycle and pedestrian facilities.</p> | <p><b>3 BE RESOURCEFUL AND FEASIBLE.</b></p> <p>We will design trails that can be operated in a cost-efficient manner and access a variety of funding sources to build trail facilities that are easy to maintain and are resilient in the face of weather events and fluctuations in the economy.</p> |
| <p><b>4 SUPPORT DIVERSE INTERESTS.</b></p> <p>We will develop a trails system that caters to a wide range of user groups by developing a diverse suite of hiking, biking and paddling trails throughout the community that are appropriate for persons of varying interests and abilities.</p>         | <p><b>5 BOOST OUR ECONOMY AND ENVIRONMENT.</b></p> <p>We will leverage our trail corridors to promote and preserve our environmental, cultural and historical assets through access and awareness.</p>   | <p><b>6 CREATE POSITIVE MEMORIES.</b></p> <p>We will facilitate enjoyable experiences by our trails system users by promoting responsible and respectful trail usage and behaviors through improved education and awareness.</p>   |



# CHAPTER 2: OUR TRAILS SYSTEM TODAY

Our multi-use trails enjoy sustained use as one of the city’s most popular recreational amenities. Today, Waco’s trails system provides access to many of the community’s most cherished natural areas and other popular community destinations ...**but our trails can be even more!** Many opportunities exist to enhance current trailway conditions, to increase residents’ and visitors’ access, and to improve the user experience.

**Chapter 2, Our Trails System Today**, describes the conditions of the existing trails system in Waco. The chapter evaluates complimentary biking and walking facilities that augment the current trail system and important amenities and facilities that our system accesses. This review of our community’s existing conditions aids in identifying opportunities to enhance our trails system and to increase community connectivity.

WACO’S EXISTING TRAILS SYSTEM ..... PAGE 17

TRAIL USER PROFILES AND PREFERENCES ..... PAGE 37

WACO’S PLANNED TRAILS SYSTEM ..... PAGE 39

BUILDING COMMUNITY CONNECTIVITY ..... PAGE 44

# WACO'S EXISTING TRAILS (2021) SYSTEM MAP

Waco's primary multi-use trails system consists of three metropolitan trails and one recreational trail collectively located downtown, adjacent to Lake Waco and at the far southwestern edge of the city. These trails extend for roughly 16.5 miles and can support a mix of recreational and transportation uses. **Waco Metropolitan Trails System (2021)** describes and illustrates the mapped trails system. These four primary trails are augmented on the system map by additional **some** other notable special use trails, including paddling trails, mountain biking and hiking trails, and in-park fitness trails that serve a variety of recreational needs.

## WACO'S METROPOLITAN TRAILS SYSTEM (2021)<sup>1</sup>

Trail <sup>2</sup>	Trail Type <sup>3</sup>	Trail Extent	Length	Surface Material
Cotton Belt	Metropolitan	Trailblazer Park to City of Waco Landfill	2.4 miles	Paved
Lake Waco Dam	Metropolitan	Skeet Eason Drive to Lakeshore Drive	3.2 miles	Paved
Riverwalk	Metropolitan	Confluence of the Brazos and Bosque Rivers to SH-77	9.0 miles	Paved/Unpaved
River Trail	Recreational	Redwood Shelter to McLennan Community College Amphitheater	1.9 miles	Unpaved

1. Not all recreational trails are part of the mapped network. Map does not include all special-use recreational trails.
2. Detailed descriptions of each trail begin on page 19.
3. See page 8-11 for a full description of all metropolitan and recreational trails by type.

### METROPOLITAN TRAILS

- Lake Waco Dam Trail
- Riverwalk Trail
- River Trail
- Cotton Belt Trail

### SPECIAL USE TRAILS

- Cameron Park Trails
- Paddling Trails

### LEGEND

- Parks
- Floodplain
- Municipal Boundary
- ETJ
- County
- Waterbodies
- Creeks
- Major Roads
- City Street



## COTTON BELT TRAIL (METROPOLITAN TRAIL)

The Cotton Belt Trail is the southern-most trail in the **Waco Metropolitan Trails System**. Located roughly parallel to State Highway 84 West, the Cotton Belt Trail extends over 2.4 miles between Trail Blazer Park on the west, and the City of Waco Landfill at the eastern terminus. Although currently limited in length, the Cotton Belt Trail bridges the South Basque River - provides an important link between this growing neighborhood and the amenities of Hewitt..

**The Cotton Belt Trail is defined as a metropolitan greenway trail.** It provides a 12-foot wide paved surface and is located on a utility corridor immediately adjacent to undeveloped, forested land, and newer neighborhoods developing within the municipal limits. The Cotton Belt trail's design and location allows it to serve walkers, runners, and bicyclists of all ages and abilities.

Current development patterns adjacent to the Cotton Belt Trail limit its use primarily to recreation and fitness but opportunities exist to incorporate the trail into a larger active transportation network as new development occurs.

### TRAIL ATTRIBUTES

**Established 2014**

**Length:** 2.4 miles

**Width:** 12 feet

**Surface Material:** Paved (concrete)

**Primary Users:** Walkers, runners and bicyclists

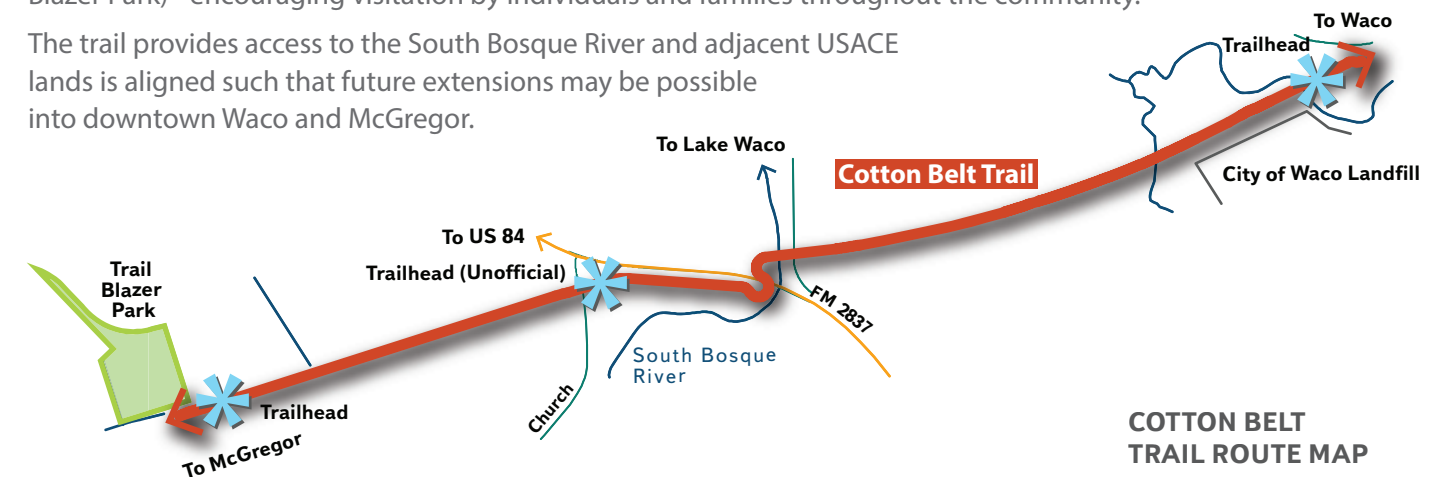
**Amenities:** Trailheads at each terminus.

**Extents:** Trailblazer Park (west) to Waco Landfill (east)

## TRAIL FEATURES

The Cotton Belt Trail incorporates several features and amenities to create a positive experience for trail users. The wide and level paved trailway surface accommodates persons of varying ages, interests, and physical capabilities. While trailheads at each terminus provide parking, shade, restroom accommodations and a playground (at Trail Blazer Park) - encouraging visitation by individuals and families throughout the community.

The trail provides access to the South Bosque River and adjacent USACE lands is aligned such that future extensions may be possible into downtown Waco and McGregor.



Shade structures (top, left) provide rest areas and escape from sunlight while using Cotton Belt Trail. Way-finding signage (top, right) along the trail helps users identify how far away trailheads or other destinations are along the trail. The Cotton Belt Trail also provides a comfortable experience for bicyclists, pedestrians and runners due to its generous width and well-maintained paved surface (top, right).

“ I LOVE THE COTTON BELT TRAIL, BUT I WISH IT WAS A LOOP SO I DIDN'T HAVE TO REPEAT THE SAME PATH DOWN AND BACK. ”

- SURVEY RESPONDENT



## COTTON BELT TRAIL CONDITIONS

The Cotton Belt Trail is in good condition. There are opportunities for future enhancements of the trail such as expansion, a trailhead at Old Lorena Road and Church Road, and the further development of each trailhead - but none of these investments are a result of advanced deterioration of existing trail facilities. There are no signs of significant trail surface deterioration - either along the length of the Cotton Belt Trail or the closed-loop trail at Trailblazer Park.

Existing trailheads - Hannah Hill Road (near the City of Waco Landfill) and Trail Blazer Park - lack permanent restrooms for trail users. Additional pavement markings, signage (or hand-actuated signalization) and potential traffic calming features may enhance trail user comfort at Church Road.



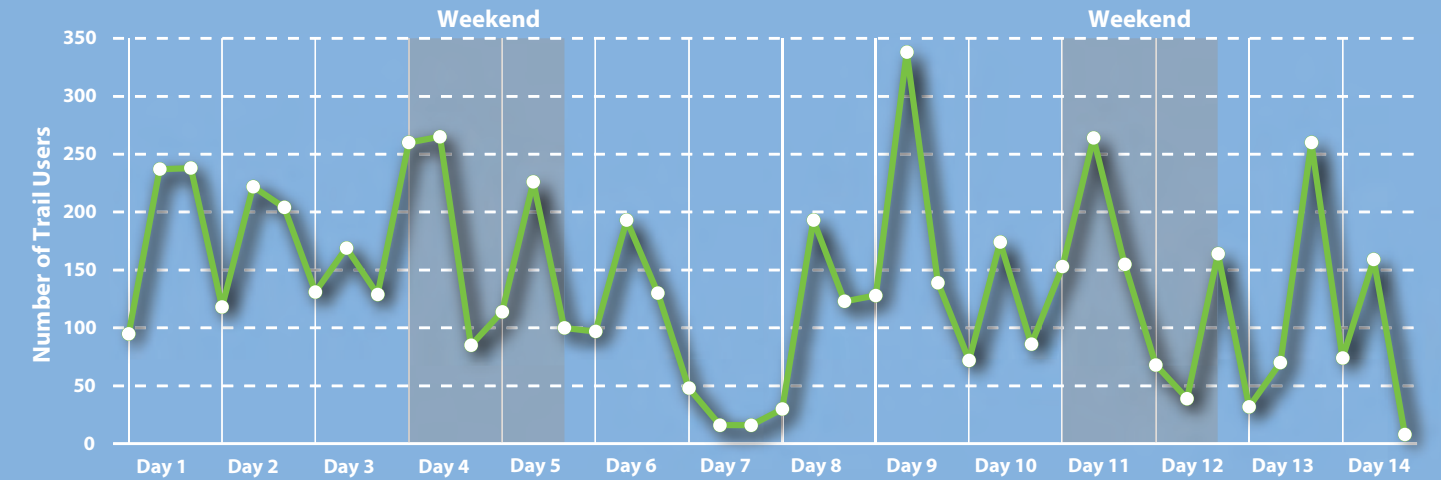
Paved concrete material makes up the entirety of the Cotton Belt trail (A, B). A feature of the Cotton Belt Trail helping to create a safer, enjoyable user experience is the pedestrian bridge crossing over the Brazos River at Old Lorena Road (C, D). Segments along certain parts of the bridge contain solar-powered lighting.



## COTTON BELT TRAIL USER ACTIVITY

Trail user counts were collected at four locations along the Cotton Belt Trail from May 5 to May 19. Over the 14 day collection period, a total of 5,972 user counts were recorded, for an average of 427 daily users. **Cotton Belt Trail Counts** illustrates that the highest volume of trail use typically occurred during mid-day.

### COTTON BELT TRAIL COUNTS (MAY 2021)



Anchor points in the graph above represent morning, midday and evening collection periods.



The unofficial trailhead at Church Road (E) lacks permanent parking and restrooms yet many users access the trail via this unsanctioned access point. Trail Blazer Park (F).

### OPPORTUNITIES FOR COTTON BELT TRAIL ENHANCEMENT INCLUDE:

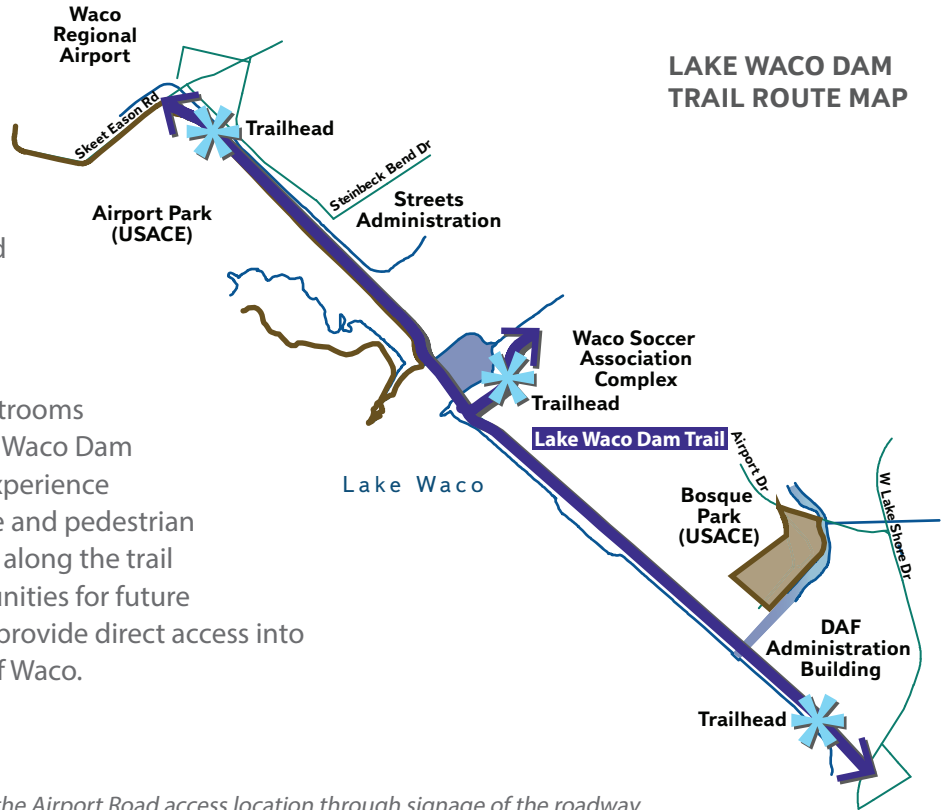
- **Amenities.** Provide permanent restrooms at each major trailhead.
- **Parking.** Work with the property owner to formalize and improve the trailhead at Old Lorena Road and Church Road.
- **Intersections.** Additional roadway signage, pavement markings and potential traffic calming at Church Road.
- **Signage and Way-finding.** Additional mileage and trail etiquette signage.
- **Trail Expansion.** Near-term extension of the trail west to Harris Creek Rd.; future links to downtown Waco and McGregor.



**TRAIL FEATURES**

The Lake Waco Dam and corresponding trail is owned and managed by the U.S. Army Corps of Engineers (USACE). This trail is maintained in partnership with the City of Waco. All features located throughout the trail are managed by the USACE, while maintaining a partnership with the City of Waco.

Trail features like trailheads with restrooms and sweeping views along the Lake Waco Dam Trail provide users with a positive experience allowing for safe and accessible bike and pedestrian activity. In general, the trail features along the trail are minimal, creating many opportunities for future enhancement. The three trailheads provide direct access into neighborhoods in (direction area) of Waco.



The the road within USACE directs users to the Airport Road access location through signage of the roadway (below, left). Additionally at the Airport Road trailhead, there are benches but no shade around the are. The way-finding structure has been abandoned and does not display any information for trail users.

**LAKE WACO DAM TRAIL (METROPOLITAN TRAIL)**

Located along Lake Waco, the Lake Waco Dam Trail is a United State Army Core of Engineers (USACE) owned and operated trail within the City of Waco. The trail runs northwest to southeast from Skeet Eason Drive to Lakeshore Drive. The northern trail head at Skeet Eason Drive is just south of the Waco Regional Airport, while the southern end spills out into the Cedar Ridge neighborhood.

**The Lake Waco Dam trail is an established metropolitan, greenway trail (non-roadway).** In general, the majority of the trail is surrounded by waterfront and undeveloped land. Airport Park is immediately adjacent to the trail to the northwest. Similarly, the Lake Waco Dam trail serves all ages groups of walkers, runners, and bicyclists of all abilities.

**TRAIL ATTRIBUTES**

- Established** 2000
- Length:** 3.2 miles
- Width:** 15 feet
- Surface Material:** Paved
- Primary Users:** Walkers, runners and bicyclists
- Amenities:** Trailheads at each terminus, as well as Airport Road.
- Extents:** Skeet Eason Drive (northwest) to Lakeshore Drive (southeast).



“ I PREFER TO USE SHADED TRAILS IN NATURAL ENVIRONMENTS, SO I DO NOT OFTEN USE THE DAM TRAIL. ”

-SURVEY RESPONDENT

## LAKE WACO DAM TRAIL CONDITIONS

The Lake Waco Dam trail, built in 2000, was recently resurfaced in 2017. With regards to the trail's surface material the condition is quite good. The trailhead located off Airport Road requires a short walk or bike on unpaved gravel material in order to access the paved trail running along Lake Waco. There are opportunities to create a more defined connection from the trailhead to the extended trail. Additionally, there are few amenities at each trailhead including permanent restrooms. The addition of more shade structures is one opportunity for enhancement and there are few instances of way-finding on the trail.



In order to access the paved Lake Waco Dam trail at the Airport Road trailhead, trail users are directed to follow an unpaved path (A). The unpaved path is in good condition, however becomes quite steep as you approach the dam (C). In many cases along the path to access the paved trail, there are damaged signs that have not been updated (B). Additionally, there is signage located along the trail providing a phone number for safety concerns (D).



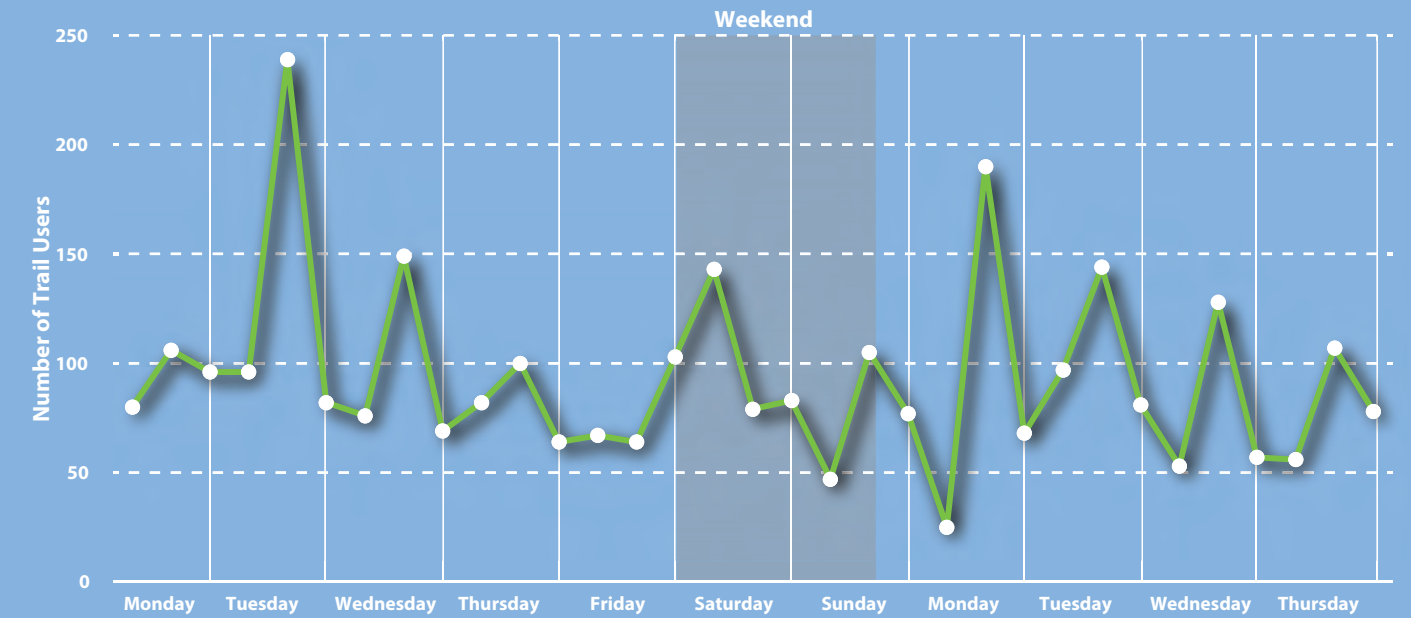
### OPPORTUNITIES FOR TRAIL ENHANCEMENT INCLUDE:

- **Trailhead.** Defined connection from trailhead parking to Dam trail.
- **Amenities.** Addition of permanent restrooms and shade structures along trail.
- **Way-finding.** Additional signage along trail and at trailheads.

## LAKE WACO DAM TRAIL USER ACTIVITY

Trail user counts were collected at two locations along the Lake Waco Dam Trail from July 5 to July 19. Over the 11 day collection period, a total of 3,091 user counts were recorded, for an average of 281 daily users. **Lake Waco Dam Trail Counts** illustrates that the highest volume of trail use typically occurred during mid-day.

### LAKE WACO DAM TRAIL COUNTS (JULY 2021)



Anchor points in the graph above represent morning, midday and evening collection periods.



A structure along the trail has been vandalized and abandoned (E). The rehabilitation of structures such as this, will provide trail users with a restroom and/or shade. Overhead lighting is consistent throughout the trail, as well as, lighting along trail-side wall (F).

## BRAZOS RIVERWALK TRAIL (METROPOLITAN TRAIL)

The Lake Brazos Riverwalk Trail is located in the heart of Waco. **Running parallel to the Brazos River, the Riverwalk Trail is a metropolitan, greenway trail, serving residents and visitors of Waco alike.** The Riverwalk Trail runs on both the east and west side of the Brazos River.

In general, the trail on the east side runs from the confluence of the Brazos and Bosque Rivers to SH-77. Students of Baylor University are served on the portions of the Riverfront Trail running east of IH-35 towards SH-77. On the west side of the Riverfront Trail the trail runs generally from Cameron Park Drive towards SH-77. This trail provides recreation for walkers, bicyclists at all levels, scooters, as well as those using wheelchairs. There are two bridge crossings over the Brazos River that connect each side of the trail. The Suspension Bridge and the Washington Bridge.

A major appeal of the Brazos Riverwalk Trail is its proximity to the destinations found in Downtown Waco. The connection to Cameron Park is also an asset of the Riverwalk Trail.

### TRAIL ATTRIBUTES

**Established 1908**

**Length:** 3.2 miles

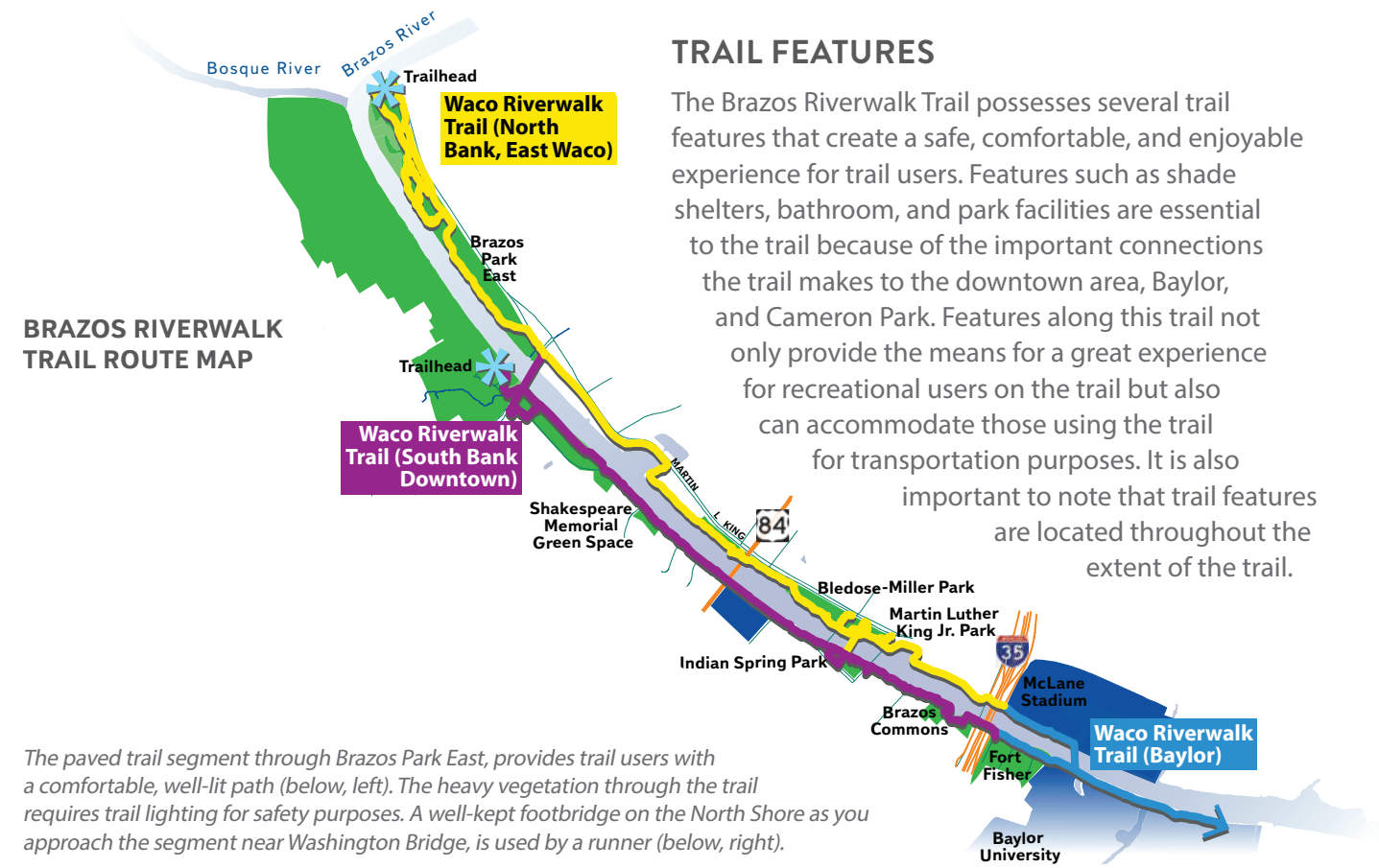
**Width:** 15 feet

**Surface Material:** Paved

**Primary Users:** Walkers, runners and bicyclists

**Amenities:** Trailheads at each terminus, as well as Airport Road.

**Extent:** Confluence of the Brazos and Bosque Rivers (west) to SH-77 (east)w.



### TRAIL FEATURES

The Brazos Riverwalk Trail possesses several trail features that create a safe, comfortable, and enjoyable experience for trail users. Features such as shade shelters, bathroom, and park facilities are essential to the trail because of the important connections the trail makes to the downtown area, Baylor, and Cameron Park. Features along this trail not only provide the means for a great experience for recreational users on the trail but also can accommodate those using the trail for transportation purposes. It is also important to note that trail features are located throughout the extent of the trail.

The paved trail segment through Brazos Park East, provides trail users with a comfortable, well-lit path (below, left). The heavy vegetation through the trail requires trail lighting for safety purposes. A well-kept footbridge on the North Shore as you approach the segment near Washington Bridge, is used by a runner (below, right).

## BRAZOS BRIDGES AND BOSQUE BLUFFS PADDLING TRAILS

Two paddling trails located in the center of Waco are the Brazos Bridges and Bosque Bluffs. Both of these blueways offer easy access to paddling trips for beginners and experienced paddlers alike. These trails offer a wonderful opportunity to enjoy the quiet serenity of nature while paddling through the parks and riparian corridors of Waco. Additionally, both trails are part of the Texas Paddling Trails system, receiving statewide regard.

The two trails can be paddled to enjoy as many miles as you wish. The Brazos Bridges Paddling Trail is a 4.8-mile loop from Brazos Park East Kayak/Canoe Ramp to Bledsoe-Miller Community Center Dock and back to Brazos Park East. The Bosque Bluffs Paddling Trail is roughly a 2.2-mile loop from McLennan Community College (MCC) Boat Ramp to Brazos Park East Kayak/Canoe Ramp and back to MCC.

Access points to the paddling trails are found at several locations along the Brazos Riverwalk Trail and the River Trail.



The Bosque Bluffs Paddling Trail (top) and the Brazos Bridges Paddling Trail (bottom).



“RIVERWALK TRAILS ARE PRONE TO FLOODING, AND CONSTRUCTION CLOSURES INTERFERE WITH USUAL ROUTES.”

-SURVEY RESPONDENT

## BRAZOS RIVERWALK TRAIL CONDITIONS

The Brazos Riverfront Trail includes 3.2 miles of trail that differs in condition as you move from segment to segment. Starting with the section at Brazos Park East, the trail generally in good condition. There are instances of way-finding, undamaged pavement, and several trail amenities that have been maintenance. Moving towards Washington Bridge, there are more instances of cracked pavement, less amenities, and prevalent drainage issues as several areas of the trail were flooded due to recent rainfall. The section of the trail crossing in front of Baylor McLane Stadium is not clearly marked as part of the Riverfront Trail and there is a lack of trail-specific amenities. On the south side of the Brazos River, the trail also experiences drainage issues, and lacks trail amenities. In general, surface conditions are adequate, however as you approach Redwood Shelter, as the Riverfront Trail backs into the Cameron Park River Trail, surface material varies and becomes less consistent.



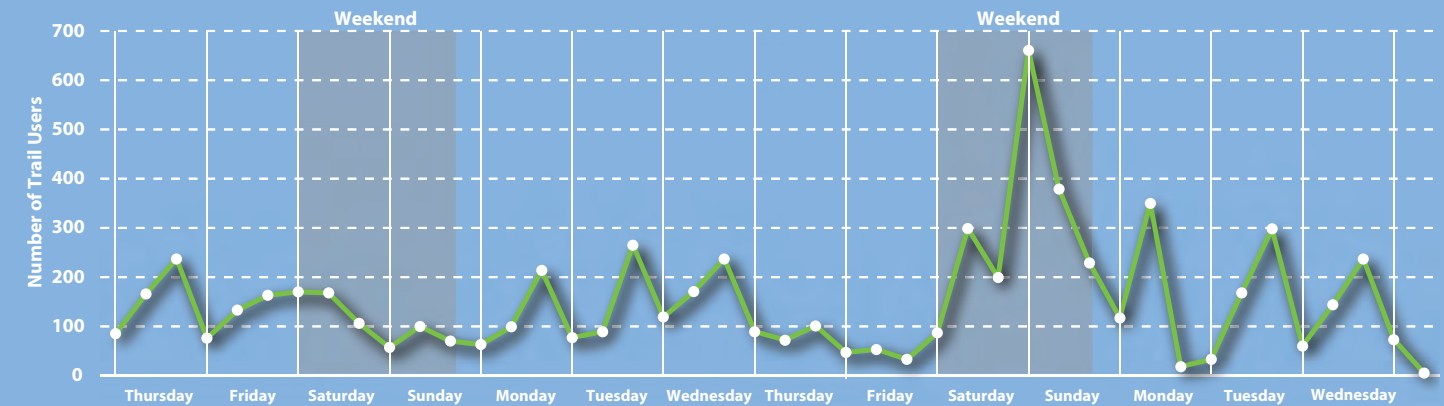
Along the Brazos Riverfront Trail are trash cans to keep waste off the trail, and prevent pollution in the Brazos and Bosque Rivers (A,B). As the trail moves through Baylor (C), the presence of signage (D) ends and the trail is not clearly marked.



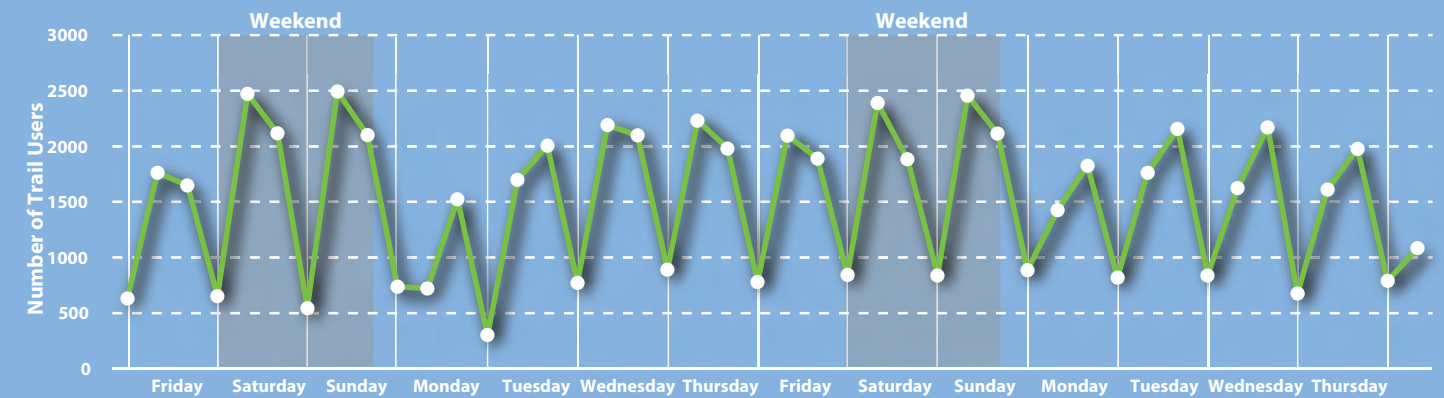
## BRAZOS RIVERWALK TRAIL COUNTS (JULY 2021)

Trail user counts were collected at four locations along the Brazos Riverfront Trail from in the months of May and June. Over the 14 day collection period, a total of 73,167 user counts were collected, for an average of 5,226 daily user counts. Brazos Riverfront Trail Counts (below) illustrates that trail was most used during weekend days while the highest user volumes occurred during mid-day.

### BRAZOS RIVERFRONT NORTH BANK TRAIL COUNTS (MAY - JUNE 2021)



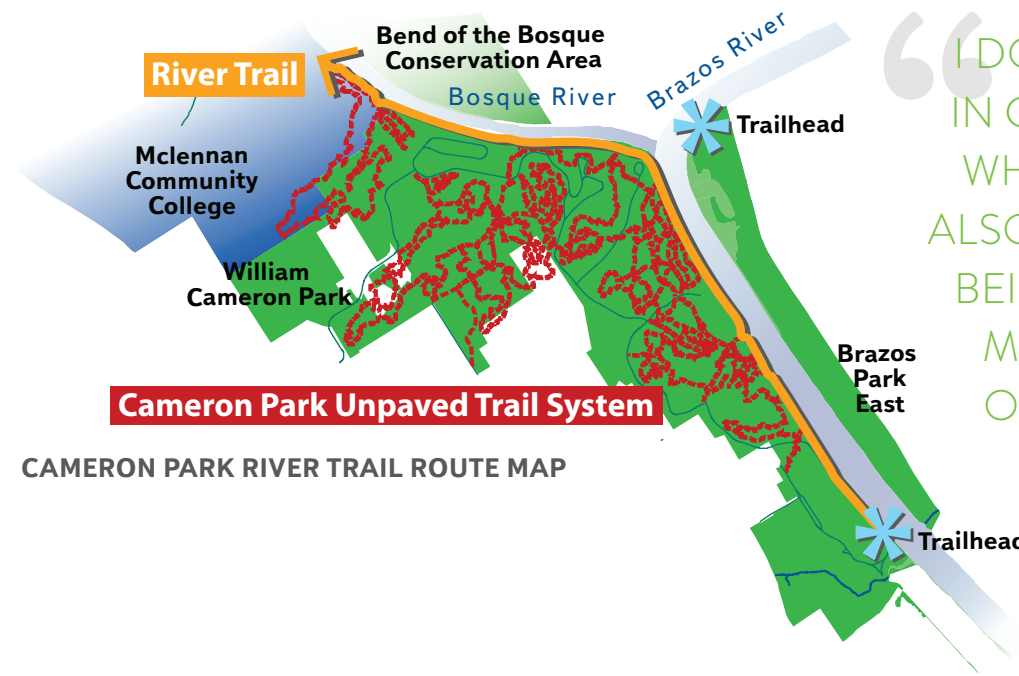
### BRAZOS RIVERFRONT SOUTH BANK TRAIL COUNTS (JUNE 2021)



Anchor points in the graph above represent morning, midday and evening collection periods.

## OPPORTUNITIES FOR TRAIL ENHANCEMENT INCLUDE:

- **Trailway Surface/Clearance.** Improvement of drainage issues causing flooding obstructions during and after rainfall events.
- **Amenities.** Opportunities for amenities on through the Washington Bridge segment to the Baylor area.
- **Way-finding.** Increased signage through the Baylor segment.
- **Trail Surface.** Resurfacing on the south segment of the trail between Redwood Shelter and Washington Bridge.



“ I DON'T FEEL SAFE IN CAMERON PARK WHEN I'M ALONE. I ALSO COME CLOSE TO BEING RUN OVER BY MOUNTAIN BIKERS ON CERTAIN TRAILS; THEY SHOULD BE MANDATED TO HAVE BELLS ON THEIR BIKES. ”

-SURVEY RESPONDENT

## RIVER TRAIL (RECREATIONAL TRAIL)

The River Trail is a multi-purpose recreational trail located within Cameron Park that provides access to active and passive recreation opportunities for hikers, runners and cyclists. Positioned between Waco's Redwood Shelter and the McClellan Community College boat ramp, the River Trail extends for over 2.4 woodland miles along the banks of the Brazos and Bosque Rivers.

The River Trail's constant river and bluff views, combined with limited elevation change, make it popular with able-bodied trail users seeking to access to wildlife and natural habitat and landscapes. Combined with Cameron Park's broader system of rugged and challenging mountain biking and hiking, the River Trail can serve the needs of both fitness and thrill-seeking trail users and those individuals seeking a calming experience with nature.

The River Trail's alignment provides bicycle and pedestrian connectivity between downtown Waco and the McClellan Community College campus. This transportation linkage is incidental however - being limited by topographic challenges and security concerns presented by the prevalence of concealed spaces resulting from the natural forested landscape.

### TRAIL ATTRIBUTES

**Established** 1908

**Length:** 2.4 miles

**Width:** varied 6ft to 12ft

**Surface Material:** Unpaved

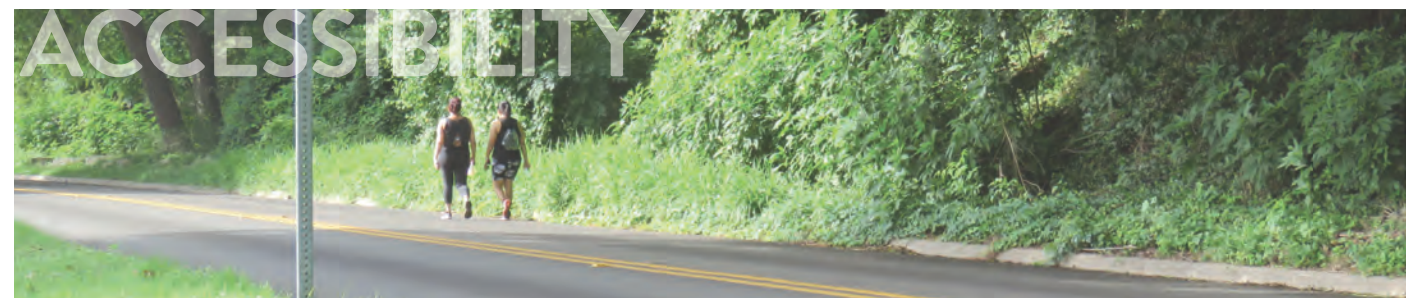
**Primary Users:** Walkers, runners and bicyclists

**Amenities:** Trailheads at each terminus.

**Extents:** Redwood Shelter (southeast) to McLennan Community College Amphitheater (northwest).



Signage shown just past Redwood Shelter (top, left) helps guide trail users along the River Trail and the Cameron Park recreational trails. After a rain event the trail surface is flooded (top, right) creating a surface difficult to travel on. Trail users walk on Cameron Park Drive as they exist the trail due to the lack of a permanent path between the redwood Shelter and the entrance of the River Trail.



## RIVER TRAIL CONDITIONS

The River Trail runs along the Bosque River and is separated from Cameron Park Drive for most of the trailway, except near Redwood Shelter and Jacobs Ladder. The natural surface of the Cameron Park River Trail has varied width throughout, making it difficult for a number of users, particularly walkers and bicyclists, the use the same segment of trail at the same time. The River Trail has several drainage concerns where heavy flooding has occurred due to rainfall. There are several rock obstructions throughout the trail especially as you approach the bluffs found throughout the trail. The footbridges located at several small stream crossings are slick in nature. Trail amenities at each trailhead provide shade and restrooms for trail users.



The gravel material and slope of the River Trail create drainage issues along the trail (A). Additionally, the surface material of the River Trail, limits trail users because of uneven surface and rock obstructions along the trail (C, D). However, the built structures along the trail, such as the restroom facilities (B) are in excellent condition and are accessible to all types of trail users.



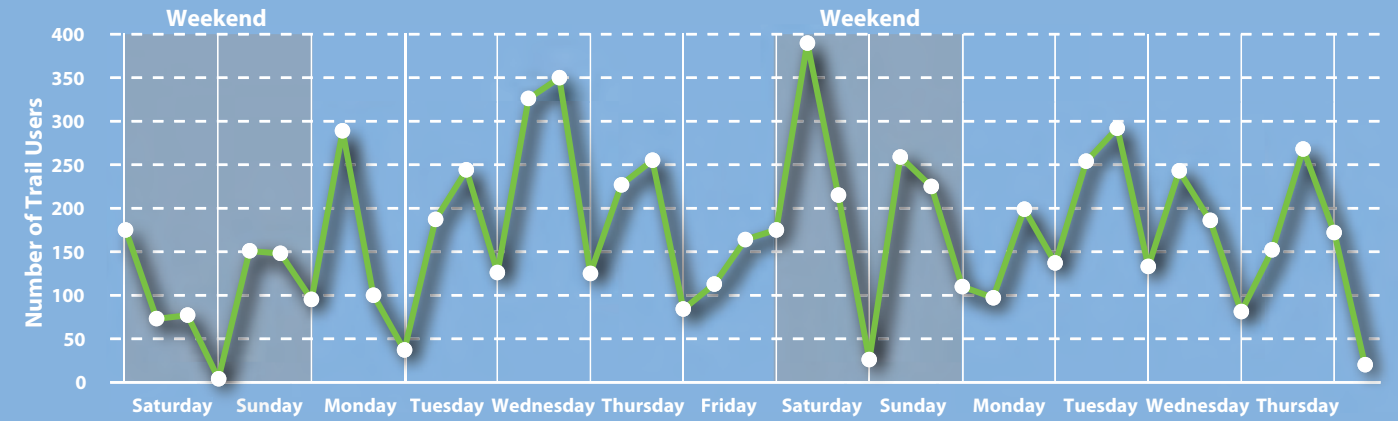
### OPPORTUNITIES FOR TRAIL ENHANCEMENT INCLUDE:

- **Trail Surface:** Trail surface primarily for walkers, joggers, and cyclists- resurfacing for trail users using wheelchairs, strollers, etc.
- **Trail Surface:** Resurfacing at footbridges to provide safe crossing over water features.
- **Trail Surface:** Resurfacing to address drainage issues where flooding occurs.
- **Trail Width:** A consistent trail width would allow safe passage of all users.

## RIVER TRAIL COUNTS (JULY 2021)

Trail user counts were collected at four locations along the River Trail for 14 days in July. Over the 14-day collection period, a total of 6,984 user counts were collected, for an average of 492 daily user counts. River Trail Counts (below) illustrates that the most popular day for trail usage was on the weekend, while the highest user volumes occurred during mid-day.

### RIVER TRAIL COUNTS (JULY 2021)



Anchor points in the graph above represent morning, midday and evening collection periods.

## SITE AMENITY AND SPECIAL USE TRAILS

Site amenity and special use trails play an important role in the existing trails system. Site amenity trails such as the closed-loop trails in Bell's Hill Park and Trailblazer Park, provide a space where trail users can access a walking or biking path in the same location as a park or playscape. Many of the site amenity trails in Waco, are accompanied by signage featuring a QR-Code. The **QR-Fit** trails provide health and fitness tips for trail users.

Special use trails also generate a significant amount of activity in Waco. The unpaved, mountain biking and running trails throughout Cameron Park are a major destination which appeal to specific user groups, whether that be mountain bicyclists or experienced trail runners. Woodway Park contains special use trails for the same audience, as well. The special use trails in Cameron Park and Woodway Park are a great asset to the overall trails system. Connections to site amenity and special use trails are important as the trails system moves forward.



The closed-loop trail at Bell's Hill Park (left) also has fitness equipment off the trail. A metal sign (right) denotes the entrance to a running trail within Cameron Park.

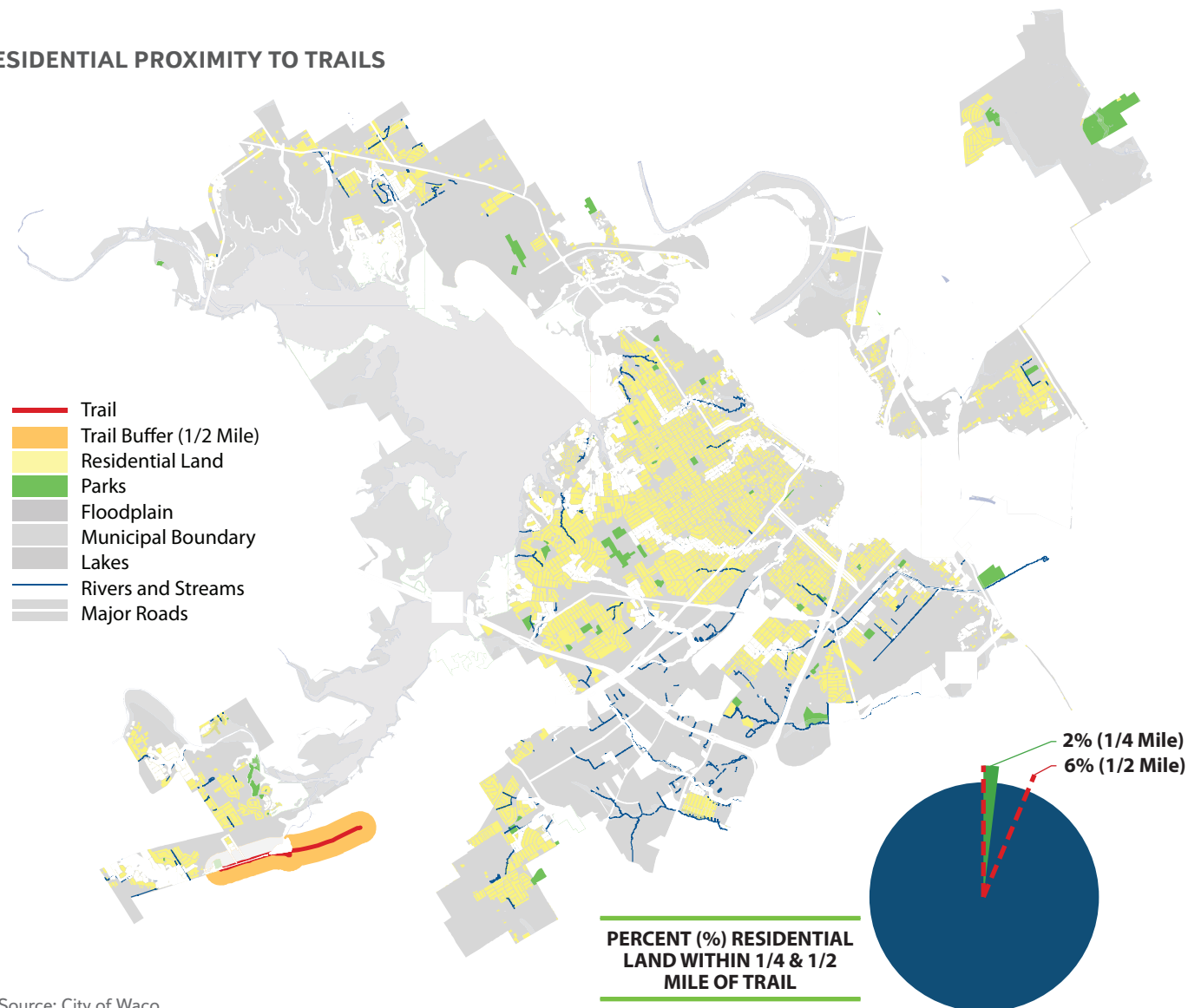
## NETWORK ACCESS

Land use and development patterns within the City of Waco have significant impacts on the development of an interconnected trail system. In many cases, rapid growth and development can be a constraint to the growth of an existing trail network. The preservation of open space and undeveloped land is important when considering the future establishment of hiking, biking and walking trails. When assessing the efficacy of the existing trail network in Waco, connectivity to key destinations, residential land uses, and vulnerable populations will shed light on opportunities for future growth.

## RESIDENTIAL LAND USES

**Residential Proximity to Trails** illustrates the proximity of Waco’s existing metropolitan trails to the City’s residential areas. Although trails are not the only facility that can serve a community’s walking and bicycling needs, trail proximity can be a significant quality of life factor that positively influences property values.

### RESIDENTIAL PROXIMITY TO TRAILS



Source: City of Waco

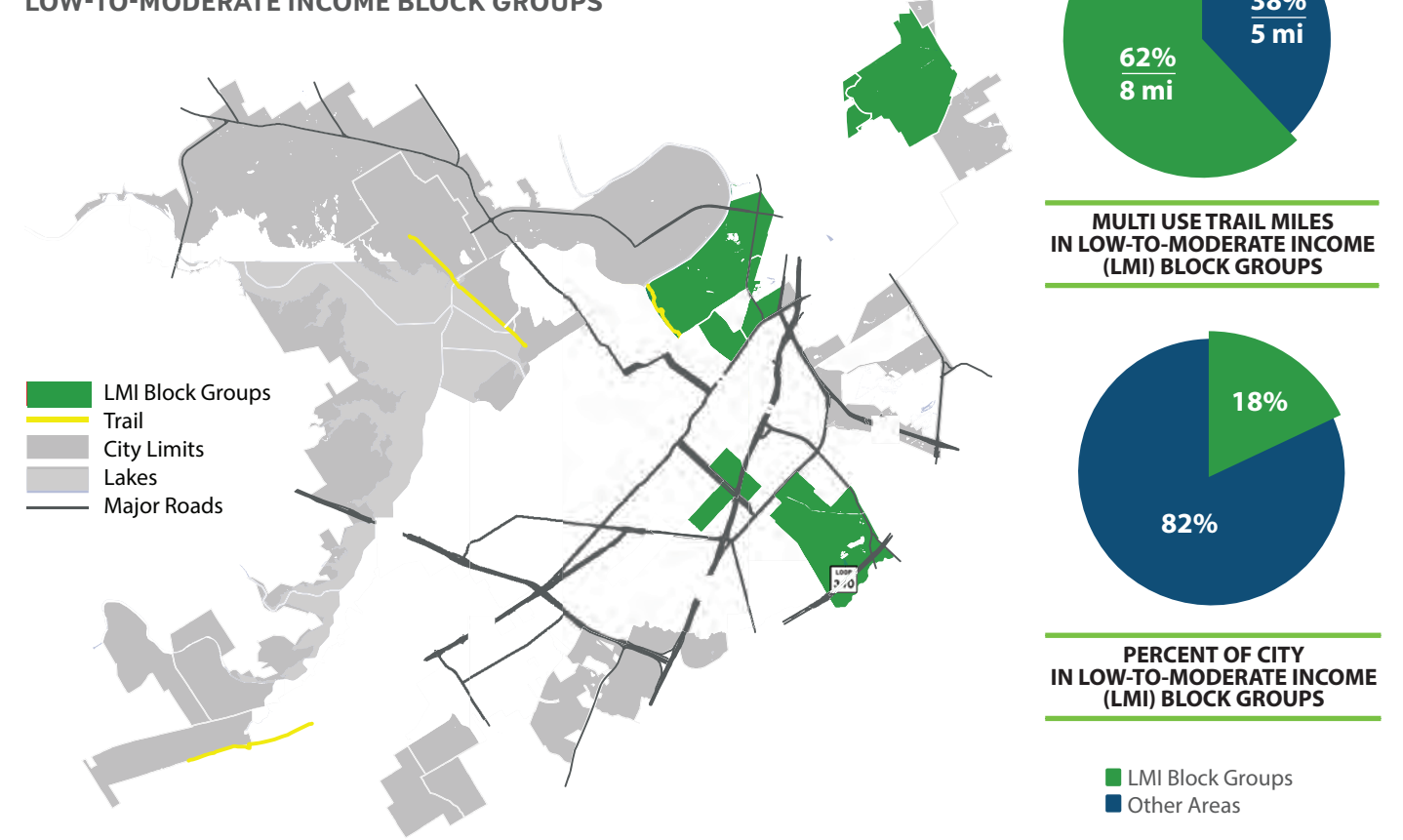
## EQUITABLE ACCESS TO TRAILS

Efforts to provide improved community-wide access to trails require that Waco consider the city’s most “vulnerable” populations. Even though there is no standard definition for who may be considered part of a “vulnerable” or “at-risk” population, such groups may generally consist of (but not be limited to) persons of color, low-income households, persons with disabilities, school-aged children, seniors, limited English proficiency (LEP) persons, and zero-car households. Any combination of these, and other socio-economic characteristics, can correlate to reduced access to a community’s trail facilities without coordinated efforts to reduce physical and financial barriers.

Vastly different concentrations of vulnerable or “at-risk” population groups may exist in a community. When considering the recreational needs of Waco’s socio-economically disadvantaged community members, **this Master Plan evaluates the distribution of trail facilities in relation to Waco’s low-to-moderate income (LMI) households as identified by the City’s 2019 – 2023 Consolidated Plan.**

**Low-to-Moderate Income Block Groups** and accompanying figures illustrate suggest no current disparity to trails system access between low-to-moderate income householders and other residents in Waco. Nonetheless, future trails investments that take advantage of suitable trail corridors should be balanced by other investments that collectively ensure that recreational amenities and transportation improvements are equitably distributed throughout the City.

### LOW-TO-MODERATE INCOME BLOCK GROUPS



Source: City of Waco, 2019 - 2023 Consolidated Plan; United States Census Bureau



Trail user counts presented on preceding pages do not identify user characteristics. Trail counting equipment used for this Plan only records when a sensor is triggered by a passing individual. Nonetheless, surveys conducted during the planning process suggest common trail user characteristics and preferences.

### HOW DO TRAIL USERS GET AROUND?

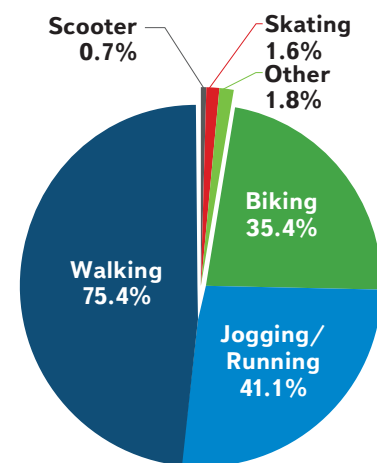


Source: Halff Associates, Public Surveys (Summer, 2021)

Master planning survey responses suggest that walking is the most common method for using the trail - followed by jogging/running, then bicycling. The figures below suggest that a small percentage of survey respondents use a trail by other means but the sample size remains small.

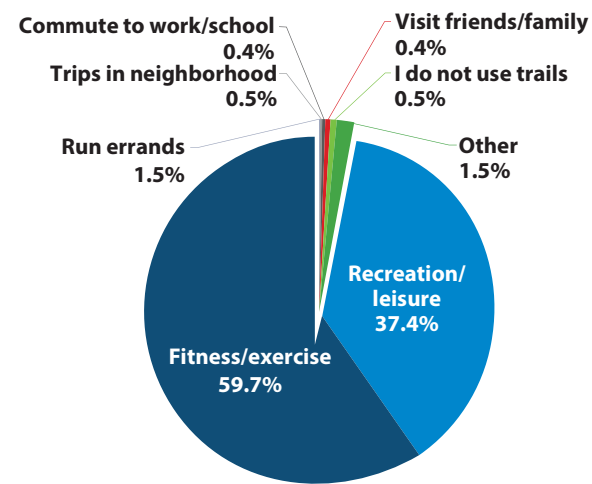
Almost 60 percent of all trail users utilize the trails system for fitness and exercise while over 37 percent use the trail for general recreation. Very few trail users utilize Waco's trails for transportation - due in part to the limited length and lack of connectivity of the current system. A majority of survey respondents also indicate that they visit the trails 1-3 times per week as a part of their normal routine.

#### METHODS YOU USE TO GET AROUND ON THE TRAILS



Source: Halff Associates, Public Surveys (Summer, 2021)

#### PRINCIPAL REASONS THAT YOU USE TRAILS...



### TRAIL USER NEEDS AND CONCERNS

On-line surveys, intercept surveys, an on-line map and conversations and public information booths reveal common themes among different trail user groups. Notable themes about existing and future trails are summarized below. All recorded public comments and concerns are compiled in [Appendix ##, \(Name\)](#).

#### WALKERS SAY...

- Existing trails are accessible for walkers.
- Safety concerns with bicyclists and runners on narrow trailways.
- Enjoy walking in groups with their family's and pets.

#### JOGGERS/RUNNERS SAY...

- Using the trails for recreation and fitness.
- Would like longer distances of trails that provided a looped track rather than an out and back.
- Fear of colliding with bicyclists at narrow trailways and at blind spots.

#### BICYCLISTS SAY...

- Desire for a wider network of bicycle facilities that connect to the existing trails in Waco.
- Use the Cameron Park recreational trail system for mountain biking.

### TRAIL ADVOCACY GROUPS

There are several local community groups in Waco that advocate for trail use throughout the city. These groups encourage residents and visitors to visit the existing trail system, as well as, champion trail improvement and enhancement initiatives. Trail advocacy groups include:

- Waco Bicycle Club
- Waco Striders
- Waco Paddle Club
- Waco Walks

Each of these groups play an important role in the Waco community to ensure those who visit the trails the most can lead the way in identifying the specific needs along the trails and partnering with the City to make improvements.





## WACO'S PLANNED TRAILS SYSTEM

The **Waco City-Wide Trails Master Plan** augments and supports initiatives laid out by previously adopted plans. **Trail Planning Precedents** provides a summary of existing municipal and regional plans that contain goals and recommendations related to the development and enhancement of trails within and proximate to Waco.

### TRAIL PLANNING PRECEDENTS

Existing City/Regional Plan	Applicable Goals
Waco 2017 Parks, Recreation and Open Space Master Plan	<ul style="list-style-type: none"> <li>Complete Riverwalk to McLane Stadium</li> <li>Expand Riverwalk to Mammoth National Monument</li> <li>Preserve existing natural areas for low-impact uses</li> <li>Continue developing trail management standards with volunteers and users</li> </ul>
The City Plan - Waco Comprehensive Plan 2040 (2016)	<ul style="list-style-type: none"> <li>Use natural areas such as floodplains and wetlands along creeks to provide open space and create connectivity between neighborhoods and the Brazos River</li> <li>Target residential developments with amenities to meet the needs of a diverse population such as community centers, senior centers, safe walking trails and sidewalks, playgrounds and community gardens</li> <li>Convert the former MKT rail line through East Waco to a multipurpose bicycle/pedestrian trail</li> </ul>
Connections 2045: Waco Metropolitan Transp. Plan (2020)	<ul style="list-style-type: none"> <li>MKT Trail from US 84 to FM 933; Construct bicycle/pedestrian path</li> </ul>
Waco Metropolitan-Area Active Transp. Plan (2019)	<ul style="list-style-type: none"> <li>Improve and expand the active transportation network in McLennan County to provide better connectivity between neighborhoods and destinations for people of all ages and abilities and services to attract and retain business and industry</li> <li>Increase the safety and convenience of walking, rolling, and biking</li> <li>Provide bikeway and continuous sidewalk between Lakeshore Dr and Waco Dr. Install a safe crossing to allow bikes and pedestrians to cross Lake Shore Dr to connect to the Lake Waco Dam Trail</li> </ul>
Waco Downtown Transportation Study (2014)	<ul style="list-style-type: none"> <li>Ensure the safe and efficient function of all transportation modes in Greater Downtown Waco</li> </ul>

### PROPOSED TRAILS

The City of Waco, in conjunction with the Waco Metropolitan Planning Organization (MPO), possesses an extensive network of proposed active transportation projects. Proposed or funded projects include the installation of bike lanes, sidewalk enhancements and new pavement markings.

The metropolitan area's proposed and funded pedestrian and bicycle projects accommodate non-motorized transportation needs (apparent and latent) that work together to create a comprehensive active transportation network. In several cases, there are proposed projects that recommend a bicycle or pedestrian facility that will increase connectivity to the City's existing trails network. A few key examples are provided in the **Waco Metropolitan-Area Active Transportation Plan (2019)**.

- Provide a bikeway and continuous sidewalk (and/or off-street shared-use path) to connect China Spring neighborhoods to the Lake Waco Dam Trail and central Waco (Not yet funded).
- Provide a bikeway and continuous sidewalk between Lakeshore Dr and Waco Dr. Install a safe crossing to allow bikes and pedestrians to cross Lake Shore Dr to connect to the Lake Waco Dam Trail (Currently in progress).

**One new trail corridor project is already proposed and has recently been funded: an off-street shared-use path along the former Missouri-Kansas-Texas, MKT Trail** to connect Lacy Lakeview, Bellmead, and Waco neighborhoods (from US 84 to FM 933). The City of Waco was awarded a Texas Department of Transportation (TxDOT), Transportation Alternatives (TA) Set-Aside grant for Phase 1 of the MKT Trail. TxDOT administers TA funds for locally sponsored bicycle and pedestrian infrastructure projects in communities less than 200,000.

### MKT RAIL CORRIDOR

The former Missouri-Kansas-Texas rail corridor was the first major rail corridor to enter Texas from the north. In Waco, the corridor purchased by the City, runs from the M. Lipsitz Co. plant by the Brazos River north to just past Lake Shore Drive. The primary benefit of a future MKT trail is connecting the neighborhoods of East Waco to the existing trail system surrounding the Brazos River. The MKT trail is planned to provide a safe route for pedestrians and cyclists to travel from the Brazos River to Lake Shore Drive and Lacy Lakeview, and to serve as a catalyst for further redevelopment in East Waco.



Original MKT train transiting through Waco (A). The abandoned corridor (B) has received funding for trail design and construction.

# WACO ACTIVE TRANSPORTATION NETWORK (2021) FACILITY MAP

Waco's existing multi-use trails system is complimented by other existing facilities designed for bicyclists and pedestrians. The city's trails, sidewalks and bicycle lanes combine to form to an "active transportation" network reduces residents' need to travel around Waco without relying exclusively on a personal motor vehicle to conduct all their trips.

Waco's Active Transportation Network (2021) Facility Map depicts the location of the City's existing active transportation facilities designed for bicyclists, or for shared bicycle and pedestrian use. The map also displays the proposed bicycle facilities that are funded through the City of Waco. Trail types are described in more detail in **Chapter 1, Why Plan for Trails**, while bicycle lanes and buffered bicycle lanes are defined in the Plan's Glossary. The mapped facilities depicted on this page serve as a baseline for the metropolitan area's bicycle and pedestrian network and has been used to inform the proposed metropolitan trails system recommended in this Plan.

## WACO'S ACTIVE TRANSPORTATION NETWORK (2021)

Facility Type	Distance (Miles)	
	Existing	Proposed (Funded)
Roadside Trail	0.9	--
Greenway Trail	15.87	--
Bicycle Lane	52.52	27.89
Buffered Bicycle Lane	25.42	18.56

Source: City of Waco

### LEGEND

- Parks
- Floodplain
- Municipal Boundary
- ETJ
- County
- Waterbodies
- Creeks
- Major Roads
- City Street

### ACTIVE TRANSPORTATION FACILITIES

- Existing**
- Lake Waco Dam Trail
- Riverwalk Trail
- River Trail
- Cotton Belt Trail
- Cameron Park Trails
- Proposed**
- Greenway Trail (Shared-use Path)
- Roadside Trail (Sidepath)
- Bike Lane
- Buffered Bike Lanes
- Shared Lane
- Paddling Trail
- Roadside Trail (Sidepath)

## TRAIL DESIGN AND DEVELOPMENT TOOLS

Expedient trails system development will require a commitment by the City to **A) Invest in trail construction** within corridors that it controls and, **B) Require trail corridor reservation, dedication and development** as part of the private land development process. Waco does not currently employ any regulatory provisions to ensure the reservation of rights-of-way or easements to preserve any of the future trail corridors proposed by this Plan - although “hike and bike trail” dedication and development standards are currently being considered by the City as part of updates to Appendix B (Subdivisions) of municipal code.

**Trail Dedication and Development Provisions** lists basic standards that can be incorporated into a community’s land development regulations to ensure that future trail dedication and construction efforts are shared by private developers that create the demand for trails, parks and other community amenities and services.

### MUNICIPAL CODES (2021)

Multi-use trail requirements are absent from the **City of Waco, Code of Ordinances**. Where required by Texas communities, trail development is often linked to parkland dedication requirements found within community subdivision regulations. Zoning regulations often include trail development and connectivity requirements related to individual site development. Waco’s zoning provisions (Chapter 28, Zoning) only incidentally mention trails in relation to lighting within the Brazos River Corridor District and concept plans for Planned Development Districts.

### ENGINEERING AND DESIGN SPECIFICATIONS (2021)

The City of Waco’s design standards for required infrastructure are contained in the **Waco Development Guide (2019)** and the **Standard Specifications for Construction (2013)** and associated detail sheets. Design specifications for multi-use trails, trailheads and amenities are not referenced in either guide. The absence of trail-specific design details may reflect the lack of trail construction requirements as part of new development prior to 2021.



### TRAIL DEDICATION AND DEVELOPMENT PROVISIONS

Provisions	Notes
<b>Scope.</b> Reservation and/or dedication of trail corridors. Construction of trail and trail facilities.	Ordinance should define the type of trail(s) which may be required as part of the development process. Must clarify conditions under which trail construction is required versus corridor reservation and/or future easement dedication.
<b>Applicability.</b> References to appropriate guiding documents.	All applicable long-range planning documents and maps should be referenced. Disclaimer language should clarify that corridor alignments in long-range planning documents are conceptual and may vary based on conditions.
<b>Dimensional Standards.</b> Spatial requirements including width, alignment and location.	Easement and trailway location and widths. Pathway in relation not on-site features and connectivity to adjacent property. Bike/pedestrian connectivity requirements for new development that will abut a future or existing trail.
<b>Development Standards.</b> Design and construction requirements for the trail and all supporting amenities.	For all items to be dedicated including trail corridor, trailway surface, crossings, signage, lighting and other amenities. Ordinance provisions should be supported by design guidelines and standard details.
<b>Dedication.</b> Acceptance of final amenities of fees in lieu of construction.	Final inspection, covenants and plat notations before acceptance of trail or trail connections. Provisions to allow the City to accept fees in lieu of trail construction

## BUILDING COMMUNITY CONNECTIVITY

### IMPEDIMENTS AND PATHWAYS

Physical features within a community influence the routing of proposed trails and other active transportation facilities. Impediments to trail connectivity can be either nodal (i.e. intersections, development tracts, etc.) or linear (i.e. highways, railroads, waterways). Waco has several barriers that can impact the routing of proposed trails, yet many of these same natural and man made impediments also provide opportunities for future pathways that support walking and bicycling.

### TRAIL IMPEDIMENTS AND PATHWAYS



### DESTINATIONS AND SURROUNDING COMMUNITIES

Creating connectivity between all of the various destinations within Waco is a priority of a comprehensive active transportation network. Creating a system that serves the diverse population in Waco is important to the City’s future. Trails play a part in creating connections that ultimately take people to where they want to go.

**Waco’s Active Transportation Network (2021) Facility Map** (pages 41 and 42) illustrates multiple community destinations in close proximity to the existing trails including schools, shopping centers, employment centers and public buildings. There are also major attractions such as Baylor University, the Waco Mammoth Site, and Magnolia Market that require connections as well.

Several other communities surround Waco including, **Hewitt, McGregor, China Spring, Elm Mott, Robinson and Woodway** that could benefit from connectivity to an expanded metropolitan trails system to provide their residents with a space for recreation and fitness. Without connections to surrounding communities fewer people can incorporate trail use into their frequent transportation practice. **Chapter 3, Our Future Trails System**, illustrates how these various destinations and communities may be linked to an expanded metropolitan trails system.

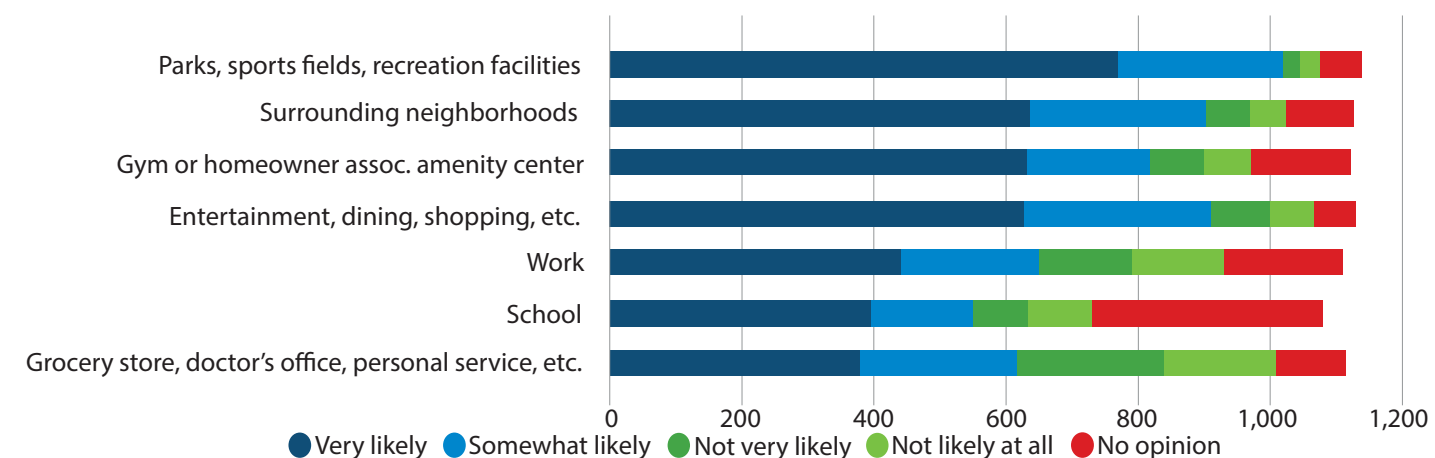
“ I WISH THAT TRAILS CONNECTED MY NEIGHBORHOOD (POLO PARK) TO MEANINGFUL DESTINATIONS (LIKE HEWITT ELEMENTARY, RESTAURANTS, AND GROCERY STORES). ”

-SURVEY RESPONDENT

## EMBRACING ACTIVE TRANSPORTATION

Public feedback reveals that very few Waco residents utilize the city’s trails for transportation purposes (see page 37). This likely reflects that lack of city-wide multi-use trail mileage or connectivity. When asked whether they might utilize trails for at least some of their weekly trips if there was better connectivity an overwhelming number of public on-line survey respondents indicated that they would be “very likely” or “somewhat likely” to do so. The figure below illustrates that - in all but one category - over 50 to 80 percent of respondents expressed an interest in bicycling or walking for some transportation needs.

**IF A TRAIL CONNECTED YOUR RESIDENCE TO THE FOLLOWING DESTINATIONS, WHAT IS THE LIKELIHOOD THAT YOU WOULD WALK OR BIKE TO EACH FOR AT LEAST SOME OF YOUR TRIPS?**



Source: Halff Associates, Public Surveys (Summer, 2021)



The Waco Mammoth National Monument was one of many destinations that members of the public would like to see linked by an expanded city-wide trails system.

## SUMMARY OF OBSERVATIONS

The combination of research and field observation reveals opportunities for the future improvement and expansion of Waco’s trails system while public feedback assists in identifying the type, location and priority of preferred trail investments. These cumulative observations are summarized in relation to how city-wide trails system expansion and enhancement can be accomplished consistent with the Master Plan’s guiding principles.

### HOW WILL OUR FUTURE TRAILS SYSTEM...

#### 1 BE CONNECTED AND ACCESSIBLE.

Several online survey respondents noted that they wished the existing trails network connected to their neighborhoods, in order to utilize destinations, such as schools. Additionally, trail users living outside of Waco proper, desired trails that were closer to their community.

#### 2 BE COMFORTABLE AND EFFICIENT.

There are several opportunities to enhance the existing trails, to create a comfortable user experience for all types of users. Along several segments of trail, wheeled users are not able to utilize the trails. Trail users also stated that in some instances there are safety conflicts with other users along the trail.

#### 3 BE RESOURCEFUL AND FEASIBLE.

The future design of proposed trails will be done in a cost-efficient manner. The proposed trails system will be one that is easy to maintain and operate. There are opportunities for existing metropolitan trails to adopt new operating procedures, as well as, diversify funding for future improvements.

#### 4 SUPPORT DIVERSE INTERESTS.

The existing trails system caters to the needs of walkers, runners/joggers, paddlers, wheeled users, and bicyclists of several different levels. The existing site amenity trails and special use trails provide users with specific interests and abilities a facility to use the trails.

#### 5 BOOST OUR ECONOMY AND ENVIRONMENT.

A combination of the existing and proposed trail network will create connections to destinations that have a positive impact on the local economy and increase awareness of area-wide cultural and historical assets. Linkages to surrounding communities and natural areas can create enduring experiences.

#### 6 CREATE POSITIVE MEMORIES.

Many trail users noted that certain aspects of trails, such as accessibility issues or current conditions, prohibited them from having a positive experience. Enhancement opportunities and proposed connections can create positive memories and increased usage for many users.



# CHAPTER 3: OUR FUTURE TRAILS SYSTEM

This Plan proposes an expanded and interconnected city-wide system of metropolitan trails consistent with our stated vision and guiding principles. This proposed system has been developed through a combination of research, field observation and community input – much of which has been summarized in preceding chapters.

The expanded network of multi-use trails identified in **Chapter 3, Our Future Trails System**, will extend throughout Waco and into unincorporated McLennan County. The mapped system depicted in this chapter focuses on “metropolitan trails” which may be used for both recreation and transportation, but some key “recreational trail” segments are also incorporated. While all trails can be an important recreational amenity, the mapped metropolitan trails system depicted in this Plan are meant to work in conjunction with Waco’s existing and proposed bikeways and pathways and represent corridors where a trail facility may be the most appropriate to promote active mobility.

WACO METROPOLITAN TRAILS SYSTEM ..... PAGE 49  
TRAILS SYSTEM OPPORTUNITIES ..... PAGE 56  
RECREATIONAL TRAIL OPPORTUNITIES ..... PAGE60

# WACO METROPOLITAN TRAILS SYSTEM

## TRAILS SYSTEM CLASSIFICATIONS

Multiple trail typologies were introduced in **Chapter 1, Why Plan for Trails?** of the Master Plan which can collectively enhance recreation and transportation opportunities in Waco. To simplify the future development of the **Waco Metropolitan Trails System**, these typologies have been grouped into three (3) classifications based on the function and priority of each existing and future trail segment.

The **Waco Metropolitan Trails System's** mapped network (depicted on page 51) is limited to existing, programmed and proposed "primary" and "secondary" trails as defined in the figures below. While the Master Plan also includes recommendations for the development of recreational trails, the mapped network's focus on primary and secondary trails is due to their **A) Dual function** as recreation and transportation facilities; and, **B) Alignments** that provide crucial connections between important community destinations. **It is important to note that the few recreational trails included in the mapped network are trail segments that have long-term potential to serve as a transportation function for some users.**

### WACO METROPOLITAN TRAILS SYSTEM, MAPPED NETWORK<sup>1</sup>



### PRIMARY AND SECONDARY TRAIL FEATURES

Feature	Primary Trail <sup>2</sup>	Secondary Trail <sup>2</sup>
Serves recreation and transportation	Yes	Yes
Includes greenway (non-roadway) trail segments	Yes	Yes
Includes roadway trail segments	Yes	Yes
Makes neighborhood (local) connections	Yes	Yes
Makes regional connections	Yes	No
Includes major trailheads	Yes	Varies
Provides a trail destination experience (Legacy Trail) <sup>1</sup>	Yes	No

1. See page 8-11 for a full description of all metropolitan and recreational trails by type.  
 2. Includes roadside trails and greenway trails only (see page 9.)  
 3. Not all recreational trails are part of the mapped network.

The **Waco Metropolitan Trails System Map** is located on pages 51 and 52. The relationship of the proposed metropolitan trails system with Waco's existing and proposed active transportation network is on pages 53 and 54.



## TRAIL ALIGNMENTS

The trail corridor alignments depicted on the **Waco Metropolitan Trails System Map** on page 51 are **conceptual**. They are presented for planning purposes only. The mapped metropolitan trails network depicts both short and long linkages, connections and alternative alignments that were identified throughout the planning process as potentially desirable trail routes. Final trail corridor alignments will vary depending on land availability or suitability conditions on individual parcels revealed during the corridor acquisition and schematic design process.

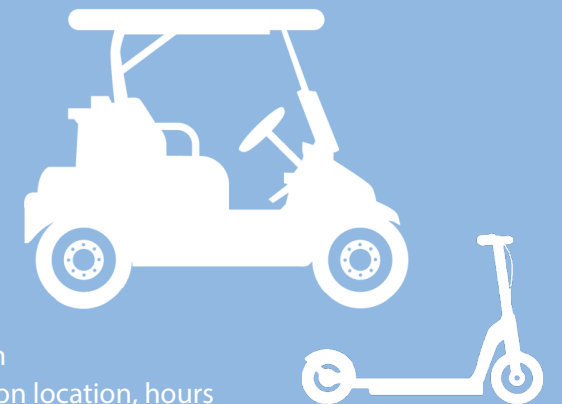
The future development of trails along the mapped alignments is dependent on environmental regulations, right-of-way acquisition and permitting. While land availability and ownership was a consideration throughout the planning process, this Plan does not assess the individual impacts that each of the alignments may have on individual parcels. Pursuing a trail in one of the proposed alignments may include: public expression of need, population growth in an under-served area, and/or an opportunity for future land acquisition or dedication or trail easements.

THE TRAIL CORRIDOR ALIGNMENTS DEPICTED ON THE WACO METROPOLITAN TRAILS SYSTEM MAP ARE CONCEPTUAL. FINAL TRAIL CORRIDOR ALIGNMENTS WILL VARY DEPENDING ON LAND AVAILABILITY OR THE CONDITIONS OF INDIVIDUAL PARCELS.

### MOTORIZED TRAIL USE

The **Waco Metropolitan Trails System** is intended for bicycle and pedestrian use and other non-motorized transportation. The Municipal Code of Waco (Code 1967, § 23-6) currently states that the operations of motorized vehicles are not permitted within parks or along trails, aside from designated internal roadways. This includes motorcycles and mopeds, as well as, scooters and golf carts.

Motorized methods of transportation can be accommodated on some improved trail segments but require clear local oversight on location, hours and speed of operation to protect pedestrians and bicycles.



# WACO METROPOLITAN TRAILS SYSTEM MAP

The City of Waco proposes a system of approximately 130 miles of metropolitan trails. Primary metropolitan trails link Waco to surrounding communities and destinations while secondary metropolitan trails provide additional connections between municipal neighborhoods, parks, schools and other services. The **Waco Metropolitan Trails System** serves as both a recreational amenity and as a valuable element of the city's transportation network and follows greenway and roadway corridors. The mapped metropolitan trails system includes some recreational trail segments which have the long-term potential to serve the transportation needs of some users.

## METROPOLITAN TRAILS BY CLASSIFICATION AND TYPE

Trail Type <sup>1</sup>	Trail Classification <sup>2</sup>	Trail Mileage	
		Existing	Proposed
ROADSIDE	Primary	0.9 Miles	33.0 Miles
	Secondary	0.0 Miles	23.8 Miles
GREENWAY	Primary	8.4 Miles	46.6 Miles
	Secondary	7.5 Miles	24.8 Miles
RECREATIONAL <sup>3</sup>	Recreational <sup>3</sup>	15.3 Miles	38.8 Miles

### LEGEND

- Proposed Trailheads
- Parks
- Floodplain
- Municipal Boundary
- ETJ
- County
- Waterbodies
- Creeks
- Major Roads
- City Street

1. See page 8-11 for a full description of all metropolitan and recreational trails by type.
2. See page ### for a description of functional trail classifications
3. Not all recreational trails are part of the mapped network. Map does not include special-use recreational trails such as paddling or site amenity trails that do not serve as a transportation function for users.

### METROPOLITAN TRAILS

- Existing Metropolitan Trails
- Greenways
- Proposed Metropolitan Trails Primary
- Greenways
- Secondary
- Greenways
- Other Recreational Trails Recreational
- Rustic
- Roadside



# WACO ACTIVE TRANSPORTATION NETWORK SYSTEM MAP

The **Waco Metropolitan Trails System** works in conjunction with the metropolitan area's existing and proposed active transportation facilities. Proposed metropolitan trail corridors include segments of the roadway network where multi-use trails are viewed as the preferred solution for future bicycle and pedestrian mobility, and non-roadway (greenway) corridors which expand upon Waco's on-street system of sidewalks and bikeways.

The existing and proposed active transportation facilities identified on this map were sourced from the Waco Metropolitan Area Active Transportation Plan, adopted by the Waco MPO in 2019.

## ACTIVE TRANSPORTATION NETWORK BY FACILITY TYPE

Facility Type	Mileage	
	Existing	Proposed
METROPOLITAN TRAIL	16.8 Miles	128.2 Miles
RECREATIONAL TRAIL	15.3 Miles	38.8 Miles
BIKEWAY <sup>1</sup>	77.9 Miles	562.3 Miles

1. Source: Waco Metropolitan Planning Organization. Includes bike lanes, buffered bike lanes, separated bike lanes, and bike routes.

### LEGEND

- Proposed Trailheads
- Parks
- Floodplain
- Municipal Boundary
- ETJ
- County
- Waterbodies
- Creeks
- Major Roads
- City Street

### ACTIVE TRANSPORTATION FACILITIES

- |                                     |                                  |                           |
|-------------------------------------|----------------------------------|---------------------------|
| <b>Existing Metropolitan Trails</b> | <b>Other Recreational Trails</b> | <b>Bikeways: Proposed</b> |
| Greenways                           | Rustic                           | Bike Lane                 |
| <b>Proposed Metropolitan Trails</b> | <b>Bikeways: Existing/Funded</b> | Buffered Bike Lane        |
| <b>Primary</b>                      | Bike Lane                        | Bike Route                |
| Greenways                           | Buffered Bike Lane               | Separated Bike Lane       |
| Recreational                        | Shared Lane                      |                           |
| Roadside                            | Sidepath                         |                           |
| <b>Secondary</b>                    |                                  |                           |
| Greenways                           |                                  |                           |
| Roadside                            |                                  |                           |



## CORRIDOR EVALUATION AND PERFORMANCE CRITERIA

Multiple factors were considered when identifying the suitability of future trail corridors in Waco. Throughout the planning process, each proposed trail segment was assessed in relation to eight (8) evaluation criteria outlined below. Note that, while each of these criteria are important in ensuring that future trails provide the greatest community benefit, not all trail segment illustrated on the **Waco Metropolitan Trails System Map (pages 51 and 52)** aligns with every criteria. Corridor evaluation criteria are combined with additional “operational” criteria in **Chapter 5, Implementing Our Trails Vision**, to help prioritize subsequent trail development projects over others with regards to future capital improvement programming.

### CORRIDOR EVALUATION CRITERIA

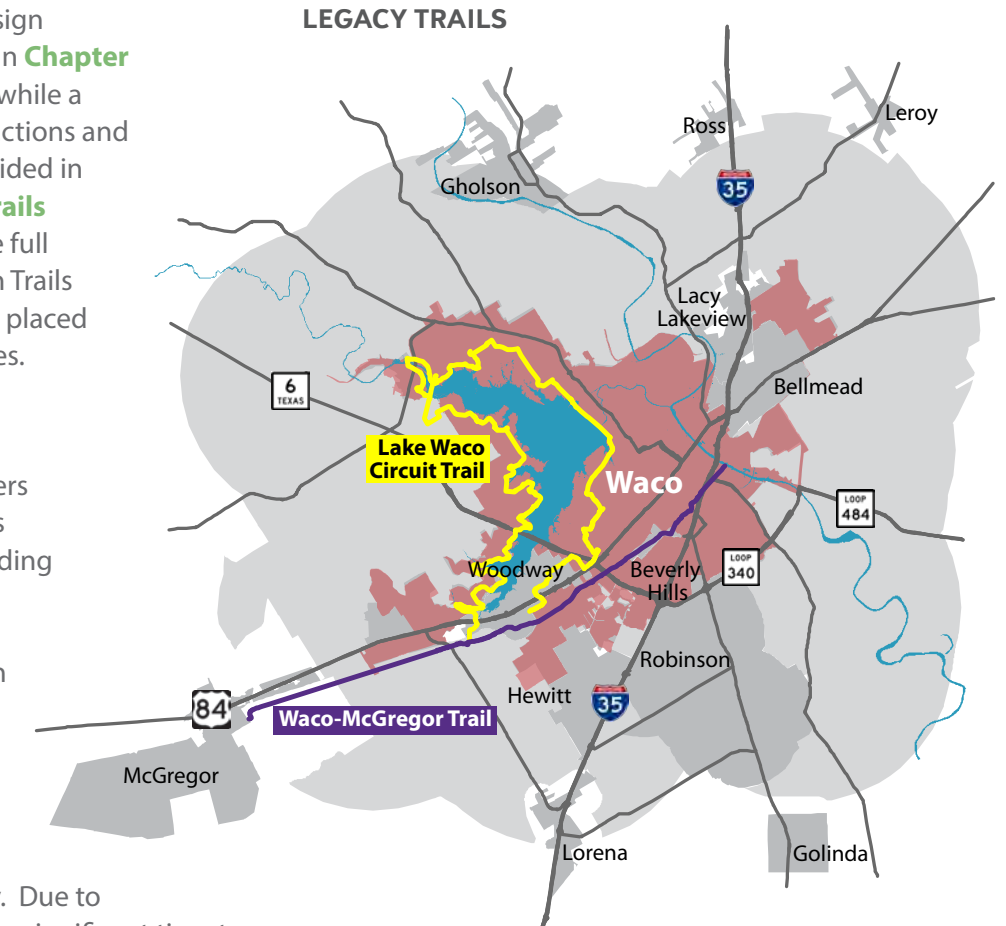
CONNECTIVITY (EXISTING SYSTEM)	CONNECTIVITY (PLANNED SYSTEM)	CONNECTIVITY (SCHOOLS, PARKS AND TRANSIT)
The corridor will increase connectivity by extending or filling a gap within the existing bicycle and pedestrian network.	The corridor has been identified as a priority through its inclusion in an adopted City or metropolitan plan.	Facility development in the corridor will provide a direct connection to one or more schools, parks or transit stops.
CONNECTIVITY (COMMUNITY DESTINATIONS)	SAFETY	ACCESS (RESIDENTIAL AREAS)
Facility development in the corridor will provide a direct connection to one or more community destinations such as civic facilities, shopping areas, major employment areas, downtown, etc.	The corridor is proximate to locations where one (1) or more injury accidents involving a bicyclist or pedestrian has been reported within the last three (3) calendar years.	The corridor is located close to, or bisects one or more residential areas.
ACCESS (EQUITY)	CORRIDOR AVAILABILITY	
The corridor is located close to or within one or more low-to-moderate income neighborhoods.	Corridor dimensions may allow for trail segments to be constructed in existing public rights-of-way or easements.	

## TRAILS SYSTEM OPPORTUNITIES

The Master Plan’s trails system design recommendations are presented in **Chapter 4, Designing Our Trails System**, while a recommended work program of actions and implementation strategies is provided in **Chapter 5, Implementing Our Trails Vision**. Nonetheless, realizing the full benefits of the Waco Metropolitan Trails System requires that emphasis be placed on leveraging key network features.

### LEGACY TRAILS

Legacy trails link population centers with distinct regional destinations such as natural areas and surrounding communities. While legacy trails promote active transportation, they also serve as a destination on their own - promoting visitation via active tourism. Active tourism amenities such as trails can maximize the economic benefits of the recreational, natural, and historic resources of a community. Due to their scale, “legacy” trails often take significant time to develop, but they serve as cornerstones of community pride and enjoyment for future generations. The **Waco City-Wide Trails Master Plan** proposes approximately 25 miles of legacy trails. These include the **Waco-McGregor Trail** and the **Lake Waco Circuit Trail**.



### POTENTIAL LEGACY TRAIL ROUTES

Legacy Trail	Trail Type	Trail Extent/Features
Waco-McGregor Trail	Roadside/Greenway	<b>## Miles.</b> Brazos Riverfront East to downtown McGregor. Provides regional connectivity, in addition to linkages to community destinations in Waco; supports long-distance travel.
Lake Waco Circuit Trail	Greenway	<b>## Miles.</b> Follows the perimeter and extent of Lake Waco. Serves as a destination for residents and visitors; supports long-distance recreational activity.



The Cotton Belt Trail would serve as the central segment of the proposed Waco-McGregor (Legacy) Trail.

## HIGH PRIORITY TRAIL CORRIDORS

A few of the **Waco Metropolitan Trail System's** proposed trail segments are located within **high priority trail corridors**. These are corridors that would include primary trails (see page ##), can be constructed in conjunction with private development activity and/or already have received designated funding for construction of trail within at least a portion of the corridor.

**Please note that location of a future trail segment within a high priority trail corridor is only one of many variables that are measured to determine trail project prioritization.** Trail development projects are prioritized in **Chapter 5, Implementing Our Trails Vision**, based on a combined series of “community benefit” and “operational” criteria.

High priority trail corridors include:

- **Mary Avenue Corridor.** The Mary Avenue corridor provides residents and visitors with a roadside trail through the downtown area. This particular corridor has connectivity to much of the retail and restaurant developments in downtown Waco and would serve as the eastern segment of the proposed Waco-McGregor (Legacy) Trail.
- **MKT Corridor.** The MKT corridor provides connectivity from the Brazos Riverwalk trails to the residential and commercial developments in east Waco near Lake Shore Drive.
- **Lake Waco Dam/Skeet Eason Drive.** The extension of the Lake Waco Dam Trail north along Skeet Eason Drive is considered a high priority corridor because of the connectivity it provides the China Spring neighborhoods to the rest of the trails network. Connectivity to the China Springs area was a common point of feedback during the stakeholder outreach efforts.
- **Primrose Trail/Primrose Drive.** The corridor following the water feature at SH 6 and the Brazos River to Primrose Drive provides trail access to the eastern side of Waco. Future commercial and residential development is likely in areas surrounding this corridor.

## TRAILS SYSTEM FEATURES

The following sections provide a brief introduction to key features that will be essential developing a successful trails system. Trail access features and amenities augment the “pathways” which form the backbone of a trails system in a way that ensures that individual user experience is sufficiently positive to entice future visits. Further design considerations and implementation strategies for trail features are presented in **Chapter 4, Designing Our Trails System** and **Chapter 5, Implementing Our Trails Vision**.

## TRAIL AMENITIES

Adding the appropriate amenities to a trail system can greatly enhance user experience. Stakeholder feedback obtained during the planning process suggests that many of Waco’s trail users would like to see a variety of trail amenities which - if present - are not widely dispersed throughout the trails system today.

Key trail amenities may include:

- |                               |  |  |
|-------------------------------|--|--|
| • <b>Bike Racks</b>           | • <b>Drinking Fountains</b>            | • <b>Lighting</b>                        |
| • <b>Bike Repair Stations</b> | • <b>Trash Receptacles</b>             | • <b>Bridges and Low Water Crossings</b> |
| • <b>Fitness Stations</b>     | • <b>Way-finding/Information Signs</b> | • <b>Safety Railings</b>                 |
| • <b>Rest Areas/Shade</b>     | • <b>Trees</b>                         |  |
| • <b>Children Play Area</b>   | • <b>Trail Overlooks</b>               |  |
| • <b>Pet Amenities</b>        | • <b>Trail Gateways</b>                |  |

## TRAIL ACCESS (TRAILHEADS)

Trailheads function as entry points to the trail network. Certain elements are common at trailhead locations including seating, signage and waste receptacles. Many other physical elements of a trailhead however are dependent on the number of anticipated users, the type of trail, and the surrounding land use context. “Major” trailheads which are designed to serve the entire community ought to be established near commercial developments and transportation nodes, for the highest accessibility. “Minor” trailheads which often serve adjacent residents should be simple pedestrian and bicycle entrances at recognizable spots such as parks or landmarks.



Major trailheads are designed to meet the needs of visitors that must travel to the trail destination (A). The level of expenditure for minor trailheads may vary but facilities are limited to those that meet the immediate needs of residents that are within a comfortable walking or biking distance (B).

## TRAILS SYSTEM FEATURES (REPRESENTATIVE IMAGES)

A comprehensive overview of trails system design features is provided in **Chapter 4, Designing Our Trails System**.



Distance markers for orientation, safety and personal benchmarking (A). Pavement markings and surfacing to distinguish the trail from adjacent gathering and motor vehicle spaces (B). User etiquette signage (C). Simple, easy-to-maintain and well-spaced places to sit and relax. Iconic architecture for trailhead features such as restrooms (D) and pavilions.

## RECREATIONAL TRAIL OPPORTUNITIES

The improvements to local mobility, fitness and recreation offered by Waco's mapped system of proposed metropolitan trails can be further enhanced through targeted recreational trail investments. While the Waco Metropolitan Trails System depicts the alignment of the proposed Lake Waco Traverse recreational trail, there are other significant ways to expand access to additional recreational trails.

Recreational trails opportunities are highlighted below. Additional recreational trail opportunities for recreational trail investments are listed in **Chapter 5, Implementing Our Trails Vision**.

### SPECIAL-USE TRAILS



There is opportunity to expand upon and improve special-use trails in Cameron Park, Woodway Park and at other locations. Special-use trails can be a destination for many residents and visitors in Waco. Opportunities for special-use trails include:

- Stabilize surfaces in Cameron Park to reduce erosion.
- Distinguish between mountain biking single-track trails and those intended for hiking and biking.
- Increase mileage of trails for running and mountain biking on USACE properties.

### PADDLING TRAILS



Waco currently has two paddling trails on the Brazos River and Bosque River which are part of the TPWD's Texas Paddling Trails system. While opportunities exist to create new paddling trails on area waterways and to add amenities to enhance these trails. Opportunities for paddling trails include:

- Enhance canoe/kayak entries and boat launches.
- Install channel markers for direction and distance.
- Add paddling trail mileage and amenities to waterways entering Lake Waco.

### SITE-AMENITY TRAILS



With 60 parks located in Waco there are many opportunities to add or enhance site-amenity trails. Site-amenity trails are an efficient ways to promote walking within a community because parks serve as dedicated space in which the amenity can be placed. Opportunities for site-amenity trails include:

- Incorporate closed-loop trails in neighborhood or larger parks to increase parkland access and utilization.
- Add trail amenities such as fitness stations.



# CHAPTER 4: DESIGNING OUR TRAILS SYSTEM

**One size does not fit all!** Waco’s existing network of metropolitan and recreational trails includes segments of widely-varying design – built for different interests, to fit into the surrounding built or natural environments, and to make the best use of available funding. The construction of a city-wide trails network will require site-specific design applications which reflect these and other variables.

Trail development will require that best practices in design and construction are calibrated to function properly within local conditions. **Chapter 4, Designing Our Trails System**, highlights key trail design factors that should be considered when extending or improving the City’s trails network. This design guidance is intended to be instructive only and should augment – not substitute – local professional judgment. Furthermore, the recommended trail design features and treatments contained in this chapter are intended to align with, and be an extension of, the standards and guidelines of applicable federal and state agencies and professional organizations.

TRAIL DESIGN PRINCIPLES AND RESOURCES ..... PAGE 63

METROPOLITAN TRAILS SYSTEM DESIGN ..... PAGE 66

RECREATIONAL TRAIL DESIGN FEATURES ..... PAGE 81

# TRAIL DESIGN PRINCIPLES AND RESOURCES

## REFERENCE GUIDE

The design recommendations contained in this Plan are derived from national best practices and should not be used exclusive of other federal, state and professional resources. Landscape architects and engineers developing a trail should consider at least the following standards and guidelines.

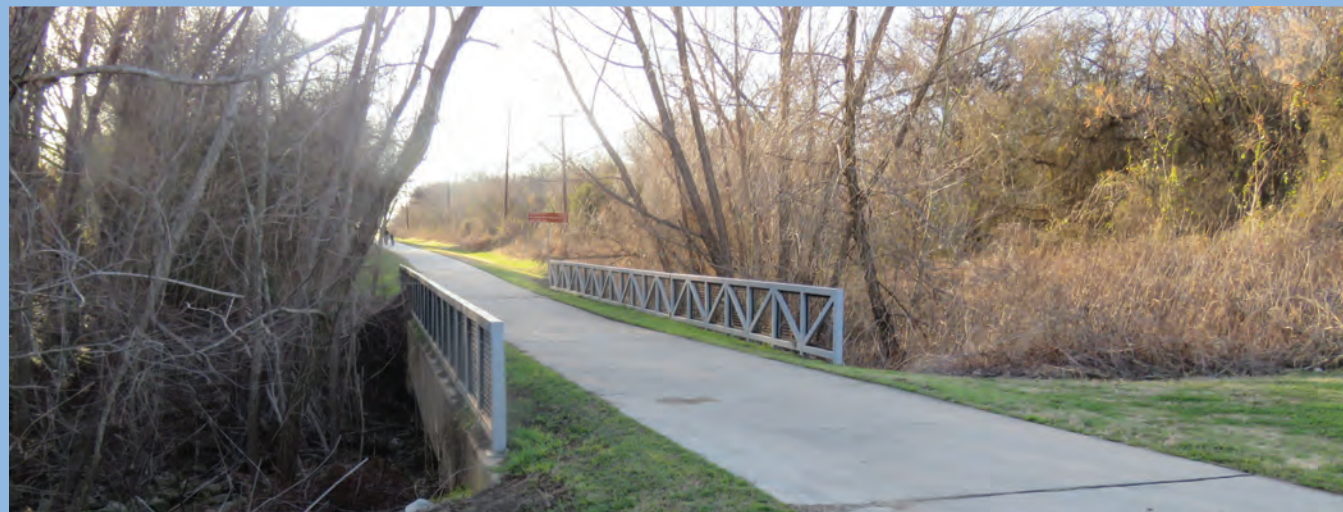
### BICYCLE AND PEDESTRIAN FACILITY DESIGN RESOURCES<sup>1</sup>

Resource	Organization <sup>2</sup>	Year <sup>3</sup>
Guide for the Development of Bicycle Facilities	AASHTO	2012
Guide for the Planning, Design and Operation of Pedestrian Facilities	AASHTO	2021
Bikeway Selection Guide	FHWA	2016
Manual on Uniform Traffic Control Devices	FHWA	2020
Shared-use Path Level of Service Calculator	FHWA	2006
Small Town and Rural Multi-modal Networks	FHWA	2019
Urban Bikeway Design Guide	NACTO	No
Public Rights-of-way Accessibility Guidelines	US Access Board	Varies
ADA Standards for Accessible Design	US Access Board	No

1. Principal resources only. Not all-inclusive. Excludes associated federal and state policy briefs and statements.
2. See "List of Abbreviations" on page ix.
3. Most recent edition.

## DESIGN FOCUS - GREENWAY AND ROADSIDE TRAILS

The proposed Metropolitan trail system is comprised of both roadside and green-way trails. While recreational trails will be present in every community, these special use trails will require specialized design consideration tailored to user interest which will be highly variable from site to site.



## TRAILS CONTEXT

When developing Waco's greenway and roadside trail network, designers must consider not only the built conditions of today, but also the potential for surrounding land uses to change in ways that affect long-term trail function. Basic design variables that must be considered in the design of all trail segments are listed on the following pages. (See pages 66 through 80 for further recommendations on how many of these factors should be incorporated into trail design and construction in Waco.) Ultimately, alternative design solutions will be necessary in many instances to account for site-specific conditions.



The popularity of the Katy Trail in Dallas, Texas, resulted in the construction of an additional parallel pathway to accommodate user volumes.

## TRAIL DESIGN BASICS

### TRAIL WIDTH

Although national guidance suggests a standard (two-way) multi-use trail width of 10 feet, this width can prove insufficient to accommodate bicycle and pedestrian traffic for popular trail segments. The FHWA's Shared-use Path Level of Service Calculator (SUPLOS) may be used during design to determine if expected user volumes may necessitate trail widths of greater than 10 feet.

### TRAIL SURFACE

For maximum accessibility, most greenway and roadside trails should employ a hard surface such as asphalt or concrete – the latter being a more durable surface treatment. The use of either material will be influenced by cost, setting, and environmental factors, as will the selective use of other surface materials such as pervious pavement, pavers, crushed granite, boardwalk, etc.

### TRAIL CLEARANCE

Well-designed and maintained trails are kept clear of obstructions. Horizontal clearance - the distance from the pavement edge to the nearest adjacent encroachment - will vary from a minimum of 2 feet or more depending on whether accessory amenities such as signage or seating amenities are present. Vertical clearance is the distance from the trail surface to overhanging obstructions. Although establishing this as a 10 foot minimum would be beneficial to future users of this plan.

“DURING THE DESIGN OF EVERY SHARED-USE PATH, SOMEONE EVENTUALLY ASKS, “HOW WIDE SHOULD THIS PATHWAY BE?” THAT QUESTION NEARLY ALWAYS RAISES EVEN MORE QUESTIONS: “WHAT TYPES OF USERS CAN WE REASONABLY EXPECT? WHEN WILL WE NEED TO WIDEN THE PATH? DO WE NEED TO SEPARATE DIFFERENT TYPES OF USERS FROM EACH OTHER?”

- FHWA, SHARED-USE PATH LEVEL OF SERVICE CALCULATOR

## TRAIL DESIGN BASICS (CONT.)

### ACCESSIBILITY

National guides establish clear recommendations on maximum cross-slopes, running grades, compliant curb ramps and more to ensure trail accessibility to a wide cross-section of users. The US Access Board's Public Rights-of-Way Accessibility Guidelines (PROWAG) should be consulted to ensure compliance with the Americans with Disabilities Act (ADA).

### DESIGN SPEED

There is no common design speed recommended for multi-use trails. Design speed will vary depending on the type of users (and mode split) anticipated, terrain and preferred surface. All these factors will further influence trail alignments and sight distances. Design speed should consider the fastest possible user which most multi-use trails accommodate (i.e. bicyclists) and how the user's speed may be moderated in a way that respects the comfort and safety of slower trail users.

### MODE SPLIT

In areas where high volumes of trails users or high percentages of pedestrian users are expected, consideration should be given to splitting users onto two parallel facilities. While the parallel facilities within a greenway corridor may still visually represent a “shared-use” facility, splitting the trail in targeted areas along the roadside may require the construction of distinct bicycle facilities (i.e. bicycle lanes) and sidewalks.

### CONNECTIVITY

Trail safety, comfort and utilization – and its utility as a viable transportation facility – will depend on the frequency of access points to and from adjacent properties. Local development codes should require unobstructed pathways between adjacent development and all metropolitan trail corridors where feasible and should define an expected frequency of access points from adjacent development to greenway trail corridors.

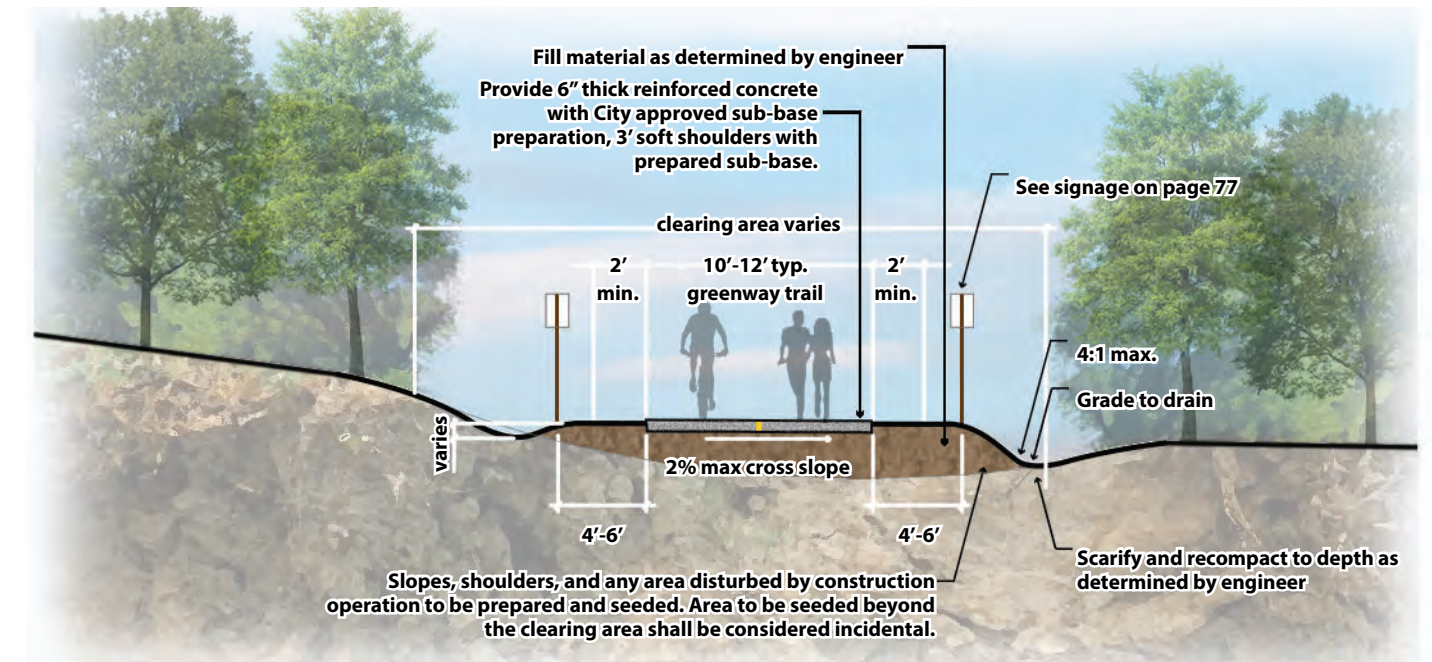
### INTERSECTIONS

Facility treatments where trail users will interact with motor vehicle traffic will vary greatly depending on whether the interaction occurs at a controlled or uncontrolled intersection. The application of pavement markings, signage, signalization and traffic calming features will be influenced by traffic volumes, roadway widths, mid-block versus intersecting street locations, and even whether the trail is crossing a street or a driveway.

## METROPOLITAN TRAILS SYSTEM DESIGN

### TRAIL DESIGN FEATURES

#### GREENWAY TRAIL DESIGN FEATURES

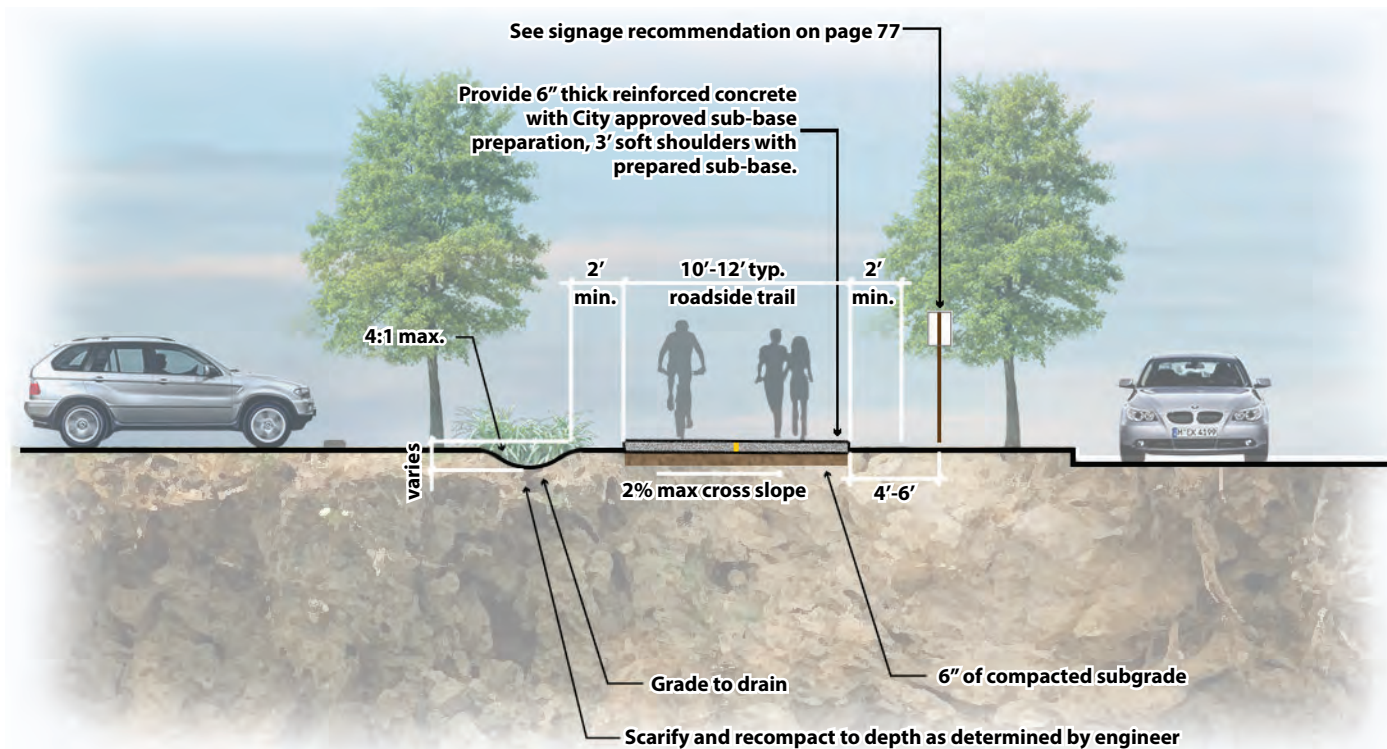


**Greenway Trail Design Features** illustrates the recommended design of a “typical” greenway trail segment when applying the ‘Trail Design Basics’ referenced on pages 64 and 65. It assumes the application of a paved trail surface for a low-to-moderate volume of bicyclists, pedestrians, wheelchair users and others. (It is acknowledged that Waco may selectively utilize a pervious surface material for future greenway trails on a case-by-case basis.)

Final trail design will vary by segment. **Utilize the bicycle and pedestrian design resources listed on page 63.** Other design considerations include:

- **Pervious Surfaces.** Some trail segments may employ a pervious surface such as decomposed granite or other crushed stone that contains about 4 percent fines by weight, and compacts with use. Where possible, concrete ribbon curbing may be used to maintain the trail surface edge.
- **Parallel Paths.** In anticipated areas of high future usage, acquire wide right-of-way or easements, and grade additional shoulder widths to provide for trail widening or the addition of future parallel paths.
- **Striping.** A dashed yellow centerline stripe should be provided for two-way traffic while a solid yellow line should be applied on tight/blind corners, on bridges, in tunnels and at approaches to roadway crossings.
- **Signage.** Traffic control signage adhering to MUTCD standards should be provided on the trail (for trail users) and adjacent roadways (for motorists) to promote safe behavior when using or crossing the trail.
- **Lighting.** Targeted lighting installation should occur at every point where the trail intersects with a street (regardless of the presence of a crossing) and on the approaches to and within tunnels and underpasses. Additional lighting should occur on those stretches of trail that may serve as key transportation corridors and are intended for 24-hour use.

## ROADSIDE TRAIL DESIGN FEATURES



**Roadside Trail Design Features** illustrates the recommended design of a “typical” roadside trail segment when applying the ‘Trail Design Basics’ referenced on pages 64 and 65. As illustrated above, the trail (or “sidepath”) is designed to accommodate a low-to-moderate volume of bicyclists, pedestrians, wheelchair users and others.

Roadside trails should always be designed primarily as a transportation facility due to the direct proximity and relationship of the trail with adjacent transit and motor vehicle facilities. **Utilize the bicycle and pedestrian design resources listed on page 63.** Other design considerations include:

- **Property Access.** Defined pedestrian access paths between the roadside trail and adjacent buildings/ structures should be provided independent of motor vehicle access.
- **Parkways.** User comfort will be increased by the physical separation of the trail from adjacent traffic. Parkway separation from motor vehicle travel lanes should be at least six feet on local streets with buffers increasing with higher posted speed limits and additional travel lanes.
- **Shade.** The incorporation of roadside trails into a street corridor should be accompanied by additional streetscaping features including trees. The targeted and deliberate placement of street trees in the parkway provides shade and a physical barrier between trail users and motorists.
- **Striping.** A dashed yellow centerline stripe should be provided for two-way traffic while a solid yellow line should be applied on tight/blind corners, on bridges, in tunnels and at approaches to roadway crossings.
- **Signage.** Traffic control signage adhering to MUTCD standards should be provided on the trail (for trail users) and adjacent roadways (for motorists) to promote safe behavior when using or crossing the trail.

## METROPOLITAN TRAIL FEATURES (REPRESENTATIVE IMAGES)



*Ribbon curb along the edge of soft surface trails can reduce erosion due to runoff during rain events (A). Targeted plantings between trails and roadways can make roadside trails more comfortable for users (B). Defined and protected pedestrian pathways should extend between trails and buildings on adjacent development sites (C). Trail signage and striping intended for “traffic” control on multi-use trails should adhere to MUTCD guidance (D) although other signage features may employ unique and distinguishing branding elements.*



## INTERSECTION AND CROSSING TREATMENTS

Multi-use trail intersections with roadways and driveways are among the complex challenges for trail users to navigate due to the variability of roadway design, traffic volumes and speeds, and the unpredictability of motorist behaviors. Correspondingly, the treatment of trail crossing facilities at signalized intersections, mid-block locations and driveway approaches will differ in response to these design variables.

### TRAFFIC CONTROLLED INTERSECTIONS

Basic design considerations where trails approach or cross a roadway at a signed or signalized intersection are depicted in **Traffic Controlled Intersections** (facing page, top). Specific design solutions will vary but the basic building blocks of trail/roadway intersection design are listed below.

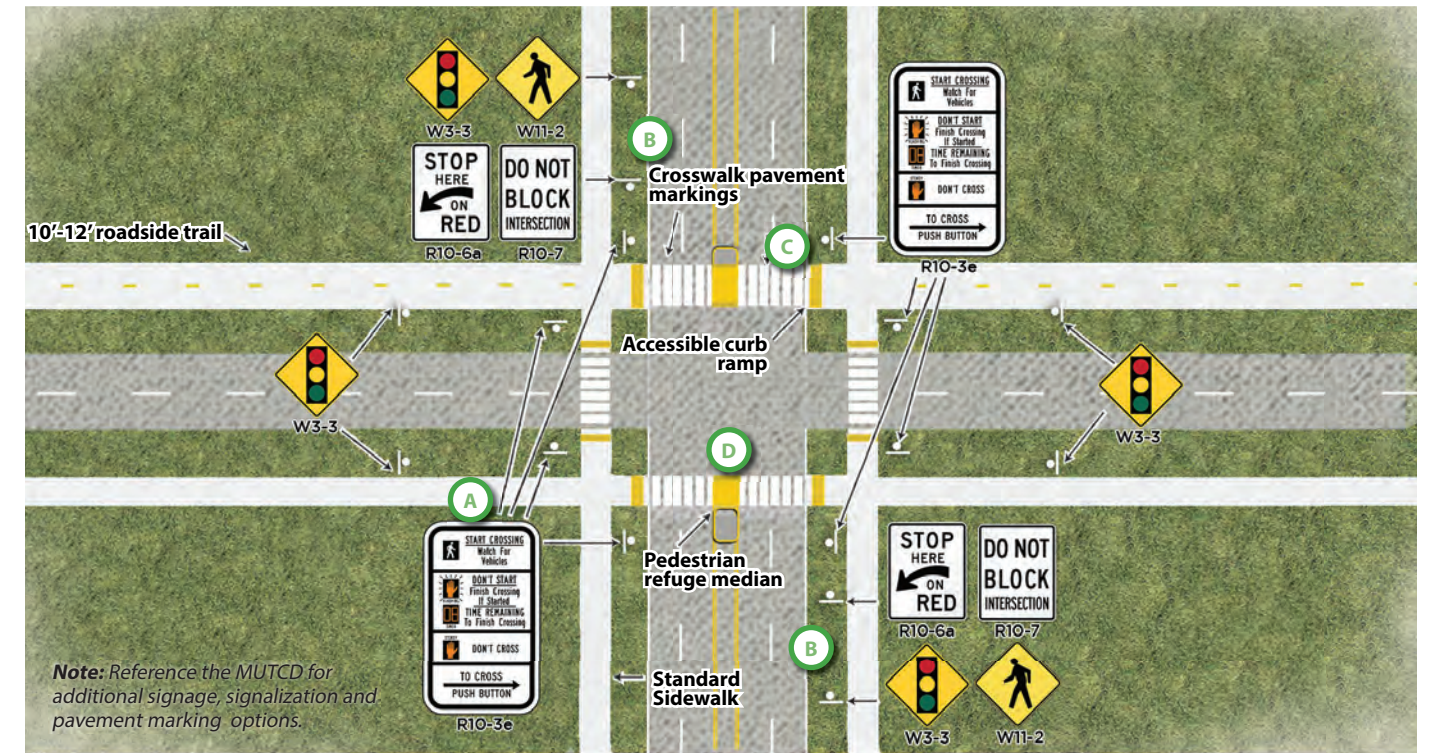
- A Trail Approach.** Protected intersections for trail users outside of the roadway curb radius are preferred. As necessary, roadside trail approaches to intersections should bend in to increase the visibility of motorists and trail users to each other (not depicted).
- B Stop/Yield Control.** Combine MUTCD signage with pavement markings to establish the right of trail users to cross the roadway and increase the predictability of trail user and motorist behaviors. Establish designated crossing intervals for pedestrians and bicyclists.
- C Crosswalks.** Install detectable warnings at sidewalk and street intersections. Apply high visibility pavement markings through the length of the crosswalk to slow motorists and prioritize the bicyclist/pedestrian space.
- D Median Refuge.** Median refuge islands may be constructed where trail users must cross multiple lanes of traffic. Additional hand actuated signal buttons may be installed in the median island in the off chance they are unable to cross the full roadway during designated pedestrian interval.
- + Miscellaneous.** Trail users may be provided with a designated crossing interval at high-volume intersections requiring even right-hand turning motorists to remain stationary on red to allow for bicyclists and pedestrians to cross unobstructed.

### MID-BLOCK CROSSINGS

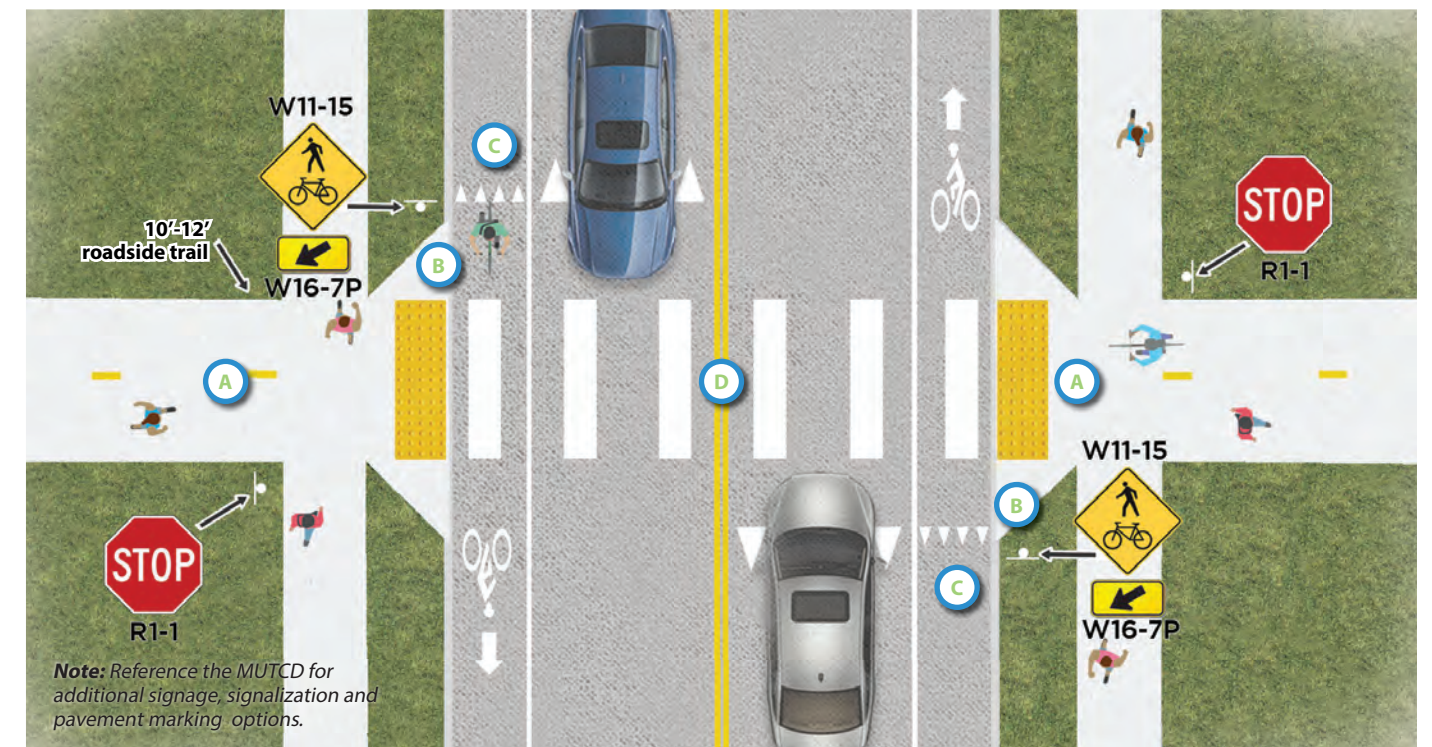
A typical trail crossing of a roadway at an un-signed/non-signalized location is depicted in **Mid-block Crossings** (facing page, bottom). Mid-block trail crossings eliminate the need for lengthy detours to signalized roadway locations, but the feasibility of their application at candidate locations will be dependent on roadway geometry and traffic operations.

- A Trail Approach.** Install detectable warnings at sidewalk and street intersections. Consider indirect approaches or slight inclines to encourage slower speeds of trail users as they approach the street right-of-way. Other design features such as dismount gates and additional trailside provide space for temporary congregation may be considered depending on topography and user volumes.
- B Trail Access.** Provide flared access on curb ramps to ease access to the trail from pedestrians or bicyclists accessing from the street.
- C Stop/Yield Control.** Combine MUTCD signage with pavement markings to establish the right of trail users to cross the roadway and increase the predictability of trail user and motorist behaviors. Hand-actuated signals requiring motorists to stop, or in-pavement flashers increasing visibility, may be installed at the discretion of the City to provide trail users with greater comfort.
- D Crosswalk Features.** Standard MUTCD pavement markings may be augmented by the construction of a raised crossing to compel slower motorist speeds. Median refuge islands may be constructed where trail users must cross multiple lanes of traffic.
- + Miscellaneous.** Ensure clear sight lines for both motorists and bicyclists so that - as the fastest trail users - they have sufficient time to stop or yield to other users.

## TRAFFIC CONTROLLED INTERSECTIONS



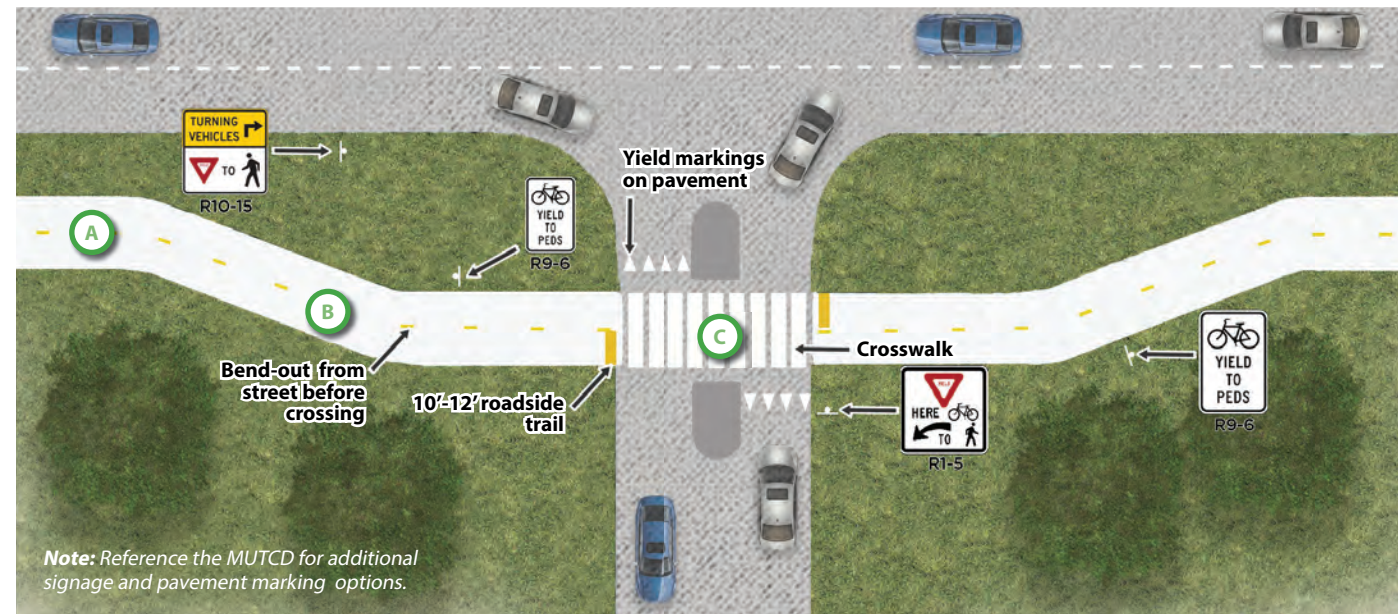
## MID-BLOCK CROSSINGS



## DRIVEWAY CROSSINGS

Driveway crossings are a special condition and warrant traffic control features that are different from a typical street intersection. The figure below depicts recommended design treatments for roadside trails that intersect driveways. As depicted, the treatment requires motorists entering or exiting the driveway to yield to bicycle and pedestrian through traffic. Yield signage posted on the roadway warns motorists entering the driveway to be aware of bicycle and pedestrian traffic, while a 'bend-out' adjustment to the trail alignment allows at least one motor vehicle to stack while exiting the roadway (should a bicyclist or pedestrian be present).

### DRIVEWAY CROSSINGS

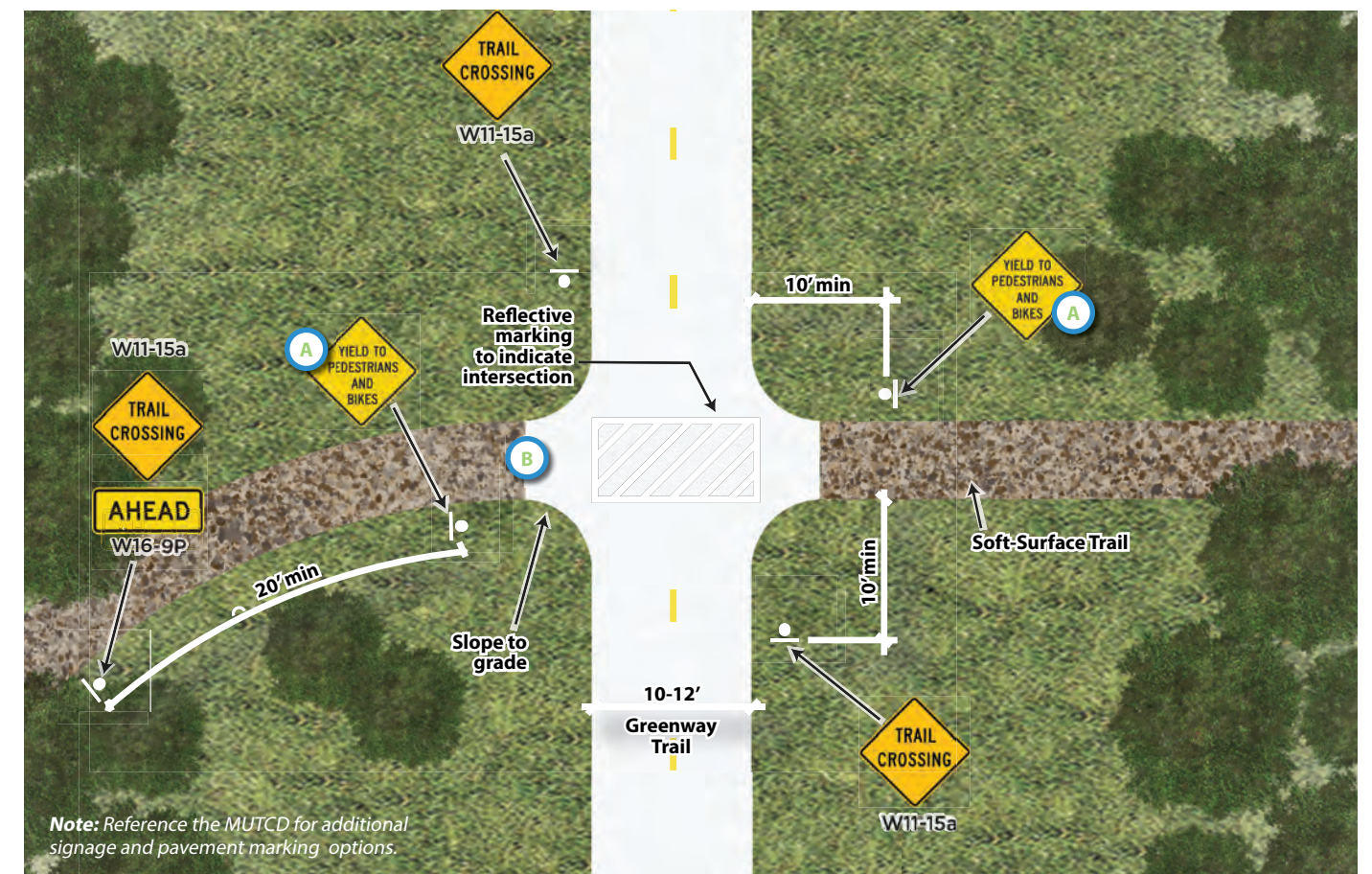


- A Pavement Markings.** Roadside trails should be designed in the same manner as other transportation facilities in the street right-of-way. The application of pavement markings emphasizes that the trail provides for two-way traffic and also provides cues to adjacent and intersecting motorists that the trail is a transportation facility (not just a recreational amenity) and that through-traffic on the trail has priority over intersecting traffic.
- B Bend Out.** Bending the trail out (i.e. away from the roadway) at driveways provides trail users with a higher degree of comfort when entering areas shared with motorists that are not signalized. When using this technique, sight lines must be kept clear between the adjacent roadway and the trail.
- C Crosswalks.** Where possible (particularly in areas of high traffic volume), raised crosswalks may be installed or augmented by pedestrian refuge medians. Detectable warnings on the trail surface at approaches will alert visibility-impaired users of the presence of a mixing zone.
- + Miscellaneous.** The bend-out orientation of a roadside trail may be reversed in favor of a "bend-in" (i.e. toward the adjacent roadway) where the trail intersects an unsignalized side street. The bend-in orientation at intersecting streets takes into account that the side street will have 'stop' signage and that approaching motorists will need to stop closer to the adjacent street to help with sight distance as they access the principal street.

## INTERSECTING TRAILS

Careful design of trail-to-trail intersections is necessary to minimize potential conflicts between bicyclists and pedestrians of different ages and abilities that are sharing popular but constrained spaces. Well designed trail intersections not only alert users to the potential presence of others who may be crossing their path of travel but also serve as hubs of information to orient users regarding routes to surrounding destinations. **Trail Hubs** depicts a typical intersection of a soft surface "special use" trail to a paved greenway trail. Similar design considerations must be given to the intersection of two hard surface trails but the application of materials will differ slightly. Either type of trail surface can be addressed with the following configuration.

### TRAIL HUBS



- A Trail Priority.** Signage should typically require that users of intersecting soft-surface trails yield to traffic on the principal greenway trail. In most instances, user volumes on the greenway will exceed those found on intersecting special use trails. In addition, some special use trails will serve users with advanced abilities (i.e. mountain biking) who should moderate their speeds in anticipation of interacting with trail users of varying ages and abilities.
- B Curb Aprons.** The paved apron of the principal greenway trail should extend into the approach of the intersecting soft surface trail to minimize the amount of debris that might accumulate on the paved trail surface.
- + Miscellaneous.** Intersections can be key "hubs" of information and serve as perfect locations for wayfinding features. Extensive mountain biking networks can be disorienting and benefit from regularly spaced markers.

## MARY AVENUE COMPLETE STREET CORRIDOR

Building a trail connection from the Brazos River to the existing Cotton Belt Trail (and beyond to McGregor) has been identified by this Plan as a community priority. This critical trail linkage would not only be a recreational amenity, but also as a regional tourist 'destination,' and an important active transportation linkage providing direct bicycle and pedestrian access to multiple community destinations.

The highest-priority segment of this corridor extends for roughly 2.5 miles between Waco's downtown riverfront and the redeveloping Hart-Patterson Track site. Over 50 percent of the proposed trail would extend along existing Mary Avenue street right-of-way. Of this 16 block roadside section, over 7 blocks would not be multi-use trail to accommodate existing developments – but is proposed as parallel sidewalks and bicycle lanes. Whether incorporating metropolitan trails, bicycle lanes or sidewalks, the **Mary Avenue Complete Street Corridor** (below) should be designed to prioritize the comfortable and efficient movement of bicyclists, pedestrian and wheelchair users from the Brazos River, through downtown Waco and to destinations beyond.



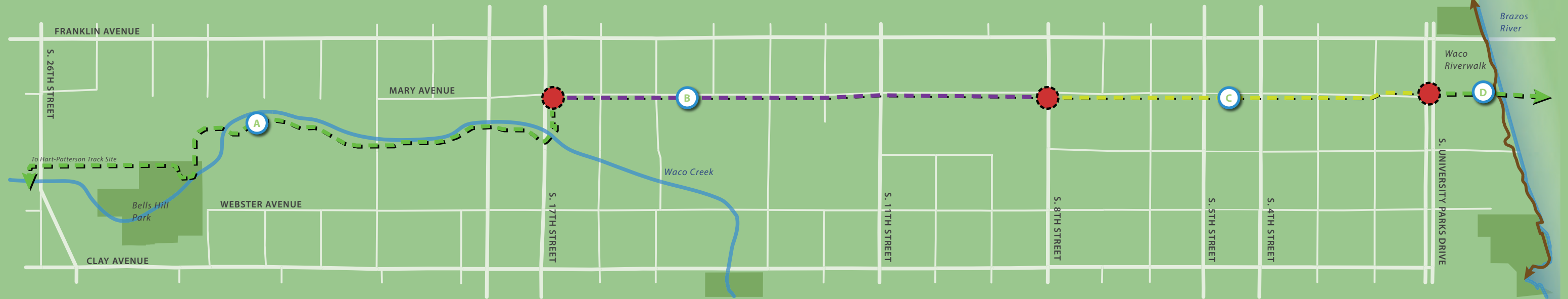
*Mary Avenue looking northeast to downtown Waco. The current roadway section and right-of-way provides sufficient space for a parallel multi-use trail and other complimentary streetscape enhancements.*

## MARY AVENUE TRAIL SEGMENTS<sup>1</sup>

- A Segment A: Waco Creek (S. 26th Street - S. 17th Street).** Greenway trail extending to the northeast from the Hart-Patterson Track site along railroad right-of-way to Bells Hill Park. At Bells Hill Park, the trail bridges the railroad right-of-way and follows Waco Creek forming a greenway corridor underneath the 18th Street and 17th Street bridges to Mary Avenue.
- B Segment B: Mary Avenue (S. 17th Street - S. 8th Street).** Roadside Trail adjacent to Mary Avenue creating a parkway setting and linking the Floyd-Casey and Hart Patterson sites to redevelopment sites in downtown Waco. Existing corridor includes wide rights-of-way with minimal obstructions. Low traffic volumes makes Mary Avenue an ideal "people" corridor adjacent to the more heavily trafficked Franklin Avenue.
- C Segment C: Mary Avenue (S. 8th Street - S. University Parks Drive).** From 8th Street toward the Brazos River, the multi-use roadside trail converts to a wide sidewalk with parallel protected bicycle lanes. Wide sidewalks provide furnishing, through-way and frontage zones of varying width that allow for pedestrian travel and the creation of public gathering spaces. The two-way protected bicycle lanes are positioned to maximize the inclusion of on-street parking where possible. Separated facilities for bicyclists and pedestrians in this area are recommended due to ongoing redevelopment and the anticipated increases in pedestrian activity that accompanies urban spaces.
- D Segment D: Mary Avenue (S. University Parks Drive - Brazos River).** Northeast from S. University Parks Drive, the corridor transitions back into a greenway trail as it proceeds to the Mary Avenue railroad trestle. With conversion of the railroad trestle to a bicycle/pedestrian bridge the trail will connect to the City's existing and planned north side trails system.

1. Additional details on the conceptual design and alignment of the Mary Avenue Trail segments can be found in Appendix A.

## MARY AVENUE COMPLETE STREET CORRIDOR



## TRAILHEADS

Trailhead design and facility selection is dependent on the number of anticipated users, the type of trail, and the surrounding land use context. Examples of the function and design distinctions between two trailhead classifications is illustrated in **Major Trailheads** and **Minor Trailheads** (facing page). Common trailhead features that serve surrounding residents and/or the traveling public are listed in **Typical Trailhead Features** below.

### TYPICAL TRAILHEAD FEATURES<sup>1</sup>

Feature	Major Trailhead	Minor Trailhead
Parking Area	X	
Drinking Fountains	X	X
Benches	X	X
Bicycle Racks	X	X
Trash Cans	X	X
Way-finding	X	X
Informational Signage	X	
Restrooms	X	
Shelter	X	
Fitness Amenities	X	
Bicycle Repair Stations	X	

1. See page 8-11 for a full description of all metropolitan and recreational trails by type.

## WAYSIDES

Waysides can enhance the trail user experience by providing intermittent places along a trail to rest, gather, or observe key views or traiside features. Although not typically located at an access point (such as a trailhead), waysides may be located at intervals along a trail segment or at intersecting points and may provide some (or many) of the same amenities that may be found at a trailhead.

*Small comforts offered by simple and inexpensive wayside features can greatly enhance the trail user*



## MAJOR TRAILHEADS

Major trailheads should serve the needs of local residents while also enticing visitors from outside of the community. Facility selection should support extended visits to the city's trails network.



## MINOR TRAILHEADS

Minor trailheads provide access to trails for individuals who reside or work in close proximity to the network. Facility selection should focus on meeting basic trail user needs including access and orientation.



## SUPPORT FEATURES AND AMENITIES

The safety and comfort of the persons that utilize the **Waco Metropolitan Trails System** requires considerations beyond the railway alignment, grades, surface treatments and access points. The cumulative impact of other accessory features will greatly improve the user experience and is often essential in ensuring usability.

### WAYFINDING

Trails system wayfinding features are designed to promote the safe use of the trail, to orient users and to present additional educational/interpretive information. These features can be divided into two categories that describe their primary function: safety and support.

#### SAFETY (WAYFINDING) FEATURES

Designed to address trail user safety – including among trail users; and, where trail user and motor vehicle interaction may occur. Most wayfinding safety features must be consistent with MUTCD guidance.

- **Traffic Control Signage.** Includes “stop,” “yield,” and other traffic control features, plus warning signs and hazard markings.
- **Pavement Markings.** Includes dashed and solid striping for two-way travel and miscellaneous markings that can be coupled with traffic control signage to advise the user about trail conditions.

#### SUPPORT (WAYFINDING) FEATURES

Designed to improve the trail user experience and make the system more accessible, enjoyable and utilitarian for recreation and transportation purposes.

- **System Signage.** System maps including routes, amenities and destinations. Content may also include trail user rules, etiquette, accessibility and level of difficulty.
- **Directional Signage.** Identifies distance and direction to trailheads, amenities, intersecting trails and destinations.
- **Educational or Interpretive Signage.** Providing general information about the history, cultural value or natural features associated with the trail. May be themed and may also include information about contributors to the trail-building effort.



Multi-use trail safety features are designed for trail users and motorists. Traffic control signage should adhere to MUTCD guidance - particularly at locations where both parties will interact.

Although this plan recommends that many safety-oriented wayfinding features adhere to MUTCD guidance, the overall trail user experience can be greatly enhanced by creating a consistent and recognizable “brand” among all wayfinding elements.

A wayfinding plan is recommended as a design component for all new trail segments. Waco should also consider aligning its wayfinding efforts with a new trails system branding initiative to ensure consistency across the community as the existing trails system grows and interconnectivity between existing segments increases.



Trails system brand created as part of a wayfinding plan. Includes various gateway, directional, and interpretive signage, and corresponding trail markings within and adjacent to the trail surface. Branding elements are applied to each new trail segment according to placement plans that are incorporated into design and construction drawings. **Elements from above (A) and (B), being installed below.**



## SAFETY AND SECURITY

A usable trails system incorporates essential design features that promote the safe utilization of the trailway, and additional features that provide an inviting and secure environment for visitors.



Hand rails must be a minimum of 42-inches above the surface for pedestrian-only facilities, but at least 48-inches above the surface for multi-purpose facilities that also serve bicyclists (A). Vertical clearance at underpasses must exceed 8-feet, but greater clearance is preferred (B).

### BRIDGES

Bridges should be as wide as the trail (at a minimum); but preferably one to two feet wider on each side. This is to account for bicyclists to “squeeze” into a space that is perceived as more constrained due to handlebar width and so that users can stop and view the adjacent scenery without obstructing the trail. Bridge material and design will vary greatly, but pre-fabricated spans are typically being used for spans of between 50 feet and 200 feet in length. Trail bridge design should adhere to AASHTO’s Bridge Design Specifications.

### RAILINGS AND FENCING

Railing and fences are essential features on bridges but may also be utilized on some boardwalks, in areas where there may be incompatible adjacent land uses (such as active rail lines) or adjacent to natural drop-offs in terrain. Minimum pedestrian and bicyclist railing heights will differ, but AASHTO’s Bridge Design Specifications and applicable building codes should always be referenced to determine appropriate railing height and construction.

### UNDERPASSES

Underpasses should be well lit and attractive and project a sense of security. Where adequate clearance is available, 10 feet is allowed as a minimum, but 10 feet or more is preferred. Underpass trail segments should be designed to occasionally withstand drainage flow.

### LOW-WATER CROSSINGS

Low-water crossings should not exceed 4 feet from the path surface to the waterway flowline unless approved by a professional engineer. Any crossing exceeding 4-foot vertical separation will require a bridge to ensure the trail is compliant with ADAAG standards. For creek crossings that require a short span, box culverts can be used with handrails.

### LIGHTING

Lighting should be provided for all parking areas, trailheads and street crossings. Policies for lighting along trailways should consider whether the trail is a component of a high-volume public amenity (i.e. the Brazos Riverwalk) or whether the specific trail segment is intended to serve as a significant active transportation corridor requiring 24-hour illumination. Regardless, trailway lighting beyond access and crossing points should align with policies on hours of use.

## COMFORT AND CONVENIENCE

Many of the miscellaneous features that increase the comfort and convenience of trail users such as seating, restrooms, bicycle racks and more are associated with trailhead and wayside locations (pages 75 and 76).



Simple trail conveniences can be grouped at trailhead locations, or placed at targeted waysides and other locations along the trailway.



### PUBLIC ART

Trails systems can be great locations to showcase public art – often serving as the spine for a series of themed exhibits. Much of the Brazos Riverwalk Trail is home to a collection of sculptures that relate to the animal exhibits in the Cameron Park Zoo.

During the design of future trail segments, the City should clearly and proactively identify those locations where public art may be permitted (or encouraged) at a future date so that placement does not occur arbitrarily. Decisions about the placement of public art should align with a City-adopted public art strategic plan and associated policies on the acceptance, maintenance, rotation and removal of public art pieces.



Site-amenity trails that provide access to facilities within a fixed park site may incorporate many of the same design features as multi-use trails.

## RECREATIONAL TRAIL DESIGN FEATURES

The specific focus of many types of recreational trails means that they must often incorporate specialized design features meant to serve the unique needs of focused user groups. While many of the bicycle and pedestrian design resources listed on page 63 may be applicable for site amenity trails within specific parks or other destinations, recreational trails serving targeted user groups such as avid mountain bikers, paddlers or equestrians must include customized design components.

### MOUNTAIN BIKING TRAILS

Customized mountain biking trails (including cross-country, flow, and downhill sub-types) are designed to utilize natural terrain to provide users with riding challenges extending across a range of difficulty. Although many mountain biking trails also support some hiking or jogging activity, well-designed systems are increasingly limiting access solely to mountain-biking enthusiasts due to design features that combine speed, jumps and drops.

Key mountain biking trail features include trailheads with parking, wayfinding and bike maintenance features, hub markers for orientation and trail signage that provides a thorough description of the features of each trail segment and trail safety/etiquette. The International Mountain Biking Association (IMBA) produces authoritative resources on mountain bike trail design:

- **Guidelines for a Quality Trail Experience (2018, with the US Dept. of Interior, Bureau of Land Management)**
- **Trail Solutions, IMBA's Guide to Building Sweet Singletrack (2004)**



Mountain biking trail signage must clearly communicate difficulty, direction of flow and acceptable type of use.

### HIKING TRAILS

Hiking trails provide able-bodied hikers and walkers with the opportunity to enjoy an “up-close” experience with the surrounding natural environment and are often located in areas with challenging topography that may be inaccessible to some users. Hiking trail design is meant to promote passive enjoyment of nature and low-impact design is meant to limit disturbances to the area.

Essential United States Forest Service resources on trail design include the following:

- **Standard Trail Plans and Specifications (2014)**
- **TRACS, Trail Assessment and Condition Surveys (2011)**
- **Forest Service Trail Accessibility Guidelines (2013)**

### PADDLING TRAILS

Paddling trail design must consider unique amenities that will ensure a comfortable and enjoyable user experience. Paddling trail designers must consider boat launch facilities, parking-to-launch access, channel markers and navigational signage.

While multiple paddling or water trail design recommendations can be found online, one of the most comprehensive design resources is **Developing Water Trails in Iowa (2010)** developed by the Iowa Department of Natural Resources.

### EQUESTRIAN TRAILS

As with other user groups, trail design to serve equestrians – including the riders and their stock – requires specialized design considerations. Trailhead and parking needs will differ from most other trail types due to the size of vehicles and need to corral animals. Trailway surfaces, clearances and grades, and bridge structures will also require alternative applications to meet the needs of users. Perhaps the greatest issues arise with the manner in which a community may choose to provide shared versus parallel or separated trail access to equestrians, bicyclists and pedestrians.

The **Equestrian Design Guidebook** produced by the United States Forest Service provides detailed and comprehensive guidance on equestrian trail design.



A

Comfortable, low-stress paddling trail launch facilities (A) - separated from ramps for motorized boats - is a critical component of creating an engaging paddling trail experience. Shared-use of trail facilities with equestrians requires significant design adjustments - particularly in terms of surface selection and maintenance. Most jurisdictions opt to create equestrian-specific trails systems where use by hikers, runners or bicyclists may be incidental (B).



B



# CHAPTER 5: IMPLEMENTING OUR TRAILS VISION

**Chapter 5, Implementing Our Trails Vision**, identifies the strategies and tools to move forward with the trail-building projects necessary to create and enhance the Waco Metropolitan Trails System. The Master Plan’s work program includes a list of prioritized investment projects and associated policies and programs that are essential for creating a city-wide trails system that meets the long-term interests and needs of our residents and visitors.

Successful implementation of our work program requires more than a simple acknowledgment of ideas for trail building. There must be a clear plan champion that can rally consistent buy-in from the partnering agencies that are essential for expanding, marketing and maintaining an ever-growing system. Even more challenging will be our efforts toward securing ongoing funding for our network, including recurring revenues to maintain our trails in a way that exceeds users’ expectations.

**TRAILS SYSTEM WORK PROGRAM ..... PAGE 85**

**FUNDING STRATEGIES ..... PAGE 95**

**ADMINISTRATION AND MANAGEMENT ..... PAGE 98**



# TRAILS SYSTEM WORK PROGRAM

Creating the **Waco Metropolitan Trails System** envisioned in this Master Plan will require the City to make substantial and sustained monetary investments into property acquisition, trail construction, facility enhancement and system maintenance. But trail infrastructure investments are only part of the story. The value of our trails system is amplified where equal attention and effort is put towards the policies and practices that promote trail usage. There are a variety of policies, programs and other initiatives that should be taken to generate positive community attitudes toward walking and biking, both for recreational and transportation purposes, and for making Waco a trails destination.

Our trails system work program includes the following two components:

## INVESTMENT PROGRAM

The **Investment Program** identifies and prioritizes the large-scale capital investment projects that are necessary to build-out the trail corridors as depicted on the **Waco Metropolitan Trails System Map** (pages 51 and 52). The investment program also recommends other miscellaneous improvement projects of varying scale that will be necessary to fully realize the long-term potential of Waco’s trail infrastructure. These projects include improvements such as trail resurfacing or realignments and bridge replacement, and enhancements such as trailhead and wayside amenities and paddling trail launches.

## POLICY PROGRAM

The **Policy Program** lists policies, programs, regulatory tools and other initiatives that represent the operational and procedural steps necessary to develop the **Waco Metropolitan Trails System** in an efficient manner and for maintaining long-term enthusiasm and community support. Policy program strategies and actions include methods for procuring trail corridors, developing recreational trail facilities and amenities, maintaining the system, identifying and leveraging trails system champions/partners, marketing the system and promoting safe usage.



Waco will need to commission a professional engineering report to determine the structural integrity of the Cotton Belt railroad trestle and the span’s suitability for bicycle and pedestrian use.

## INVESTMENT PROGRAM

The Master Plan’s recommended investment program includes two project categories: **A)** Corridor Construction projects which are capital projects that prioritize the development of new trail segments; and, **B)** System Enhancement projects which represent miscellaneous investments (both capital and non-capital in scale) that will enhance existing and future trail infrastructure. Estimated costs per unit for new trail construction are illustrated below in **Cost Estimates** and represent “planning level” estimates for proposed new trails at a pre-design stage.

### COST ESTIMATES

Facility	Estimated Unit Cost <sup>1</sup>
10 ft. wide reinforced concrete shared-use path (per linear foot)	\$85 per l.f.
12 ft. wide reinforced concrete shared-use path (per linear foot)	\$105 per l.f.
10ft. wide asphalt shared-use path (per linear foot)	\$70 per l.f.
12ft. wide asphalt shared-use path (per linear foot)	\$84 per l.f.

1. Order of magnitude (planning level) cost per unit estimates as of June 2022. Subject to disclaimers represented below.

### ORDER OF MAGNITUDE (PLANNING LEVEL) COSTS

Recommendations presented in this Master Plan include opinions of probable construction costs (OPCC) for suggested trail additions and improvements. **Where presented, OPCC are subject to the assumptions and disclaimers summarized below.**

- A. All costs represent the Consultant’s best judgment as professionals familiar with the construction industry and current available unit pricing (as of June 2022). Consultant does not guarantee that proposals, bids or actual project construction costs will not vary from this opinion. OPCC presented in this Master Plan do not include subsurface utilities.
- B. Unit pricing is based on average cost statewide and does not account for any site specific determinants that would effect costs of construction (i.e., unknown subsurface conditions, structural foundations/footing per local soil conditions, etc.).
- C. Twenty percent construction contingency includes (but is not limited to): general conditions, mobilization, demolition, erosion/sedimentation control, site retaining walls and unclassified earthwork.
- D. Environmental and regulatory review, permitting and associated fees are not included in the OPCCs presented in this Master Plan.
- E. Horizontal utility adjustments/relocations/extensions/services for storm sewer, domestic water, sanitary sewer, gas, electric and communication utility lines to a project site are not included in the OPCC presented in this Master Plan.
- F. Projection of future construction costs should include a 10 percent annual increase at a minimum to account for inflation.



## CORRIDOR CONSTRUCTION PROJECTS

The **Waco Metropolitan Trails System** is proposed to extend over 137 linear miles at a cumulative estimated cost of between \$36,168,000.00 and \$75,952,800.00 dollars (in 2022 dollars) depending on trailway width and materials. The investments necessary to effect this ambitious trail building project cost can be marginally overset by linking some trail segment construction to new development (see page 88) but this system will ultimately be a legacy project that will take an extended period to complete and public investment must be incrementally programmed over many years.

## PROJECT PRIORITIZATION

To assist in the incremental integration of **Waco Metropolitan Trails System** projects into the City of Waco's Capital Improvement Plan (CIP), this Plan has prioritized all proposed metropolitan trail segments by dividing them into "Tier One," "Tier Two" and "Tier Three" groupings. Trail segments were divided into each grouping through the application of established project prioritization criteria.

Project prioritization criteria are categorized and defined by eleven **Community Benefit Criteria** and **Operational Criteria**. Community benefit criteria consider the recreational and transportation benefits that each trail segment can provide. Operational criteria consider the constructibility of each proposed trail segment.

## TIER ONE TRAIL SEGMENTS

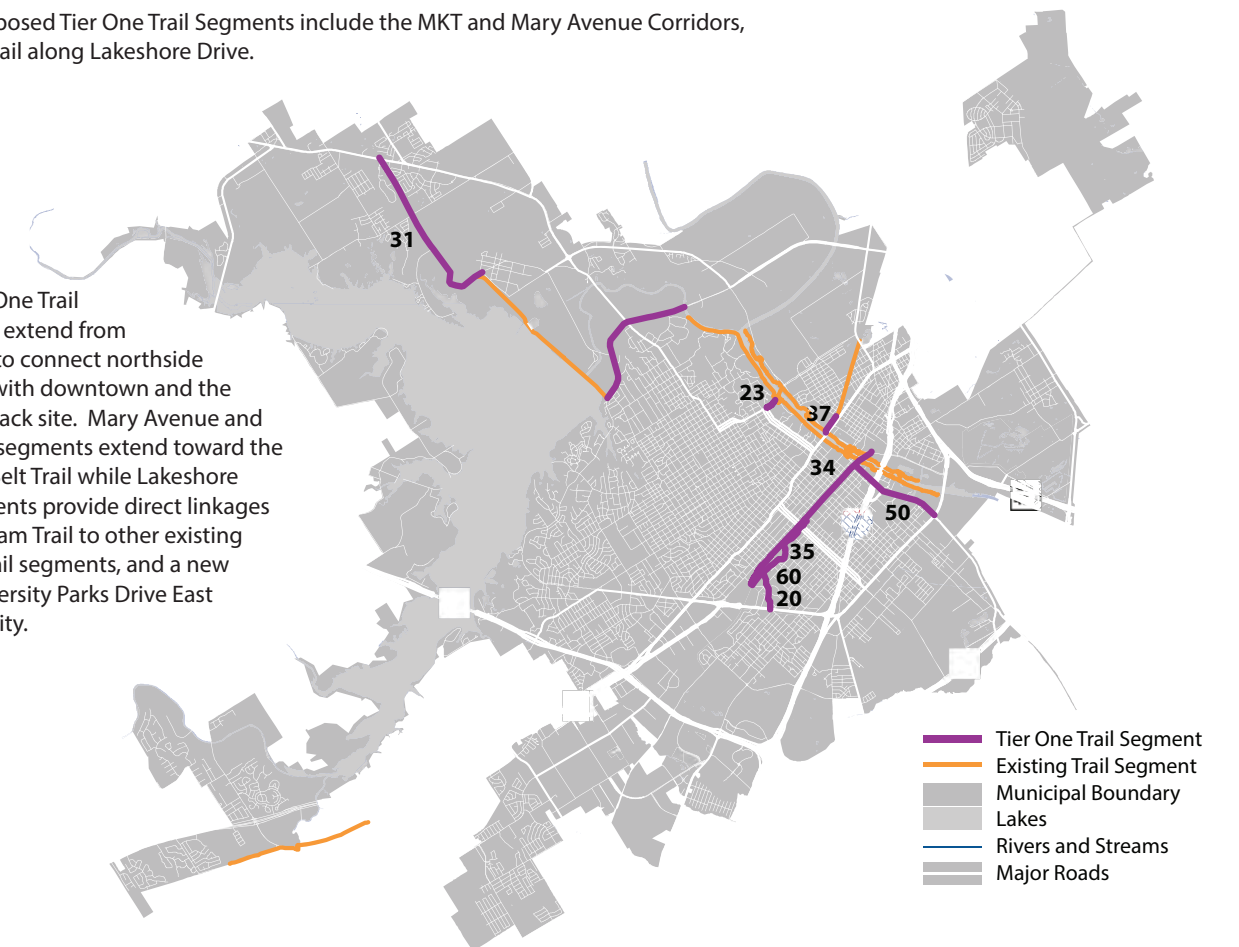
Over 16 miles of roadside and greenway trails are proposed to be constructed as part of the City's initial phase of trail development at an estimated cost of between \$4,224,000.00 and \$8,870,400.00 dollars.

## TIER ONE TRAIL SEGMENTS

Key	Project Name	Project Type	Beginning	End	Distance (Miles)	Primary
34	Mary Ave. North	Roadside	S MLK Jr. Blvd	S 16th St	1.5	P
60	Waco Creek	Greenway	S 16th St	S 32nd St	1.5	P
20	Floyd Casey/Valley Mills Connector	Greenway	UP Railline at Waco Creek	S Valley Mills Dr	0.6	S
29	Lake Shore	Roadside	Industrial Blvd/FM 3051	Lake Waco Dam Trail	5.7	P
35	Mary Ave. South	Roadside	S 11th St	S 32nd St	1.3	P

**SEGMENTS.** Proposed Tier One Trail Segments include the MKT and Mary Avenue Corridors, and a roadside trail along Lakeshore Drive.

**LINKAGES.** Tier One Trail Segments would extend from the Brazos River to connect northside neighborhoods with downtown and the Hart-Patterson Track site. Mary Avenue and Waco Creek trail segments extend toward the existing Cotton Belt Trail while Lakeshore Drive enhancements provide direct linkages from the Waco Dam Trail to other existing and proposed trail segments, and a new route along University Parks Drive East to Baylor University.



**TIER TWO TRAIL SEGMENTS**

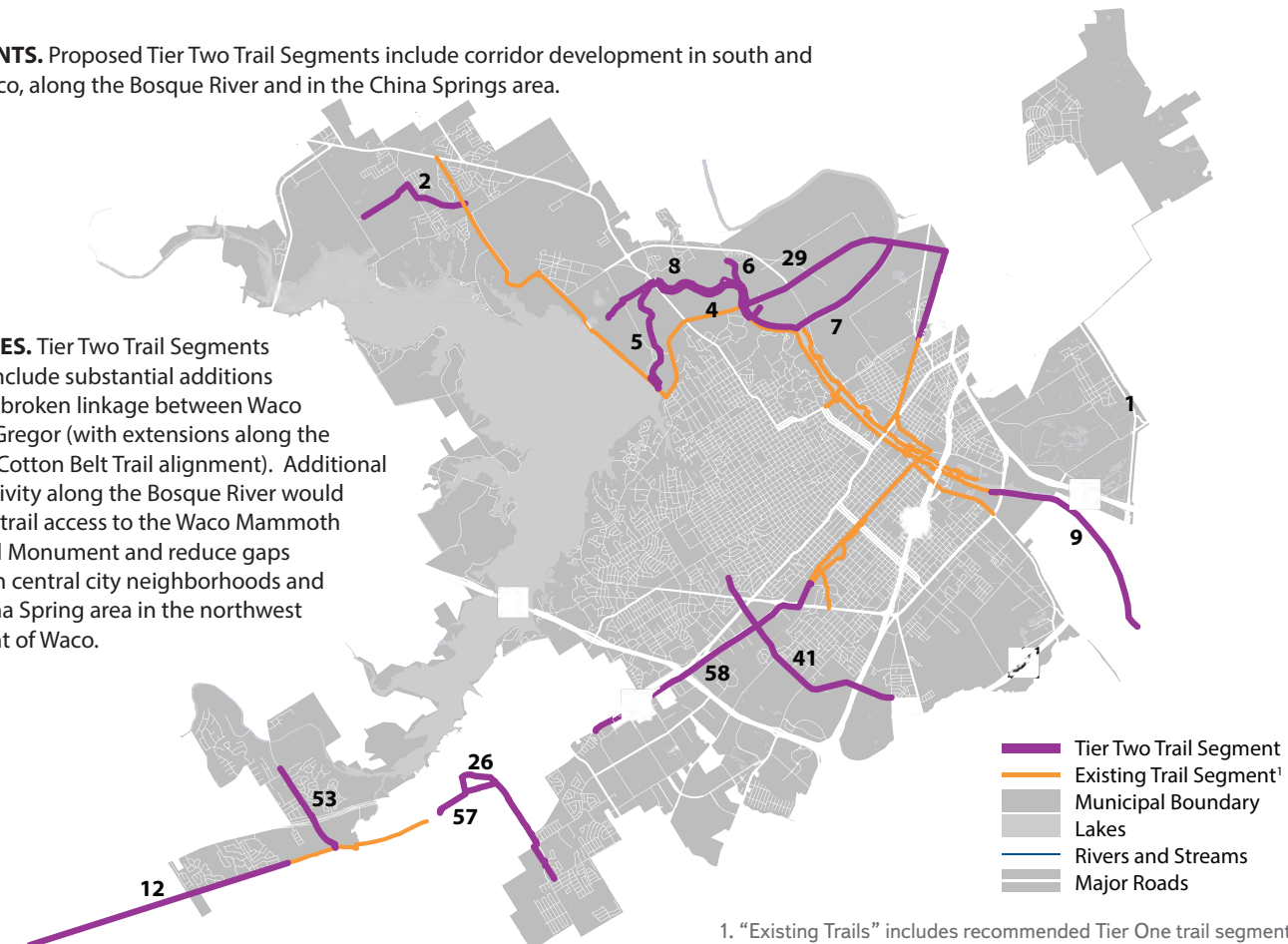
Tier Two segments include over 33 miles of roadside and greenway trails to be constructed at an estimated cost of between \$8,712,000.00 and \$18,295,200.00 dollars.

**TIER TWO TRAIL SEGMENTS**

Key	Project Name	Project Type	Beginning	End	Distance (Miles)	Primary/Secondary
53	Speegleville Rd	Roadside	Oak Rd	Old Lorena Rd/Church Rd (Cottonbelt Trail)	1.5	S
5	Bosque River/Lake Waco Dam Connection	Greenway	N 19th Street (Fm 1637)	Lake Waco Dam Trail	2.2	S
9	BrazosRFBaylorExt.1	Greenway	Brazos River-front Baylor	Treatment Plant Dr.	3.5	P
12	Cottonbelt Extention	Greenway	Cottonbelt Terminus	E 2nd St/S Johnson St	7.0	P
41	New Rd.	Roadside	Old Robinson Road	New Road/W Industrial Dr.	3.5	P
57	US 84/Hannah Hill Rd	Roadside	Ritchie Rd	UP Railline (East of Bush Dr)	1.0	S
58	Waco-McGregor North Segment	Roadside	Mary Ave / S 32nd St	Old Hewitt Rd	4.3	P

**SEGMENTS.** Proposed Tier Two Trail Segments include corridor development in south and east Waco, along the Bosque River and in the China Springs area.

**LINKAGES.** Tier Two Trail Segments would include substantial additions to an unbroken linkage between Waco and McGregor (with extensions along the current Cotton Belt Trail alignment). Additional connectivity along the Bosque River would provide trail access to the Waco Mammoth National Monument and reduce gaps between central city neighborhoods and the China Spring area in the northwest quadrant of Waco.



1. "Existing Trails" includes recommended Tier One trail segments.

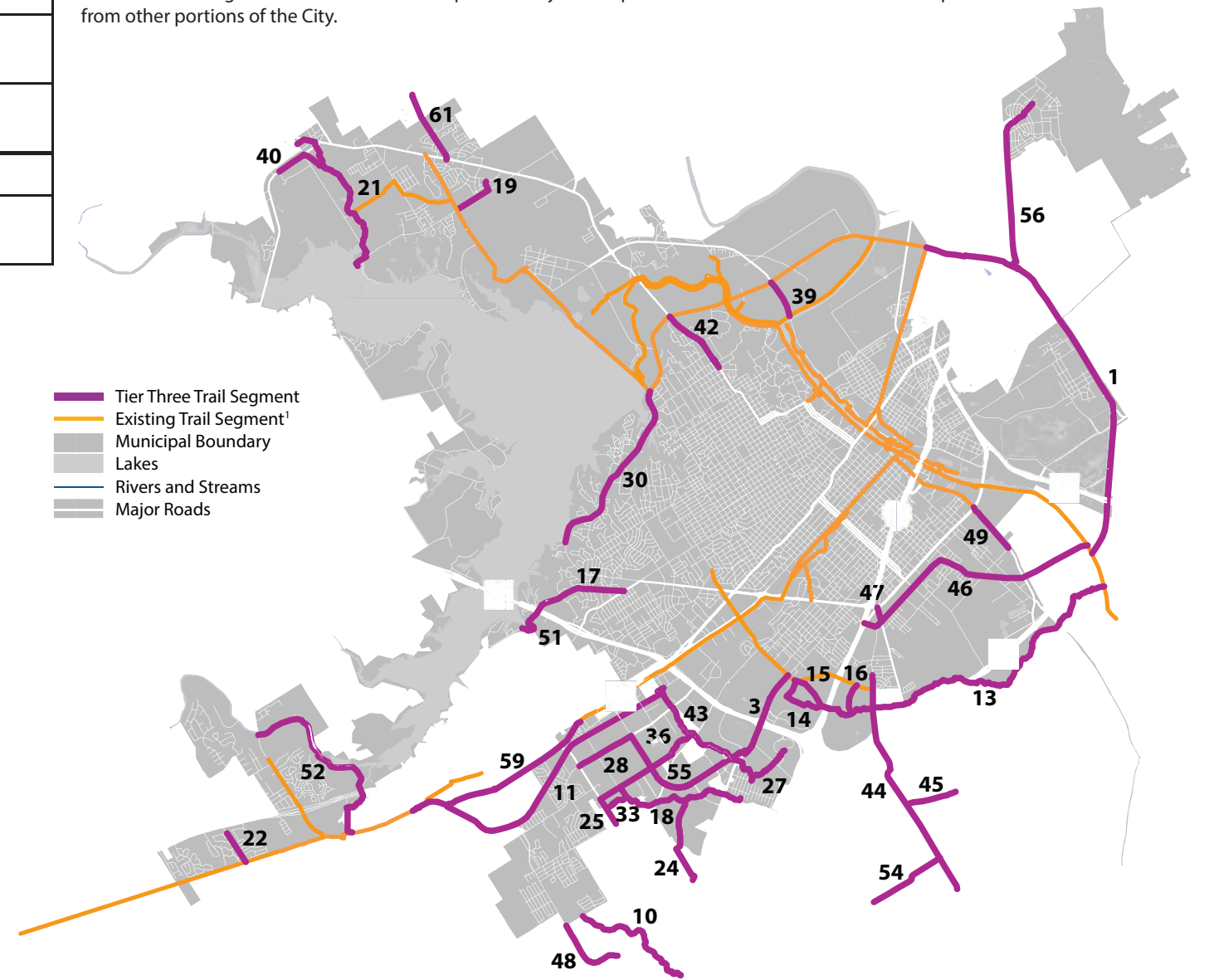
**TIER THREE TRAIL SEGMENTS**

Tier Three trail segments include the remaining 76 miles of roadside and greenway trail proposed by this Master Plan. Total estimated construction costs for Tier Three trail segments are estimated to cost between \$20,064,000.00 and \$42,134,400.00 dollars (2022) but it is acknowledged that overall costs may far exceed this estimate due to inflation over an extended period of time.

Tier Three trail segments may be further summarized as follows:

**SEGMENTS.** Proposed Tier Three Trail Segments are concentrated along the southern and eastern periphery of Waco and throughout the China Spring area in the northwestern quadrant of the City. The perceived absence of facilities in center city neighborhoods reflects the fact that many of these areas are intended to be served by a combination of sidewalks and bikeway facilities. (See **Waco Active Transportation Network, System Map**, on pages 53 and 54).

**LINKAGES.** Tier Three Trail Segments complete the Waco to McGregor linkage and the linkage between the China Spring area and central Waco. Southern and eastern neighborhoods are linked to the City's active transportation network while a trail corridor along SH 340 and Air Base Road provide bicycle and pedestrian access to the TSTC Waco Airport from other portions of the City.



1. "Existing Trails" includes recommended Tier One and Tier Two trail segments. Note: Corresponding trail segment descriptions are located on page 91. \* Lake Waco Loop Trail is considered a Tier Three segment of the trail system

**TIER THREE TRAIL SEGMENTS\***

Key	Project Name	Project Type	Beginning	End	Distance (Miles)	Primary/Secondary
11	Cement Plant Rail	Greenway	UP Railline near Wickson Rd	North Flat Creek	4.4	S
13	Cottonwood Creek	Greenway	South of TX-340 Loop	IH-35	5.7	P
19	Flat Rock Road	Roadside	Skeet Eason Dr	Desperado Dr	0.7	S
26	Hewitt to Cottonbelt	Roadside	Panther Way	US 84 @ Ritchie Rd	2.6	S
31	Lake Waco Dam Trail North Ext.	Roadside	Access Road/Skeet Eason Dr.	China Spring Rd (FM 1637)	2.9	P
33	Mars Dr	Roadside	Hewitt Dr	Midway High School	0.4	S
39	N MLK Jr. Connector	Roadside	Brazos RF North Shore	Lake Shore Dr	0.6	S
40	N. River Crossing Connector	Greenway	n/a	N River Xing (FM 185)	0.9	S
49	S University Parks Dr West	Roadside	La Salle Ave (US 77)	Garden Dr	0.8	S
51	SH 6/Midway Park Connector	Greenway	Old Fish Pond Road	Midway Park	0.8	S
56	TSTC Extension	Roadside	IH-35 / TX-340 Loop	Texas State Technical College Waco	4.4	P
59	Waco-McGregor South Segment	Roadside	Old Hewitt Rd	Cottonbelt Terminus	3.2	P
30	Lake Shore Drive to Koehne Park	Roadside	Lake Waco Dam SE Terminus	Koehne Park	3.0	S
42	North 19th St (FM 1637)	Roadside	Lake Shore Dr	Park Lake Dr	1.1	P
1	340 Loop	Roadside	Airbase Rd (US 84/Loop 340)	Brazos River South Shore	5.0	P
3	Bagby Ave	Roadside	S New Rd	Exchange Pkwy @ North Flat Creek	1.4	S
16	Cottwood Creek Alt @ W. Uni HS	Greenway	South of University HS	New Rd.	0.5	S
21	Greenway Yankee Rd	Greenway	Yankee Rd./Flat Rock Rd.	Yankee Rd./Tulum Lane	2.8	S
22	Harris Creek Rd	Roadside	UP Railline @ Harris Creek Rd	Stageline Dr	0.5	S
46	Primrose Trail	Greenway	TX-340 Loop	IH-35	4.2	P

\*Note: Corresponding map located on page 90.

**SYSTEM ENHANCEMENT PROJECTS**

In addition to the construction of new trail segments, there exist many identified near-term needs along existing metropolitan and recreational trail segments that can enhance the user experience. Although not an all-inclusive list, the following projects should be considered for near-term inclusion in the City's capital budget.

**BRAZOS RIVERWALK TRAIL**

The Brazos Riverwalk Trail is the City's most high-profile trail facility. Much has been learned by the City regarding trail construction and maintenance since the design and construction of the original trail segments adjacent to downtown. Riverwalk improvements involve the realignment and reconstruction of multiple trail segments to accommodate new development, ensure a higher degree of user comfort and reduce recurring maintenance issues related to periodic flooding.

**SOUTH BANK/DOWNTOWN**

- **Realignment.** Construct an alternative alignment for segments of the trail that are currently located in the floodway to ensure that the trail remains accessible during flooding events. Alter trail alignments through Indian Spring Park to eliminate switchbacks and to incorporate a pending connection to the Mary Avenue Corridor when constructed.
- **Surfacing.** Replace asphalt segments of the trail with concrete - ensuring that trail surface widths and clearances are consistent with the trail design features presented in this Plan.
- **Access.** This applies to both the north and south bank of the river through the Baylor campus area. Especially on the north side near McLane Stadium.

**NORTH BANK/EAST WACO**

- **Realignment.** Realign or reconfigure segments of the trail that are directly adjacent to N. MLK Jr. Boulevard to create greater roadway separation and/or reduce driveway crossings. Propose new alignment to separate trail from main roadway and avoid driveway crossings. Options may include additional boardwalk sections or barricades between the trail and adjacent roadway.
- **Trailhead.** Construct a new major trailhead along S. MLK Jr. Boulevard near the IH 35 frontage road.

**RIVER TRAIL (CAMERON PARK)**

Classified as a recreational trail, the River Trail in Cameron Park has a more rustic feel than proximate segments of the Brazos Riverwalk, which this Plan proposes to maintain even if future trail connectivity increases bicycling and walking traffic along its length. The geography of the trail between the riverbanks and adjacent bluffs will require additional measures to mitigate periods of flooding.

- **Trail Surfacing.** Repair rustic trailway surface to adhere to the greenway trail design features presented in this Plan. Wholesale enhancements will include the re-establishment of a defined soft surface trailway and trailway clearance (including removal of boulders).
- **River Embankments.** Reinforce river embankments where necessary to mitigate ongoing sloughing that endangers the trail corridor. Install railings as necessary where engineered solutions eliminate natural buffers between the trailway and river edge.
- **Bridges.** Replace narrow bridges near the northern trail terminus at MCC. Raise approaches to replacement bridges to reduce the number and duration of periods of heavy rain and inundation.
- **McLennan Community College (MCC) Trailhead.** Improve the MCC trailhead in accordance with the major trailhead design recommendations contained in this Plan.
- **Hard-surface Trail Segment.** Replace the worn pathway extending from the Redwood Shelter parking lot northwest along the Brazos River to the tree line (where the trail diverges from Cameron Park Drive) with a paved surface that adheres to the roadside trail design features presented in this Plan.
- **Signage.** Upgrade existing trailhead signage at Redwood Shelter and the MCC trailhead. Install way-finding signage (including distance markers) along the length of the River Trail.



The City should work with TxDOT to transform the parking area along the Cotton Belt Trail at Old Church Road into a major trailhead.

## COTTON BELT TRAIL

As a newer facility within the City's trails system, the Cotton Belt Trail remains in good condition. Immediate investments which can improve the user experience are primarily related to trailheads - although preventative maintenance activities may be warranted due to the trailway's dual use as a utility service corridor.

- **Trail Surface.** Repair longitudinal cracking. Replace segments of the existing trail surface with reinforced concrete to support weight of service vehicles.
- **Trailhead Enhancements.** Construct a major trailhead at the unofficial trailhead on Old Church Road. Construct a permanent restroom at Trail Blazer Park.
- **Crossings.** Upgrade the crossing at Old Church Road to compel trail users to approach at lower speeds and encourage motorists to yield for trail user traffic.

## LAKE WACO DAM TRAIL

As with the Cotton Belt Trail, immediate investments which can improve the user experience are primarily related to trailheads - facility upgrades which may be accomplished in partnership with the U.S. Army Corps of Engineers. Corresponding investments in shade structures are also warranted due to the length of the trail that is directly exposed to the elements.

- **Trailhead Enhancements.** Expand and improve parking at the popular trailhead on the southeast end of trail (Lakeshore Drive). Provide general repair and improvements at the trailhead on the northwest side of dam (near airport).
- **Shade Structures.** Coordinate with the US Army Corps to install wayside shade structures at incremental locations along the trail (including on the dam structure).

## GENERAL INVESTMENTS

The master planning process has revealed other public preferences and trail development opportunities that extend beyond the construction of new metropolitan trail segments or a location-specific enhancement to existing metropolitan trail segments. Additional system-wide enhancements are recommended.

- **Trails System Branding.** Create a trails system branding and way-finding plan. Provide annual funding for the gradual installation of coordinated signage and way-finding features across all segments of the Waco Metropolitan Trails System.
- **Trailheads and Waysides.** Construct major trailheads in conjunction with new trail segments and as identified within this Master Plan. Identify where new minor trailheads and waysides may be desired/warranted and fund gradual installation of new features.
- **Special Use Trails - Cameron Park Trails.** Prepare a network plan for the Cameron Park special use trails. Work with advocacy groups to determine which routes may be designated as joint use versus hiking or mountain biking only. Implement the plan including trail surface rehabilitation, use and direction of travel. Specialized trail upgrades (i.e. flow or downhill segments) include signage and way-finding, geo-locating the trail routes, etc.
- **Recreational Trails, Lake Waco.** Coordinate with the US Army Corps of Engineers to generate a plan for the construction of a recreational trail circling Lake Waco.
- **Brazos and Bosque River Paddling Trail Investments.** Work with TPWD to design and construct a series of paddling launches and channel markers to support and encourage access to the Brazos and Bosque River Paddling Trail.

## POLICY PROGRAM

The inclusion of trail infrastructure for pedestrians and bicyclists can bring a number of social, environmental, economic and health benefits to the Waco community. The benefits of trail infrastructure is also amplified where equal attention and effort is put towards the policies and practices that promote trail usage. Positive community attitudes toward walking and biking, both for recreational and transportation purposes, requires the creation of a safe environment – one which extends beyond just the presence of trails.

The League of American Bicyclists (LAB) identifies five primary programming categories that are essential to the development of a bicycle-friendly community. These categories also known as the “Five E’s”. The Policy Program provides a list of programs, policies, ordinances, and facilities that can be utilized by the City of Waco to develop policies and programs centered around trails. These policies are not presented in any order of priority. Note that much of the engineering policies and programs are identified throughout [Chapter 4, Designing Our Network](#).

## POLICIES/REGULATIONS

- **Trail Dedication and Construction.** Prepare and adopt amendments to municipal land development regulations that require the reservation of trail corridors and trail construction as part of the development process. (See [Trail Dedication and Development Provisions](#) on page 43.)
- **Hours of Operation.** Selectively reduce hours of trail usage to improve user safety during nighttime hours. In general, access to non-lighted metropolitan and recreational trails should be limited to daytime hours. Exceptions to this baseline standard can (and should) vary widely. Access to roadside trails should not be limited because they serve as a transportation facility in the same manner as a street, bicycle lane or sidewalk. Likewise, greenway trails that provide important transportation linkages should be lit to allow for 24-hour access and use, as determined on a case-by-case basis.
- **Micro-mobility/Automated Vehicles.** Establish clear policies or regulations governing the operation of scooters, E-bikes and other forms of micro-mobility on metropolitan trails and recreational trails. Adopted policies and regulations should also consider mobile (automated) delivery vehicles in accordance with recent amendments to the Texas Transportation Code.

## OPERATIONS

- **Maintenance Plan/Procedures.** Establish a standard trail maintenance program which may include minor surface repair; standard and post-storm sweeping and clearing debris; lighting and signage replacement; trash collection, litter removal and graffiti removal; cleaning of restrooms, drinking fountains, parking lots and other trailhead and trail amenities; and trimming of vegetation to ensure visibility. Upon implementation, generate an estimate of annual trail maintenance and operations costs per linear mile and adjust budgets accordingly. Create a corresponding asset database.
- **Trail Level of Service.** Starting with the baseline trail counts collected as part of this master planning process, collect annual or semi-annual trail user counts to measure changes in usage patterns. Accurate trail counts will assist the City in determining when trail segments should be widened beyond minimum recommendations or when roadway crossing enhancements should be considered. Utilize annual trail count data and the FHWA's Shared-use Path Level of Service (LOS) Calculator to monitor the level of service on existing trails.
- **Trail Stewardship.** Support the development of a trail advocacy organization through direct funding and/or in-kind support such as office space and materials. Rely on the organization to assist with trail maintenance and stewardship, generate and support funding initiatives, and to serve as clearinghouse for community-wide bicycling initiatives.

# FUNDING STRATEGIES

There are multiple funding strategies that can be utilized to implement the action items discussed in the Master Plan's Policy Program and Investment Program. This section outlines typical city-generated funding and funding at the local, regional, state and federal levels.

## CITY OF WACO

- **General Fund Expenditure.** Primarily used for improvements or repairs to existing facilities. Typical general fund expenditures are for smaller repair and replacement efforts.
- **Bond Fund.** Primarily targeted for new facilities.
- **Utility Partnerships.** May be established for trails within utility easements. This partnership typically does not involve monetary contributions. Rather, it includes use agreements for easements held by utility companies.
- **Business Improvement District Funds.** A type of public-private partnership that leverages public and private funds to increase the attractiveness of defined geographic areas to existing and potential customers. These entities often see value in making streetscape improvements that make walking and biking more comfortable.

## LOCAL AND REGIONAL

- **Waco Metropolitan Planning Organization (MPO).** Available for all stages of a project from planning, design and construction. MPO funding may be particularly helpful in projects that need further study.
- **Private Foundations.** Private foundations such as Downtown Waco can assist in funding for projects that have an economic development impact in Waco's downtown area.
- **Baylor University.** Partnerships can be formed to fund segments of trail that have benefits for people moving to, from and around the Baylor University campus. These partnerships can also be made in the trail maintenance stage of the project as well.
- **School Districts.** School districts can partner with the City to implement the Safe Routes to Schools (SRTS) Program.
- **Waco Lake - Army Corps of Engineers.** The Army Corps of Engineers can partner with the City to implement the trail segments around Lake Waco.

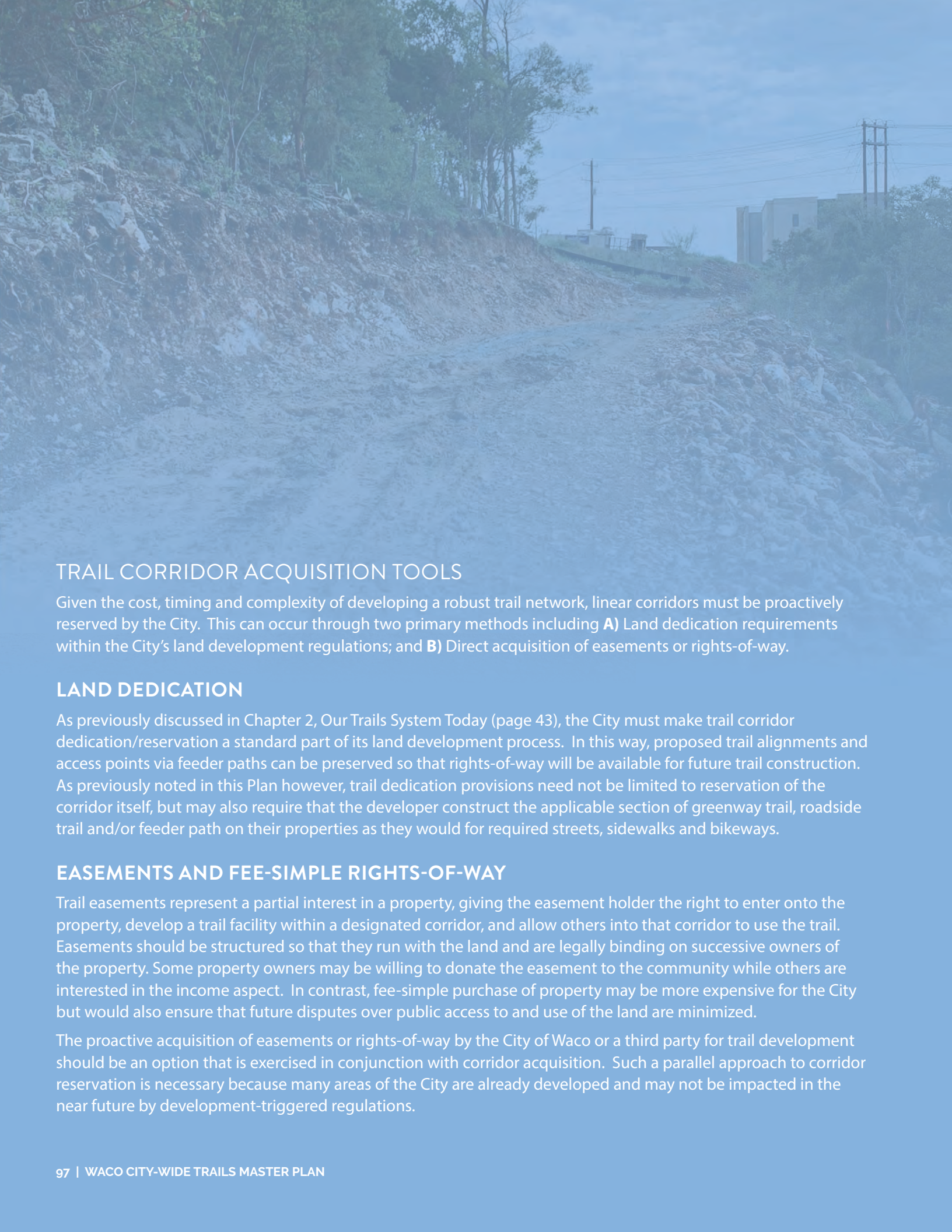
## STATE OF TEXAS

- **Recreational Trail Grants.** Funds can be utilized on both motorized and non-motorized recreation trail projects, such as the construction of new recreational trails, improvements to existing trails, to develop trailheads or trailside facilities and to acquire trail corridors. The grants can be up to 80 percent of project cost with a maximum of 300,000 dollars for non-motorized trail grants and a maximum of 600,000 dollars for motorized trail grants.
- **Outdoor Recreation Grants.** Fifty percent matching grant funds are provided to cities, counties, municipal utility districts (MUDs) and other special districts to acquire and may specify that these funds can be used for the development of trails. There is one funding cycle per year, with a maximum grant amount of 750,000 dollars for populations under 500,000.
- **Community Outdoor Outreach Program (CO-OP) Grants.** Provide funding to local governments and non-profit organizations for programming that introduces under-served populations to environmental and conservation programs as well as TPWD mission-oriented outdoor activities. This is not a land acquisition or construction grant; this is only for programs. Grants are awarded to non-profit organizations, schools, municipalities, counties, cities and other tax-exempt groups. Individual grant requests may be between 5,000 and 50,000 dollars.
- **Transportation Alternatives.** Administered through both TxDOT and local MPOs, depending on project location, to provide funding for pedestrian- and bike-oriented infrastructure that facilitates walking and biking for short trips. Projects should have rights-of-way and easements settled, be able to advance to construction within 3 years and show connections to multiple locations.

## FEDERAL

- **RAISE Transportation Discretionary Grant Program.** Rebuilding American Infrastructure with Sustainability and Equity grants focus on projects that provide significant economic benefits while also improving safe transportation options. Funding can be used for, but is not limited to, bicycle lanes, crosswalks, lighting, and bridges. Most bicycle and pedestrian projects will only be competitive under this program if they are part of a larger project with proven economic, equity and safety benefits at a regional level.
- **Surface Transportation Block Grant Program (STBG).** Provides funds that are eligible for bicycle and pedestrian improvement projects. Federal funds are sub-allocated to the local level based on population and TxDOT then prioritizes projects and administers STBG funds.
- **Congestion Mitigation and Air Quality Improvement Program (CMAQ).** Federal Highway Administration (FHWA) funds that are apportioned to states. CMAQ funds are intended to fund projects that improve air quality and reduce congestion. CMAQ funds may be used on projects related to pedestrian and bicycle infrastructure such as bicycle lanes, sidewalks, shared use paths, and signage. In Texas, CMAQ funds are included within TxDOT's Category 5 funding.
- **Federal Transit Administration (FTA).** Provides funds for bicycle and pedestrian investment as they relate to transit. FTA funds may be used to fund improvements such as bicycle lanes, bicycle parking, bus shelters/benches, sidewalks and lighting among others. To qualify for FTA funds, projects must provide or improve access to existing or planned transit facilities such as stops and stations.
- **The Community Development Block Grants (CDBG).** Provides money for streetscape revitalization, which may be largely comprised of pedestrian improvements. Federal CDBG grantees may use the funds for real property, public facility improvements and planning. Trail master plan projects that enhance accessibility are a good fit for this funding source. CDBG funds could also be used to write an ADA Transition Plan for the city or support design and construction of projects. These funds are administered through the Texas Department of Agriculture and MPOs, and must benefit low to moderate income households.
- **The Rivers, Trails, and Conservation Assistance Program (RTCA).** A National Parks Service (NPS) program providing technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance - there are no implementation funds available. This program may benefit trail development throughout the region indirectly through technical assistance, particularly for community organizations, but should not be considered a future capital funding source.
- **Reconnecting Communities.** A USDOT program that supports pedestrian and other transportation related infrastructure for large, impactful projects that reconnect communities that have been divided by transportation corridors. Equity, supportive stakeholders and safety are key considerations.

The landscape of federal funding opportunities for bicycle and pedestrian programs and projects is always changing. A number of Federal agencies, including the Bureau of Land Management, the Department of Health and Human Services, the Department of Energy and the Environmental Protection Agency have offered grant programs amenable to bicycle and pedestrian planning and implementation, and may do so again in the future. **For up-to-date information about grant programs through all federal agencies, see <http://www.grants.gov/>.**



## TRAIL CORRIDOR ACQUISITION TOOLS

Given the cost, timing and complexity of developing a robust trail network, linear corridors must be proactively reserved by the City. This can occur through two primary methods including **A)** Land dedication requirements within the City's land development regulations; and **B)** Direct acquisition of easements or rights-of-way.

### LAND DEDICATION

As previously discussed in Chapter 2, Our Trails System Today (page 43), the City must make trail corridor dedication/reservation a standard part of its land development process. In this way, proposed trail alignments and access points via feeder paths can be preserved so that rights-of-way will be available for future trail construction. As previously noted in this Plan however, trail dedication provisions need not be limited to reservation of the corridor itself, but may also require that the developer construct the applicable section of greenway trail, roadside trail and/or feeder path on their properties as they would for required streets, sidewalks and bikeways.

### EASEMENTS AND FEE-SIMPLE RIGHTS-OF-WAY

Trail easements represent a partial interest in a property, giving the easement holder the right to enter onto the property, develop a trail facility within a designated corridor, and allow others into that corridor to use the trail. Easements should be structured so that they run with the land and are legally binding on successive owners of the property. Some property owners may be willing to donate the easement to the community while others are interested in the income aspect. In contrast, fee-simple purchase of property may be more expensive for the City but would also ensure that future disputes over public access to and use of the land are minimized.

The proactive acquisition of easements or rights-of-way by the City of Waco or a third party for trail development should be an option that is exercised in conjunction with corridor acquisition. Such a parallel approach to corridor reservation is necessary because many areas of the City are already developed and may not be impacted in the near future by development-triggered regulations.

## ADMINISTRATION AND MANAGEMENT

### PLAN ADMINISTRATION

The Waco Parks and Recreation Department will be the primary administrator of this Master Plan. The department will be responsible for the day-to-day oversight of all Plan activities including the coordination of implementation, amendments and monitoring success. Successful implementation of this Plan's Policy Program and Investment Program will also require the collective efforts of other City departments, boards and commissions.

### MUNICIPAL DEPARTMENTS

Multiple City departments will participate in Waco's efforts to build a comprehensive system of metropolitan and recreational trails. The following departments will assume important and ongoing roles in assisting the Parks and Recreation Department with its plan administration duties:

#### ENGINEERING DEPARTMENT

- Assist in incorporating trail and other bicycle/pedestrian accommodations into roadway, bridge and intersection construction or improvement projects.
- Provide standard specifications for trail construction including trailways and roadway crossings, etc.
- Maintain public street rights-of-way and trail corridors.

#### PLANNING & ZONING DEPARTMENT

- Process land development code amendments that provide for trail easement dedication, trail construction and trails system access via feeder trails.
- Amend long-range planning documents to align with the recommendations of this Plan.

#### TRAFFIC DEPARTMENT

- Design and installation of traffic control devices for trails - including roadside trails and at various crossing locations.
- Monitor trail usage via the collection of trail counts.

### BOARDS AND COMMISSIONS

The following City boards and commissions may assume ongoing roles in assisting with Master Plan implementation in accordance with the powers and duties vested in them by City Charter and/or Municipal Code:

#### PARKS AND RECREATION COMMISSION

- Will oversee and make recommendations on the development of new metropolitan and recreational trails.
- Will work with Parks and Recreation staff to monitor and report on Master Plan implementation



City staff installing trail and sidewalk counters as part of the master planning process.

#### PLAN COMMISSION

- Will provide recommendations to City Council on proposed land development code amendments related to trail construction, dedications and access.
- Will review development plans for consistency with trail-related code provisions.
- Will recommend amendments to the comprehensive plan and other long-range planning documents to align with the recommendations of this Master Plan.

## WACO METROPOLITAN PLANNING ORGANIZATION



The Waco Metropolitan Planning Organization (MPO) coordinates the long-range transportation planning activities for McLennan County and all local government jurisdictions within the County boundaries - including the City of Waco. Not only does the MPO develop long-range transportation plans for its jurisdictional area, it programs federal funds to support local transportation projects and operations.

Waco MPO staff was a reliable partner to City staff in preparing this Master Plan. MPO staff - as well as the MPO's Policy Board and Technical Advisory Committee - will remain an essential partner in Master Plan implementation. Key MPO-tasks will be to ensure consistency between the recommendations of this Master Plan and other long-range transportation plans as well as incorporating recommended trail projects into the metropolitan area's Transportation Improvement Program.

## NON-PROFIT ORGANIZATIONS

There is often a direct correlation between successful development and operation of a comprehensive community-wide trails system and the presence (and active participation) of champions outside of the local government organization. Many such organizations in Waco actively participated in the early stages of the trails master planning process including Waco Walks, Waco Chamber of Commerce, Waco Bicycle Club and more. The City must continue to engage these entities for support with the following tasks:

- **Raise interest and awareness of trails**
- **Advocate, promote and encourage trail development**
- **Host, sponsor, or co-sponsor events and activities that highlight and utilize trails and other active transportation facilities in Waco**
- **Assist in advocating for trail funding and in directly raising money for trail development and maintenance**
- **Help to organize volunteers to assist with implementation, maintenance and management**

As suggested in the Plan's Policy Program (page 94), the City may wish to facilitate the creation of a trail-dedicated non-profit advocacy organization that is geared toward furthering the trails initiatives listed above.

“WE ARE THE DRIVING FORCE BEHIND A 200+ MILE PLANNED SYSTEM OF MULTI-USE TRAILS – A DYNAMIC NETWORK OF CONNECTED STREAMS, PARKS, BUSINESSES, AND NEIGHBORHOODS. TRAILS ARE RECREATION, TRANSPORTATION INFRASTRUCTURE, TOURISM DESTINATIONS, AND QUALITY-OF-LIFE NECESSITIES.”

- EXAMPLE MISSION STATEMENT EXCERPT (OZARK GREENWAYS)

## GOVERNMENT PARTNERS

Much of this Plan's proposed metropolitan and recreational trail mileage will be located within public road rights-of-way and/or on federal land (much of which is owned and maintained by the U.S. Army Corps of Engineers). Successful Plan implementation will require close coordination with federal and state entities such as the U.S. Army Corps, National Parks Service and TxDOT for purposes of obtaining funding support and rights of access, construction and use on non-municipal property. These considerations extend equally to public utility authorities for the use of utility corridors for the development of some trail segments.



Completion of the proposed recreational trail circling Lake Waco will require ongoing coordination with the U.S. Army Corps of Engineers.

## MEASURING SUCCESS

There are several measurable benchmarks that the City of Waco can monitor in affirming its commitment to implementing the recommendations of this Master Plan. Although not all-inclusive, **Performance Indicators** presents a list of example measures that should be periodically updated to gauge the effectiveness of the City's and its partners' efforts in building an expanded and improved **Waco Metropolitan Trails System**.

## PERFORMANCE INDICATORS

Topic	Indicator	Measure
Network	Trail Mileage	Cumulative metropolitan trail mileage
Network	Trail Mileage	Amount/percentage of recommended trail mileage constructed
Network	Access	Percentage of residential areas within 1/4 mile of a metropolitan trail
Network	Access	Linear miles of trail per 1,000 city residents
Network	Access	Number/frequency of feeder paths between metropolitan trails and adjacent properties
Network	Connectivity	Schools/parks/public housing directly accessed or within 1/4 mile of a metropolitan trail
Investment	Trails	Amount of funding expended for new trail mileage
Investment	Trails	Amount of funding expended for the improvement of existing trailways
Investment	Amenities	Number of major and minor trailheads
Investment	Safety	Type/value of trailway enhancements (i.e. surfacing, lighting, way-finding, etc.)
Investment	Safety	Number/type/value of roadway crossing enhancements
Safety	Crashes	Number and rate of reduction in crashes involving bicyclists
Safety	Crashes	Number and rate of reduction in crashes involving pedestrians
Usage	Trail Counts	Annual change in trail usage at trail counter locations
Usage	Mode Share	Amount of trips by biking/walking as a percentage of all trips





# APPENDIX A:

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# GLOSSARY OF TERMS

# GLOSSARY OF TERMS

## PEDESTRIAN-ORIENTED TERMS

**Buffer:** The portion of the a highway, road or street between the curb-face or edge of the pavement and the sidewalk that provides a spatial buffer between vehicular traffic and pedestrians on sidewalks. Buffers often include landscape plantings such as grass, trees or shrubs, or utility poles, and may also be referred to as the “planting strip,” “landscape buffer,” “tree buffer,” or “tree box.” Buffers can also include barriers such as highway guide rails (guardrails) or bollards. In rural or suburban areas the buffer may be a grassy swale or drainage ditch. In urban areas, downtowns, the buffer may also include street furniture, street signs, fire hydrants, vending boxes, lighting poles, etc.

**Cross-Slope:** Defined as the slope measured perpendicular to the direction of travel. Cross-slope must be measured at specific points. The average cross-slope is the average of cross-slopes measures at regular intervals along the trail. Running crossslope is defined as the average cross-slope of a contiguous section of trail. The running cross-slope can be determined by taking periodic measurements throughout a section of trail and then averaging the values.

**Crosswalk:** The horizontal portion of roadways, usually at intersections, reserved for pedestrian crossing; it may be marked or unmarked. Three marking patterns using white striping are most common: 1) Double parallel lines, 2) “zebra Stripes:” white cross hatches perpendicular to the pedestrian direction of travel, or 3) “Ladder:” perpendicular white cross hatches combined with double parallel lines on the outside edges.

**Enhanced Sidewalks:** These are sidewalks that are wider than the standard sidewalk at 8’ wide. This facility specifically serves pedestrians connecting to key destinations and allowing for bi-directional foot traffic.

**Greenway.** A narrow corridor of land, which may include natural or man-made features such as streams, drainage channels, or utility easements, and may be preserved for environmental protection or recreational use. Greenways are often left undeveloped to protect natural habitats or other sensitive environmental areas, improve flood management and water quality, and provide open space or vegetative buffers between land uses.

**Intersection Treatment:** The design of intersections to reduce conflict between pedestrians, cyclists, and motorists that occurs at roadway and trail intersections. The purpose of these treatments is to Increase awareness for all users, achieved through the implementation of visual or physical indicators such as specialized signals, changes in pavement material, pavement markings, and the addition of refuge medians on wide roadways.

**Linear Park.** A narrow corridor of land, which may include natural or man-made features such as streams, drainage channels greenbelts, or utility easements, preserved for environmental protection and dedicated for public recreational use.

**Major Thoroughfares:** Roadways designated for large traffic volumes, higher speeds, and intended for long-distance travel. Typically, this type of thoroughfare creates interjurisdictional connections and is part of a regional roadway network.

**Mid-Block Crossing:** Pedestrian or bicyclist crossings located in between signalized intersections. Midblock crossings have marked crosswalks on the pavement and may also include a pedestrian signal. These crossings can offer a more convenient option for crossing roadways, especially ones with long distances in between intersections.

**Minor Thoroughfares:** Roadways with lower traffic volumes, slower speeds, and intended for local travel needs. Typically, these thoroughfares creates key cross-town connections and connects to major thoroughfares.

**Pedestrian:** A person walking or traveling by means of a wheelchair, electric scooter, crutches, or other walking devices or mobility aids. Use of the term pedestrian is meant to include all disabled individuals regardless of which equipment they may use to assist their self-directed locomotion (unless they are using a bicycle). It also includes runner, joggers, those pulling or pushing strollers, carriages, carts and wagons, and those walking bicycles.

**Pedestrian Activated Signal:** A traffic control device used to indicate the presence of a pedestrian to allow for a safe crossing away from a signalized intersection. Once the signal is activated, flashing lights appear to signal their presence and vehicles are required to stop.

**Rest Area:** Defined as level portions of a trail wide enough to provide wheelchair users and others a place to rest and gain relief from prevailing grade and cross-slope demands. Users can benefit from rest stops on steep or very exposed trails to pause from their exertions and enjoy the environment. Rest areas are most effective when placed at intermediate points, scenic lookouts, or near trail amenities. Rest areas located of the trail allow stopped trail users to move out of the way of continuing traffic. The most inviting rest areas have a bench, shade, a place to rest bicycles, and a trash receptacle.

**Sidepaths:** This type of facilities provide connections for pedestrians and bicyclists, and are typically located adjacent to roadways. Sidepaths are 10’ or wider to serve multiple users in a safe manner.

**Sidewalk:** That portion of a highway, road or street specifically constructed for the use of pedestrians on the outside edge of the vehicular travel way. Sidewalks are typically, but not always, curbseparated from the roadway and made of concrete, brick, asphalt or another hard surface material.

**Spine Trail:** These off-street trail facilities serve a variety of users and are typically 12’ or wider to accommodate high volumes of users. These trails are generally found withing greenbelts and provide regional connectivity.

**Texas Accessibility Standards (TAS):** Standards for developing ADA accessible public facilities in Texas. The TAS are regulated by the Texas Department of Licensing and Regulations (TDLR).

**Trail:** The word “trail” has come to mean a wide variety of facilities types, including everything from a “marked or beaten path, as through woods or wilderness” to a paved “multi-use trail.” For this reason, this planning process will not use the word “trail” to reference a facility intended for bicycle transportation. We urge use of the term shareduse path in place of multi-use trail. Note: Several of these definitions are taken from the American Association of State Highway and Transportation Officials (AASHTO) “Guide for the Development of Bicycle Facilities,” 1999 Edition.

**Wayside.** Waysides can enhance the trail user experience by providing intermittent places along a trail to rest, gather, or observe key views or trailside features. Although not typically located at an access point (such as a trailhead), waysides may be located at intervals along a trail segment or at intersecting points and may provide some (or many) of the same amenities that may be found at a trailhead.

## BICYCLE-ORIENTED TERMS

**Bicycle:** Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term “bicycle” in this planning process also includes three and four-wheeled human-powered vehicles, but not tricycles for children.

**Bicycle Accommodations/Facilities:** A general term denoting a variety of improvements and provisions that are made by public agencies to accommodate or encourage bicycling, including bike lanes, shared use pathways, signed bike routes, and bicycle parking and storage facilities.

**Bicycle Boulevard:** A roadway designated for the mix of bicycle and motor vehicle traffic, which creates a comfortable shared-use environment through a combination of traffic calming measures, pavement markings, and signage.

**Bike Lane:** A portion of a roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

**Bicycle Lane, Buffered.** Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane (source: NACTO).

**Bikeway:** A generic term for any road, street, path, trail, or way that, in some manner, is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

**Cycle Track:** A type of bicycle facility that provides a high level of separation between motor vehicles and bicyclists. Typically, physical barriers such as raised medians or bollards are used to indicate separations, and colored or textured pavement is implemented to indicate the space of cyclists.

**Mixing Zone.** A mixing zone a space where bicyclists and automobiles that are turning right merge into one lane before an intersection. Mixing zones provide a design option in which the possible conflict among vehicles that are turning right and through bicyclists happens ahead of the intersection, like the lateral shift.

**Shared-Use Lane:** A roadway that is open to both bicycle and motor vehicle travel. Unless bicycle travel is explicitly prohibited, all highways, roads, and streets are “share lanes.” Some shared lands may have wide curb lanes or paved shoulders, to increase comfort for bicyclists; however in most cases these roads do not have sufficient width to accommodate a designated bike lane.

**Shared-Use Path:** A bicycle and pedestrian path separated from motorized vehicular traffic by an open space barrier or curb. Shared-use paths may be within the highway right-of-way (often termed “sidepaths”) or within an independent right-of-way, such as on an abandoned railroad bed or along a stream valley park. Shared use paths typically accommodate two-way travel and are open to pedestrians, in-line skaters, wheelchair users, joggers and other non-motorized path users. They are typically surfaced in asphalt or concrete, but may have hard-packed/all weather gravel or dirt surfaces as well.

**Sharrow:** A pavement marking with two inverted ‘V’ shapes above a bicycle indicating that the entire lane is meant to be shared by motor vehicles and bicyclists. Often times sharrow will be accompanied by a “Bicycle May Use Full Lane” sign.

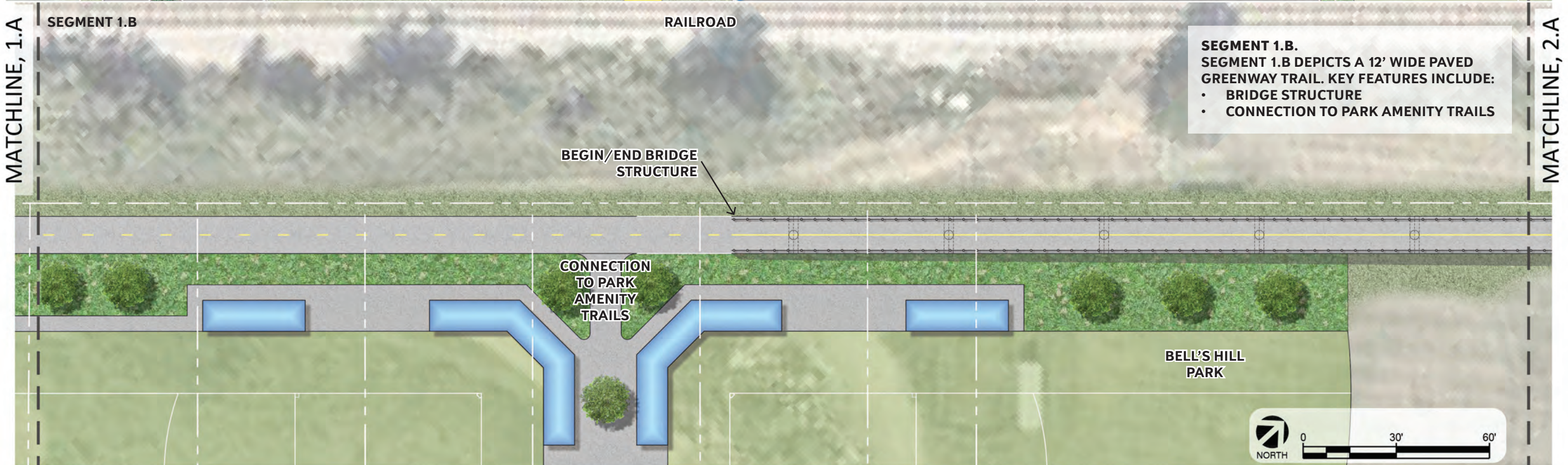
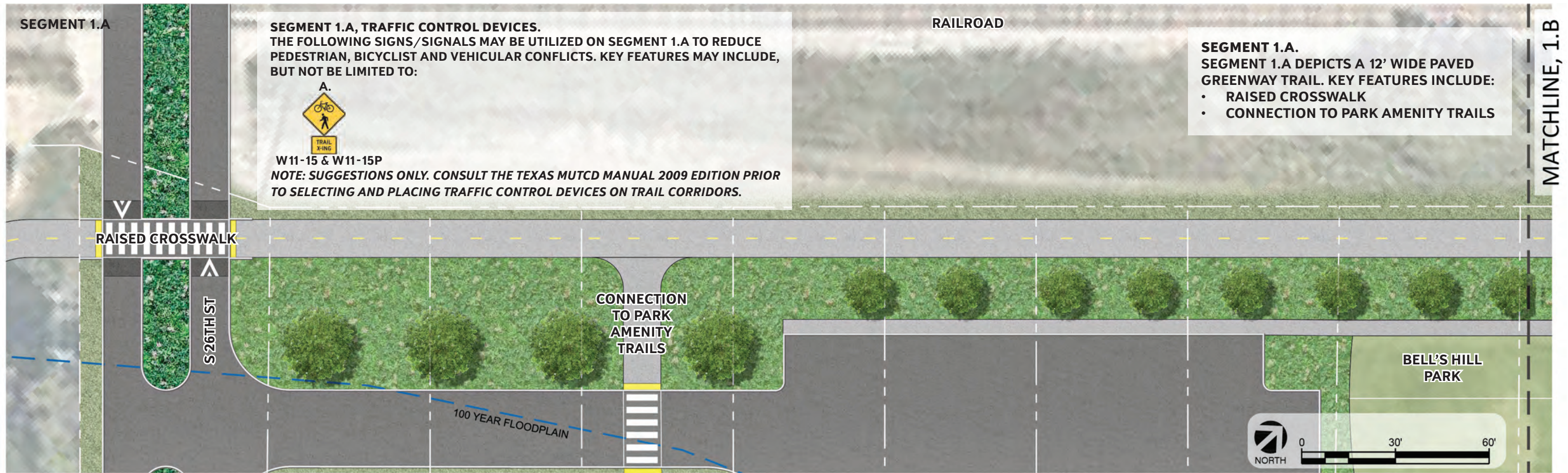
**Shoulder:** Any pavement of a roadway to the right of the right-most travel lane, but not including curbs, planting buffers, and sidewalks. Shoulders can have variety of surface treatments including pavement, gravel, or grass. Depending on their width and surface, they serve a variety of purposes, including providing space for vehicles to slow and turn right, accommodation of stopped or broken down vehicles, to allow emergency vehicles to pass, for structural support of the roadbed, or for bicycle and pedestrian travel.

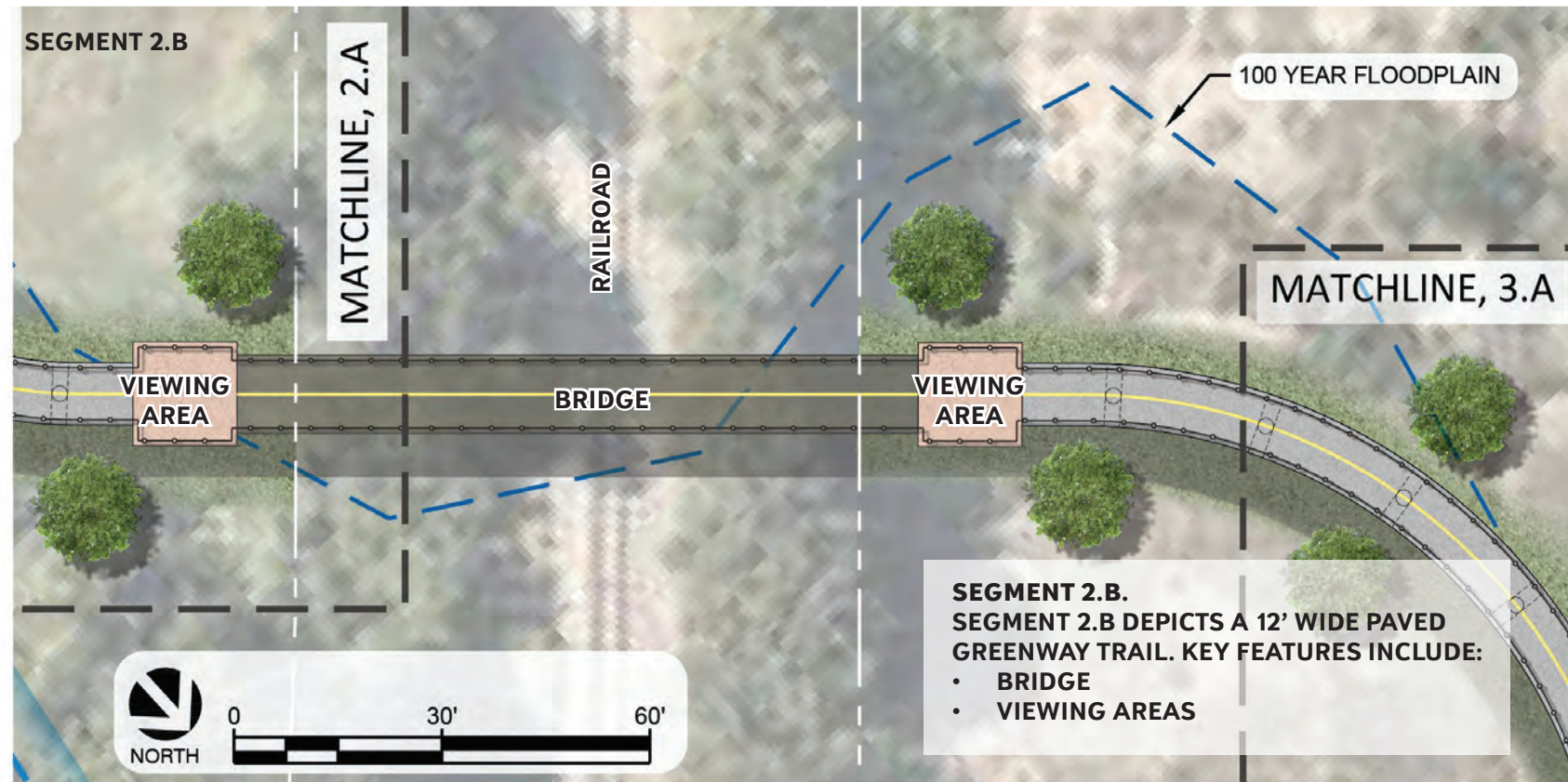
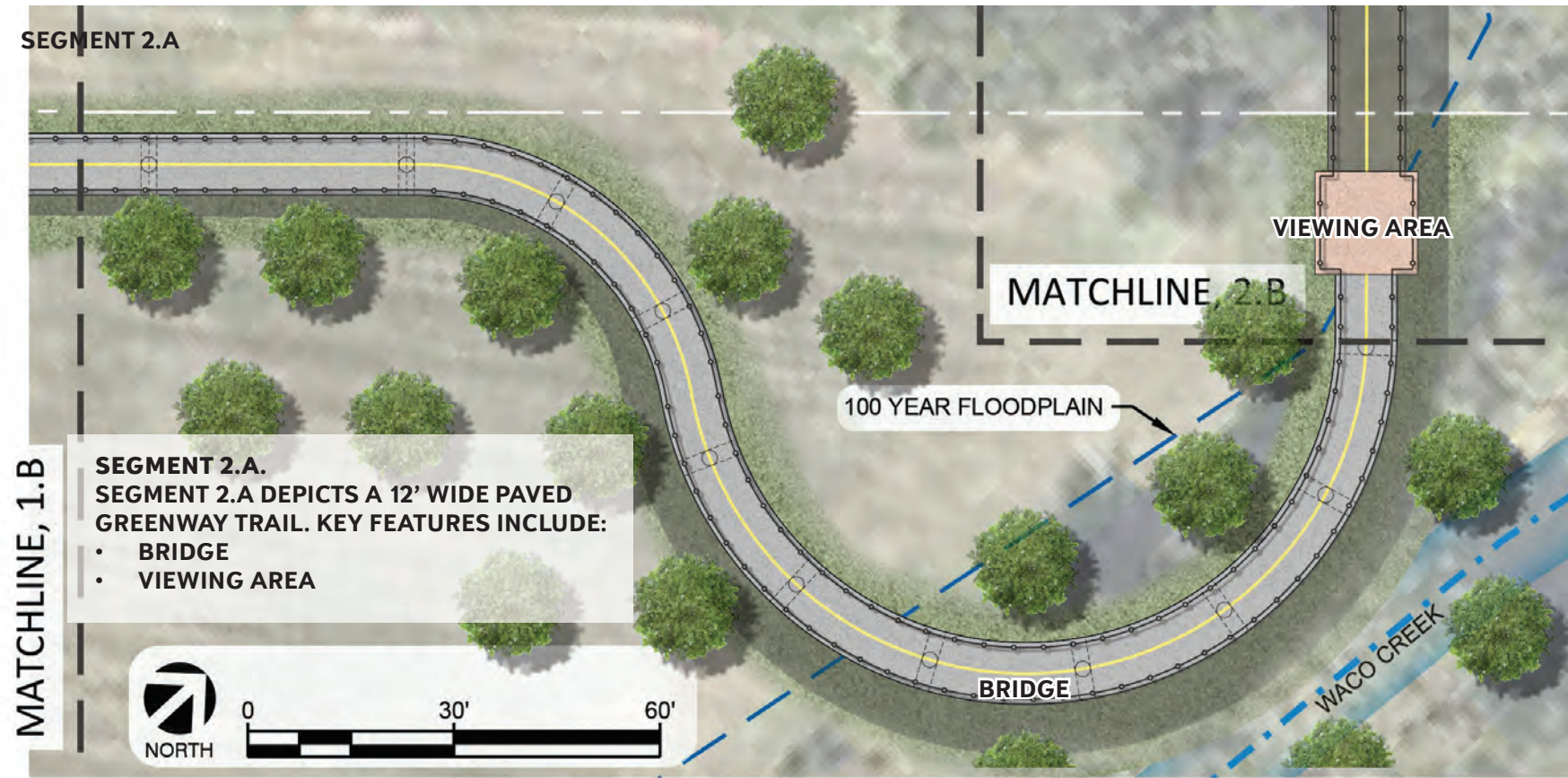


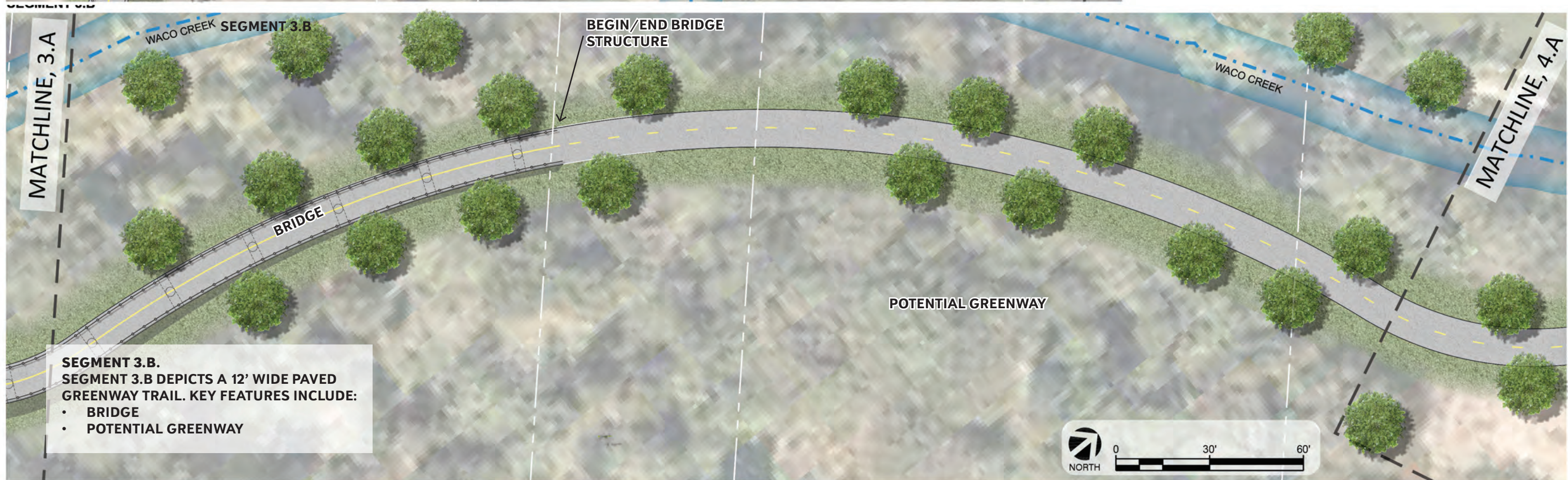
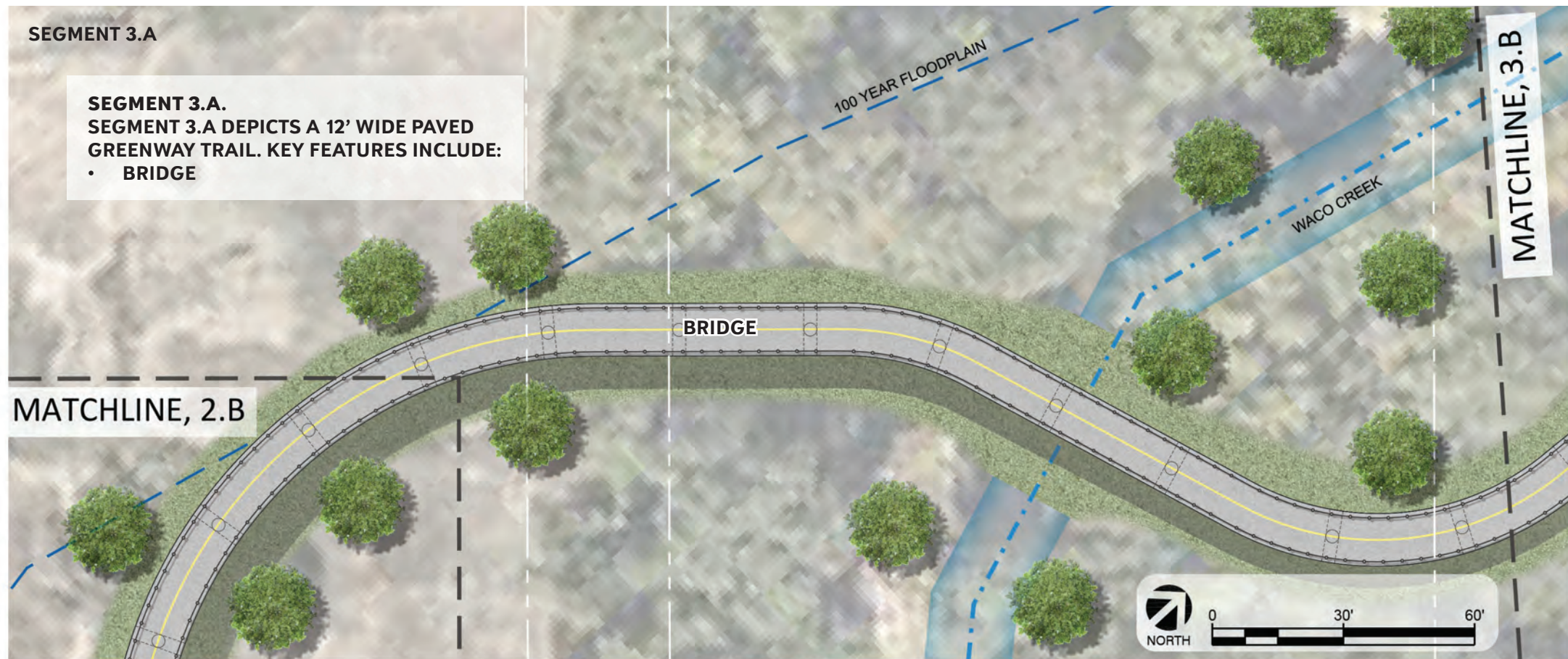
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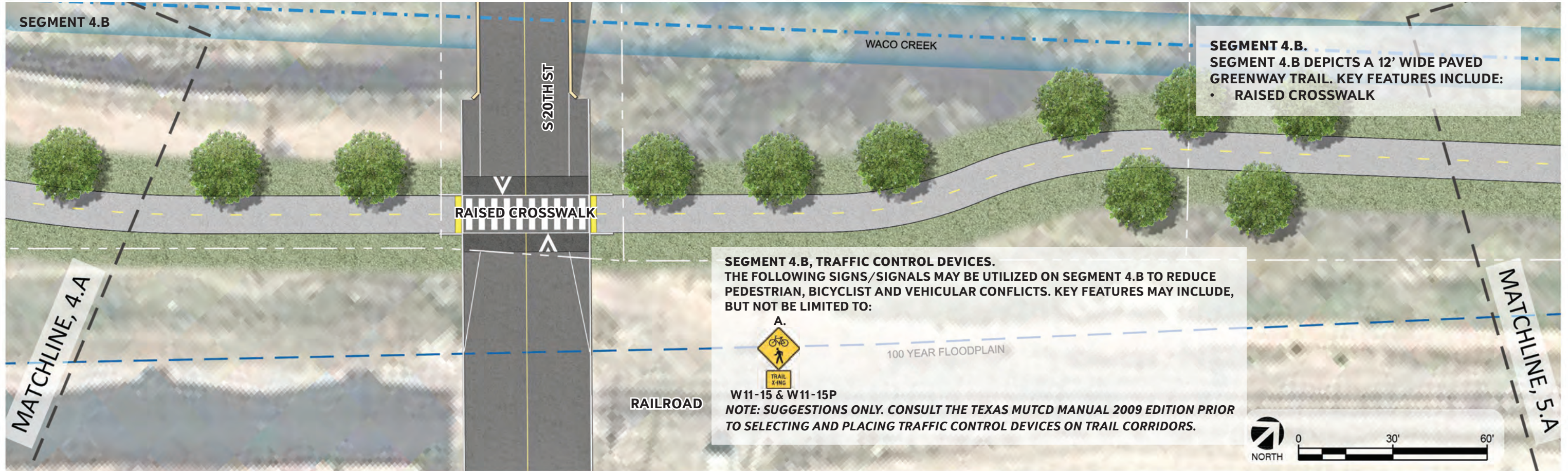
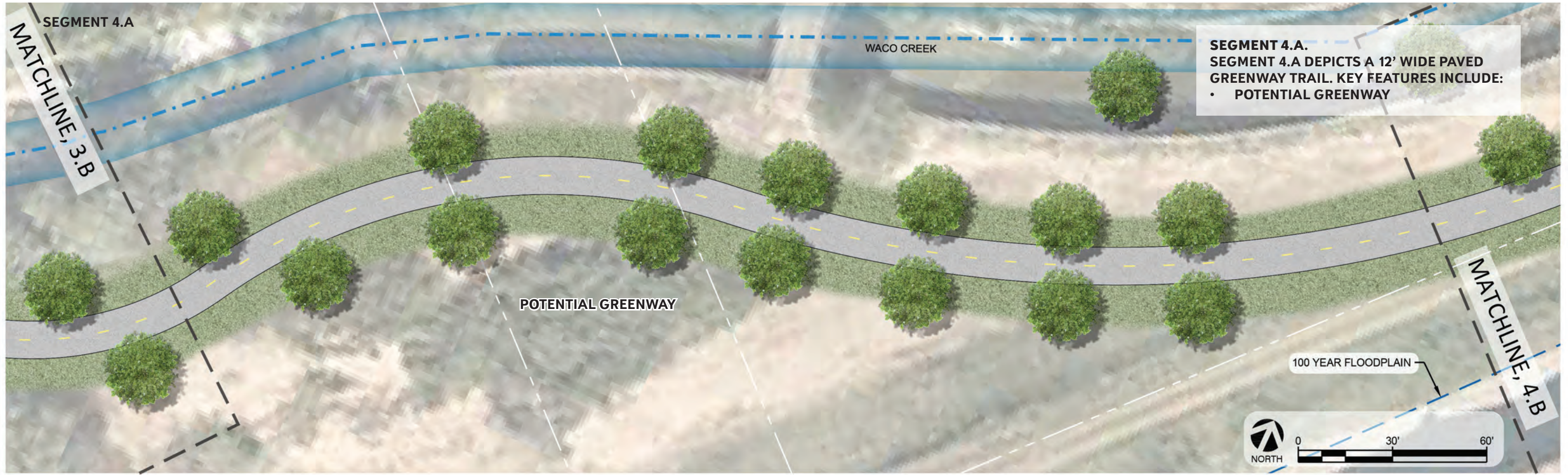
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# **MARY AVENUE CONCEPTUAL ALIGNMENT PLAN**

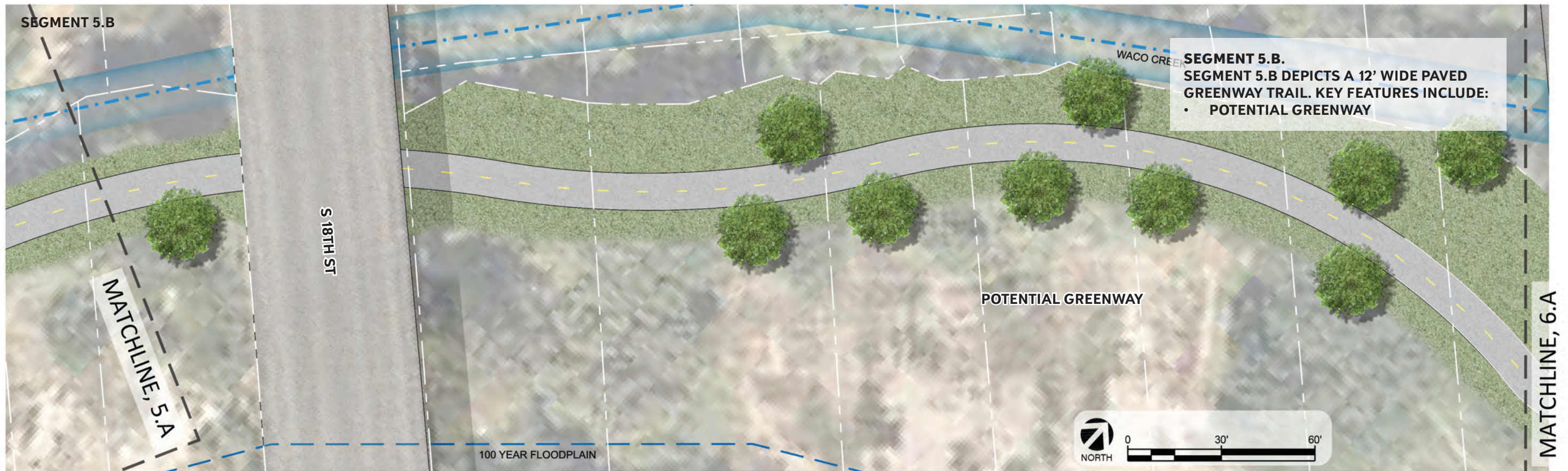
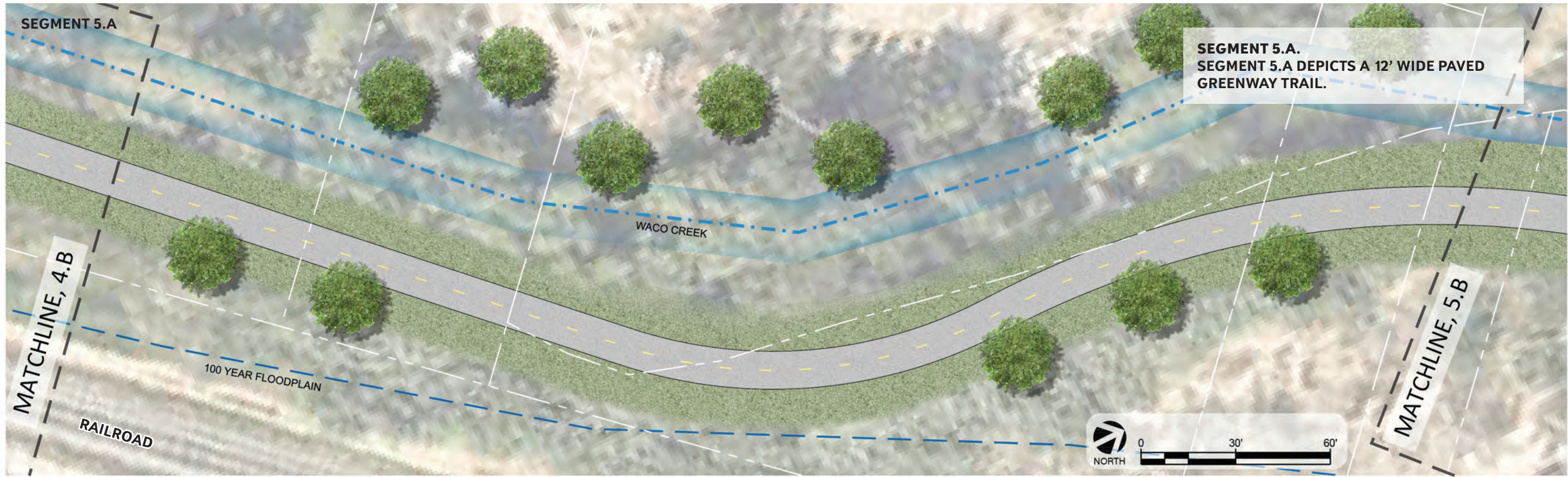


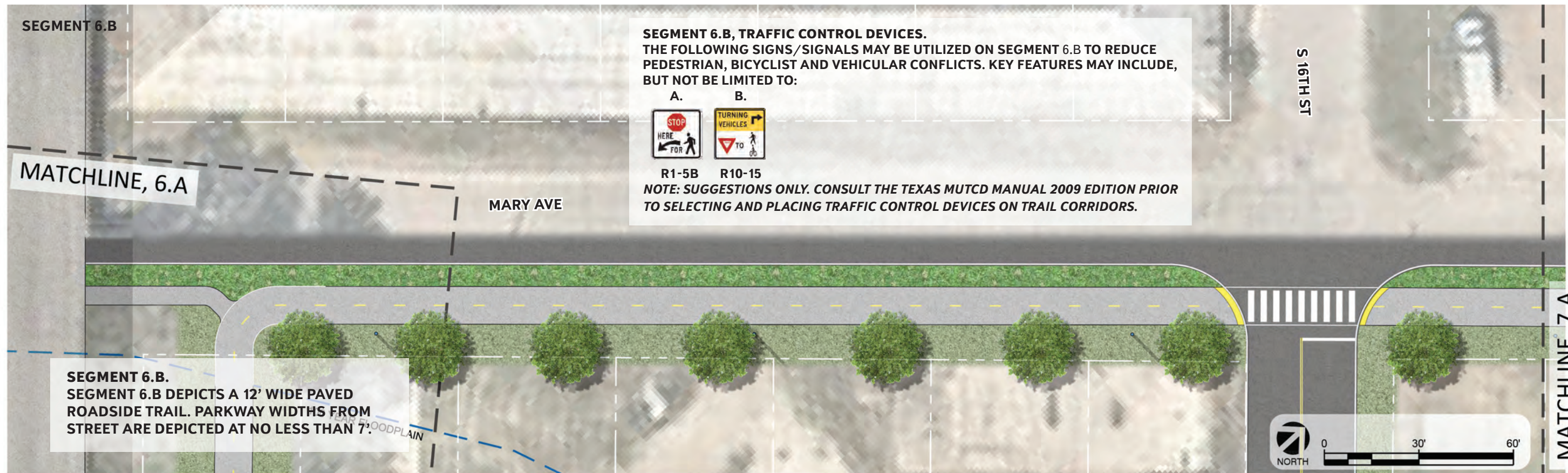












MATCHLINE, 6.B

SEGMENT 7.A

MARY AVE

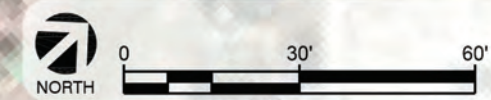
**SEGMENT 7.A, TRAFFIC CONTROL DEVICES.**  
THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 7.A TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:



R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 7.A.**  
SEGMENT 7.A DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



MATCHLINE, 7.B

MATCHLINE, 7.A

SEGMENT 7.B

S 14TH ST

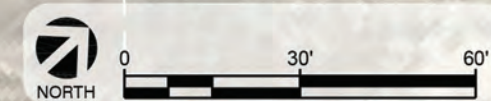
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THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 7.B TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:



R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 7.B.**  
SEGMENT 7.B DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



MATCHLINE, 8.A

MATCHLINE, 7.B

SEGMENT 8.A

S 13TH ST

MARY AVE

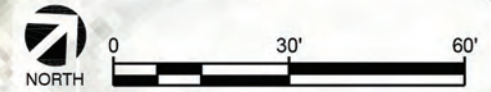
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R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 8.A.**  
SEGMENT 8.A DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



MATCHLINE, 8.B

SEGMENT 8.B

S 12TH ST

MARY AVE

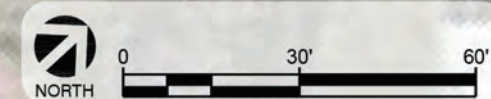
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R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 8.B.**  
SEGMENT 8.B DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



MATCHLINE, 8.A

MATCHLINE, 9.A

MATCHLINE, 8.B

SEGMENT 9.A

S 11TH ST

MARY AVE

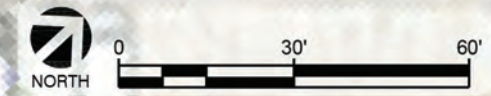
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R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 9.A.**  
SEGMENT 9.A DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



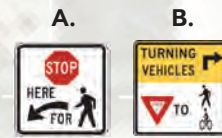
MATCHLINE, 9.B

MATCHLINE, 9.A

SEGMENT 9.B

MARY AVE

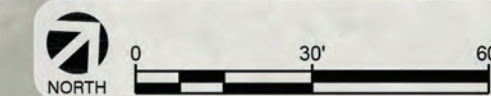
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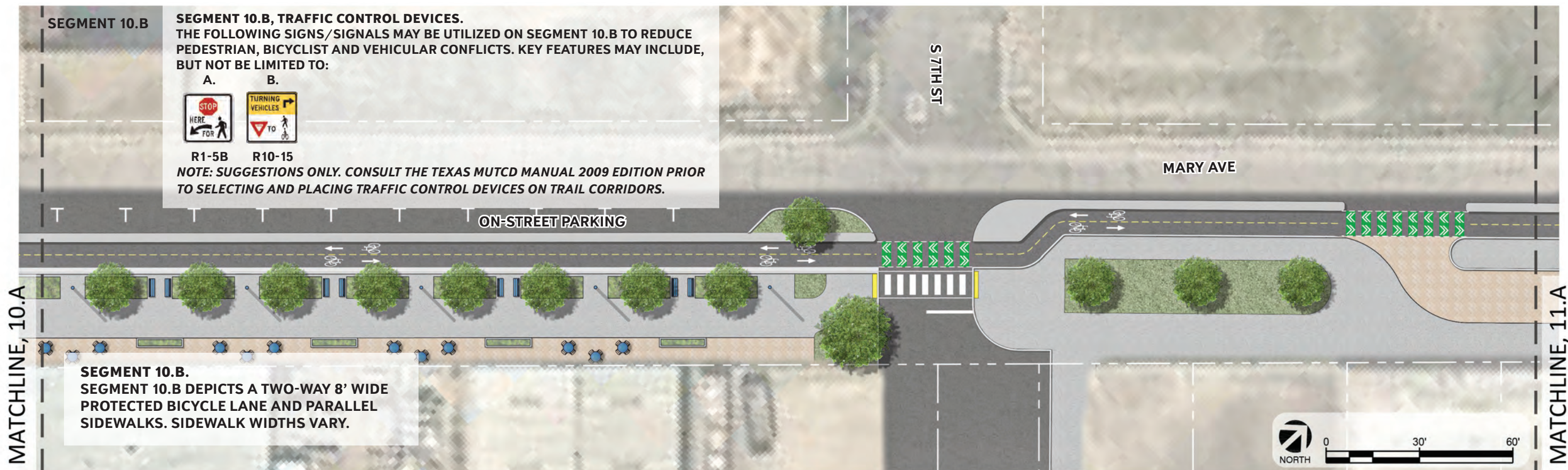
R1-5B R10-15

**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**

**SEGMENT 9.B.**  
SEGMENT 9.B DEPICTS A 12' WIDE PAVED ROADSIDE TRAIL. PARKWAY WIDTHS FROM STREET ARE DEPICTED AT NO LESS THAN 7'.



MATCHLINE, 10.A





MATCHLINE, 10.B

SEGMENT 11.A

S 6TH ST

MARY AVE

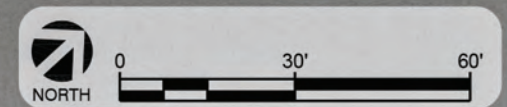
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A.  B. 

R1-5B R10-15

*NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.*

**SEGMENT 11.A.**  
 SEGMENT 11.A DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.



MATCHLINE, 11.B



MATCHLINE, 11.A

SEGMENT 11.B

S 5TH ST

ON-STREET PARKING

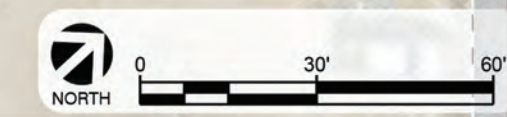
**SEGMENT 11.B, TRAFFIC CONTROL DEVICES.**  
 THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 11.B TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:

A.  B. 

R1-5B R10-15

*NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.*

**SEGMENT 11.B.**  
 SEGMENT 11.B DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.



MATCHLINE, 12.A

MATCHLINE, 11.B

SEGMENT 12.A

S 4TH ST

MARY AVE

ON-STREET PARKING

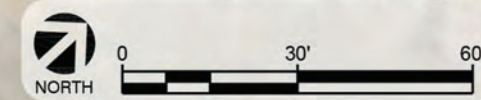
SEGMENT 12.A, TRAFFIC CONTROL DEVICES. THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 12.A TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:



R1-5B R10-15

NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.

SEGMENT 12.A. SEGMENT 12.A DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.



S 3RD ST

MATCHLINE, 12.B

SEGMENT 12.B

SEGMENT 12.B, TRAFFIC CONTROL DEVICES. THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 12.B TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:



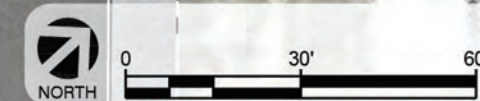
R1-5B R10-15

NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.

MARY AVE

ON-STREET PARKING

SEGMENT 12.B. SEGMENT 12.B DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.



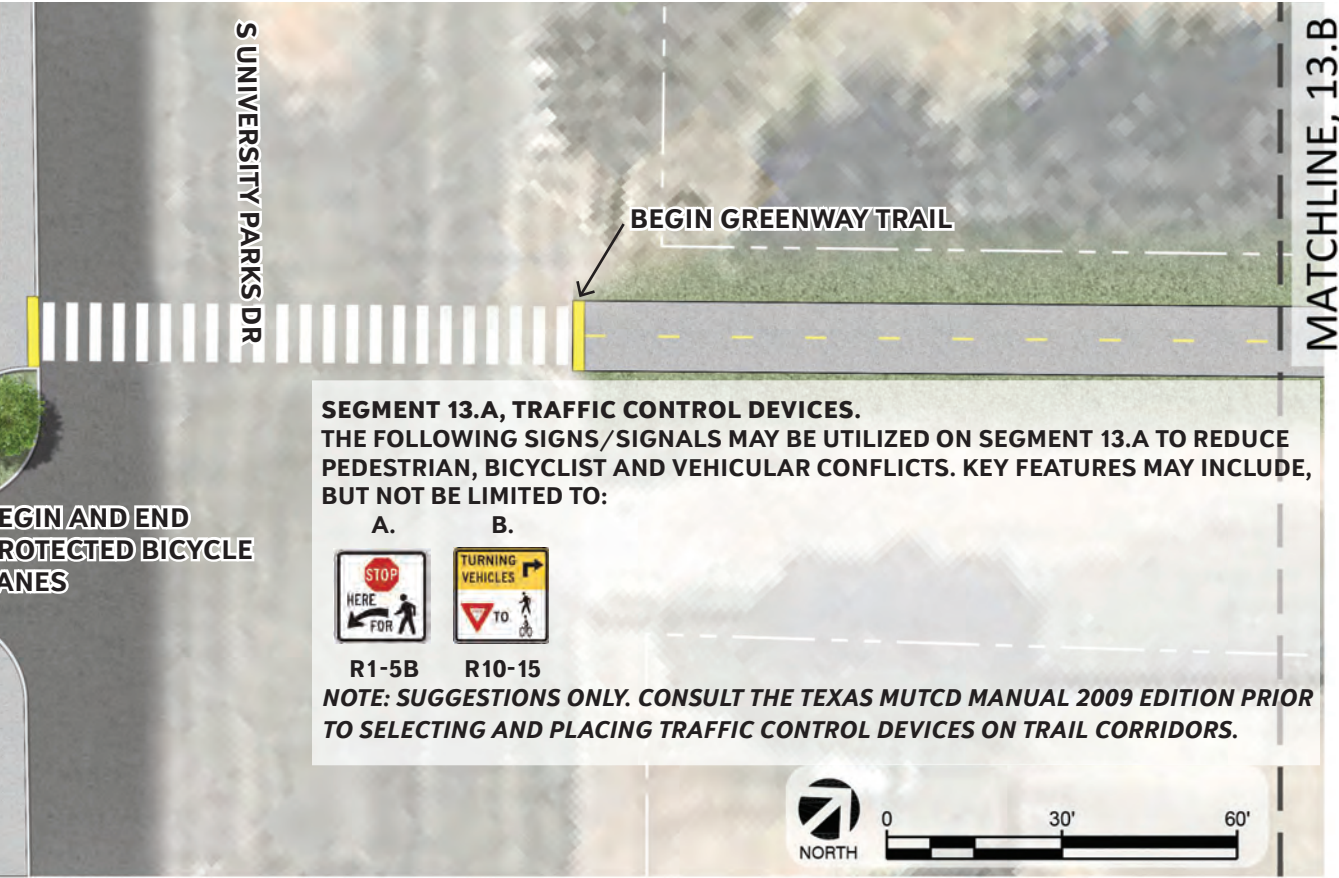
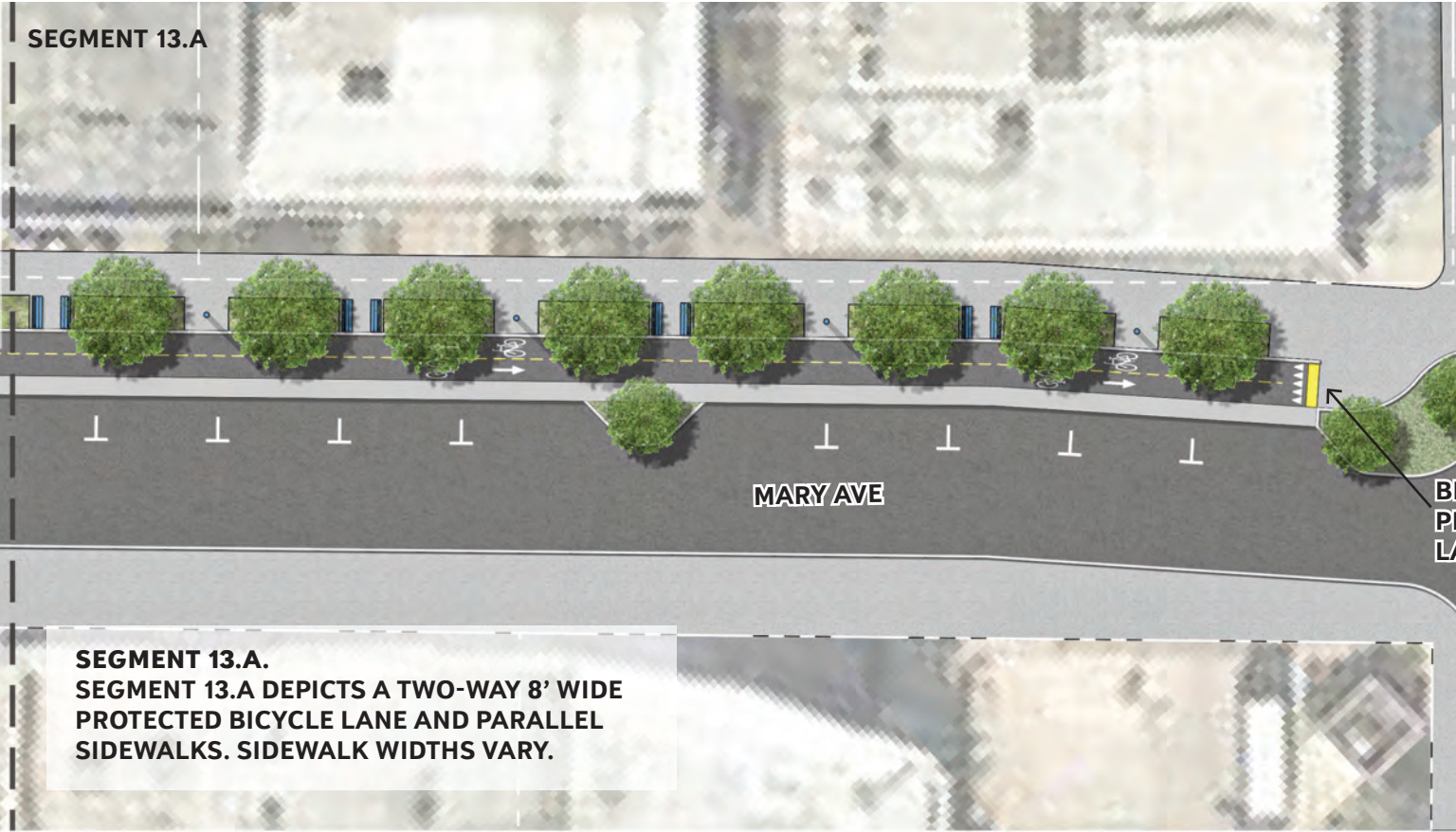
S 2ND ST

MATCHLINE, 12.A

MATCHLINE, 13.A



MATCHLINE, 12.B

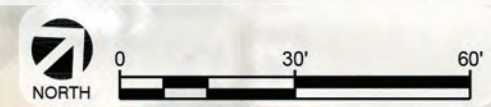


**SEGMENT 13.A.**  
 SEGMENT 13.A DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.

**SEGMENT 13.A, TRAFFIC CONTROL DEVICES.**  
 THE FOLLOWING SIGNS/SIGNALS MAY BE UTILIZED ON SEGMENT 13.A TO REDUCE PEDESTRIAN, BICYCLIST AND VEHICULAR CONFLICTS. KEY FEATURES MAY INCLUDE, BUT NOT BE LIMITED TO:

A.	B.
R1-5B	R10-15

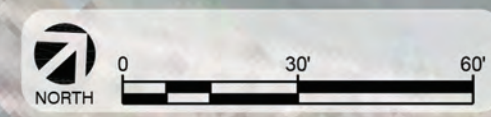
**NOTE: SUGGESTIONS ONLY. CONSULT THE TEXAS MUTCD MANUAL 2009 EDITION PRIOR TO SELECTING AND PLACING TRAFFIC CONTROL DEVICES ON TRAIL CORRIDORS.**



MATCHLINE, 13.A



**SEGMENT 13.B.**  
 SEGMENT 13.B DEPICTS A TWO-WAY 8' WIDE PROTECTED BICYCLE LANE AND PARALLEL SIDEWALKS. SIDEWALK WIDTHS VARY.





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