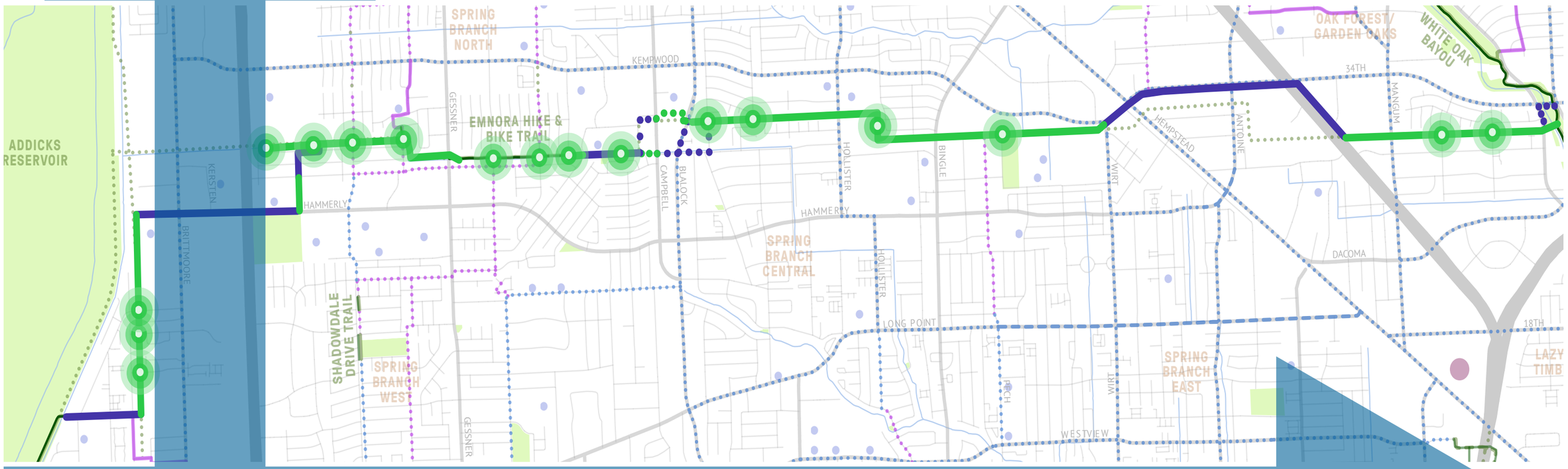
SPRING BRANCH TRAIL STUDY

A Local Active Transportation Plan



January 2020

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SPRING BRANCH TRAIL STUDY
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EXECUTIVE SUMMARY

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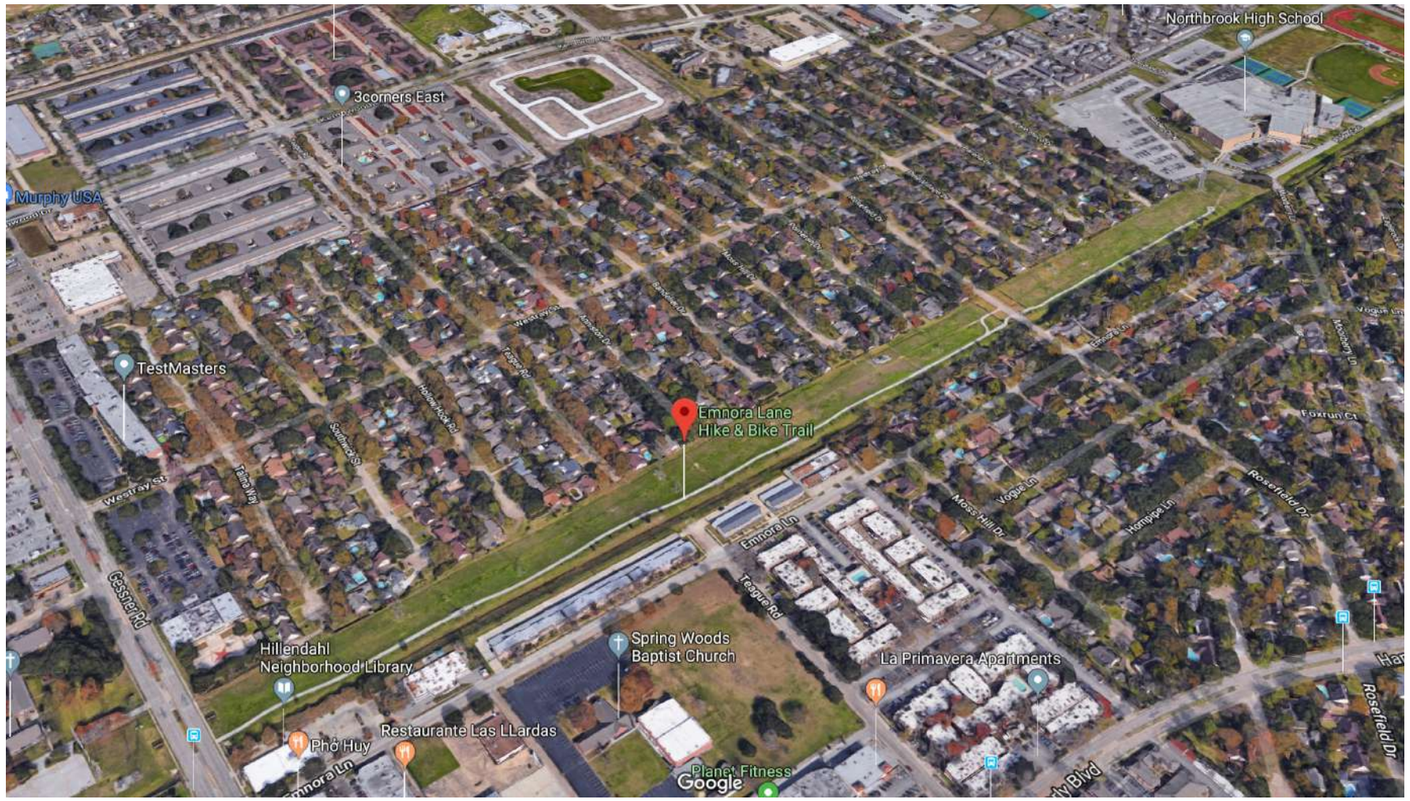

EXISTING EMNORA HIKE & BIKE TRAIL CONNECTING GESSNER ROAD
ON THE WEST TO NORTHBROOK HIGH SCHOOL ON THE EAST

THE SPRING BRANCH TRAIL

INTRODUCTION

The Spring Branch Trail is an 11-mile regional trail corridor that will someday connect Addicks Reservoir to White Oak Bayou Greenway, filling an essential gap in a network of high-comfort trails that extend from the Energy Corridor to Downtown Houston. The trail will serve as the backbone of a new network in the Spring Branch vicinity, a very diverse area of Houston that lacks trails and safe, continuous places for people to walk and bike. This is an exciting opportunity for Spring Branch residents and businesses, and is possible through thoughtful planning, analysis, and coordination amongst the Spring Branch Management District and other local entities.

The concept of the Spring Branch Trail was identified and refined through multiple planning efforts including the *Spring Branch Management District's Comprehensive Plan* (2015), the *Houston Bike Plan* (2017), *The Houston Parks Board's Beyond the Bayous Report* (2017), and *Reimagine Long Point Livable Centers Study* (2018). The regional trail would be located mostly within a CenterPoint utility easement and is feasible through the City of Houston's Master License Agreement with CenterPoint (2013) allowing for recreational trails within such easements.

To explore the opportunities and challenges to pursue this regional trail, the Spring Branch Management District in partnership with the Houston Galveston Area Council's Local Active Transportation Plan Program (formerly the Special Districts Studies Program) established this Spring Branch Trail Study effort to take the trail concept to the next step towards implementation. The Spring Branch area is a location where there are significant opportunities to replace vehicle trips with walking and biking trips, supporting the Local Active Transportation Plan Program goals.

In the Spring Branch area, 20,200 people live within 0.5 mile of an existing trail today*. Once implemented, the proposed regional Spring Branch Trail will more than double that to 44,800 people living within 0.5 mile of a trail. Not only would the proposed 0.5 mile trail provide access to 24,600 more people, it will also provide safe routes to over 12 schools in the Spring Branch area supporting more students walking and biking.

ABOUT THIS STUDY

The Spring Branch Trail Study is a community-driven planning process that explores viable connections through the heart of the Spring Branch community. As noted in the Study Vision to the right, this project seeks to improve the health, connectivity, and quality of life of the area. This study addresses barriers, community needs, and opportunities to connect local and regional destinations via safe, high-comfort bikeways and trails that serve people of all ages and abilities.

The planning process involved detailed analysis and identification of a proposed trail alignment presented in the form of a "Corridor Plan" showing a recommended approach to interconnected off-street trails and on-street bikeways and sidepaths. Ideally, the entire corridor would be built within CenterPoint utility easements and could be straightforward to design and implement. However, the CenterPoint easement intersects major barriers such as tollways and highways, making the continuous connection via the easement infeasible due to conflicts and cost. Considering the barriers present, trail connections between CenterPoint easements via on-street bikeways are recommended to provide safe, high-comfort connections. The Corridor Plan shows the trail divided into seven segments. This allows the Spring Branch Management District and partners to implement the regional trail in logical, meaningful segments over time.

The Spring Branch Trail Study report presents an overview of the planning process including engagement efforts; identification of needs, barriers, and opportunities; a toolbox presenting an all ages and abilities trail and bikeway recommendations for the Spring Branch Trail; a Corridor Plan outlining the detailed alignment of seven segments of the 11-mile trail corridor; and an easy-to-use Implementation Workbook outlining steps to coordinate phased implementation of each trail segment. The workbook will serve as a road map for Spring Branch Management District and partners to bring the vision to reality.

SPRING BRANCH TRAIL VISION STATEMENT

The Spring Branch Trail will:

- Improve the health, connectivity, and quality of life of area residents with safe, comfortable, and accessible walking and biking trails.
- Provide a nearly eleven-mile central link connecting Spring Branch neighborhoods to schools, parks, and other major destinations.
- Extend Beyond the Bayous to connect into the regional network of Bayou Greenway trails at the White Oak Bayou Greenway and the Addicks Reservoir.

FIGURE 1.1 STUDENTS NEAR NORTHBROOK HIGH SCHOOL ACCESSING THE EXISTING EMNORA HIKE & BIKE TRAIL

**NOTE: The existing high-comfort facilities included in the 0.5 mile analysis are illustrated in Figure 1.4 and includes the Emnora Hike & Bike Trail between Gessner Road and Northbrook High School, Shadowdale Drive between Metronome Drive and Timberoak Drive, the Addicks Reservoir trail between Chatterton Drive and Reddleshire Lane, the White Oak Bayou Greenway between IH 610 and West 43rd Street, and the West 12th Street sidepath across IH 610 under construction by TxDOT.*

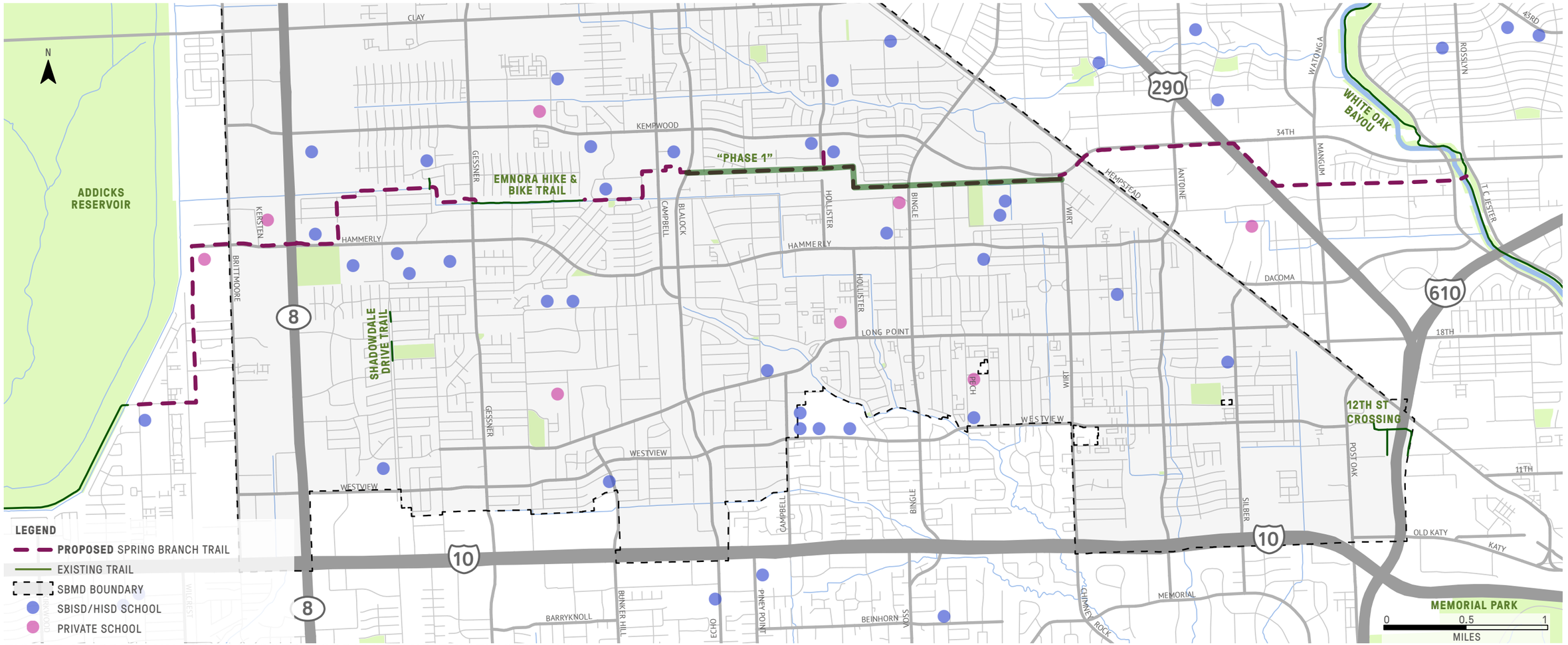

FIGURE 1.2 PRELIMINARY PROPOSED CORRIDOR AND EXISTING TRAILS

SPRING BRANCH TODAY

In an area of Houston that is deficient in trails and safe places to walk and bike, the Spring Branch Management District strives to provide quality of life initiatives such as the Spring Branch Trail Study. This Study defines an approach for implementing a highly-desired local and regional amenity to Spring Branch. Today, there are only three short, off-street shared-use trails within the Spring Branch Management District: the Emnora Hike and Bike Trail, the Shadowdale Trail, and a short connection under IH 610 at 12th Street. Each of these is under one mile long and disconnected from the others. The 0.7-mile Emnora Hike and Bike Trail is the only existing trail located within the east-west CenterPoint easement (this segment is technically owned and maintained by Harris County Precinct 4). A connection to the east or west of that existing trail would support continuation of the larger Spring Branch Trail.

In *Reimagine Long Point Livable Centers Study* (2018) the public strongly supported development of a trail within the CenterPoint corridor. As a result, a "Phase 1" of the Spring Branch Trail was identified between Blalock Road and Wirt Road (see **Figure 1.2**) for initial implementation. Phase 1 is a two-mile section of the overall trail completely within the CenterPoint easement just east, but not directly connected to, the Emnora Hike and Bike Trail. The Houston Parks Board is leading the design and construction in partnership with the Spring Branch Management District with expected construction to begin in early 2020.

The missing link between the Emnora Hike and Bike Trail and the Phase 1 trail is highlighted in this report with implementation considerations focused on making that connection. The appetite in Spring Branch is strong for the fully connected trail to serve all users, and this study provides further analysis and details to take the next steps towards implementation.

COMMUNITY-DRIVEN SUPPORT

Engaging the Spring Branch community and local stakeholders was an important driving force behind the progress and success of this effort. To better understand the opportunities for safe walking and biking locations and the challenges to make the Spring Branch Trail connections possible, the study sought input from the people who live and/or work in the surrounding community.

The overall engagement process included coordination with a steering committee; Spring Branch Management District (SBMD) Comprehensive Plan Committee (a committee of the Board of Directors); two public meetings; one interactive publicly available map website; and coordination meetings with the Spring Branch Independent School District (SBISD), the City of Houston, the Houston Parks Board, METRO and TxDOT.

The Steering Committee was comprised of four local Spring Branch Super Neighborhood representatives, SBMD, Houston Parks Board, City of Houston Planning and Development, City of Houston Parks and Recreation, City of Houston Public Works and Engineering, Texas Department of Transportation (TxDOT), METRO, Harris County Precinct 4, Houston-Galveston Area Council (H-GAC), Spring Branch Independent School District (SBISD), BikeHouston, and LINK Houston. The Steering Committee acted as a working group for this effort, meeting at five separate meetings during key points throughout the process, working together to collaborate and support the recommendations of this effort.

A Spring Branch Trail specific website through Map.Social was available and allowed the public to provide map-related features with comments. They shared existing walking and biking needs, barriers, and opportunities in Spring Branch. This online activity mimicked a similar in-person activity at the first public meeting.

The two public meeting attracted over 150 attendees total (not including SBMD or consultant team staff). Both meetings were opportunities to gather input as well as share information about the project, progress, and action forward to pursue implementation of the Spring Branch Trail. A three-week public comment period allowed for final comments on the Draft Report before finalizing.





FIGURE 1.3 PUBLIC ENGAGEMENT AND STEERING COMMITTEE MEETINGS

COMMUNITY ENGAGEMENT SUMMARY

- 5 Steering Committee meetings
- 2 Public Meetings with over 150 attendees
- 220 publicly-sourced map features through Map.Social interactions

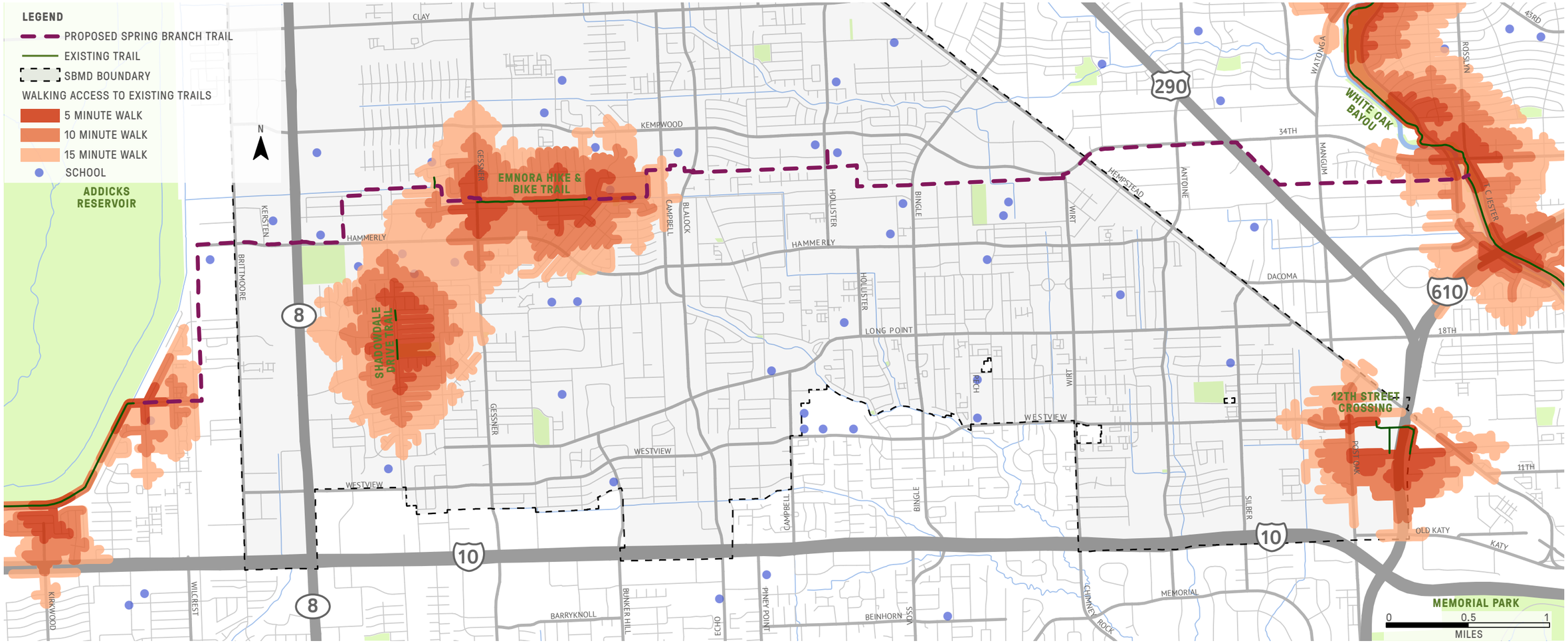

FIGURE 1.4 WALKING ACCESS TO EXISTING TRAILS

EXISTING OPPORTUNITIES

The existing off-street trail access in Spring Branch is limited to the Emnora Hike and Bike Trail and the Shadowdale Drive Trail, with some access to the trails at the Addicks Reservoir, the White Oak Bayou Greenway, and a small trail connection under the IH 610 Loop at 12th Street (**Figure 1.4**). The opportunities to provide increased local and regional trail access through the proposed Spring Branch Trail are great, but some significant barriers provide challenges to making a completely seamless off-street trail network.

NEEDS AND BARRIERS

The CenterPoint easement cuts across the center of Spring Branch and has two locations where the power lines span major highways: one at Beltway 8 and one at US 290. The easement is an ideal trail alignment for the majority of the distance between the Addicks Reservoir and the White Oak Bayou Greenway. However, where the power lines cross the highways and the Union Pacific Railroad parallel to Hempstead Road, an alternative is required. In these locations, creative, comfortable and safe on-street and off-street connections for people walking and biking are proposed.

Between Northbrook High School and the Phase 1 trail segment starting at Blalock Road, the CenterPoint easement continues but intersects with a substation that serves as critical infrastructure for CenterPoint operations. At the substation, an alternate route is required as there is not enough physical space for a trail due to facility access needs within that location. Navigating around the substation presents one of the largest challenges or barriers in making a fully connected regional trail.

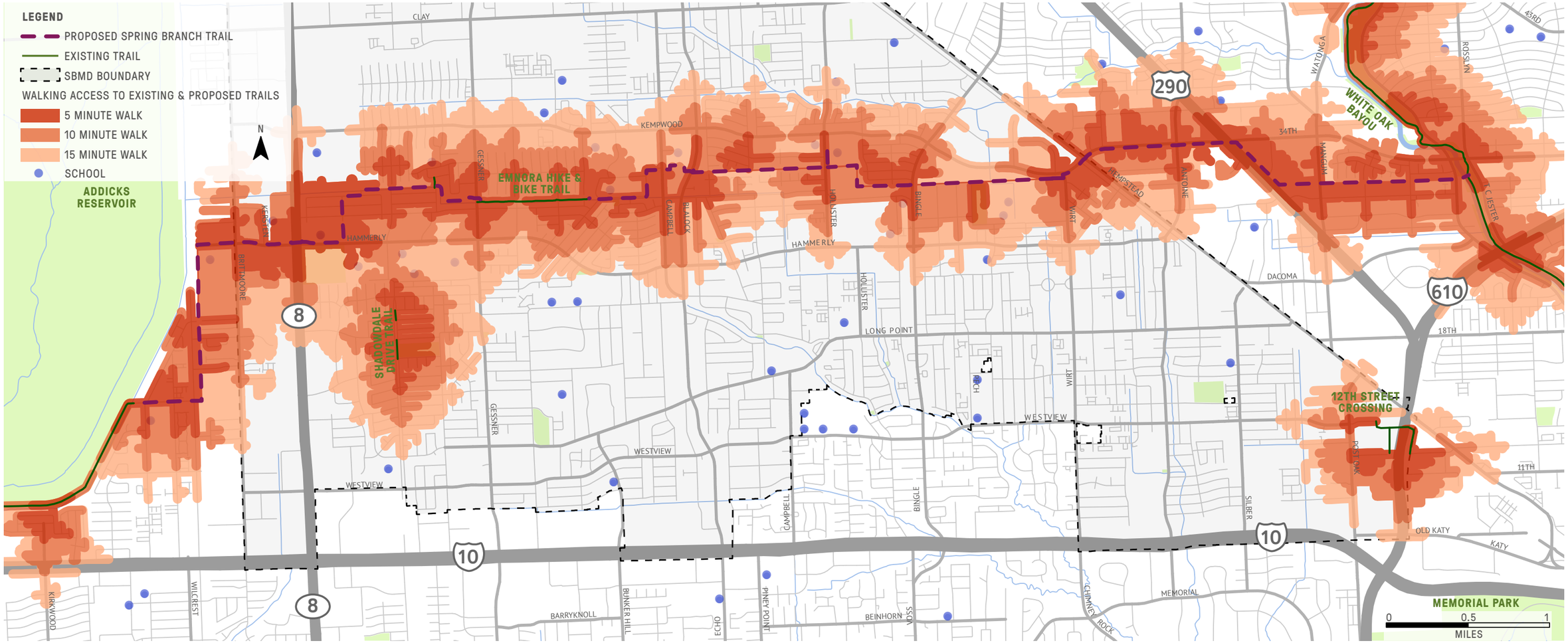

FIGURE 1.5 WALKING ACCESS TO EXISTING & PROPOSED TRAILS

OPPORTUNITIES

Providing the missing trail link between the Emnora Hike and Bike Trail and the Phase 1 Spring Branch Trail is very important in supporting the regional trail corridor. Not only will that segment link two trails to make one larger one, it will also provide direct access to Northbrook High School with connections to Buffalo Creek Elementary School, Edgewood Elementary School, and Landrum Middle School with multiple neighborhood access points.

Approximately 31% of the student population at Northbrook High School currently walk to school and 1% bikes (2019). This high walking percentage is due in part to students' limited access to cars, but also in part to the Emnora Hike and Bike Trail leading directly to the school from the surrounding neighborhoods.

There are at least 12 schools to which the trail would provide direct, or nearly direct access. There are many additional local schools beyond those 12 that could benefit from access to this regional trail project with increased local opportunities to safely walk and bike in general. With additional bikeway and trails improvements supporting the Spring Branch Trail spine along local streets, access could be further enhanced for people walking and biking to and from destinations.

SBISD provided commuting data for 15 schools near the Trail corridor. Northbrook High School has the highest percentages of students walking compared to the other high school and two middle schools. For elementary schools, Westwood Elementary has 46% of its population walking to/from school and Cedar Brook Elementary has 36%. Those high percentages may imply that they are located in more walkable neighborhoods with sidewalk access compared to the other elementary schools that have low walking participation.

In addition to the potential to provide safe, healthy options to reach local schools, there are also opportunities to connect people to local destinations such as parks, retail, restaurants, libraries, community centers, and transit corridors. The map in **Figure 1.5** illustrates the potential walkable access into the neighborhoods all along the corridor once the trail is built. The Spring Branch Trail will be a major community asset allowing people to have more choices about how to travel to desired destinations, and will add tremendous recreational value to the local residents and beyond.

SPRING BRANCH TRAIL TOOLBOX

BICYCLE FACILITY

TRAIL CROSSING

INTERSECTION TREATMENT

TRAFFIC/SPEED CALMING TREATMENT

WAYFINDING

PROGRAMMATIC ELEMENT

TRANSIT ACCESS COMPONENT

OFF-STREET TRAILS

FIGURE 1.6 OFF-STREET TRAIL, HOUSTON, TX

NEIGHBORHOOD BIKEWAYS

FIGURE 1.7 SHARROWS, PORTLAND, OR

ON-STREET DEDICATED BIKEWAYS

FIGURE 1.8 PROTECTED BIKEWAY, SAN FRANCISCO, CA

The colors support the type of facility and are based on the nomenclature presented in the Houston Bike Plan. The symbols are color coordinated to the facility type for each consideration.

AN ALL AGES AND ABILITIES SPINE FOR SPRING BRANCH

The proposed Spring Branch Trail corridor will link together safe, comfortable, and equitable off-street trails and on-street bikeways, navigating around barriers and providing access to destinations. The Corridor Plan is the recommended alignment for the trail which has been divided into seven segments (see **Figure 1.9**) for phased implementation. Supporting the Corridor Plan recommendations, a Spring Branch Trail "Toolbox" provides sample graphics and examples that illustrate the concepts recommended as a part of this project, supporting an "All Ages and Abilities" trail spine for Spring Branch.

"All Ages and Abilities" is a criteria set forth in the National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and is a national and international best practice guide that considers the urban context and provides recommendations that are safe, comfortable, and equitable for all users. The goal is to select and design a facility that is safe for everyone including women, children, seniors, and minority and low-income individuals — all of whom make up the most vulnerable and under-represented groups of bicyclists.

The Spring Branch Trail Toolbox photos and descriptions serve as a visual glossary of terminology supporting the criteria and considerations outlined in the design guide. The visuals and supporting text help provide context for making decisions on bikeway facility type for trail connections, including considerations for traffic volume and speed management to maximize safety of all users.

Each of the seven trail segments have unique design and safety challenges that can be addressed through Toolbox illustrations and explanations. The Toolbox is not an exhaustive list of all types of walking and biking facilities available, but was specifically curated to illustrate real-world best practice examples of preferred recommendations supporting the Spring Branch Trail.

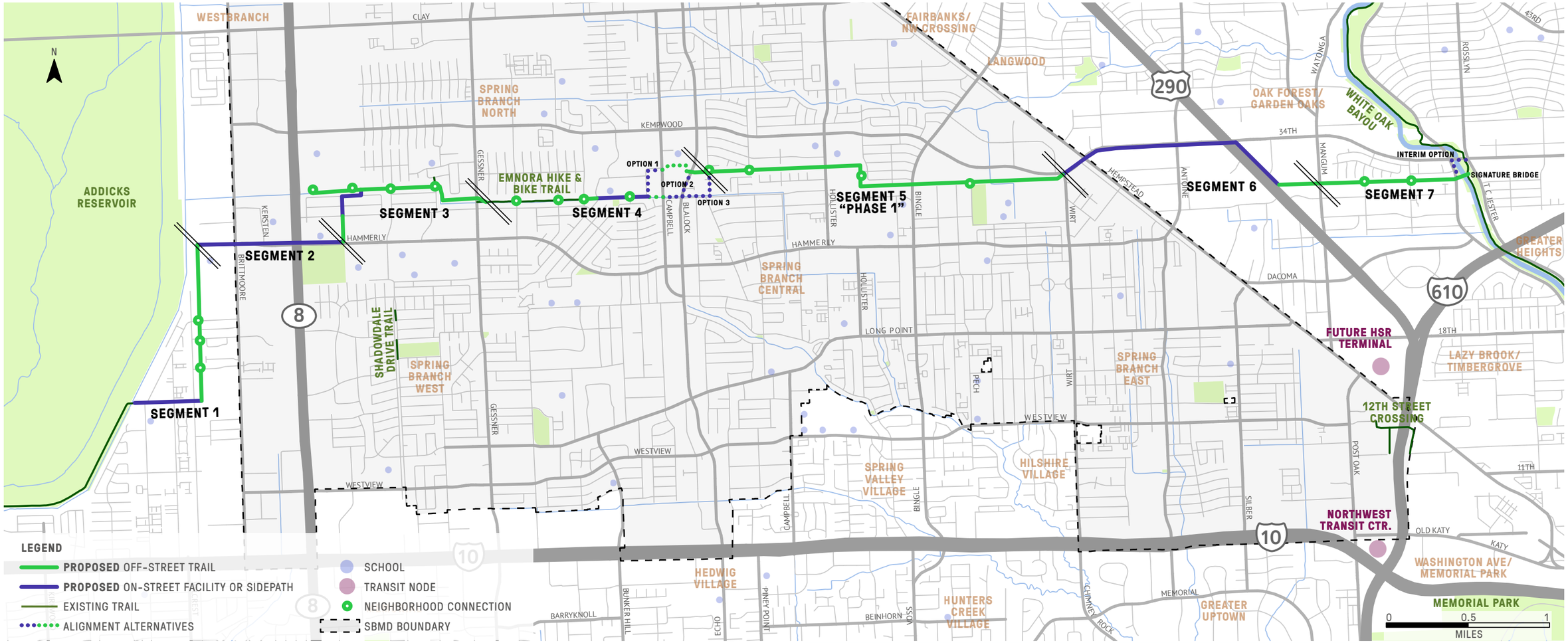

FIGURE 1.9 CORRIDOR PLAN

CORRIDOR PLAN DEVELOPMENT

The Corridor Plan presents the full 11-mile Spring Branch Trail recommendations in seven segments for phased implementation. The segments were created through the determination of logical break points that divide the regional trail corridor into segments that should function independently as useful trails.

The Corridor Plan explains the logic and planning behind each unique segment-specific recommendations and addresses safety, design, and coordination necessary for segment implementation.

Each Corridor Plan segment presents the following:

- **Alignment overview**
  - Including a breakdown of segments within the segment
- **Alternatives considered**
- **Points of interest**
- **Trail access points**
- **Mid-block crossings**
- **Toolbox references**

SEGMENT	LIMITS (START/END)	FACILITY TYPE	LENGTH
Segment 1	Addicks Reservoir at Chatterton to West Hammerly Boulevard	Neighborhood Bikeway/ Off-Street Trail	1.4 Miles
Segment 2	West Hammerly to East of the Guthrie Center	Neighborhood Bikeway/Side Path	1.0 Miles
Segment 3	East of the Guthrie Center to Gessner Road	Neighborhood Bikeway/ Off-Street Trail	1.5 Miles
Segment 4	Gessner Road to Blalock Trail Connection	Off-Street Trail	1.7 Miles
Segment 5 Est. Construction: 2020	Blalock Road to Wirt Road	Off-Street Trail	2.4 Miles
Segment 6	Wirt Road to Mangum Road	Sidepath/On-street Bikeway/Off-street Trail	1.75 Miles
Segment 7	Mangum Road to White Oak Bayou	Off-street Trail	1.0 Mile

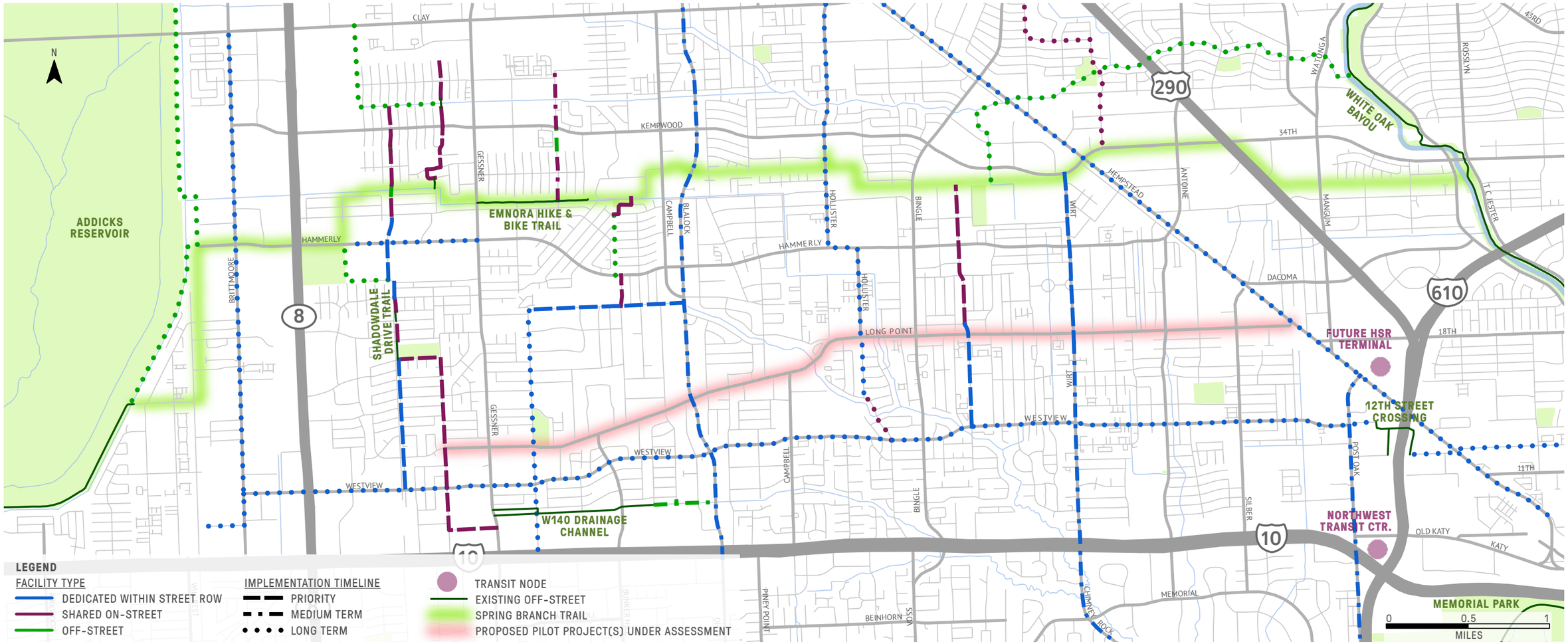

FIGURE 1.10 REGIONAL BIKEWAY CONNECTIONS

REGIONAL BIKEWAY CONNECTIONS

The proposed Spring Branch Trail is a mostly east-west corridor with numerous neighborhood access points. The *Houston Bike Plan* (2017) presents a network of proposed bikeways in the Spring Branch area that could provide the access points from the Spring Branch Trail regional spine to destinations throughout Spring Branch and beyond.

A regional bikeway connections analysis was conducted supporting the schematic design of the Spring Branch Trail. The analysis was based on the lines proposed in the *Houston Bike Plan* along with recommendations from previous SBMD studies including the *Spring Branch Comprehensive Plan* and *Reimagine Long Point*. The area corridors identified in the *Houston Bike Plan* were refined and presented here with updated timelines for near-term coordination with the City of Houston and other stakeholders supporting access to and from the Spring Branch Trail.

The priority bikeways include Wirt Road, Pech Road, Neuens Road, Shadowdale Drive, Conrad Sauer, Triway Lane and Durban Drive. Although they may need additional coordination and time, the medium-term corridors will be important to begin considering as many of those connections would provide access to and from the proposed High Speed Rail Terminal and the existing Northwest Transit Center. This supports the development of a full network of multi-modal connections.

With the establishment of the Spring Branch Trail, there is an exciting opportunity for SBMD, the City, and other organizations to expand on the new east-west regional spine to ensure communities north and south of the trail have access to and from the trail. This effort will be central to the continuing build-out of an All Ages and Abilities bicycle network for Spring Branch.

IMPLEMENTATION WORKBOOK

The Implementation Workbook, the final section in this study, takes the Corridor Plan with Toolbox recommendations for each trail segment and provides a segment-by-segment overview that is succinct yet detailed enough to facilitate decision-making and actions to implement.

The workbook for the Spring Branch Management District and partners acts as a planning and budgeting tool as well as a grant-writing and funds-seeking tool. The entire 11-mile trail corridor is illustrated segment-by-segment by a rendering of the schematic alignment with proposed on-street and off-street trail connections. The renderings (examples in **Figures 1.11 through 1.14**) provide visual insight as to what the trail could look like once implemented, and should be referenced for a general understanding of each detailed segment including unique on-street design, intersection design, as well as landscaping and trailhead considerations.

Table 1.1 presents a brief snapshot of each trail segment as it is provided in the Implementation Workbook. In the Workbook, each trail segment has an individual section write-up, visuals, and maps that provide details including length, description, key features, destinations served, potential partners, timing, funding considerations, opinions of probable cost, trailhead considerations, maintenance costs, and tasks to implement. Cross-sections of the existing and proposed facility type are also included to illustrate what the proposed trail could look like, specifically providing insight to how any on-street bikeways would look within the public right-of-way.

The intention of the workbook is to provide concise information and tools that may assist the Spring Branch Management District (and other implementing entities) with budgeting, planning, and more streamlined implementation of each corridor segment. It is important to note that all of the segments will need coordination across multiple agencies.

SEGMENT - LOCATION	PRIORITY TIER	FACILITY TYPE	LENGTH	POTENTIAL TRAILHEAD LOCATIONS	COST ESTIMATE (CONSTRUCTION ONLY)	KEY DESTINATIONS
Segment 1 Addicks Reservoir at Chatterton to West Hammerly Boulevard	2	Neighborhood Bikeway/Off-Street Trail	1.4 Miles	8	$ 1,416,340	» Addicks Reservoir (and trails) » Sherwood Elementary School » The Parish School and the Carruth Center » Spring Branch West Super Neighborhood (10)
Segment 2 West Hammerly to East of the Guthrie Center	2	Neighborhood Bikeway/Side Path	1.0 Miles	1	$2,155,508	» The Parish School and the Carruth Center » The Westview School » Agnes Moffitt Park » The Guthrie Center (SBISD) » Westwood Elementary School (SBISD)
Segment 3 East of the Guthrie Center to Gessner Road	1	Neighborhood Bikeway/Off-Street Trail	1.5 Miles	8	$1,944,012	» The Guthrie Center (SBISD) » Terrace Elementary School (SBISD) » Spring Woods High School (SBISD) » Baseball USA » Hillendahl Neighborhood Library
Segment 4 Gessner Road to Blalock Trail Connection	1	Off-Street Trail	1.7 Miles	9	*School Option:* $1,461,312 *Median Option:* $1,370,872 *Neighborhood Option:* $1,267,644	» Northbrook High School » Buffalo Creek Elementary School
Segment 5 Blalock Road to Wirt Road	Estimated Construction: 2020	Off-Street Trail	2.4 Miles	8	Segment under design with expected construction 2020	» Fiesta Grocery Store » Landrum Middle School » Schwartz Park » Edgewood Elementary School » Saint Jerome Catholic School » Buffalo Creek Elementary School
Segment 6 Wirt Road to Mangum Road	3	Sidepath/On-street Bikeway/Off-street Trail	1.75 Miles	1	$2,033,268	» Fiesta Grocery Store » Shopping and restaurants within the US 290 corridor
Segment 7 Mangum Road to White Oak Bayou	3	Off-street Trail	1.0 Mile	7	*Trail from Mangum Road to East TC Jester Boulevard:* $1,655,888 *Signature Pedestrian Bridge over White Oak Bayou:* $3,202,933	» Some commercial locations » White Oak Bayou Trail

TABLE 1.1 IMPLEMENTATION WORKBOOK SUMMARY BY SEGMENT

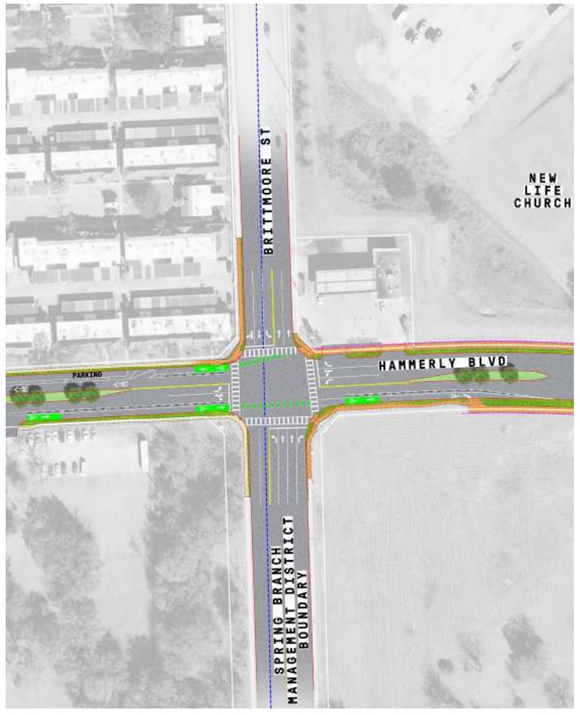

FIGURE 1.11 “SEGMENT 2” - NEIGHBORHOOD BIKEWAY TO BIKE LANE, TO SIDEPATH ACROSS HAMMERLY BLVD AND BRITTMOORE ST INTERSECTION

FIGURE 1.12 “SEGMENT 2” - SIDEPATH ALONG HAMMERLY BLVD UNDER BELTWAY 8/SAM HOUSTON PARKWAY

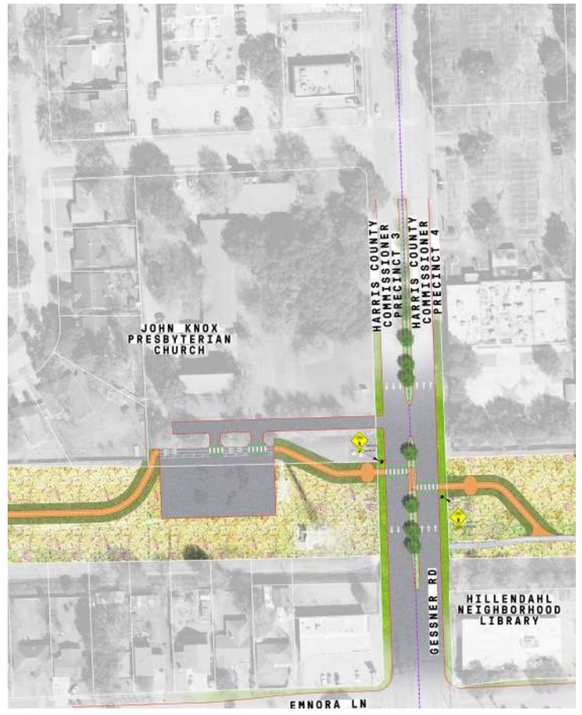

FIGURE 1.13 “SEGMENT 3” - OFF-STREET TRAIL ALONG CENTERPOINT EASEMENT WITH MID-BLOCK CROSSING AT GESSNER RD

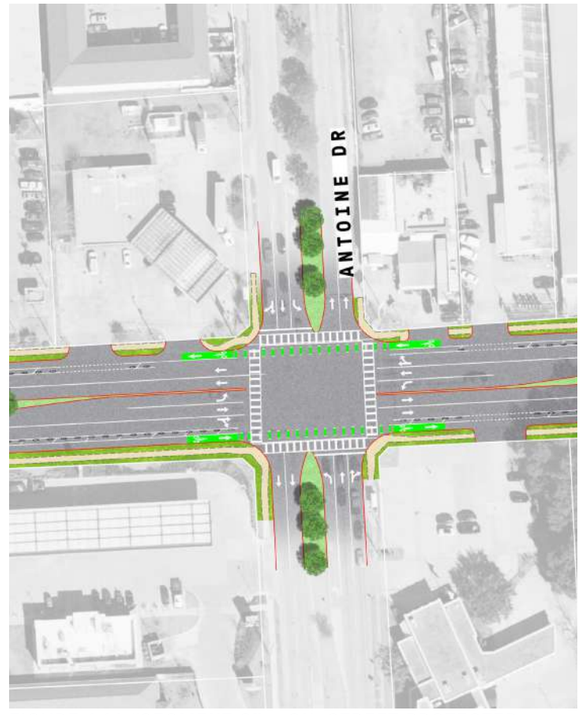

FIGURE 1.14 “SEGMENT 6” - ON-STREET PROTECTED BIKEWAY ALONG WEST 34TH ST AT ANTOINE DR INTERSECTION

PHASED IMPLEMENTATION

Through the Corridor Plan and the Implementation Workbook, each individual segment has trade-offs and challenges, and will require more detailed analysis leading into the design work. For example, Segment 4 is one of the most critical links supporting the larger regional spine because it connects the existing Emnora Hike and Bike Trail to the Phase 1 trail nearing construction. Segment 4, however, will require a concerted effort between the Spring Branch Management District, SBISD, City of Houston, and local businesses to further assess and decide the most feasible route connection out of the three options presented. Although that particular segment will require a significant level of effort and coordination, it is a Tier 1 segment supporting more near-term implementation in order to make that critical connection.

The other trail segments are presented as Tier 1, Tier 2, and Tier 3, all based on the complexity, the proposed connections, and the presence or absence of a “champion” (or lead agency) to implement. Tier 1 segments have the clearest path forward and could be implemented first, providing immediate connections to existing projects. Tiers 2 and 3 will have more complexity, but could build upon the momentum of existing segments and/or Tier 1 implementation, with the appropriate champion.

Segment 7 presents an exciting opportunity to connect to the White Oak Bayou Greenway trail through a “Signature Bridge” (**Figure 1.15**) at an intersection of two of Houston’s most critical and innovative urban plans: Houston Parks Board’s *Bayou Greenways 2020* and *Beyond the Bayous*. The Signature Bridge will not only provide a safe, connected access point, but it provides an opportunity to present a gateway between the White Oak Bayou Greenway trail system onto the Spring Branch Trail. Wayfinding, landscaping, and entry signs will tie the two trail systems together providing a gateway into the larger regional trail network.

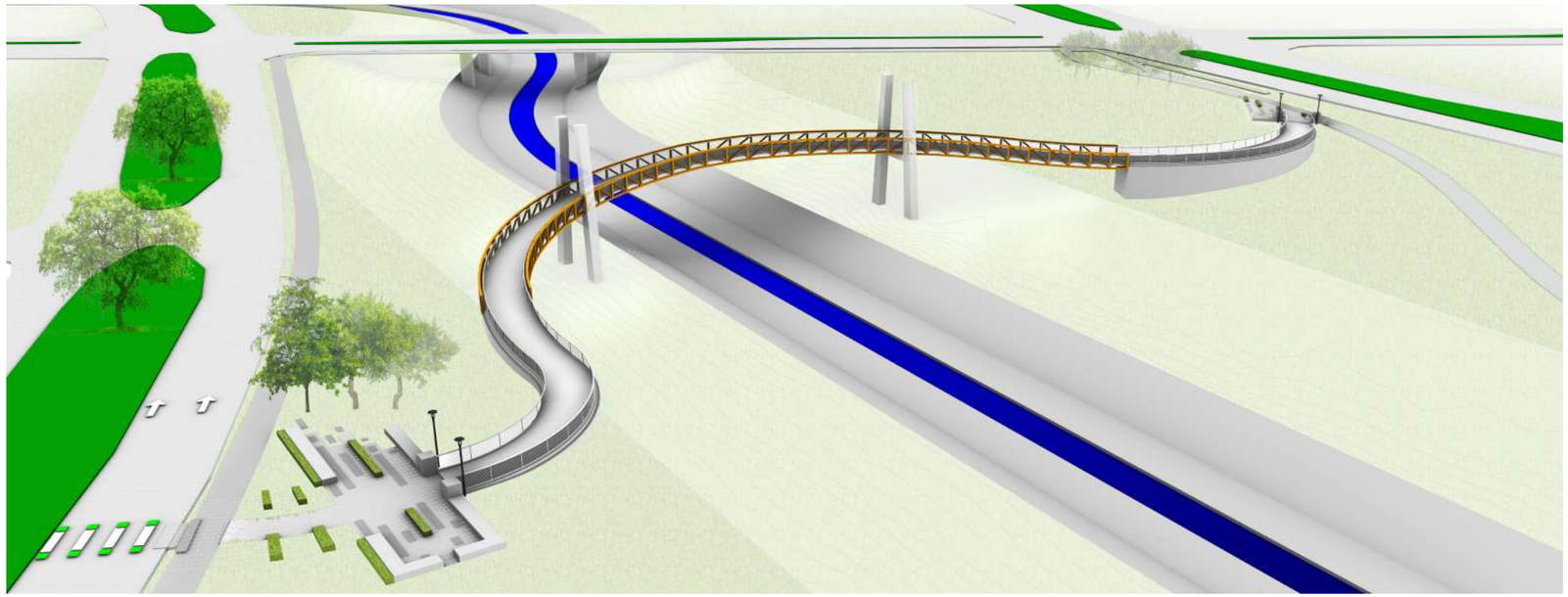

FIGURE 1.15 SIGNATURE BRIDGE ACROSS WHITE OAK BAYOU GREENWAY

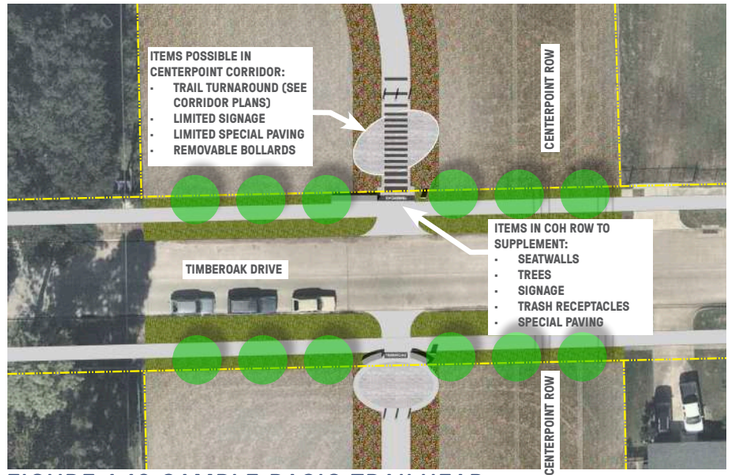

FIGURE 1.16 SAMPLE BASIC TRAILHEAD

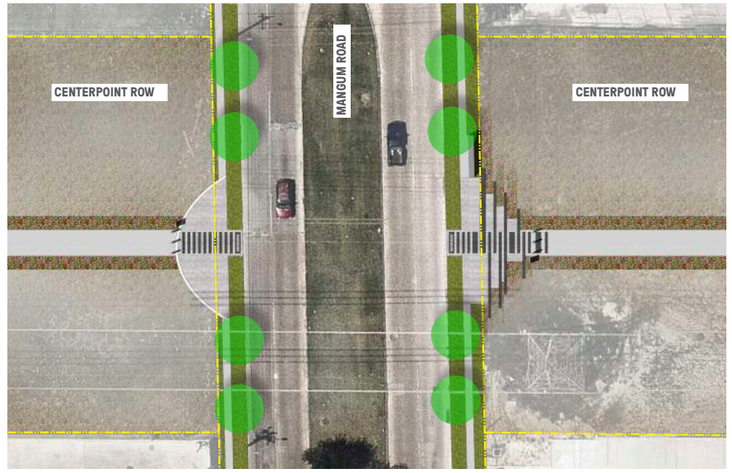

FIGURE 1.17 SAMPLE ENHANCED TRAILHEAD

TRAILHEADS AND WAYFINDING

Supporting the interconnected trail, the Spring Branch Management District has the opportunity to brand and provide wayfinding including possible trailhead locations that are identified throughout the Corridor Plan.

Trailheads serve multiple functions in the context of a trail network. They create transition points from roadways and neighborhoods onto the trail and therefore serve important roles as gateways, landmarks, and meeting points for trail users. At street crossings, trailheads can incorporate accessible ramps, signage, and signalization (if warranted). Trailhead signage should be provided that can serve any or all of the following functions: wayfinding, trail regulations, and mile markers. Other trailhead considerations may include benches, water fountains, shade (not permitted in CenterPoint right-of-way, but possible just outside of it), parking (would need adjacent parcel coordination), bike racks, waste receptacles, and lighting.

Trailheads can range from very basic to enhanced with many amenities (**Figures 1.16 and 1.17**), and could be coordinated with the local neighborhoods or businesses to provide a community-driven look and feel.

CONCLUSION

The Spring Branch Trail has vast potential as a much-desired, much-needed regional trail for Spring Branch and beyond. The trail will connect Spring Branch into the broader regional Bayou Greenways network and enhance the quality of life for Spring Branch residents and businesses. This will be achieved by designing for safe, healthy All Ages and Abilities trail use for both recreational and practical walking and biking trips in all of Spring Branch's many neighborhoods.

The Spring Branch Trail Study provides the road map to understanding the challenges, opportunities, and steps forward to implement this regional trail. The Implementation Workbook will be a critical piece of this Study that will assist SBMD and other implementing entities in taking steps to implement this over time.

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PROJECT INTRODUCTION & ENGAGEMENT OVERVIEW

2

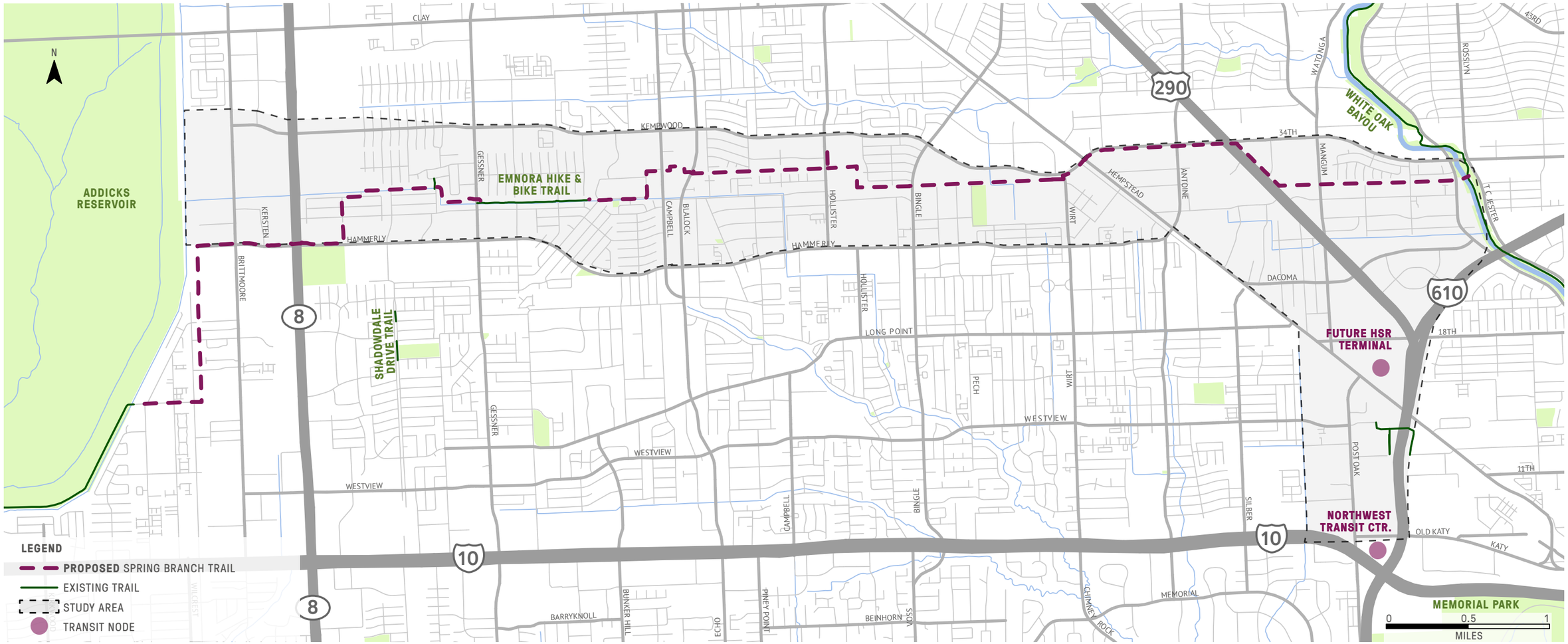


FIGURE 2.1 SPRING BRANCH TRAIL STUDY AREA

ABOUT THE SPRING BRANCH TRAIL STUDY

The Spring Branch Trail Study is a community-driven planning effort that explores the feasibility of creating an 11-mile trail corridor designed for users of all ages and abilities connecting Spring Branch to Addicks Reservoir and White Oak Bayou. Given the lack of safe places to walk and bike in Spring Branch today, residents are excited about the potential of this significant regional trail.

The Spring Branch Trail Study is made possible by the Houston Galveston Area Council (H-GAC) in partnership with Spring Branch Management District (SBMD). H-GAC's Local Active Transportation Plan Program, formerly known as the Special Districts program, focuses on areas with significant opportunities to replace vehicle trips with walking and biking trips. This Study provides analysis contextualizing this opportunity as well as specific steps forward for implementing the trail.

WHAT'S GOING ON IN SPRING BRANCH?

Currently, in the 44 square miles that make up SBMD (**Figure 2.2**), there are only three trails, which are disconnected from one another and each under a mile long. Just outside SBMD, the regional trail around Addicks Reservoir connects to the Energy Corridor, and the White Oak Bayou Greenway leads to downtown Houston. The Spring Branch Trail, proposed primarily within a CenterPoint utility corridor spanning SMBD, will provide an important regional spine linking these trails.

SBMD strives to provide and support quality of life efforts for local residents and business. SBMD's mission is:

"...to positively impact public safety, business development, environmental and urban design, and mobility and transportation to help create an environment attractive to business, to facilitate profitability, and to promote the redevelopment and growth of the area."

A number of recent planning efforts conducted by SBMD and other agencies identify an east–west trail through Spring Branch as a critical walking and biking connection and quality of life initiative. Pursuing an east–west trail through CenterPoint utility easements is one of the four priority action items in SBMD's *Comprehensive Plan* (2015). The *Houston Bike Plan* (2017) and Houston Parks Board's *Beyond the Bayous* (2017) specifically identify this same corridor as a critical regional spine connecting to the Bayou Greenways network. Likewise, residents expressed strong support for this proposed trail during the public engagement process of the *Reimagine Long Point Livable Centers Study* (2018). Since the completion of that study, SBMD partnered with Houston Parks Board on to design the first phase of the full regional trail corridor. Construction of this first segment, which utilizes the CenterPoint utility easement between Blalock Road and Wirt Road, is expected to start in early 2020.

The Spring Branch Trail Study builds off this existing momentum and explores and assesses the feasibility of developing the full regional connection between through Spring Branch between White Oak Bayou and Addicks Reservoir. While the majority of this connection can utilize CenterPoint utility easements, segments of on-street bikeways will be required through areas where CenterPoint easement trails are infeasible and to cross two major highways, US 290 and Beltway 8.

CENTERPOINT MASTER LICENSE AGREEMENT

The Spring Branch Trail is proposed primarily within a CenterPoint utility easement. The City of Houston's Master License Agreement with CenterPoint (2013) allows for recreational trails in such easements, provided that trails follow strict guidelines to avoid disrupting CenterPoint operations. This agreement has allowed for other trails in the Houston area to be built, providing safe off-street places for people to walk and bike.

STUDY AREA AND PROCESS

The Spring Branch Trail Study area defined through H-GAC's Local Active Transportation Studies Program encompasses the swath of Spring Branch surrounding the Centerpoint easement. Shown in **Figure 2.1**, the study area extends from Addicks Reservoir in the west to White Oak Bayou in the east, and from the Kempwood Drive and 34th Street corridor in the north to Hammerly Boulevard in the south. The eastern portion the study area extends south to the intersection of IH 10 and IH 610, in order to consider connections to the future high speed rail terminal and METRO's Northwest Transit Center.

This Study focuses on identifying opportunities to develop a trail supporting local and regional walking and biking, as well as multimodal connections. This study not only looks at connections within the study area, it develops recommendations for projects outside of those boundaries to support a comprehensive walking and biking network anchored by the Spring Branch Trail.

The one-year planning process included coordination with a steering committee, SBMD Comprehensive Plan Committee, public engagement efforts, and coordination with Spring Branch Independent School District (SBISD), TxDOT, and the City of Houston.

A COMMUNITY PRIORITY

The Spring Branch Trail emerged as a community priority through a variety of planning efforts. Building on the widespread support and momentum behind the project, the Spring Branch Trail Study hosted multiple public events and an interactive online survey in which the community voiced their aspirations for both the regional trail and a broader network of walking and biking connections. The remainder of this chapter describes the community-driven public engagement efforts and milestones completed as a part of the Spring Branch Trail Study.

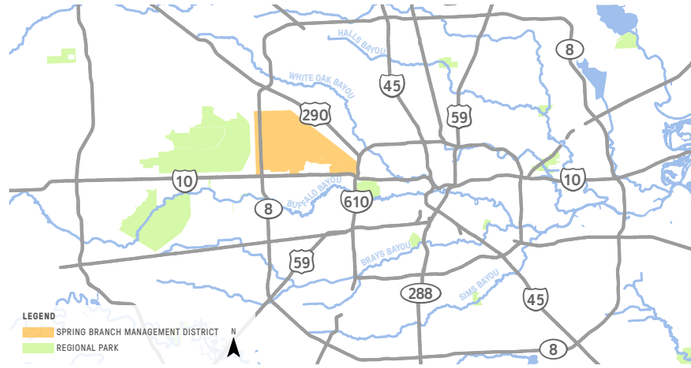


FIGURE 2.2 SPRING BRANCH MANAGEMENT DISTRICT

SPRING BRANCH TRAIL VISION STATEMENT

The Spring Branch Trail will:

- Improve the health, connectivity, and quality of life of area residents with safe, comfortable, and accessible walking and biking trails.
- Provide a nearly eleven-mile central link connecting Spring Branch neighborhoods to schools, parks, and other major destinations.
- Extend Beyond the Bayous to connect into the regional network of Bayou Greenway trails at White Oak Bayou Greenway and Addicks Reservoir.

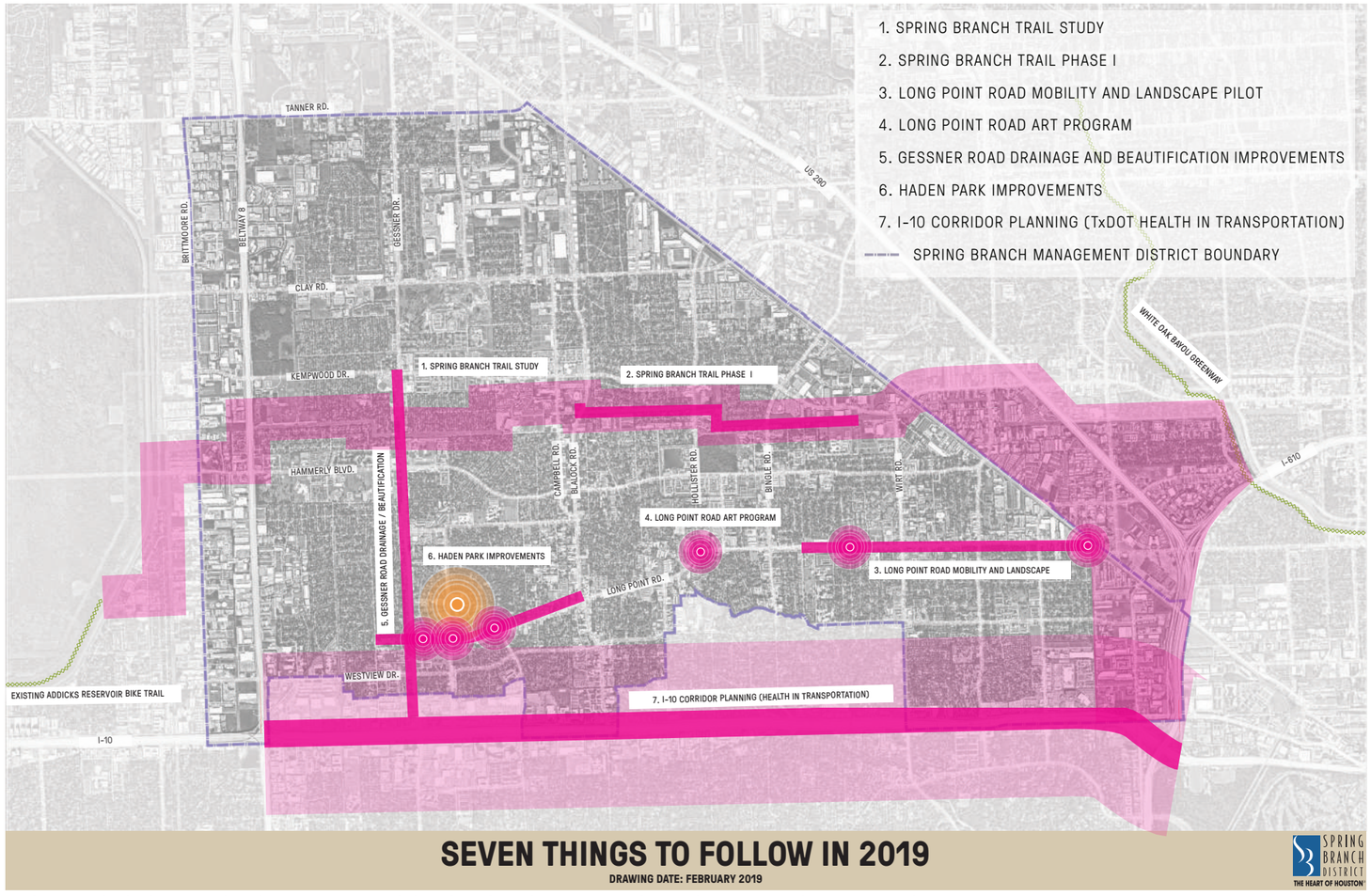


FIGURE 2.3 SBMD'S "SEVEN THINGS TO FOLLOW" - FROM 1ST PUBLIC MEETING

FIGURE 2.4 2ND PUBLIC MEETING EVENT

ENGAGEMENT EFFORTS:

- » **Steering Committee Meetings**
- » **Map.Social**
- » **Public Meetings**
- » **SBISD Coordination**
- » **Agency Coordination Meetings**

COMMUNITY ENGAGEMENT OVERVIEW

SBMD frequently engages residents and businesses about topics and projects aimed at improving the quality of life in the area. During the development of the *Spring Branch Comprehensive Plan* (2015), the public supported the idea of an east-west trail utilizing CenterPoint easements, and the plan identified this trail corridor as a priority project for implementation in the coming years. Since the completion of the *Comprehensive Plan*, SBMD has actively engaged the public through other planning efforts including the *Reimagine Long Point Livable Centers Study* and this effort for the *Spring Branch Trail Study*.

The first public meeting for the Spring Branch Trail Study, conducted jointly with the Houston Parks Board, showcased seven exciting projects and improvements in the works in Spring Branch. The theme of the meeting and title of the supporting website was "Seven Things to Follow In 2019".

The Spring Branch Trail Study occurred concurrently with the design of "Phase 1" of the Spring Branch Trail. Previous planning efforts identified the portion of the proposed trail corridor between Blalock Road and Wirt Road as a straightforward segment that could be implemented entirely within a CenterPoint easement. SBMD and Houston Parks Board are partnering on this segment, and construction is anticipated to start in early 2020. The Spring Branch Trail Study builds upon this project by envisioning the design of a longer east-west corridor spanning the entirety Spring Branch and linking Addicks Reservoir to White Oak Bayou.

The Spring Branch Trail Study engaged the public and key stakeholders to get input and feedback throughout the study process. The engagement process, presented on the following pages, includes: steering committee meetings, an interactive website called Map.Social, two public meetings, and coordination meetings with Spring Branch ISD and other agencies. Continued support and buy-in from the public and key stakeholders will be critical to the successful implementation of the full trail corridor.

Excitement and support among the Spring Branch community for the proposed 11-mile trail emerged as a common theme during public engagement conducted throughout the study period.

STEERING COMMITTEE COMPOSITION

- Spring Branch Management District (SBMD)
- Houston-Galveston Area Council (H-GAC)
- TxDOT
- City of Houston
- Harris County Precinct 4
- METRO
- Houston Parks Board
- Spring Branch Independent School District (SBISD)
- Bike Houston
- LINK Houston
- Spring Branch Super Neighborhood West
- Spring Branch Super Neighborhood East
- Spring Branch Super Neighborhood Central
- Spring Branch Super Neighborhood North

FIGURE 2.5 STEERING COMMITTEE MEETING PHOTOS & MAP

STEERING COMMITTEE

At the outset of this study effort, the project team established a Steering Committee comprised of key stakeholders in and around Spring Branch. The Committee met five times to provide input at key milestones of the study. The Committee included representatives from the City of Houston, Harris County, Spring Branch ISD, Super Neighborhoods, METRO, and nonprofit and civic organizations. The full composition of the Steering Committee is listed above. Each meeting was well attended with a majority of the entities present.

At each meeting, Steering Committee members received updates on the progress of the study and opportunities to provide input. A meeting summary was recorded after each meeting and can be found in **Appendix B.**

At each meeting, the role of the Steering Committee was presented (shortened for brevity below):

1 - To share information about the SB Trail project

2 - To coordinate among key stakeholders

3 - To report/share relevant agency information

4 - To receive updates and provide input on progress

5 -To ensure buy-in and feasibility of SB Trail

MEETING NUMBER	MEETING DATE	TOPICS DISCUSSED
1	February 27, 2019	Study background, overview, and schedule Input on needs, barriers and opportunities through group mapping exercise
2	April 24, 2019	Existing conditions overview and presentation of opportunities
3	June 19, 2019	Present and review the draft Corridor Plan schematic
4	August 21, 2019	Presentation of the revised Corridor Plan segmented for implementation consideration
5	October 23, 2019	Review public input, presentation of implementation workbook and draft plan overview

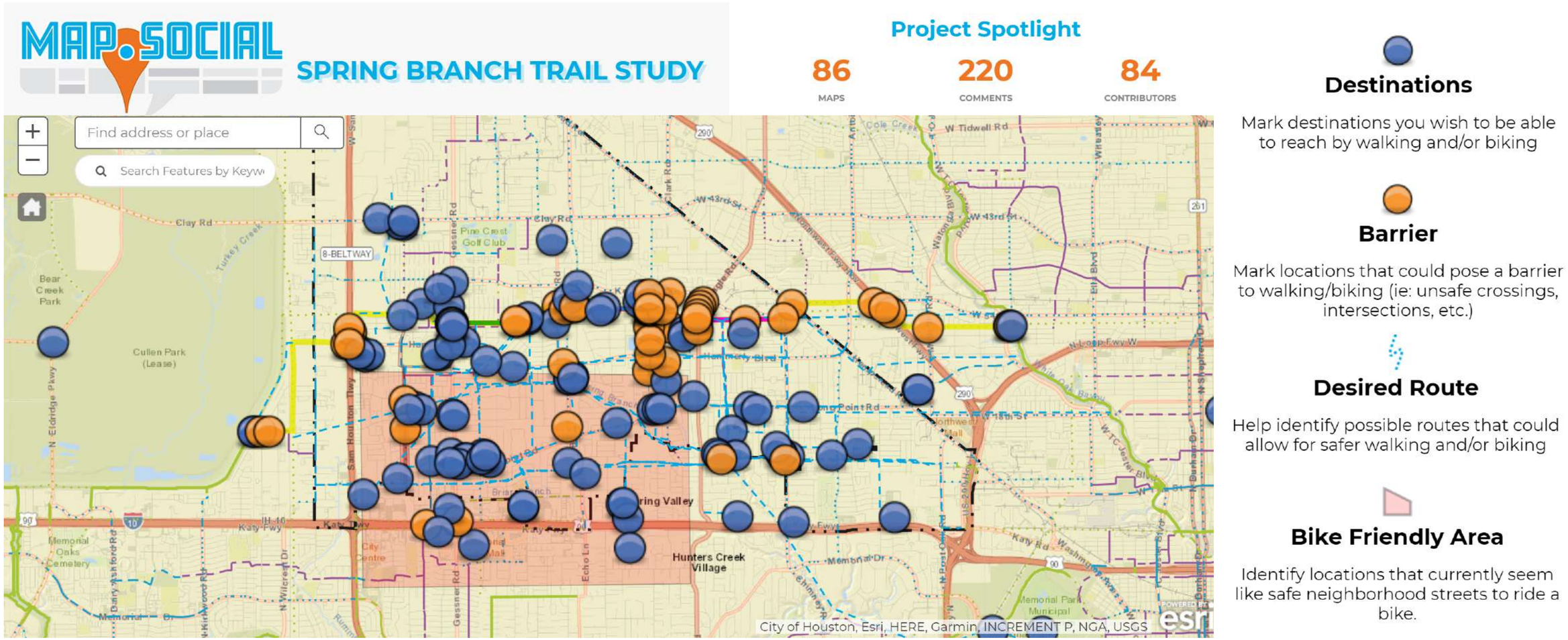


FIGURE 2.6 SPRING BRANCH TRAIL MAP.SOCIAL INTERACTIVE WEBSITE

MAP.SOCIAL

This study effort invited the public to provide input about the proposed Spring Branch Trail through an interactive website called Map.Social. The website was live from March 4–June 1, 2019. Map.Social is a public engagement platform that allows the public to view specific projects and provide feedback by placing (and commenting on) dots, lines, and polygons on an interactive map.

The Spring Branch Trail Map.Social page presented the proposed trail alignment spanning Addicks Reservoir to the White Oak Bayou. Upon entering the site, participants encountered an introduction saying, "Let's identify places where you want to safely walk and bike in Spring Branch!" Instructions explained the proposed corridor shown on the map and asked participants to identify how and where they would access the trail, destinations they would like to reach on foot or bike, barriers to walking and biking, and opportunities for additional walking and biking connections in Spring Branch. Participants then created individual maps by placing blue dots to indicate destinations, orange dots for barriers, blue lines for desired routes, and pink polygons for bike-friendly areas. Participants could provide comments supporting each feature they placed on the map.

During the comment period, 84 contributors created 86 individual maps and placed 220 features with comments. **Figure 2.6** shows all 220 features with comments placed by the public. Comments range from explanations of destinations and descriptions of desired locations for safe walking and biking access to complaints and concerns about traffic and unsafe locations. Individual users were able to view other people's maps, as well as an overall map aggregating all comments and features. In the overall map, users could "Like" or "Dislike" other participants' comments. Overall, the public left a total of 966 likes and 32 dislikes. Dislikes were typically about traffic or barriers, and many likes supported local businesses and access points.

The inputs from this interactive website informed the planning process, providing a better understanding of the concerns and desires of public. This type of input is critical to developing a comprehensive, safe, and well-connected trail system tailored to the needs and aspirations of the community.

Detailed summaries from the Map.Social engagement can be found in **Appendix C** including the comments provided for each entry supporting the map features.

FIGURE 2.7 PUBLIC MEETING 1 ADVERTISEMENT AND ATTENDEES AT THE EVENT

PUBLIC MEETINGS

There were two well-advertised, well-attended public meetings as a part of the Spring Branch Trail Study, each with a unique presentation and ask from the public. As mentioned previously, the residents and businesses of Spring Branch have had many opportunities over the last few years to engage about a variety of quality of life topics including the proposed Spring Branch Trail corridor. To support the ongoing projects and continuity of public engagement by SBMD, the first public meeting was a joint meeting to share not only about the Spring Branch Trail Study, but ongoing and upcoming efforts. SBMD created a tagline and website called, "Seven Projects to Follow in 2019" in Spring Branch that included information on the following seven efforts:

- Spring Branch Trail Study
- Spring Branch Trail Phase 1
- Long Point Road Mobility and Landscape Pilot
- Long Point Road Art Program
- Gessner Road Drainage and Beautification Improvements
- Haden Park Improvements
- I-10 Corridor Planning (TxDOT Health in Transportation)

Most of these efforts were identified as projects or strategies in either the *Comprehensive Plan* or the *Reimagine Long Point Livable Centers Study*.

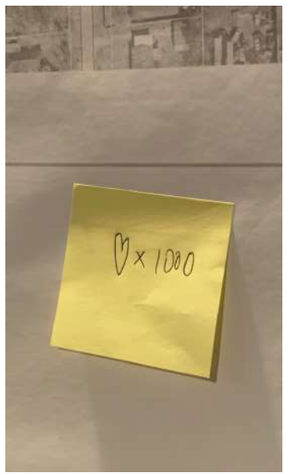
PUBLIC MEETING 1 OVERVIEW

The first public meeting was held on March 3, 2019 from 6–8 PM at the Karbach Brewery located in the Spring Branch area. This first meeting was a joint meeting hosted by SBMD to share information and get feedback on the Spring Branch Trail Study and six other efforts. The meeting was formatted as an open house where people could walk around, look at boards presenting information on the seven projects, grab food and drinks, and interact with the project teams on any of the projects. About an hour into the open house, the project managers of the seven initiatives gave a formal presentation about the efforts. The presentation provided the audience with an overview of the Spring Branch Trail Study, describing where the idea for the project came from, why the project is important and exciting, the expected timeline, and ways to stay engaged throughout the process.

Before and after the presentation, two large printed maps of the study area and the proposed Spring Branch Trail were set out on tables. Stickers, markers, and sticky notes were available for participants to provide input on the destinations, barriers, needs, and opportunities surrounding the 11-mile corridor. The project team engaged with meeting participants at these tables, answering any questions as well as seeking and recording input on the Spring Branch Trail corridor and opportunities to create a larger walking and biking network in Spring Branch. The Houston Parks Board team worked with the same maps to get feedback from meeting participants on the proposed alignment and connections to Phase 1 implementation. At the time of the meeting, Phase 1 was not yet to 30 percent design (close to one-third of the way through the entire design process). The formal presentation described these mapping activities and encouraged attendees to provide input.

The dots, sticky notes, and drawings on the maps helped to support corridor alignment and local connections for this study. The input collected from the public meeting was combined with the similar information received through Map.Social and is presented in the Existing Conditions (destinations, needs, barriers, opportunities, etc.).

The meeting attracted more than 50 participants including residents, business owners, families, and others interested in the exciting things happening in Spring Branch.



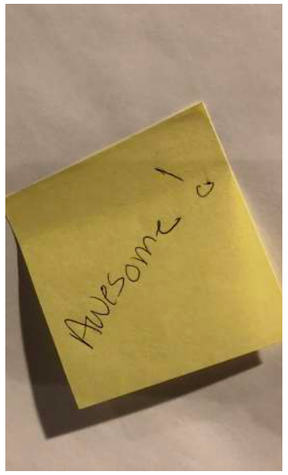


FIGURE 2.8 PUBLIC MEETING 2 ADVERTISEMENT AND ATTENDEES AT THE EVENT

PUBLIC MEETING 2 OVERVIEW

The second public meeting, held closer to the end of the planning process, focused solely on the Spring Branch Trail Study. The meeting presented details on the proposed trail alignment and regional connections. The meeting was held at a local Spring Branch establishment called The Branch on September 24, 2019 from 6:30–8:30 PM. This meeting was an open house format with a formal presentation around 7 PM from SBMD and the planning team. A series of six oversized maps depicting the entire 11-mile trail corridor from the Addicks Reservoir to the White Oak Bayou lined two large walls at the back of the restaurant. Meeting participants previewed a beautifully rendered schematic of the entire Spring Branch Trail corridor illustrating the on-street and off-street treatments as well as connections to adjacent neighborhoods. Participants were encouraged to ask questions and provide comments on the alignment and design, the proposed signature bridge across White Oak Bayou, and implementation considerations related to project timing, phasing, and cost.

The presentation was kicked off by SBMD's Deputy Executive Director, Josh Hawes, and SBMD Board Member Catherine Barchfield. Both SBMD representatives expressed excitement for the proposed trail, noting that Phase 1 should be under construction by early 2020. They encouraged the audience to engage, ask questions, support the project, and stay involved throughout the process. The planning team then presented the corridor segment by segment, describing the trail alignment, connections to destinations, suggestions for implementation, and cost estimates.

This meeting attracted close to 100 participants of all ages, backgrounds, and interests. Overall, meeting participants expressed excitement and support for the project. At least two participants raised concerns and questions about crime and flooding impacts from the project, specifically the Phase 1 segment slated for construction in early 2020. The Houston Parks Board has worked with the neighborhoods adjacent to the Phase 1 segment to address these concerns and will continue working with the community throughout implementation.

PUBLIC COMMENT PERIOD

At the second public meeting, attendees were notified of an upcoming opportunity to review the Draft Plan, provide feedback and comments, and voice concerns and/or support. The Draft Report was available for three weeks from December 2, 2019 through December 20, 2019 for the public to review and provide comments on the information presented. Comments have been compiled and summarized in **Appendix A** starting on page 220. The majority of comments were supportive of the study and efforts to implement the trail. There were a few comments to consider alternative routes within Segments 1 and 6 that have been addressed in Chapters 4 and 5. There were a couple negative comments overall.

FIGURE 2.9 NORTHBROOK HIGH SCHOOL

FIGURE 2.10 NORTHBROOK HIGH SCHOOL

FIGURE 2.11 THE GUTHRIE CENTER

FIGURE 2.12 THE GUTHRIE CENTER EASEMENT

AGENCY COORDINATION

The proposed Spring Branch Trail corridor will utilize CenterPoint easements for much of the trail alignment. However, to forge a regional connection from Addicks Reservoir to White Oak Bayou through Spring Branch, the walking and biking corridor will need to include on-street segments within City of Houston and TxDOT right-of-way. The corridor may also benefit from easements on or adjacent to SBISD property. To ensure coordination and awareness of these recommendations, SBMD staff and the planning team met with SBISD, the City of Houston, and TxDOT multiple times throughout the planning process, and engaged the three entities at Steering Committee meetings.

SBISD COORDINATION

The proposed Spring Branch Trail will improve access to over a dozen schools located either directly on the corridor or within walking distance. Most of these schools are part of SBISD. To coordinate on opportunities to provide safe access for students near the proposed trail, the planning team met with SBISD and school officials to share information and get input on the proposed alignment. At two locations, coordination is especially critical, because the trail is proposed to run through or directly adjacent to SBISD property:

- Northbrook High School, where the existing Emnora Hike and Bike Trail terminates, and
- The Guthrie Center, a technical high school serving students throughout SBISD located on Hammerly Boulevard immediately east of Beltway 8.

The planning team met with the Northbrook High School principal and SBISD's director of planning and construction on April 4, 2019. At this meeting, the team discussed the overall proposed trail corridor, and focused specifically on the potential options for extending the Emnora Hike & Bike Trail east of the school. The principal and SBISD representative shared information about the student body—including how they get around before and after school—and the school's daily operations. Their insights and suggestions directly shaped the alignment options proposed in the Corridor Plan between the eastern end of the existing Emnora Trail and the western end of the Phase 1 segment at Blalock Road. The planning team, SBMD staff, and Houston Parks Board staff met with SBISD representatives on September 11, 2019 to discuss the recommendations to provide a trail adjacent to Northbrook High School and The Guthrie Center. The Houston Parks Board attended in order to discuss the Phase 1 trail segment near Landrum Middle School. At this meeting, SBISD staff included the director of community relations, a project manager working on SBISD capital projects around Northbrook High School, and the director of transportation operations.

The planning team discussed three alternative alignments for connecting the existing Emnora Trail through the Northbrook High School campus to Phase 1 of the Spring Branch Trail beginning at Blalock Road. SBISD staff provided input on the three potential alignments, noting that one of the options would conflict with daily school bus operations and car-related traffic. The planning team and SBISD representatives also discussed the possibility of developing a trail within SBISD property on the far eastern edge of The Guthrie Center. An easement through the campus would provide a connection into the adjacent neighborhood; further coordination with SBISD will be necessary to arrange this. An easement could also be considered through the church property directly adjacent to The Guthrie Center, an option discussed at this meeting.

A representative from SBISD attended most Steering Committee meetings. These meetings served to update all attendees about the progress on the project, and provided additional opportunities for SBISD to give input on the project. This input and conversations with SBISD have helped shape the recommendations for this study.

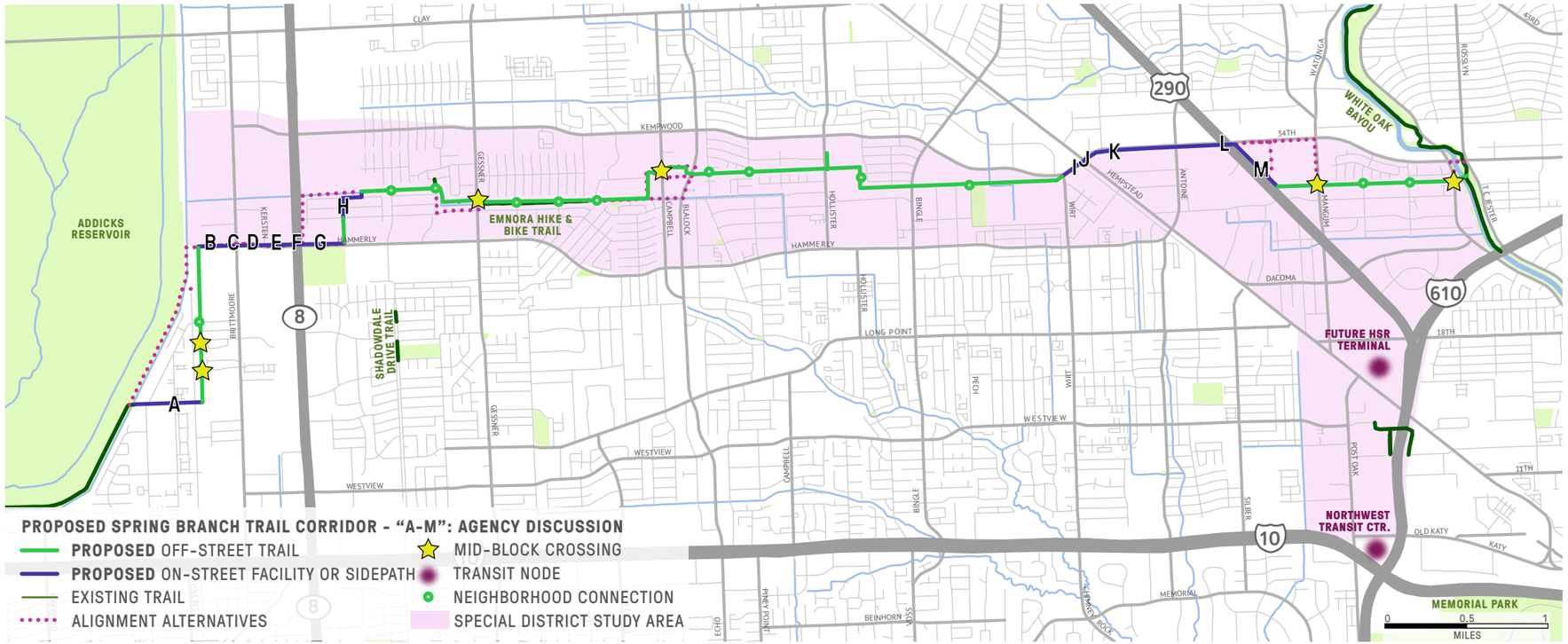


FIGURE 2.13 AGENCY COORDINATION MAP

Letters on the map correspond to a background paper that can be found in **Appendix F** with pictures presenting necessary on-street coordination with the City.

FIGURE 2.14 CHATTERTON DRIVE

FIGURE 2.15 KEMPWOOD DRIVE

CITY OF HOUSTON COORDINATION

Implementing a safe, comfortable walking and biking corridor through Spring Branch between White Oak Bayou and Addicks Reservoir will require extensive coordination with the City of Houston. The trail corridor envisioned in this study includes several mid-block crossings of city streets, many of which will need some form of traffic control to create a trail that people of all ages and abilities feel comfortable using. In addition, developing the regional link between White Oak Bayou and Addicks Reservoir will require building walking and biking facilities within City of Houston right-of-way along segments of Hammerly Boulevard and West 34th Street.

Figure 2.13 illustrates the locations of proposed on-street facilities and off-street connections along the trail corridor. Blue lines indicate on-street segments that will require coordination with the City of Houston. The crossings of the two major highways, Beltway 8 and US 290, will require additional coordination with TxDOT through design and implementation.

In May 2019 the planning team and H-GAC met with representatives from the City of Houston's Public Works & Engineering Department and Planning & Development Department. The planning team presented the proposed corridor alignment and several of the proposed north-south bikeway connections supporting the *Houston Bike Plan*. To facilitate this discussion, the planning team shared the corridor plan map shown in **Figure 2.13** and a background paper included in **Appendix F.**

A second coordination meeting took place in early December 2019, with City of Houston Planning & Development and Public Works & Engineering representatives to review the Implementation Workbook included in this report. This meeting focused on future coordination between SBMD and City of Houston to implement segments of this regional trail connection.

All steering committee meetings, public meetings, and inter-agency coordination meetings were held to not only engage key stakeholders in this process about the trail study, but to build capacity to work towards partnerships that will support implementation of this trail over time.

FIGURE 2.16 US 290 AT 34TH STREET

FIGURE 2.17 12TH STREET TRAIL UNDER IH 610

FIGURE 2.18 US 290 NORTHBOUND FRONTAGE RD

FIGURE 2.19 FRONTAGE RD - AUSTIN TRAIL EXAMPLE

FIGURE 2.20 PUBLIC MEETING 2 ATTENDEES

TXDOT COORDINATION

In May 2019, the planning team and H-GAC met with TxDOT staff to coordinate with respect to the crossings of Beltway 8 and US 290. The planning team shared the same map and background paper shown to the City of Houston. The meeting focused on the trail crossing under US 290 and the proposed sidepath along the northbound frontage road of US 290 between 34th Street and the Centerpoint easement. The group discussed potential safety concerns associated with proposed sidepath, and decided to meet a second time to explore safety treatments and alternative alignments.

This second meeting took place on July 26, 2019, and included the planning team, H-GAC representatives, and TxDOT staff. The group discussed trail alignment alternatives near US 290, including an alignment along the Brickhouse Gully drainage easement north of the proposed on-street facility on 34th Street. The planning team presented the advantages and disadvantages of each alternative, and discussed traffic operations near the intersection of 34th Street and US 290. Meeting summaries and supporting background documents and presentations from both TxDOT coordination meetings can be found in **Appendix F.**

CONCLUSION

The legacy and success of implementation will depend upon public support and agency coordination. At the conclusion of this study process, SBMD will own the study and will work to coordinate across agencies and the community to push this project forward to implementation. The community can continue to stay engaged through the SBMD website and social media outlets to hear about future projects and the progress of ongoing projects. This project will continue to be one of the “Seven Projects to Follow” for Spring Branch.

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EXISTING CONDITIONS & OPPORTUNITIES

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FIGURE 3.1 SPRING BRANCH & THE HOUSTON REGION

INTRODUCTION

The Spring Branch Trail envisioned in this plan provides eleven miles of continuous off-street and on-street trails and bikeways stretching from Addicks Reservoir in the west to White Oak Bayou Greenway in the east. The proposed trail creates a major regional connection, linking the larger Bayou Greenways network to one of the region's largest greenspaces (Addicks Reservoir), and provides a safe, comfortable option for people walking and biking to countless local destinations throughout Spring Branch.

This chapter develops a holistic picture of the neighborhoods, destinations, and infrastructure surrounding the proposed trail corridor to provide context supporting implementation of the Spring Branch Trail. This chapter focuses on three key themes: the community's ***needs*** for walking and biking facilities, the ***barriers*** and challenges to developing safe, comfortable multimodal infrastructure, and ***opportunities*** to deliver local and regional benefits through the Spring Branch Trail and other connections.

SPRING BRANCH TODAY

Located just outside of the IH 610 Loop, north of IH 10, south of US 290, and east of Beltway 8, Spring Branch encompasses approximately 44 square miles within the City of Houston. Today, Spring Branch residents have limited options for getting around by foot and bike. As **Figure 3.1** illustrates, none of Houston's bayous run through Spring Branch, and the community has therefore not reaped the benefits of the Houston Parks Board's and the City's massive and ongoing investment in Bayou Greenway trails. Only a few trails exist—the 0.7-mile Emnora Hike & Bike Trail, an 0.3-mile trail on Shadowdale Drive near Nob Hill Park, and a sidepath connecting 12th Street under IH 610 that will soon be completed by TxDOT. These facilities are short and disconnected from one another and the local sidewalks in the Spring Branch area are intermittent and incomplete.

The Spring Branch Trail will provide healthy and safe options for people to walk and bike in a place where there are limited options to do so today. The trail will serve a wide range of local and regional destinations, directly benefiting dozens of schools and the four very active Super Neighborhoods in Spring Branch, and will connect to parks, recreational spaces, retail corridors, transit service, and civic amenities.

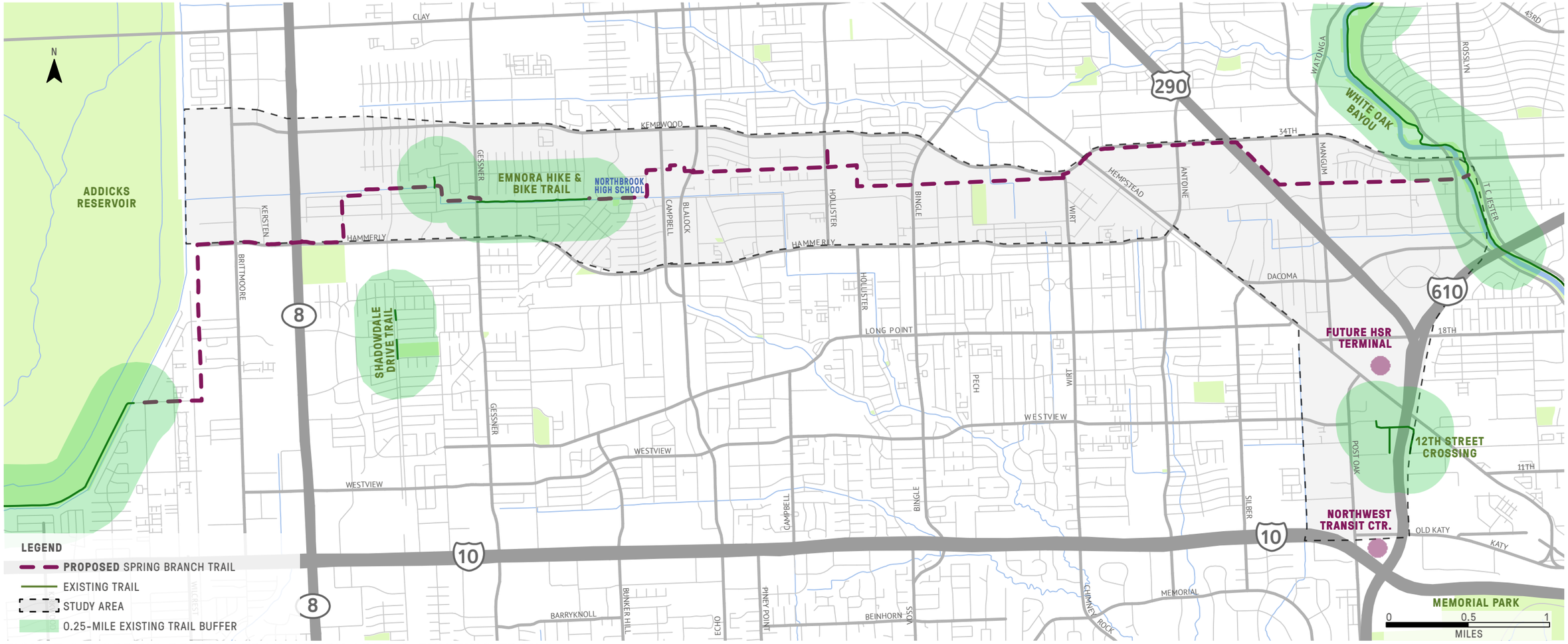

FIGURE 3.2 SPRING BRANCH TRAIL STUDY AREA & EXISTING TRAILS

THE STUDY AREA

The study area initally defined for the H-GAC Local Active Transportation Study, shown in **Figure 3.2**, includes a slightly less than one-mile-wide swath of land between Hammerly Boulevard and Kempwood Drive/34th Street stretching from Addicks Reservoir in the west to White Oak Bayou Greenway to the east. This corridor encompasses a regional east–west CenterPoint easement, the proposed location of much of the Spring Branch Trail. The eastern portion of the study area extends south to the future High-Speed Rail Terminal near US 290 and IH 610 and toward METRO's Northwest Transit Center and Memorial Park near the intersection of IH 610 and IH 10.

Figure 3.2—along with many maps presented later in this chapter—illustrates the general alignment of the proposed Spring Branch Trail within the study area, and shows most of the Spring Branch Management District. A more detailed alignment is presented in subsequent chapters. While this plan focuses on the study area surrounding the proposed trail corridor, it also explores and recommends connections to expand the high-comfort walking and biking network beyond the lines of the study area boundaries in order to better connect people to the regional trail and local destinations. The Spring Branch Trail can serve as a spine in this high-comfort network.

NEEDS

Today, the walking and biking infrastructure in Spring Branch is incredibly limited, discouraging people from making trips by foot or bike, and endangering those who do. **Figures 3.2** through **3.5** help specify the need for new and improved walking and biking facilities in Spring Branch.

EXISTING HIGH-COMFORT TRAILS

As **Figure 3.2** illustrates, only a few trails exist within Spring Branch: the 0.7-mile Emnora Hike & Bike Trail, an 0.3-mile trail on Shadowdale Drive, and a sidepath on 12th street crossing IH 610 currently under construction by TxDOT. Just outside of Spring Branch, there are two much longer trails. Just 0.7 miles west of Beltway 8, the Addicks Reservoir trail circulates through one of Houston's largest contiguous greenspaces. East of Spring Branch, the White Oak Bayou Greenway runs within a mile of US 290.

The buffers around the trails in **Figure 3.2** show the places within a quarter-mile (about a five-minute walk) of these facilities. These catchment areas, which do not account for obstacles to trail access posed by limited street connectivity, missing sidewalks, and unsafe intersections, highlight how few Spring Branch residents have access to safe places to walk and bike. The Spring Branch Trail has the potential to dramatically expand trail access, an opportunity discussed later in this chapter.

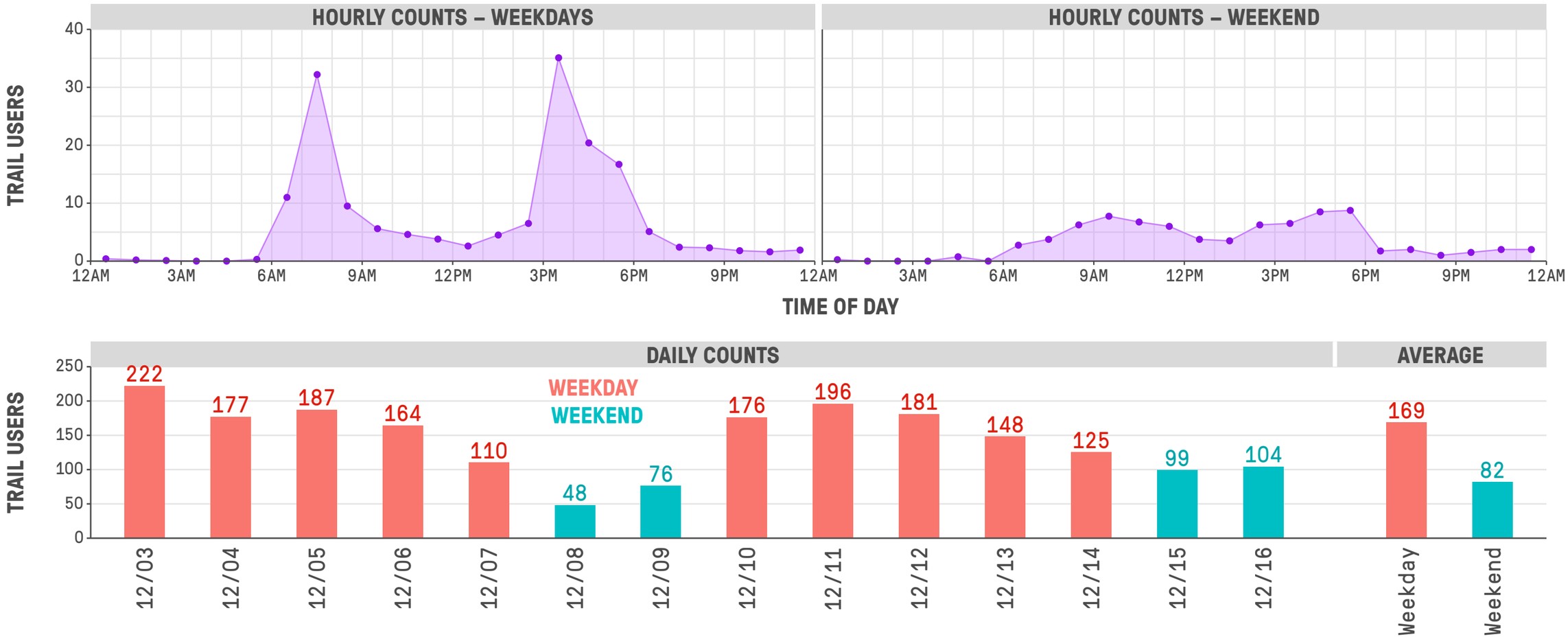

FIGURE 3.3 EXISTING EMNORA TRAIL COUNTS

Source: H-GAC

EXISTING EMNORA TRAIL USE

As a part of this study, H-GAC collected information about baseline levels of activity on the existing Emnora Hike & Bike Trail between Gessner Road and Northbrook High School. **Figure 3.3** shows counts of people walking and biking along the trail near the Northbrook campus—data captured by infrared trail pedestrian counters over the two-week period between December 3–16, 2018.

As the charts illustrate, twice as many people use the trail on weekdays than on Saturdays or Sundays. Over the two-week period observed, the counters recorded an average of 169 walking and biking trips on weekdays, compared to just 82 on weekends. The hourly trends suggest that many Northbrook High School students use the trail to reach campus. Activity along the trail is highest on weekday mornings and afternoons between the hours of 6–9 AM and 2–6 PM—and especially between 7–8 AM and 3–4 PM—the times when students travel to and from school. This data aligns with field observations and information provided by SBISD staff.

The baseline levels of trail use at Northbrook High School indicate strong demand for safe, off-street walking and biking infrastructure and speak to the need for trail connections to and from schools throughout Spring Branch. The proposed Spring Branch Trail provides these types of safe and convenient walking and biking connections to dozens of schools, an opportunity discussed in more detail later in this chapter. As different phases of the full Spring Branch Trail are implemented, subsequent trail counts can help demonstrate the demand for high-comfort walking and biking facilities throughout the Spring Branch community, as well as the benefits delivered to residents, schools, and other district stakeholders.

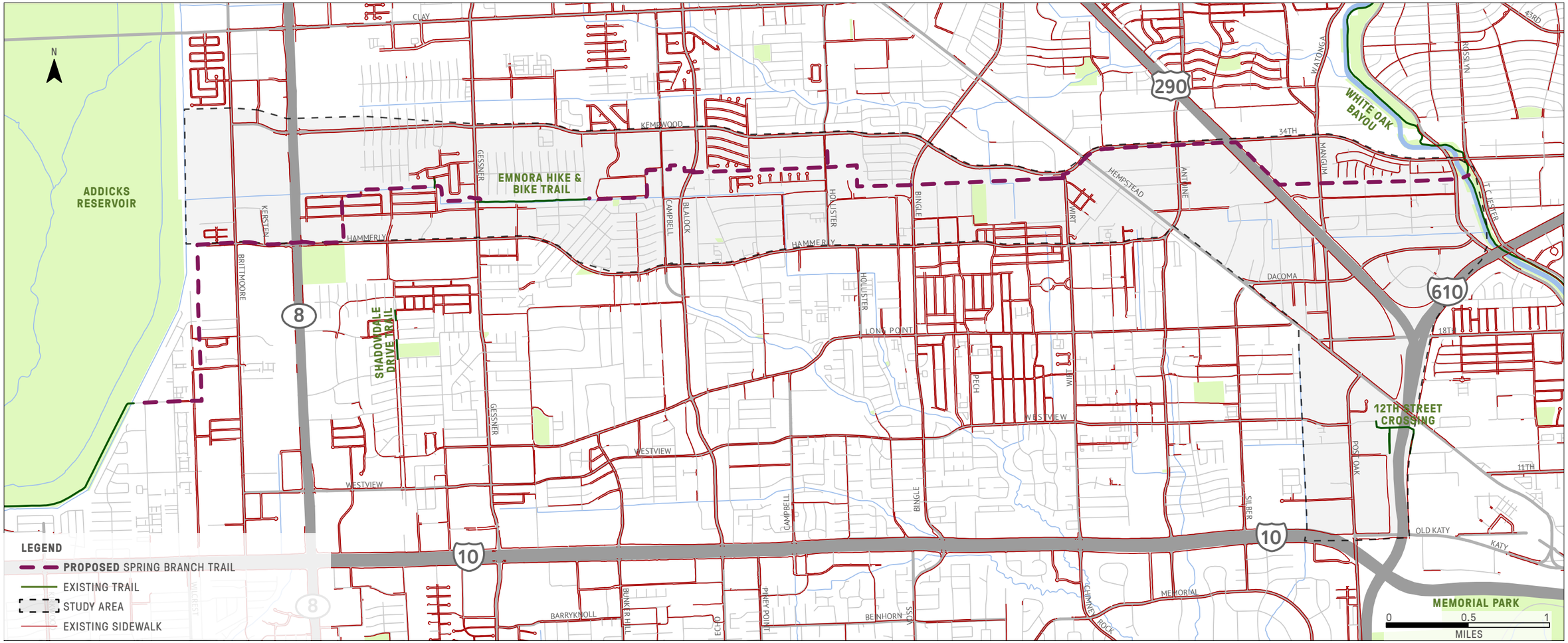

FIGURE 3.4 EXISTING SIDEWALKS

Source: H-GAC, 2019

SIDEWALK CONNECTIVITY

Figure 3.4 shows existing sidewalks throughout Spring Branch. The red lines on the map indicate only the *presence* of a sidewalk—not the *quality*, which varies widely and can render sidewalks impassable to people using wheelchairs or pushing strollers. This data set is provided by H-GAC and is based on aerial imagery; it has has not been field checked.

While the major thoroughfares and collectors that connect across neighborhoods typically have sidewalks on both sides, many of the local residential streets in Spring Branch lack sidewalks altogether. This makes accessing destinations like schools, parks, and transit stops by walking challenging—especially for people with mobility issues.

The limited sidewalk network underscores the need for safe, accessible, and comfortable walking facilities in general and for neighborhood connections to and from the proposed trail corridor in particular. The Spring Branch Trail can serve as an important east-west walking route between major commercial corridors and can connect many pockets of walkable neighborhoods that are currently kept apart by the CenterPoint easement, difficult street crossings, and minor drainage channels. It can serve as a central east-west spine, from which additional sidewalk projects extend outward, improving access and overall walkability.

FIGURE 3.5 EXISTING BARRIERS

Source: Map.Social Public Input

BARRIERS & CHALLENGES

People who want to walk and bike in Spring Branch today encounter a number of barriers and challenges to doing so. Many of the barriers identified by the public and borne out by crash and traffic data are crossings of wide, fast roadways with high traffic volumes and a history of severe crashes. These types of roadways and intersections pose real challenges to creating a safe, seamless trail system through Spring Branch. The proposed trail corridor plan will address ways to mitigate these barriers and challenges through safe mid-block crossing treatments, signage to increase visibility, and other elements of safe design.

PERCEIVED BARRIERS

Through the interactive website Map.Social, the public identified and commented on barriers in Spring Branch that currently act as obstacles to walking and biking and may present challenges to pursuing the Spring Branch Trail moving forward. **Figure 3.5** illustrates the locations of perceived barriers to getting around by bike or foot. A summary of public input can be found in **Appendices A and C**.

The majority of the barriers identified by the public within the proposed trail alignment are crossings of Spring Branch's fastest and busiest streets and roadways. Beltway 8, Gessner Road, Blalock Road and Campbell Road, Hollister Road, Bingle Road, Wirt Road, Hempstead Road, US 290, Mangum Road, and TC Jester Boulevard are all major north-south roadways crossing the proposed corridor cited as barriers by the public. Beltway 8 and US 290 are two of the greatest hurdles to developing a regional connection between Addicks Reservoir and White Oak Bayou Greenway, given the safety challenges associated with crossing major highways and service roads.

Perceived barriers outside of the proposed trail corridor include places with heavy vehicular volumes, a need for crosswalks or signals, and safety issues for people walking or biking.

CENTERPOINT SUBSTATION

Another of the greatest challenges to developing an east–west trail spanning Spring Branch is the CenterPoint substation located between Northbrook High School and Blalock Road. The substation is a critical piece of infrastructure for CenterPoint's power grid, and a trail cannot be located near that location. Both the existing Emnora Hike & Bike Trail and the first phase of the Spring Branch Trail programmed by SBMD and Houston Parks Board stop short of the substation, creating a missing 0.7-mile link between the western edge of the high school and Blalock Road. This plan considers several alignments that bridge this gap while avoiding the substation.

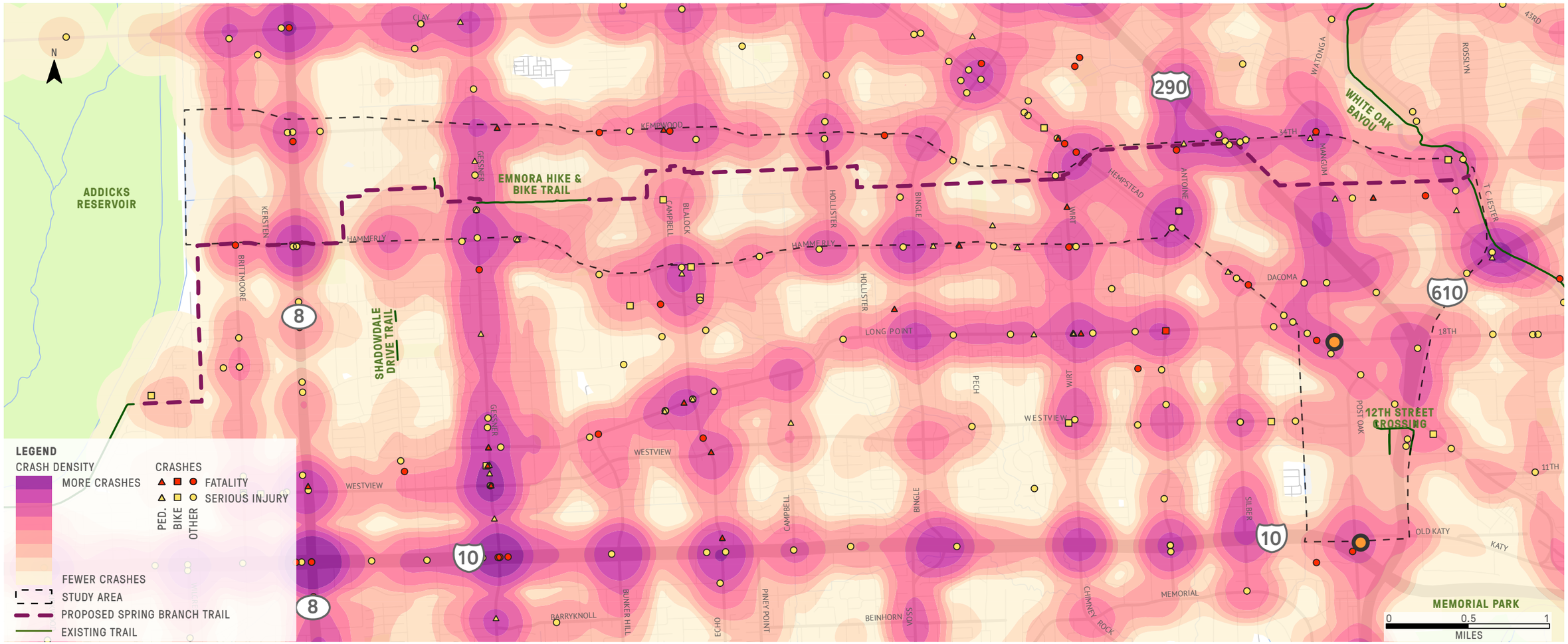

FIGURE 3.6 CRASH DENSITY WITHIN SPRING BRANCH DISTRICT

Source: TxDOT Crash Records Information System (2014-2018)

CRASHES - BARRIERS

Many of the locations that people cited as obstacles to walking and biking have seen a high volume of crashes over the past five years, giving credence to the idea that these streets and intersections pose safety concerns as currently configured.

Figure 3.6 illustrates the density of crashes between 2014–2018 in and around Spring Branch. Darker colors indicate a greater density and number of crashes. The map highlights crashes resulting in fatalities and sever injuries. Severe and fatal crashes involving pedestrians are symbolized with triangles, those involving bikes with squares, and those involving only cars with circles.

Along the trail corridor, three places stand out for their particularly high density of recent crashes:

- Hammerly Boulevard at Beltway 8,
- Kempwood Drive between Wirt Road and Hempstead Road, and
- West 34th Street between Antoine Drive and US 290.

These are all locations where the proposed trail corridor travels along an existing street, rather than through the Centerpoint easement. The Toolbox, Recommendations & Corridor Plan chapter of this report recommends a range of treatments and safety countermeasures—including geometric modifications to encourage slower turns and vertical separation between bikes and cars—at these locations to reduce crash risk and ensure the entirety of the walking and biking facility is safe and comfortable for people of all ages and abilities.

Other locations along the proposed trail corridor with a notable crash history (and highlighted as areas of concern by residents) include the intersections of:

- Hammerly Boulevard and Brittmoore Road,
- Gessner Road and the existing Emnora Hike & Bike Trail,
- Campbell Road and the proposed Spring Branch trail,
- Blalock Road and the proposed trail,
- Hollister Road and the proposed trail,
- Bingle Road and the proposed trail,
- Magnum Road and the proposed trail, and
- TC Jester Boulevard and the proposed trail.

The Toolbox, Recommendations & Corridor Plan chapter describes treatments including traffic control and median refuge islands to create safe mid-block crossings at many of these locations.

BRITTMOORE ADT: 20,646 SPPED: 49.5 MPH LANES: 5

GESSNER ADT: 34,124 SPPED: 41.5 MPH LANES: 6, DIVIDED

CAMPBELL ADT: 8,215 SPPED: 36 MPH LANES: 2

BLALOCK ADT: 15,645 SPPED: 34 MPH LANES: 4, DIVIDED

HOLLISTER ADT: 6,525 SPPED: 34 MPH LANES: 2

BINGLE ADT: 20,840 SPPED: 39.5 MPH LANES: 4, DIVIDED

WIRT ADT: 18,860 SPPED: 39.7 MPH LANES: 4, DIVIDED

HEMPSTEAD ADT: 21,592 SPPED: 47.5 MPH LANES: 4

MANGUM ADT: 16,131 SPPED: 37 MPH LANES: 4, DIVIDED

W TC JESTER ADT: 18,158 SPPED: 41 MPH LANES: 4, DIVIDED

LEGEND

- PROPOSED SPRING BRANCH TRAIL
- HOUSTON PARKS BOARD TRAIL (IN DESIGN)
- EXISTING TRAIL
- SCHOOL

MTFP
- THROUGHFARE
- MAJOR COLLECTOR
- MINOR COLLECTOR

ROW STATUS
- SUFFICENT ROW
- TO BE WIDENED
- PROPOSED

TRAIL/ROADWAY INTERSECTIONS
- SIGNALIZED
- MID BLOCK

FIGURE 3.7 VEHICULAR VOLUMES & SPEEDS AT KEY TRAIL CROSSINGS

Source: City of Houston

TRANSPORTATION CHARACTERISTICS

Figure 3.7 illustrates key transportation characteristics at intersections along the proposed Spring Branch Trail corridor. The figure highlights the thirteen signalized intersections (shown in blue) and mid-block trail crossings (shown in purple) along the corridor. These are all locations the public identified as barriers to walking and biking or with a crash history that raises safety concerns. Accordingly, each of these intersections will require thoughtful design and safety countermeasures to ensure a comfortable walking and biking experience for people of all ages and abilities along the corridor.

To this end, **Figure 3.7** presents baseline information—both from the City of Houston and collected as a part of this study—that shapes the safety treatments presented in the Toolbox, Recommendations & Corridor Plan. The map shows the roadway classification as stated within the City of Houston's Major Thoroughfare and Freeway Plan (MTFP). Below the map, the figure notes the average daily traffic, the 85th percentile speed, and the cross-section of the north–south roadways intersecting the trail corridor. Each of these data points informs the crossing treatments and bikeway design proposed at these intersections.

As the proposed Spring Branch Trail is implemented in phases, reviewing and updating the traffic and speed data will help identify the crossing treatments necessary to create a seamless and safe trail experience for people walking and biking.

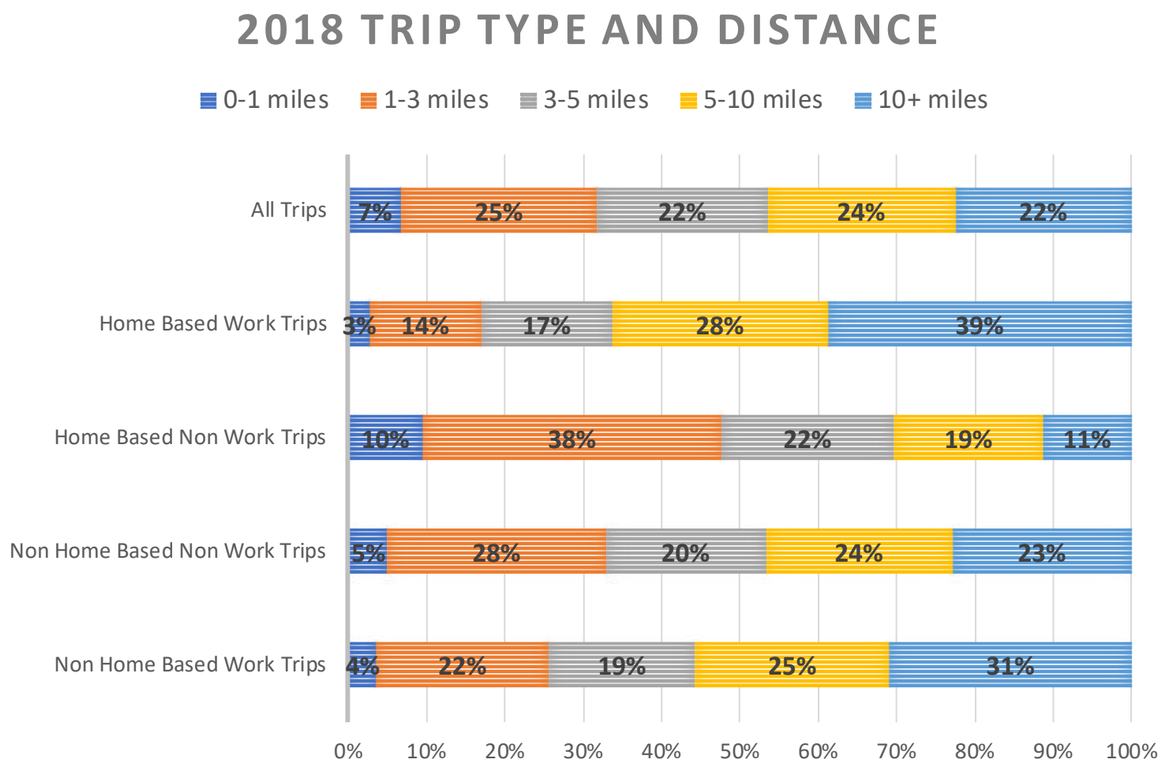

FIGURE 3.8 TRIP TYPE & DISTANCE Source: H-GAC Travel Demand Model

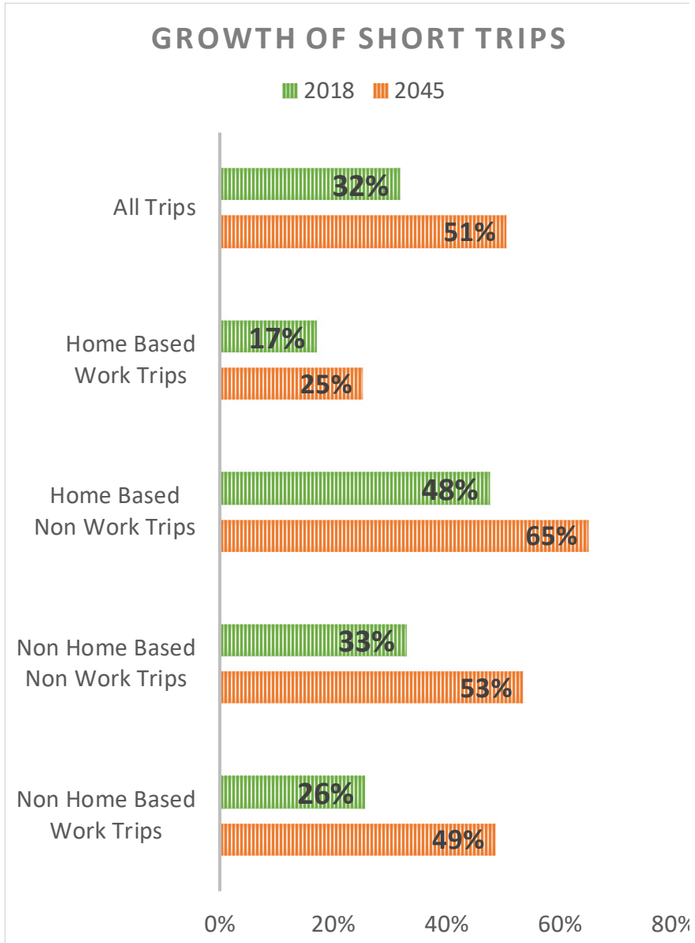

FIGURE 3.9 PROJECTED GROWTH OF SHORT TRIPS Source: H-GAC Travel Demand Model

OPPORTUNITIES

The Spring Branch Trail envisioned in this plan represents an extraordinary opportunity to address the demonstrated need for trail infrastructure and overcome the safety challenges identified as obstacles to walking and biking. The proposed trail will provide Spring Branch residents with a new safe and convenient option for reaching nearby educational, commercial, recreational, and civic destinations by foot or by bike, presenting opportunities to convert short trips currently made by car into walking and biking trips–the goal of H-GAC's Local Active Transportation Studies. The proposed trail will also expand options for making longer trips without a car by linking neighborhoods and destinations to transit corridors that span the Houston region—many of which are identified for capital investment and service improvements in the METRONext plan approved for bonding authority in 2019.

This section describes opportunities to convert vehicle trips to walking, biking, and transit trips by examining the characteristics of trips in Spring Branch (both today and in the future) and identifying the destinations and multimodal connections people are most interested in reaching.

SHORT TRIPS

The proposed Spring Branch Trail represents such an excellent opportunity in large part because of the high prevalence of short trips within Spring Branch. Today, 32 percent—or approximately one in three—of trips originating in Spring Branch are under three miles (**Figure 3.8**), a distance many people are comfortable walking or biking if safe facilities exist. Because Spring Branch is home to so many trips that are a reasonable walking or biking *distance*, but lacks a strong network of walking and biking *infrastructure*, the Spring Branch Trail has the potential to shift how people reach nearby destinations in the immediate future.

The number and fraction of short trips is expected to grow as the area attracts more activity, development, and density in the coming decades. As **Figure 3.9** indicates, over half—51 percent—of all trips originating in Spring Branch will be less than three miles by 2045. The Spring Branch Trail can serve as a regional spine that anchors a much broader and far-reaching network of walking and biking facilities, which can provide an alternative to traffic congestion as the area grows and redevelops in the coming decades.

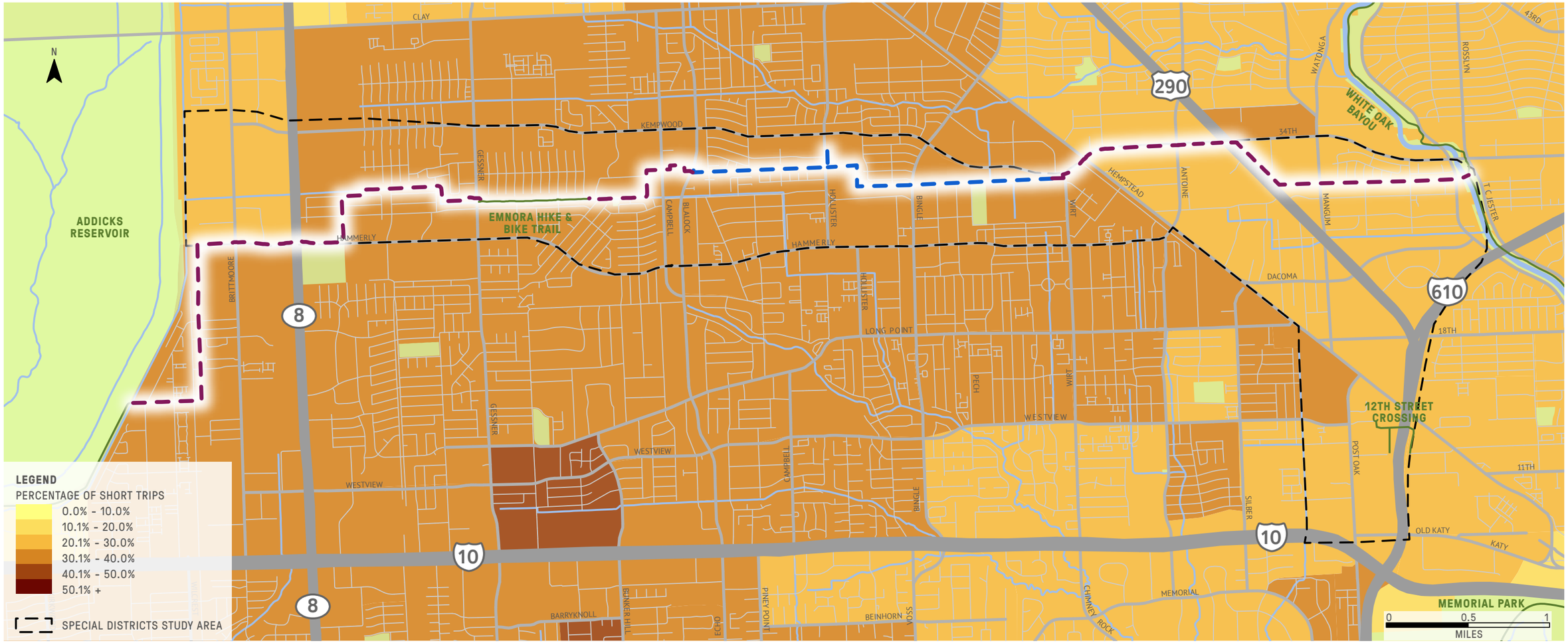

FIGURE 3.10 TRIP CHARACTERISTICS: 2018

Source: H-GAC Travel Demand Model

TRIP TYPES

As **Figure 3.8** illustrates, the fraction of short trips (those three miles or less) varies by type of trip. Home-based non-work trips—those between someone's home and a destination other than their workplace, such a grocery store, school, or park—are especially likely to qualify as short trips. Almost half—48 percent—of home-based non-work trips originating Spring Branch are three miles or less. The trail connections to the schools, parks, retail corridors, and civic amenities identified later in this chapter can provide residents of all ages and abilities with a new option to complete these types of trips.

Commuting trips directly between someone's home and their job tend to be longer than other types of trips; only 17 percent of home-based work trips in Spring Branch qualify as short trips. Commuting trips are often the longest trips people make on a regular basis, and the most likely to be completed by faster modes like driving or rapid transit (in places where it is available).

While people are less likely to walk or bike the entirety of longer trips, they are more likely to use transit rather than drive if they can safely and comfortably reach a bus stop or transit station. Accordingly, trail connections to existing and future transit service represent a meaningful opportunity to replace vehicle trips with other modes and provide a range of safe and convenient options for traveling to, from, and within Spring Branch.

EXISTING SHORT TRIPS

Figure 3.10 shows the share of 2018 trips under three miles or less, as estimated by the H-GAC Travel Demand Model. In most of the areas surrounding the proposed Spring Branch Trail, between 30–40 percent of 2018 trips qualify as short trips, consistent with the finding that 32 percent of all trips in Spring Branch are three miles or less. Because people often opt to make short trips by foot or bike if safe, comfortable facilities to do so are available to them, the high prevalence of short trips along the corridor suggests many people may use the trail in lieu of driving once the infrastructure is in place.

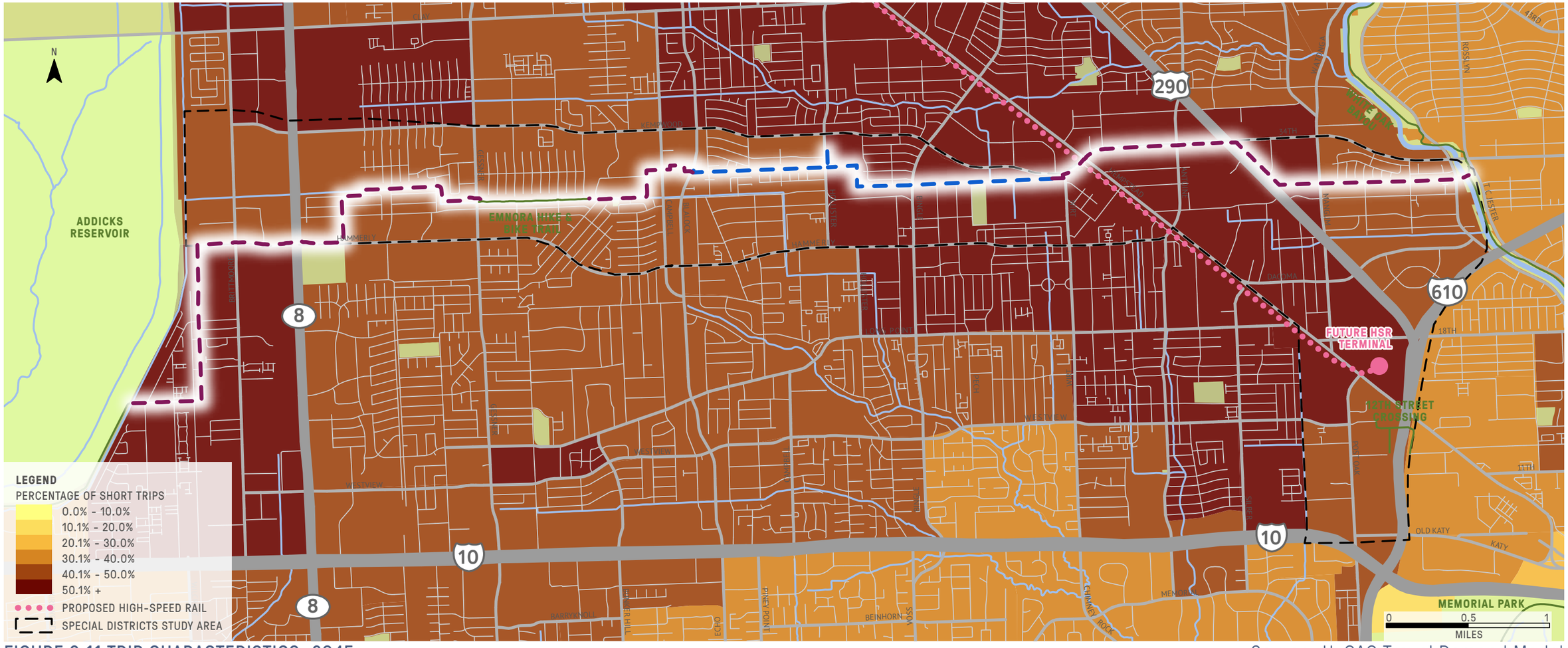

FIGURE 3.11 TRIP CHARACTERISTICS: 2045

Source: H-GAC Travel Demand Model

TRIP CHARACTERISTICS

Short trips are projected to grow dramatically by 2045, both in terms of sheer volume and as a percentage of all trips. As the area grows denser and more populous, there will likely be more residences, jobs, schools, shops, community amenities, and other destinations within close proximity of one another, creating more opportunities for trips that are three miles or less.

As **Figure 3.11** illustrates, short trips are projected to account for at least 40 percent of all trips in the areas surrounding the proposed trail alignment in 2045. Along the proposed trail between Hollister Road and Blalock Road—and in Hempstead Road corridor generally—projections indicate that over half of all trips will be three miles or less in 2045, up from 20 to 40 percent in those areas in 2018. If safe, comfortable walking and biking facilities like the proposed Spring Branch Trail link people to the places they want to go, future Spring Branch residents may complete many of these shorter trips by foot or by bike rather than by car.

Trips of *all* lengths are expected to increase substantially by 2045, and if the vast majority of these trips are made by car, they will overburden the existing roadway network. Developing safe, accessible, and connective walking and biking networks is one of the few ways to provide people with a true alternative to roadway congestion in the long term. The Spring Branch Trail could serve as a key spine to such a network.

FIGURE 3.12 EXISTING SCHOOLS

DESTINATIONS: SCHOOLS

Safe, spacious, and comfortable walking and biking connections that link neighborhoods to nearby destinations have the potential to expand the range of mobility choices available to Spring Branch residents and shift their transportation decisions in the immediate future. The proposed Spring Branch Trail presents opportunities to connect residents to many of the local destinations people are most interested in reaching on a regular basis, beginning with schools.

Figure 3.12 shows the location of schools in and around Spring Branch and the proposed trail corridor. Public schools in the Spring Branch Independent School District (SBISD) and the Houston Independent School District (HISD) are shown in blue, while private schools are denoted in pink.

Figures 3.13 through **3.17** on the following pages focus on public elementary, middle, and high schools surrounding the proposed trail corridor, showing the attendance zones and the transportation modes that students use to reach each school.

In addition to the zoned public schools described in the following pages, a number of other schools stand to benefit from the proposed Spring Branch Trail. The Guthrie Center, an SBISD vocational high school that enrolls students from across the district, is located directly on the proposed trail corridor immediately east of Beltway 8. Tiger Pre-K, another SBISD school, also lies within a half-mile (or about a ten-minute) walk of the trail corridor. Several private schools also fall within walking distance of the corridor, including:

- The Parish School and The Carruth Center on Hammerly Boulevard west of Brittmoore Road,
- The Westview School on Hammerly Boulevard west of Beltway 8,
- Houston Christian High School on Kempwood Drive immediately east of Beltway 8,
- St. Jerome Catholic School on Kempwood Drive west of Hollister Road, and
- Central Christian Academy on Bingle Road between Kempwood Drive and Hammerly Boulevard.

The trail will provide the students, families, and staff of these schools with opportunities for healthy, active transportation and recreation.

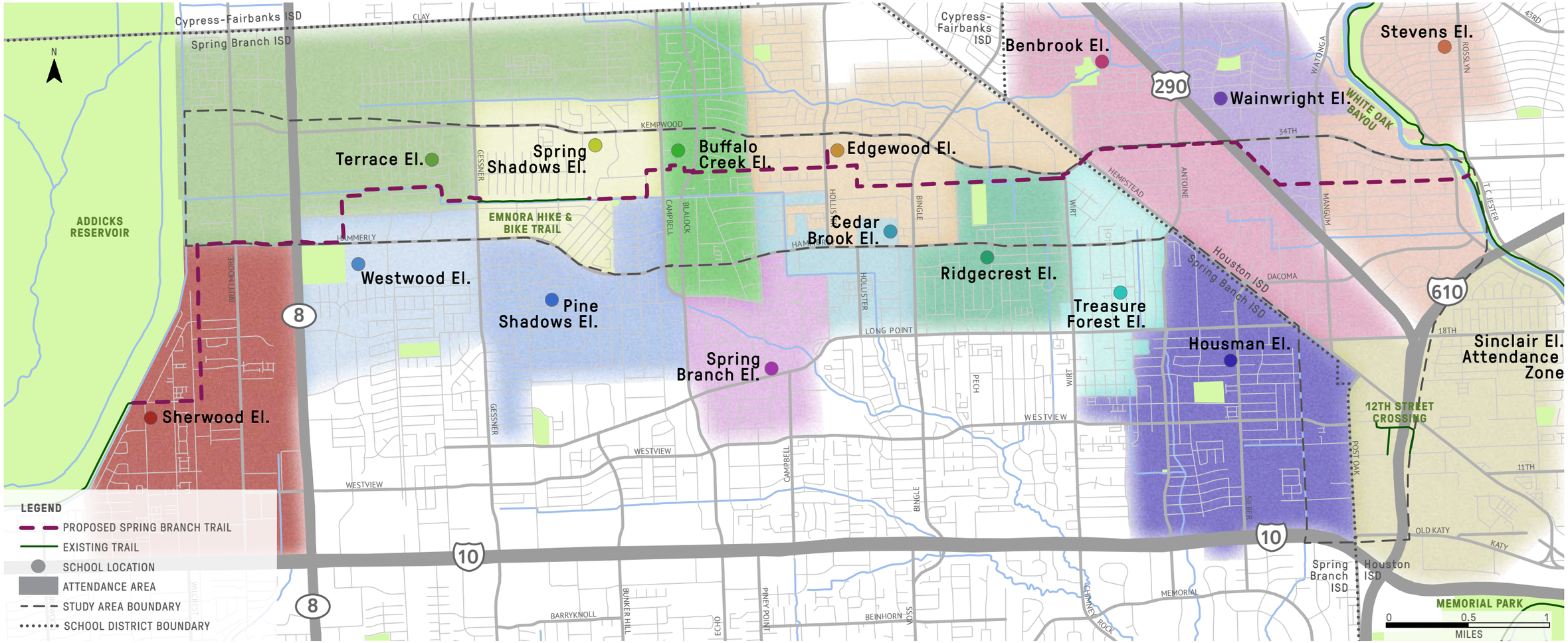

FIGURE 3.13 ELEMENTARY SCHOOL ATTENDANCE ZONES

Source: Spring Branch ISD, Houston ISD

DESTINATIONS: ELEMENTARY SCHOOLS

The proposed Spring Branch Trail runs through the attendance zones of a total of ten SBISD and HISD elementary schools, shown in **Figure 3.13**:

- Sherwood Elementary School (SBISD),
- Westwood Elementary School (SBISD),
- Terrace Elementary School (SBISD),
- Spring Shadows Elementary School (SBISD),
- Buffalo Creek Elementary School (SBISD),
- Edgewood Elementary School (SBISD),
- Ridgecrest Elementary School (SBISD),
- Benbrook Elementary School (HISD),
- Wainwright Elementary School (HISD), and
- Stevens Elementary School (HISD).

Of these ten schools, all but one (Pine Shadows Elementary) are within a half-mile (or about a ten-minute) walk of the proposed trail corridor. The Spring Branch Trail will provide direct access to Sherwood Elementary, Westwood Elementary, Buffalo Creek Elementary, and Edgewood Elementary, all of which lie right on the proposed corridor. Cedar Brook Elementary also falls within walking distance of the proposed trail, though its attendance zone lies entirely beyond the corridor alignment.

The proposed trail corridor will create a safer, more pleasant experience for students and families who already walk or bike to these elementary schools, and can encourage more students and families to do so in the future. The trail provides critical safe crossings of fast, busy thoroughfares that act as barriers to walking and biking today. For example, the trail provides a safe crossing of Blalock Road for students and families near Buffalo Creek Elementary, connections across Hollister Road and Bingle Road for neighborhoods zoned to Edgewood Elementary, and safer crossings of Antoine Drive and West 34th Street in the Benbrook Elementary attendance zone.

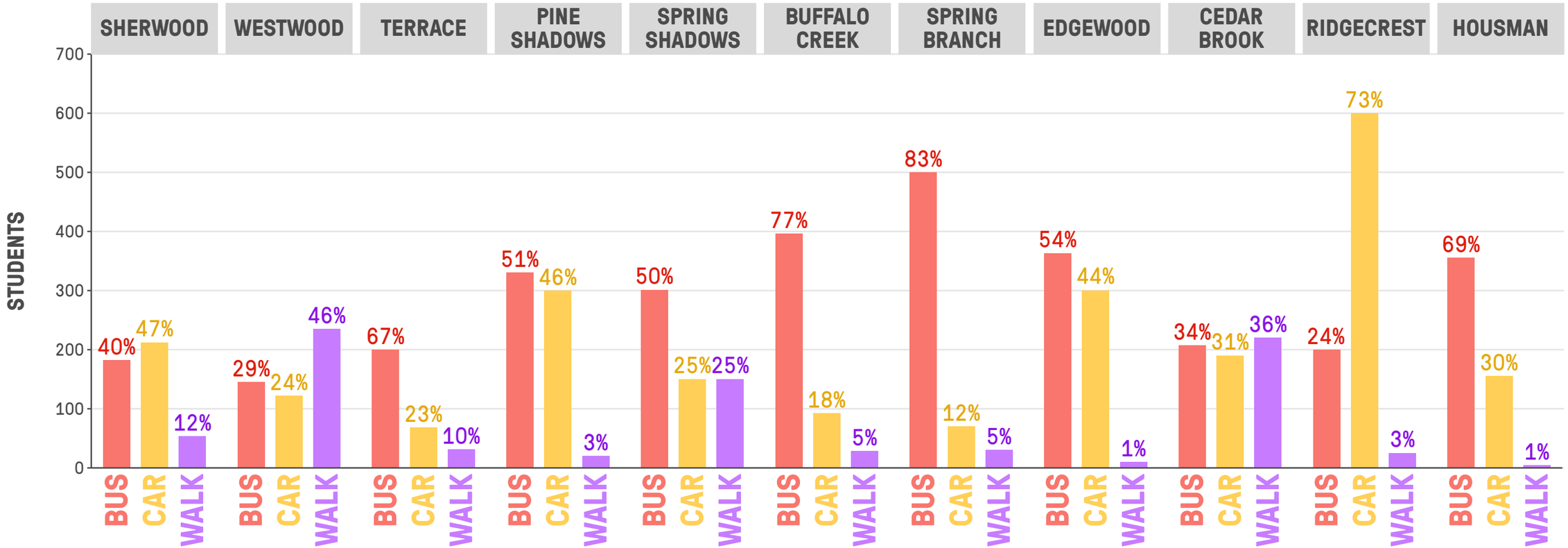

FIGURE 3.14 ELEMENTARY SCHOOL STUDENT MODE SHARE

Source: Spring Branch ISD

ELEMENTARY SCHOOL TRIPS

Figure 3.14 shows how SBISD elementary school students and their families travel to and from campus today.

Transportation choices vary considerably by school. While most students at each school typically travel by school bus or by car, the share of students who walk ranges from barely 1 percent at Housman and Edgewood Elementary Schools to 25 percent, 36 percent, and even 46 percent at the Spring Shadows, Cedar Brook, and Westwood campuses, respectively. The high fraction of walkers at these campuses suggests an appetite for walking to school that the Spring Branch Trail can satisfy and help cultivate.

Across all elementary schools, very few students bike. Biking accounted for less than 1 percent of students at each school, and amounted to only 14 students total across the eleven schools.

The transportation choices of Spring Branch ISD students and families depicted **Figures 3.14** and **3.16** are in large part a response to and a reflection of the existing infrastructure and options available in the district today. New walking and biking facilities like the proposed Spring Branch Trail and neighborhood connections will not only improve the experience of people who walk and bike today, they will also encourage more students and families to walk and bike to school in the future.

As with trail counts, data about trips to and from school will be a useful tool for quantifying the impact of the Spring Branch Trail and demonstrating the utility of investments in walking and biking infrastructure moving forward. Future mode share surveys from Spring Branch ISD can help track how the transportation choices of students and their families shift as different segments of the proposed Spring Branch Trail are built.

At the time of report completion, data was not available for Treasure Forest Elementary School or HISD schools.

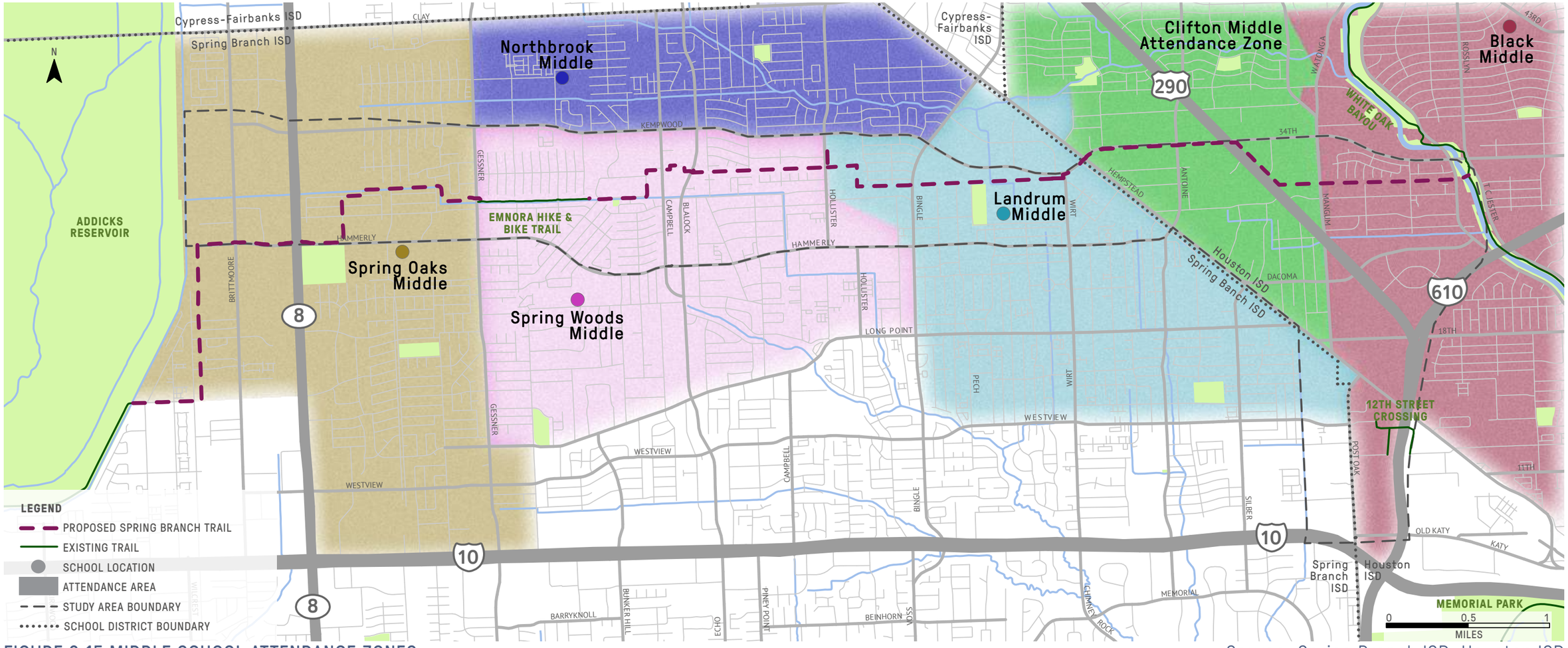

FIGURE 3.15 MIDDLE SCHOOL ATTENDANCE ZONES

Source: Spring Branch ISD, Houston ISD

DESTINATIONS: MIDDLE SCHOOLS

The proposed Spring Branch Trail runs through the attendance zones of five SBISD and HISD middle schools, shown in **Figure 3.15**:

- Spring Oaks Middle School (SBISD),
- Spring Woods Middle School (SBISD),
- Landrum Middle School (SBISD),
- Clifton Middle School (HISD), and
- Black Middle School (HISD).

Of these five schools, two—Spring Oaks Middle and Landrum Middle—are within a half-mile (or about ten-minute) walk of the proposed trail corridor. These two campuses, along with Spring Woods Middle, Black Middle, and Northbrook Middle are within a ten-minute (or 1.5-mile) bike ride of the proposed trail, though the Northbrook attendance zone falls entirely outside of the corridor alignment. Landrum Middle School will have direct access to the segment of the Spring Branch Trail currently in design by the Houston Parks Board through the Spring Branch Management District.

As with the elementary schools, the trail provides safe crossings of major thoroughfares separating Spring Branch households from their zoned middle schools. The trail provides particularly valuable connections in the Spring Oaks Middle School and Clifton Middle School attendance zones, both of which are bisected by major highways. With bikeways and crossings designed to accommodate people of all ages and abilities along Hammerly Boulevard and West 34th Street, Spring Oaks Middle School students living west of Beltway 8 and Clifton Middle School students southwest of US 290 will have much safer and more viable walking or biking routes to and from school.

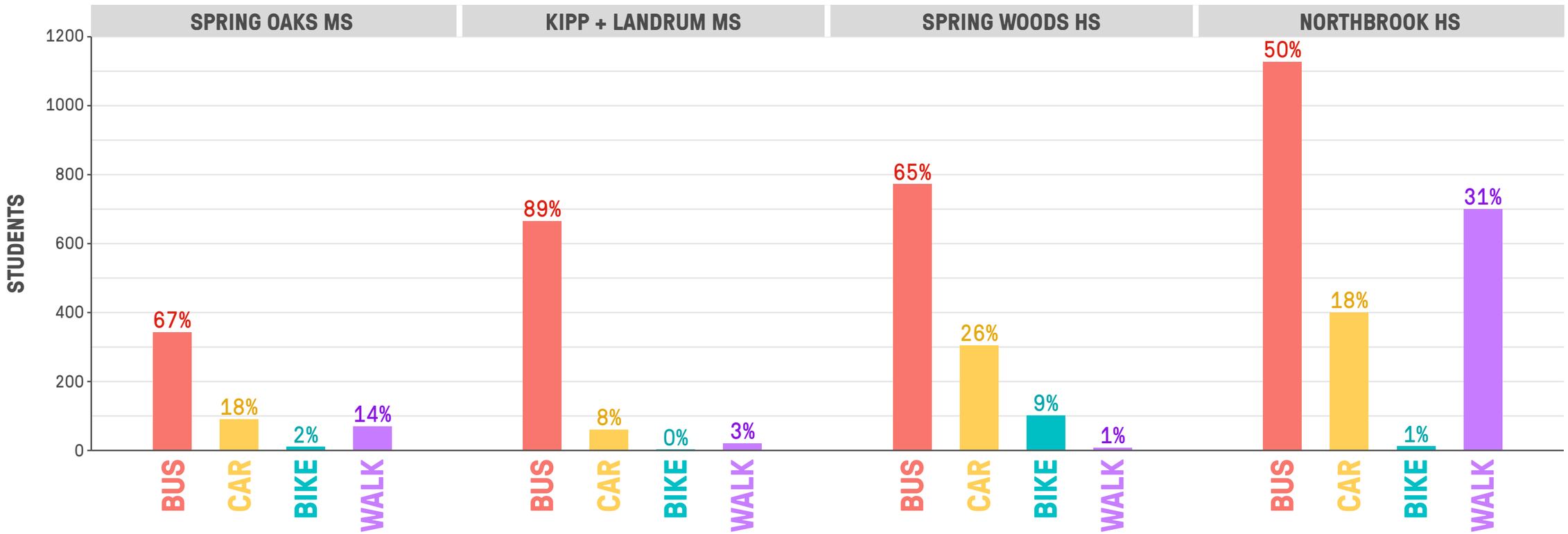

FIGURE 3.16 MIDDLE SCHOOL & HIGH SCHOOL STUDENT MODE SHARE

Source: Spring Branch ISD

MIDDLE SCHOOL TRIPS

Figure 3.16 shows how students at Spring Oaks Middle School and Landrum Middle School (the two campuses within a ten-mile walk of the trail corridor) currently get to and from school. At both schools, the vast majority of students take the bus: two thirds of Spring Oaks Middle School students and nearly nine tenths of Landrum Middle School students arrive by bus.

The two schools differ in terms of the share of students who walk or bike to school. A total of 16 percent of Spring Oaks Middle School's student body walks or bikes to school, with 14 percent walking and 2 percent biking. At Landrum Middle School, meanwhile, only three percent of students walk, and almost no students bike. The difference in students' transportation choices at these two schools reflects the disparate walking and biking environments in the two surrounding neighborhoods. Near Spring Oaks Middle School, Shadowdale Drive provides a direct walking and biking route for students living south of the school. Landrum Middle School has no such walking or biking connections today. Once the segment of trail under design by Houston Parks Board in partnership with the Spring Branch Management District provides direct access to the campus, walking and biking at Landrum may very well increase.

HIGH SCHOOL TRIPS

As at the middle schools, students at Spring Woods High School and Northbrook High School predominately get to and from school by bus. However, both high schools also have a substantive share of students arriving by foot or by bike, suggesting a demand for walking and biking infrastructure among high school students. One in ten Spring Woods High School students travel to school by foot or by bike, with nine percent biking and one percent walking. At Northbrook High School, almost one in three students walks or bikes to school, with 31 percent walking and only one percent biking. Monitoring how the share of students walking and biking to school shifts as different phases of the Spring Branch Trail are implemented will help track and quantify the impact of the project, and may help demonstrate how investments in walking and biking infrastructure change transportation choices and tap into unmet demand.

At the time of report completion, data was not available for Spring Woods Middle School, Northbrook Middle School, and HISD schools.

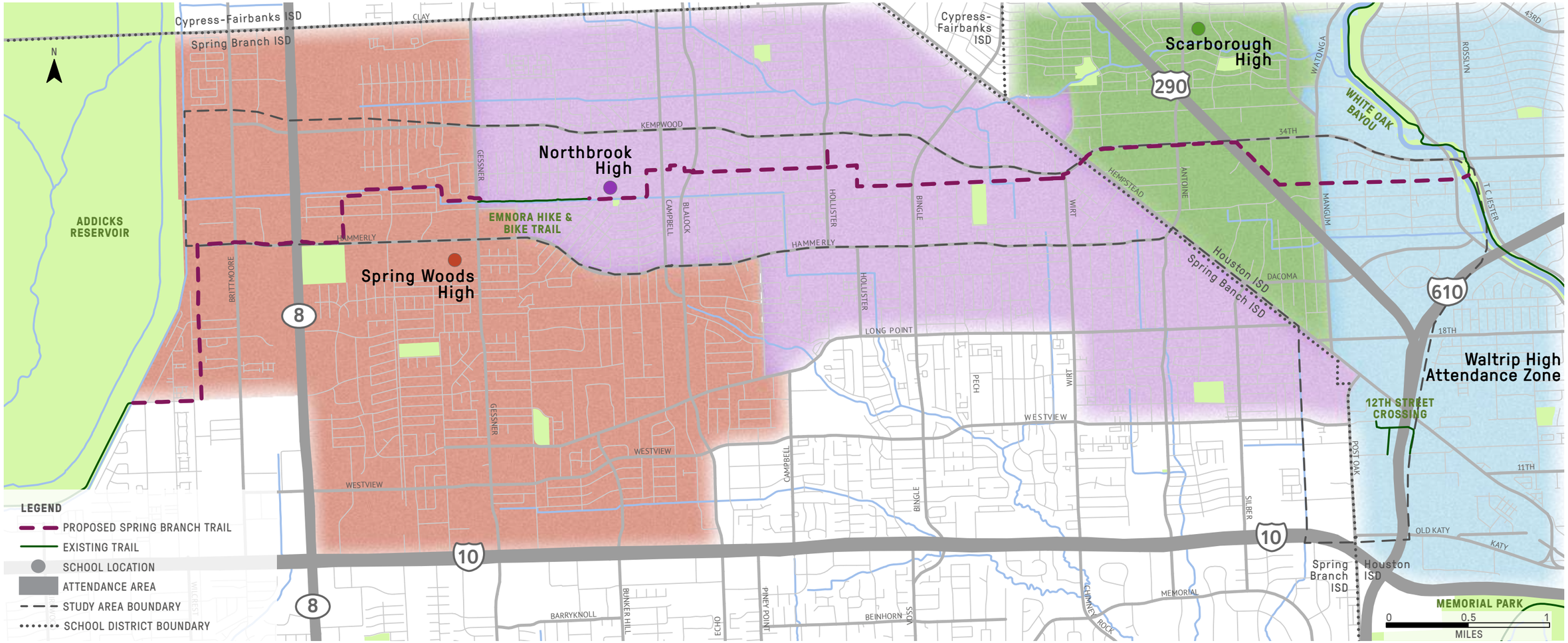

FIGURE 3.17 HIGH SCHOOL ATTENDANCE ZONES

Source: Spring Branch ISD, Houston ISD

DESTINATIONS: HIGH SCHOOLS

The proposed Spring Branch Trail intersects the attendance zones of four SBISD and HISD high schools shown in **Figure 3.17**:

- Spring Woods High School (SBISD),
- Northbrook High School (SBISD),
- Scarborough High School (HISD), and
- Waltrip High School (HISD).

All four campuses are within 1.5 miles of the proposed trail corridor, about a ten-minute bike ride. The two SBISD schools—Springwoods and Northbrook—are within a half-mile (or ten-minute) walk.

Northbrook High School lies at the eastern end of the existing segment of the Emnora Hike & Bike Trail, which provides an off-street walking and biking option for students living west of the school. While the existing trail serves areas to the west, the vast majority of the attendance zone lies east of the school, where no strong walking and biking connections exist. By linking neighborhoods between Campbell Road and Hempstead Road to the school, the Spring Branch Trail presents an opportunity to extend the benefits of the Emnora Trail to hundreds of additional students. Given the large share of Northbrook students who currently walk to school (see **Figure 3.16**) and the high levels of activity on the Emnora Trail today (see **Figure 3.3**), this segment of the proposed trail is likely to attract a large volume of student trips once implemented.

The proposed trail provides vital safe crossings of major thoroughfares and highways that students encounter or their trips to and from high school. Much like Spring Oaks Middle School and Clifton Middle School, Spring Woods High and Scarborough High serve students living on opposite sides of Beltway 8 and US 290, respectively. The trail corridor provides safe connections across these major barriers, linking Spring Woods High students living west of Beltway 8 and Scarborough High students living southwest of US 290 to their schools.

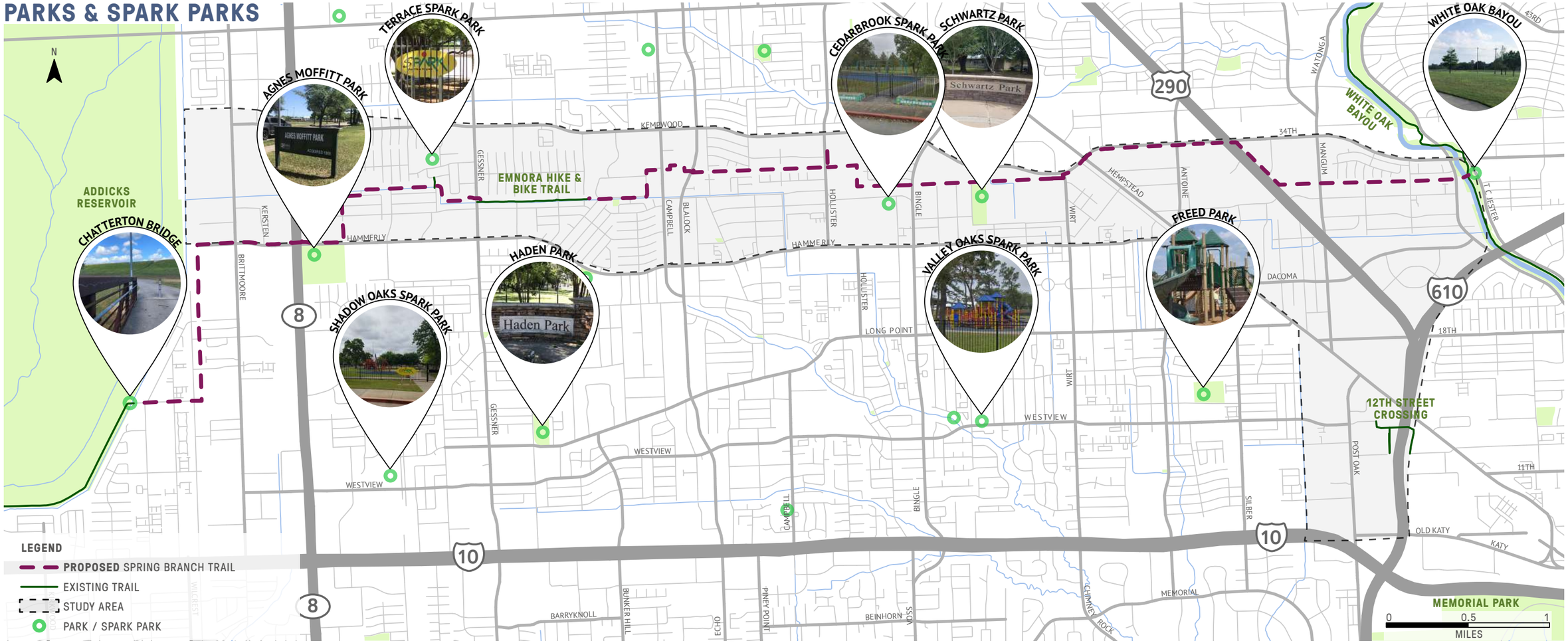

FIGURE 3.18 PARKS & SPARK PARKS

DESTINATIONS: PARKS & SPARK PARKS

Spring Branch is a park-deficient area of Houston according to the Parks and Recreation Department's Park Audit. To remedy this, the City of Houston, Spring Branch Management District, and other community stakeholders have worked to improve the quantity and quality of parks in the community in recent years. City of Houston Park & Recreation partnered with local elementary schools to make SPARK parks available for community use. SPARK parks allow the public to access playgrounds and park space within school property outside of regular school day hours. The City of Houston is also currently in the process of improving Agnes Moffit Park, located along the proposed trail corridor just east of Beltway 8, and the Spring Branch Management District is leading an effort to improve Haden Park on Long Point Road.

The added SPARK parks and planned improvements to City parks have and will continue to expand the number and variety of park amenities and greenspace available to Spring Branch residents. However, because of the parks' geographic spread, access remains a challenge.

The proposed Spring Branch Trail will enhance access to greenspace and recreation by providing a safe active transportation route to area parks. This is especially important for improving greenspace access for people who do not drive, including children. The trail alignment runs within short walking or biking distance of several small local parks, as well as larger regional destinations, such as Agnes Moffit Park and Schwartz Park.

At either end of the proposed corridor, the trail links to major regional greenspaces and trail networks. The eastern end of the trail connects to the White Oak Bayou Greenway, linking Spring Branch residents to the regional Bayou Greenways network. At the western end of the proposed alignment, the trail connects Addicks Reservoir, one the Houston area's largest greenspaces. These two connections provide Spring Branch residents with opportunities for long-distance recreational activities and access to destinations citywide.

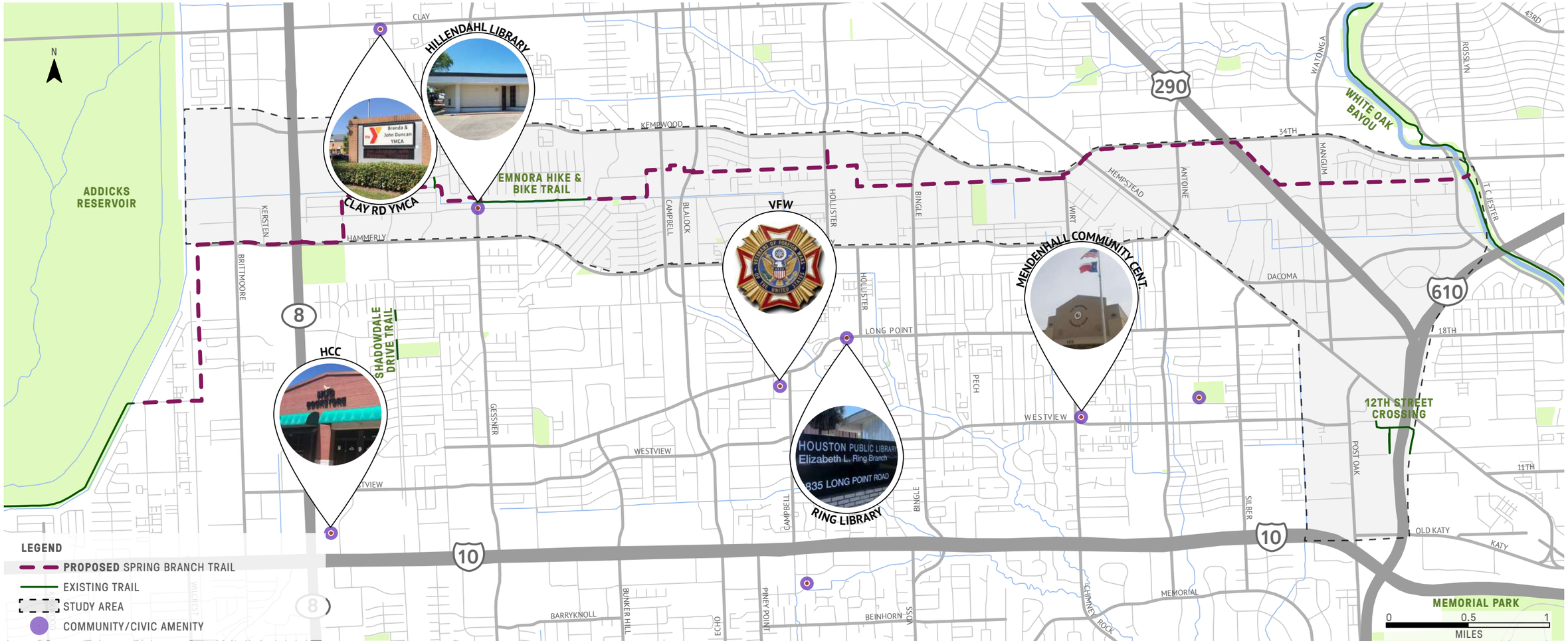

FIGURE 3.19 COMMUNITY AMENITIES

Source: Map.Social Public Input

DESTINATIONS: COMMUNITY AMENITIES

Spring Branch is home to a variety of community amenities, and **Figure 3.19** shows several of the community destinations identified by the public through Map.Social. Civic and religious destinations including two public libraries, a YMCA, community centers, a Houston Community College campus, and several churches contribute to Spring Branch residents' quality of life and civic engagement, but are sparsely dispersed across the district. These destinations tend to cluster along fast, busy thoroughfares, which make walking and biking access challenging.

The Spring Branch Trail will improve access to these destinations by providing a safe regional corridor for active transportation modes, such as walking and biking.

North–south connections extending to and from the trail can further enhance access to these destinations by providing safe walking and biking routes along major roadways intersecting the proposed trail corridor.

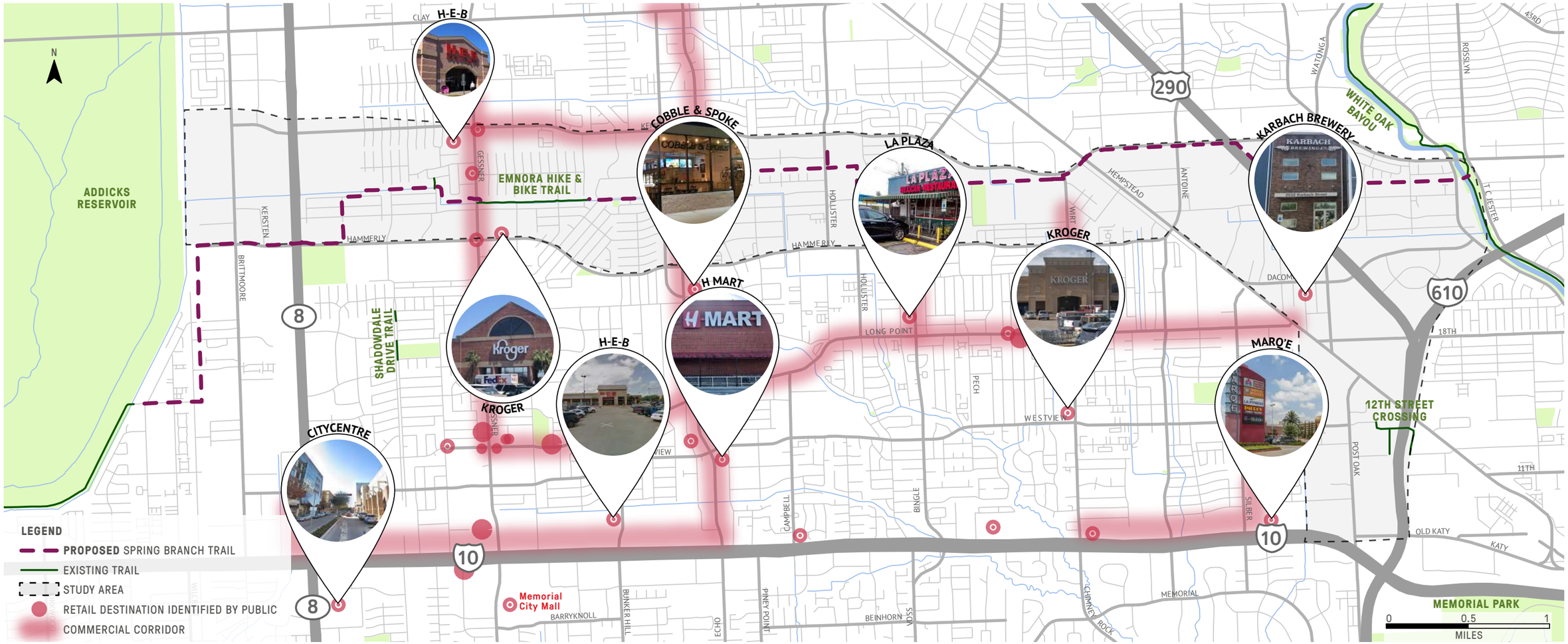

FIGURE 3.20 RETAIL & COMMERCIAL CORRIDORS

Source: Map.Social Public Input

DESTINATIONS: RETAIL AND COMMERCIAL

Retail and commercial corridors with local businesses and restaurants span Spring Branch. Although the corridors highlighted in **Figure 3.20** are home to businesses identified by the public as destinations of interest, the high volumes of automobiles on these roads make local access via walking and biking challenging. Many of these commercial corridors have bus service, but pedestrian amenities along the corridors are scarce, and crossings can be difficult.

The Spring Branch Trail will directly expand access to commercial corridors that cross the trail alignment, such as at Blalock Road, Gessner Road, Bingle Road and Wirt Road, giving local residents a safe route to, from, and between these corridors. Additionally, the safe crossings provided by the trail will improve access between commercial destinations along the same corridor, making it easier for people who bike or drive to a retail corridor park once and then walk between multiple businesses. The safe crossing locations also improve the experience of transit users, all of whom need to cross the street in order to make a round trip.

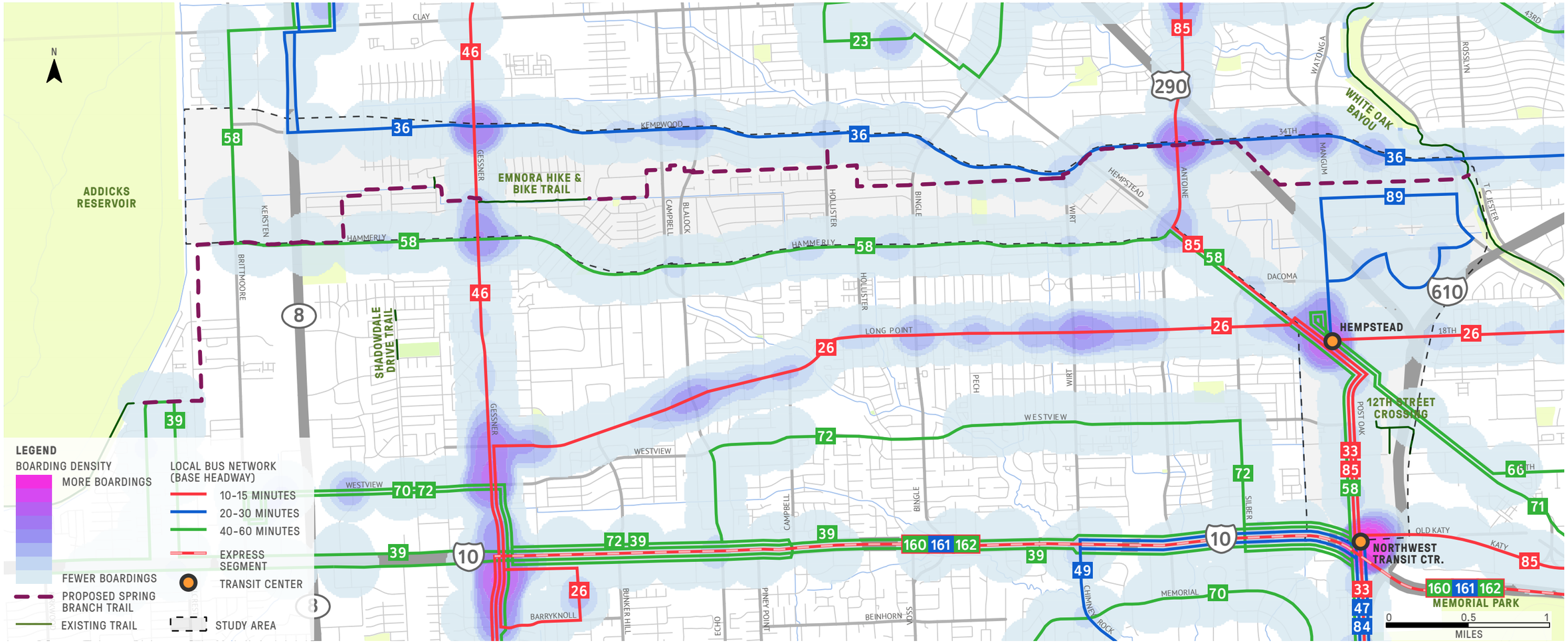

FIGURE 3.21 EXISTING METRO TRANSIT SERVICE & RIDERSHIP

Source: METRO

OPPORTUNITIES: EXISTING TRANSIT

All transit trips begin with someone arriving at a stop or station, typically by foot or by bike. Accordingly, safe, accessible, and comfortable walking and biking facilities are essential to the success of transit. The proposed Spring Branch Trail will directly connect residents and destinations to five of METRO's local bus routes shown in **Figure 3.21**, and additional connections can further improve multimodal access to Northwest Transit Center.

LOCAL BUS SERVICE

Fixed-route local bus service operates on many of key corridors in Spring Branch. The 26 Long Point/Cavalcade, 46 Gessner, and 85 Antoine/Washington are the most frequent routes in the area, with buses arriving every 10–15 minutes throughout the day. Both the 46 Gessner and the 85 Antoine/Washington run along north–south streets that intersect the proposed trail alignment; these intersections are the highest ridership points along the proposed trail.

Three other routes—the 36 Kempwood, the 39 Katy Freeway, and the 58 Hammerly—run along on-street segments of the proposed trail alignment. The trail corridor plan proposes bus stop improvements along with treatments to prevent conflicts between buses, bikes, and pedestrians. Bus stop design and amenities (such as shelters) can have a meaningful impact on an individual's transit experience along infrequent routes like the 36, the 39, and the 58, because riders can spend extended periods of time at stops waiting for the bus to arrive.

NORTHWEST TRANSIT CENTER

Situated northwest of the IH 10 and IH 610 interchange, Northwest Transit Center (NWTC) is major transit hub in the southeast corner of the study area. NWTC is serviced by a total of twelve local bus routes and offers two types of service not available elsewhere in Spring Branch: Park & Ride service and, beginning in 2020, Bus Rapid Transit (BRT). Park & Ride routes, which are oriented toward weekday commuters, provide express connections between Downtown Houston, NWTC, and METRO facilities along IH 10 and US 290. When it opens in Spring 2020, the Uptown BRT will offer a faster and more reliable connection between NWTC and the Uptown District.

Given the convergence of service at NWTC, walking and biking connections to the transit hub could make transit a more accessible and appealing option for traveling to, from, and within Spring Branch. These types of first- and last-mile connections could potentially be pursued as a part of the voter-approved METRONext Moving Forward Plan.

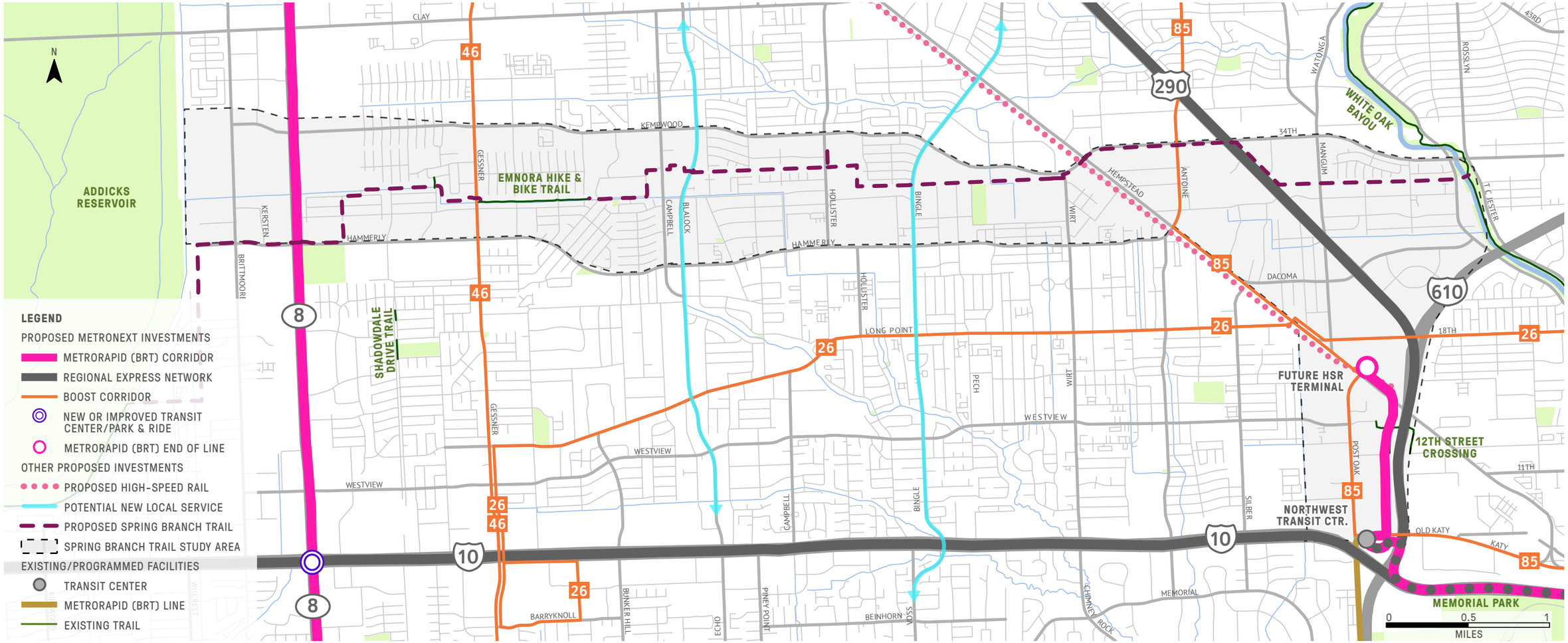

FIGURE 3.22 METRONEXT MOVING FORWARD PLAN

Source: METRO

OPPORTUNITIES: FUTURE TRANSIT

The METRONext Moving Forward Plan, approved for bonding authority by voters in November 2019, proposes a range of transit investments in Spring Branch illustrated in **Figure 3.22**. Proposed BOOST corridors and potential new local routes directly intersect the proposed trail alignment. METRORapid and Regional Express projects promise to expand the rapid transit connections available at Northwest Transit Center (NWTC), the future High-Speed Rail (HSR) Terminal at Northwest Mall, and along IH 10, US 290, and Beltway 8.

METRONext presents numerous opportunities to create new walking and biking connections that tie into the Spring Branch Trail. The Moving Forward Plan includes $70 million for Universal Accessibility, funds that can improve bus stops and nearby sidewalks systemwide. In addition, first- and last-mile connections will likely be a component of all METRORapid and BOOST corridor projects.

BOOST CORRIDORS & NEW LOCAL SERVICE

The BOOST program aims to holistically improve the safety, speed, reliability, comfort, accessibility, and overall customer experience along high-ridership local bus routes. The 26 Long Point/Cavalcade, 46 Gessner, and 85 Antoine/Washington routes, shown in orange in **Figure 3.22**, are BOOST corridors identified for optimization.

The Moving Forward Plan also includes a 25 percent increase in local bus service, which can improve existing routes and add entirely new service. Although not explicitly included in METRONext, new routes on Blalock Road and Bingle Road could bridge the large gap in north–south connectivity between the Gessner and Antoine corridors and intersect the proposed trail alignment.

METRORAPID

METRORapid corridors are Bus Rapid Transit (BRT) lines. Termed “rail on rubber”, BRT features station platforms and dedicated travel lanes much like light rail. The Moving Forward Plan includes three METRORapid projects in Spring Branch: the Inner Katy corridor, which is already funded and will connect NWTC to Downtown; the extension of the Uptown BRT to the future HSR Terminal; and the West Houston corridor proposed along Beltway 8 between the Missouri City and West Little York Park & Rides.

These projects will transform the future HSR Terminal at Northwest Mall into a major transit hub. The Inner Katy project and Uptown extension will enable rapid transit connections between Northwest Mall and two of the Houston area’s four largest job centers (Uptown and Downtown), with the other two (Texas Medical Center and Greenway Plaza) easily reachable with a transfer.

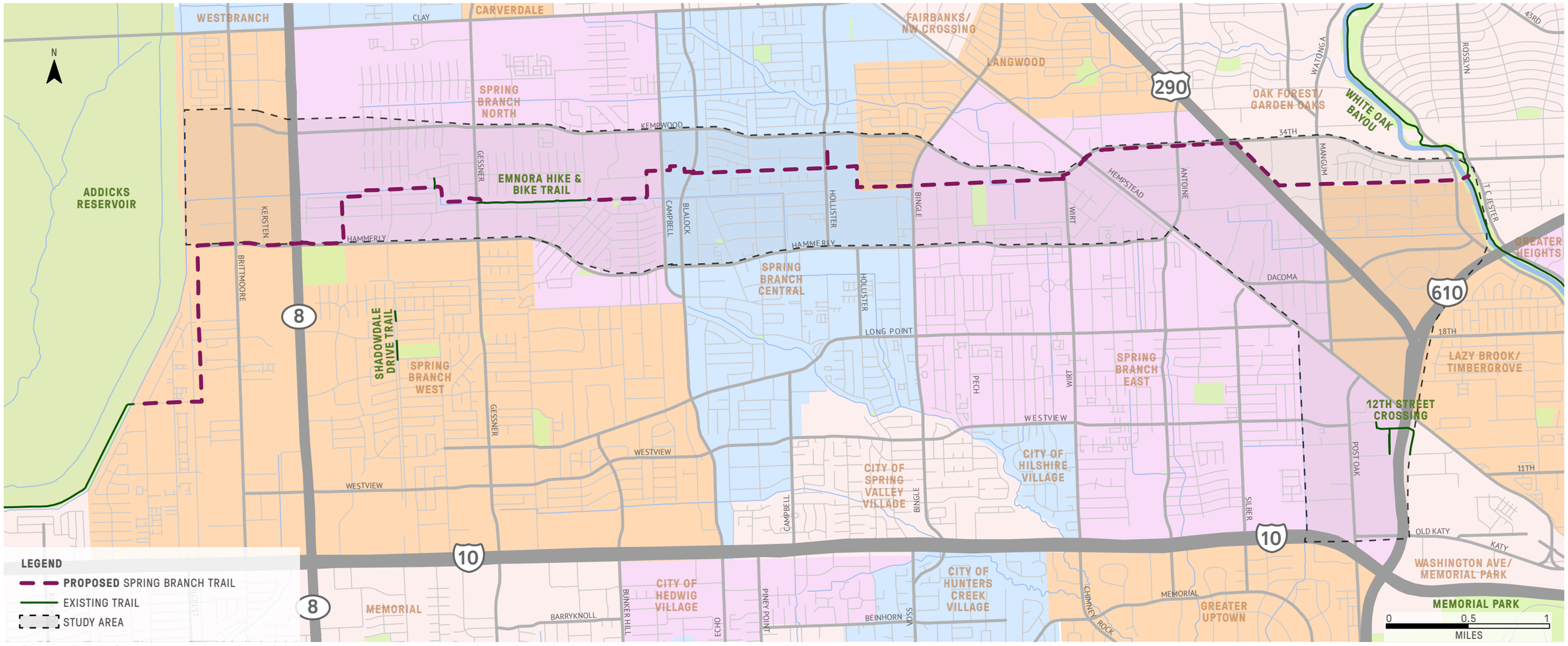

FIGURE 3.23 SUPER NEIGHBORHOODS

DESTINATIONS: SUPER NEIGHBORHOODS

A super neighborhood is "a geographically designated area where residents, civic organizations, institutions and businesses work together to identify, plan, and set priorities to address the needs and concerns of their community". Super neighborhoods serve as organizations for stakeholders to collectively communicate their local needs. As **Figure 3.23** illustrates, the study area and the proposed trail corridor intersect seven super neighborhoods: Spring Branch West, Spring Branch North, Spring Branch Central, Langwood, Spring Branch East, Oak Forest/Garden Oaks, and Lazy Brook/Timbergrove.

The majority of the Spring Branch super neighborhoods are very active with regular monthly meetings to share information on projects, events, and other City of Houston related information. The Spring Branch Trail potential has created some excitement in multiple super neighborhood meetings as residents are generally in great anticipation of trail implementation.

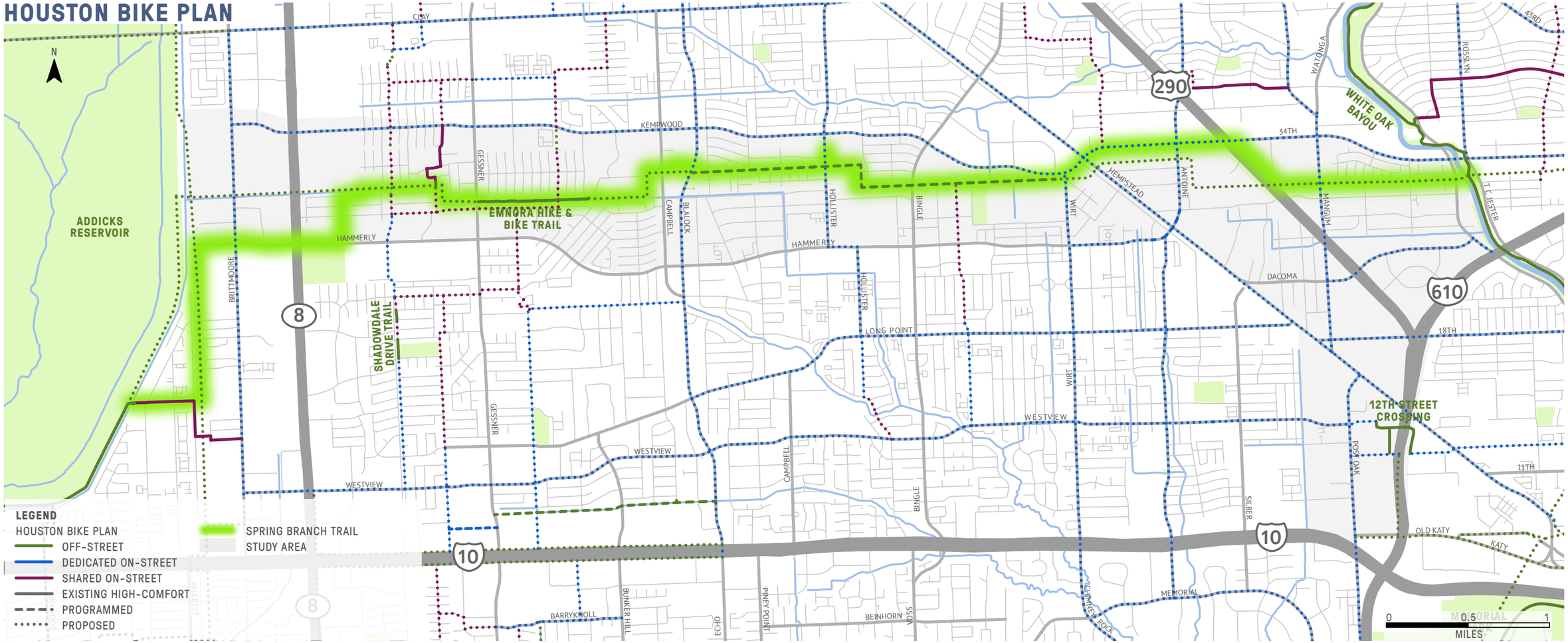

FIGURE 3.24 HOUSTON BIKE PLAN

Source: City of Houston

OPPORTUNITIES: BIKEWAYS

Access to off-street trail facilities via bike is also limited in the study area. Only the western and eastern ends of the study area have relatively easy access to long-distance high-comfort trail facilities amenable to recreational cycling, on the Addicks Reservoir Trail and White Oak Bayou Greenway, respectively. There are currently a few streets corridors with very poor bike lanes that are used by some cyclists, but are outdated, unsafe and low comfort. Blalock Road, Wirt Road, and Kempwood Road are examples of low quality existing bikeways that need improvements.

The *Houston Bike Plan*, adopted in 2017, lays out long-range vision for a safe, connective bicycle network spanning the City of Houston. **Figure 3.24** shows the existing, programmed (short-term), and planned (long-term) bikeway corridors envisioned in this plan. Although the timeline for most of proposed bikeway corridors is unknown, some projects in and around Spring Branch have been programmed for design and construction in the short-term. The construction of high-comfort bike facilities on roadways in and around Spring Branch will complement and benefit from the Spring Branch Trail. Together, the proposed on-street facilities and the trail can form a network of safe cycling facilities linking all communities within Spring Branch to one another and providing regional connections beyond the district. This will enhance access to the trail for recreational purposes, and increase the viability of useful trips to schools, parks, businesses, and other destinations of interest.

This study uses the corridors identified in the *Houston Bike Plan* as a foundation for regional bikeway connection recommendations.

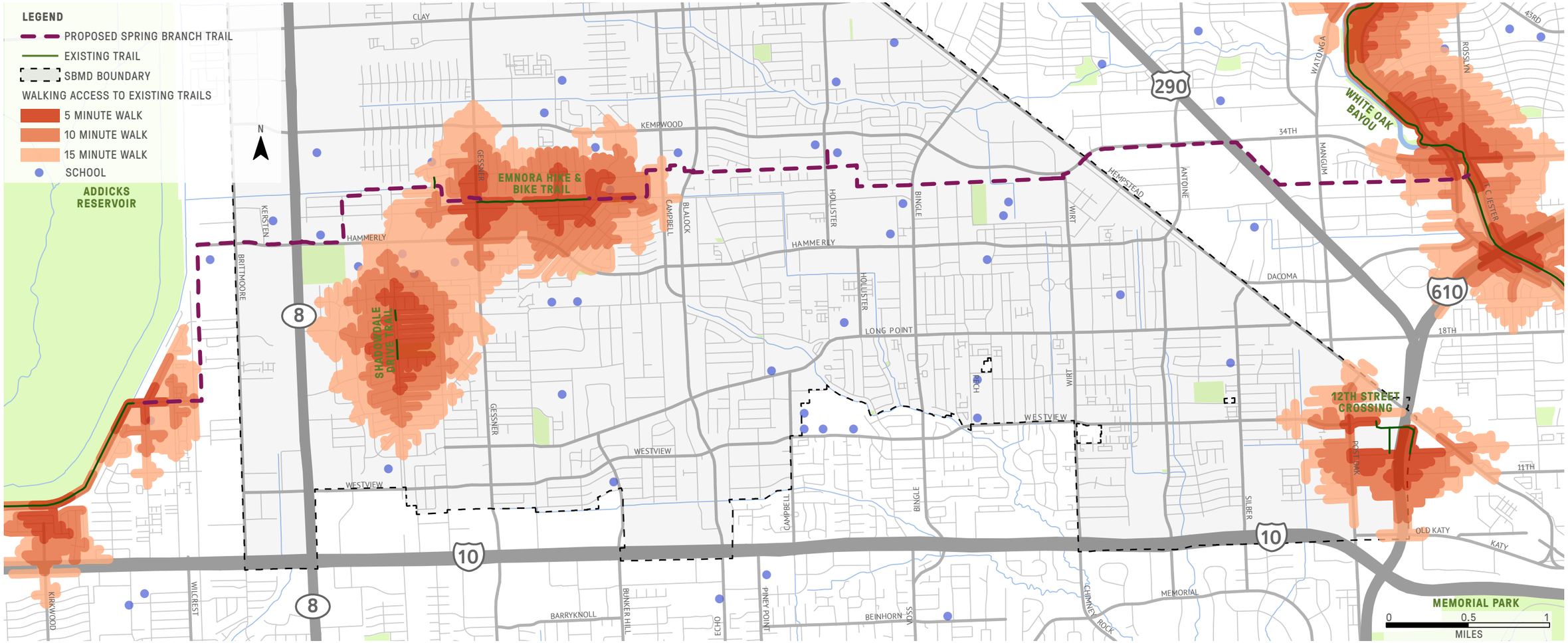

FIGURE 3.25 WALKING ACCESS TO EXISTING* TRAILS

OPPORTUNITIES: IMPROVED TRAIL ACCESS

The Spring Branch Trail presents an incredible opportunity to expand access to safe, spacious, and high-comfort walking and biking facilities designed for people of all ages and abilities.

Figures 3.25 and **3.26** show, respectively, the places within a five-, ten-, and 15-minute walk of off-street paths and trails before and after the proposed Spring Branch Trail. Today, only a small fraction of the study area and the greater Spring Branch vicinity lies within walking distance of existing and programmed off-street trails. Many of communities with convenient walking access to trails are outside of Spring Branch itself, either west of Beltway 8 near Addicks Reservoir or east of US 290 near White Oak Bayou Greenway, as depicted in **Figure 3.25**.

The Spring Branch Trail brings far more of the neighborhood within walking distance of a high-comfort trail, providing a way for residents to access schools, parks, transit, and retail corridors by foot. As **Figure 3.26** illustrates, almost the entire swath of Spring Branch between Hammerly Boulevard and Kempwood Drive/West 34th Street falls within a 15-minute walk of the Spring Branch Trail envisioned in this plan. The proposed trail gives tens of thousands of Spring Branch residents convenient walking access to a high-comfort off-street path, opening up new options for transportation and recreation. As **Figure 3.27** indicates, 36,000 people live within a half-mile (or approximately ten-minute) walk of the full Spring Branch Trail corridor, two thirds of whom (24,600 people) do not have convenient walking access to a trail today.

* *The existing high-comfort facilities included in the walkshed analysis in **Figures 3.25** through **3.30** are the Emnora Hike & Bike Trail between Gessner Road and Northbrook High School, Shadowdale Drive between Metronome Drive and Timberoak Drive, the Addicks Reservoir trail between Chatterton Drive and Reddleshire Lane, the White Oak Bayou Greenway between IH 610 and West 43rd Street, and the West 12th Street sidepath across IH 610 under construction by TxDOT.*

Figures 3.25 *and* **3.26** *assume a walking speed of 3.5 feet per second, the standard for ADA.*

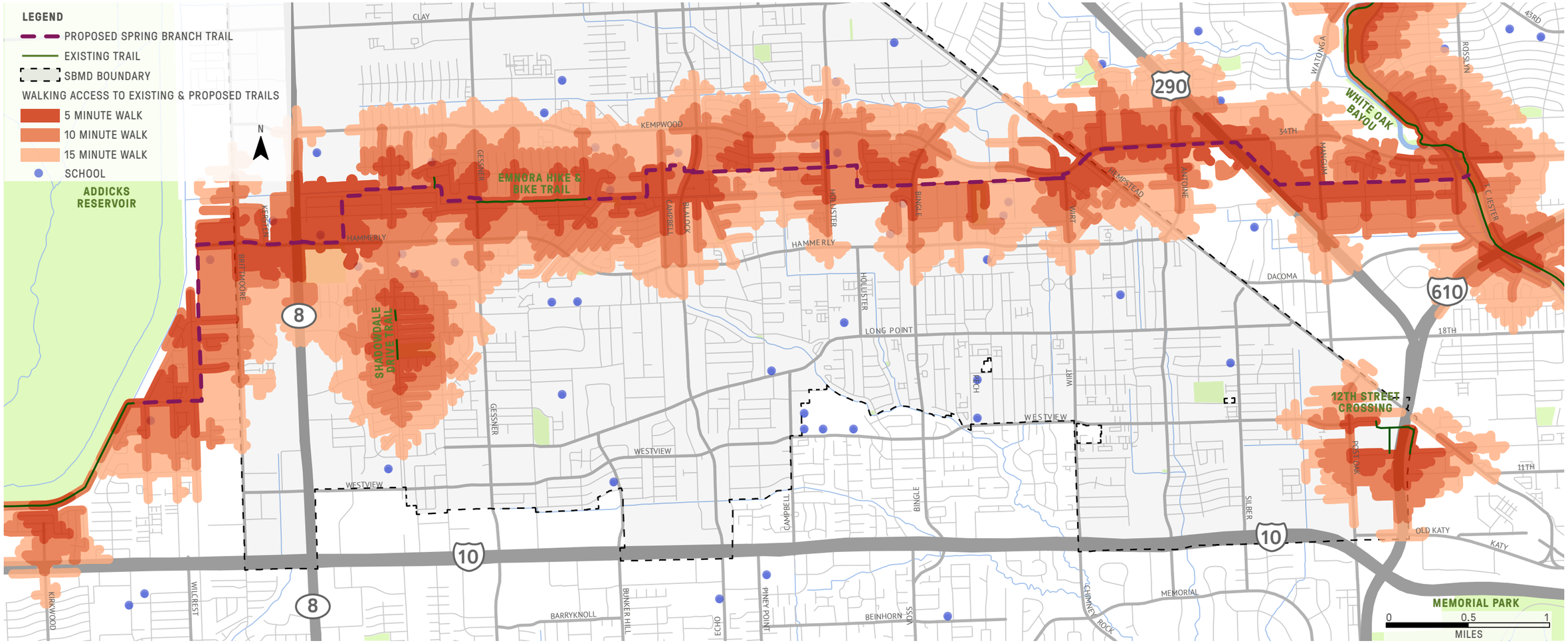

FIGURE 3.26 WALKING ACCESS TO EXISTING* & PROPOSED TRAILS

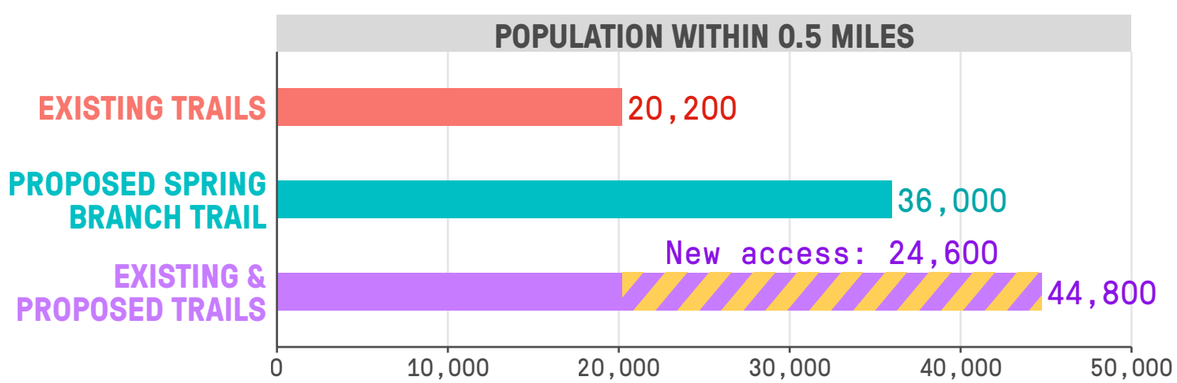

FIGURE 3.27 POPULATION WITH WALKING ACCESS TO EXISTING* & PROPOSED TRAILS

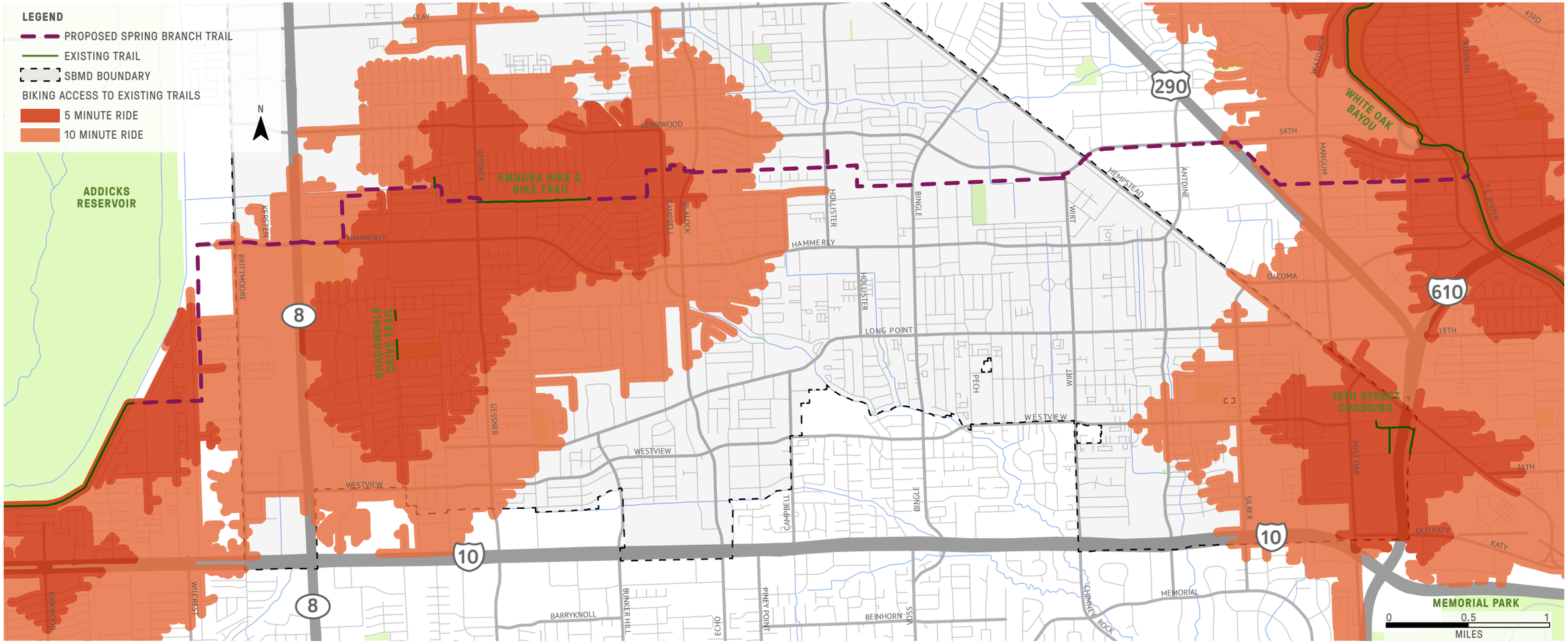

FIGURE 3.28 BIKING ACCESS TO EXISTING TRAILS

OPPORTUNITIES: IMPROVED TRAIL ACCESS

The Spring Branch Trail also dramatically expands the number of people and destinations within a short bike ride of a high-comfort bikeway designed for users of all ages and abilities.

Figures 3.28 and **3.29** show the places within a five- and ten-minute bike ride of an off-street path or protected bikeway before and after the proposed Spring Branch Trail. Compared to the areas within walking distance (**Figure 3.25**), a more substantive portion of Spring Branch lies within convenient biking distance of an existing trail. As **Figure 3.28** shows, much of the western portion of Spring Branch is within a reasonably short bike ride of the existing Emnora Hike & Bike Trail and the Shadowdale Drive trail. However, a *short* bike ride is not the same as a *safe* bike ride: for many of the areas highlighted in **Figure 3.28**, reaching trails by bike is an unsafe and uncomfortable experience that requires traveling along and through fast, high-volume roadways and intersections with little to no dedicated space for cyclists.

The Spring Branch Trail introduces a new high-comfort facility to neighborhoods lacking trails today, creating a regional walking and biking spine accessible by much of Spring Branch. As **Figure 3.29** illustrates, much of the swath of Spring Branch between Long Point Road and Clay Road lies within a convenient ten-minute bike ride of the proposed trail corridor or an existing facility. As **Figure 3.30** indicates, over 124,000 people live within a 1.5-mile (or approximately ten-minute) bike ride of the Spring Branch Trail, over 53,000 (or 43 percent) of whom are not within a reasonable biking distance today.

The neighborhood connections developed in the Implementation Workbooks chapter can further benefit residents by ensuring that biking to and from trails is a safe and comfortable experience for people of all ages and abilities.

** The existing high-comfort facilities included in the walkshed analysis in **Figures 3.25** through **3.30** are the Emnora Hike & Bike Trail between Gessner Road and Northbrook High School, Shadowdale Drive between Metronome Drive and Timberoak Drive, the Addicks Reservoir trail between Chatterton Drive and Reddleshire Lane, the White Oak Bayou Greenway between IH 610 and West 43rd Street, and the West 12th Street sidepath across IH 610 under construction by TxDOT.*

***Figures 3.28** and **3.29** assume a constant biking speed of nine miles per hour.*

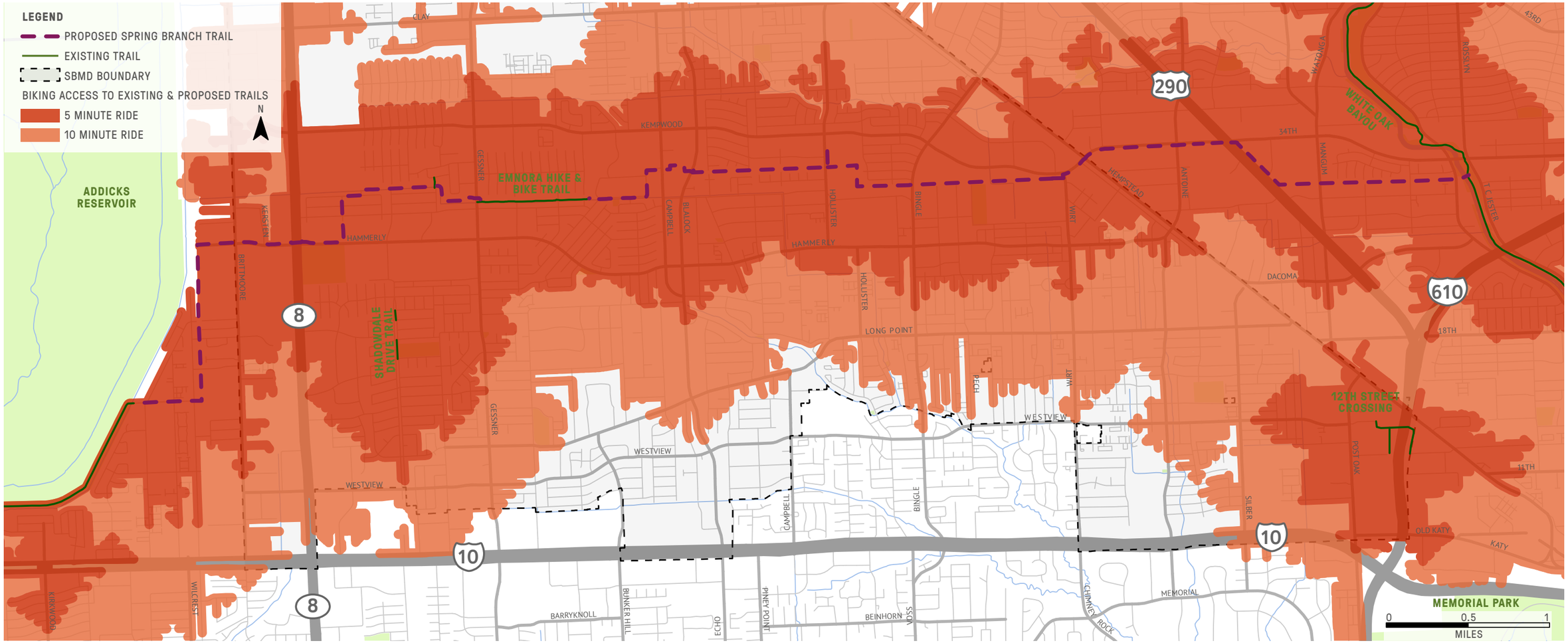

FIGURE 3.29 BIKING ACCESS TO EXISTING TRAILS

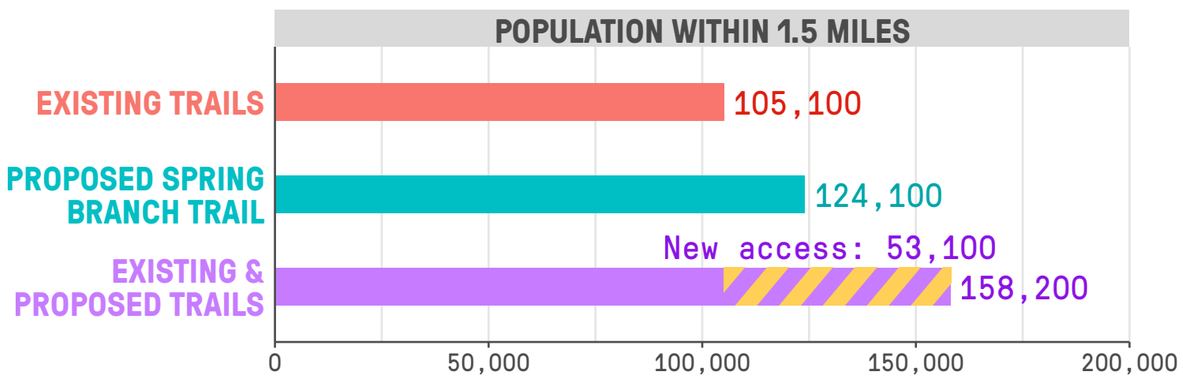

FIGURE 3.30 POPULATION WITH BIKING ACCESS TO EXISTING & PROPOSED TRAILS

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TOOLBOX, RECOMMENDATIONS, & CORRIDOR PLAN

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INTRODUCTION

The existing conditions, needs, barriers, and opportunities assessment in the previous chapter presented baseline data for how a regional trail connection can be made through Spring Branch and beyond. Ideally, a fully integrated trail that utilizes CenterPoint easements would be consistent and straightforward. However, the barriers presented make it challenging to fully complete the trail network strictly within the easements. To address this challenge, a Corridor Plan was created through closely analyzing locations for logical, high-comfort off-street and on-street all ages and abilities walk and bike connections between the Addicks Reservoir and the White Oak Bayou Greenway, centering around the CenterPoint easements where feasible.

The proposed Spring Branch Trail corridor will link together safe, comfortable, and equitable off-street trails and on-street bikeways, navigating around barriers and providing access to destinations. The Corridor Plan is the proposed recommended alignment for the trail that is broken down into seven segments for phased implementation. Supporting the Corridor Plan recommendations, a Spring Branch Trail Toolbox provides sample photos and graphics that illustrate the concepts recommended as a part of this project, supporting an all ages and abilities trail spine for Spring Branch.

"All Ages and Abilities" is a criteria set forth in the National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and is a national and international best practice guide that considers the urban context and provides recommendations that are safe, comfortable, and equitable for all users. The goal is to design a bikeway that is safe for everyone including women, children, seniors, and people with disabilities including minority and low-income individuals - keeping in mind the more vulnerable or under-represented bicyclists.

A schematic drawing was created for the entire corridor to lay out a proposed trail alignment. Within the CenterPoint easement locations, the corridor design strictly follows what is allowed through the CenterPoint and City of Houston Master License Agreement. The trail must be no less than 20 feet from a tower or other CenterPoint infrastructure, the trail cannot be more than 10-feet wide, and there must be 10-feet on both sides of the trail set aside as a maintenance easement (totaling 30 feet width of the trail and maintenance area). Identifying the appropriate on-street treatment for the Spring Branch Trail was determined using best practices guides such as *American Association of State Highway and Transportation Officials* (AASHTO) and NACTO, the requirements laid out in the *City of Houston's Infrastructure Design Manual* (IDM), and the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD).

To determine the on-street bikeway recommendations in the schematic, traffic data collection and analysis took place at the start of the study process to understand the existing function of the corridors, the right-of-way widths and constraints, and any other geometric constraints or opportunities in considering on-street bikeway recommendations. The preliminary recommendations for the on-street segments were shared, discussed, and coordinated with staff representatives from the City of Houston and TxDOT as the owners of the existing on-street rights-of-way.

TOOLBOX OVERVIEW

The Toolbox provides illustrations and explanations for the types of Spring Branch Trail recommendations used in developing the Corridor Plan. This Toolbox was developed with the goal of implementing an all ages and abilities network of on-street and off-street facilities.

The Toolbox is a useful visual glossary of terminology that will be used throughout the report. Each section provides definitions for these terms, explanations of their intended use, as well as photos of real-world examples for reference. The Toolbox not only includes types of corridor type recommendations, but also presents important supporting trail features within those types and that will support a more comprehensive, safe, and integrated regional trail. Toolbox topics, and subtopics, include:

- **Off-street trails**
  - Mid-block crossings
- **Neighborhood bikeways**
  - Wayfinding
  - Traffic speed and volume reduction
  - Intersection treatments
- **On-street dedicated bikeways**
- **Transit considerations**
- **Programs to support the trail**
- **Trailhead and landscaping design ideas**

This toolbox is not an exhaustive list of all types of walking and biking facilities available. This list was specifically curated to illustrate real-world best practice examples of the preferred recommendations supporting the Spring Branch Trail. More best practice examples for general walking and biking design implementation can be found through NACTO or AASHTO.

CORRIDOR PLAN OVERVIEW

The Corridor Plan presents the full 11-mile Spring Branch Trail recommendations through seven segments for phased implementation over time. The segments were created through thoughtful and logical break points that not only should function independently without the other trail segments, but that will ultimately support a larger regional trail corridor. Each of the trail segments have unique design and safety challenges that can be addressed within the Toolbox presented within this chapter.

The Corridor Plan lays out the following information illustrating the logic and planning behind the recommendations as well as addressing safety, design, and coordination necessary to implement. Each segment presents the following:

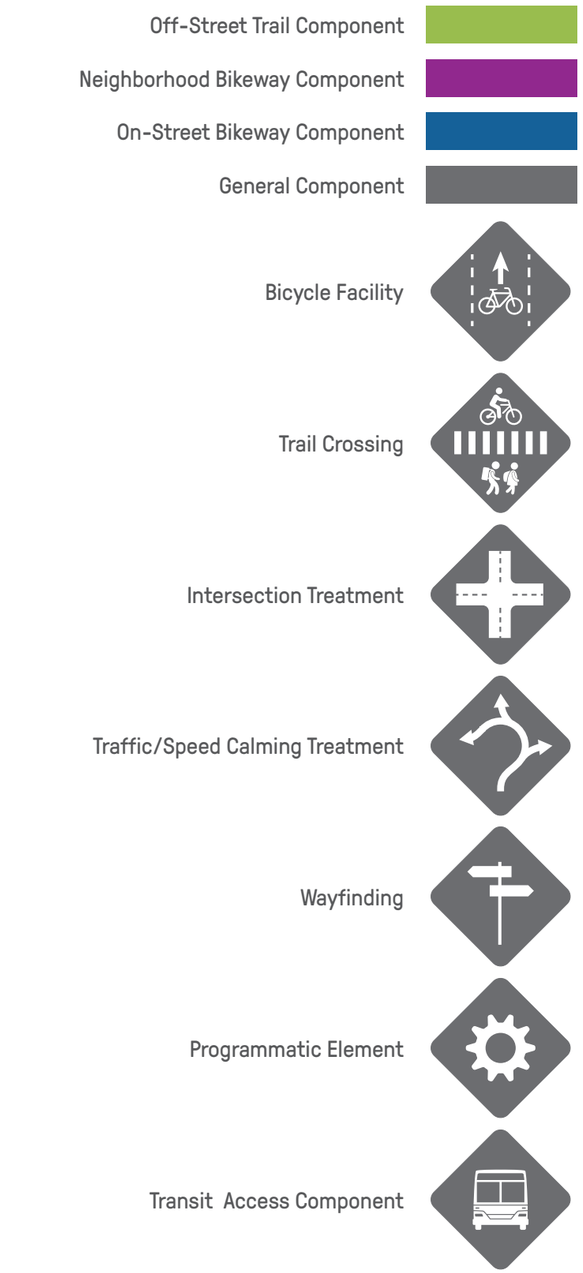
- **Alignment overview**
- **Alternatives considered**
- **Points of interest**
- **Trail access points**
- **Mid-block crossings**
- **Toolbox references**

This information is presented with implementation considerations in the next chapter: Implementation Workbook.

REGIONAL BIKEWAY CONNECTIONS

Supporting the Corridor Plan are regional bikeway connections identified through analysis of the *Houston Bike Plan* (2017) recommendations and from previous studies including the *Spring Branch Comprehensive Plan* and *Reimagine Long Point*. There is an exciting opportunity for SBMD, the City, and other organizations to expand on the Spring Branch Trail east-west corridor to ensure communities both north and south of the trail have access to and from the trail and to continue to build-out a quality network for people walking and biking.

TOOLBOX ICON LEGEND



OFF-STREET TRAILS

Off-Street trails (Figures 4.1, 4.2, 4.3, 4.4) provide a wide, comfortable pathway shared by people walking and bicycling. It is distinct from other common pedestrian and bike facilities in that it does not usually follow a roadway. Because of this full separation from motor traffic, this facility type is the most comfortable for recreation and long trips; however, it also has reduced access to street destinations when compared to on-street options. Center stripes are considered optional on off-street trails, but their presence can help to remind trail users that they are using a two-way facility and should attempt to stay to one side of the trail. A center stripe should be included on high-volume trails to improve comfort.

FIGURE 4.1: OFF-STREET TRAIL, BOULDER, CO

FIGURE 4.2 OFF-STREET TRAIL, UNIVERSITY PLACE, WA

FIGURE 4.3 COLUMBIA TAP RAIL TRAIL, HOUSTON, TX

FIGURE 4.4 CENTERPOINT EASEMENT TRAIL, HOUSTON, TX

MIDBLOCK CROSSINGS

Wherever an off-street trail crosses a street, a midblock crossing treatment of some kind is necessary. These crossings are distinct from other walking and biking crossings in that they do not fall at an existing intersection. Because they create what is essentially a new intersection, their locations are regulated by the City of Houston, which defines that they must be at least 100 feet from an existing intersection. Depending on the traffic speed, traffic volume, and geometry of the street that the trail crosses, a variety of treatments may be necessary.

SIGNAGE AND PAVEMENT MARKINGS

At crossing locations on streets with low traffic volumes and speeds, active traffic control may be unnecessary. When appropriate, **warning signage and crossing pavement markings (Figures 4.5, 4.6)** may be a viable and less costly alternative. The core elements of this treatment are signage to warn drivers of the crossing, and white and green shared **crossing pavement markings (Figure 4.7)** to highlight the crossing location. Different municipalities use different standard pavement markings for bikes and shared crossings; refer to City of Houston's IDM standards for details. Additional advance warning signage, advance warning pavement markings, yield triangles, and "yield here to ped and bike" signs are also recommended. Street parking should be restricted in the vicinity of the midblock crossing in order to provide better visibility between vehicles and crossing users. The IDM provides recommendations about the degree of treatment to be used based on roadway characteristics and traffic, but this trail's context and status as a regional spine should be considered when consulting City standards. Using more intensive measures than the City recommends may be advisable. Additional considerations related to the IDM standards are included at this end of this chapter in **Table 4.2**.

FIGURE 4.5 MIDBLOCK CROSSING SIGNAGE/ PAVEMENT MARKINGS, MARION, IA

FIGURE 4.6 MIDBLOCK CROSSING SIGNAGE/ PAVEMENT MARKINGS, HOUSTON PARKS BOARD

FIGURE 4.7 SHARED CROSSING PAVEMENT MARKING, HOUSTON, TX

ACTIVE TRAFFIC CONTROL

Active traffic control crossings use flashing lights and signals to indicate to drivers a trail user is attempting to cross the street. At midblock crossings of streets with high traffic volumes and speeds, active traffic control is necessary to safely convey trail users. These active methods provide safe routes across streets that would otherwise pose major barriers to people walking and biking, and thus are very beneficial to people walking and biking along the trail or simply in its vicinity. Several of these major streets meriting active crossings are also transit corridors, which means that the crossings will have the added benefit of enhancing transit service by providing another street crossing location for boarding and alighting bus passengers.

The pedestrian **hybrid beacon (Figure 4.8, 4.9)** (also known as a HAWK) is the most intense and permanent solution available for a midblock crossing. It pairs all the elements of a signage and pavement marking midblock crossing with a mast arm equipped with yellow and red lights which will cycle on when a person crossing presses a button. The advantage of this system is that its red lights provide a consistent experience to drivers, who should know how to act when given a red traffic light. However, this system is also the costliest to install when compared with other options. In order to account for this potential high cost and retain the latitude to make the appropriate contextual choice, this was the solution included in the cost estimate for every active traffic control midblock crossing.

The **rectangular rapid flashing beacon (RRFB) (Figure 4.10)** has all the elements of a signage and pavement marking crosswalk, with the addition of flashing yellow lights on the crosswalk warning signs. These yellow lights are activated when a pedestrian pushes the button to cross, and draw the attention of people driving. This solution has a much lower cost and simpler implementation than pedestrian hybrid beacons. However, they do not provide drivers with a definitive red stop signal.

Median refuge islands (Figure 4.11) can be paired with either of the above active traffic control methods to enhance safety. By creating a wide raised island with a pedestrian cut through, this design element gives a person crossing the street a safe place to wait in the middle of the roadway. This makes crossings safer and more comfortable by simplifying the risk assessment tasked to the crosser, in that they only must cross one direction of traffic at a time. It also shortens the overall crossing distance, decreasing the time that the crosser spends exposed to traffic. In addition to the refuge effects for crossing users, a median refuge island can also have traffic calming effects by providing a horizontal constraint for people driving. Median refuge islands are a relatively low-cost intervention with significant impacts on crossing comfort, and should be implemented wherever feasible when creating an active traffic control midblock crossing.

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FIGURE 4.10 RRFB, ST. PETERSBURG, FL

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FIGURE 4.11 MEDIAN REFUGE ISLAND, BELLEVUE, WA

RAISED CROSSWALKS

A **raised crosswalk (Figure 4.12)** uses vertical deflection to slow approaching vehicles and visually reinforce the priority of those using the crossing. People walking and biking through the crossing experience a near-level grade through the crossing, while roadway users are temporarily forced up onto near-sidewalk grade. Implementation of raised crosswalks varies in difficulty depending on site drainage characteristics. They are a crossing enhancement compatible with all the signalization methods introduced in the previous section.

BUS STOP CONSIDERATIONS

Where the trail crosses a bus route at a midblock location, coordination with METRO is recommended. A bus stop spacing and placement study could be undertaken to determine whether nearby stops should be moved to **midblock locations (Figure 4.13)** so that transit riders may easily take advantage of the midblock crossing treatment created by the trail. If bus stops are moved closer to the trail, they should be placed on the far side of the midblock crossing to maintain visibility of people in the crossing and to minimize bus delays. If applicable, trailheads adjacent to these stops should integrate bus stop access into their design to provide a seamless experience transitioning between the trail and the bus.

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FIGURE 4.8 PEDESTRIAN HYBRID BEACON, TALLAHASSEE, FL

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FIGURE 4.9 PEDESTRIAN HYBRID BEACON, PHOENIX, AZ

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FIGURE 4.12 RAISED MIDBLOCK CROSSING, CEDAR RAPIDS, IA

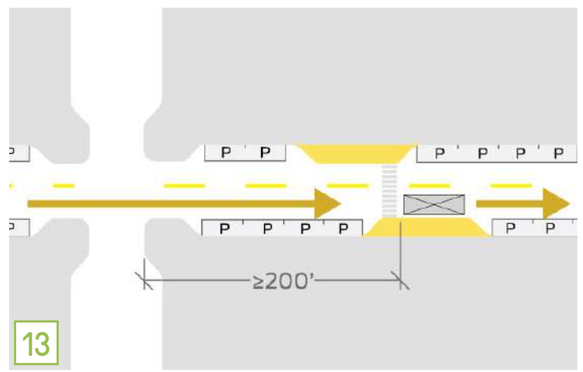

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FIGURE 4.13 BUS STOP AT MIDBLOCK CROSSING, NACTO

NEIGHBORHOOD BIKEWAYS

Neighborhood Bikeways are roadways with low traffic volumes and speeds where bicycles share the roadway with other vehicles. Neighborhood bikeways go by many names around the country and are referred to as bicycle boulevards in national design guidance. Their core elements are simple signage and wayfinding; however, where necessary, the toolbox for neighborhood bikeways can expand to include interventions that will reduce vehicular traffic speeds and vehicular traffic volumes. These interventions are recommended on corridors where speeds or volumes exceed the maximums listed in NACTO's "Contextual Guidance for Selecting All Ages & Abilities Bikeways" table.

This section serves as an introduction to the elements of a neighborhood bikeway; detailed guidance can be found in the Bicycle Boulevards chapter of NACTO's Urban Bikeway Design Guide.

WAYFINDING

Sharrows (Figure 4.14) serve two primary functions: wayfinding for people biking, and a visual reminder for people driving that they are using a street that is intended to prioritize people on bikes. They can help guide people biking along turns in the recommended route and lead them to important connections such as a trailhead for an off-street trail. This facility does not provide any separation between drivers and cyclists, so it is not appropriate in high-traffic-volume or high-speed scenarios.

Signage (Figure 4.15, 4.16) along neighborhood bikeways serves to guide people biking along the route and to destinations, such as schools, parks, or trailheads. It also is an opportunity for branding the route, helping to unify the experience between neighborhood bikeways and the other walking and biking facilities that make up the Spring Branch Trail.

FIGURE 4.14 SHARROWS, PORTLAND, OR

FIGURE 4.15 NEIGHBORHOOD BIKEWAY SIGNAGE, PORTLAND, OR

FIGURE 4.16 NEIGHBORHOOD BIKEWAY SIGNAGE, SAN LUIS OBISPO, CA

INTERSECTION TREATMENTS

Where a neighborhood bikeway crosses an intersection, it is important to prioritize through travel along the neighborhood bikeway for people on bikes. In the neighborhood context, this typically means reorientation of stop signs such that cross-streets yield to the bikeway. In order to prevent the bikeway from being used as a motor vehicle cut-through, these efforts should be paired with methods to minimize vehicular speed and volume.

Where the neighborhood bikeway crosses major streets, more substantial changes may be necessary to ensure cyclist comfort. A **partial closure and median refuge island (Figure 4.17, 4.18)** is a median refuge island as described in the discussion of midblock crossings, but placed at an intersection such that it allows through bicycle and walking travel while disallowing left turns onto the neighborhood bikeway from the major roadway. This provides a volume reduction benefit in addition to a crossing enhancement. A **diverter (Figure 4.19)** is a broad category of designs that restrict certain vehicle turning or through movements while permitting the passage of bicycles. Like midblock crossings, diverters and median refuge islands can be implemented with or without **cyclist/pedestrian-activated signalization (Figure 4.19, 4.20)**, depending on traffic volumes.

FIGURE 4.17 PARTIAL CLOSURE AND MEDIAN REFUGE ISLAND, PORTLAND, OR

FIGURE 4.18 PARTIAL CLOSURE AND MEDIAN REFUGE ISLAND, PORTLAND, OR

FIGURE 4.19 DIVERTER WITH BIKE SIGNAL, TUCSON, AZ

FIGURE 4.20 BIKE-ACTIVATED SIGNAL, PORTLAND, OR

TRAFFIC SPEED AND VOLUME REDUCTION

If traffic speeds or volumes on the recommended neighborhood bikeway corridors are measured to be in excess of the recommended maximums outlined in NACTO guidance, a variety of speed reduction or volume reduction measures, referred to as traffic calming, may be implemented. This section serves as an introduction to speed and volume control solutions, but at the time of implementation national design guidance should be consulted as best practices on these measures are still being developed. It is important to note that these measures are meant to leave people biking unaffected by speed or volume reduction measures, reflecting these corridors' priority of non-motorized modes.

Neighborhood traffic circles (Figure 4.21, 4.22) slow vehicular traffic by forcing it to deflect from a straight path. They also can serve as landscaping or other neighborhood beautification opportunities. **Speed cushions or humps (Figure 4.23, 4.24)** use vertical deflection to slow vehicles, and should be designed with wheel cutouts so that people biking and emergency vehicles are unaffected.

Diagonal diverters (Figure 4.25, 4.26) restrict through movements and left turns for people driving, while allowing people biking or walking to make all movements. Implemented in a neighborhood with a consistent street grid, this intervention can give people walking and biking a more direct path to destinations than those driving, encouraging walking and biking trips and reducing neighborhood cut-through traffic. This reduces vehicular volume along the corridor while promoting through bicycle traffic.


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FIGURE 4.21 NEIGHBORHOOD TRAFFIC CIRCLE, NAPLES, FL

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FIGURE 4.22 NEIGHBORHOOD TRAFFIC CIRCLE, PORTLAND, OR


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FIGURE 4.23 SPEED CUSHIONS BALTIMORE, MD

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FIGURE 4.24 SPEED HUMP, PORTLAND, OR

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FIGURE 4.25 DIAGONAL DIVERTER, PORTLAND, OR


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FIGURE 4.26 DIAGONAL DIVERTER, BALTIMORE, MD

BUS STOP CONSIDERATIONS

Bus routes along neighborhood bikeways are rare, due to neighborhood bikeways' routing along minor streets. When they occur, they are typically low frequency routes intended to fill a gap in the transit service area. In these situations of low bus frequencies, shared space bus stops are typically sufficient. Signage and pavement marking may be necessary to notify cyclists of the presence of buses, but conflicts will be rare enough that little intervention is necessary.

ON-STREET DEDICATED BIKEWAYS

These facilities follow roadway right-of-way and provide cyclists with a high comfort experience by using physical barriers to separate them from motor traffic. The facilities may be designed either within the existing curbs (a front-of-curb design) or outside of them (a back-of-curb design). Design of these facilities varies depending on available space, traffic volumes and speeds along the roadway, and existing drainage infrastructure.

When a bikeway project uses existing roadway and drainage infrastructure, it is a bikeway retrofit. When a bikeway is included as part of a rebuild of the street and its drainage system, the bikeway is only one component of a street reconstruction. Street reconstructions open up more space and possibilities for bikeways by allowing for the relocation of the gutter flow line, but opportunities for these reconstructions are rare. Far more common are retrofit opportunities: these are the design approaches that are described in detail in the bulk of this report. If in the future a street with a bikeway retrofit is reconstructed, that bikeway should be redesigned and reconstructed according to latest design standards.

Protected bikeways (Figure 4.27, 4.28, 4.29), also known as cycle tracks, are a front-of-curb design solution that redistribute roadway space to bikes and separate cyclists from motor traffic with a physical barrier. Depending on context, they may be designed as paired one-way facilities or as a two-way facility. In retrofit scenarios, they can be designed with physical barriers that do not impede existing drainage patterns, but in reconstruction scenarios, more permanent barrier materials are preferred, as well as altered drainage patterns that do not place the gutter in the bikeway. Protected bikeways are recommended when traffic volumes or speeds warrant (refer to NACTO's facility selection table) and there is space in the roadway that may be reallocated to bikes. When implementing protected bikeways, national best practices design guidance should be consulted, as standards are still being developed.

Detailed guidance for protected bikeways can be found in the Cycle Tracks chapter of NACTO's *Urban Bikeway Design Guide.*

Shared-use sidepaths (Figure 4.30) are a back-of-curb design solution that create a wide pathway in place of traditional sidewalks to be shared by people walking and riding bikes. They can be designed as one-way or two-way bike facilities, with the expectation that people walking will always travel two ways. Designing these as one-way bike facilities can simplify signal operations and improve their interface with one-way protected bikeway facilities. Sidepaths are recommended in scenarios where traffic volumes or speeds warrant (refer to NACTO's facility selection chart), there is not space available for a front-of-curb design, and there are few obstacles in the back-of-curb right-of-way. Because these facilities are shared between people walking and riding bikes, they are not appropriate for areas with high volumes of people walking.

Detailed guidance for shared-use sidepaths in the context of Houston's roadways can be found in Chapter 4.2 of the *Houston Bike Plan*.

FIGURE 4.27 PROTECTED BIKEWAY (TWO-WAY), SANTA MONICA, CA

FIGURE 4.28 PROTECTED BIKEWAY, HOUSTON, TX

FIGURE 4.29 PROTECTED BIKEWAY, DRIVEWAY CONFLICT MARKINGS, SAN FRANCISCO, CA

FIGURE 4.30 SHARED-USE SIDEPATH, HOUSTON, TX

INTERSECTION AND DRIVEWAY CONSIDERATIONS

Where a protected bikeway or sidepath crosses an intersection, people biking lose physical separation from motor traffic and are at their most exposed. Because of this, intersections require some of the most careful consideration when designing a protected bikeway or sidepath. This section serves as an introduction to the design of intersections involving protected bikeways and sidepaths, but upon implementation, it is very important to consult the most up-to-date and detailed national design guidance, as best practices of intersection design are rapidly changing.

Where a protected bikeway crosses a street without a bike facility, **intersection conflict markings (Figure 4.31)** highlight the presence of bikes and show cyclists the designed path through the intersection. **Two-stage turn boxes (Figure 4.32)** help people on bikes turn off of the bikeway onto side streets by providing visual instructions

FIGURE 4.31 INTERSECTION CONFLICT MARKINGS, HOUSTON, TX

FIGURE 4.32 TWO-STAGE TURN BOX, PORTLAND, OR

for how to safely turn left out of a right-side bikeway, and by giving them a designated place to wait to cross traffic. At signalized intersections with vehicle detection, bike detectors should be installed. Best practices on bike detection technology and pavement marking are still being developed, so current design guidance should be sought out at the time of implementation.

Where a protected bikeway intersects another protected bikeway, a variety of intersection treatments can be implemented to improve safety for all intersection users. This scenario isn't expected to occur in the initial Spring Branch Trail implementation, but it may arise as the regional connections to the trail are added. A **protected intersection (Figure 4.33)** uses bikeway setbacks and corner islands to improve visibility and reduce turning speeds. Another design approach, the dedicated intersection, uses corner wedges and centerline hardening to achieve many of the safety benefits of a protected intersection in locations where there is not enough space for bikeway setbacks. Detailed guidance for intersections involving protected bikeways can be found in NACTO's *Don't Give Up At The Intersection* design guide.

Where a protected bikeway crosses a high volume driveway, intersection conflict markings and warning signage should be installed. Signage facing exiting drivers is particularly critical for driveways intersecting two-way bikeways.

Where a shared-use sidepath crosses an intersection, people walking and biking cross together in the same space. This space and its corresponding curb ramps should be wide enough to be comfortably shared by both modes. Additionally, intersection corners should be built with the minimum permissible curb radius in order to slow turning vehicles.

FIGURE 4.33 PROTECTED INTERSECTION, SALT LAKE CITY, UT

Driveway interactions with shared-use sidepaths are complex and should be very carefully considered. Signage for driveway users is strongly recommended in order to warn them of the presence of bicycles on the sidepath, as people on bikes likely are moving more quickly than people walking. It is especially important to warn drivers of the presence of two-way trail traffic, as many drivers will otherwise only look left when turning right.

In both protected bikeway and shared-use sidepath scenarios, **raised driveway crossings (Figure 4.34)** can be implemented to enhance the safety of trail users. This design element uses vertical deflection to slow vehicles entering and exiting the driveway and to visually reinforce the priority of those traveling on the bikeway/sidepath. Similarly, **raised crossings at channelized right turn lanes (Figure 3.35)** can be used to slow turning vehicles.

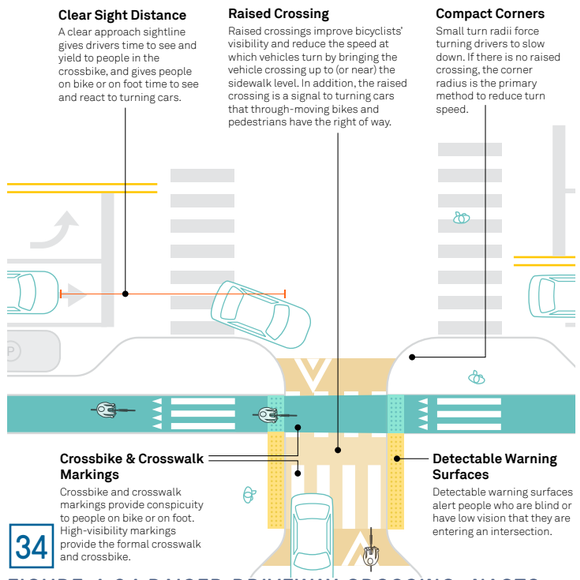


FIGURE 4.34 RAISED DRIVEWAY CROSSING, NACTO

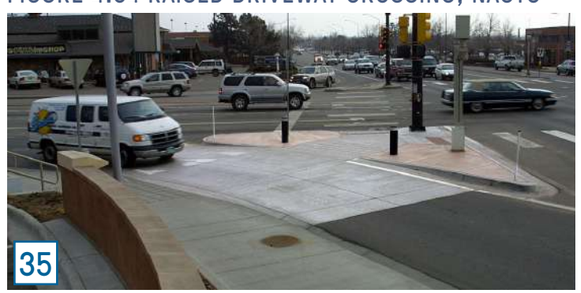


FIGURE 4.35 RAISED CROSSING AT CHANNELIZED RIGHT TURN LANE, BOULDER, CO

BUS STOP CONSIDERATIONS

Typically in bus route and bikeway designs, buses and bikes compete for space along the curb. This competition can lead to conflicts between buses and people on bikes, as they attempt to overtake one another and must merge into adjacent motor vehicle traffic in order to do so. **Floating bus stops (Figure 4.36)** are a design solution that eliminate conflicts between buses and people on bikes by routing bikes behind the bus stop area, such that people waiting for the bus will do so between the bikeway and the roadway. While conflicts between buses and people on bikes are eliminated by this design approach, please note that it does so by introducing a conflict between people on bikes and people crossing the bikeway to the bus stop. Design elements such as signage, crosswalk pavement markings and/or raised crosswalks are appropriate methods of communicating to people on bikes their responsibility to yield. Designs of these stops can vary greatly depending on specific site conditions such as rights-of-way, trees, utility poles, and street drainage considerations, as well as transit agency standards for shelters and stop areas.

METRO has recently developed standard drawings for floating bus stops to guide designers, and these should be made use of during final design and implementation. Additionally, detailed design guidance is available in the Stations & Stops chapter of NACTO's *Transit Street Design Guide*. In the guide, floating bus stops are referred to as side boarding island stops.

Where floating bus stops are infeasible due to obstacles, or in the event of very low frequency bus routes that will make bus/bike conflicts rare, a **shared space bus stop (Figure 37, 38)** may be an acceptable alternative. This design option uses pavement markings to notify people on bikes of the potential conflict, as well as to remind bus drivers to use caution in approaching the stop. When implementing a shared space bus stop along a protected bikeway, it is important to verify that the gap in the bikeway's protection is large enough to accommodate the turning radius and overall length of METRO buses in order to avoid barrier materials' being struck by buses pulling out of the stop area.

Coordination with METRO about the specific design of shared space bus stops is critical.

FIGURE 4.36 FLOATING BUS STOP, SEATTLE, WA

FIGURE 4.37 SHARED SPACE BUS STOP, HOUSTON, TX

FIGURE 4.38 SHARED SPACE BUS STOP, HOUSTON, TX

ADDITIONAL TRANSIT CONSIDERATIONS

In planning and designing for the Spring Branch Trail, it is important to consider the fact that all bus trips begin and end with a person walking, biking, or using another personal mobility device. Viewing transit through this lens demonstrates that each transit rider represents a potential trail user, and each trail user represents a potential transit rider. An excellent regional trail improves the experience of existing transit riders by providing them with additional street crossing opportunities and access to a high-comfort walking and biking corridor for connecting trips. An excellent transit system enables better access to the trail, and provides better connectivity to destinations from the trail. This improved access and connectivity improves the trail as a recreational destination, but particularly enhances its usefulness as a transportation corridor. The creation of a regional trail and the improvement of the regional transit context in which that trail will exist are mutually beneficial goals that should be pursued in parallel in order to maximize the impact of the Spring Branch Trail project.

This section outlines processes and design elements that should be considered integral to the implementation of the Spring Branch Trail. Each of these will require coordination with METRO.

STOP SPACING AND PLACEMENT

Where the trail is implemented along a street with a METRO bus route, a process of corridor optimization should be undertaken. Many routes have stops that are not spaced according to contemporary best practices. Standardizing stop spacing according to best practices can improve bus travel times and on-time performance. Depending on the frequency of existing stops, improving stop spacing may require the removal, addition, and/or shifting of stops. While carrying out this process, there is also the opportunity to improve the specific placement of stops. While many METRO bus stops are currently **near side stops (Figure 4.41)**, METRO standards now call for **far side stops (Figure 4.42)**, as this has shown to reduce delays and increase pedestrian safety. Land uses and destinations should be considered when relocating stops. Coordinating with METRO will ensure optimal stop placement both for the trail and the METRO route.

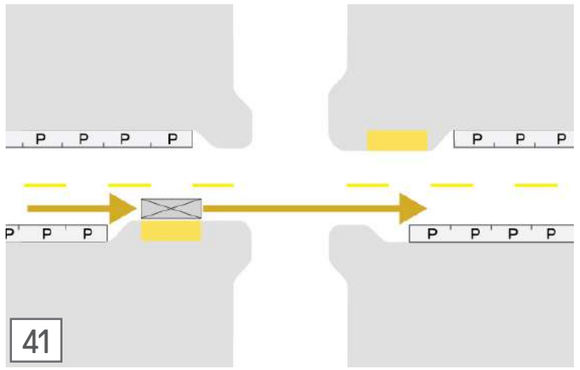


FIGURE 4.41 NEAR SIDE IN LANE BUS STOP, NACTO

REGIONAL CONNECTIONS

Many of the regional connections recommended in this study, and presented in part below in **Figure 4.43** and in whole in **Figure 4.60** at the end of this chapter, are also along future or planned bus routes. When implementing a regional connection bikeway, the implementing party should coordinate with METRO to carry out the process of improving bus stop spacing and placement, and use the applicable bus stop treatments outlined in this toolbox to integrate bus stop and bikeway designs and minimize conflicts between buses and people on bikes.

FIGURE 4.43 REGIONAL CONNECTIONS, HOUSTON, TX

FIGURE 4.39 BIKE ON BUS RACK, HOUSTON, TEXAS

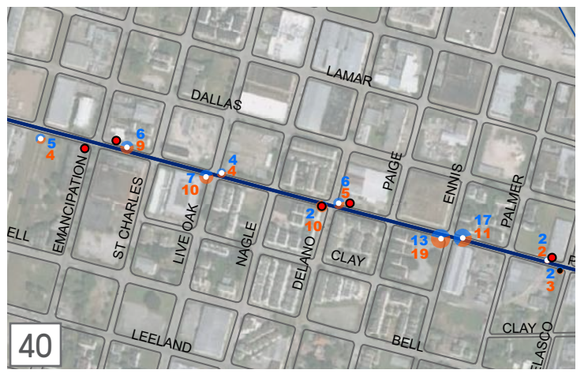


FIGURE 4.40 STOP SPACING AND PLACEMENT, HOUSTON, TX

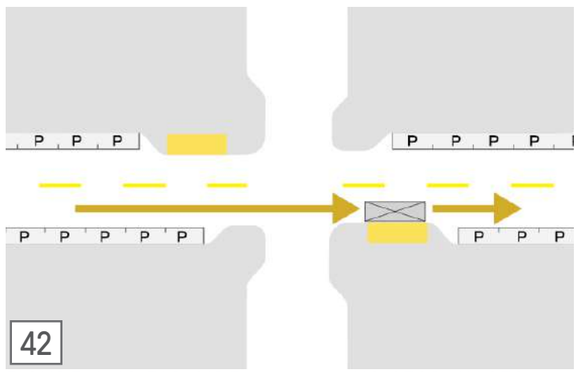


FIGURE 4.42 FAR SIDE IN LANE BUS STOP, NACTO

PROGRAMS

Certain programs and partnerships with local residents, organizations, and businesses can be implemented in parallel with the implementation of the Spring Branch Trail in order to improve trail users' experience while also fostering positive public engagement.

MAINTENANCE PROGRAMS

Various programs can be created to utilize the community's help in maintaining the trail. **Adopt-a-trail programs (Figure 4.44)** are a popular method of organizing volunteers to help maintain trails by picking up trash. By signing up to pick up trash along a trail segment for a period of time, volunteers can get a sign of recognition placed along the trail, or some other benefit. Similar programs can be set up for businesses to help maintain a trash-free trail segment in exchange for public recognition along the trail.

BUSINESS PARTNERSHIPS

Partnerships with local businesses can provide a variety of amenities to trail users while also improving trail publicity and public relations. Some examples of amenities that can be featured in business partnerships include the construction of Spring Branch Trail **branded bike parking (Figure 4.45)**, car parking available to trail users, and discounts for people arriving on foot or by bike. In exchange for benefits or amenities such as these, businesses can be given window stickers and be added to a publicly available list of "Friends of the Spring Branch Trail", or something similar.

FIGURE 4.44 ADOPT-A-TRAIL, THE WOODLANDS, TX

FIGURE 4.45 BRANDED BIKE PARKING, WASHINGTON, D.C.

HOUSTON BCYCLE

Houston BCycle, run by the nonprofit organization Houston Bikeshare, is a system of short-term rental bikes available at 100 (at the time of writing, and growing) docking stations around Houston. Anyone is able to make one-time rentals, and monthly or annual members are available to access unlimited short trips. Stations along the Bayou Greenways continue to be among the strongest-performing stations in the system, and the Spring Branch Trail, as a regional trail connected to the greater Bayou Greenways network, has the opportunity to replicate that success. BCycle stations can be incorporated into trailhead designs or at partnering businesses along the trail. Houston BCycle has funding available, but requires a partner to complete the funding necessary to implement a station. Houston BCycle should be contacted for details about station planning and funding.

FIGURE 4.46 HOUSTON BCYCLE, HOUSTON, TX

TRAIL-ORIENTED DEVELOPMENT

Residential and commercial developments adjacent to the trail can be designed to complement and benefit from the trail. To engage trail users, businesses along the trail can orient themselves to face the trail, and provide bike parking, seating, or other trailhead-like amenities. Businesses can be incentivized to create more dense development friendly to people walking and biking by reducing minimum parking requirements for parcels within a certain distance of the trail that provide amenities for trail users.

FIGURE 4.47 TRAIL-ORIENTED DEVELOPMENT, FORT WORTH, TX

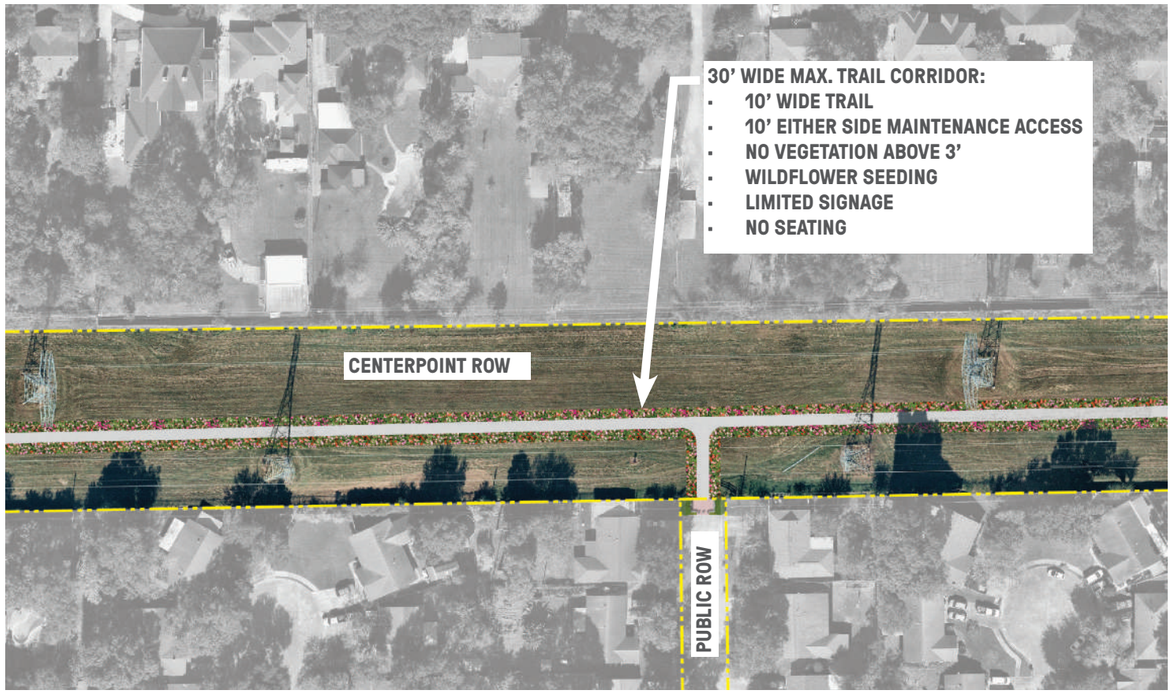


FIGURE 4.48 CENTERPOINT CORRIDOR

30’ Wide Maximum Trail Zone (10’ Concrete Trail + 10’ Maintenance Zone Each Side)

FIGURE 4.49 CENTERPOINT CORRIDOR

Potential wildflower seeding the entire width of corridor pending coordination with CenterPoint’s mowing schedule and agreement.

LANDSCAPING

The Spring Branch Trail utilizes predominantly CenterPoint corridors and City of Houston rights-of-way, Following are approaches to creating landscape strategies for the various types of rights-of-way.

CENTERPOINT CORRIDORS

Given the restrictions of the CenterPoint’s Master License Agreement with the City of Houston on what is permissible in CenterPoint corridors, opportunities for landscape approaches are limited. The trail is limited to a 30’ wide strip (10’ concrete trail with 10’ maintenance strip each side) within CenterPoint corridors (**Figure 4.48**).

Currently a list of approved plant material and criteria for planting is included in the Master License Agreement. Since these corridors are very wide with low-growing vegetation, they are excellent candidates for meadow restoration (**Figure 4.49**). However, coordination with CenterPoint’s mowing schedule is required so that plants will not be cut before they have the opportunity to re-seed themselves. Additionally, if a sponsor exceeds a certain threshold of planting, CenterPoint may require that they take over maintenance for the *entire* corridor, which could be cost prohibitive to the sponsor. If a trail sponsor does want to enhance the full cross section of the corridor landscape, they should consider taking over and funding the maintenance of the segment so that they have control over the maintenance regime. General cost estimates for trail maintenance are included within the next chapter. Additionally, CenterPoint does not allow irrigation in their corridors nor do they allow altering drainage patterns, so a robust plant palette and minimal maintenance regime are recommended.

FIGURE 4.50 TRAILHEAD IN THE PUBLIC RIGHT-OF-WAY

At locations where public ROW is next to the trail, enhanced landscaping (otherwise not permitted in the corridor) can supplement the minimal trail landscape.

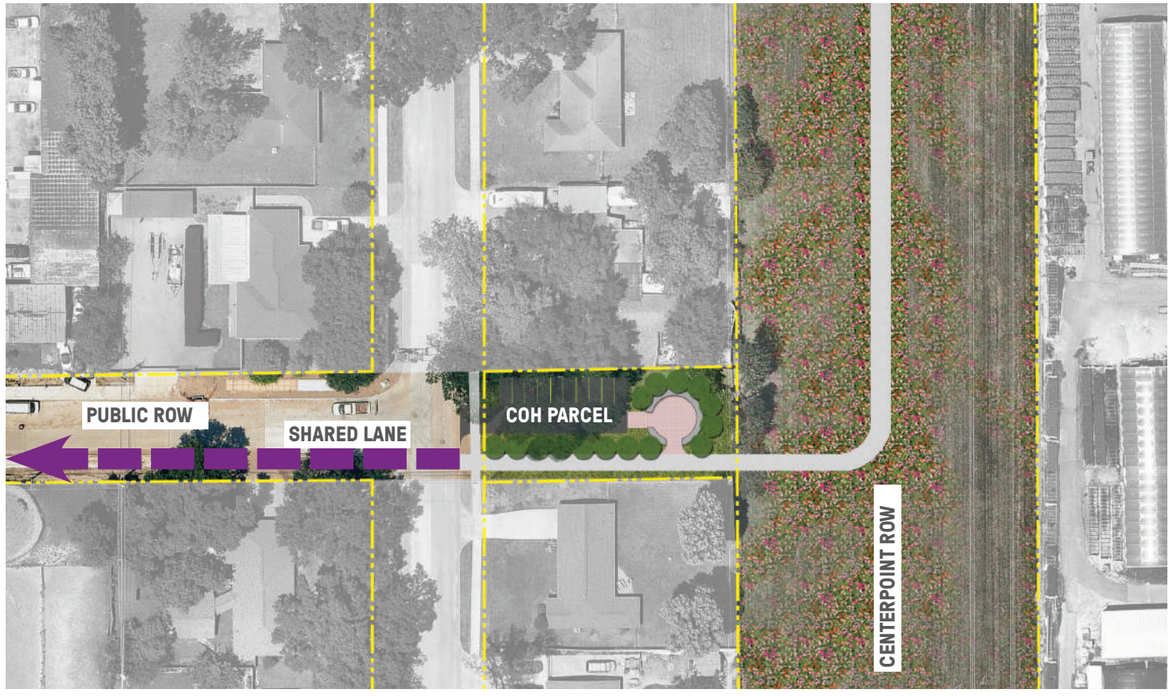


FIGURE 4.51 TRAILHEAD IN AN ADJACENT PARCEL

This parcel at Chatterton is owned by the City of Houston and represents an opportunity for a parking lot and trailhead.

CITY OF HOUSTON RIGHTS-OF-WAY

Where the trail crosses streets, the trail design will be subject to City of Houston's design criteria per the City of Houston Infrastructure Design Manual (IDM) for elements within the public right-of-way. Since the trail is outside of CenterPoint easements at these locations, there are opportunities for street trees for shade (though should still respect CenterPoint's "Right Tree Right Place" guidelines if under power lines), seating, signage, shrubs, and groundcovers. At street crossings, ADA ramps should be provided and "welcome mat" street signage with street names to facilitate wayfinding. Where the trail occupies the public ROW as a bikeway (i.e. traveling with the flow of traffic as opposed to crossing it), further opportunities can be explored for incorporating street trees and other vegetation, depending on the degree of streetscape intervention desired. Landscape opportunities for bikeways as part of the project are outside the scope of this study since these can be considered more normative streetscape projects.

See example of utilizing the public right-of-way in **Figure 4.50**.

ADJACENT PARCELS

At locations where adjacent parcels can be integrated into the trail (as trailheads, destinations, or support facilities) and/or where adjacent property owners are interested in collaborating to integrate the trail with their property, City of Houston landscape ordinances will apply and detention may be required depending upon hardscape improvements. Generally the landscape design at these locations should be welcoming, create places of shade and rest with trees and seating, and have appropriate signage that is within the Spring Branch Trail signage family. Waste receptacles, bike racks, restrooms and drinking fountains are upgraded amenities that can be offered depending upon cooperation of the property owner, funding, and ability for ongoing maintenance. There is also a need for increased vehicular parking along the trail which could be accommodated on adjacent parcels as opportunities arise. These adjacent parcel opportunities are not identified or included in the scope of this study as they will arise through the course of implementation of segments of the trail. As each segment is implemented, a public engagement process can identify these partnership opportunities.

See one example of utilizing adjacent parcel opportunities in **Figure 4.51**.

FIGURE 4.52 WELCOME MAT WITH BOLLARD
Example street name near mid-block crossing with bollard

FIGURE 4.53 911 MILE MARKER
These can be placed anywhere along the trail

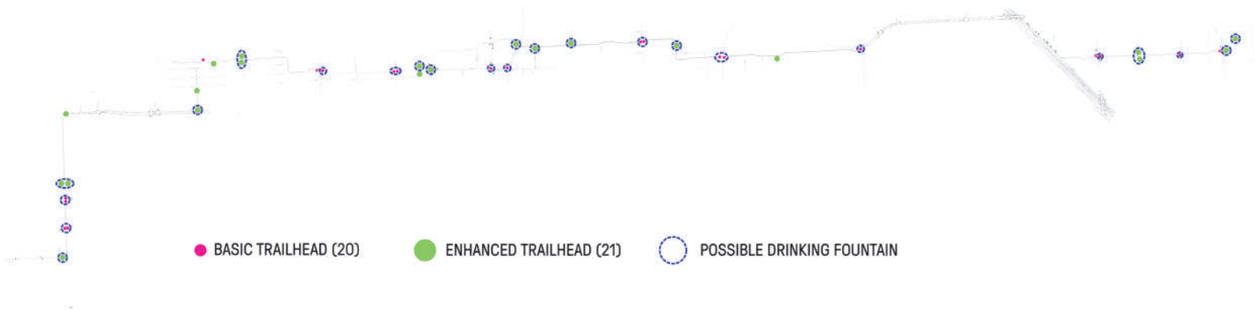


FIGURE 4.54 BASIC VS. ENHANCED TRAILHEADS
The dots indicate potential trailhead locations along Spring Branch Trail corridor based upon current ROW conditions, including potential drinking fountain locations.

FIGURE 4.55 SAMPLE TRAILHEAD SIGNAGE
Houston Parks Board Example under consideration in Spring Branch Phase 1

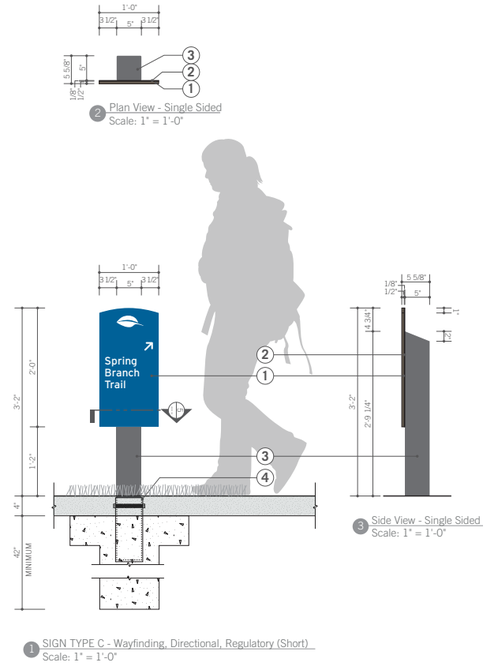


FIGURE 4.56 SAMPLE TRAIL SIGNAGE
Phase 1 Spring Branch Trail Sample by Houston Parks Board

TRAILHEADS

Trailheads serve multiple functions in the context of a trail network. They create transition points from roadways and neighborhoods into the trail itself and therefore serve important gateway and orientation functions, and because of this can serve as meeting points for trail users. Signage should be provided that can include any and all of the following: informational, wayfinding, regulatory (**Figures 4.55 and 4.46**), and mile markers (**Figure 4.53**). Trailheads provide opportunities for rest when they provide seating, and shade when trees or other overhead structures are available and/or feasible. At street crossings, trailheads can also incorporate accessible ramps and signalization where recommended to ensure safe crossing. Where space is available, parking can be provided (though this will typically require an adjacent parcel, which is outside the scope of this study), and where access to a water line is nearby, drinking fountains can be provided. Bike racks may also be provided for temporary storage by trail users. Waste receptacles may also be provided but consideration should be given as to whom will empty them and how frequently. Lighting or enhanced lighting may also be provided where possible and/or feasible. Any special paving associated with trailheads should be engineered to withstand CenterPoint's equipment driving over it to gain access to their corridors.

The project team classified three types of trailheads: Neighborhood Access Points, Basic Trailheads, and Enhanced Trailheads. Basic and Enhanced classifications are used based upon the highest level of amenitization possible given the right-of-way available (see potential locations in **Figure 4.54**.)

Prototype trailheads were developed at multiple sites: at street crossings (Timberoak Drive **Figure 4.57** and Mangum Road **Figure 4.58**), a City of Houston parcel at Chatterton Drive **Figure 4.51** through which the trail crosses, and a street that dead ends into the CenterPoint corridor. The street crossing trailhead represents the most common trailhead opportunity; the dead-end street the second most common (though not very common), and the adjacent parcel the least common, being represented by only the City of Houston parcel at Chatterton Drive.

NEIGHBORHOOD ACCESS POINT

This is simply an access point onto the trail that will not include any trailhead amenities, but is merely a paved path leading to the trail. Neighborhood Access Points exist anywhere a Basic or Enhanced Trailhead is indicated in the diagram above and can be upgraded to Basic or Enhanced Trailheads if funding and right-of-way type allows. Neighborhood Access Points only contribute to the overall basic function of the trail.

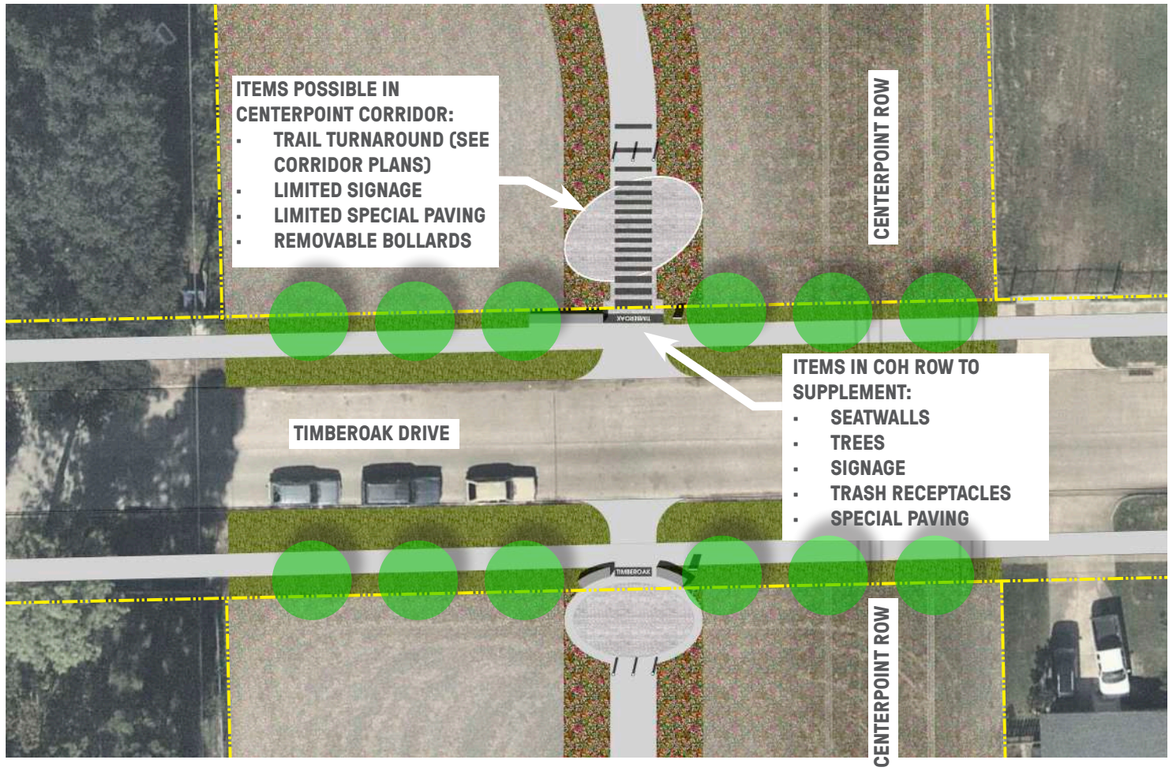


FIGURE 4.57 SAMPLE TRAILHEAD AT TIMBEROAK DRIVE, NEIGHBORHOOD STREET

Streets with less traffic and lower speeds (See corridor plans for street crossing treatment). Note seatwalls and trees are in public ROW.

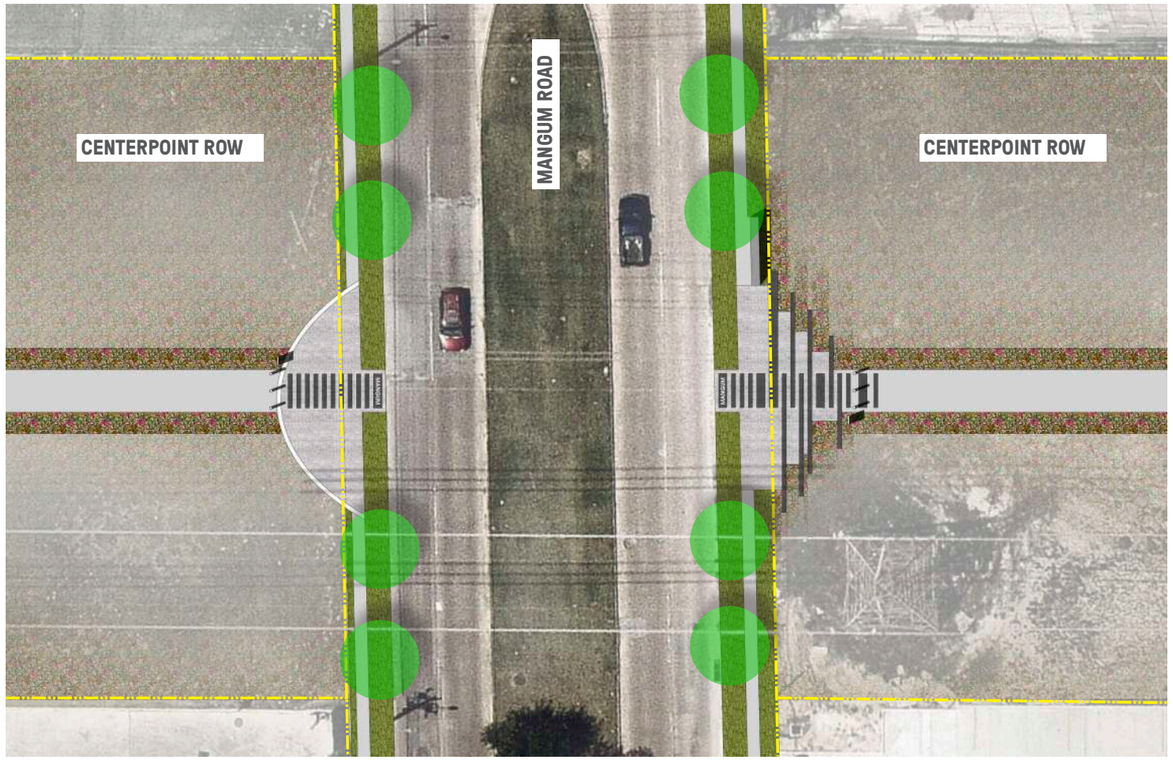


FIGURE 4.58 SAMPLE TRAILHEAD AT MANGUM ROAD, MAJOR STREET

Streets with higher traffic volumes and speeds (See corridor plans for street and median crossing treatment). Note seatwalls and trees are in public ROW.

BASIC TRAILHEAD

The Basic Trailhead designation indicates trailhead opportunities within CenterPoint corridors that are restricted per the Master License Agreement between CenterPoint and the City of Houston. CenterPoint does not allow trees in their corridors due to potential conflicts with overhead power lines. Basic Trailheads at locations where the trail crosses City of Houston (or other) right-of-way or properties can include amenities also not allowed by the CenterPoint Master License Agreement as long as these items are located within the public right-of-way and not on the CenterPoint property. Suggested items for Basic Trailheads include:

- Pavers (with concrete edge restraint band)
- Welcome mat with street name (**Figure 4.52**)
- Concrete seatwall
- Shrubs and/or other low planting
- Trash receptacle
- Removable bollard (**Figure 4.52**)

ENHANCED TRAILHEAD

Opportunities for larger, more monumental entrances into the trail are designated as Enhanced Trailheads. This designation applies at locations where trailheads span across a CenterPoint property to an adjacent property or right of way, or exist outright on a non-CenterPoint parcel, and have enough area to have a larger footprint of materials. Enhanced Trailheads include all the items listed under the Basic Trailheads plus trees.

DRINKING FOUNTAINS

Possible drinking fountain locations are determined in the diagram (**Figure 4.54** in concert with Basic and Enhanced Trailheads) based upon their proximity to water lines as documented on the City of Houston GIMS website (http://www.gims.houstontx.gov/gims). Implementation of drinking fountains at any of these locations will require funding for the drinking fountain itself as well as tapping into the city water line for water supply. Drinking fountains with an ADA-compliant fountain, bottle filling station, and pet fountain should be considered as a best practice. These typically cost around $5,000 each plus the cost of the water line to connect to the city water line (which will be site-specific depending upon the length of the run to make the pipe connection).

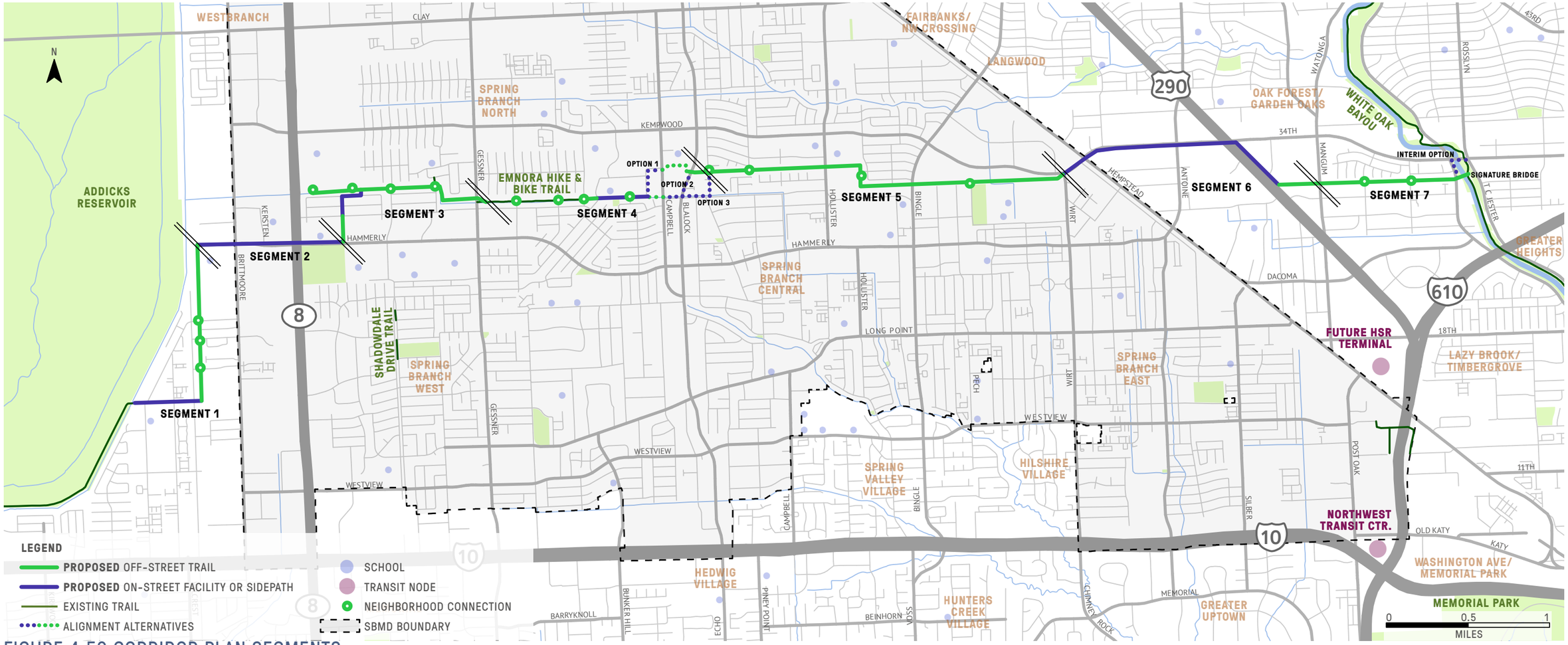


FIGURE 4.59 CORRIDOR PLAN SEGMENTS

CORRIDOR PLAN

At the start of the study process, a simple line was used to illustrate a general alignment for the regional trail between the Addicks Reservoir to the White Oak Bayou Greenway. Through analysis and an understanding of the barriers and opportunities for safe, logical connections to destinations, the Corridor Plan was created recommending a combination of both off-street shared use paths coordinated with segments of on-street high-comfort bikeways with sidewalks. The proposed regional trail was divided into seven segments supporting a phased approach to implement the entire corridor over time.

Each segment provides a combination of on-street and off-street facility types from one end to the other, connecting destinations and providing opportunities for safe locations for people to walk and bike. Each segment could function independently of the other segments if implemented in any order. The map above (**Figure 4.59**) illustrates the nearly 11-mile regional trail corridor in seven segments and indicates off-street and on-street sections with green (off-street) and blue (on-street).

Segment 5 is currently under design with estimated construction in early 2020. This segment is “Phase 1” of the Spring Branch Trail in partnership between the Spring Branch Management District and the Houston Parks Board. It will be significant to connect to this trail supporting the larger regional spine.

DEFINING ALIGNMENT OF ON-STREET SECTIONS OF TRAIL

On-street sections of the Spring Branch Trail were developed as a response to feasibility concerns of crossing the major barriers of Beltway 8, US 290, and the UPRR that runs parallel to Hempstead Road. Bridging over these barriers, while possible, would be very expensive and limit the feasibility of implementation of the Spring Branch Trail. On-street sections both provide opportunities for crossing major barriers, while also providing additional access to CenterPoint trail segments from neighborhoods and key commercial corridors.

To make informed and data-driven decisions on corridor alignment for sections not within the CenterPoint easement, two key factors were considered and evaluated.

Alignment

People walking and bicycling will take the most direct path. Therefore, when developing corridor alignments,

and assessing alternatives, the most direct route was often the preferred route to ensure both convenience and compliance.

Existing Roadway Characteristics

Existing roadway geometry was assessed to determine feasibility of construction of high comfort bicycle facilities within the roadway right-of-way and/or within existing roadway pavement. In addition to geometry, vehicular volumes and vehicular speeds were assessed to provide guidance on the preferred facility for an all ages and all abilities bikeway, as detailed in the Toolbox. Data collected for these analyses is included in **Appendix D** and **Appendix E**. Shared-use sidepaths, on-street bikeways, and neighborhood bikeways were all recommended for on-street segments of the Spring Branch Trail. Traffic operations analyses were also conducted as part of the on-street segment analysis and are summarized at the end of this chapter.

PROPOSED CORRIDOR PLAN

The following pages present details for each segment. The process of defining corridor alignment was both data driven and discussed in detail with the Steering Committee to ensure the recommended Corridor Plans are fully supported by those who will ensure implementation.

The Corridor Plan for each segment lays out information illustrating the logic and planning behind the recommendations as well as addressing safety, design, and coordination necessary to implement. Each segment presents the following:

- **Alignment overview**
- **Alternatives considered**
- **Points of interest**
- **Trail access points**
- **Mid-block crossings**
- **Toolbox references**

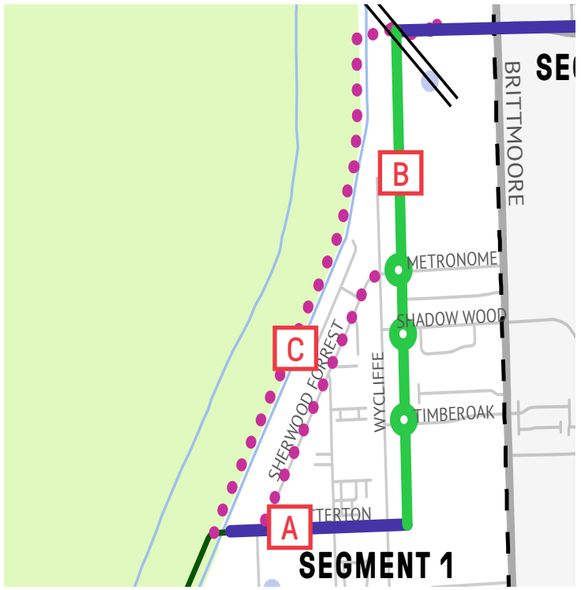
This information is presented with implementation considerations in the next chapter in the Implementation Workbook.

Supporting the Corridor Plan are regional bikeway connections identified through analysis of the *Houston Bike Plan* (2017) recommendations along with recommendations from previous SBMD studies including the *Spring Branch Comprehensive Plan* and *Reimagine Long Point*.

TABLE 4.1 SUMMARY OF CORRIDOR PLANS FOR EACH TRAIL SEGMENT

SEGMENT - LOCATION	PROPOSED FACILITY TYPE	LENGTH	ALTERNATIVES CONSIDERED	POTENTIAL NEIGHBORHOOD CONNECTIONS	TOOLBOX REFERENCES
Segment 1 Addicks Reservoir at Chatterton to West Hammerly Boulevard	Neighborhood Bikeway/Off-Street Trail	1.4 Miles	2	3	
Segment 2 West Hammerly Boulevard to East of the Guthrie Center	Neighborhood Bikeway/ Sidepath	1.0 Miles	2	0	
Segment 3 East of the Guthrie Center to Gessner Road	Neighborhood Bikeway/Off-Street Trail	1.5 Miles	2	4	
Segment 4 Gessner Road to Blalock Road Trail Connection	Off-Street Trail/Sidepath/ Neighborhood Bikeway	1.7 Miles	3	4	
Segment 5 Blalock Road to Wirt Road	Off-Street Trail	2.4 Miles	0	4	
Segment 6 Wirt Road to Mangum Road	Sidepath/On-Street Bikeway/ Off-street Trail	1.75 Miles	2+	0	
Segment 7 Mangum Road to White Oak Bayou Greenway	Off-street Trail	1.0 Mile	2	2	

CORRIDOR PLAN: SEGMENT 1
ADDICKS RESERVOIR AT CHATTERTON TO WEST HAMMERLY BOULEVARD

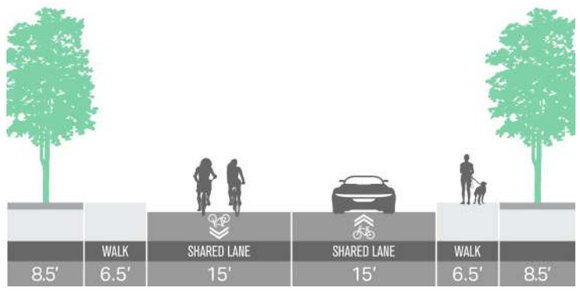


ALIGNMENT OVERVIEW

Segment 1 is approximately 1.4-miles and connects the Chatterton trailhead of the existing Addicks Dam Road hike and bike trail to the dead end of Hammerly Boulevard. The western terminus at the Chatterton bridge is a logical end point for the greater Spring Branch Trail because it connects to the existing trail system in and around Addicks Reservoir, which provides extensive recreational opportunities as well as connections to the Energy Corridor. Connecting the Chatterton trailhead to the dead end of Hammerly Boulevard provides Addicks Dam Road trail access to the large apartment communities in the vicinity of Hammerly, as well as increased connectivity to the Parish School on Hammerly. These end points allow Segment 1 to stand on its own as an independently beneficial project. The unique segments that make up Segment 1 are described below and illustrated through cross-sections.

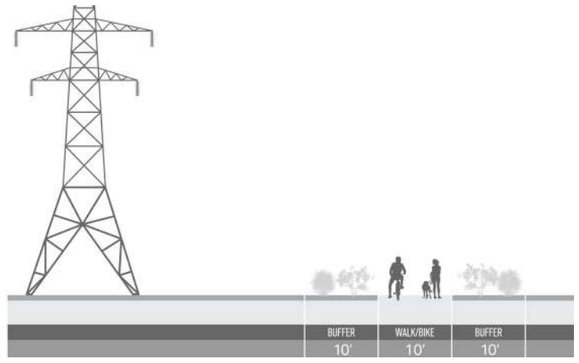
A CHATTERTON BRIDGE TO CITY PARCEL

From the Addicks Dam Road trailhead at the western end of Chatterton Drive, the trail alignment proceeds as a **neighborhood bikeway** east along Chatterton Drive for 0.38 miles, until Chatterton Drive ends at Wycliffe Drive. Here, trail users will proceed onto a City-owned parcel that will be developed as a trailhead and entrance to the CenterPoint easement immediately to its east.



B CITY PARCEL TO WEST HAMMERLY

Once on the CenterPoint easement, the trail proceeds north as an **off-street trail** for 1 mile to reach the dead end of Hammerly Boulevard. Here, a trailhead will provide an entrance to Hammerly Boulevard immediately east of the CenterPoint easement.

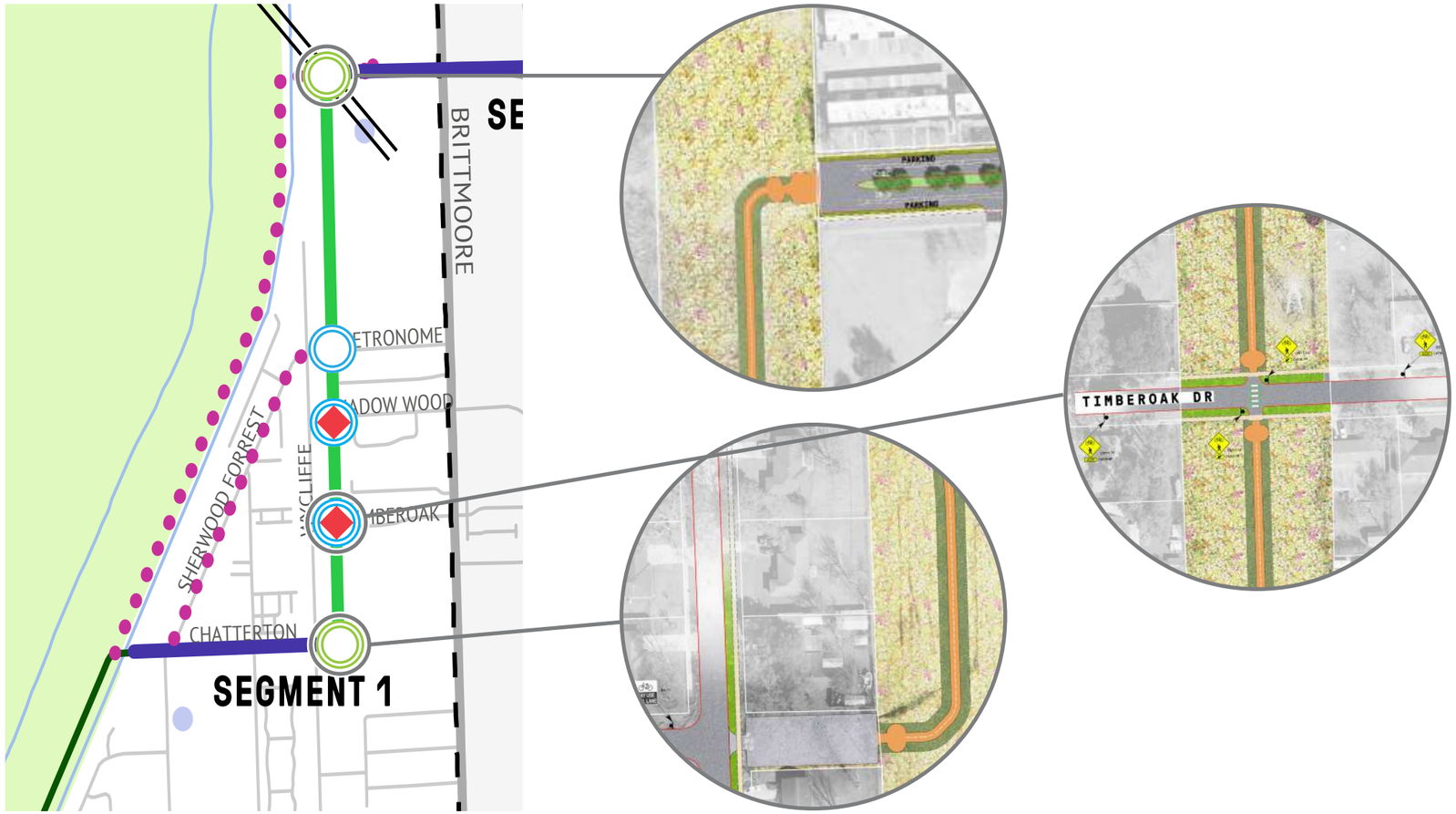


C ALTERNATIVES CONSIDERED

The pink dotted lines show two alternatives that were considered for this segment and could be considered in future design considerations. The preferred alignment connects more directly to the surrounding east and west neighborhoods with key access points and is mostly an off-street trail located within a CenterPoint easement.

The alternative directly adjacent to Addicks Reservoir may present more complicated coordination with a variety of public entities and would not be as straight-forward design-wise as the CenterPoint easement due to drainage requirements. It will first require a champion to lead coordination with Harris County Precinct 3, Harris County Flood Control District, and the US Army Corps of Engineers. The other alternative up Sherwood Forrest Street could be a neighborhood bikeway that would provide access up to Metronome Drive at the CenterPoint easement that could be potentially less expensive as it would require no new pavement for the portions along the streets in lieu of new trail up a larger portion of CenterPoint easement.

CORRIDOR PLAN: SEGMENT 1 CONTINUED
ADDICKS RESERVOIR AT CHATTERTON TO WEST HAMMERLY BOULEVARD



TRAIL ACCESS POINTS

Basic Trailhead
- Timberoak Drive
- Shadow Wood Drive
- Metronome Drive

Enhanced Trailhead
- Chatterton Drive City property
- Hammerly Drive

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings
- Timberoak Dr
- Shadow Wood Dr

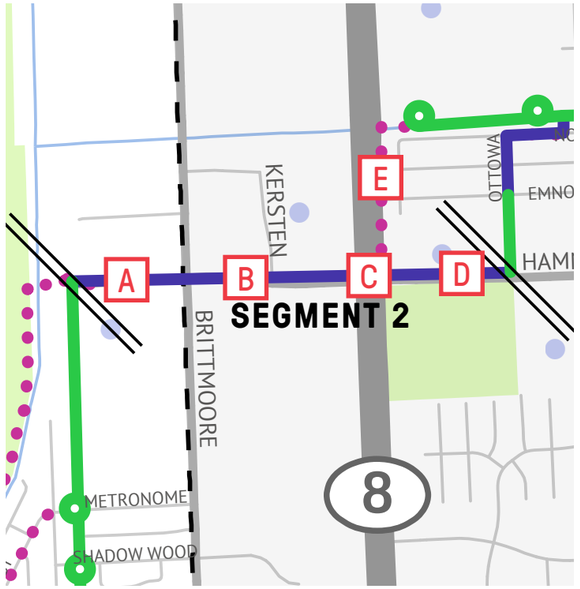
Active Traffic Control
- None

TOOLBOX REFERENCES

POINTS OF INTEREST

- The Parish School
- New Life Church
- The Westview School
- Agnes Moffitt Park
- The Guthrie Center

CORRIDOR PLAN: SEGMENT 2
WEST HAMMERLY TO EAST OF THE GUTHRIE CENTER

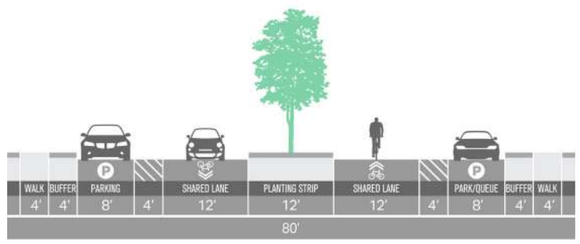


ALIGNMENT OVERVIEW

This 1.0-mile segment connects the western dead end of Hammerly Boulevard to Agnes Moffitt Park and The Guthrie Center. Segment 2 could stand as an independently valuable project that will connect the apartment community and Parish School on the west end of Hammerly Boulevard to Agnes Moffitt Park and The Guthrie Center to the east via a safe route across Beltway 8. There are four unique cross sections that make up Segment 2.

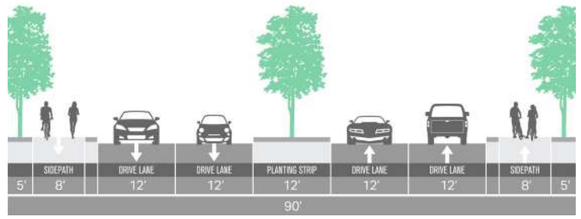
A WEST HAMMERLY TO BRITTMOORE

From the western end of Hammerly Boulevard to just before Brittmoore Street, the trail will proceed as a **neighborhood bikeway** in combination with newly formalized parking and school queuing lanes. These formalized lanes will clarify school queuing operations and contribute to the independent merit of this Segment.



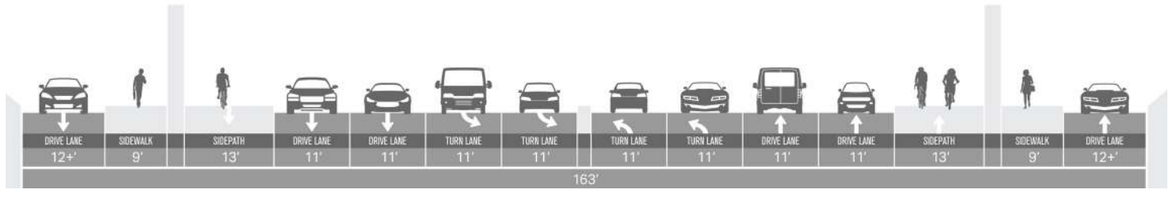
B BRITTMOORE TO BELTWAY 8

Just before Brittmoore Street, bikes are given a **protected bikeway** to help navigate through the intersection. East of Brittmoore Street, bikes transition behind the curb to a paired one-way **shared-use sidepath**.



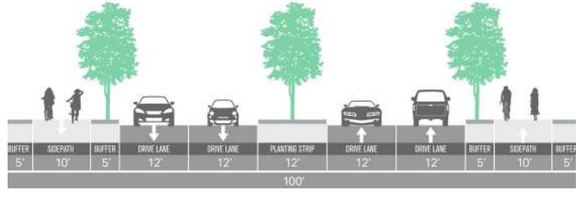
C BELTWAY 8

Where Hammerly Boulevard meets the Beltway 8 frontage roads, intersection geometry changes will improve visibility and safety for trail users. These treatments include mountable truck aprons, which reduce corner curb radii and turning speeds for private cars while still retaining traversability for commercial trucks. Under Beltway 8, drive lanes are narrowed to grant more back of curb space to trail users, and people biking and walking are separated on different sides of the highway support columns in order to make best use of the available back of curb space.



D BELTWAY 8 TO THE GUTHRIE CENTER

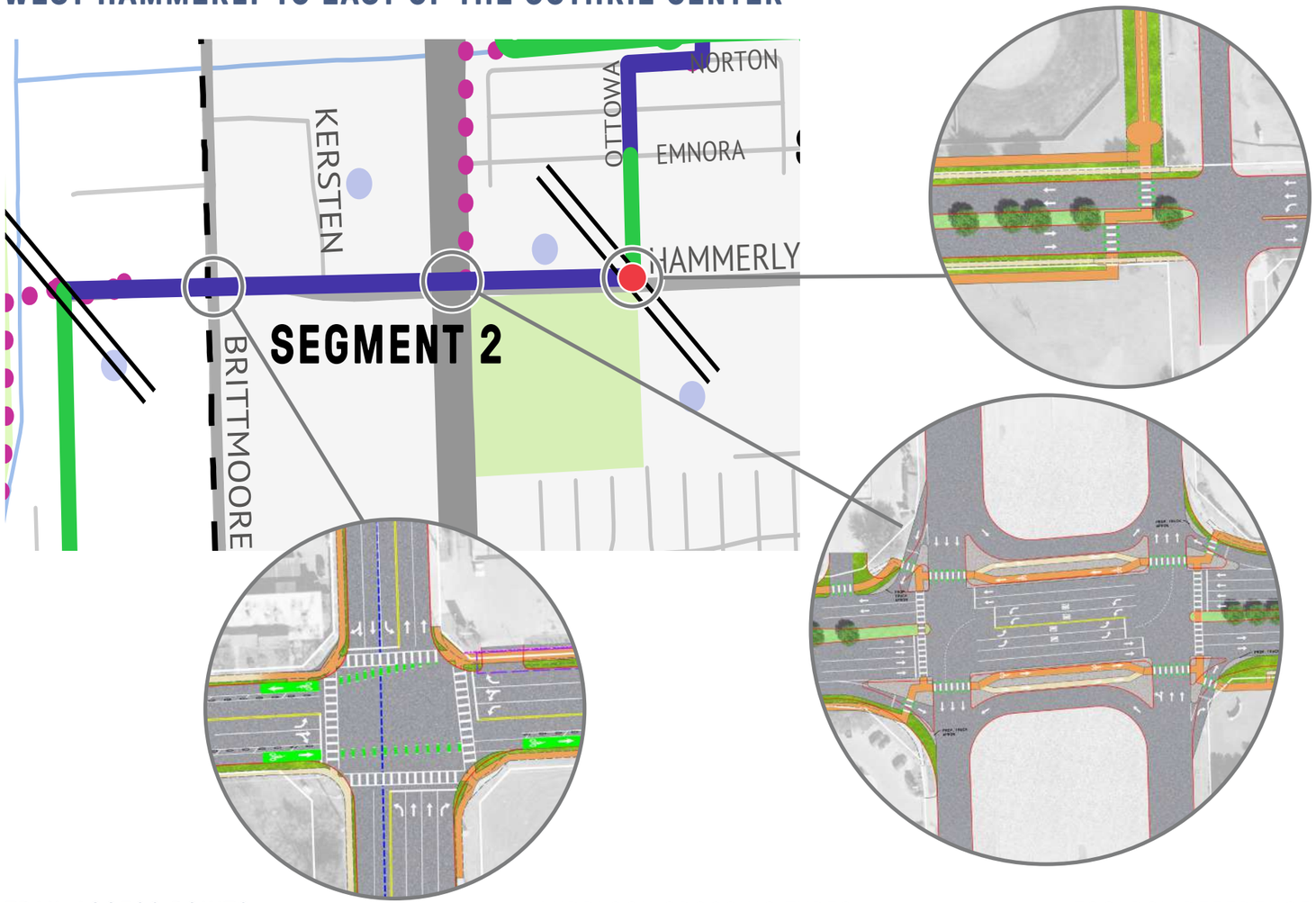
East of Beltway 8, shared-use sidepaths continue up to the eastern boundary of The Guthrie Center, where a midblock crossing treatment will bring eastbound trail users to the north side of Hammerly Boulevard. If Segment 2 is completed as an independent project, this midblock crossing treatment will have the independent benefit of facilitating crossings between The Guthrie Center and Agnes Moffitt Park.



E ALTERNATIVES CONSIDERED

The trail alignment deviates from the CenterPoint easement for Segment 2 in order to cross the major barrier of Beltway 8. Where the CenterPoint easement crosses Beltway 8, the Beltway is at-grade, meaning that crossing at this location would require either a bridge or tunnel, which would be prohibitively expensive. In order to cross this major barrier it was necessary to choose an existing Beltway 8 crossing location that could be improved. Of the available nearby options (Hammerly Boulevard, Kempwood Drive), Hammerly Boulevard was chosen in order to maintain a somewhat direct alignment that avoids the doubling back that would be necessary in a Kempwood Drive alignment.

CORRIDOR PLAN: SEGMENT 2 CONTINUED
WEST HAMMERLY TO EAST OF THE GUTHRIE CENTER



TRAIL ACCESS POINTS

This Segment is entirely within the public right-of-way and can be accessed anywhere along the route. Additionally, if implemented simultaneously with Segments 1 or 3, it connects directly to trailheads providing access to off-street trails.

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings

» None

Active Traffic Control

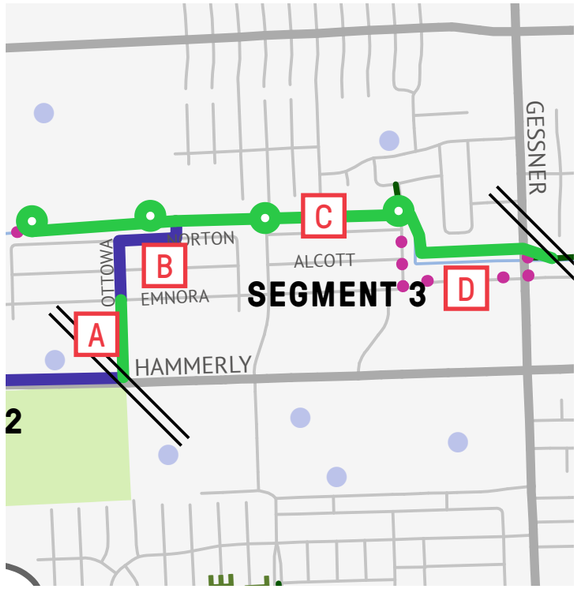
» Hammerly Boulevard

TOOLBOX REFERENCES

POINTS OF INTEREST

» The Parish School
» New Life Church
» The Westview School
» Agnes Moffitt Park
» The Guthrie Center

CORRIDOR PLAN: SEGMENT 3
EAST OF THE GUTHRIE CENTER TO GESSNER ROAD

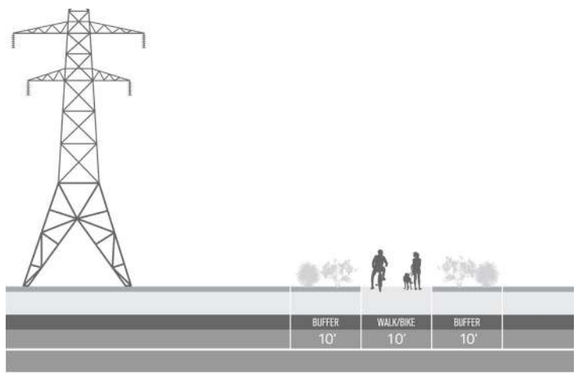


ALIGNMENT OVERVIEW

Segment 3 connects Hammerly Boulevard via an off-street trail and neighborhood bikeway to the east-west CenterPoint easement with a ten-foot wide concrete shared-use off-street trail from the Baseball USA campus on the west end to the existing Emnora Hike & Bike Trail just east of Gessner. This trail segment will not only add 1.5 miles of trail building upon and extending the Emnora Hike and Bike Trail, it would provide safe walking and biking connections from residential areas to schools such as the Guthrie Center and Terrace Elementary School, and to recreational destinations such as to Agnes Moffitt Park and Baseball USA. This Segment is particularly well-suited to independently implement because it will function as an extension of the existing Emnora Hike & Bike Trail.

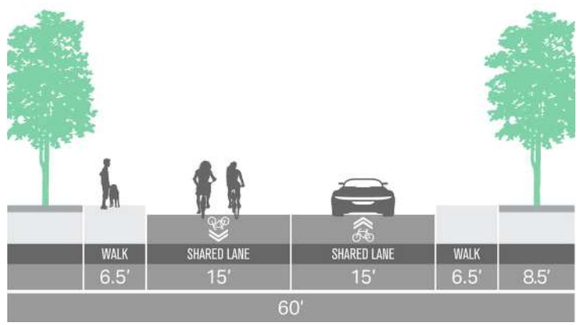
A HAMMERLY BOULEVARD TO OTTOWA LANE

From Hammerly Boulevard, the Segment will proceed north as an **off-street trail** along an SBISD easement to reach the dead end of Ottawa Lane.



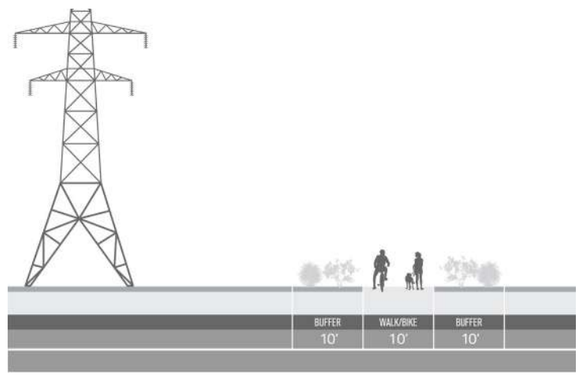
B OTTOWA LANE TO LANELL LANE

From here, the Segment will proceed as a **neighborhood bikeway** via Ottawa Lane, and Norton Drive to reach Lanell Lane, which dead ends into the CenterPoint easement.



C CENTERPOINT EASEMENT TO BASEBALL USA AND GESSNER ROAD

At the dead end, a trailhead will connect Lanell Lane to an **off-street trail** along the Centerpoint Easement which will branch west to provide access to Baseball USA and east towards Gessner Road. Between Lanell Lane and Gessner Road, a new neighborhood connection at Shadowdale Drive and an existing neighborhood connection at Triway Lane will facilitate trail access and north-south connectivity between the neighborhoods on either side of the CenterPoint easement. At Gessner, the Segment will install a new midblock crossing just north of the existing Emnora Hike & Bike Trail terminus and connect to the existing trail east of Gessner.

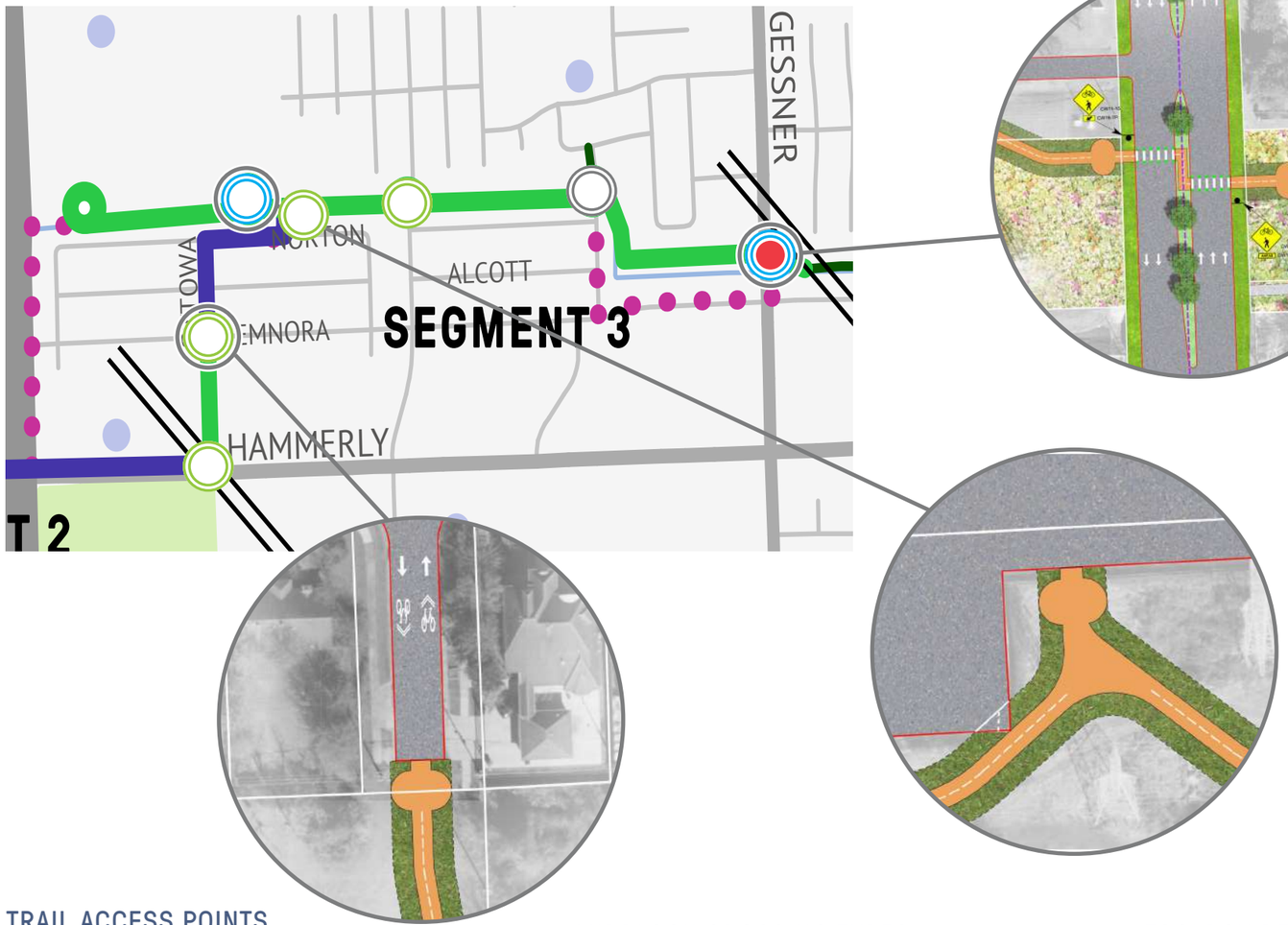


D ALTERNATIVES CONSIDERED

As shown in the pink dotted line, an alternative from the west end of the CenterPoint easement at Beltway 8 was considered along the northbound frontage Road to connect to the Hammerly Boulevard and Beltway 8 intersection. The preferred route is to make the connection within a neighborhood instead of along the frontage road.

At the Gessner Road crossing, alternatives to provide a safer mid-block crossing were considered. Where the trail would cross to meet up with the existing Emnora Hike and Bike Trail, it is very close to a signalized intersection at Gessner Road and Emnora Lane. Due to the presence of that traffic signal, a mid-block crossing at that location would go against the City of Houston's regulations against placing a midblock crossing in close proximity to a traffic signal. The preferred option is to move the crossing further north up Gessner and making the trail connection at that location.

CORRIDOR PLAN: SEGMENT 3 CONTINUED
EAST OF THE GUTHRIE CENTER TO GESSNER ROAD



TRAIL ACCESS POINTS

Basic Trailhead
- Baseball USA
- Gessner Rd

Enhanced Trailhead
- Hammerly Blvd
- Ottawa Ln
- Lanell Ln
- Shadowdale Dr

Access Point
- Triway Ln

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings
- None

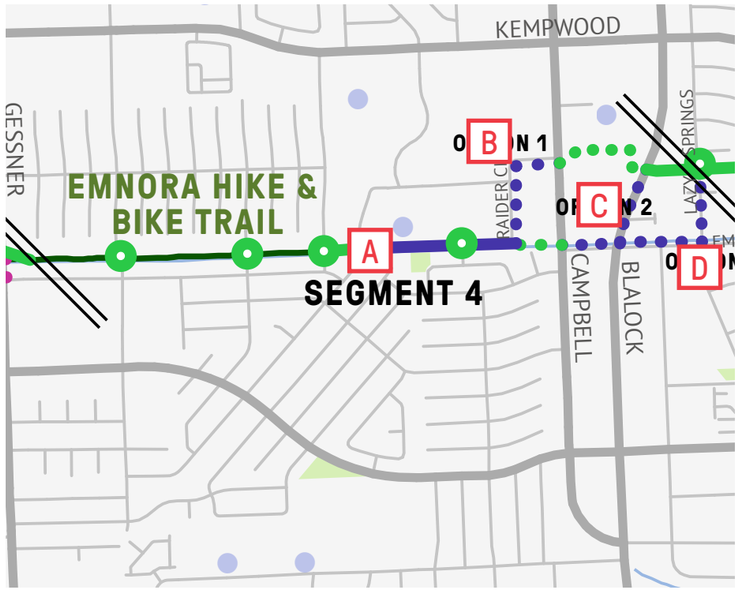
Active Traffic Control
- Gessner Road

TOOLBOX REFERENCES

POINTS OF INTEREST

- Agnes Moffitt Park
- The Guthrie Center
- Baseball USA

CORRIDOR PLAN: SEGMENT 4
GESSNER ROAD TO BLALOCK TRAIL CONNECTION

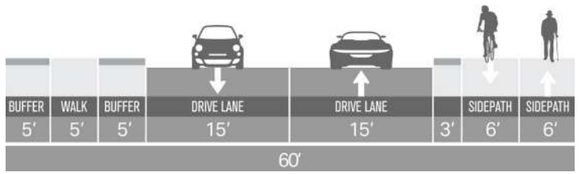


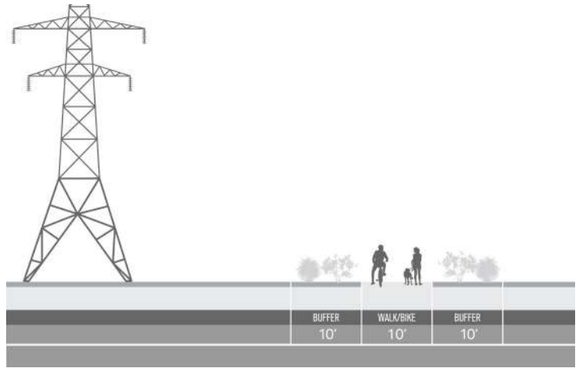
ALIGNMENT OVERVIEW

This segment's boundaries are Gessner Road on the west and Blalock Road to the east, totaling 1.7 miles. It features enhancements along the existing Emnora Hike & Bike Trail, and extends east to Blalock Road. East of Northbrook High School, the trail alignment is split into three possible options, with the choice between these options depending on budget and feasibility of land acquisition or easement negotiations.

A GESSNER TO NORTHBROOK HIGH SCHOOL

Along the existing Emnora Hike & Bike Trail, new neighborhood connections will be established at Teague Road and Palo Pinto Drive. **Off-street trail** will connect the current eastern terminus of the Emnora Hike & Bike Trail to Raider Circle, where the trail will continue as a two-way **shared-use sidepath** along the southern edge of Raider Circle South. From here, the trail will continue along one of three options.





B SCHOOL OPTION

Option 1 would continue a two-way **shared-use sidepath** north along Raider Circle East and follow the roadway to its intersection with Campbell Road. Here, intersection improvements would carry trail users across Campbell Road, and a private parcel acquisition together with an easement from Buffalo Creek Elementary School would provide access via an **off-street trail** to the west side of Blalock Road and the western terminus of the Phase 1 SBMD/Houston Parks Board trail segment.

C MEDIAN OPTION

Option 2 would use easements from Harris County Flood Control District and private property owners to place an **off-street trail** along the north side of a drainage ditch that parallels Emnora Lane. Intersection improvements at Campbell Road and Emnora Lane would cross trail users to the east side of Campbell Road, where they would continue along the north side of the drainage easement until reaching Blalock Road. Intersection improvements at the intersection of Blalock Road and Emnora Lane would cross trail users to the median of Blalock Road, where they would continue along a two-way **shared-use sidepath** running within Blalock's wide median north to the Phase 1 SBMD/Houston Parks Board trail segment.

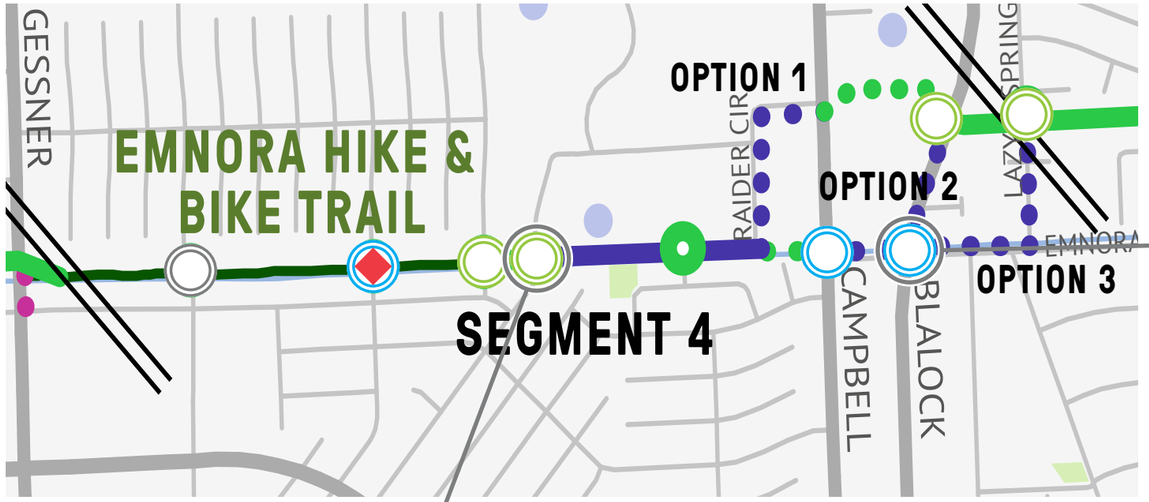
D NEIGHBORHOOD OPTION

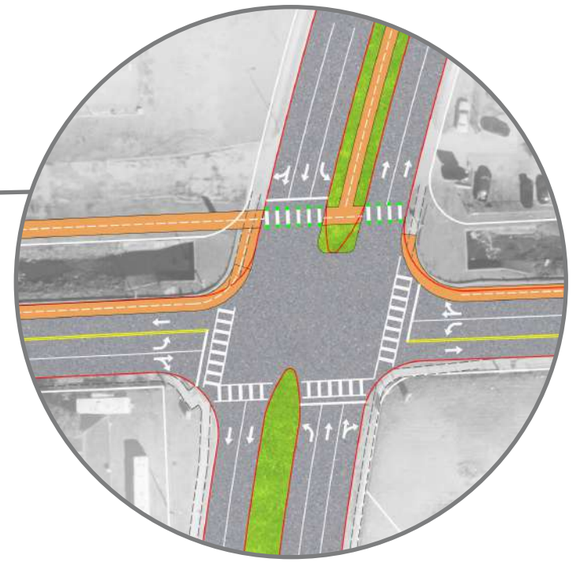
Option 3 would follow the same drainage easement as Option 2 up to Campbell Road, but east of Campbell Road it will jog south of the drainage easement and become a two-way **shared use sidepath** along the north side of Emnora Lane. This would continue until Lazy Spring Drive, where the trail would turn north and continue as a **neighborhood bikeway** until intersecting with the CenterPoint easement and joining the Phase 1 SBMD/ Houston Parks Board trail segment.

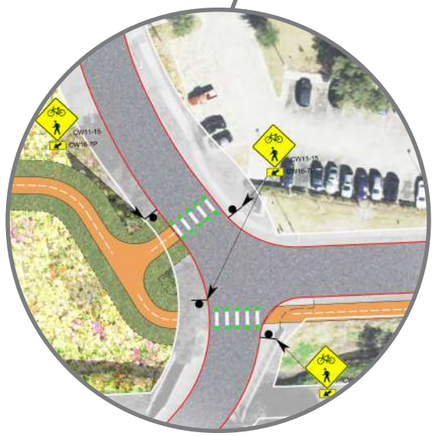
E ALTERNATIVES CONSIDERED

The alternatives are presented in the three options for implementation consideration.

CORRIDOR PLAN: SEGMENT 4 CONTINUED
GESSNER ROAD TO BLALOCK TRAIL CONNECTION







TRAIL ACCESS POINTS

Basic Trailhead
- Rosefield Drive
- Campbell Road (Median & Neighborhood Options)
- Blalock Road (Median & Neighborhood Options)

Enhanced Trailhead
- Raider Circle South
- Palo Pinto Drive
- Blalock Road (School Option)
- Lazy Spring Drive (Neighborhood Option)

Access Point
- Teague Road

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings
- Rosefield Drive

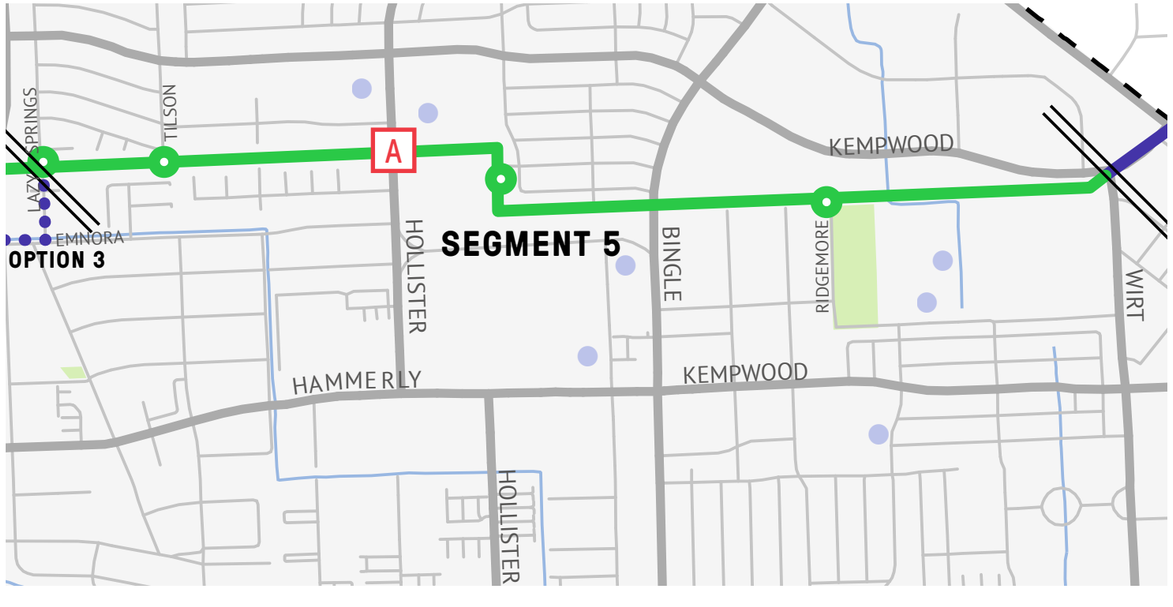
Active Traffic Control
- None

TOOLBOX REFERENCES

POINTS OF INTEREST

- Northbrook High School
- Existing Emnora Hike and Bike Trail
- Phase 1 SBMD/Houston Parks Board Trail (Segment 5)

CORRIDOR PLAN: SEGMENT 5
BLALOCK ROAD TO WIRT ROAD "PHASE 1"

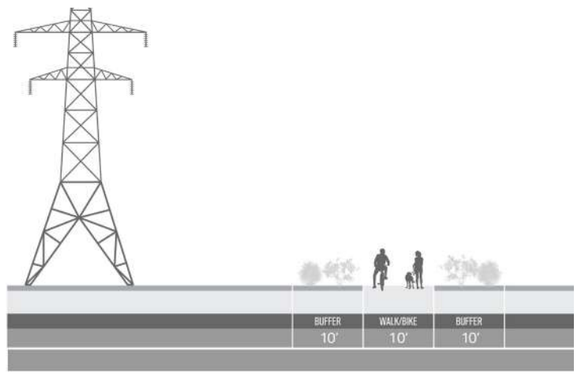


ALIGNMENT OVERVIEW

This segment follows the CenterPoint corridor in a continuous 2.4-mile stretch from Blalock Road to Wirt Road. It was identified by the Spring Branch Management District as "Phase 1" of the Spring Branch Trail to be implemented first through partnership with the Houston Parks Board. This segment has been designed and is slated to begin construction in early 2020. Although this segment was identified prior to this study beginning, the legwork to get the trail to the design standpoint was initiated through SBMD's leadership pursuing implementation of top strategies from the 2015 *Comprehensive Plan*.

A BLALOCK ROAD TO WIRT ROAD

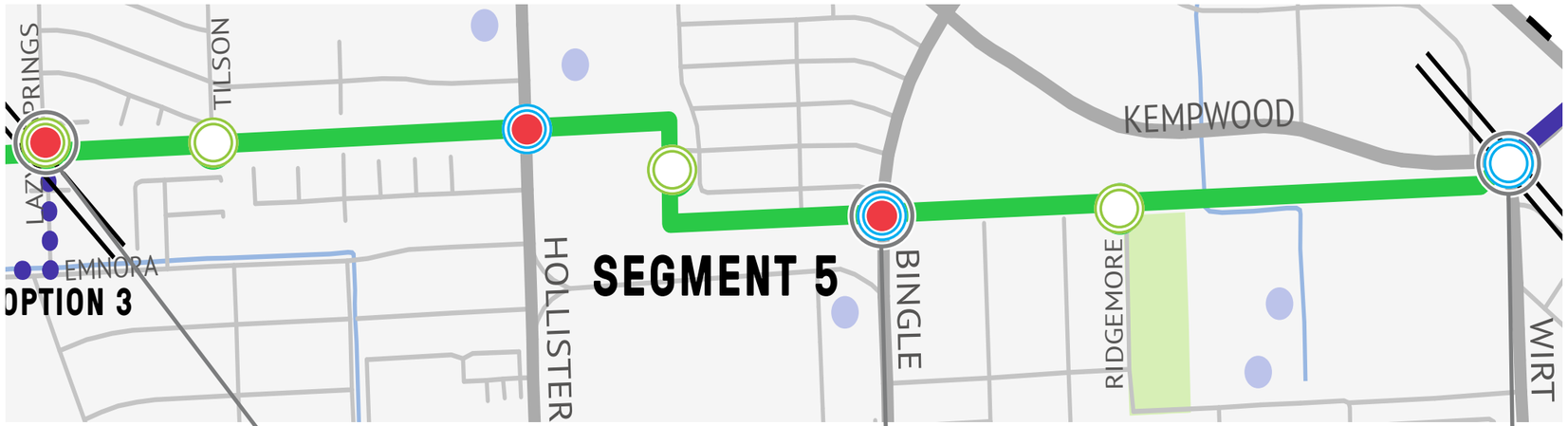
This trail segment is entirely **off-street trail** with multiple neighborhood connections. The trail will serve multiple schools as well as Schwartz Park, a community park in the area.

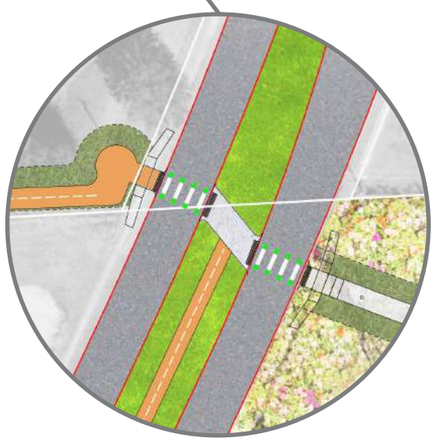


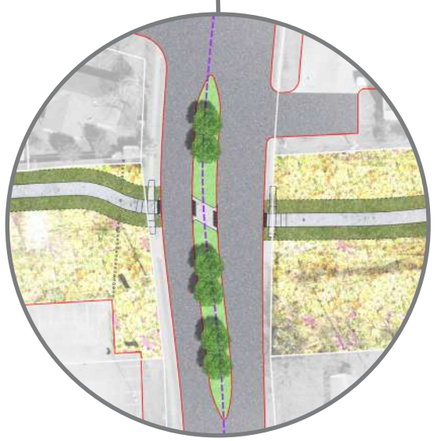
ALTERNATIVES CONSIDERED

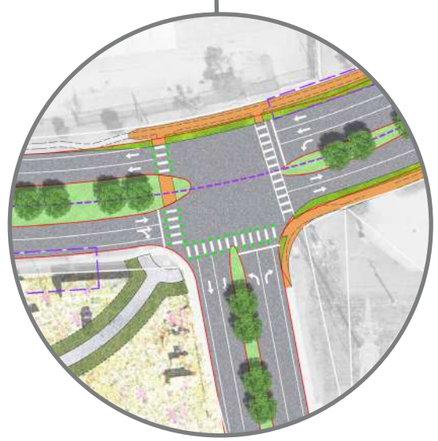
There were not any significant alternatives considered for this segment, as the entire stretch is within a CenterPoint easement.

CORRIDOR PLAN: SEGMENT 5 CONTINUED
BLALOCK ROAD TO WIRT ROAD “PHASE 1”









TRAIL ACCESS POINTS

Basic Trailhead
- Hollister Road
- Bingle Road
- Wirt Road

Enhanced Trailhead
- Tilson Lane
- Alcott Drive
- Ridgemore Drive

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings
- None

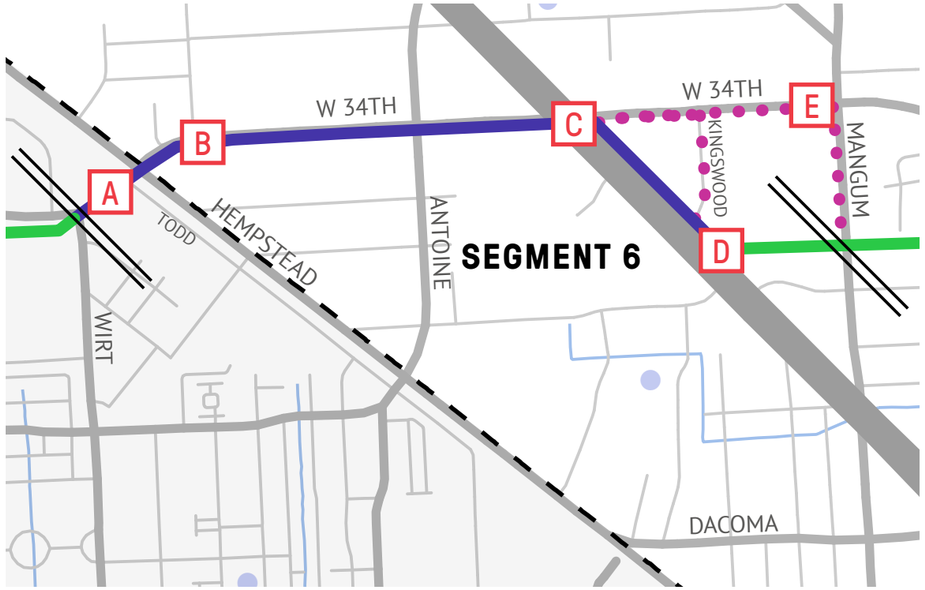
Active Traffic Control
- Blalock Road
- Hollister Road
- Bingle Road

TOOLBOX REFERENCES

POINTS OF INTEREST

- Buffalo Creek Elementary School
- Edgewood Elementary School
- Saint Jerome Catholic School
- Landrum Middle School
- The Lion Lane School
- Schwartz Park

CORRIDOR PLAN: SEGMENT 6
WIRT ROAD TO MANGUM ROAD

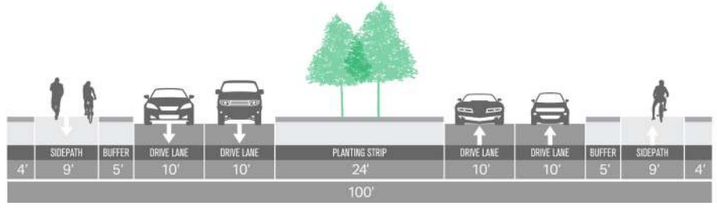


ALIGNMENT OVERVIEW

This 1.75-mile segment connects the eastern terminus of Houston Parks Board's trail segment at Wirt Road to Mangum Road. Much of this Segment's alignment is determined by the very limited crossing opportunities of Hempstead Road and US 290. These major obstacles make this Segment complex to implement, but also give this Segment great independent merit, as it will give people walking and biking a safe way to cross these obstacles.

A WIRT ROAD TO HEMPSTEAD ROAD

From the terminus of Segment 5 at Wirt Road, the trail proceeds as a paired one-way **shared-use sidepath** along Kempwood Drive towards Hempstead Road. At the southwest corner of Kempwood Drive and Wirt, the trail splits with eastbound and westbound sidepaths along Kempwood Dr.

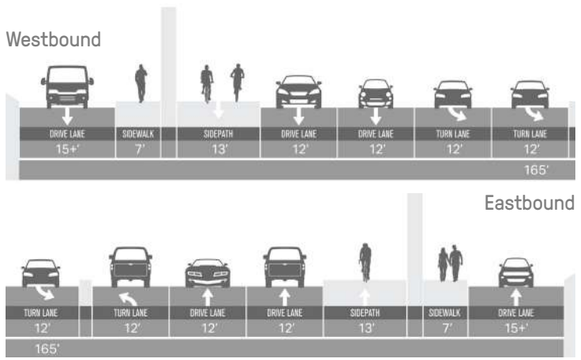


B HEMPSTEAD ROAD TO US 290

At the freight rail crossing adjacent to Hempstead Road, the sidepath leaves the back-of-curb area and becomes a shared walking and biking space in the roadway, where a concrete curb will separate trail users from traffic to cross the railroad tracks. This facility safely conveys trail users across the freight rail despite the limited back-of-curb area. Once across the railroad, walking trail users will transition back behind the curb onto sidewalks, and people biking will continue in a **protected bikeway** through the intersection with Hempstead Road and east along West 34th Street. The Segment continues east with these facility types until just west of US 290.

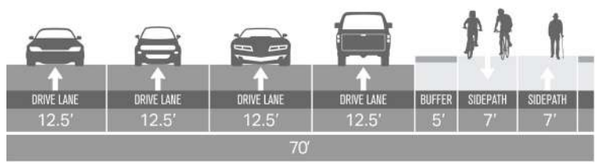
C US 290

West of US 290 along West 34th Street people biking will transition behind the curb onto a **shared-use sidepath**. Trail users will navigate the US 290 frontage road intersections on these sidepaths, and under the highway curb lines will be moved inward to expand the back-of-curb space available for sidepaths. This extra space allows for the separation of people biking and walking on either side of the highway support columns. East of US 290, the Segment turns south to follow the northbound frontage road of US 290.



D US 290 TO MANGUM ROAD

At the northbound frontage road at US 290 and West 34th Street, the trail will continue south as a two-way **shared-use sidepath**. Signage and pavement markings will remind frontage road driveway users of the presence of two-way trail traffic. The Segment follows the frontage road until reconnecting with the CenterPoint easement, where it will continue east as an **off-street trail** until terminating on the western side of Mangum Road.

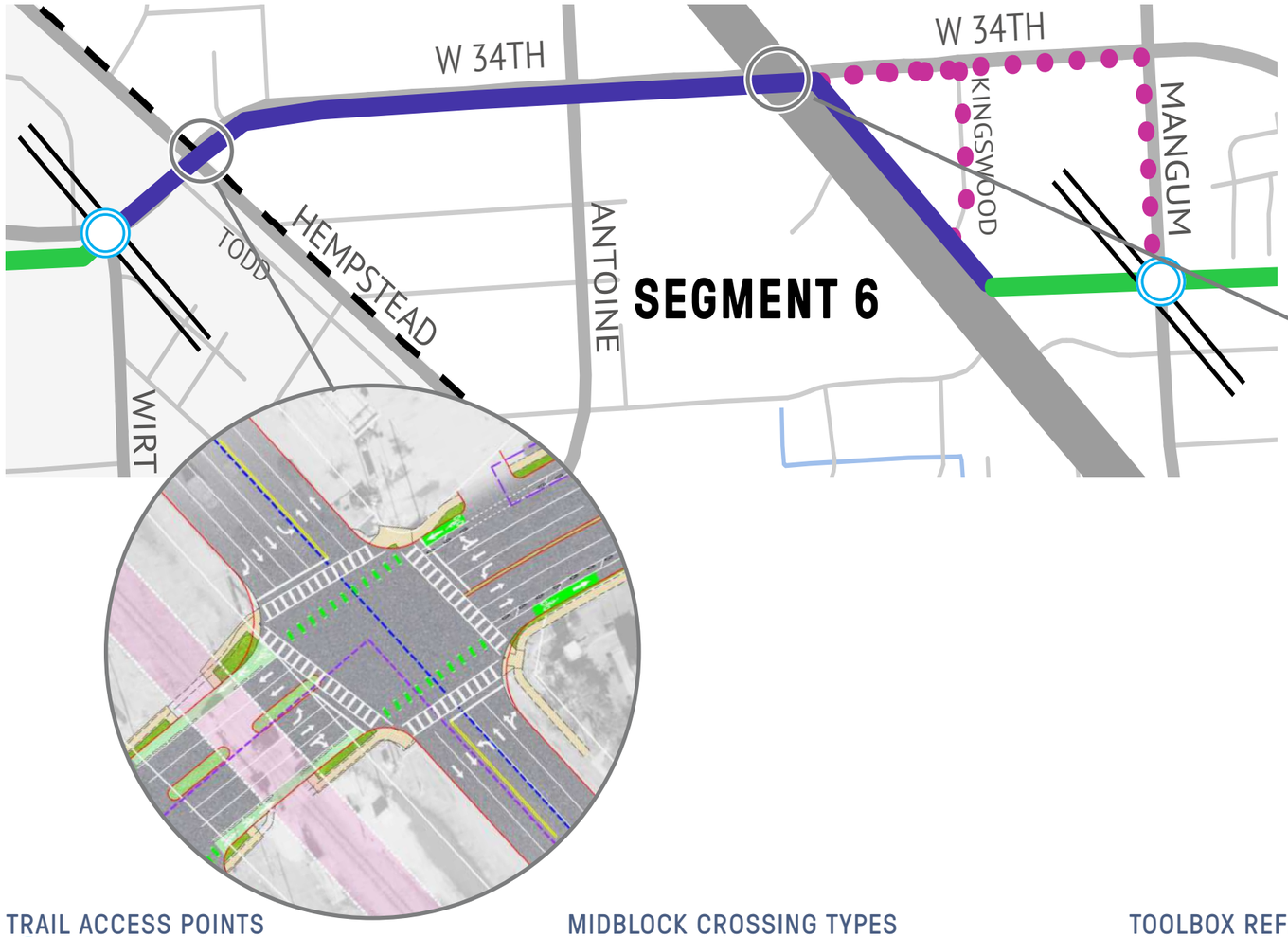


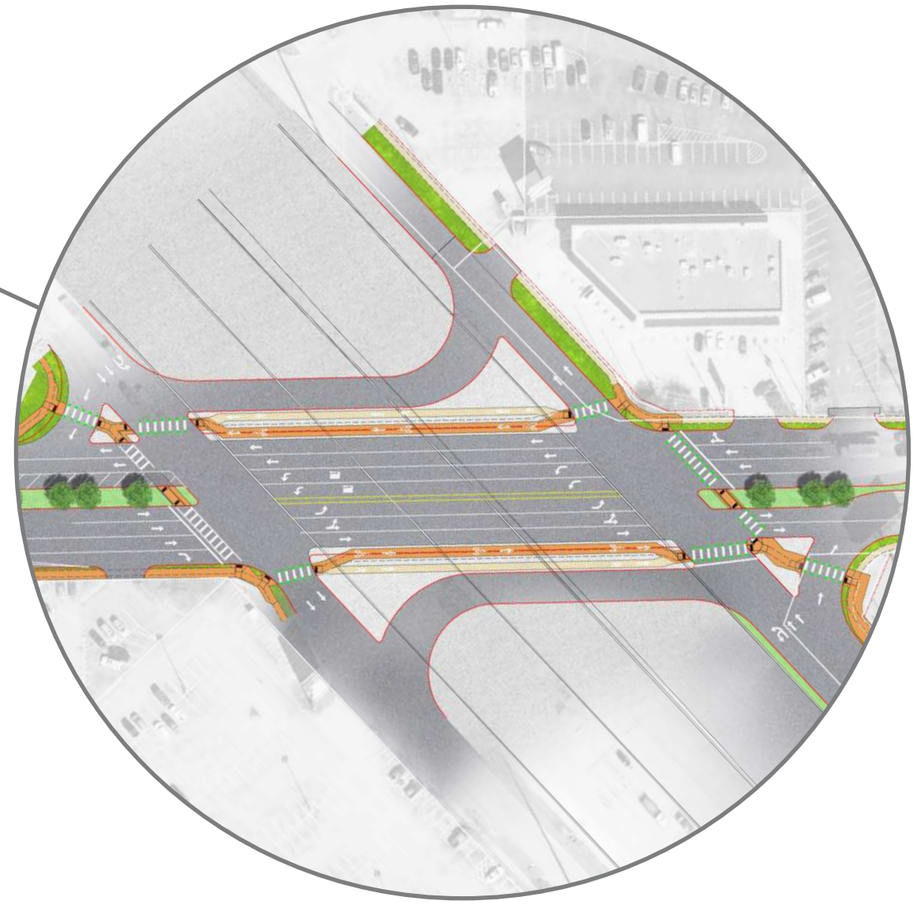
E ALTERNATIVES CONSIDERED

This Segment diverges from the path of the CenterPoint easement because of the difficulties posed by the major obstacles of Hempstead Road and US 290. At Hempstead Road, the easement does not cross at an intersection, and it was determined that a midblock crossing would not be appropriate or sufficient for a crossing of such a major roadway. Therefore, it was most feasible to cross at the existing signal at Kempwood/West 34th Street. The CenterPoint easement was similarly unfeasible as a crossing location at US 290, so the trail was aligned along 34th Street to cross under the highway. Several alternatives were considered before recommending the frontage road sidepath option for the east side of US 290. Continuing east along West 34th Street proved infeasible due to capacity concerns with taking a lane and concerns with driveway conflicts, and bringing it back down either Kingswood Lane or Mangum Road posed more conflicts and safety concerns to accommodate a sidepath within the corridors' rights-of-ways. The disconnected nature of the street grid east of US 290 restricted the number of direct routes to the CenterPoint easement, and made lower-traffic routes negatively circuitous.

Another alternative was explored west of the Wirt Road intersection exploring opportunities to connect via the Brickhouse Gully (a Harris County Flood Control District drainage channel) that would lead the trail north and east from where the proposed Segment 6 is located. More details on that alternative can be found in **Appendix F** with photos illustrating the challenges with that alternative's viability.

CORRIDOR PLAN: SEGMENT 6 CONTINUED
WIRT ROAD TO MANGUM ROAD





TRAIL ACCESS POINTS

Basic Trailhead

» Mangum Road

Enhanced Trailhead

» None

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings

» None

Active Traffic Control

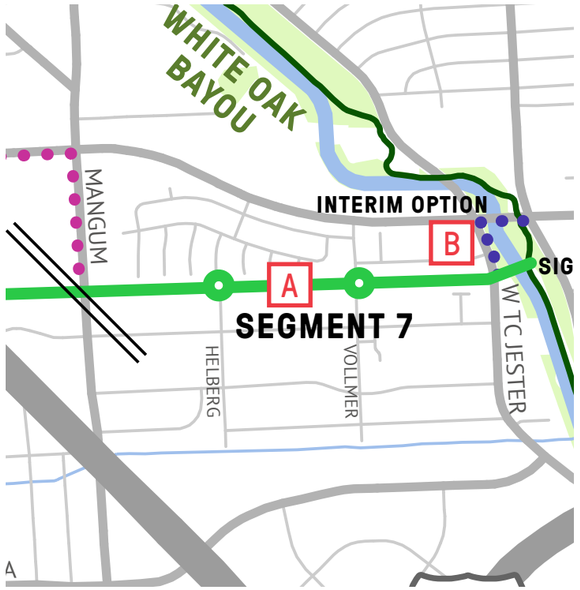
» None

TOOLBOX REFERENCES

POINTS OF INTEREST

» Retail and businesses

CORRIDOR PLAN: SEGMENT 7
MANGUM ROAD TO WHITE OAK BAYOU GREENWAY

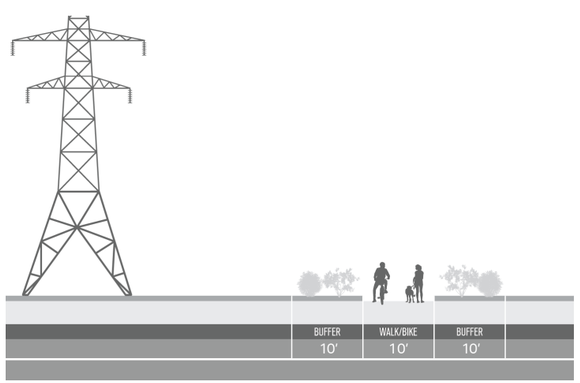


ALIGNMENT OVERVIEW

This last trail segment connects Mangum Road to the White Oak Bayou Greenway. As an independent project, this Segment would create an important one-mile neighborhood connection for the White Oak Bayou Greenway. The segment consists of a mostly straightforward CenterPoint easement trail from Mangum Road to East TC Jester Boulevard, but then becomes more complex once reaching West TC Jester Boulevard. After a mid-block crossing at West TC Jester Boulevard, a signature bridge option would connect trail users directly to White Oak Bayou Greenway across the bayou. Because this bridge is likely to be a long-term project, a short-term alternative that travels north along the east side of West TC Jester Boulevard and then across the West 34th Street bridge was also studied.

A MANGUM ROAD TO EAST TC JESTER BOULEVARD

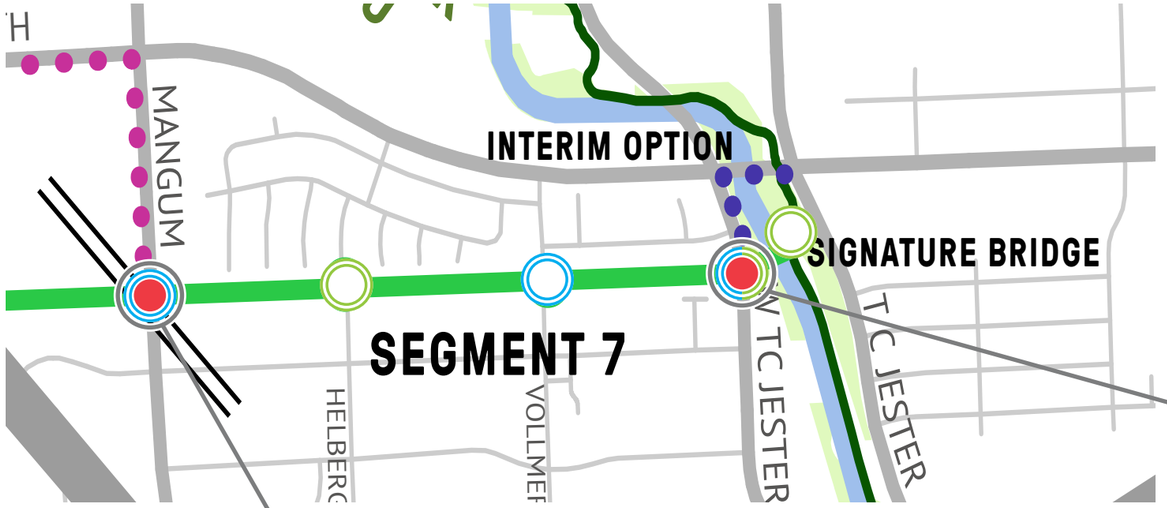
From Mangum Road to East TC Jester Boulevard, the Segment uses an **off-street trail** along the CenterPoint easement. New neighborhood connections at Helberg Road and Vollmer Road will enhance trail connectivity to the adjacent neighborhoods. A new midblock crossing treatment will cross trail users to the east side of West TC Jester Boulevard. From here, the short-term alternative will bring trail users north on a two-way **shared-use sidepath** along the east side of West TC Jester Boulevard. It will then turn and proceed east as a two-way **shared-use sidepath** on the south side of West 34th Street in order to make use of the existing bridge. Long-term, a trailhead and signature dedicated bridge on the east side of West TC Jester Boulevard will transition trail users between the Spring Branch Trail and the White Oak Bayou Greenway.

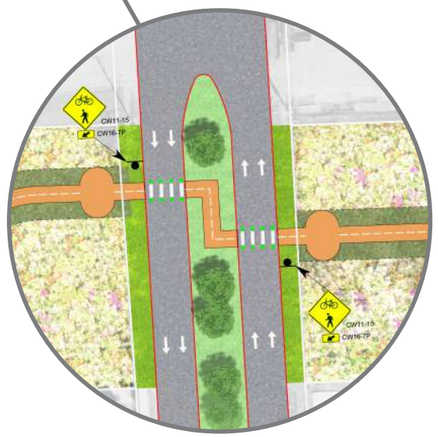


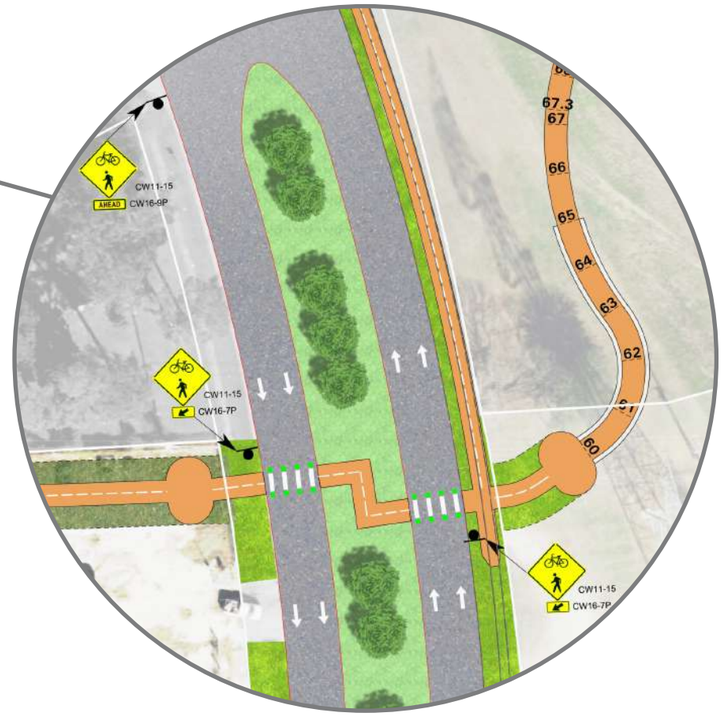
B ALTERNATIVES CONSIDERED

There are two possible ways to connect the Spring Branch Trail to the White Oak Bayou Greenway. One is a more interim connection utilizing right-of-way along West TC Jester Boulevard to create a sidepath to then cross the existing, West 34th Street Bridge by widening the sidewalk along the bridge. The other is the Signature Bridge that is the preferred way to cross White Oak Bayou Greenway as it would provide a safer, more comfortable, and monumental connection between the two trail corridors.

CORRIDOR PLAN: SEGMENT 7 CONTINUED
MANGUM ROAD TO WHITE OAK BAYOU GREENWAY







TRAIL ACCESS POINTS

Basic Trailhead
- Mangum Road
- Vollmer Road
- TC Jester Road

Enhanced Trailhead
- Helberg Road
- TC Jester Road
- White Oak Bayou Greenway

MIDBLOCK CROSSING TYPES

Signage & Pavement Markings
- None

Active Traffic Control
- Mangum Rd
- TC Jester Rd

TOOLBOX REFERENCES

POINTS OF INTEREST

- White Oak Bayou Greenway Trail

TRAFFIC OPERATIONS ANALYSIS

Traffic operations analyses were conducted in support of the Corridor Plans presented on the previous pages. Below is a summary of considerations assessed to inform preliminary design decisions to ensure the development of corridor plans that are not only feasible but also supported by key stakeholders who will be integral to implementation. All traffic analysis results were presented to the Steering Committee, City of Houston staff, and TxDOT.

MIDBLOCK CROSSINGS FOR OFF-STREET SECTIONS OF TRAIL

An integral part of designing an all ages and abilities off-street trail is to ensure safe and comfortable crossing of major roadways. Chapter 17 of the *City of Houston Infrastructure Design Manual* (IDM) includes bicycle, transit, and pedestrian design requirements.

The IDM includes the design recommendations for standard treatments but allows for the installation of "optional treatments" based on engineering judgment and with Houston Public Works approval. Based on the IDM guidelines and the project team's assessment of each crossing, recommendations were developed for each midblock crossing, as shown on each Corridor Plan and summarized in **Table 4.2**. Recommendations for each midblock crossing fell into two categories: Signage & Pavement Marking and Active Traffic Control. The Toolbox, presented earlier in this chapter, should be referenced for details on design considerations for each of these two categories of midblock crossings. The final design process should evaluate each midblock crossing and design treatment in detail and apply best practices to ensure safe and comfortable crossings for people both walking and bicycling.

INTERSECTION OPERATIONS FOR ON-STREET SECTIONS OF TRAIL

To understand the impact to intersection operations of each on-street segment, capacity analysis for existing conditions and proposed conditions were conducted at key intersections along the corridor.

Turning Movement Counts (TMCs) were collected at nine key signalized intersections within the study corridor. Counts were collected for the morning and evening peak periods. TMCs help provide an understanding of vehicle traffic patterns, intersection capacity constraints, and peak hours of traffic volume. The AM peak hour for each intersection is based on the appropriate peak hour between 7:00 AM and 9:00 AM. The PM peak hour for each intersection is based on the appropriate peak hour between 4:00 PM and 6:00 PM. A summary of TMCs is presented in **Appendix D**.

Projections for 2040 intersection turning movements were developed by scaling the observed 2019 turning movement counts by the calculated compound annual growth rate (CAGR). The CAGR was calculated for a 1.0% growth for 21 years which resulted in a total growth of 23%. The Existing and Projected 2040 TMCs were used to assess both the existing intersection geometry and the proposed intersection geometry where the proposed Spring Branch Trail alignment would require modifications to intersection geometry.

Capacity Analysis Methodology

Signalized intersections were analyzed according to the *Transportation Research Board 6th Edition Highway Capacity Manual (HCM 6th Edition)* methodology. The analyses were conducted using PTV VISTRO traffic analysis software.

The outputs reported for each intersection approach are "Delay" and "Level of Service" (LOS). Delay represents the average signal delay in seconds experienced by a vehicle on the approach. LOS translates the delay into a qualitative rating on an A through F scale. LOS A represents free flow conditions and LOS F represents highly congested conditions associated with high vehicular delay.

Outputs reported for each intersection as a whole are Delay, Level of Service, and Volume to Capacity. Delay is taken as the average of all vehicles approaching the intersection and forms the basis for overall LOS. In general, LOS D or better for a signalized intersection in an urban area is considered an acceptable level of delay. Volume to Capacity (V/C) is the ratio of the analysis volume to the theoretical capacity of the intersection. A value greater than 1 indicates the intersection is over capacity.

TABLE 4.2 SUMMARY OF TRAIL MIDBLOCK CROSSINGS

SEG-MENT	MIDBLOCK CROSSING LOCATION	SPEED LIMIT	85TH PERCENTILE SPEED*	AVERAGE DAILY TRAFFIC*	NUMBER OF LANES	MEDIAN	IDM LEVEL**	RECOMMENDED CROSSING TYPE
1	Timberoak Dr	30 MPH	Unknown	Unknown	2	NO	Level A	Signage & Pavement Markings
1	Shadow Wood Dr	30 MPH	Unknown	Unknown	2	NO	Level A	Signage & Pavement Markings
2	Hammerly Dr	35 MPH	40.5 MPH	13,977	4	YES	Level C	Active Traffic Control
3	Gessner Rd	35 MPH	41.5 MPH	34,124	6	YES	Level D	Active Traffic Control
4	Rosefiedld Dr	30 MPH	Unknown	Unknown	2	NO	Level A	Signage & Pavement Markings
5	Blalock Rd	35 MPH	34MPH	15,645	4	YES	Level D	Active Traffic Control
5	Hollister Rd	30 MPH	34 MPH	6,525	2	NO	Level B	Active Traffic Control
5	Bingle Rd	35 MPH	39.5MPH	20,840	4	YES	Level D	Active Traffic Control
7	Mangum Rd	35 MPH	37MPH	16,131	4	YES	Level D	Active Traffic Control
7	West TC Jester Blvd	35 MPH	41 MPH	18,158	4	YES	Level D	Active Traffic Control

** Data included in **Appendix D** and summarized in **Figure 3.7** in the previous chapter*
***When ADT is unknown, ADT value is estimated based on available information and surrounding corridor context*

All outputs are influenced by the timing of the signal. For the existing conditions analysis, the existing signal timings are used. In all future scenarios, the existing standard cycle length is maintained but the timing split is optimized for the volume of traffic analyzed.

It should be noted that vehicle LOS is not the only factor to be optimized depending on the demands placed on the intersection. Lower vehicle traffic LOS may be justified when a priority is to provide improved service for transit vehicles, bicycle, and/or pedestrian traffic.

Capacity Analysis Results

Capacity and Level of Service analyses for signalized intersections were conducted for two scenarios, existing volumes and future growth for 2040. Both scenarios were applied to the existing geometry and the proposed intersection geometry. The results are included in **Table 4.3** and **Table 4.4** with the in-depth reports included in **Appendix E**. The outputs of the intersection operations analysis indicate:

- Capacity analysis indicate that the proposed modifications at Brittmoore Road at Hammerly Boulevard have minor overall impact to intersection operations. While, the level of service is expected to be LOS F in 2040 for both the existing geometry and the proposed geometry, this is driven by Brittmoore Road operating as an alternate route to Beltway 8.
- Modifications to radii for right-turns at Beltway 8 to improve safety for people walking and bicycling across the intersection is not projected to negatively impact existing or future intersection operations.
- Intersection capacity analysis along West 34th Street indicate there is excess vehicular capacity and converting the outside lane to a protected bikeway will not have adverse impacts to intersection operations, as shown by comparing the Existing and Projected scenarios for both 2019 and 2040.
- Proposed lane assignment modifications to maintain two westbound through lanes (and providing two dedicated westbound left-turn lanes) from east of US 290 to west of US 290 to match the proposed cross-section west of US 290 is not expected to have adverse impacts on intersection operations.

TABLE 4.3 INTERSECTION CAPACITY ANALYSES RESULTS FOR AM PEAK HOUR

AM PEAK HOUR	EXISTING 2019				PROPOSED 2019 (OPTIMIZED)				EXISTING 2040* (OPTIMIZED)				PROPOSED 2040* (OPTIMIZED)			
	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS
HAMMERLY BLVD AT BRITTMOORE RD	SB LEFT	0.507	37.1	D	SB LEFT	0.534	37.2	D	SB LEFT	0.632	42.7	D	SB LEFT	0.665	42.9	D
SBFR BW 8 AT HAMMERLY BLVD	EB RIGHT	0.782	47.8	D	EB RIGHT	0.780	47.3	D	SB LEFT	0.986	117.8	F	SB RIGHT	0.953	96.3	F
NBFR BW 8 AT HAMMERLY BLVD	WB RIGHT	0.604	37.1	C	WB RIGHT	0.629	33.9	D	NB RIGHT	0.762	57.3	E	NB RIGHT	0.761	57.2	E
GESSNER RD AT EMNORA LN	EB LEFT	0.573	29.9	C	EB LEFT	0.583	27.6	C	EB LEFT	0.749	40.9	D	EB LEFT	0.749	40.9	D
KEMPWOOD DR AT WIRT RD	WB LEFT	0.638	28.8	C	WB LEFT	0.638	28.8	C	WB LEFT	0.793	42.4	D	WB LEFT	0.793	42.4	D
HEMPSTEAD RD AT 34TH ST	SWB LEFT	0.501	35.5	D	SWB LEFT	0.549	31.9	C	SWB LEFT	0.623	40.0	D	SWB LEFT	0.683	41.1	D
W 34TH AT ANTOINE	EB LEFT	0.536	23.4	C	EB LEFT	0.569	25.3	C	NB LEFT	0.67	32.9	C	EB LEFT	0.569	27.3	C
SBFR US 290 AT 34TH ST	EB RIGHT	0.485	30.3	C	EB RIGHT	0.450	30.0	C	EB RIGHT	0.482	25.3	C	EB RIGHT	0.561	34.9	C
NBFR US 290 AT 34TH ST	NWB LEFT	0.307	29.9	C	NWB LEFT	0.307	29.9	C	EB THRU	0.518	32.4	C	EB THRU	0.518	32.3	C

TABLE 4.4 INTERSECTION CAPACITY ANALYSES RESULTS FOR PM PEAK HOUR

PM PEAK HOUR	EXISTING 2019				PROPOSED 2019 (OPTIMIZED)				EXISTING 2040* (OPTIMIZED)				PROPOSED 2040* (OPTIMIZED)			
	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS	WORST MVMT	V/C	DELAY (S/VEH)	LOS
HAMMERLY BLVD AT BRITTMOORE RD	WB RIGHT	0.665	52.4	D	WB RIGHT	0.664	49.3	D	WB RIGHT	0.827	98.6	F	NB THRU	0.897	92.9	F
SBFR BW 8 AT HAMMERLY BLVD	EB RIGHT	0.765	51.5	D	EB RIGHT	0.744	42.8	D	SB RIGTH	0.977	108.3	F	SB RIGHT	0.996	101.8	F
NBFR BW 8 AT HAMMERLY BLVD	WB RIGHT	0.706	38.7	D	EB LEFT	0.706	33.2	C	NB RIGHT	0.897	72.9	E	NB RIGHT	0.897	72.5	E
GESSNER RD AT EMNORA LN	EB LEFT	0.547	27.8	C	EB LEFT	0.550	26.1	C	EB LEFT	0.715	40.8	D	EB LEFT	0.720	34.6	C
KEMPWOOD DR AT WIRT RD	WB LEFT	0.820	50.7	D	WB LEFT	0.820	50.6	D	WB LEFT	1.019	102.5	F	WB LEFT	1.019	102.5	F
HEMPSTEAD RD AT 34TH ST	SEB LEFT	0.548	37.3	D	SWB LEFT	0.662	39.2	D	SEB LEFT	0.697	48.6	D	SWB RIGHT	0.790	59.0	E
W 34TH AT ANTOINE	NB LEFT	0.479	23.2	C	NB LEFT	0.519	25.3	C	SB LEFT	0.597	32.4	C	NB LEFT	0.519	25	C
SBFR US 290 AT 34TH ST	WB THRU	0.493	29.3	C	WB THRU	0.471	38.4	D	WB THRU	0.532	39.5	D	WB THRU	0.586	54.5	D
NBFR US 290 AT 34TH ST	NWB LEFT	0.455	45.3	D	NWB LEFT	0.403	35.4	D	NWB LEFT	0.833	65.8	E	NWB LEFT	0.835	71.2	E

* ASSUMED COMPOUND YEARLY GROWTH RATE OF 1%

PROPOSED ALTERING OF CHANNELIZED RIGHT-TURN RADII

PROPOSED CONVERSION TO APPROACH GEOMETRY AND LANE ASSIGNMENTS

PROPOSED CONVERSION TO LANE ASSIGNMENTS

CORRIDOR PLAN: REGIONAL BIKEWAY CONNECTIONS

The Spring Branch Trail will be the **central link** and **east-west spine** of a Spring Branch bicycle network designed for **all ages and all abilities** connecting neighborhoods, schools, parks, and other major destinations.

The proposed Spring Branch Trail corridor will link together safe, comfortable, and equitable off-street trails and on-street bikeways, navigating around barriers and providing access to destinations. The Plan is designed to support mobility choices for all ages and abilities. All ages and abilities is a criteria that is a national and international best practice that considers the urban context and provides recommendations that are safe, comfortable, and equitable for all users. The goal is to design a bikeway that is safe for everyone including women, children, and seniors - keeping in mind the more vulnerable or under-represented bicyclists.

The Spring Branch Trail, when completed, will provide a safe, comfortable, and useful east-west connection through communities that currently have limited access to safe and comfortable bicycling routes.

Building high quality trails, bikeways, and sidewalks increases the number of people walking and bicycling within a community. However, building infrastructure is just one of many steps to be taken to improve mobility choices for a community and increase the share of people walking and bicycling. An essential step is ensuring that when infrastructure investments are made, thy are focused around developing a *network* of safe and comfortable bikeways and sidewalks.

The Spring Branch Trail will provide almost 11 miles of high comfort bikeways that are designed for cyclists of all ages and all abilities. There is an exciting opportunity for SBMD, the City, and other organizations to expand on this east-west corridor to ensure communities both north and south of the trail have access to and from the trail and to continue to build-out a quality bicycle network for Spring Branch.

A regional connections analysis was conducted along with the schematic design of the Spring Branch Trail to begin to define a bikeway network developed around the trail. The analysis began by evaluating the existing *Houston Bike Plan* (2017) recommendations along with recommendations from previous SBMD studies including the *Spring Branch Comprehensive Plan* and *Reimagine Long Point*.

The Steering Committee was consulted for the analysis and provided invaluable input into priority corridors, preferred connections, and barriers to overcome. City staff was consulted throughout this process to ensure alignment. The public provided positive support of building out a network of bikeways along with the development of the Spring Branch Trail to expand the reach of the trail and to continue to build a high-quality bikeway network for Spring Branch.

The regional connections analysis resulted in the development of a recommended bikeway network, built on the development of the Spring Branch Trail east-west spine, as shown in **Figure 4.60**. The proposed network shows recommended bikeway corridors along with the recommended facility type. Facility types are identified using the *Houston Bike Plan* naming convention.

Facility types recommendations are based on existing corridor geometry and length, existing motor vehicle volumes and speeds, and surrounding land uses. The Toolbox was an input into facility type recommendations and should be used when developing future projects based on presented regional connections within this section.

To better define implementation strategies and project definition, the proposed bikeway network was segment ed into three implementation categories: priority, medium-term and long-term, and presented in detail within the next chapter, Implementation Workbook.

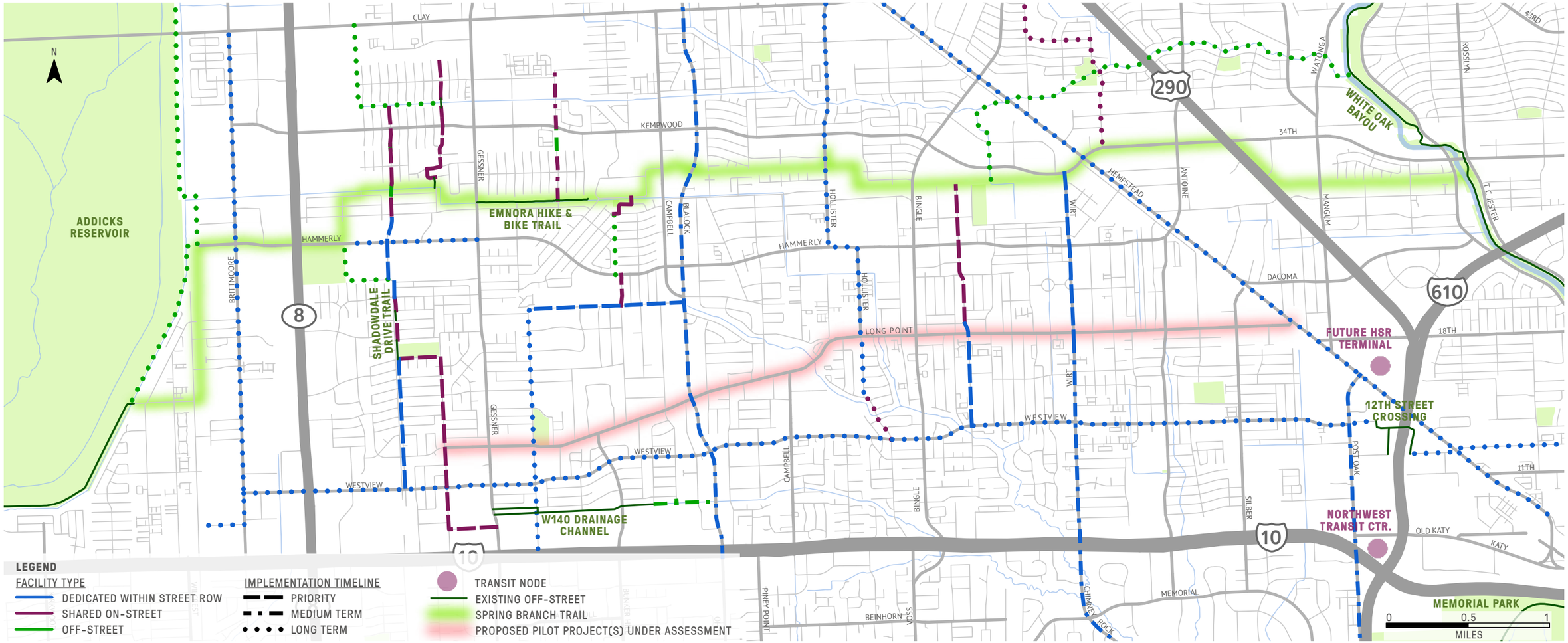


FIGURE 4.60 PRIORITIZATION OF REGIONAL CONNECTIONS INTERSECTING THE SPRING BRANCH TRAIL

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IMPLEMENTATION WORKBOOK BY TRAIL SEGMENT

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INTRODUCTION: IMPLEMENTATION WORKBOOK

The Spring Branch Trail is designed to connect Addicks Reservoir to White Oak Bayou Greenway through central Spring Branch via nearly 11 miles of safe, interconnected on-street and off-street walking and biking infrastructure. For the purpose of detailed planning, the Spring Branch Trail Study divided this expansive regional trail corridor into seven segments. The boundaries of each segment were determined based on team analysis and stakeholder input to ensure that each segment provides utility for people walking and bicycling independently of other segments, with the understanding that implementation will be phased over time. Each segment has its own unique challenges and opportunities and will require thoughtful coordination amongst multiple agencies and entities to implement.

The Implementation Workbook provides a snapshot of each trail segment including trail length, description of the corridor, key features, destinations served, potential partners, timing considerations, funding considerations, cost estimates, and tasks to implement. The intent of the workbook is to provide concise information and tools that may assist the Spring Branch Management District (and other implementing entities) with budgeting, planning, and more streamlined implementation of each corridor segment.

Included after the seven segment workbooks is an implementation workbook for the key regional bikeway connections identified as a part of this study. The Spring Branch Trail will become a regional east-west spine for biking and walking. The north-south corridors support a safe regional bikeway network that serves the Spring Branch community and beyond. The bikeways will need to be coordinated with City of Houston staff for potential inclusion in the City's CIP, but can be supported and promoted by the Spring Branch Management District.

HOW TO USE THE IMPLEMENTATION WORKBOOK

Each workbook will consistently present information with a few exceptions (Segment 5 and Key Bikeway Connections). A brief description of each item included as a part of the implementation workbook is presented by topic below. These workbooks can be reviewed as a whole or individually.

LENGTH

Each segment presents the length from start point to end point, supporting the regional corridor that totals around 11 miles. Some trail segments (ie: 1, 2, 3, and 6) have directional sidepaths or on-street bikeways that may be presented on both sides of the roadway corridor. The on-street segments are not counted for length in both directions, but one direction. Most of the segment lengths are around one mile or slightly more, and two segments are over two miles (Segment 5 and Segment 6).

DESCRIPTION

A brief overview is presented for each trail segment that describes the corridor in high-level detail. This brief description can be used as a starting point for a funding or grant application to describe the individual corridor segments.

KEY FEATURES

A list of key features presents bullets illustrating the unique attributes of the particular segment. Features may include the type of trail or bikeway, an indication of where mid-block crossings are recommended, where access points are located, and where trailheads should be considered.

DESTINATIONS SERVED

A brief list of destinations that are directly adjacent or within a short walk of the trail segment are presented in each workbook. Schools and Super Neighborhoods are listed specifically, but reference to commercial or retail locations are more generally described in case businesses turn over with time.

POTENTIAL PARTNERS

The list of potential partners includes entities that could champion, support, or facilitate implementation of the trail for each individual segment. In each segment, the Spring Branch Management District is listed at the top as the potential lead entity, but in some cases outside the management district boundaries, another entity such as the City of Houston or Houston Parks Board (for example), would need to lead implementation. Many of the segments will take coordination amongst multiple partners who may have jurisdiction over the proposed alignment. The partners listed in total include: Spring Branch Management District (SBMD); City of Houston; Spring Branch ISD (SBISD) Harris County Precinct 3; Harris County Precinct 4; Houston Parks Board; Harris County Metropolitan Transit Authority (METRO); Texas Department of Transportation (TxDOT), Harris County Flood Control District (HCFCD), Union Pacific Railroad (UPRR); and Baseball USA.

TIMING

Each trail segment is categorized as Tier 1, Tier 2, or Tier 3, describing the general timing to implement. The tiers are based on Complexity, Connections, and Champions, and will help set up long-term implementation of the nearly 11-mile corridor. Tier 1 segments have the clearest path forward and could be implemented first. Tiers 2 and 3 will have more complexity, but could build upon the momentum of existing segments and/or Tier 1 implementation. The three factors that contribute to tier classification are:

Complexity

Each trail segment will take coordination between multiple entities and agencies. The more straight-forward segments are the ones utilizing a CenterPoint easement and involve fewer coordinating entities. The more complex segments are ones that involve coordination with TxDOT, City of Houston, UPRR, etc. The more entities that need to be involved, the more complex and more lengthy implementation timing is expected to be.

Connections

The segments that support and build upon existing (or soon-to-be-existing) trails and bikeways will provide comprehensive connections towards the larger regional trail. Many times, in grant applications, applying for funding for a trail that builds upon an existing trail will score better than a trail that does not connect to any other existing facility. Tier 1 segments are those that build off of existing trail segments.

Champions

Having a lead implementation entity is critical to the success of the Spring Branch Trail. The majority of the trail is located within the Spring Branch Management District Boundaries, meaning SBMD could be the "champion" (or

Tier 1 Segments could be implemented first, as there is a clear path forward.

Tier 2 and 3 Segments may need more time and extensive coordination to implement.

INTRODUCTION (CONTINUED)

lead entity) to pursue funding, design, construction, and maintenance of the segment. There are some segments that are completely outside of SBMD boundaries, and will therefore be more complicated to pursue without a proper leader or champion to ensure implementation.

FUNDING CONSIDERATIONS

The nearly 11-mile regional trail is estimated to cost nearly $13 million. Funding will need to come from a variety of sources including but not limited to the Spring Branch Management District's district assessment budget, through local funds (TxDOT, City of Houston, METRO), local/state/national grant opportunities, private dollars, and more. A bulleted list of potential funding sources is provided for each trail segment.

OPINION OF PROBABLE COST

A cost estimate has been created for each segment. A summary of that opinion of probable cost (or cost estimate) is presented by segment in this document, and the more detailed spreadsheets can be found in **Appendix G**. Costs developed are planning level cost estimates; detailed cost estimates will be developed during design.

The cost estimate items include:

- **Trail/Bikeway Construction** - this includes but is not limited to: pavement, signage, traffic signal modification, active traffic control at mid-block crossings, pavement markings, drainage for the trail within the CenterPoint easement, and traffic control.
- **Contingency** - this is a percentage of the construction cost factored in for any unknowns during design and construction.
- **Engineering/Design** - this is a percentage of the construction cost factored in for the engineering and design prior to construction.
- **Mobilization** - this is a cost that is factored in as a percent of the construction cost that accounts for the setting up the site to start work.
- **Landscaping** - this is accounted for only within the CenterPoint easements for wildflower planting only, due to height and plant type restrictions by CenterPoint.

TRAILHEADS

There are at least 41 locations for potential trailheads throughout the 11-mile corridor. However, it is not necessary to have a trailhead at every opportunity possible. Each segment will have a corridor overview map that shows green and/or blue circles where trailhead opportunities are present. The blue circles indicate a basic trailhead and the green circles indicate an enhanced trailhead. A more detailed presentation of trailhead types can be found in the Recommendations Chapter. For the Implementation Workbook, it is important to understand that the opportunities are vast, but with budgeting and further detailed design of each segment, appropriate locations for trailheads will be determined. Due to the number of opportunities, a star has been placed at the preferred locations that should be prioritized during design.

Basic Trailhead

In most cases, a basic trailhead opportunity is presented at an opening or intersection of a CenterPoint easement. The Basic trailheads are basic in that they cannot have any tall or elaborate structures or landscaping due to CenterPoint restrictions. There could be signage, bollards, and wayfinding. A few signage examples are presented in Segment 5, Phase 1 of the regional trail corridor designed by the Houston Parks Board.

Enhanced Trailhead

These locations are opportunities where an adjacent public owned property could be utilized for a larger trailhead that may have amenities such as water fountains, bike racks, parking, and more. Unlike the basic trailheads that are restricted by CenterPoint regulations, an enhanced trailhead has greater potential to provide shade, places to rest, and other comfort amenities.

MAINTENANCE

Planning and budgeting for maintenance is important for longevity of the project. This amount will depend on the facility type, but is included in each trail segment for the sections that are within the CenterPoint easement. This maintenance amount was provided by the Houston Parks Board based on their maintenance budgets for their trails. Maintenance amounts for other trail segments would need to be determined by the City of Houston or other entities with jurisdiction over the trail or bikeway location.

One of the programs mentioned in the Recommendations Chapter is an "Adopt-a-Trail" program, where businesses, neighborhood associations, or other entities can "adopt" a segment of the trail to help maintain by picking up trash, reporting any graffiti or vandalism, and keeping an eye on the condition of the trail. This would be a volunteer-based program but could help support better long-term maintenance of any trails or bikeways.

TASKS TO IMPLEMENT

In each trail segment summary sheet, a few bullets are provided as tasks to implement the segment. Some of the bullets are more general than others, but the idea is to give a starting point to the implementation entity to move forward with pursuing trail design and construction. The majority of the steps to implement a project will start with coordination among agencies and entities, funding of the project, design/engineering, and then construction.

Another factor to consider with implementation is coordination with adjacent commercial property owners to partner on parking and enhanced trailhead opportunities for the regional trail.

TABLE 5.1 SUMMARY OF ALL SEVEN SPRING BRANCH TRAIL SEGMENTS

SEGMENT - LOCATION	PRIORITY TIER	FACILITY TYPE	LENGTH	POTENTIAL TRAILHEAD LOCATIONS	COST ESTIMATE (CONSTRUCTION ONLY)	KEY DESTINATIONS
Segment 1 Addicks Reservoir at Chatterton to West Hammerly Boulevard	2	Neighborhood Bikeway/ Off-Street Trail	1.4 Miles	8	$ 1,474,716	» Addicks Reservoir (and trails) » Sherwood Elementary School » The Parish School and the Carruth Center » Spring Branch West Super Neighborhood (10)
Segment 2 West Hammerly to East of the Guthrie Center	2	Neighborhood Bikeway/ Sidepath	1.0 Miles	1	$2,155,508	» The Parish School and the Carruth Center » The Westview School » Agnes Moffitt Park » The Guthrie Center (SBISD) » Westwood Elementary School (SBISD)
Segment 3 East of the Guthrie Center to Gessner Road	1	Neighborhood Bikeway/ Off-Street Trail	1.5 Miles	8	$1,944,012	» The Guthrie Center (SBISD) » Terrace Elementary School (SBISD) » Spring Woods High School (SBISD) » Baseball USA » Hillendahl Neighborhood Library
Segment 4 Gessner Road to Blalock Road Trail Connection	1	Off-Street Trail	1.7 Miles	9	*School Option:* $1,461,312 *Median Option:* $1,370,872 *Neighborhood Option:* $1,267,644	» Northbrook High School » Buffalo Creek Elementary School
Segment 5 "Phase 1" Blalock Road to Wirt Road	Estimated Construction: 2020	Off-Street Trail	2.4 Miles	8	Segment under design with expected construction 2020	» Fiesta Grocery Store » Landrum Middle School » Schwartz Park » Edgewood Elementary School » Saint Jerome Catholic School » Buffalo Creek Elementary School
Segment 6 Wirt Road to Mangum Road	3	Sidepath/On-Street Bikeway/Off-Street Trail	1.75 Miles	1	$2,033,268	» Fiesta Grocery Store » Shopping and restaurants within the US 290 corridor
Segment 7 Mangum Road to White Oak Bayou Greenway	3	Off-Street Trail	1.0 Mile	7	*Trail from Mangum Road to East TC Jester Boulevard:* $1,655,888 *Signature Pedestrian Bridge over White Oak Bayou Greenway:* $3,584,799	» Some commercial locations » White Oak Bayou Greenway Trail

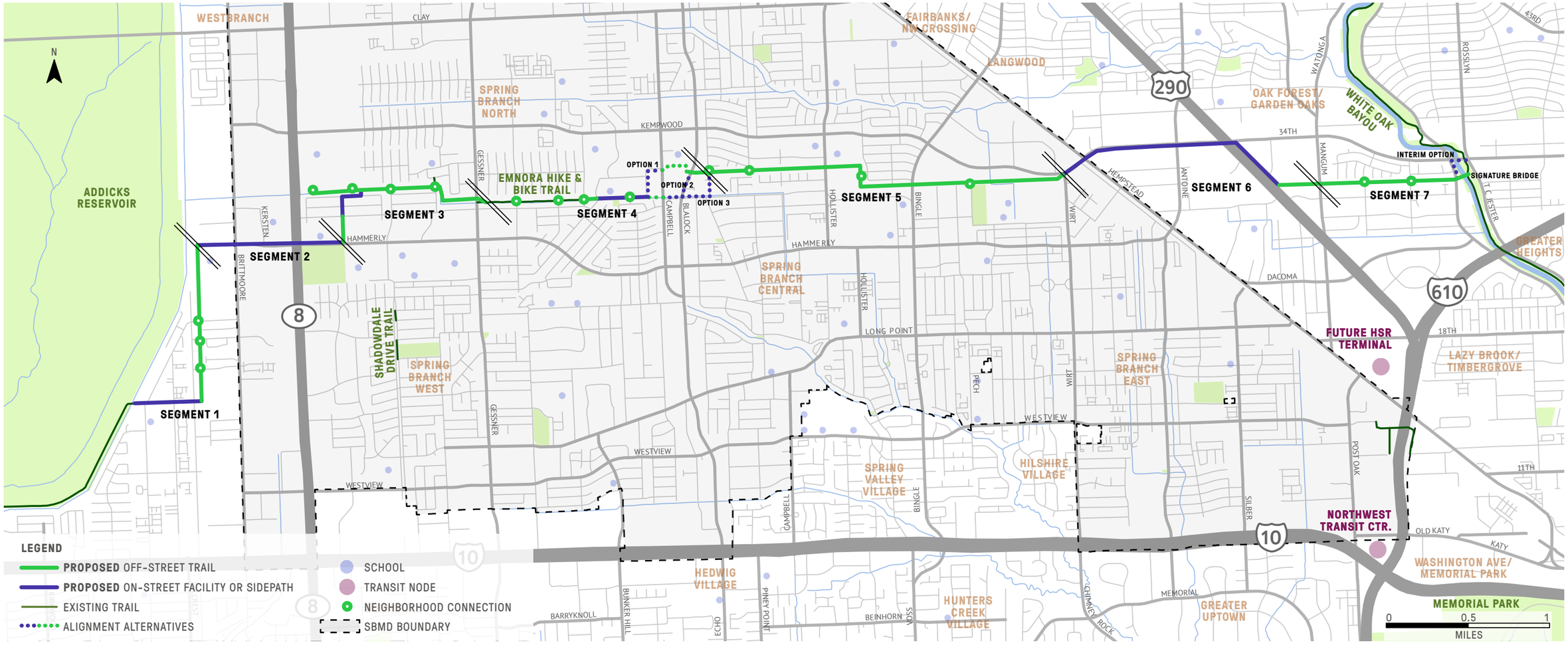


FIGURE 5.1 SPRING BRANCH TRAIL SEGMENTATION OVERVIEW

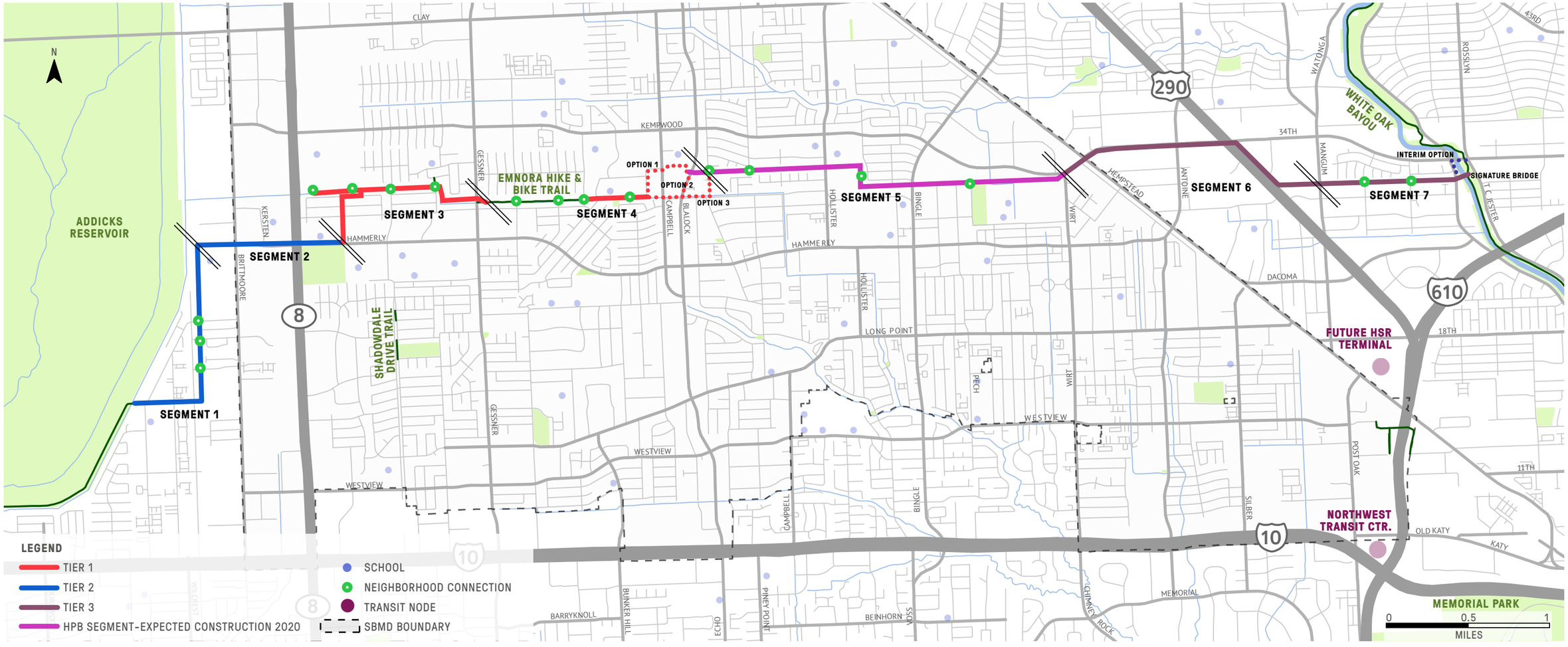


FIGURE 5.2 SPRING BRANCH TRAIL PRIORITIZATION TIER OVERVIEW

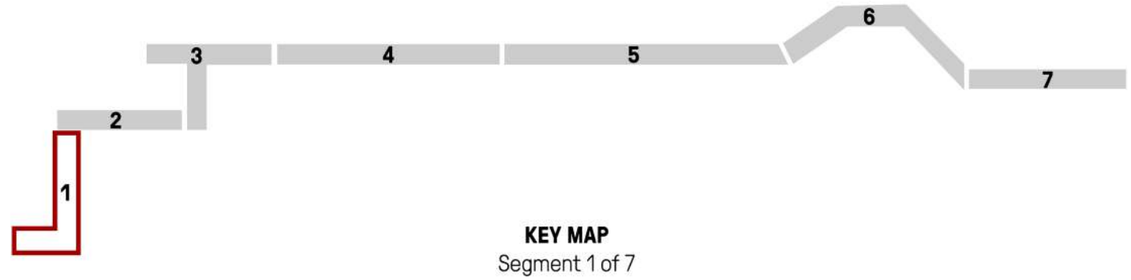
FIGURE 5.3 POTENTIAL TRAILHEAD LOCATIONS & PROPOSED TYPE

SEGMENT 1:
ADDICKS RESERVOIR AT CHATTERTON TO WEST HAMMERLY BOULEVARD

SEGMENT 1

ADDICKS RESERVOIR TO WEST HAMMERLY

PRIORITY CORRIDOR: TIER 2



KEY MAP
Segment 1 of 7

LENGTH: 1.4 miles

DESCRIPTION:

Segment 1, connecting Addicks Reservoir to Hammerly Boulevard, is primarily an off-street shared-use path along a north-south CenterPoint easement. The segment begins at the Chatterton Bridge near Addicks Reservoir and continues east along Chatterton Street as a neighborhood bikeway connecting to the north-south CenterPoint easement. Neighborhood bikeways are designed with signage and pavement markings (called "sharrows") to indicate that cyclists and motor vehicle drivers are to share the roadway. In addition, roadway design elements should be explored to reduce motor vehicle speeds. The sidewalks along Chatterton Street were reconstructed to City standard in 2019 and will provide a safe place for people walking from the Chatterton bridge towards the CenterPoint easement shared-use trail. Segment 1 extends to the western terminus of Hammerly Boulevard west of the Parish School and Carruth Center. The Segment 1 terminus at West Hammerly Boulevard is a potential trailhead location.

KEY FEATURES

- Mostly off-street along a CenterPoint easement with a small section of shared on-street bikeway
- Five access points to the trail:
  - Chatterton Street (potential trailhead)
  - Timberoak Drive (mid-block crossing)
  - Shadow Wood Drive (mid-block crossing)
  - Metronome Drive (neighborhood connection)
  - Hammerly Boulevard (potential trailhead)
- Trail crossings at intersecting roadways are low speed, low volume

DESTINATIONS SERVED

- Addicks Reservoir (and trails)
- Sherwood Elementary School
- The Parish School and the Carruth Center
- Spring Branch West Super Neighborhood (10)
- METRO Bus Route 39 along Chatterton Street

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)
- City of Houston*
- Houston Parks Board*
- Harris County Precinct 3
- Harris County Flood Control District (HCFCD)
- US Army Corps of Engineers (USACE)
- Spring Branch ISD

**indicates potential lead implementation entity*

TIMING:

The timing of Segment 1 will depend on the partners leading the effort and funding availability. The segment is located just outside the Spring Branch Management District boundaries, but that does not mean the District could not lead the effort to implement the trail connection effort. This segment is a Tier 2 priority corridor.

FUNDING CONSIDERATIONS:

- District Assessment
- Local Funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

OPINION OF PROBABLE COSTS: $1,474,716

Trail/Bikeway Construction Estimate	$880,000
Mobilization (10%)	$88,000
Contingency (20%)	$193,600
Engineering/Design (26%)	$302,016
Trail/Bikeway Construction Subtotal	**$1,463,616**
Wildflower Seeding Adjacent to Trail	$11,100
TOTAL SEGMENT 1 COST ESTIMATE	**$1,474,716**

TRAILHEAD CONSIDERATIONS:

There are eight locations where trailheads could be incorporated into Segment 1: four locations where enhanced trailheads could be considered and four locations where a basic trailhead could be considered. Funding and feasibility to implement will be factors in deciding the location and style of trailheads to be incorporated along Segment 1. Trailhead cost by type are shown below. See the schematic design on the following pages for potential locations.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

MAINTENANCE COSTS:

Annual Trail Maintenance*	$ 25,000/ mile

**Based on Houston Parks Board estimates and only applies to trail portions that are off-street shared-use paths*

TASKS TO IMPLEMENT:

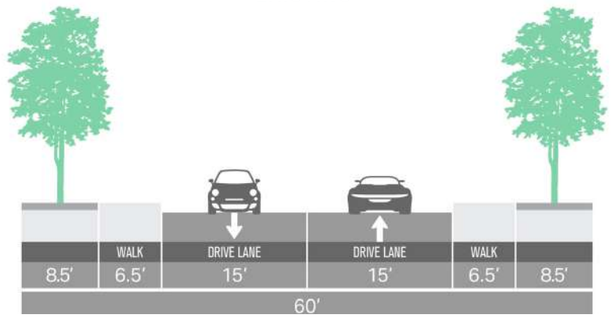
- Determine lead agency to implement since Segment 1 is outside SBMD boundaries
- Coordinate among SBMD, Houston Parks Board, Harris County Precinct 3, City of Houston, HCFCD and USACE on feasibility of all options or potential trail alignments and identify implementation roles.
- Explore feasibility and coordination with Harris County Precinct 3 including HCFCD and USACE on opportunities for off-street connections adjacent to the Addicks Reservoir as an alternative to the CenterPoint easement alignment. Three viable alternatives are defined on page 80 in Chapter 4 of the Corridor Plan for reference.
- Create budget and expected timing for project design and construction
- Investigate underground utilities, land ownership or licenses within CenterPoint easement
- Apply for grant funding opportunities
- Begin engineering and design
- Coordinate with METRO on the 39 bus stop placement and design along Chatterton
- Assess existing pavement quality for on-street bikeways
- Identify potential partners for shared parking

SEGMENT 1

CROSS-SECTIONS:

CHATTERTON STREET

EXISTING



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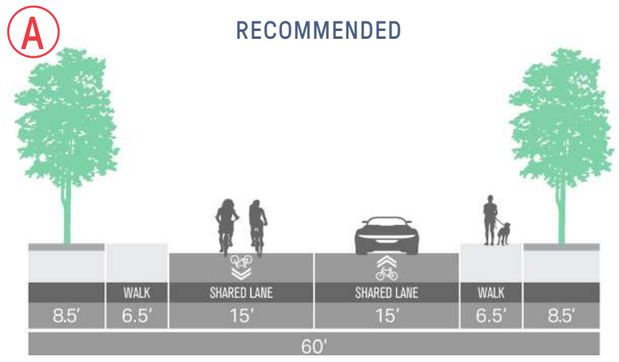
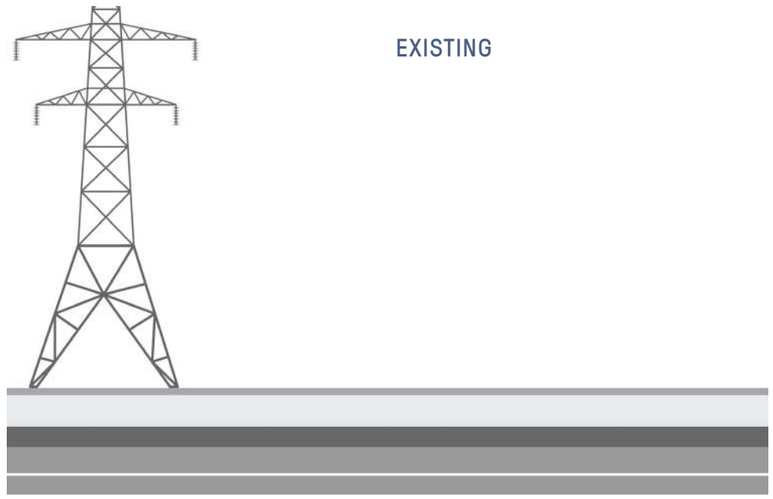


CENTERPOINT EASEMENT

EXISTING



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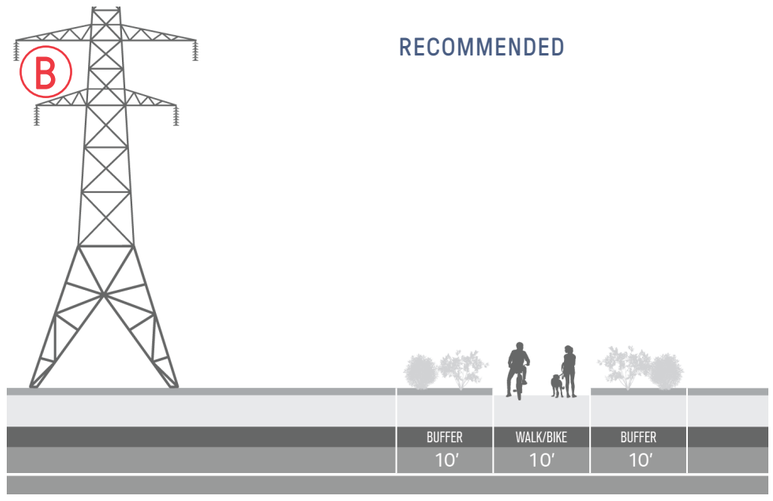
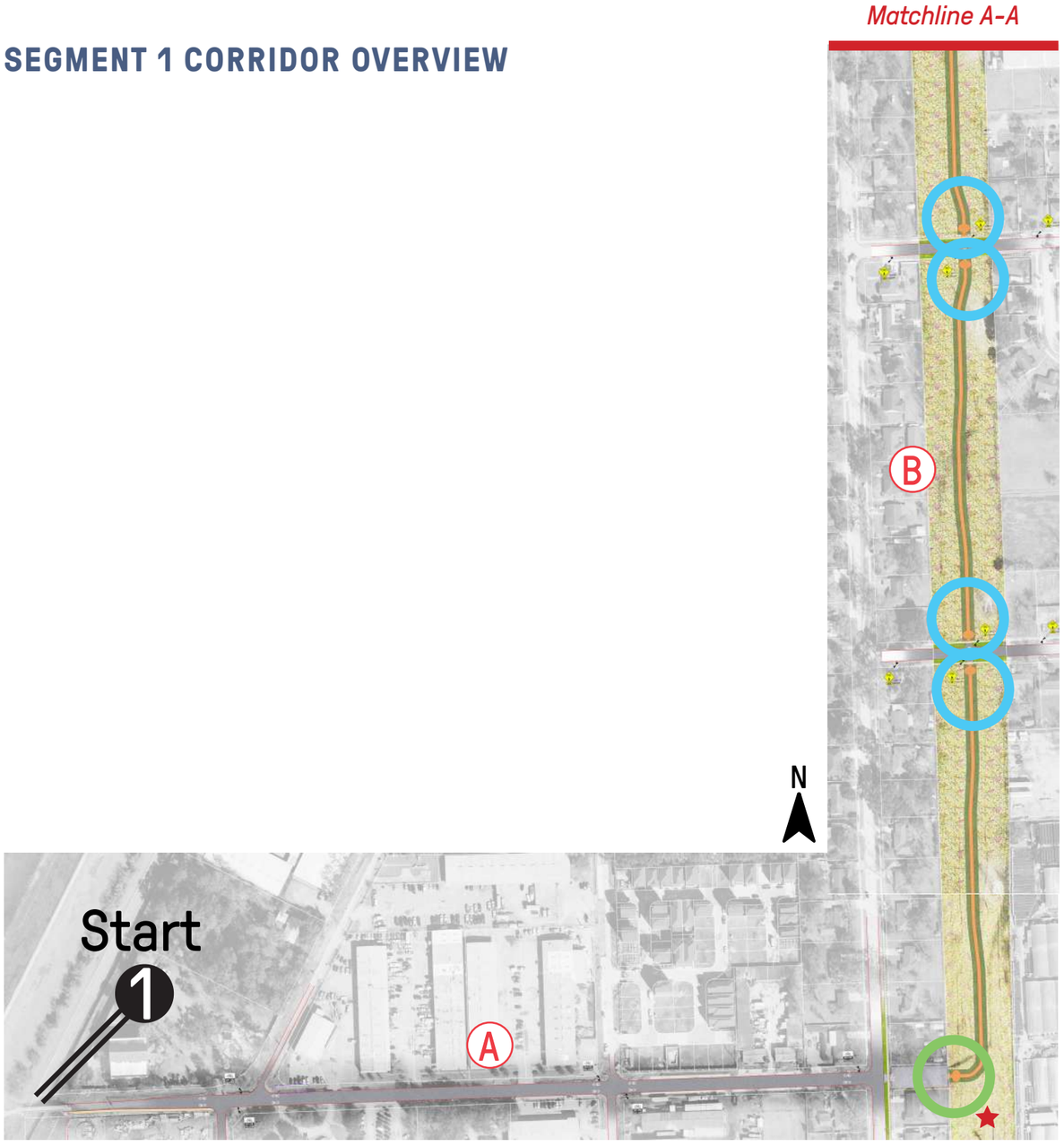


SB TRAIL TOOLBOX:

NEIGHBORHOOD BIKEWAY

OFF-STREET SHARED-USE TRAIL

SEGMENT 1 CORRIDOR OVERVIEW



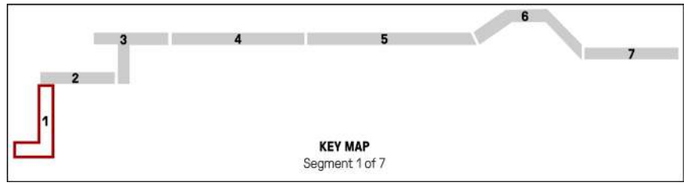
BASIC TRAILHEAD

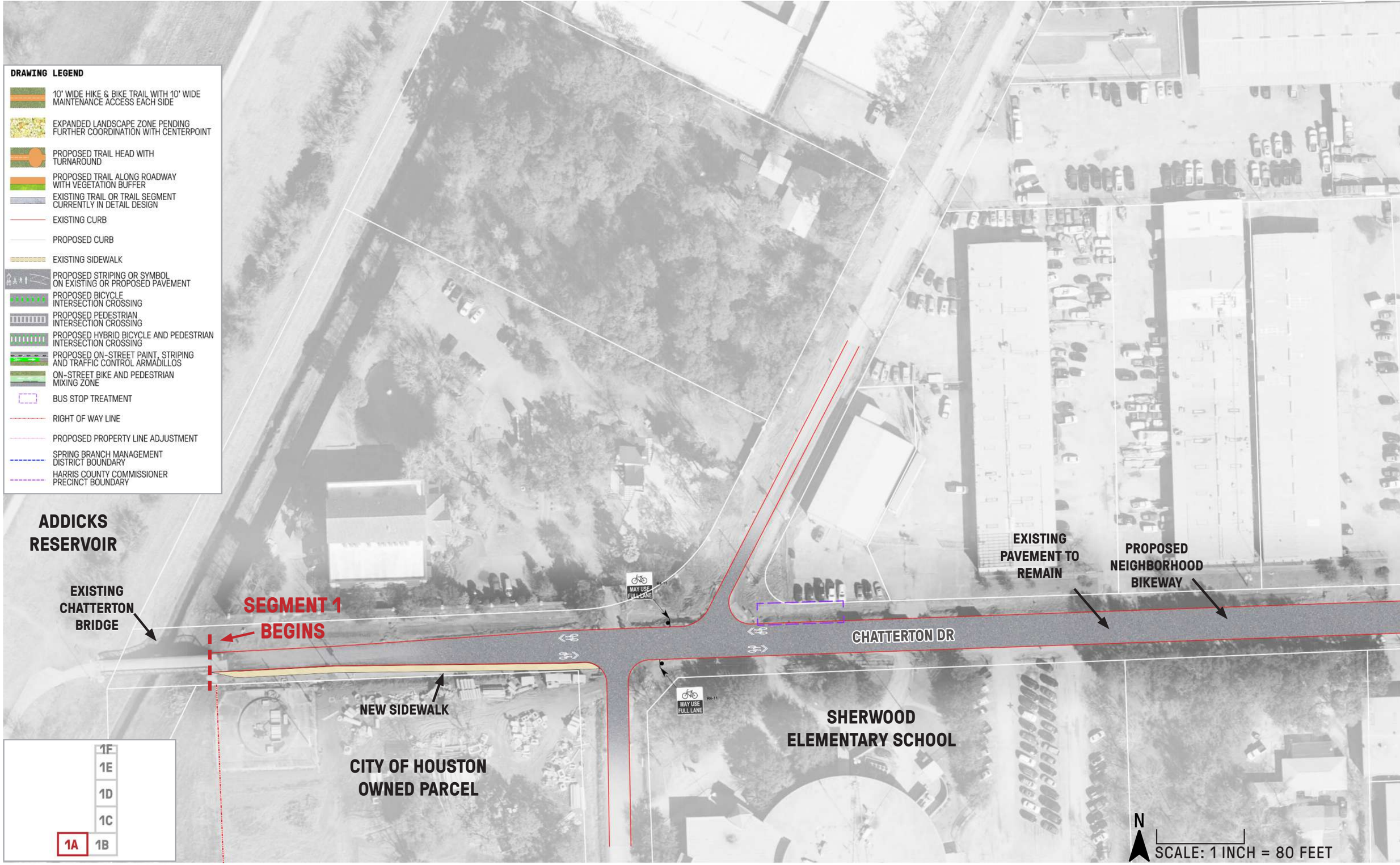
ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages

SCHEMATIC DESIGN FOR ENHANCED TRAILHEAD AT CHATTERTON STREET

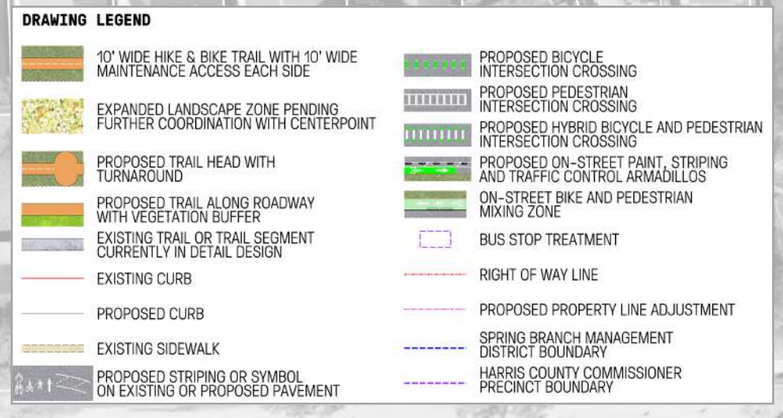




PAGE 1A | SEGMENT 1 OF 7

PAGE 1B | SEGMENT 1 OF 7

PAGE 1C | SEGMENT 1 OF 7



PAGE 1D | SEGMENT 1 OF 7

PAGE 1E | SEGMENT 1 OF 7

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

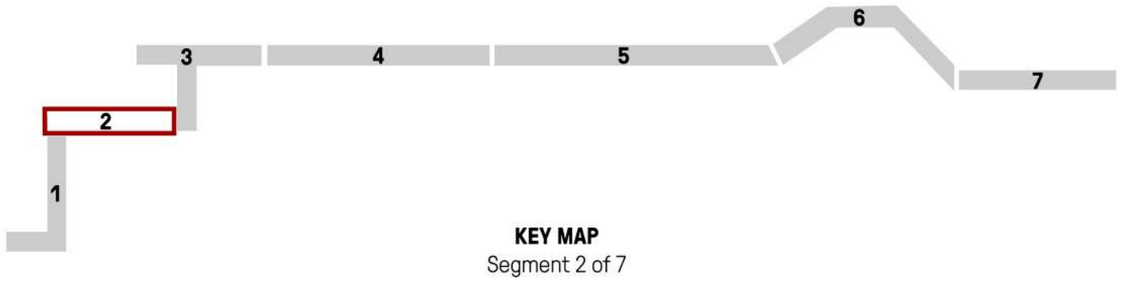
PAGE 1F | SEGMENT 1 OF 7

SEGMENT 2: WEST HAMMERLY BOULEVARD TO EAST OF THE GUTHRIE CENTER

SEGMENT 2

WEST HAMMERLY TO EAST OF GUTHRIE CENTER

PRIORITY CORRIDOR: TIER 2



KEY MAP
Segment 2 of 7

LENGTH: 1.0 mile

DESCRIPTION:

Segment 2 extends approximately 1 mile along Hammerly Boulevard connecting the CenterPoint easement that is parallel to Addicks Dam to Agnes Moffitt Park and The Guthrie Center. West of Brittmoore Road where Hammerly Boulevard is a low-volume, dead-end street, a neighborhood bikeway, including signage and "sharrow" pavement markings, is recommended. At the Brittmoore Road intersection, a separated bikeway will be provided. Trail users on foot will be accommodated by improved sidewalks. New roadway striping and signage will formalize on-street parking and queuing areas for the Parish School, which will reduce conflicts between trail users and school-related activity.

East of Brittmoore Road, bikes will transition to behind the curb along wide sidepaths, shared with walking trail users. At the intersection of Hammerly Boulevard and Beltway 8, the recommended schematic design includes roadway geometry improvements, including smaller turning radii and mountable curbs, to allow trail users to cross Beltway 8 safely and comfortably. At Beltway 8, the design includes separated and dedicated spaces for both people walking and people bicycling.

A mid-block crossing with active traffic control, pavement markings, and a median refuge is recommended at the eastern end of Segment 2 connecting The Guthrie Center with Agnes Moffitt Park.

KEY FEATURES

- Proposed corridor alignment is within the public right-of-way utilizing three types of facilities: neighborhood bikeway, separated bikeway, and shared-use sidepaths.
- Installation of bikeway traffic signal at Hammerly Boulevard at Brittmoore Road intersection
- Proposed geometry modifications at the intersection of Hammerly Boulevard at Beltway 8 to provide safe and comfortable crossings for trail users
- Proposed mid-block crossing with active traffic control across Hammerly Boulevard

DESTINATIONS SERVED

- The Parish School and the Carruth Center
- The Westview School
- Agnes Moffitt Park
- The Guthrie Center (SBISD)
- Westwood Elementary School (SBISD)
- Spring Branch West Super Neighborhood (10)
- Spring Branch North Super Neighborhood (84)
- METRO Bus Route 58 along Hammerly Boulevard

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)*
- City of Houston*
- TxDOT
- Harris County Toll Road Authority (HCTRA)
- Harris County Precinct 3
- Spring Branch ISD
- METRO

**indicates potential lead implementation entity*

TIMING:

The timing of Segment 2 will depend on funding availably and coordination between SBMD and the City of Houston since it is located within City of Houston rights-of-way. This is a Tier 2 priority corridor.

FUNDING CONSIDERATIONS:

- District Assessment
- Local Funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

OPINION OF PROBABLE COSTS: $2,155,508

Trail/Bikeway Construction Estimate	$1,296,000
Mobilization (10%)	$129,600
Contingency (20%)	$285,120
Engineering/Design (26%)	$444,788
Trail/Bikeway Construction Subtotal	**$2,155,508**
Wildflower Seeding Adjacent to Trail	n/a
TOTAL SEGMENT 2 COST ESTIMATE	**$2,155,508**

TRAILHEAD CONSIDERATIONS:

There is one location where a trailhead could be considered near the Guthrie Center (either basic or enhanced trailhead). Trailhead cost by type is shown below. See the schematic design on the following pages for potential locations.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

MAINTENANCE COSTS:

To be determined in coordination with City of Houston.

TASKS TO IMPLEMENT:

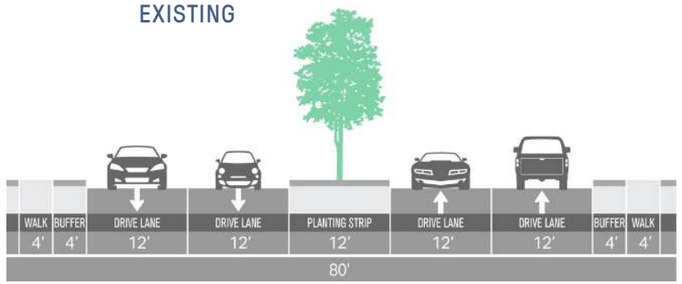
- SBMD to coordinate with the City of Houston Planning and Public Works to begin preliminary assessment and schematic design
- SBMD and City of Houston to coordinate with Harris County Toll Road Authority and TxDOT on improvements at Beltway 8
- Create budget and expected timing for project design and construction
- Apply for grant funding opportunities
- Begin engineering and design
- Coordinate with METRO (58) on bus stop placement and design
- Assess existing pavement quality for on-street bikeways
- Identify potential partners for shared parking

SEGMENT 2

CROSS-SECTIONS:

HAMMERLY BOULEVARD EAST OF BRITTMOORE STREET

EXISTING



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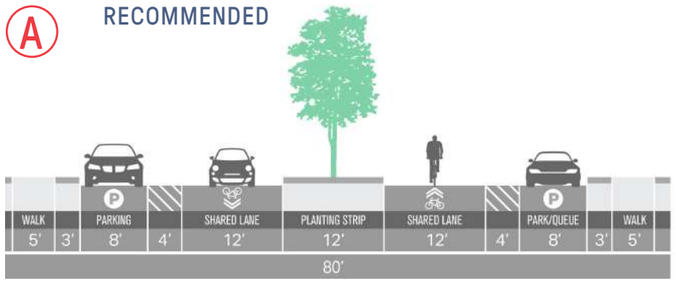
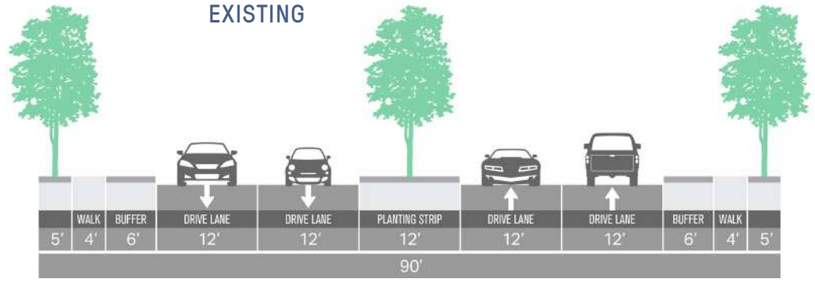


HAMMERLY BOULEVARD BETWEEN BRITTMOORE STREET AND BELTWAY 8

EXISTING



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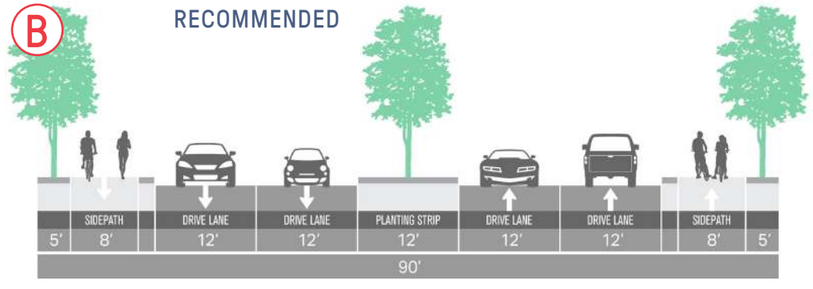
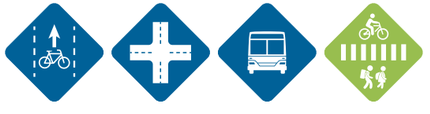


SB TRAIL TOOLBOX:

NEIGHBORHOOD BIKEWAY

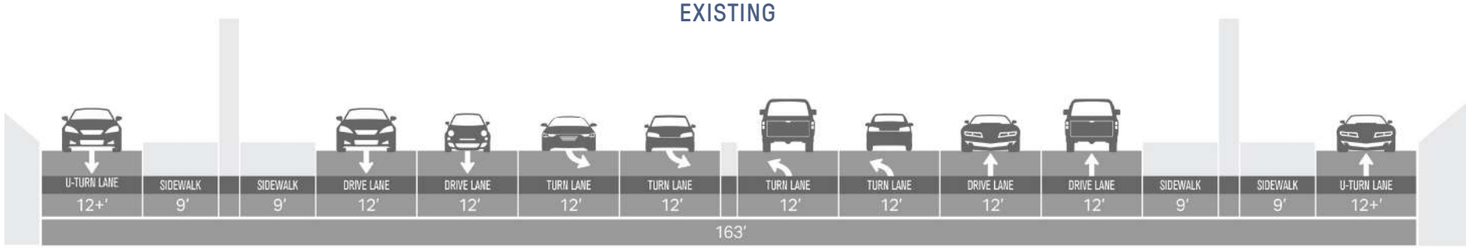
SHARED-USE SIDEPATH



CROSS-SECTIONS:

HAMMERLY BOULEVARD AT BELTWAY 8

EXISTING

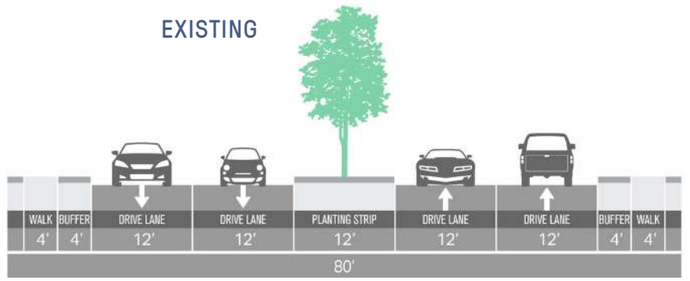


C

RECOMMENDED

HAMMERLY BOULEVARD BETWEEN BELTWAY 8 AND THE GUTHRIE CENTER

EXISTING



D

RECOMMENDED

SEGMENT 2 CORRIDOR OVERVIEW

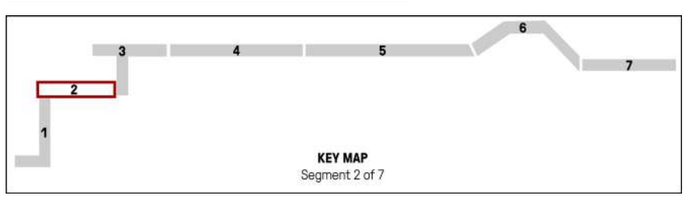
BASIC TRAILHEAD

ENHANCED TRAILHEAD

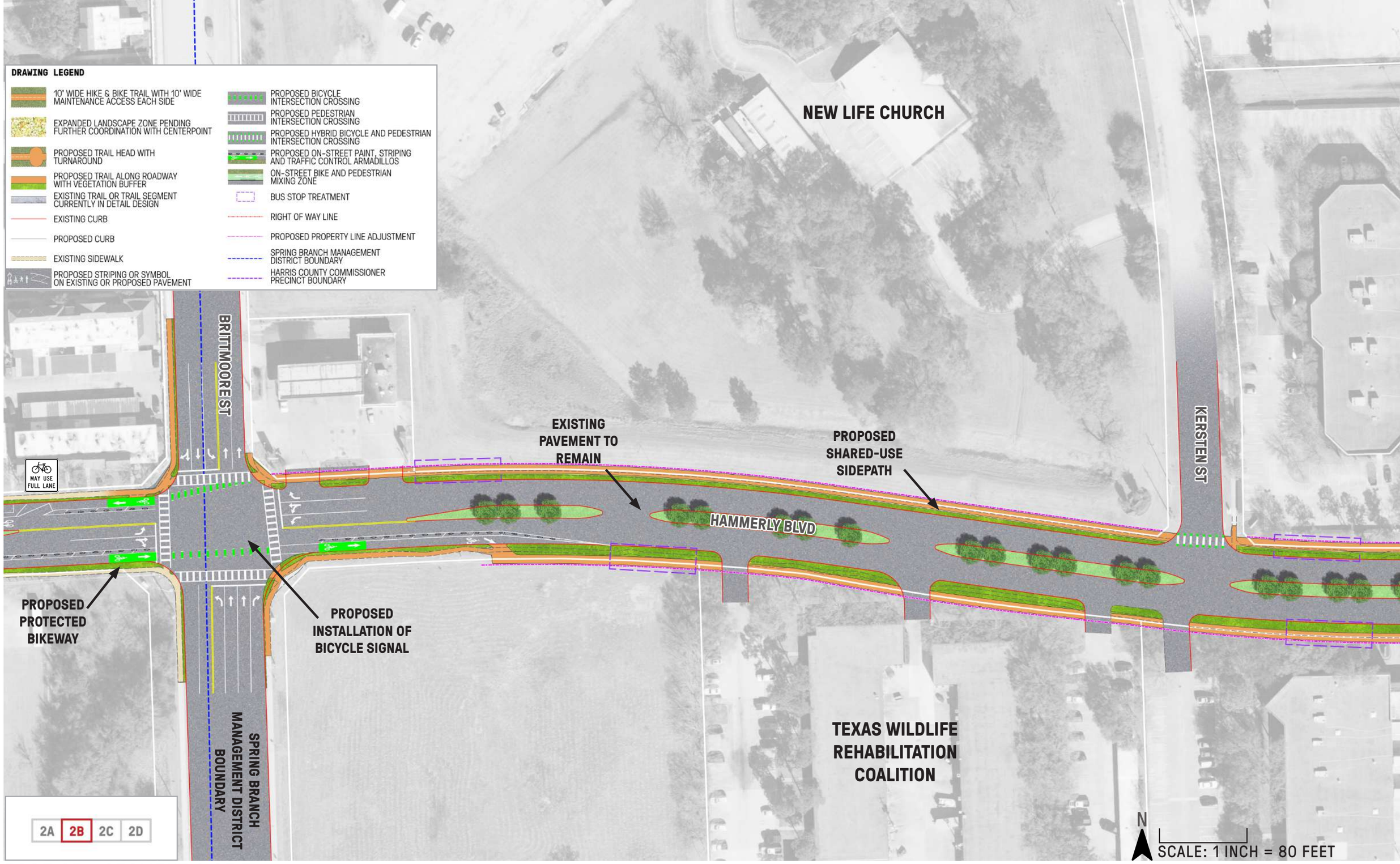
PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages

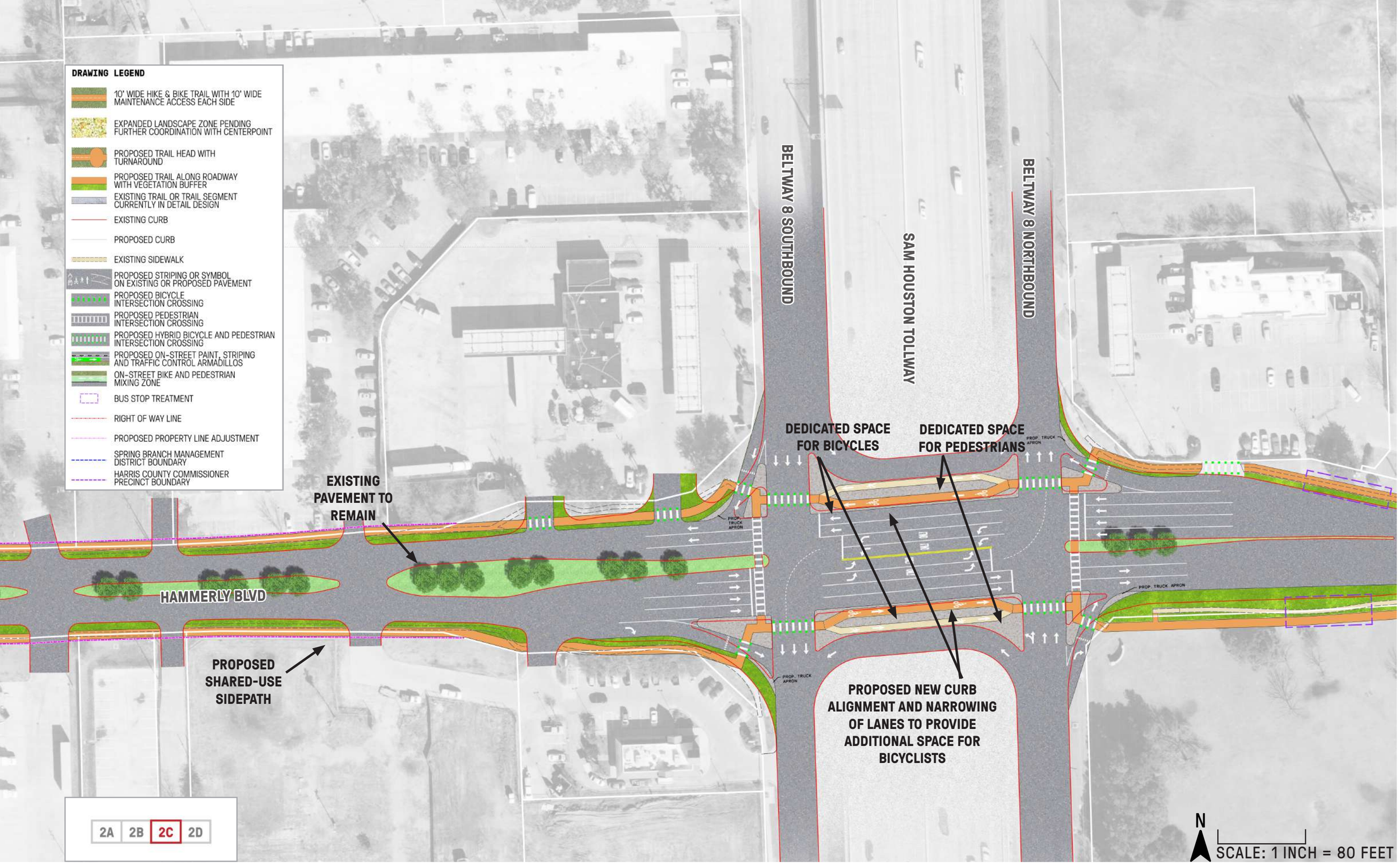
N



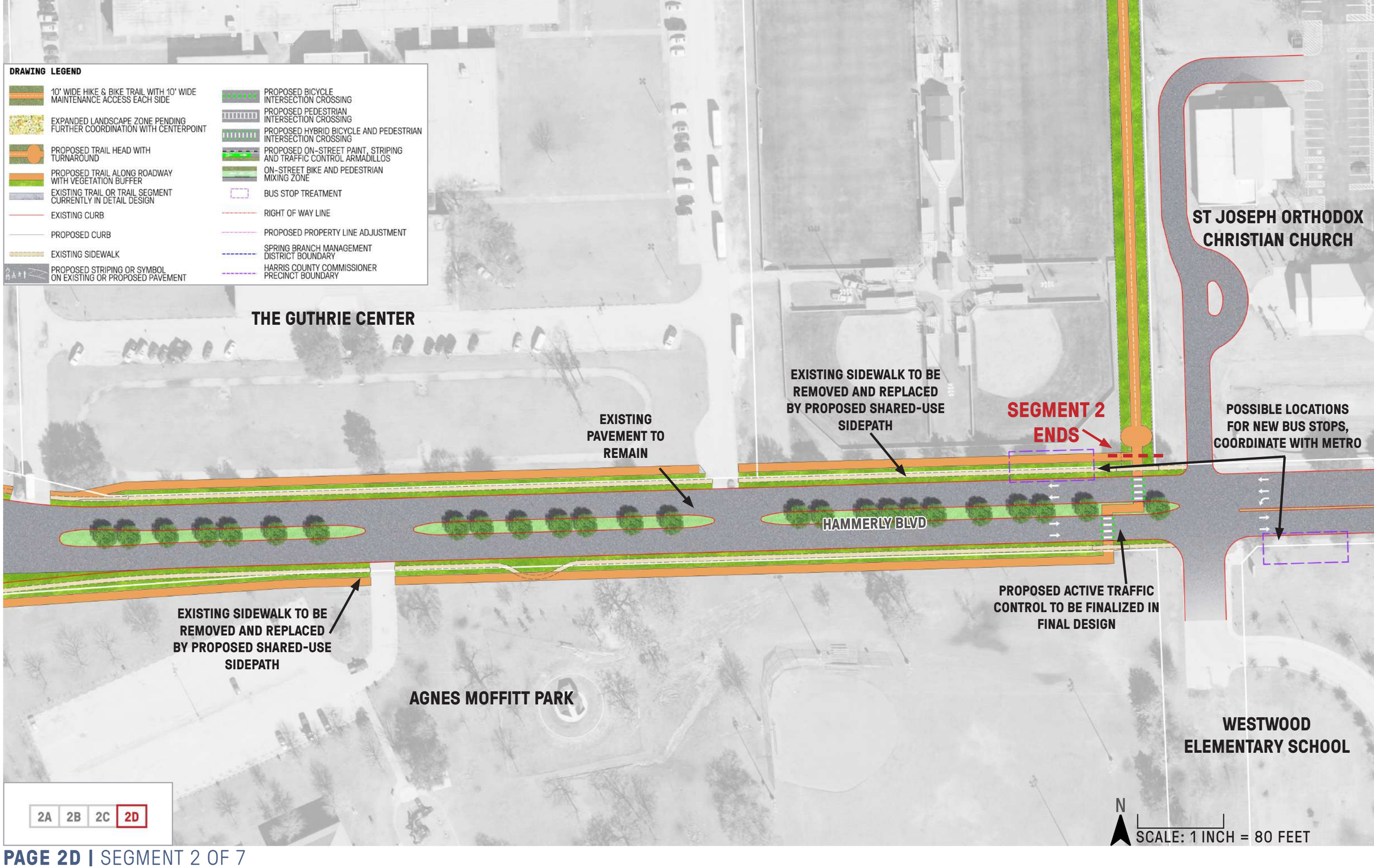
PAGE 2A | SEGMENT 2 OF 7



PAGE 2B | SEGMENT 2 OF 7



PAGE 2C | SEGMENT 2 OF 7



PAGE 2D | SEGMENT 2 OF 7

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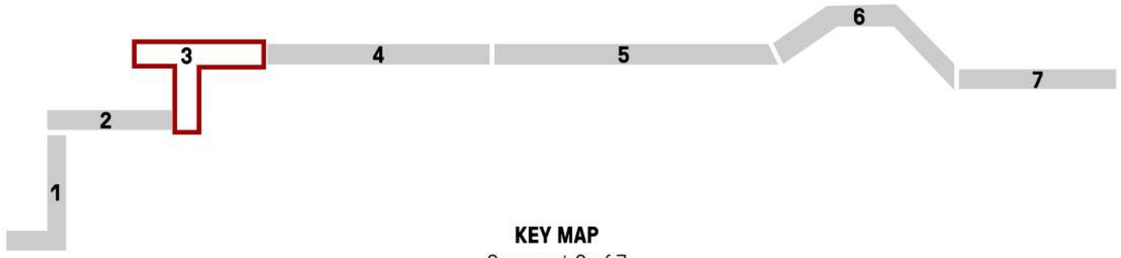
SEGMENT 3:
EAST OF THE GUTHRIE CENTER TO GESSNER ROAD

SEGMENT 3

EAST OF GUTHRIE CENTER TO GESSNER ROAD

PRIORITY CORRIDOR: TIER 1



KEY MAP
Segment 3 of 7

LENGTH: 1.5 miles

DESCRIPTION:

Segment 3 utilizes off-street trails and low-volume neighborhood streets to connect The Guthrie Center on Hammerly Boulevard to the existing Emnora Trail in the CenterPoint Easement east of Gessner Road. From Hammerly Boulevard an off-street trail will follow an SBISD easement along the eastern edge of The Guthrie Center to connect to Ottawa Lane. A neighborhood bikeway will guide trail users through the neighborhood to Lanell Lane, where there will be a new entrance to the CenterPoint easement. From Lanell Lane, off-street trails will follow the CenterPoint easement both west to Baseball USA and east towards Gessner Road. A new north-south neighborhood connection at Shadowdale Drive and an existing north-south neighborhood connection at Triway Lane are included within this Segment.

At Gessner Road, a midblock crossing with active traffic control to safely connect trail users to the existing Emnora Trail segment is recommended. The recommended midlbock crossing of Gessner Road is proposed to be located approximately 350 feet north of the Emnora Road intersection to enhance the safety of the crossing. An extension of the existing Emnora Trail east of Gessner Road is recommended to intersect the proposed mid-block crossing.

KEY FEATURES

- Mostly off-street shared-use path along CenterPoint easement with a small section of neighborhood bikeway through low-volume neighborhood streets
- Neighborhood connection points at:
  - Lanell Street
  - Ottowa Lane (possible trailhead location)
  - Shadowdale Drive (existing connection north and south of easement today)
  - Gessner Road (mid-block crossing and potential trailhead location)

DESTINATIONS SERVED

- The Guthrie Center (SBISD)
- Terrace Elementary School (SBISD)
- Spring Woods High School (SBISD)
- Baseball USA
- Hillendahl Neighborhood Library
- METRO Bus Route 46 along Gessner Road
- Spring Branch North Super Neighborhood (84)
- Commercial and retail along Gessner Road

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)*
- City of Houston
- Harris County Precinct 4
- Harris County Precinct 3
- Houston Parks Board
- Spring Branch ISD
- Baseball USA
- METRO

**indicates potential lead implementation entity*

TIMING:

The timing of Segment 3 will depend on funding availability and coordination with SBISD for the easement, City of Houston for on-street connections and the mid-block crossing at Gessner Road, and Harris County Precinct 4 to make a new connection to the existing Emnora Trail. Coordination with Baseball USA will also be necessary as some of the trail will need to utilize small portions of two parking lots to meet CenterPoint design requirements. Segment 3 includes proposed access points to Baseball USA to provide direct connections from the neighborhoods to the facility. This segment is a Tier 1 priority corridor, meaning it is one of two segments that should be pursued next by SBMD after Segment 5 is underway.

FUNDING CONSIDERATIONS:

- District Assessment
- Local funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

OPINION OF PROBABLE COSTS: $1,944,012

Trail/Bikeway Construction Estimate	$1,160,000
Mobilization (10%)	$116,000
Contingency (20%)	$255,200
Engineering/Design (26%)	$398,112
Trail/Bikeway Construction Subtotal	**$1,929,312**
Wildflower Seeding Adjacent to Trail	$14,700
TOTAL SEGMENT 3 COST ESTIMATE	**$1,944,012**

TRAILHEAD CONSIDERATIONS:

There are four locations where enhanced trailheads could be considered and one location where a basic trailhead could be considered. Trailhead cost by type is shown below. See the schematic design on the following pages for potential locations.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

MAINTENANCE COSTS:

Annual Trail Maintenance*	$ 25,000/ mile

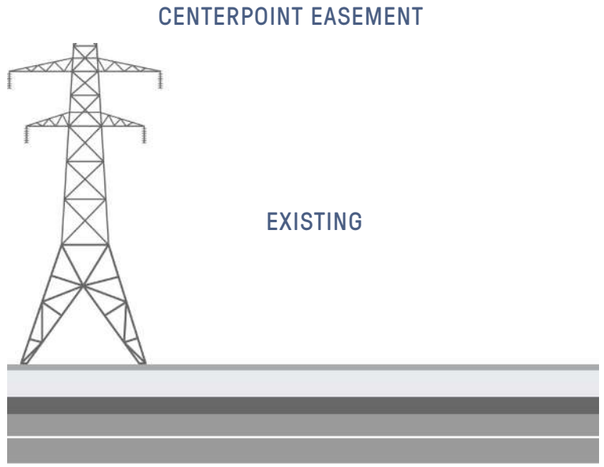
**Based on Houston Parks Board estimates and only applies to trail portions that are off-street shared-use paths*

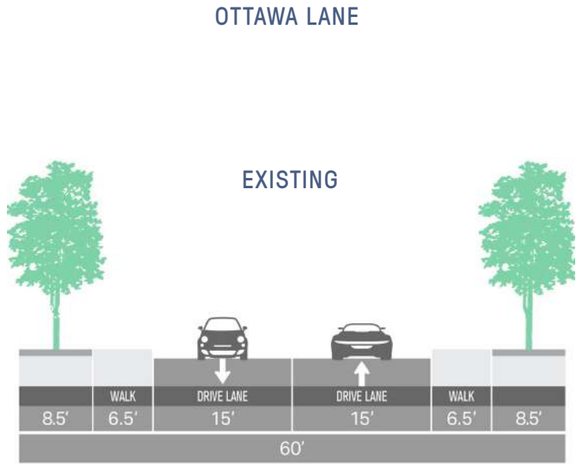
SEGMENT 3

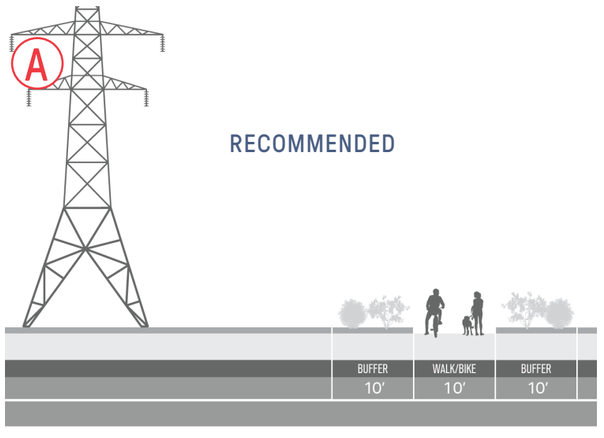
TASKS TO IMPLEMENT:

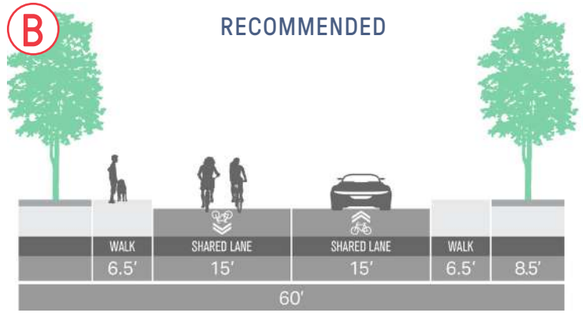
- » SBMD to engage with Houston Parks Board to facilitate trail development within CenterPoint easement
- » SBMD to lead coordination with Spring Branch ISD (SBISD) on acquiring an easement on the very east side of The Guthrie Center property for the trail connection
- » SBMD to lead coordination with the City of Houston on mid-block crossing at Gessner Road and on-street shared corridor through the neighborhood
- » SBMD to lead coordination with Baseball USA on access points to facility
- » Create budget and expected timing for project design and construction
- » Investigate underground utilities, land ownership or licenses within CenterPoint easement
- » Apply for grant funding opportunities
- » Begin engineering and design
- » Coordinate with METRO (46) on bus stop placement and design at Gessner Road midblock crossing
- » Assess existing pavement quality for on-street bikeways
- » Identify potential partners for shared parking

CROSS-SECTIONS:







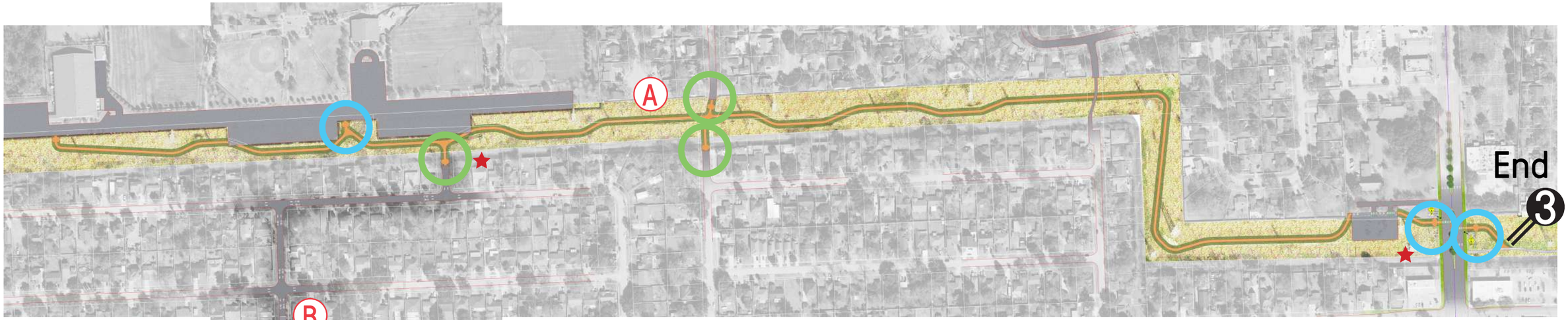


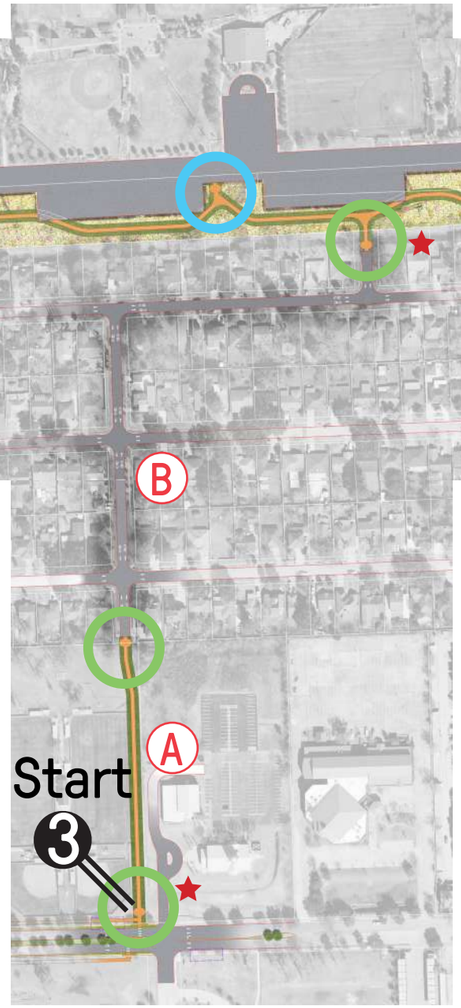
SB TRAIL TOOLBOX:

OFF-STREET SHARED-USE TRAIL

NEIGHBORHOOD BIKEWAY

SEGMENT 3 CORRIDOR OVERVIEW



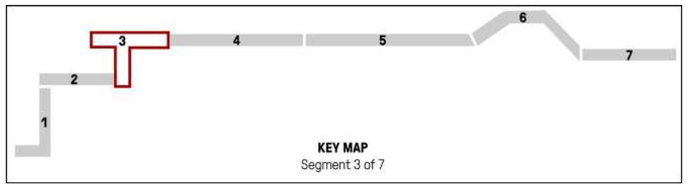


BASIC TRAILHEAD

ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages



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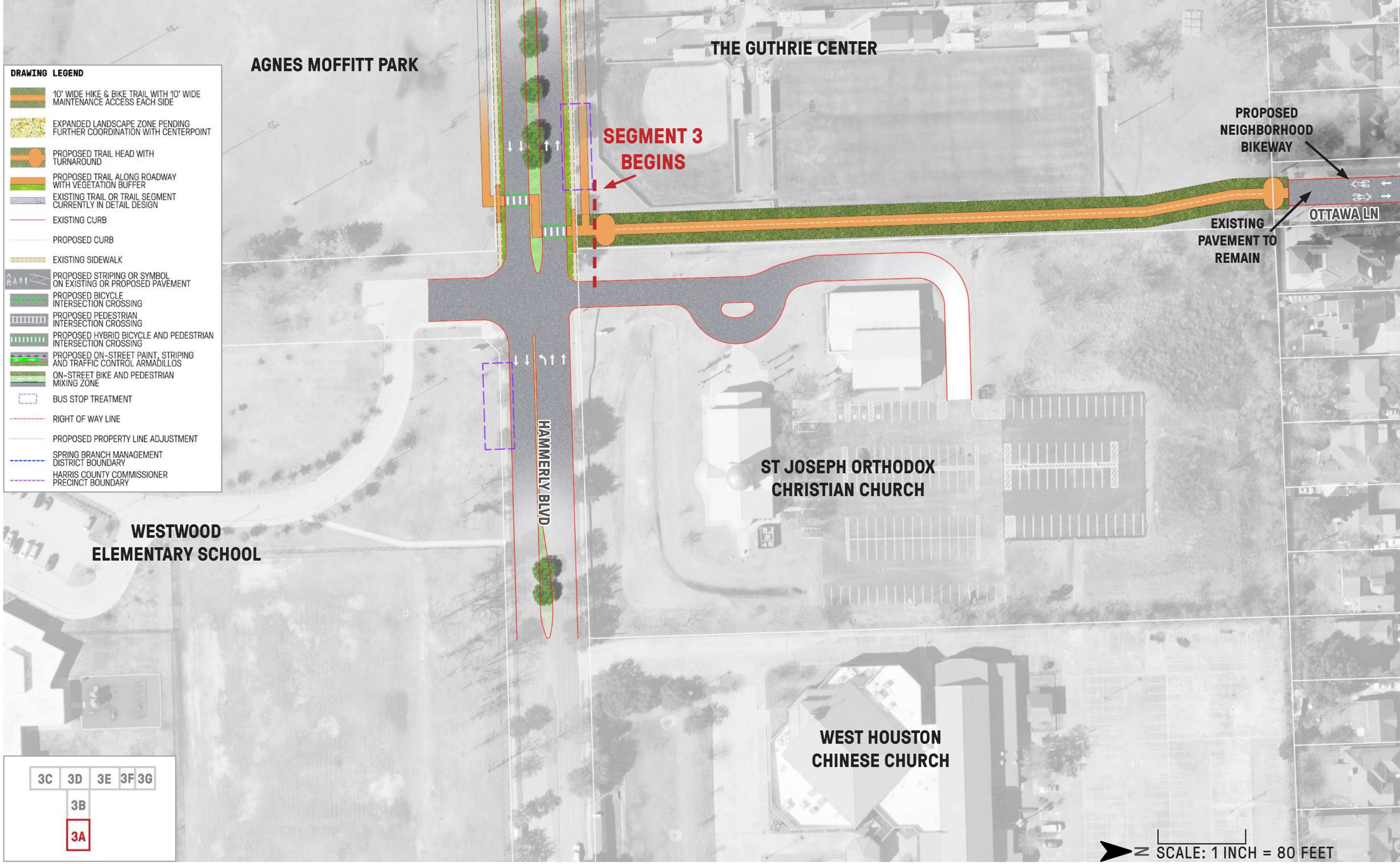
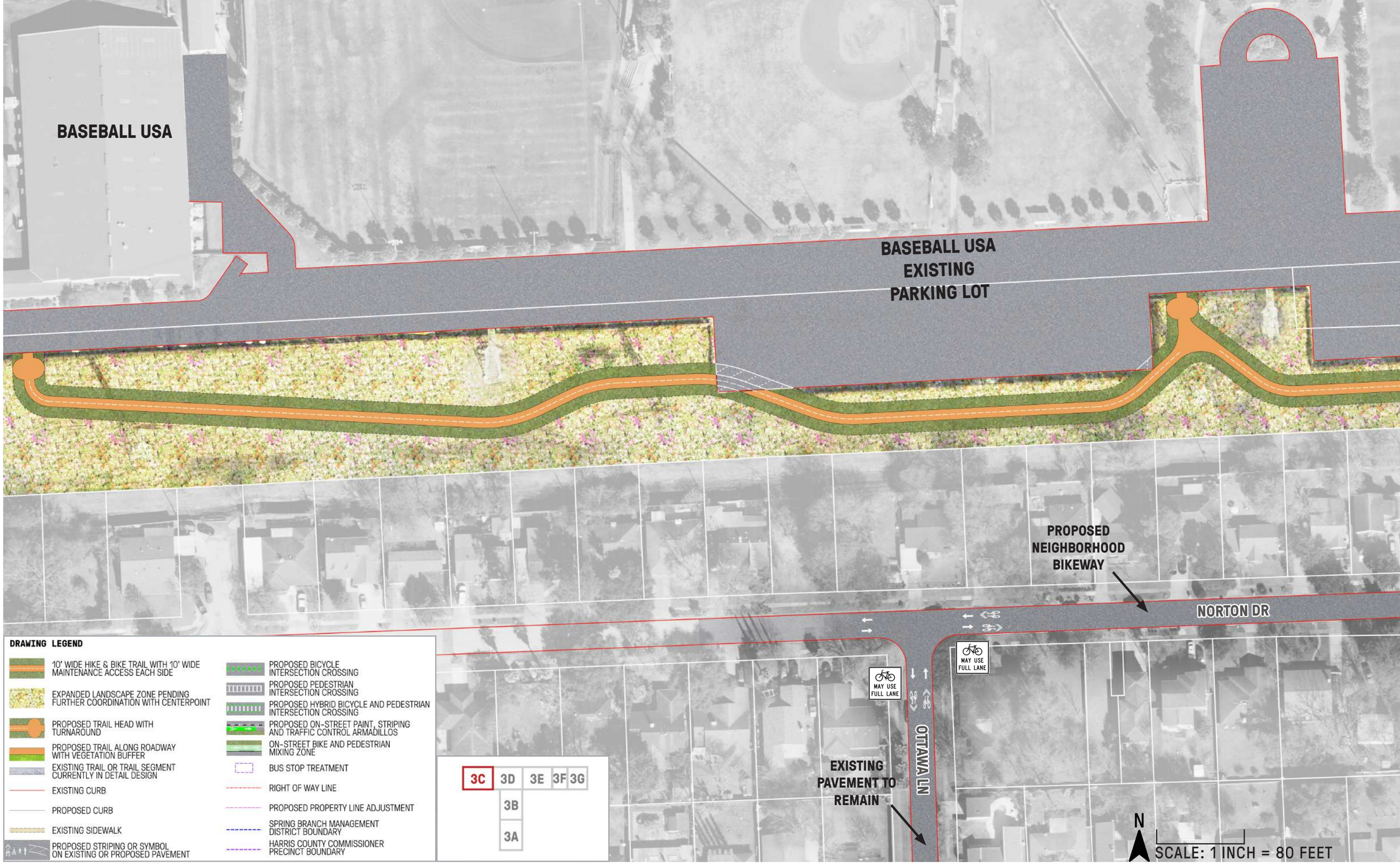


PAGE 3A | SEGMENT 3 OF 7

PAGE 3B | SEGMENT 3 OF 7



PAGE 3C | SEGMENT 3 OF 7

BASEBALL USA

PROPOSED NEIGHBORHOOD CONNECTION

SHADOWDALE DR

LANELL LN

EXISTING PAVEMENT TO REMAIN

MAY USE FULL LANE

NORTON DR

PROPOSED NEIGHBORHOOD BIKEWAY

MANILA LN

SHADOWDALE DR

NORTON DR

3C 3D 3E 3F 3G
3B
3A

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

N

SCALE: 1 INCH = 80 FEET

PAGE 3E | SEGMENT 3 OF 7

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
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- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
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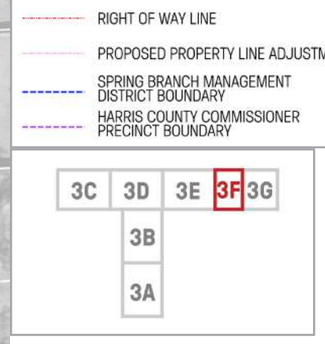

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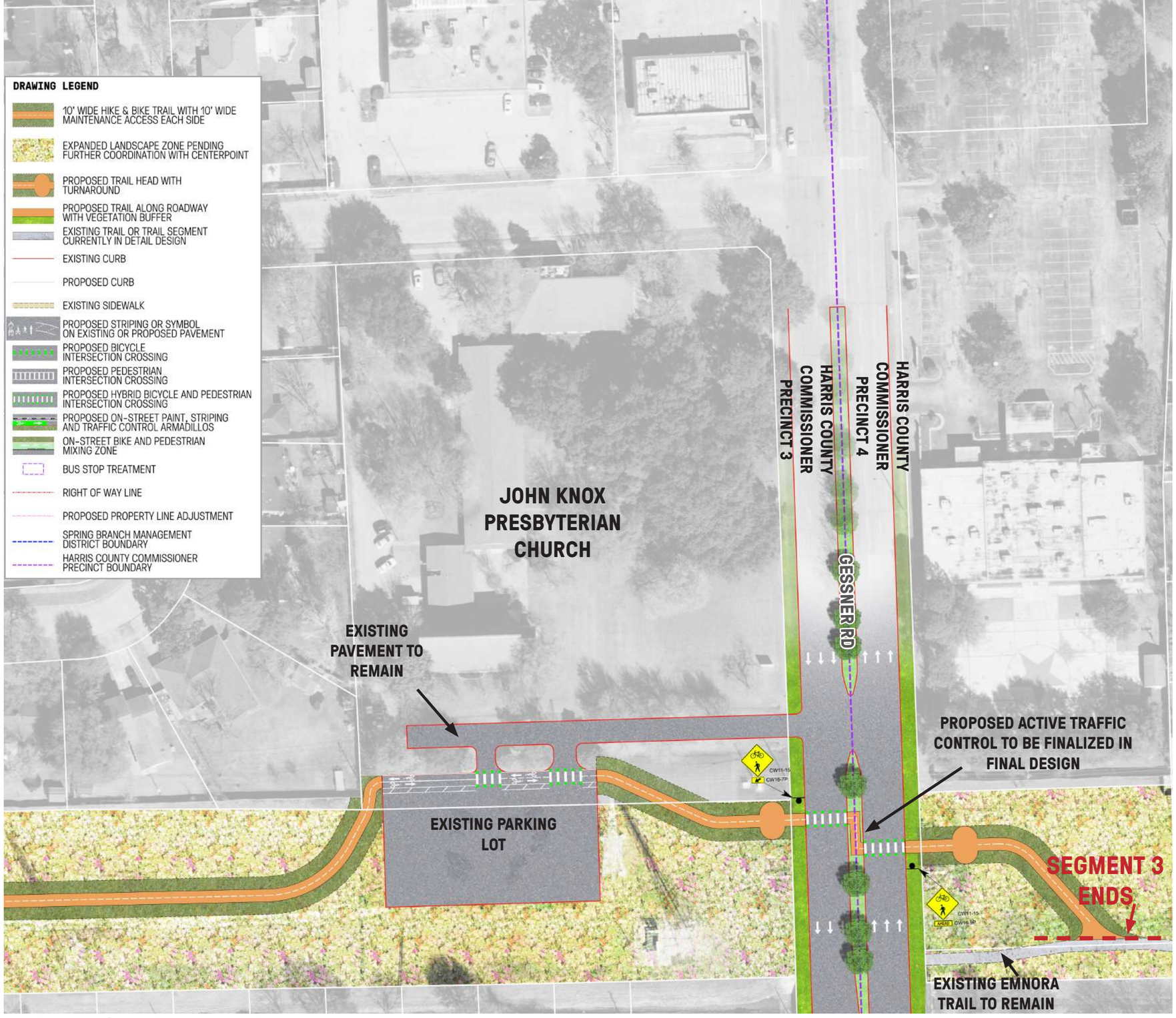
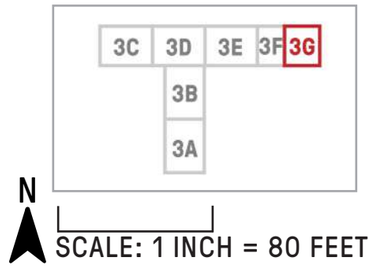
SCALE: 1 INCH = 80 FEET

PAGE 3F | SEGMENT 3 OF 7





PAGE 3G | SEGMENT 3 OF 7

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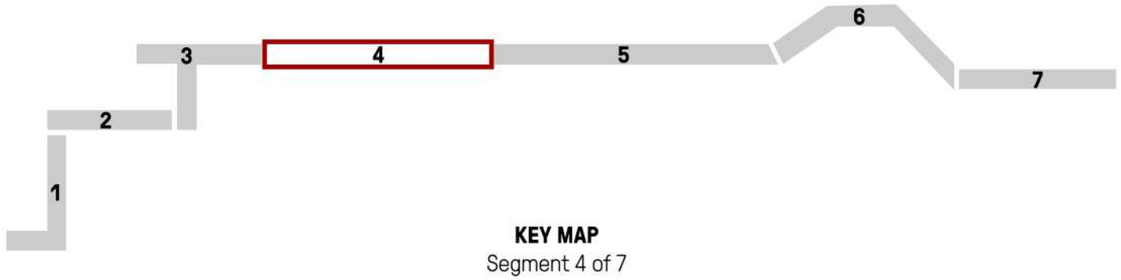
SEGMENT 4:
GESSNER ROAD TO BLALOCK TRAIL CONNECTION

SEGMENT 4

GESSNER ROAD TO BLALOCK ROAD

PRIORITY CORRIDOR: TIER 1



KEY MAP
Segment 4 of 7

LENGTH: 1.7 miles
(including existing 0.7 mile Emnora Trail)

DESCRIPTION:

This segment both enhances the existing Emnora Hike and Bike Trail (owned and maintained by Harris County Precinct 4) with formalized neighborhood connections at Teague Road and Palo Pinto Drive, as well as extends into and through the Northbrook High School campus to the east towards the programmed trail in design by SBMD and Houston Parks Board that begins at Blalock Road. This trail connection near Northbrook High School is an obvious missing link between an existing trail and the soon-to-be constructed segment. A critical CenterPoint substation is located within the easement leading directly from Northbrook High School to the new trail terminus at Blalock Road. A trail will not be allowed near the substation due to safety concerns and CenterPoint operations. Therefore, this segment has three options (with three specific option names), each with their own trade-offs, that should be explored and considered in detail for implementation.

All three segment options share a common alignment along the south side of Northbrook High School's campus. At Raider Circle South, the School Option heads north and the Median and Neighborhood Options continue east along a the drainage ditch towards Campbell Road.

KEY FEATURES AND TRADEOFFS

- All three options will be a sidepath within the roadway right-of-way on the south edge of Raider Circle, then the Median and Neighborhood Options continue east and the School Option turns north.
- **School Option:**
  - Sidepath continues up east side of Raider Circle towards the school entrance near Campbell Road
  - Midblock crossing recommended for Campbell Road
  - SBISD staff have expressed concerns over conflicts with buses and cars entering and existing Northbrook High School Campus during school hours - this option may be challenging to current and future operations of the school
  - Property acquisition (two parcels, one owner) would be required along the east side of Campbell Road to continue the trail along the southwest property line of Buffalo Creek Elementary School
  - A shared-use path would continue alongside the south edge of Buffalo Creek Elementary school to Blalock Road, requiring a fence along the trail for security
  - A trailhead could be located on the west side of Blalock Road near Buffalo Creek Elementary School
- **Median Option:**
  - A shared-use trail will continue east of the Northbrook High School campus along the south property line, requiring an easement along the southern edge of three commercial parcels west of Campbell Road (includes two separate owners) to provide at least 10 feet of buffered trail leading to Campbell Road
  - A midblock crossing is recommended for Campbell Road just north of Emnora Lane
  - The trail will continue east of Campbell Road along the south side of commercial properties (two parcels, one owner for both) where a ten-foot buffered trail would connect to Blalock Road; this section will likely require an easement with the property owners (not necessarily a property acquisition)
  - Improvements are recommended at the signalized intersection of Blalock Road at Emnora Lane to safely cross people walking and biking from the west side of Blalock Road into the Blalock Road median
  - The trail will continue as a 10-foot path up the Blalock Road median from Emnora Lane to the Segment 5 trail terminus at Blalock Road near Buffalo Creek Elementary School
  - Curb extensions are recommended at median opening along Blalock Road to shorten crossing distances
- **Neighborhood Option:**
  - Similar to the Median Option, the shared-use trail will continue east of the Northbrook High School campus along the south property line, requiring an easement along the southern edge of three commercial parcels west of Campbell Road (includes two separate owners) to provide at least 10 feet of buffered trail leading to Campbell Road
  - The trail will continue across a small bridge across the drainage ditch on the west side of Campbell Road towards the Emnora Lane intersection
  - A midblock crossing is recommended for Campbell Road at Emnora Lane
  - The trail will continue within the public right-of way of Emnora Lane by extending out the north side curb to accommodate at least a ten-foot sidepath leading to Blalock Road
  - The northwest and northeast curbs at the Blalock Road and Emnora Lane intersection are recommended to be extended and shifted to make a clearer, straight crossing across Blalock Road to continue the sidepath on the east side of Blalock Road still within the Emnora Lane right-of-way towards Lazy Springs Drive
  - The sidepath between Blalock Road and Lazy Springs Drive will transition into a neighborhood bikeway along Lazy Springs Drive
  - The neighborhood bikeway will terminate at the CenterPoint trail location that will be under construction in early 2020

DESTINATIONS SERVED

- Northbrook High School
- Buffalo Creek Elementary School
- Spring Branch North Super Neighborhood (84)
- Spring Branch Central Super Neighborhood (85)

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)*
- City of Houston*
- Harris County Precinct 4
- Houston Parks Board
- Spring Branch ISD

**indicates potential lead implementation entity*

GESSNER ROAD TO BLALOCK ROAD

PRIORITY CORRIDOR: TIER 1

SEGMENT 4

TIMING:

The timing of Segment 4 will depend on how quickly SBMD can coordinate with the City of Houston to determine the most feasible option (School, Median, or Neighborhood Option) to implement. The timing is also dependent on funding availability. Options that require property acquisition are likely to have a longer timeline. (Note: Cost estimates do not include property acquisition.) This segment is a Tier 1 priority corridor.

FUNDING CONSIDERATIONS:

- District Assessment
- Local Funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

SCHOOL OPTION OPINION OF PROBABLE COSTS: $1,461,312

Trail/Bikeway Construction Estimate	$872,000
Mobilization (10%)	$87,200
Contingency (20%)	$191,840
Engineering/Design (26%)	$299,272
Trail/Bikeway Construction Subtotal	**$1,450,312**
Wildflower Seeding Adjacent to Trail	$11,000
TOTAL SEGMENT 4, SCHOOL OPT. COST ESTIMATE	**$1,461,312***

*Property acquisition will be an additional cost for this option

MEDIAN OPTION OPINION OF PROBABLE COSTS: $1,370,872

Trail/Bikeway Construction Estimate	$819,000
Mobilization (10%)	$81,900
Contingency (20%)	$180,180
Engineering/Design (26%)	$281,082
Trail/Bikeway Construction Subtotal	**$1,362,162**
Wildflower Seeding Adjacent to Trail	$8,710
TOTAL SEGMENT 4, MEDIAN OPT. COST ESTIMATE	**$1,370,872**

NEIGHBORHOOD OPTION OPINION OF PROBABLE COSTS: $1,267,644

Trail/Bikeway Construction Estimate	$757,000
Mobilization (10%)	$75,700
Contingency (20%)	$166,540
Engineering/Design (26%)	$259,804
Trail/Bikeway Construction Subtotal	**$1,259,044**
Wildflower Seeding Adjacent to Trail	$8,600
TOTAL SEGMENT 4, NEIGH. OPT. COST ESTIMATE	**$1,267,644**

TRAILHEAD CONSIDERATIONS:

There are nine locations where trailheads could be incorporated into Segment 4: five locations where enhanced trailheads could be considered and four locations where a basic trailhead could be considered. Funding and feasibility to implement will be factors in deciding the location and style of trailheads. Trailhead cost by type is shown below. See map for potential locations and the schematic design on the following pages for potential locations.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

MAINTENANCE COSTS:

Annual Trail Maintenance*	$ 25,000/ mile

Based on Houston Parks Board estimates and only applies to trail portions that are off-street shared-use paths

TASKS TO IMPLEMENT:

- SBMD to coordinate with City of Houston staff to determine feasibility of one of the three options since a significant portion of the recommendations would be within City of Houston public right-of-way
- SBMD to coordinate with Harris County Precinct 4 on providing the neighborhood connections to the existing Emnora Hike and Bike Trail
- SBMD to coordinate with SBISD staff on extending the trail through the Northbrook High School campus
- Create budget and expected timing for project design and construction
- Investigate underground utilities, land ownership or licenses within CenterPoint easement
- Apply for grant funding opportunities
- Begin engineering and design
- Coordinate with METRO - Blalock has been highlighted as a potential new local service (see **Figure 3.22** showing proposed METRONext transit improvements)
- Assess existing pavement quality for on-street bikeways (neighborhood option only)
- Identify potential partners for shared parking

CROSS-SECTIONS:

CENTERPOINT EASEMENT

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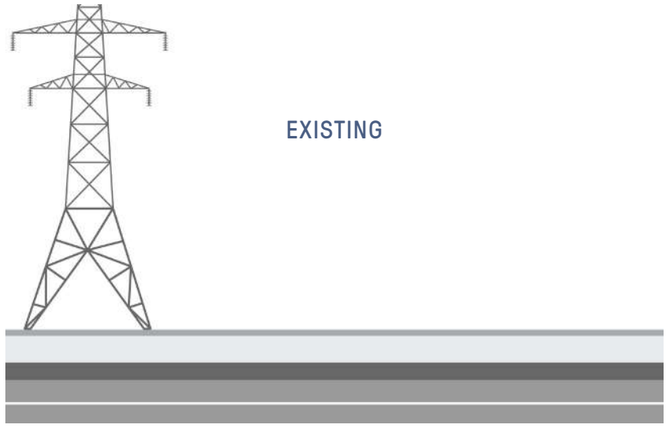

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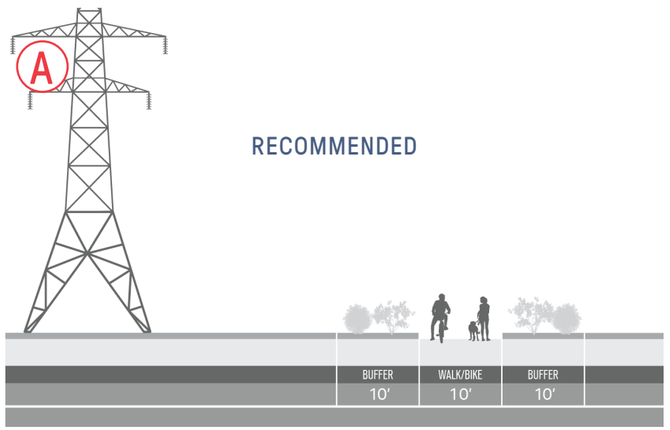
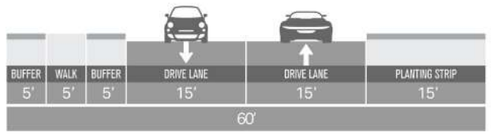
RECOMMENDED



RAIDER CIRCLE

EXISTING



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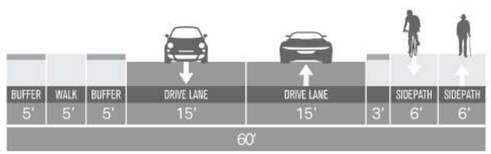
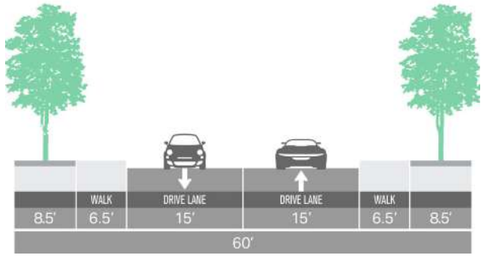


LAZY SPRING DRIVE

EXISTING



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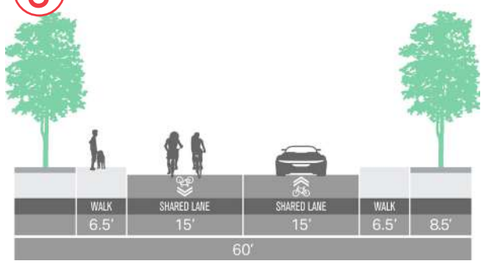
RECOMMENDED



SB TRAIL TOOLBOX:

A

OFF-STREET SHARED-USE TRAIL

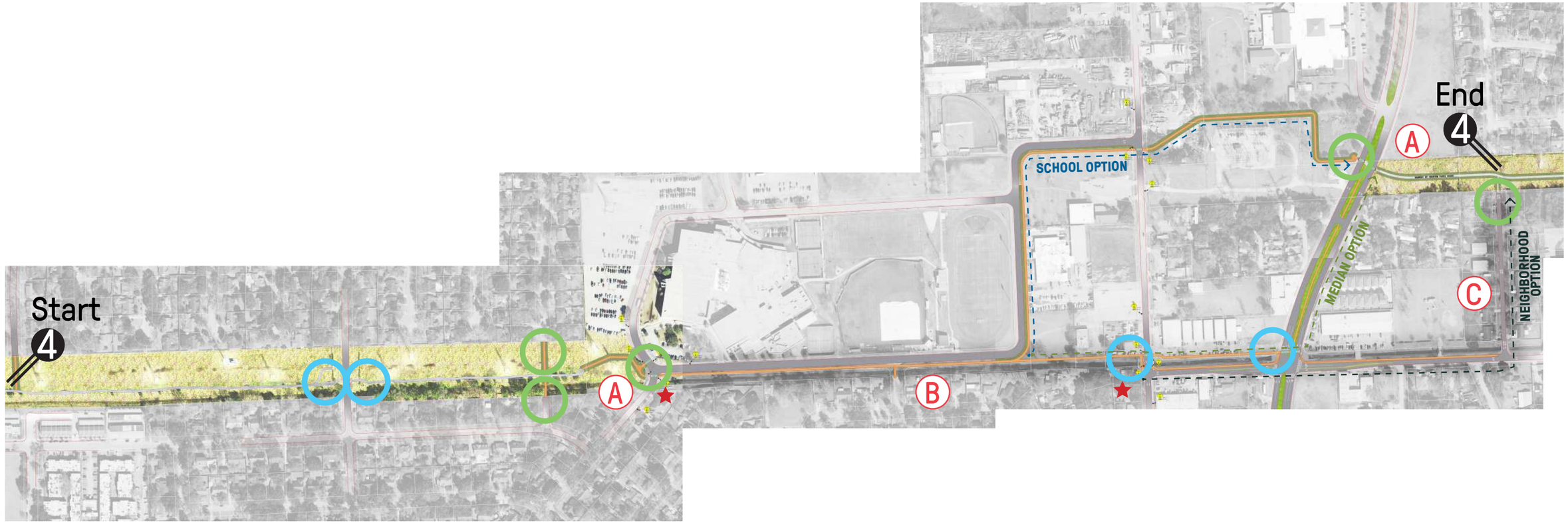
B

SHARED-USE SIDEPATH

C

NEIGHBORHOOD BIKEWAY

SEGMENT 4 CORRIDOR OVERVIEW



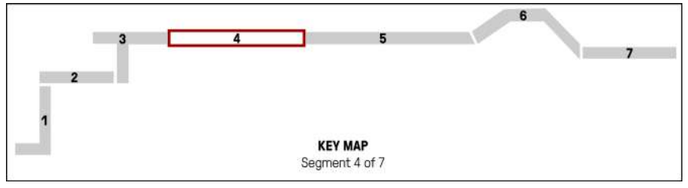
BASIC TRAILHEAD

ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages

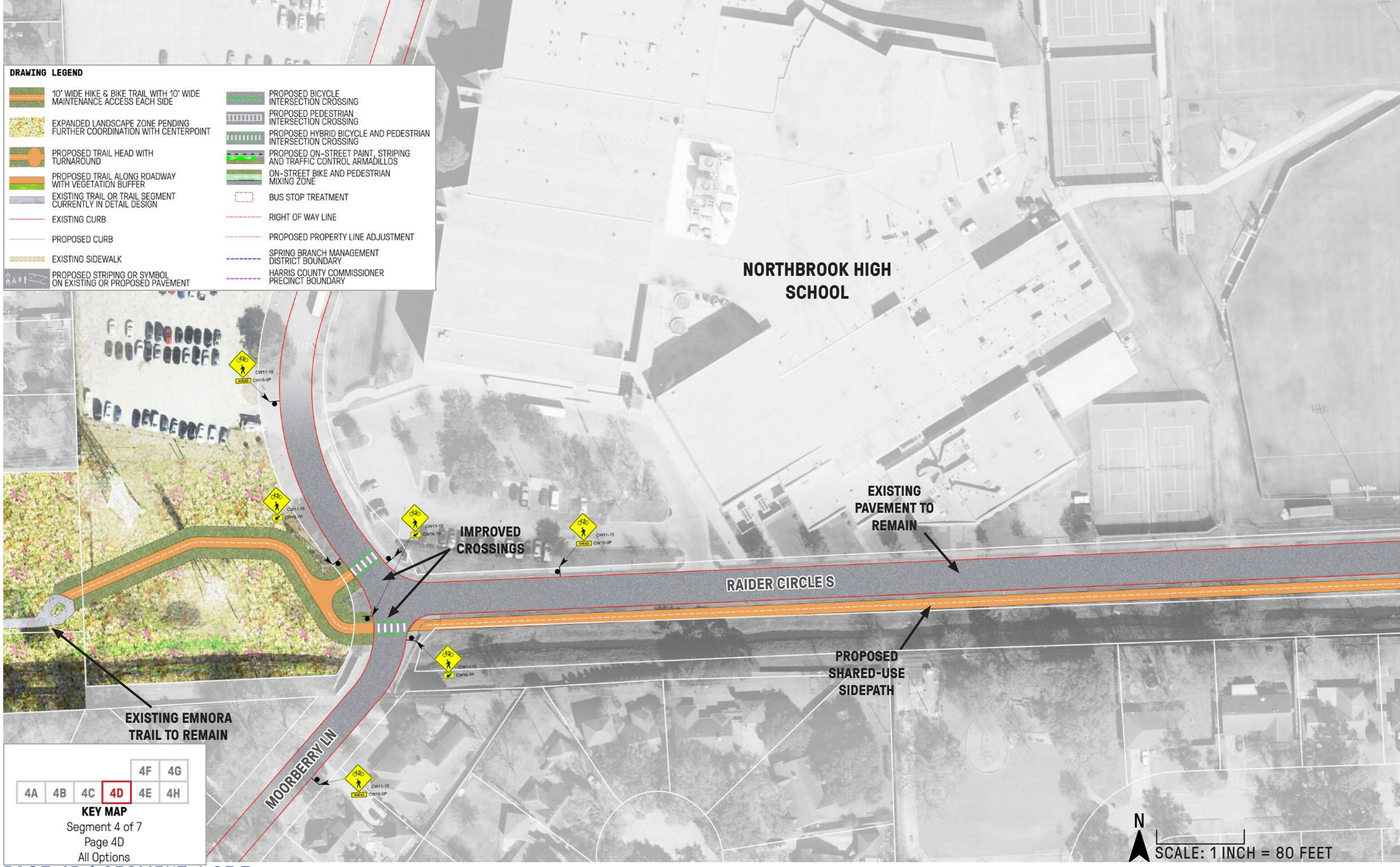
N



PAGE 4A | SEGMENT 4 OF 7

PAGE 4B | SEGMENT 4 OF 7

PAGE 4C | SEGMENT 4 OF 7



PAGE 4D | SEGMENT 4 OF 7

SEGMENT 4: SCHOOL OPTION

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

RAIDER CIRCLE E

SCHOOL OPTION

PROPOSED SHARED-USE SIDEPATH

EXISTING PAVEMENT TO REMAIN

RAIDER CIRCLE S

MEDIAN OPTION & NEIGHBORHOOD OPTION

CAMPBELL RD

MEDIAN OPTION

NEIGHBORHOOD OPTION

PROPOSED ACTIVE TRAFFIC CONTROL TO BE FINALIZED IN FINAL DESIGN

PROPOSED SHARED-USE SIDEPATH

SPRINGROCK LN

EXISTING NEIGHBORHOOD CONNECTION

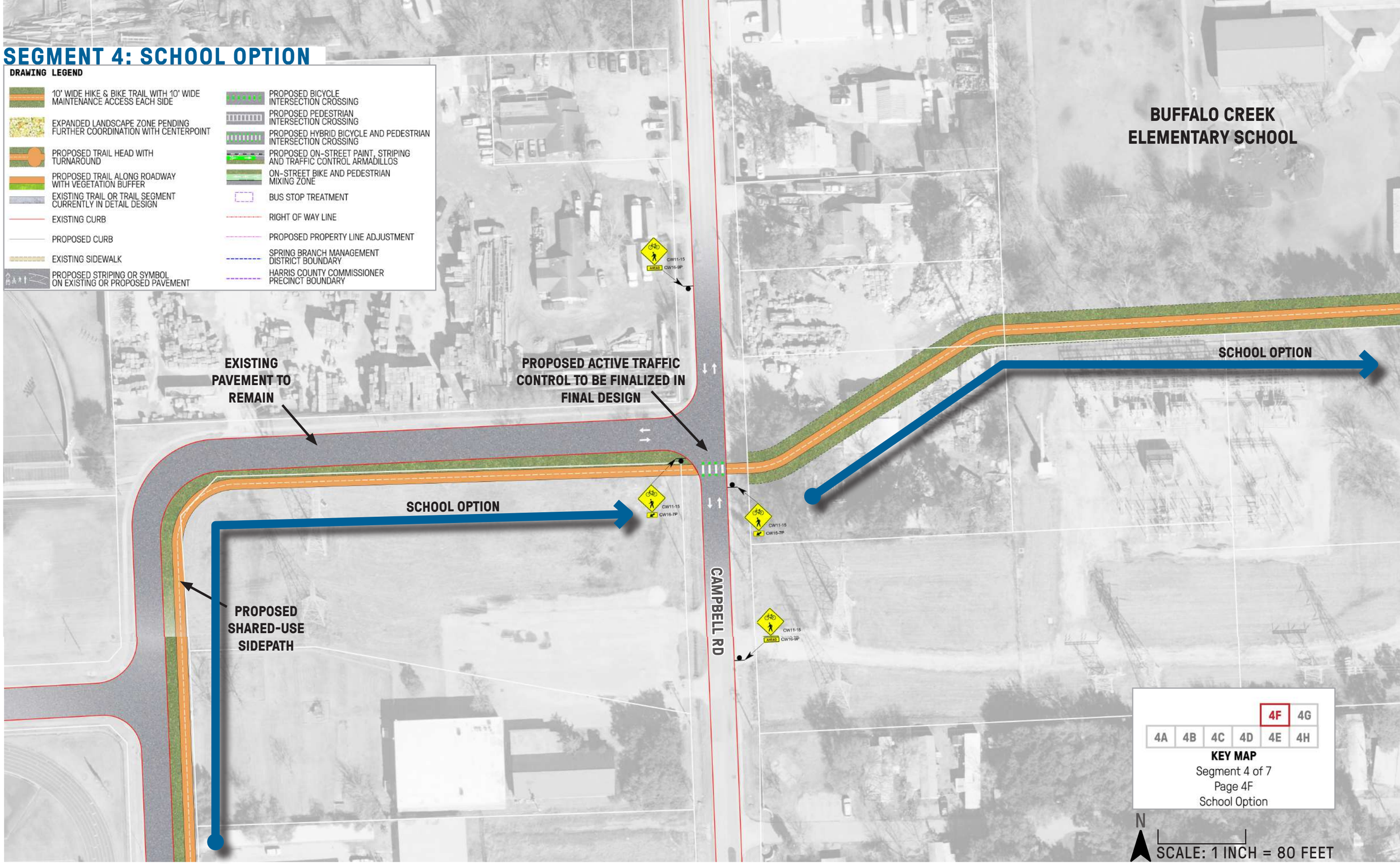
					4F	4G
4A	4B	4C	4D	4E	4H	

KEY MAP
Segment 4 of 7
Page 4E
School Option

N

SCALE: 1 INCH = 80 FEET

SEGMENT 4: SCHOOL OPTION

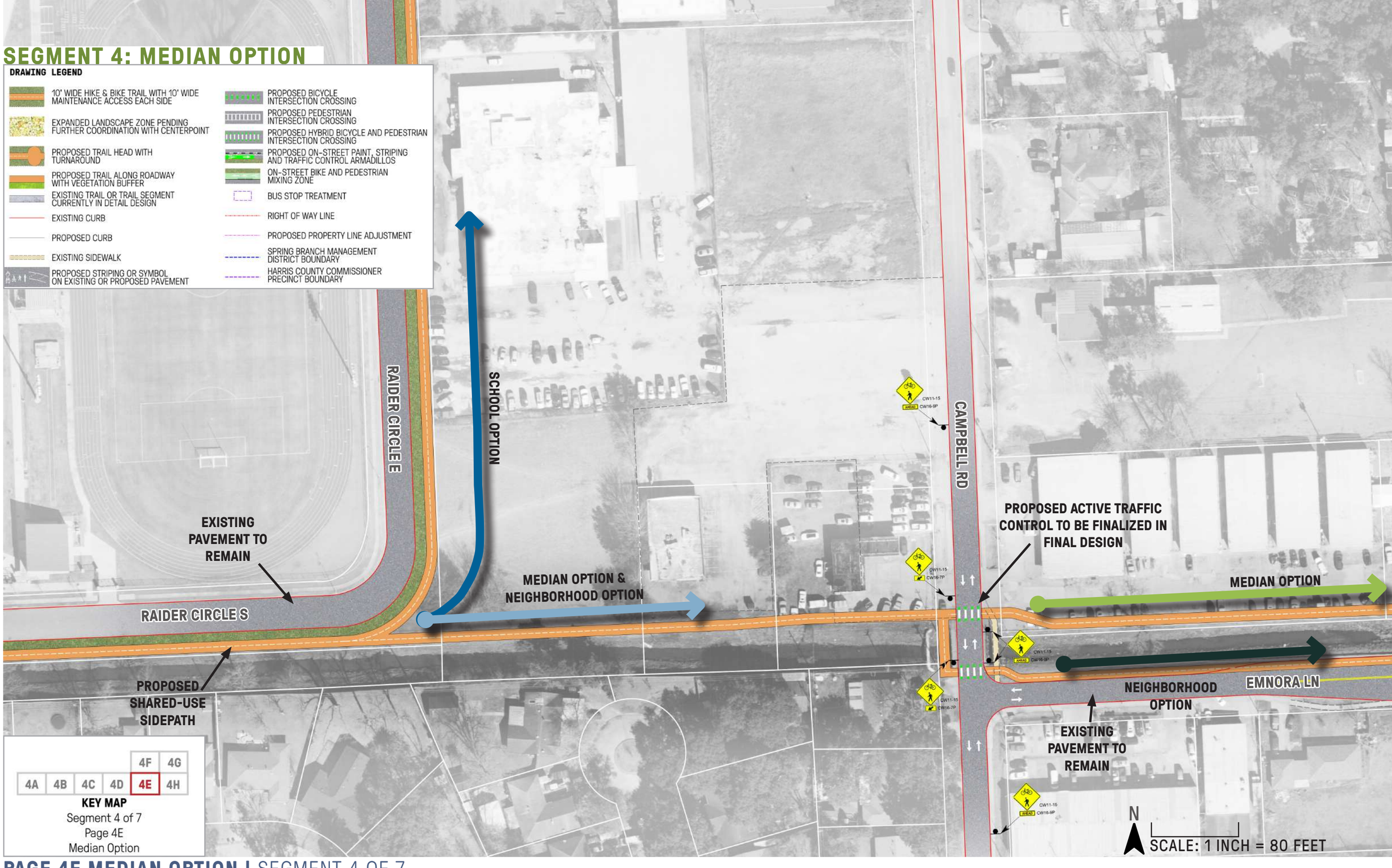


PAGE 4F SCHOOL OPTION | SEGMENT 4 OF 7

SEGMENT 4: SCHOOL OPTION

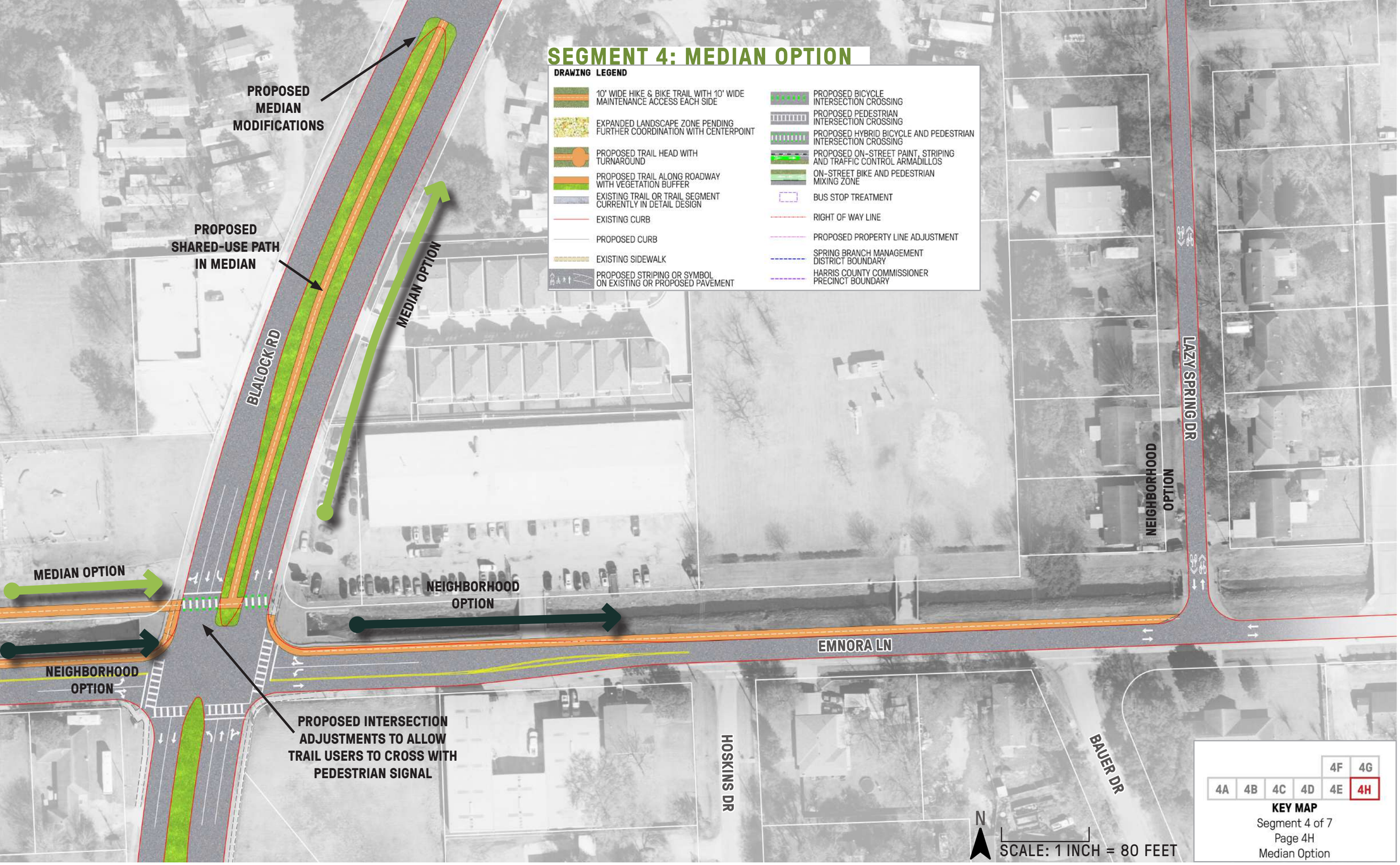
PAGE 4G SCHOOL OPTION | SEGMENT 4 OF 7

SEGMENT 4: MEDIAN OPTION



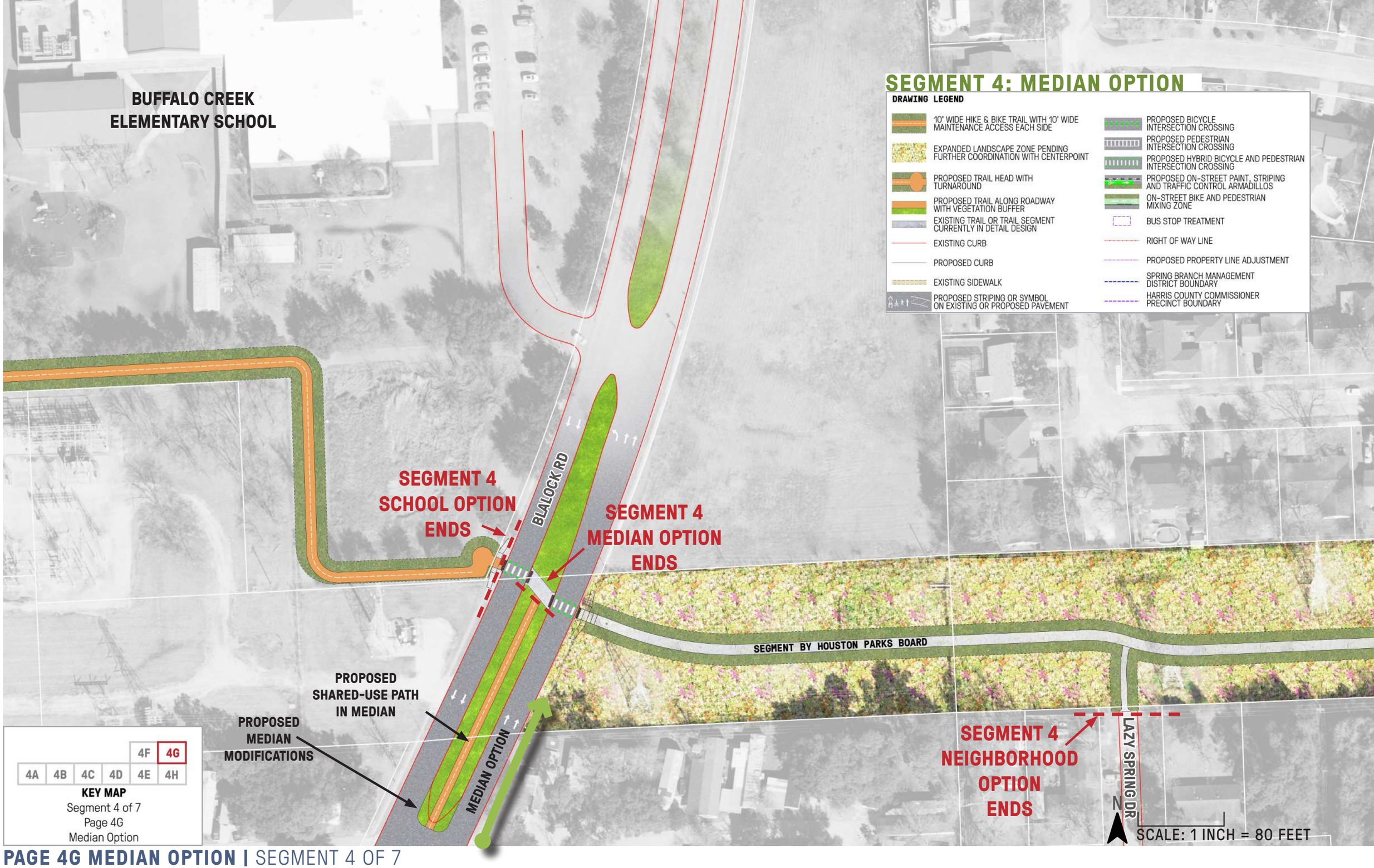
PAGE 4E MEDIAN OPTION | SEGMENT 4 OF 7

SEGMENT 4: MEDIAN OPTION



PAGE 4H MEDIAN OPTION | SEGMENT 4 OF 7

SEGMENT 4: MEDIAN OPTION



DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
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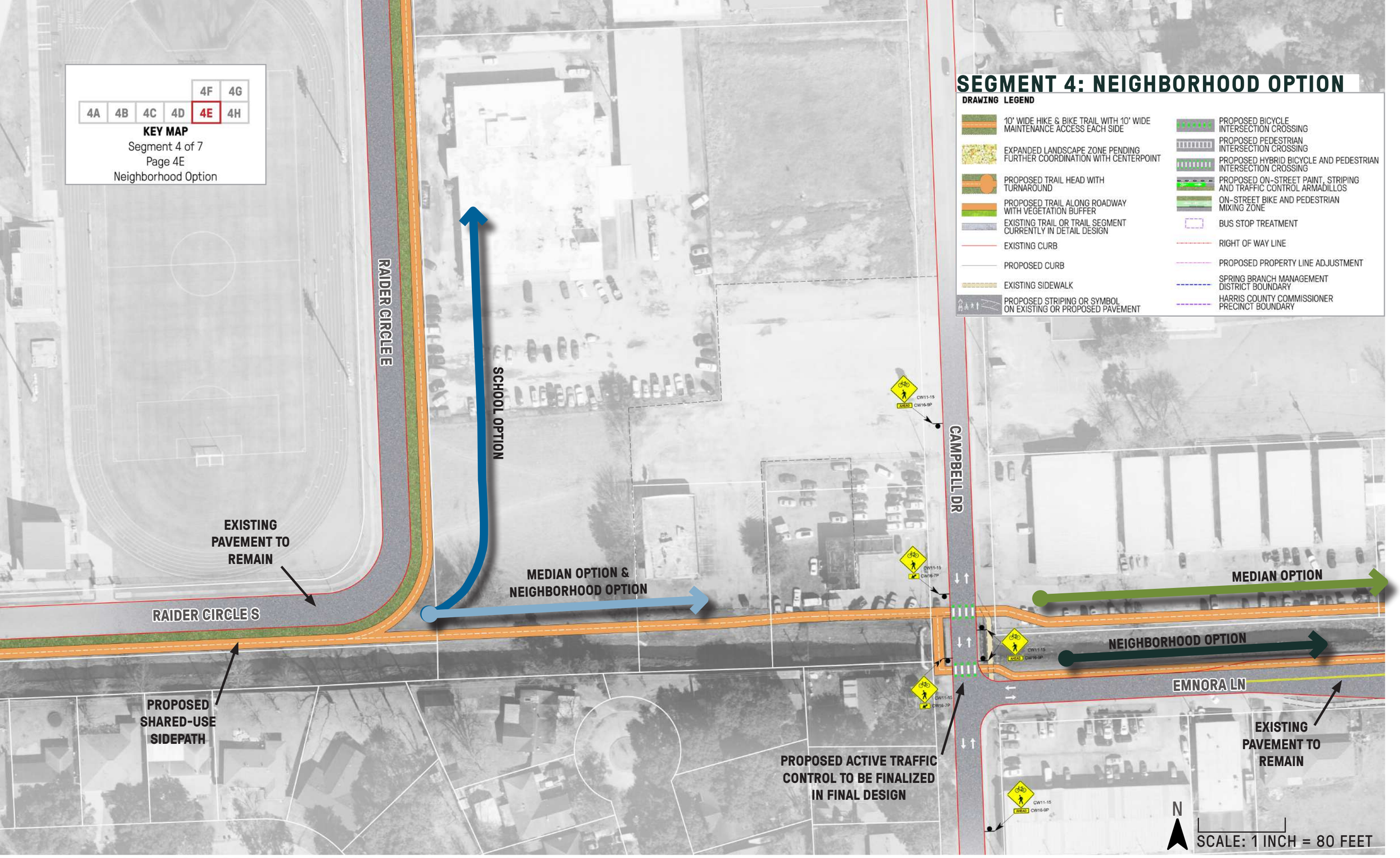
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

					4F	4G
4A	4B	4C	4D	4E	4H	

KEY MAP
Segment 4 of 7
Page 4G
Median Option

PAGE 4G MEDIAN OPTION | SEGMENT 4 OF 7



PAGE 4E NEIGHBORHOOD OPTION | SEGMENT 4 OF 7

SEGMENT 4: NEIGHBORHOOD OPTION

				4F	4G
4A	4B	4C	4D	4E	4H

KEY MAP
Segment 4 of 7
Page 4H
Neighborhood Option

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

EXISTING PAVEMENT TO REMAIN

MEDIAN OPTION

BLALOCK RD

LAZY SPRING DR

NEIGHBORHOOD OPTION

PROPOSED NEIGHBORHOOD BIKEWAY

MAY USE FULL LANE

MEDIAN OPTION

NEIGHBORHOOD OPTION

EXISTING PAVEMENT TO REMAIN

PROPOSED SHARED-USE SIDEPATH

EMNORA LN

NEIGHBORHOOD OPTION

PROPOSED INTERSECTION ADJUSTMENTS TO ALLOW TRAIL USERS TO CROSS WITH PEDESTRIAN SIGNAL

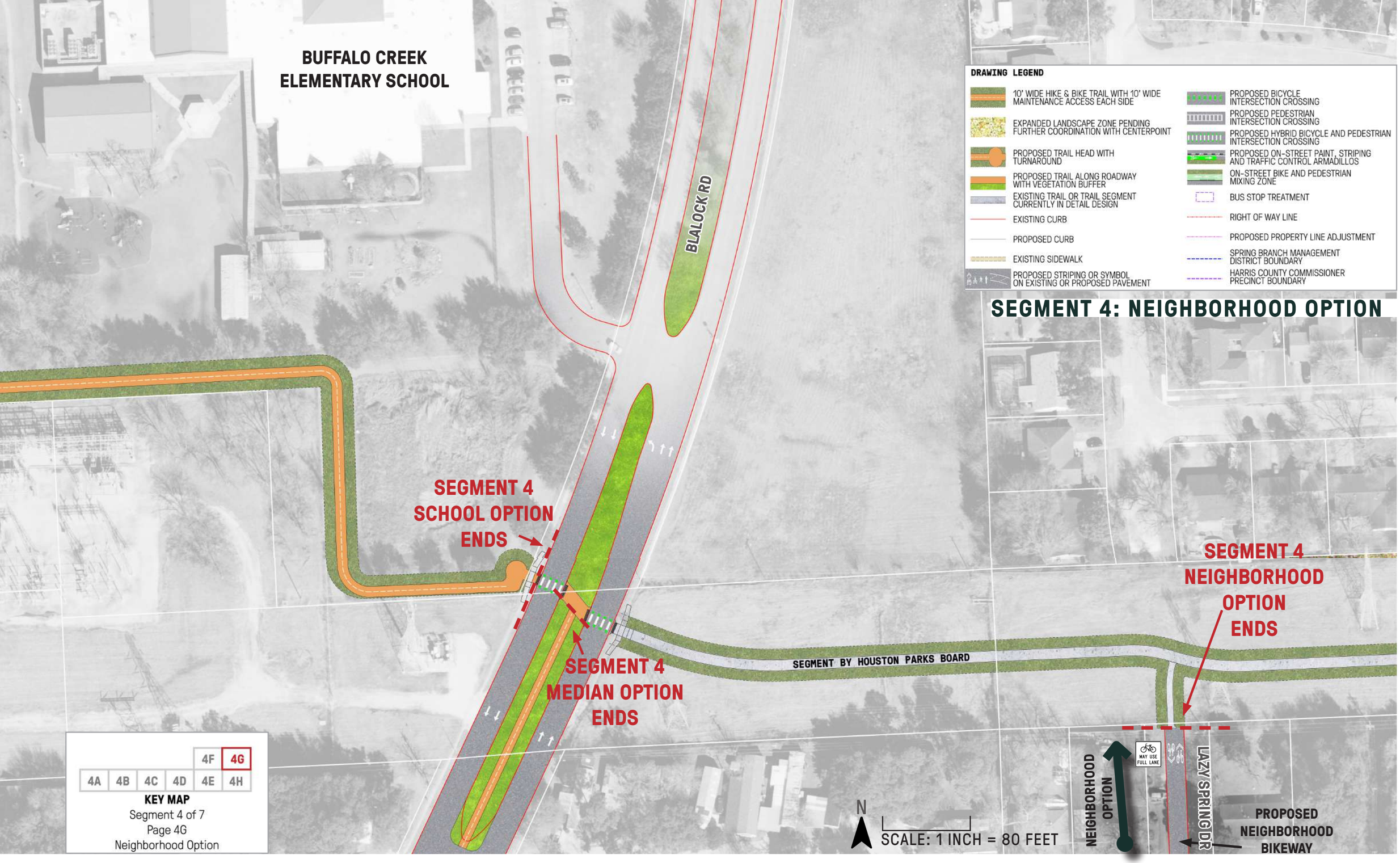
HOSKINS DR

BAUER DR

N

SCALE: 1 INCH = 80 FEET

PAGE 4H NEIGHBORHOOD OPTION | SEGMENT 4 OF 7



PAGE 4G NEIGHBORHOOD OPTION | SEGMENT 4 OF 7

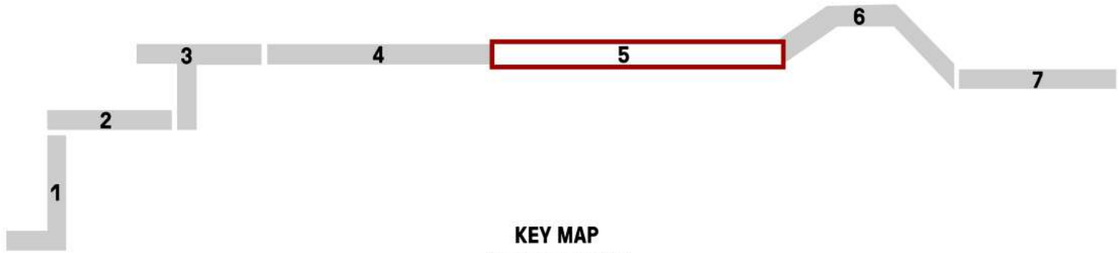
SEGMENT 5:
BLALOCK ROAD TO WIRT ROAD

(SEGMENT UNDER DESIGN AS “PHASE 1” WITH EXPECTED CONSTRUCTION 2020)

SEGMENT 5

BLALOCK ROAD TO WIRT ROAD

ESTIMATED CONSTRUCTION: EARLY 2020



KEY MAP
Segment 5 of 7

LENGTH: 2.4 miles

DESCRIPTION:

Segment 5 is the first segment the Spring Branch Management District (SBMD) will implement in partnership with the Houston Parks Board, adding 2.4 miles of safe, off-street, 10-foot wide concrete shared-use trails connecting schools and neighborhoods between Blalock Road and Wirt Road. Planning work for this segment was performed prior to this study through SBMD building on momentum from the *Spring Branch Comprehensive Plan* and the *Reimagine Long Point Livable Centers Study*. This project will provide momentum for the future implementation of the other six Spring Branch Trail segments. Once this trail is built, there will still be a gap between the existing Emnora Trail (Harris County Precinct 4 trail) and Segment 5. Segment 4 will be a critical link between the two trails. Once Segments 4, 5, and 6 are connected, Spring Branch will have a trail spine extending over four miles. Construction on Segment 5 is slated to begin in early 2020 with completion in mid-2021.

Images on this page represent signage and wayfinding to be installed along Segment 5 by Houston Parks Board. Other segments of the Spring Branch Trail should strive for continuity with the standards set forth by Houston Parks Board. Full PDF of the sign specifications can be found in **Appendix H.**

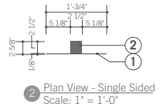
KEY FEATURES

- Neighborhood connection points at:
  - Blalock Road (mid-block crossing)
  - Lazy Springs Road
  - Tilson Lane
  - Hollister Road (mid-block crossing)
  - Alcott Drive
  - Bingle Road (mid-block crossing)
  - Access at Schwartz Park
  - Wirt Road
- Trail will be off-street shared-use path along a CenterPoint easement
- Includes trail markings such as 911 markers, welcome mats indicating upcoming street, and bollards at trailheads
- Gateway signs at trailhead locations
- Trail supports the regional trail connector identified in Houston Parks Board's *Beyond the Bayous*
- Trail will terminate along METRO's 36 Kempwood bus route

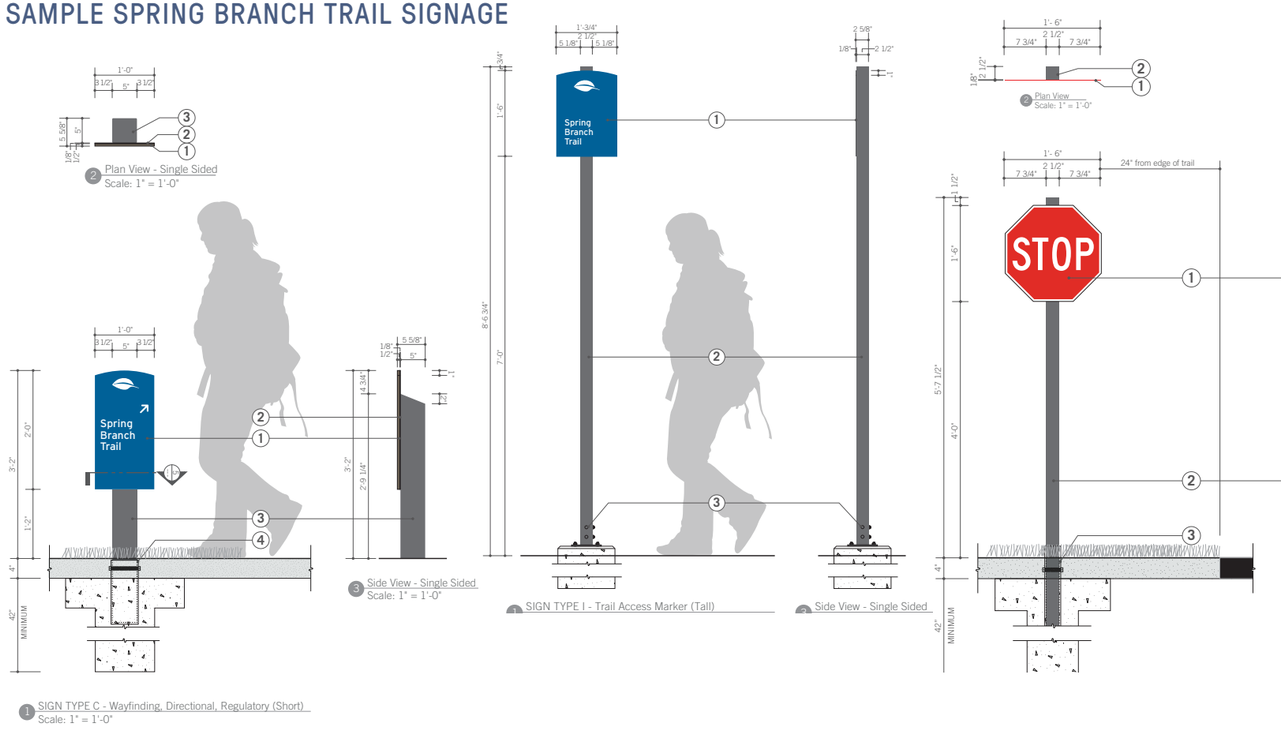
Sample 911 and mile marker

DESTINATIONS SERVED

- Fiesta Grocery Store
- Landrum Middle School
- Schwartz Park
- Edgewood Elementary School
- Saint Jerome Catholic School
- Buffalo Creek Elementary School
- Spring Branch Super Neighborhood 84
- Spring Branch Super Neighborhood 85

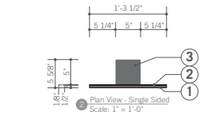


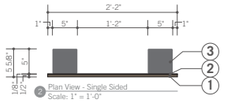
SAMPLE SPRING BRANCH TRAIL SIGNAGE



SEGMENT 5

SAMPLE SPRING BRANCH TRAIL SIGNAGE (CONTINUED)





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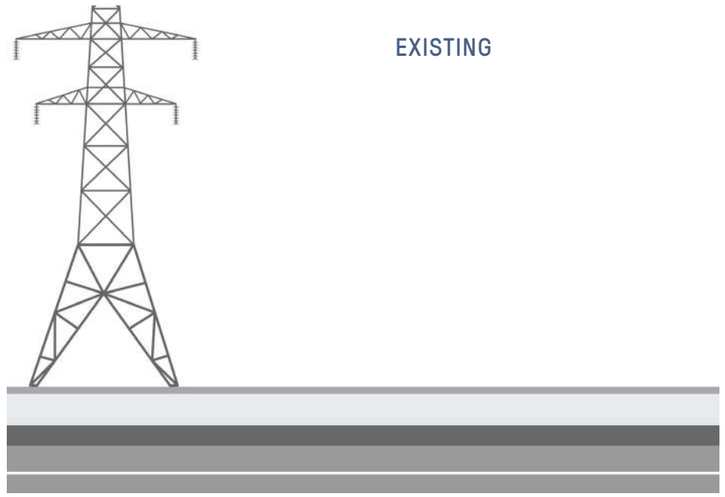
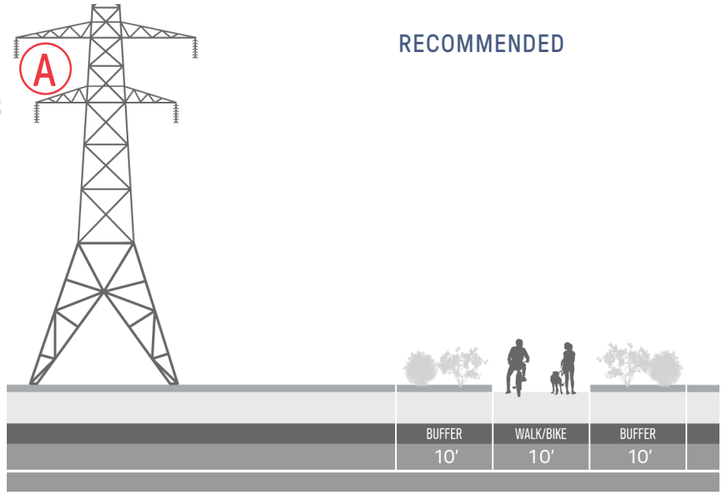




SB TRAIL TOOLBOX:

OFF-STREET SHARED-USE PATH

MEDIAN REFUGE

SEGMENT 5 CORRIDOR OVERVIEW

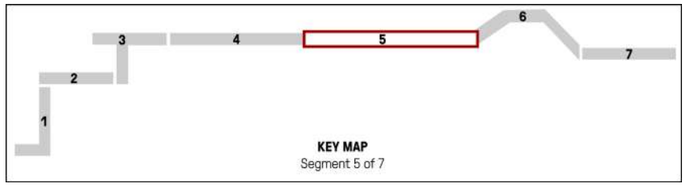
BASIC TRAILHEAD

ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages

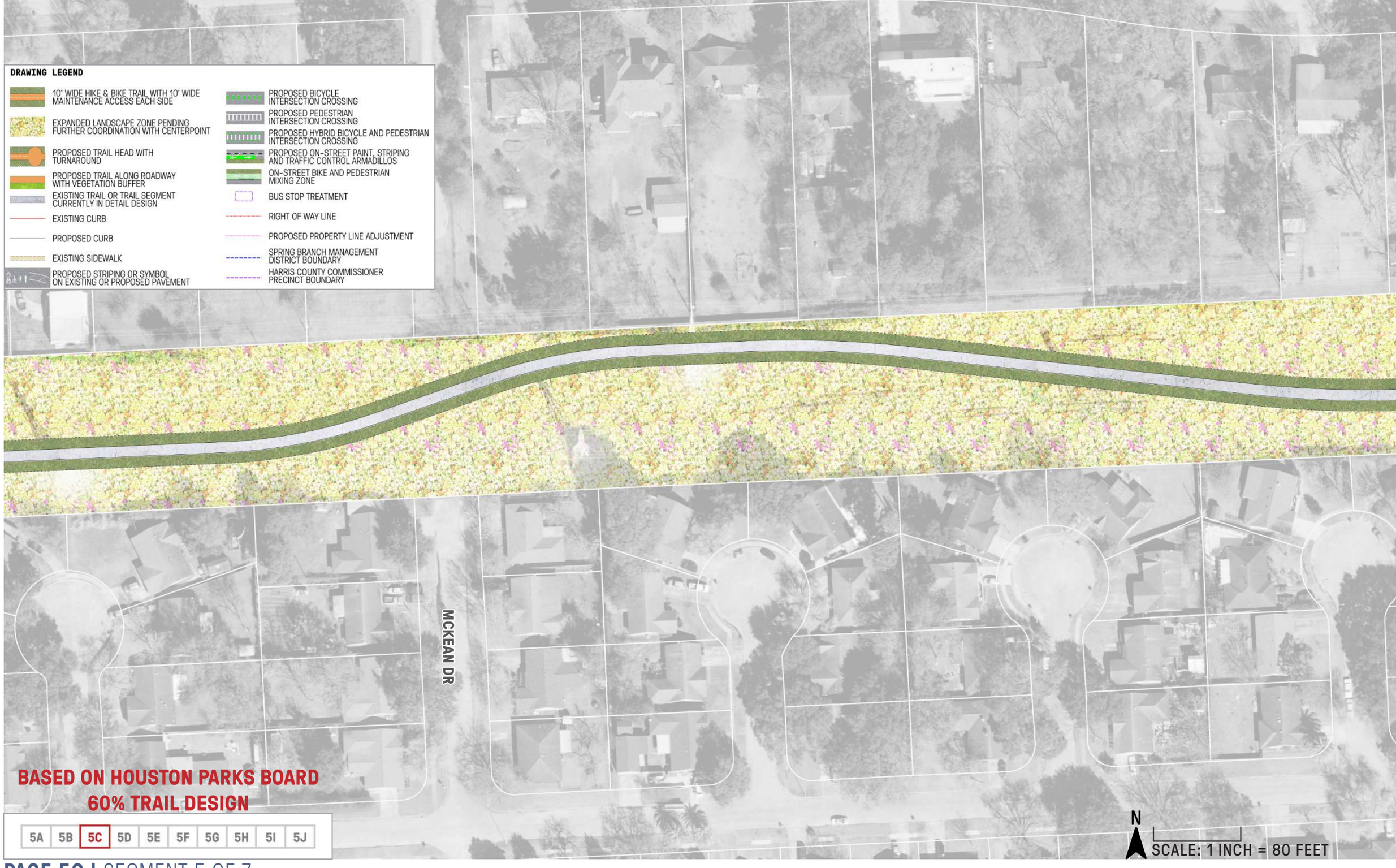
N



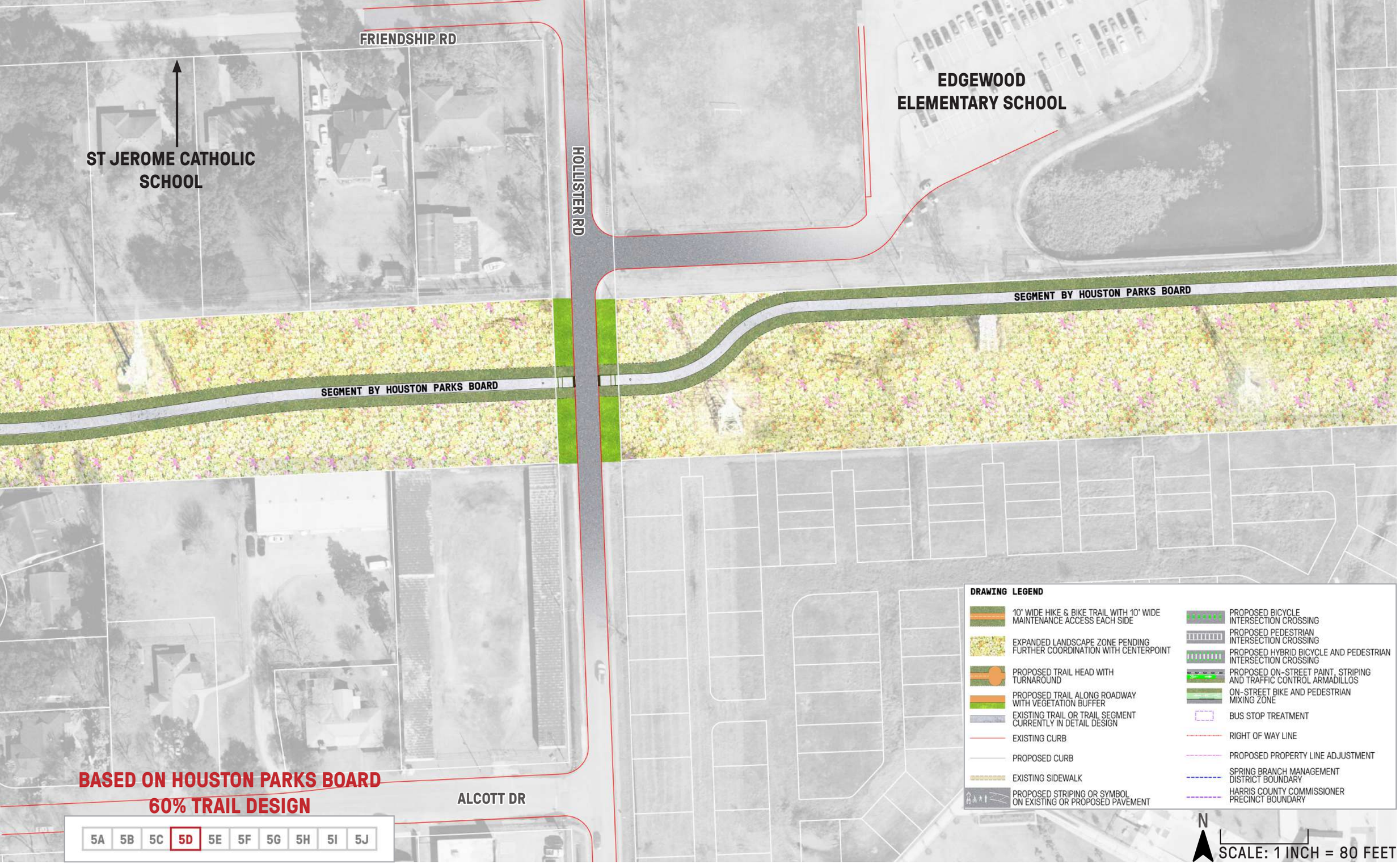
KEY MAP
Segment 5 of 7

PAGE 5A | SEGMENT 5 OF 7

PAGE 5B | SEGMENT 5 OF 7



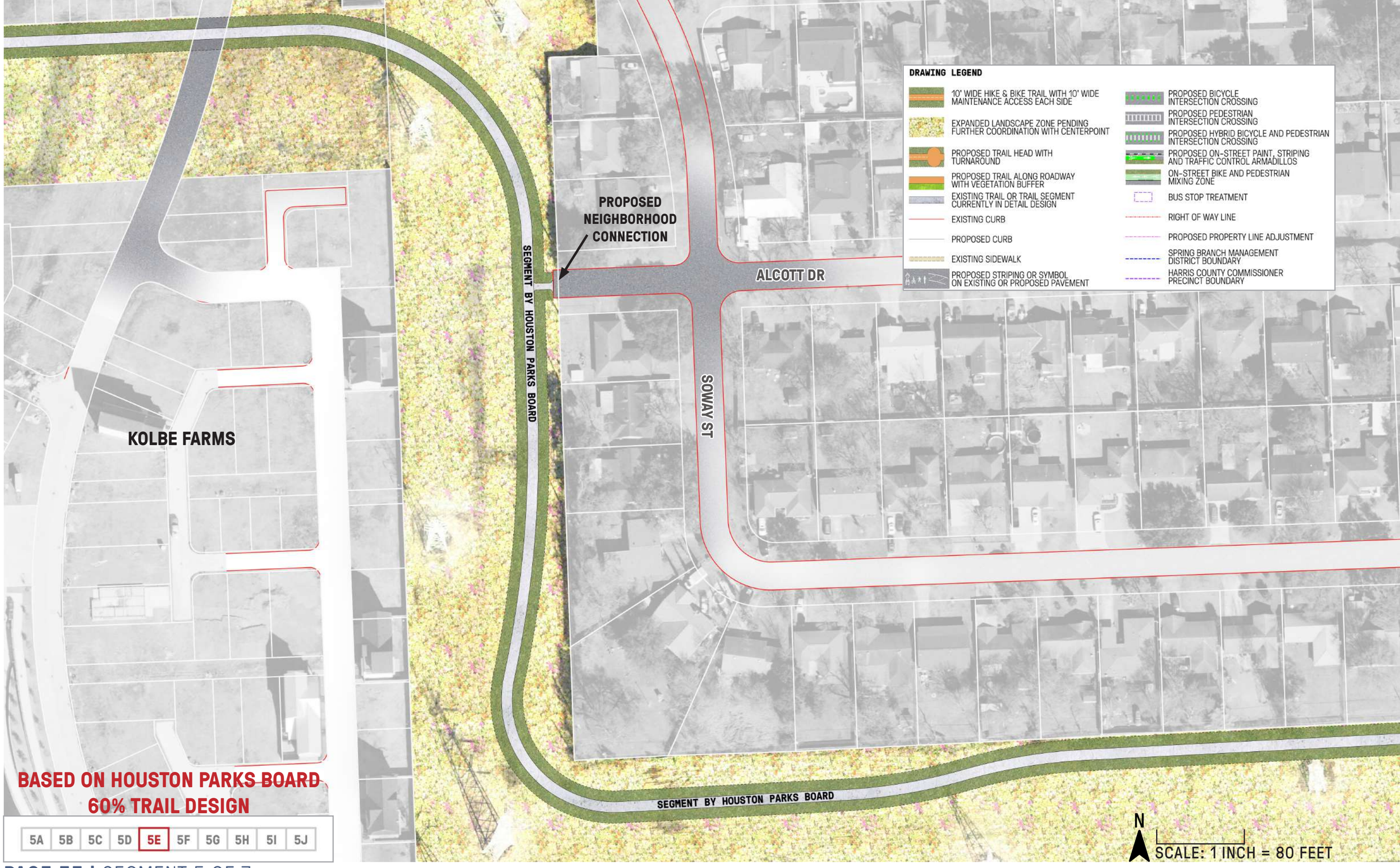
PAGE 5C | SEGMENT 5 OF 7



BASED ON HOUSTON PARKS BOARD 60% TRAIL DESIGN

5A | 5B | 5C | **5D** | 5E | 5F | 5G | 5H | 5I | 5J

PAGE 5D | SEGMENT 5 OF 7



BASED ON HOUSTON PARKS BOARD 60% TRAIL DESIGN

5A	5B	5C	5D	5E	5F	5G	5H	5I	5J

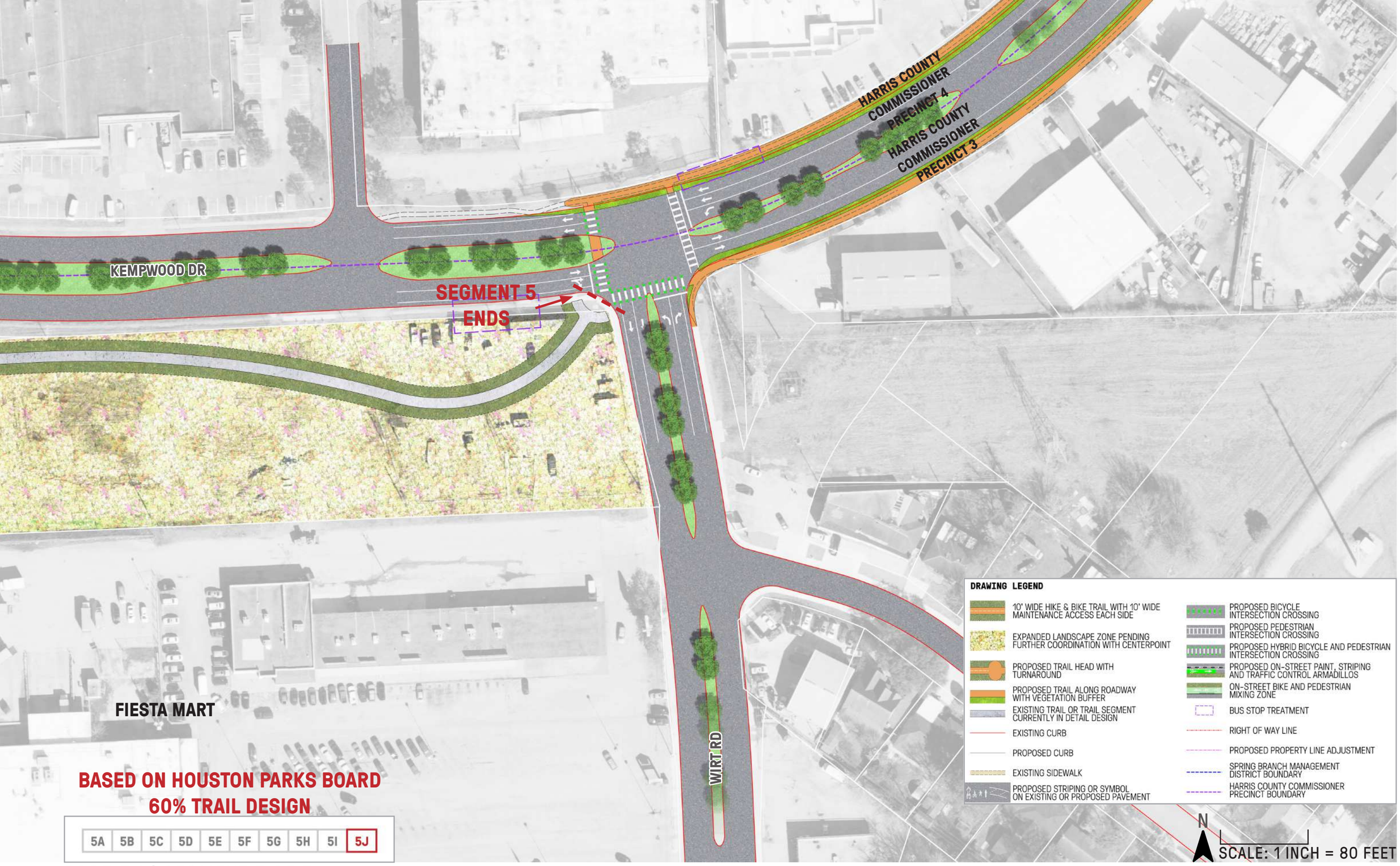
PAGE 5E | SEGMENT 5 OF 7

PAGE 5F | SEGMENT 5 OF 7

PAGE 5G | SEGMENT 5 OF 7

PAGE 5H | SEGMENT 5 OF 7

PAGE 5I | SEGMENT 5 OF 7



BASED ON HOUSTON PARKS BOARD 60% TRAIL DESIGN

5A | 5B | 5C | 5D | 5E | 5F | 5G | 5H | 5I | **5J**

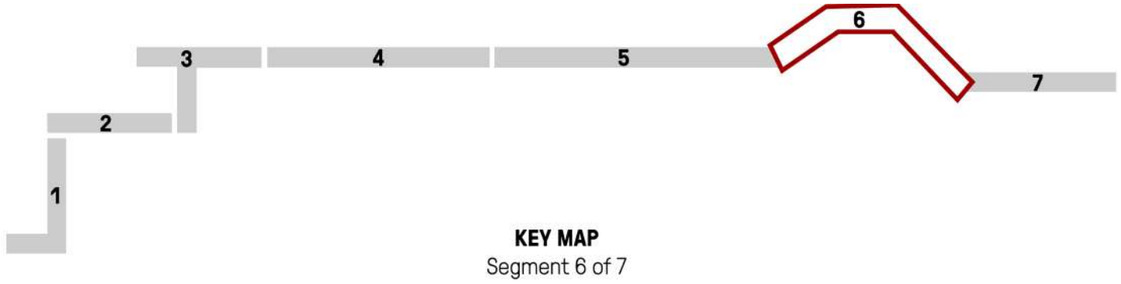
PAGE 5J | SEGMENT 5 OF 7

SEGMENT 6:
WIRT ROAD TO MANGUM ROAD

SEGMENT 6

WIRT ROAD TO MANGUM ROAD

PRIORITY CORRIDOR: TIER 3



KEY MAP
Segment 6 of 7

LENGTH: 1.75 miles

DESCRIPTION:

Segment 6 is a complex trail segment that includes on-street bikeways with sidewalks, shared-use sidepaths, and off-street trails to connect the Houston Parks Board trail (Segment 5) to Mangum Road northeast of US 290. This segment primarily consists of on-street bikeways in order to cross the significant obstacles of Hempstead Road with its parallel Union Pacific Railroad (and planned high speed rail corridor) and US 290.

From the eastern end of the Houston Parks Board trail terminus at Wirt Road, directional shared-use sidepaths on the north and south sides of Kempwood Drive will continue the trail to Todd Street. At Todd Street the sidepaths will transition onto the street to cross the railroad, where they will be separated from traffic by a new concrete curb.

East of the railroad, trail users on foot will move onto sidewalks, while bikes will stay in the roadway and continue across Hempstead Road into protected bikeways on West 34th Street. Just west of US 290, bikes will transition behind the curb. At US 290, the design includes separated and dedicated spaces for both people walking and people bicycling.

East of US 290 the trail continues as a bidirectional shared-use sidepath. This sidepath will feature highly visible signage and pavement markings to minimize conflicts with driveways. Finally, a short section of off-street trail along the CenterPoint easement will connect trail users to Mangum Road.

KEY FEATURES

- This segment is primarily located within the public right-of-way in the form of on-street bikeways combined with sidewalks or sidepaths
- Design includes intersection improvements at:
  - Kempwood Drive at Wirt Road
  - Kempwood Drive at Hempstead Road
  - 34th Street at Antoine
  - 34th Street at US 290
- Bikes and pedestrians will share a buffered shared space to cross the railroad tracks west of Hempstead Road
- The shared-use side path along the northbound frontage road of US 290 will have highly visible signage, paint, and must consider other safety features to notify vehicular traffic of the trail
- This is a critical connection across the major barriers of US 290 and the UPRR

DESTINATIONS SERVED

- Connection to Segment 5 trail terminus near Wirt Road at the Fiesta Grocery Store
- Shopping and restaurants within the US 290 corridor
- METRO Bus Routes 36 (Kempwood/34th) and 85 (Antoine)
- Spring Branch East Super Neighborhood (86)
- Oak Forest/Garden Oaks Super Neighborhood (or Central Northwest - 12)

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)*
- City of Houston*
- TxDOT
- Harris County Precinct 3 and Precinct 4
- METRO

**indicates potential lead implementation entity*

TIMING:

The timing of Segment 6 will depend on the partners leading the effort and funding availability. More than half of this segment is located just outside the Spring Branch Management District boundaries (east of Hempstead Road), but that does not mean the District could not lead the effort to implement the trail connection effort. Coordination with City of Houston is imperative for all on-street recommendations as well as coordination with TxDOT to cross US 290. This segment is a Tier 3 priority corridor.

FUNDING CONSIDERATIONS:

- Local funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

OPINION OF PROBABLE COSTS: $2,033,268

Trail/Bikeway Construction Estimate	$1,221,000
Mobilization (10%)	$122,100
Contingency (20%)	$268,620
Engineering/Design (26%)	$419,048
Trail/Bikeway Construction Subtotal	**$2,030,768**
Wildflower Seeding Adjacent to Trail	$2,500
TOTAL SEGMENT 3 COST ESTIMATE	**$2,033,268**

TRAILHEAD CONSIDERATIONS:

There is one trailhead location within this segment at Mangum Road. The western terminus of this segment is located at a future trailhead at Wirt Road of Segment 5.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

MAINTENANCE COSTS:

Annual Trail Maintenance*	$ 25,000/ mile

**Based on Houston Parks Board estimates and only applies to trail portions that are off-street shared-use paths*

TASKS TO IMPLEMENT:

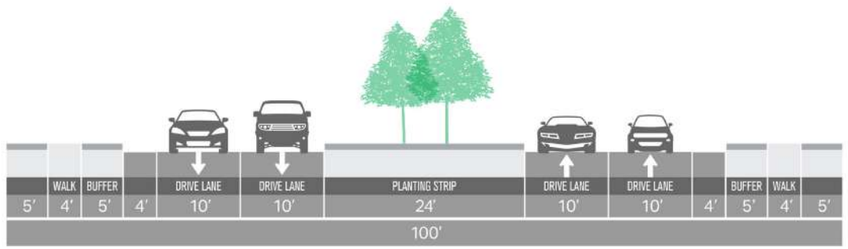
- Determine lead agency to implement since a large portion is outside SBMD boundaries
- Coordinate between SBMD, City of Houston, and TxDOT on feasibility and implementation roles
- Create budget and expected timing for project design and construction
- Investigate underground utilities, land ownership or licenses within CenterPoint easement
- Apply for grant funding opportunities
- Begin engineering and design
- Coordinate with METRO on bus stop placement and design for the 36 and 86 routes
- Assess existing pavement quality for on-street bikeways

SEGMENT 6

CROSS-SECTIONS:

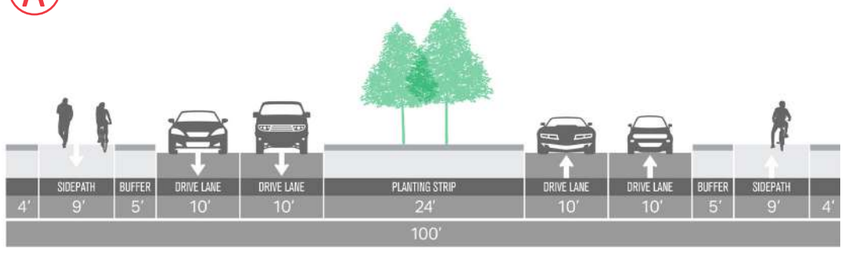
KEMPWOOD DR

EXISTING



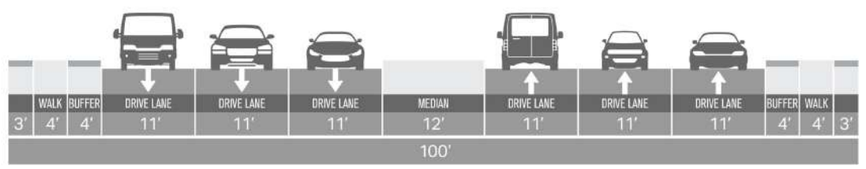
A

RECOMMENDED



WEST 34TH STREET

EXISTING



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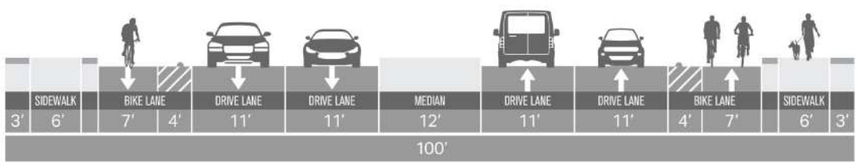


SB TRAIL TOOLBOX:

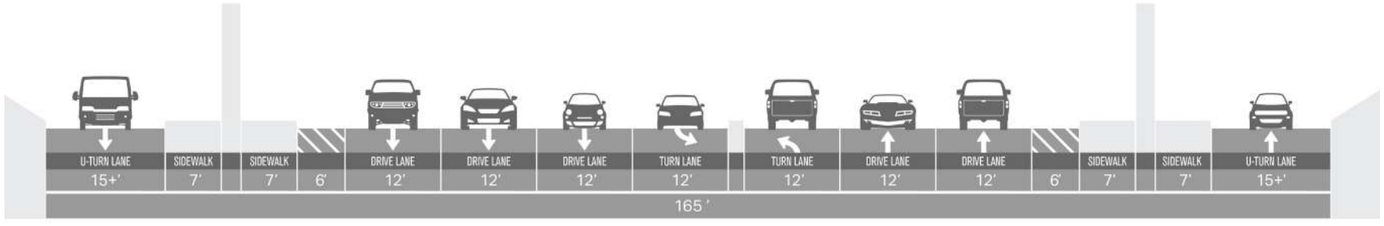
SHARED-USE SIDEPATH

PROTECTED BIKEWAY

CROSS-SECTIONS:

WEST 34TH STREET AT US 290

EXISTING



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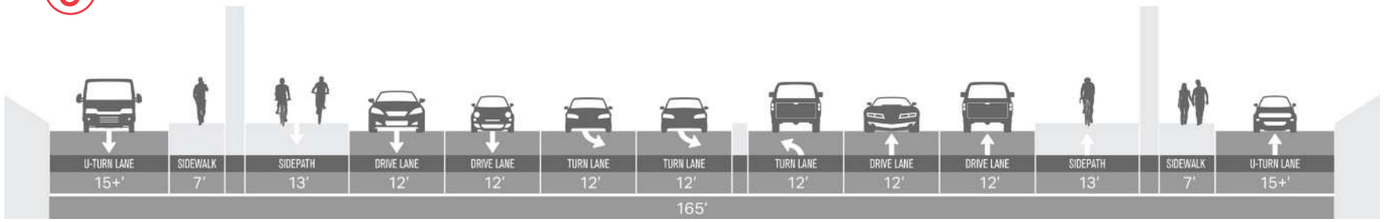
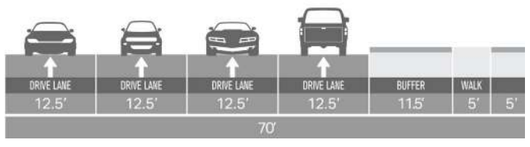


US 290 NORTHBOUND FRONTAGE ROAD

EXISTING



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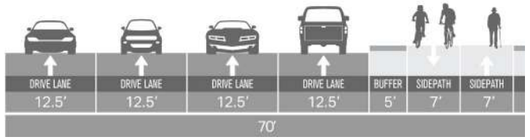
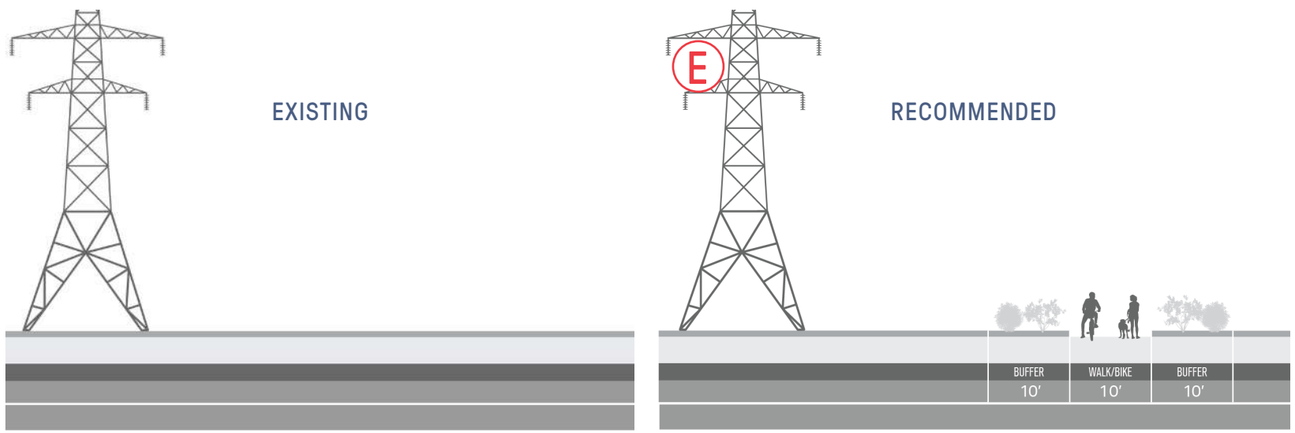
RECOMMENDED



CENTERPOINT EASEMENT



SB TRAIL TOOLBOX:

OFF-STREET SHARED-USE PATH

SEGMENT 6 CORRIDOR OVERVIEW

SEGMENT 6 CORRIDOR OVERVIEW

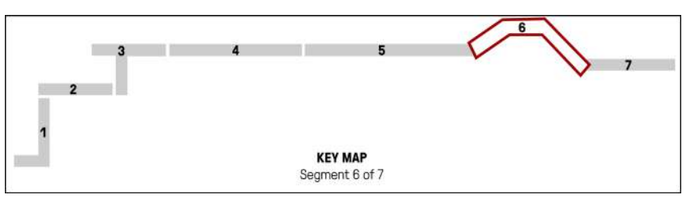
BASIC TRAILHEAD

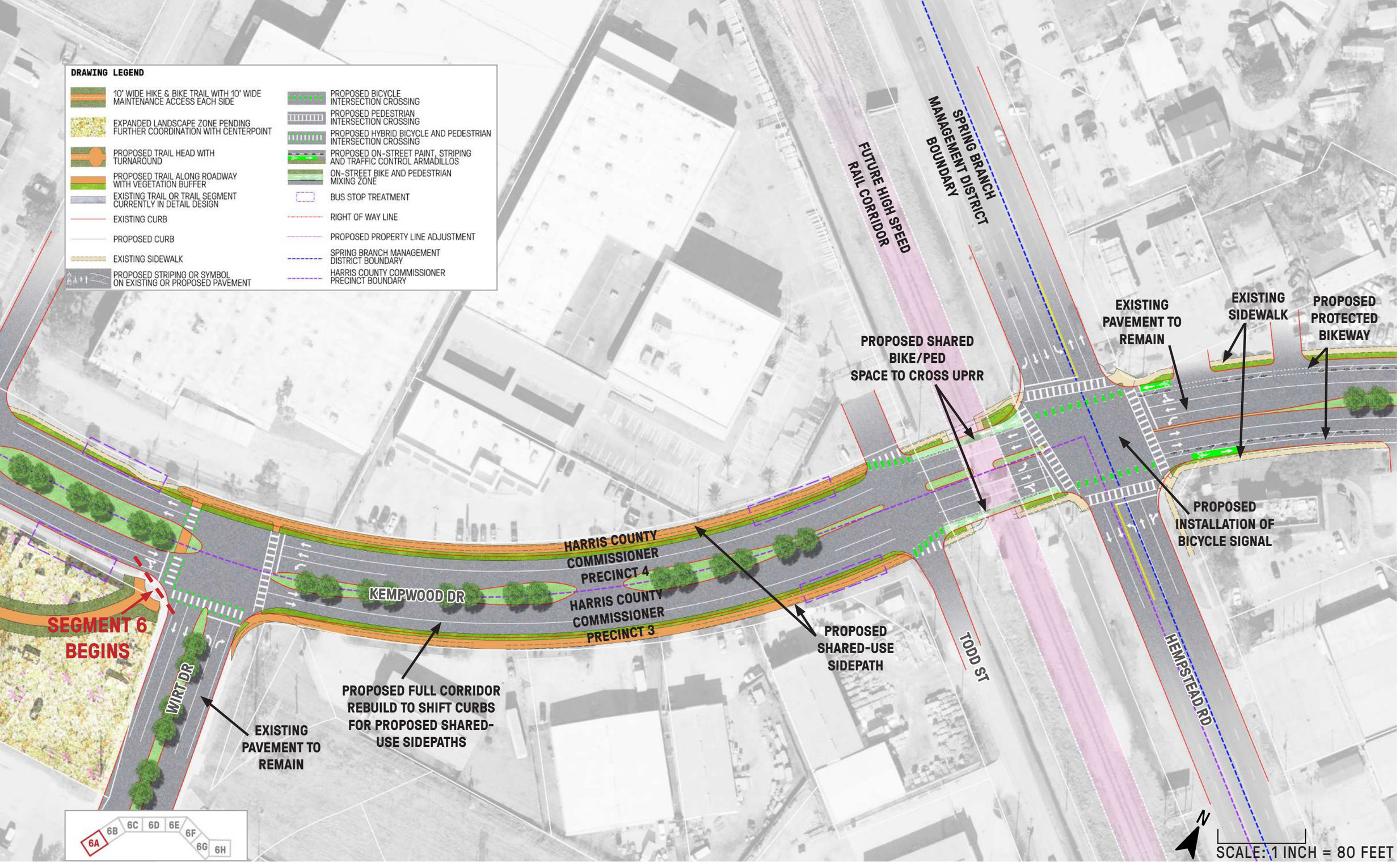
ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

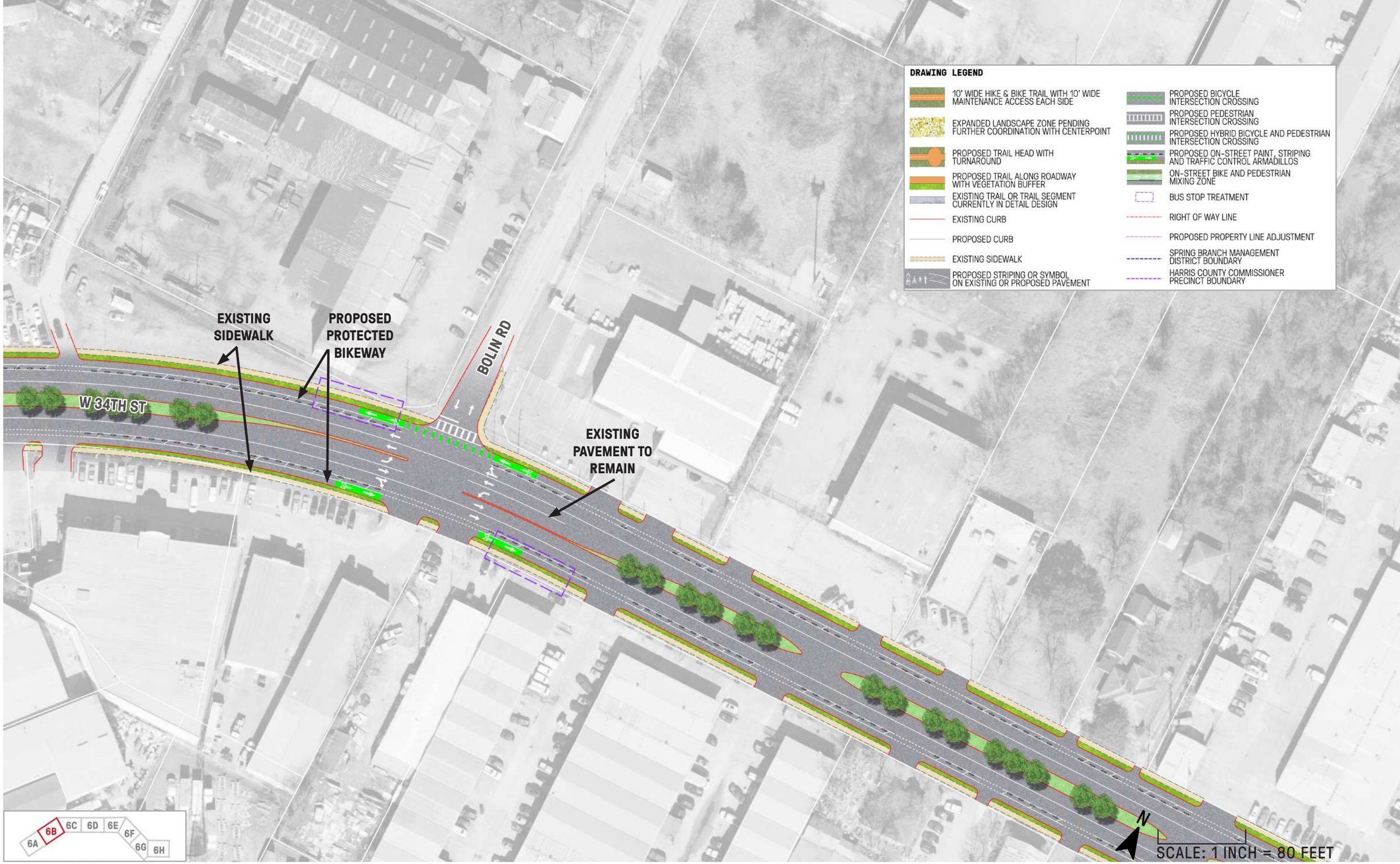
Additional legend items included within schematic design on following pages

N





PAGE 6A | SEGMENT 6 OF 7



PAGE 6B | SEGMENT 6 OF 7

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

PROPOSED PROTECTED BIKEWAY

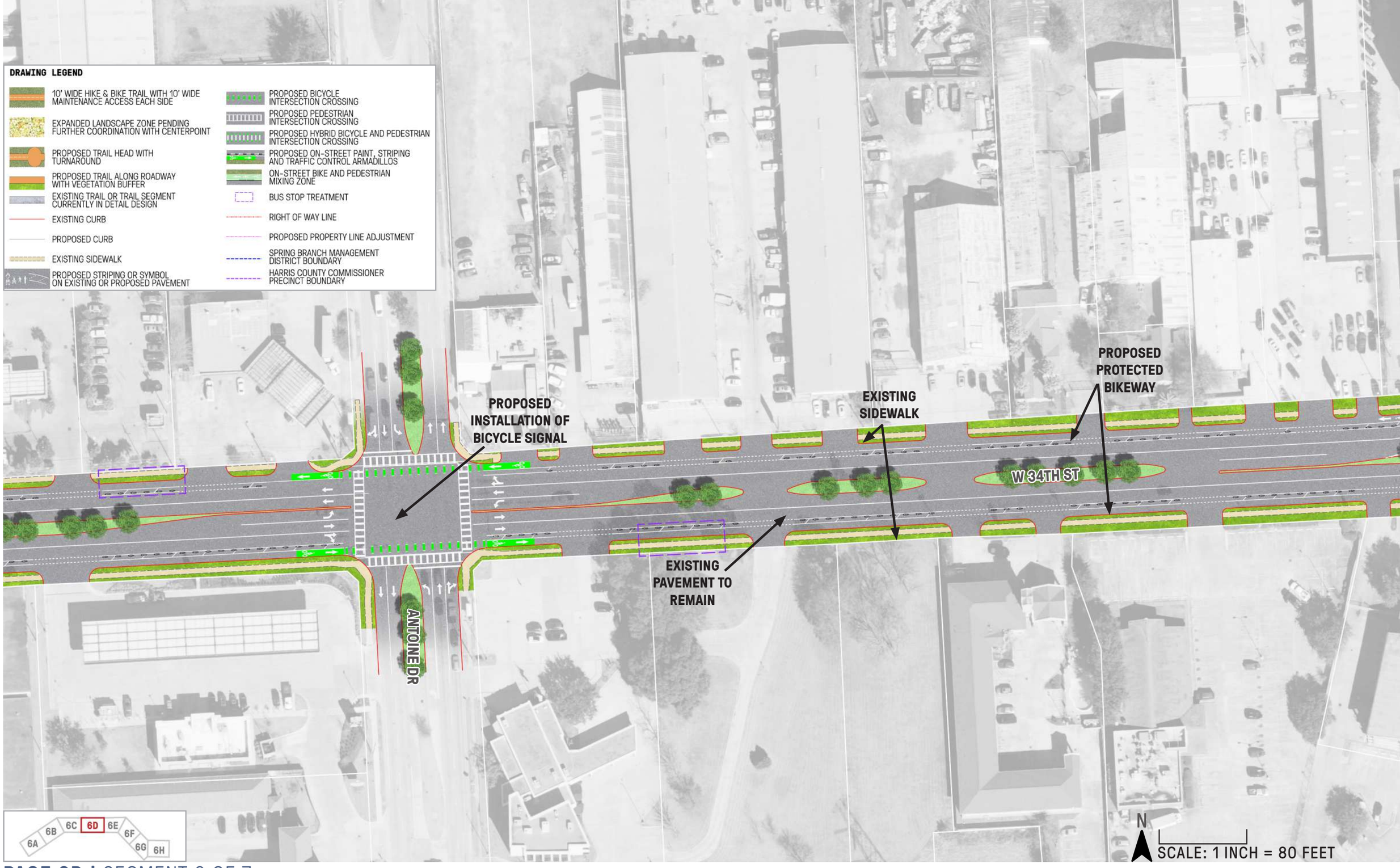
EXISTING SIDEWALK

W 34TH ST

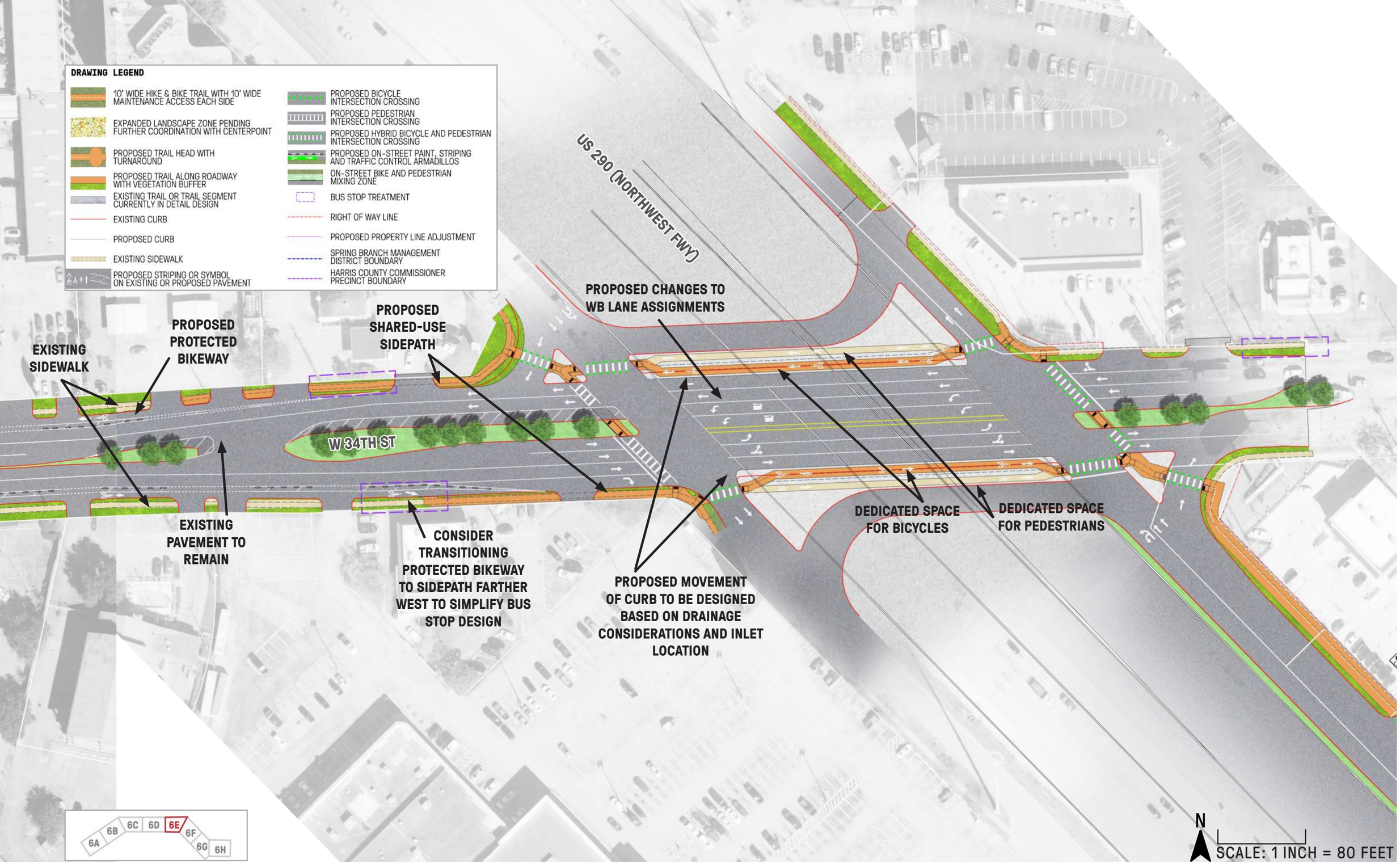
EXISTING PAVEMENT TO REMAIN

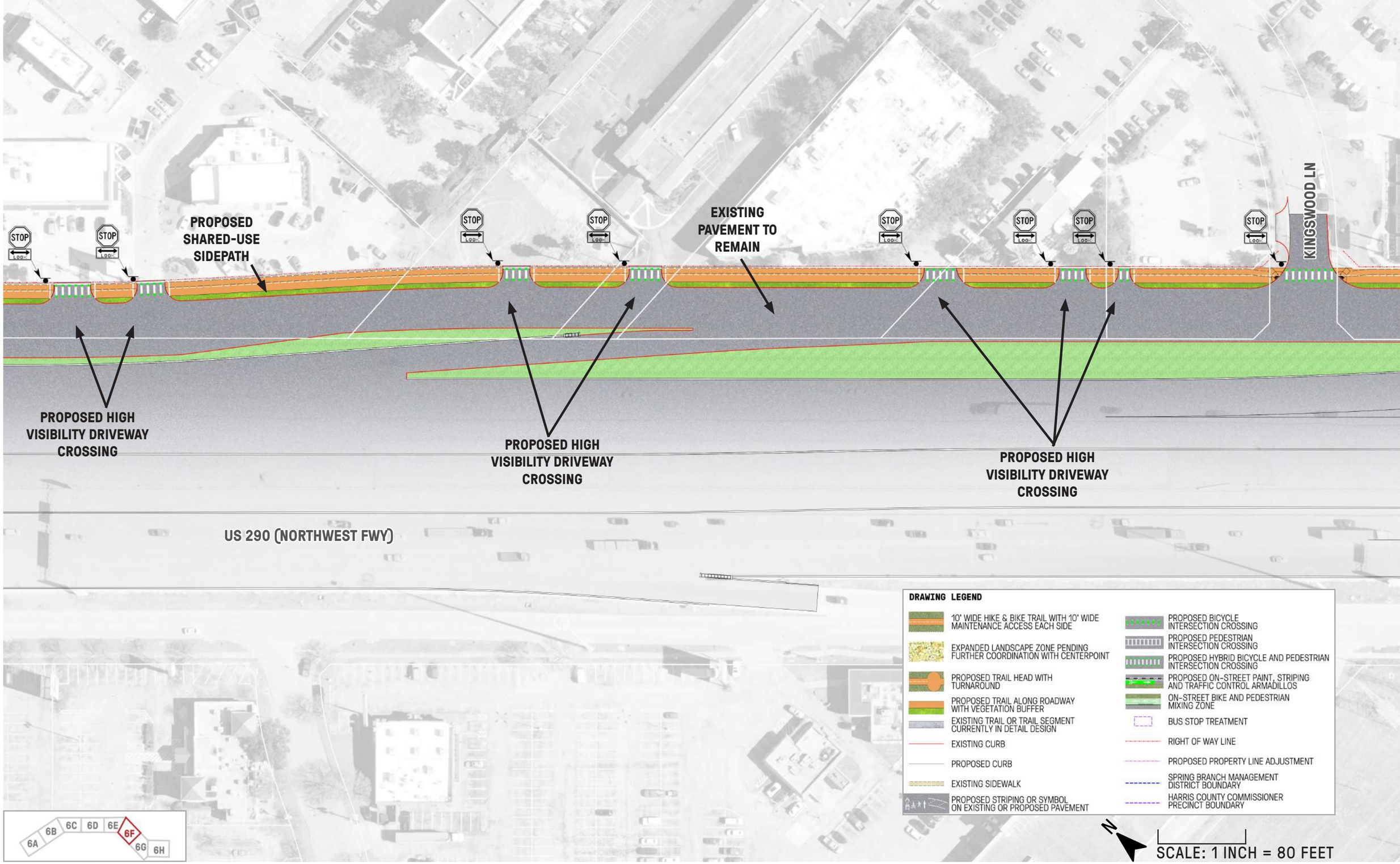
N

SCALE: 1 INCH = 80 FEET

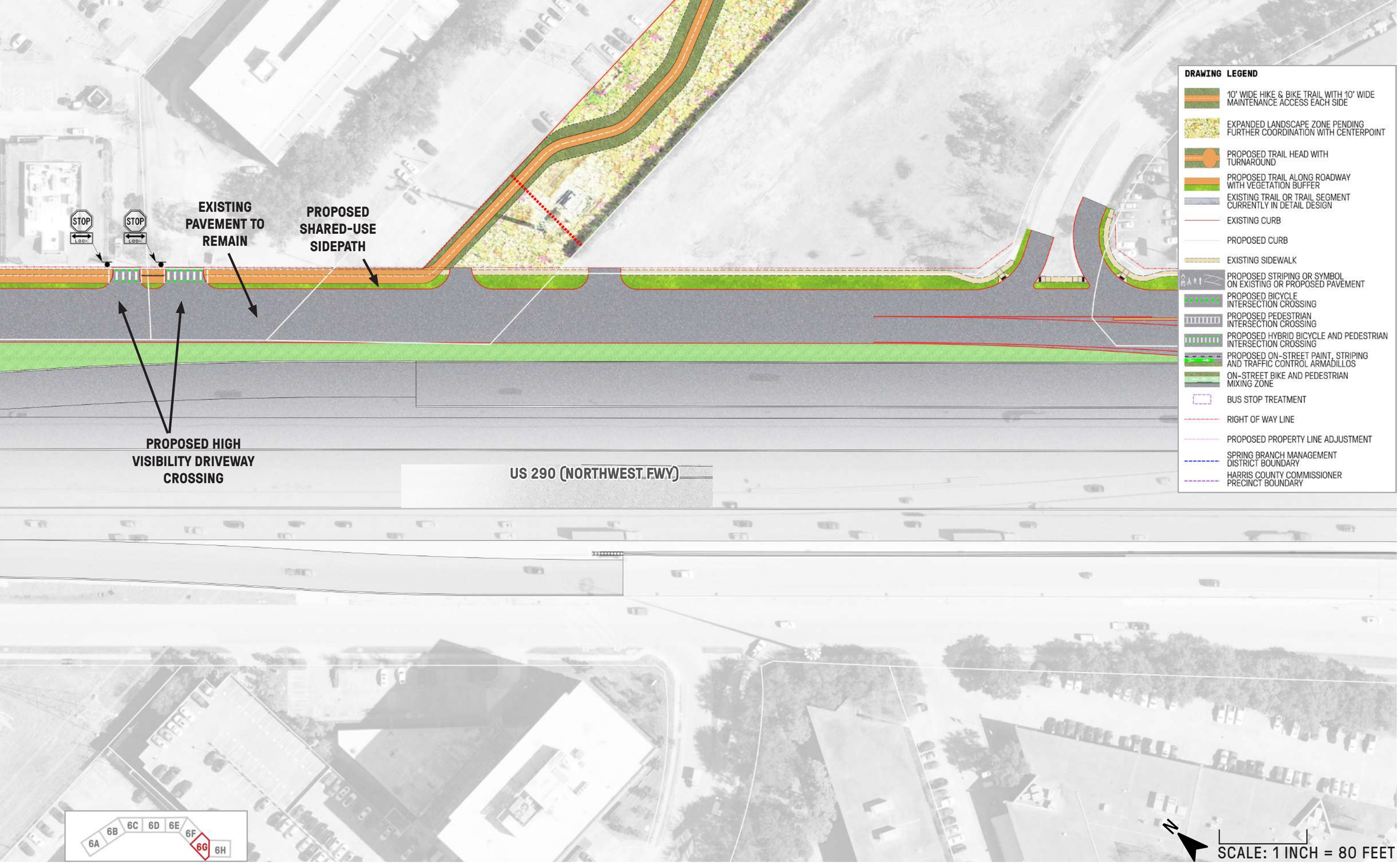


PAGE 6D | SEGMENT 6 OF 7

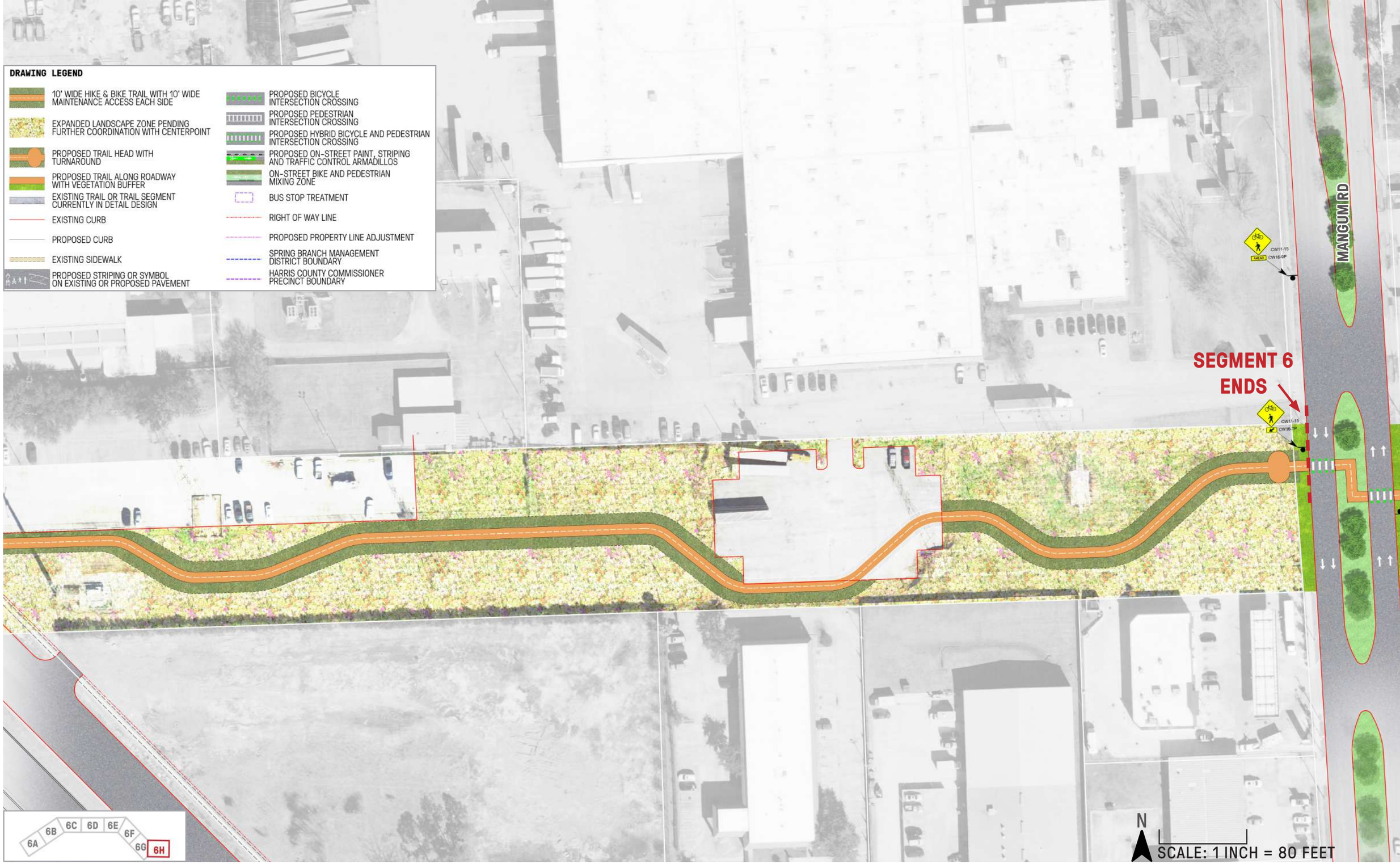

DRAWING LEGEND
10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
PROPOSED TRAIL HEAD WITH TURNAROUND
PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
EXISTING CURB
PROPOSED CURB
EXISTING SIDEWALK
PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
PROPOSED BICYCLE INTERSECTION CROSSING
PROPOSED PEDESTRIAN INTERSECTION CROSSING
PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
BUS STOP TREATMENT
RIGHT OF WAY LINE
PROPOSED PROPERTY LINE ADJUSTMENT
SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY
US 290 (NORTHWEST FWY)
W 34TH ST
EXISTING SIDEWALK
PROPOSED PROTECTED BIKEWAY
PROPOSED SHARED-USE SIDEPATH
PROPOSED CHANGES TO WB LANE ASSIGNMENTS
EXISTING PAVEMENT TO REMAIN
CONSIDER TRANSITIONING PROTECTED BIKEWAY TO SIDEPATH FARTHER WEST TO SIMPLIFY BUS STOP DESIGN
PROPOSED MOVEMENT OF CURB TO BE DESIGNED BASED ON DRAINAGE CONSIDERATIONS AND INLET LOCATION
DEDICATED SPACE FOR BICYCLES
DEDICATED SPACE FOR PEDESTRIANS
6A 6B 6C 6D 6E 6F 6G 6H
N
SCALE: 1 INCH = 80 FEET



PAGE 6F | SEGMENT 6 OF 7



PAGE 6G | SEGMENT 6 OF 7



PAGE 6H | SEGMENT 6 OF 7

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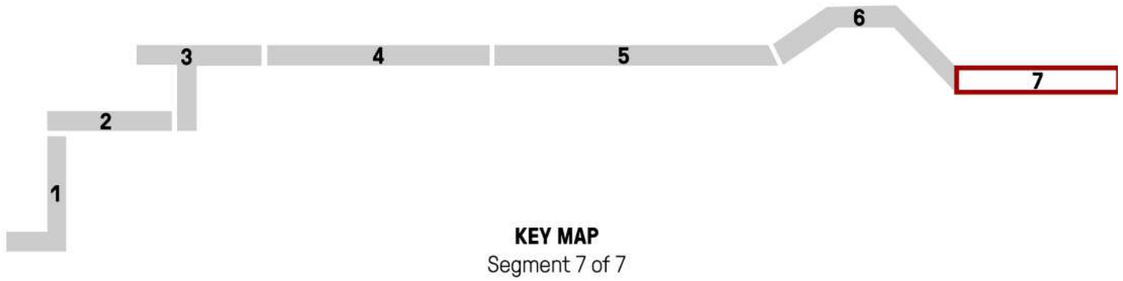
SEGMENT 7:
MANGUM ROAD TO WHITE OAK BAYOU GREENWAY

SEGMENT 7

MANGUM ROAD TO WHITE OAK BAYOU GREENWAY

PRIORITY CORRIDOR: TIER 3



KEY MAP
Segment 7 of 7

LENGTH: 1.0 mile

DESCRIPTION:

Segment 7 is a straightforward trail segment that will install an off-street trail along the CenterPoint easement between Mangum Road and T.C. Jester Boulevard. A midblock crossing treatment at Mangum Road will feature active traffic control, pavement markings, and a median refuge. From Mangum Road, the trail continues east, where trail connections at Helberg Road and Vollmer Road will facilitate neighborhood trail access. At West T.C. Jester Boulevard, another midblock crossing treatment with active traffic control, pavement markings, and a median refuge will connect trail users to the site of the proposed bridge to White Oak Bayou Greenway. An interim connection across White Oak Bayou Greenway to the trail along the east side of the bayou is proposed along the existing 34th Street bridge through a widened sidewalk or sidepath along the south side of the bridge. The signature bridge across White Oak Bayou Greenway from the West T.C. Jester Boulevard trail connection is desired.

The pedestrian bridge will be a great gateway onto and off of the Spring Branch Trail. If the timing of bridge implementation takes a while and is the missing link between the CenterPoint trail and White Oak Bayou Greenway, an interim improvement of a sidepath along the east side of TC Jester, up to the 34th Street bridge where the existing south side sidewalk could be expanded by moving the curb into the outside lane to meet up with the existing Bayou Greenways Trail is feasible. The first cost presented is this option without the bridge. The bridge would be added onto the cost of the first estimate presented.

KEY FEATURES

- Mostly off-street along a CenterPoint easement with a small section of sidepath up to and over the 34th Street bridge to meet White Oak Bayou Greenway Trail
- Four access points to the trail:
  - Mangum Road (midblock crossing and potential trailhead)
  - Helburg Road (two potential trailheads)
  - Vollmer Road (potential trailhead)
  - TC Jester Boulevard (midblock crossing, two potential trailheads)
  - White Oak Bayou Greenway Trail at 34th Street (potential trailhead)

DESTINATIONS SERVED

- Some commercial locations
- White Oak Bayou Greenway Trail
- Lazybrook/Timbergrove Super Neighborhood (14)
- Oak Forest/Garden Oaks Super Neighborhood (or Central Northwest - 12)

POTENTIAL PARTNERS:

- Spring Branch Management District (SBMD)
- City of Houston*
- Houston Parks Board*
- Harris County Flood Control District (HCFCD)
- Harris County Precinct 4
- METRO

**indicates potential lead implementation entity*

TIMING:

The timing of Segment 7 will depend on the partners leading the effort and the funding availability. The segment is located outside the Spring Branch Management District boundaries, but that does not mean the District could not lead and/or support the effort to implement the trail connection. This segment is a Tier 3 priority corridor, meaning it may take more time to coordinate between partners and implement, but should build off of momentum of Tier 1 and Tier 2 trail segments.

FUNDING CONSIDERATIONS:

- Local Funds
- MPO/TIP Funding
- Grants - Federal, State, or Local

OPINION OF PROBABLE COSTS MANGUM TO EAST TC JESTER: $1,655,888

Trail/Bikeway Construction Estimate	$1,108,000
Mobilization (10%)	$110,800
Contingency (20%)	$243,760
Engineering/Design (26%)	$380,266
Trail/Bikeway Construction Subtotal	**$1,842,826**
Wildflower Seeding Adjacent to Trail	$9,400
TOTAL SEGMENT 7 COST ESTIMATE	**$1,852,226**

OPINION OF PROBABLE COSTS PEDESTRIAN BRIDGE: $3,202,933

Trail/Bikeway Construction Estimate	$2,155,000
Mobilization (10%)	$215,500
Contingency (20%)	$474,100
Engineering/Design (26%)	$739,596
Trail/Bikeway Construction Subtotal	**$3,584,196**
Wildflower Seeding Adjacent to Trail	$603
TOTAL SEGMENT 7 COST ESTIMATE	**$3,584,799**

TRAILHEAD CONSIDERATIONS:

There are seven locations where basic or enhanced trailheads could be considered. Trailhead cost by type is shown below. See the schematic design on the following pages for potential locations.

Basic Trailhead Cost Estimate	$31,850
Contingency (20%)	$6,370
Total Construction Subtotal	**$38,220**

Enhanced Trailhead Cost Estimate	$49,450
Contingency (20%)	$9,890
Total Construction Subtotal	**$59,340**

SEGMENT 7

MAINTENANCE COSTS:

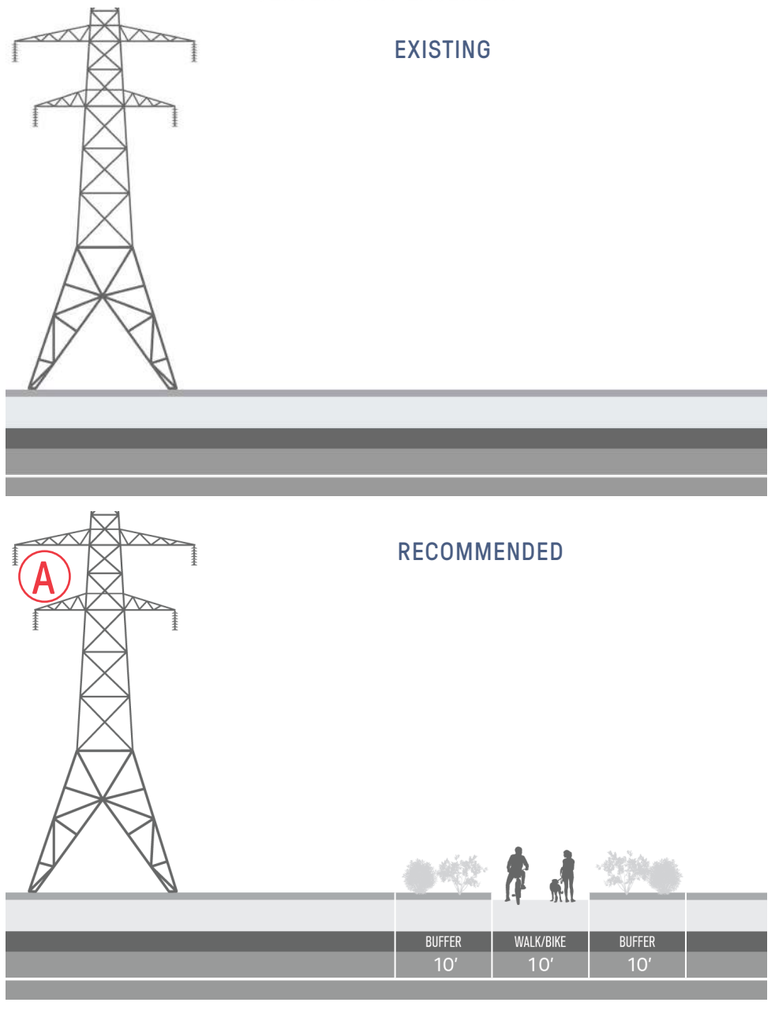
Annual Trail Maintenance*	$ 25,000/ mile

**Based on Houston Parks Board estimates and only applies to trail portions that are off-street shared-use paths*

TASKS TO IMPLEMENT:

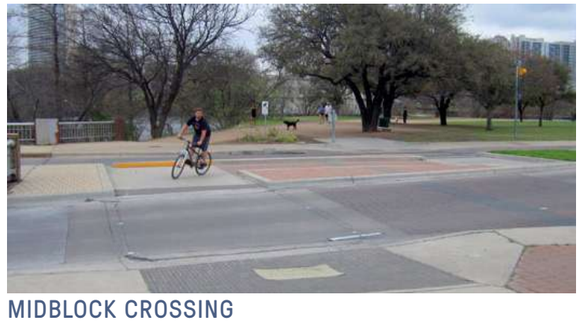
- Determine lead agency to implement since Segment 7 is outside SBMD boundaries
- Coordinate between SBMD, Houston Parks Board, Harris County Precinct 4, and City of Houston on feasibility and implementation roles
- Coordinate with Harris County Flood Control District on the proposed bridge design and timing
- Create a budget and expected timing for project design and construction
- Investigate underground utilities, land ownership or licenses within CenterPoint easement
- Apply for grant funding opportunities
- Begin engineering and design
- Identify potential partners for shared parking

CROSS-SECTIONS:



SB TRAIL TOOLBOX:

OFF-STREET SHARED-USE PATH



MIDBLOCK CROSSING

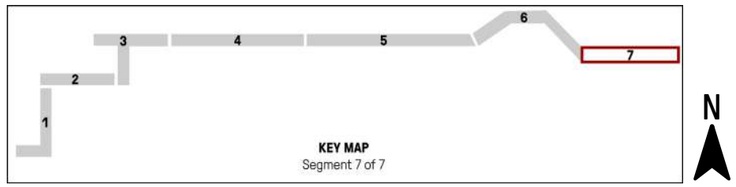
SEGMENT 7 CORRIDOR OVERVIEW

BASIC TRAILHEAD

ENHANCED TRAILHEAD

PREFERRED TRAILHEAD LOCATION

Additional legend items included within schematic design on following pages



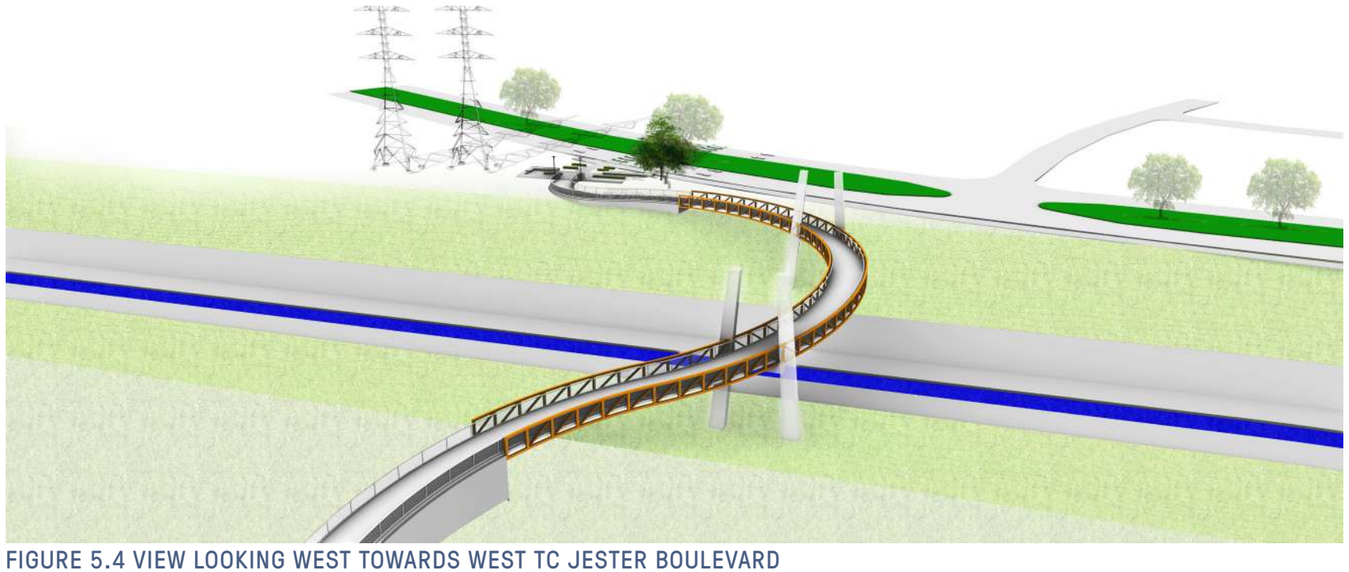


FIGURE 5.4 VIEW LOOKING WEST TOWARDS WEST TC JESTER BOULEVARD

FIGURE 5.5 WEST BANK ABUTMENT PLAZA

FIGURE 5.6 EAST BANK ABUTMENT PLAZA

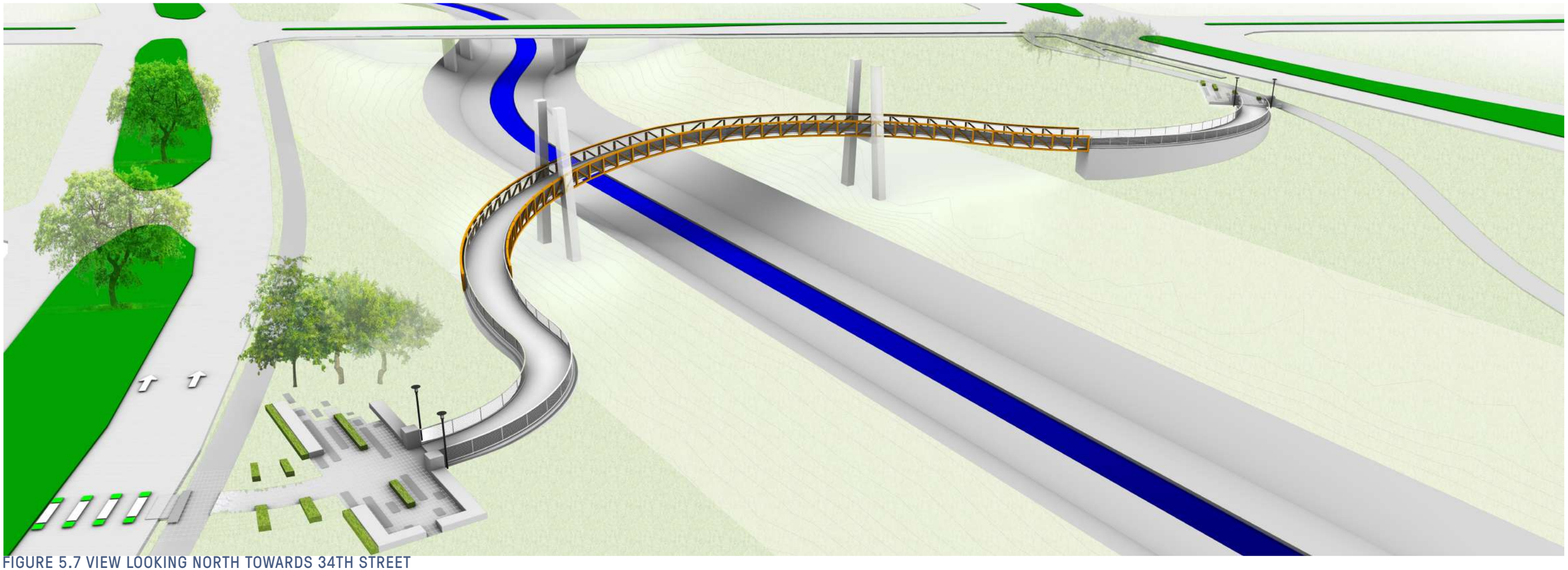


FIGURE 5.7 VIEW LOOKING NORTH TOWARDS 34TH STREET

SIGNATURE BRIDGE

OPPORTUNITY

The intersection of the Spring Branch Trail and White Oak Bayou Greenway represents an intersection of two of Houston's most critical and innovative urban plans: *Bayou Greenways 2020* and *Beyond the Bayous*. *Bayou Greenways 2020* by Houston Parks Board (approved by voters in 2012) has been implementing hike and bike trails along Houston's major bayous with a target completion date of 2020. The White Oak Bayou Greenway trail is currently implemented on the east bank of White Oak Bayou Greenway and therefore would require a bridge crossing in order for the Spring Branch Trail to connect to it.

Building upon the success of *Bayou Greenways 2020,* the *Beyond the Bayous* report, also by Houston Parks Board, seeks to connect the bayous (typically running east-west) together by using CenterPoint corridors and other opportunistic sites and easements to build a more connected hike and bike network. Given the fact that most of these trail projects are creating a regional network, it is recommended that a signature bridge celebrate this bayou crossing and trail intersection moment to provide both a safe and iconic crossing of White Oak Bayou Greenway for trail users.

Additionally, the Spring Branch Trail was identified in Spring Branch Management District's *Spring Branch Comprehensive Plan* (2015) as one of four major action items, and further studied as part of H-GAC's Livable Center Study *Reimagine Long Point* in 2017. The multiple independent studies have validated the importance of the trail project and underscores the opportunity of a signature bridge.

The team also identified an interim solution of routing the trail up to the existing West 34th Street bridge and widening the sidewalk and is shown in the corridor plan as an option until funding for the bridge is available.

DESIGN & ALIGNMENT

In order to meet the updated HCFCD design criteria for low chord elevation (see page 192), the trail needs to climb to a minimum elevation before spanning the channel. Additionally, moving the bridge from underneath the overhead transmission lines will create a safer environment for construction of the bridge. The bridge shown represents one possible solution to these criteria. Other alignments could also meet these if funding does not support the alignment shown. However, a more abrupt angular turn before crossing the channel, while reducing the overall material needed for the bridge, would be less bike-friendly as it does not support the wider turning radius of a bicycle.

The profile of the bridge maintains a continuous sine curve rather than reaching the mandatory low chord elevation and flattening out. This allows the trail user to experience higher views in the landscape while also creating a more aesthetically pleasing structure. The ADA criteria of 5% max slope (without handrails and landings) is met in the alignment shown.

ABUTMENT PLAZAS

Plazas at each abutment create places for sitting and also logical meeting spots along the trail. These plazas can include upgraded planting, seatwalls, special pavers, waste receptacles, drinking fountains, and lighting. Bridge lighting should also be considered to illuminate the deck surface.

FIGURE 5.8 VIEW LOOKING NORTH AT W TC JESTER: PROPOSED ALIGNMENT IS DASHED

SIGNATURE BRIDGE

EXISTING SITE CONDITIONS

The dashed lines in the photo above represent the alignment of the trail entering from across West TC Jester. In order to avoid the overhead power lines for construction purposes, the plan alignment needs to curve to the north to avoid the towers. Existing trees and smaller wooden power poles are in this location as shown. These smaller poles will need to be relocated (which requires coordination with CenterPoint). The trees should be preserved if possible, and the alignment should avoid the root zones by staying out of the dripline of the canopies. On the east bank the proposed bridge and trail will connect to the existing White Oak Bayou Greenway trail. There are no utility pole or tree conflicts on the east bank with the alignment shown.

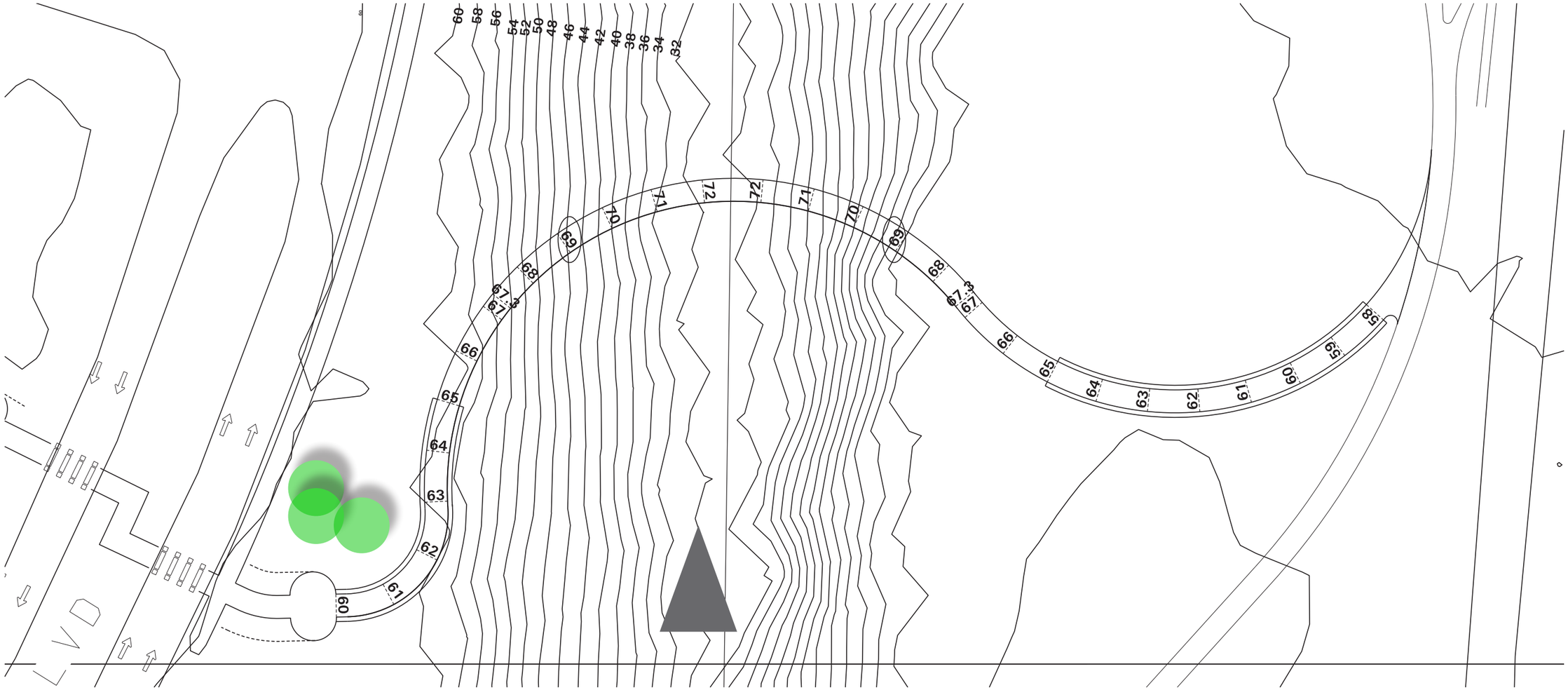


Figure 5.9 Plan view showing potential grades of trail: The alignment shown accounts for HCFCD bridge design criteria and ADA accessibility (5% max. slope without handrails; guardrails are required where the adjacent dropoff exceeds 30") to meet existing grades on both banks.

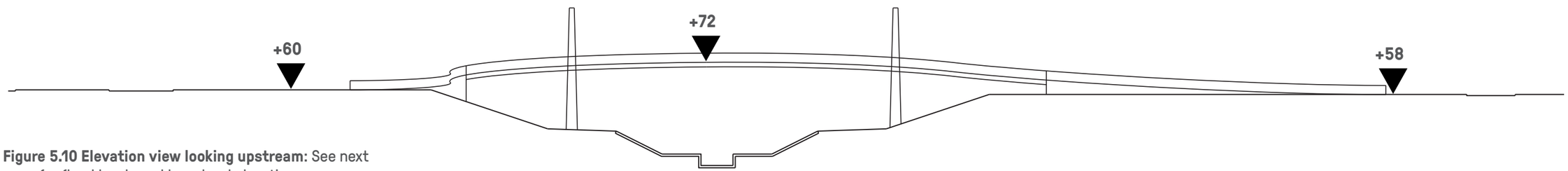


Figure 5.10 Elevation view looking upstream: See next page for flood levels and low chord elevation

SUMMARY SHEET - HCFCD HIGH WATER MARKS 10/24/2017

WHITE OAK BAYOU E100-00-00 PAGE 2 of 3

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS 10/16/06	IKE 9/13/08	4/28/09	10/25/15	4/18/16	HARVEY 8/27/17
MAIN ST		52.32	-0.8	26.4	32.0	35.0	40.5						
HOUSTON AVE		43.26	-0.9	31.3	35.6	37.8	42.7	26.5	32.8		29.0	33.5	40.3
HEIGHTS	520	39.93	-1.8	35.7	40.4	42.8	46.8	31.6	36.3		33.9	38.8	45.6
N SHEPHERD		50.55	-1.2	42.6	49.6	50.8	52.1	36.3	40.6		35.5	44.1	51.3
W. 11th ST		51.03	-1.2	46.8	52.7	53.9	55.8	39.8	46.8		39.3	46.8	52.7
W. 18th ST		55.55	-1.3	51.4	55.2	56.6	58.4	43.6	49.5		44.1	49.6	54.4
ELLA BLVD	530	56.39	-1.2	53.3	56.0	57.0	58.9	44.4	50.2		44.3	50.4	56.9
LOOP 610 E. FEEDER		61.27	-1.3	55.6	58.5	59.6	61.7	47.2	52.3		46.7	53.1	57.2
W. 34th ST		61.87	-1.3	57.8	61.0	61.9	63.8	48.8	54.0		54.7	54.4	57.5
W. 43rd ST		69.85	-2.1	64.0	66.1	66.9	69.4	55.7	59.2		57.3	62.5	63.9
PINEMONT	535	68.85	-2.4	65.9	68.1	68.9	71.6	58.0	62.1		58.9	63.9	66.6
TIDWELL	575	71.41	-2.4	67.9	70.1	70.8	73.4	59.6	62.1		58.9	66.0	68.8
W LITTLE YORK		75.40	-3.0	71.6	74.3	75.5	77.4	66.5	69.0		67.4	72.8	73.7
ANTOINE		74.94	-3.0	73.0	75.5	76.2	78.1	69.3	70.2		72.5	74.0	74.5
ALABONSON	540	78.71	-3.2	77.3	78.5	79.0	80.0	70.7	72.5		73.6	76.0	77.6
N. HOU ROSSLYN		86.80	-3.2	80.7	81.9	83.7	84.6	78.6	75.4	78.0	76.2	80.0	78.8
PEDESTRIAN BR			-4.3	89.9	90.3	90.4	90.9	82.0	83.4	85.5	84.1	88.8	89.6
FAIRBANKS N. HOU	545	95.32	-4.3	91.8	92.3	92.4	92.9	82.6	84.4	86.9	83.0	92.2	90.7
WINDFERN RD		97.53	-4.4	95.4	96.0	96.3	97.0	83.0	85.9	89.5	86.5	94.8	92.9
GESSNER		102.76	-5.2	96.9	98.0	98.3	99.1	89.1	88.7	91.5	88.4	96.5	94.6
LAKEVIEW	550	99.60	-5.0	101.3	102.2	103.0	104.0	97.5	96.0	98.6	93.1	101.3	98.2
WEST RD		111.58	-3.9	110.1	111.3	111.7	112.5	103.9	104.6	107.6	104.6	110.6	107.6
JONES RD	555	114.80	-3.6	114.6	115.7	116.1	116.9	110.9	110.4	112.2	110.2	115.3	113.1
FM 1960		121.73	-3.6	119.3	120.7	121.1	122.0	116.4	115.8	118.3	113.7	120.1	115.2

NOTE: ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

NOTE: Main St. discontinued as HWM location in summer 2005 due to traffic safety.

[1] = Suspect elevation, low confidence in field

(?) = Survey Dept research needed to confirm elevation

Table 5.2 HCFCD High Water Marks: The 0.2% (i.e. 500-yr) event is the elevation used to determine the bridge's low chord elevation.

SIGNATURE BRIDGE

HCFCD BRIDGE DESIGN CRITERIA

Harris County Flood Control District (HCFCD) released new bridge design criteria in July 2019 as part of their revised *Policy, Criteria, and Procedure Manual* (October 2018). The update to the *PCPM* are:

> "being made to address the information included with the release of the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11 Version 2.0 Texas (Atlas 14). The release of Atlas 14 provides updated precipitation depths in Texas for average recurrence intervals of 1-year through 1000-year, and from durations from 5-minutes to 60-days. The updated information will replace the current precipitation depth and frequency information that is used for a variety of engineering analyses and designs including design of drainage facilities and floodplain modeling and mapping."
>
> (Source: HCFCD PCPM Atlas 14 Guidelines Cover Memo)

Per the HCFCD PCPM July 2019 update, bridge design parameters include:

Low chord elevation:

- "For new bridges on all channels, set the low chord at the center of the bridge 1.5 feet or more above the existing or ultimate 1% exceedance water surface, or the effective 0.2% water surface, whichever is higher."

Bridge span criteria:

- "As a minimum, span the existing full channel top width (do not narrow the channel at the bridge).
- Span the ultimate channel top width, where possible.
- Extend the bridge beyond the channel top width where the floodway and/or floodplain are wide and it is necessary to satisfy the no adverse impact criteria."

Bents and Abutments:

- "Align bents and abutments within the channel parallel to the general direction of flow in the channel to minimize obstruction of flow.
- Minimize the number of bridge bents in the channel and locate them outside of the channel bottom, if possible, to reduce debris buildup and head loss."

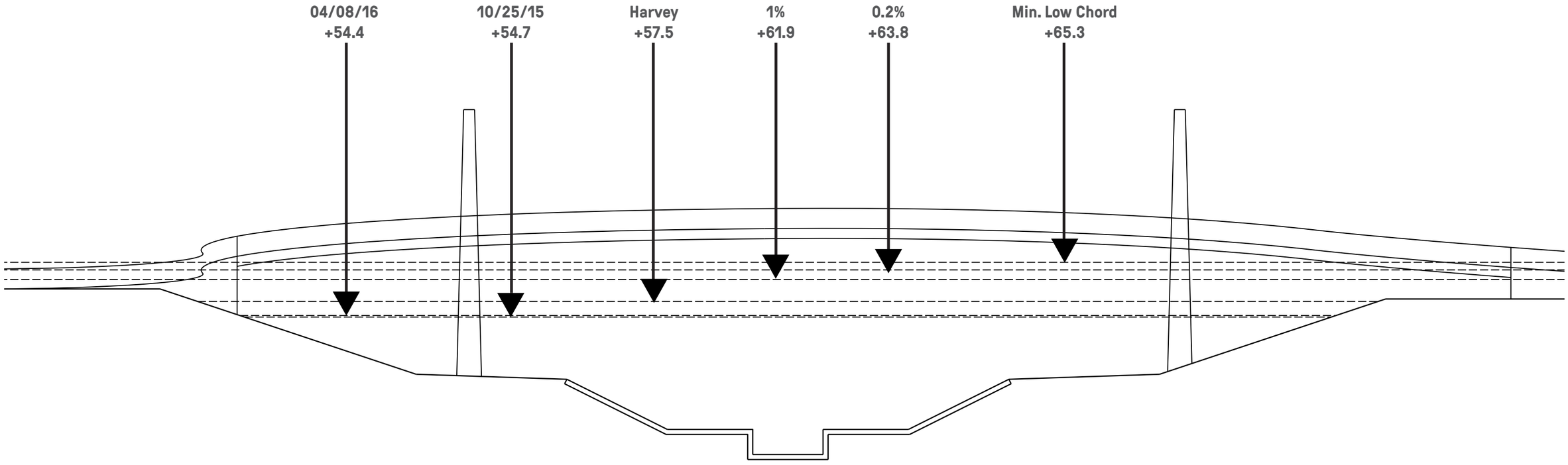


Figure 5.11 Flood Elevations (Elevation View Looking Upstream): Major high water events noted with the 1% and 0.2% chance the required minimum low chord elevation.

AGENCY COORDINATION AND APPROVALS

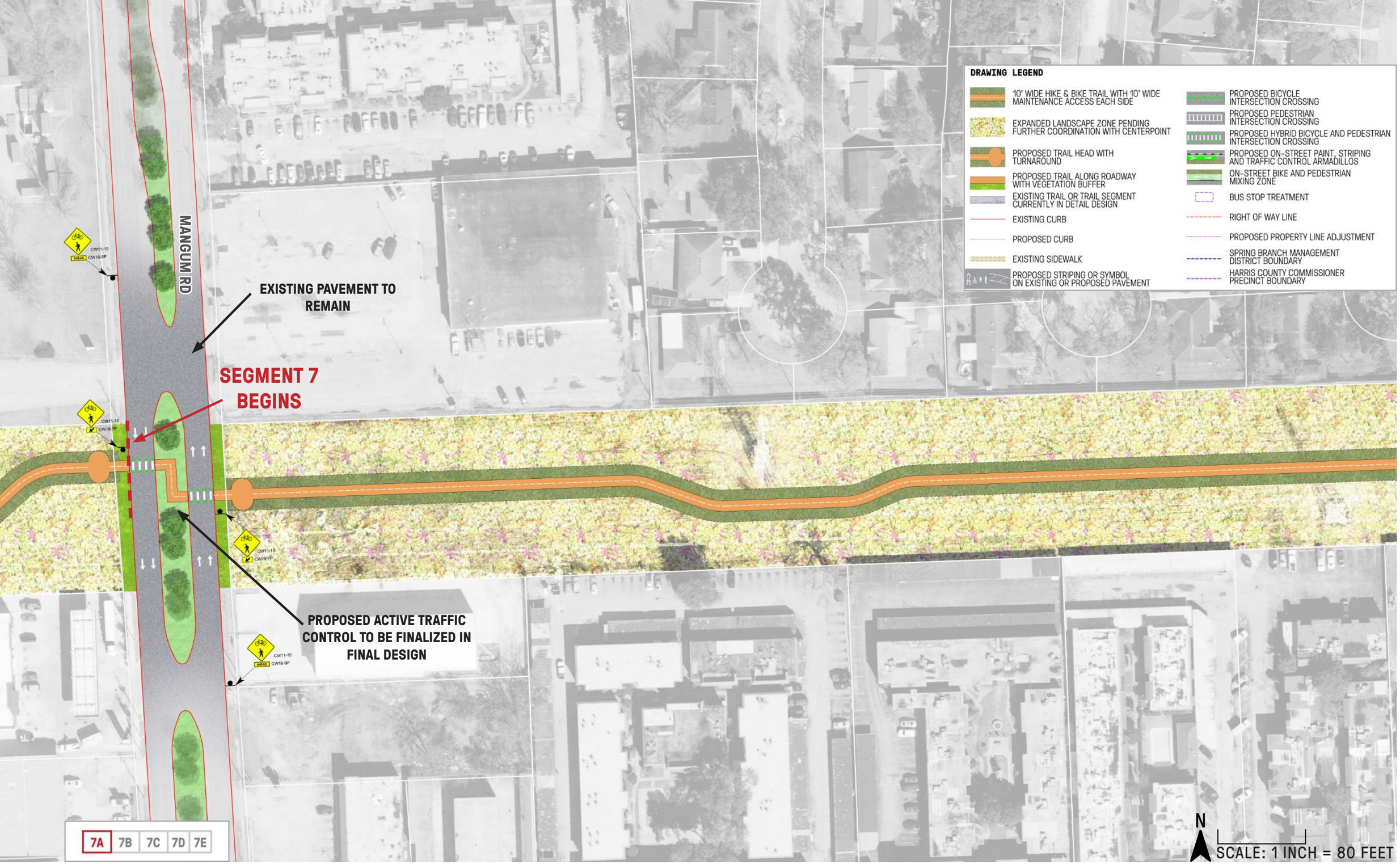
HCFCD will have to review and approve the bridge so that it meets their design criteria and does not produce negative impacts to the 10-, 100-, and 500-year flood elevations (which is determined through an impact analysis performed by a Hydraulic and Hydrologic Engineer). The United States Army Corps of Engineers (USACE) will have to review and approve the bridge if it touches, or is within, the ordinary high water mark for the bayou at this location or if it is within a federal project (federal projects can be located via HCFCD).

TIMELINE

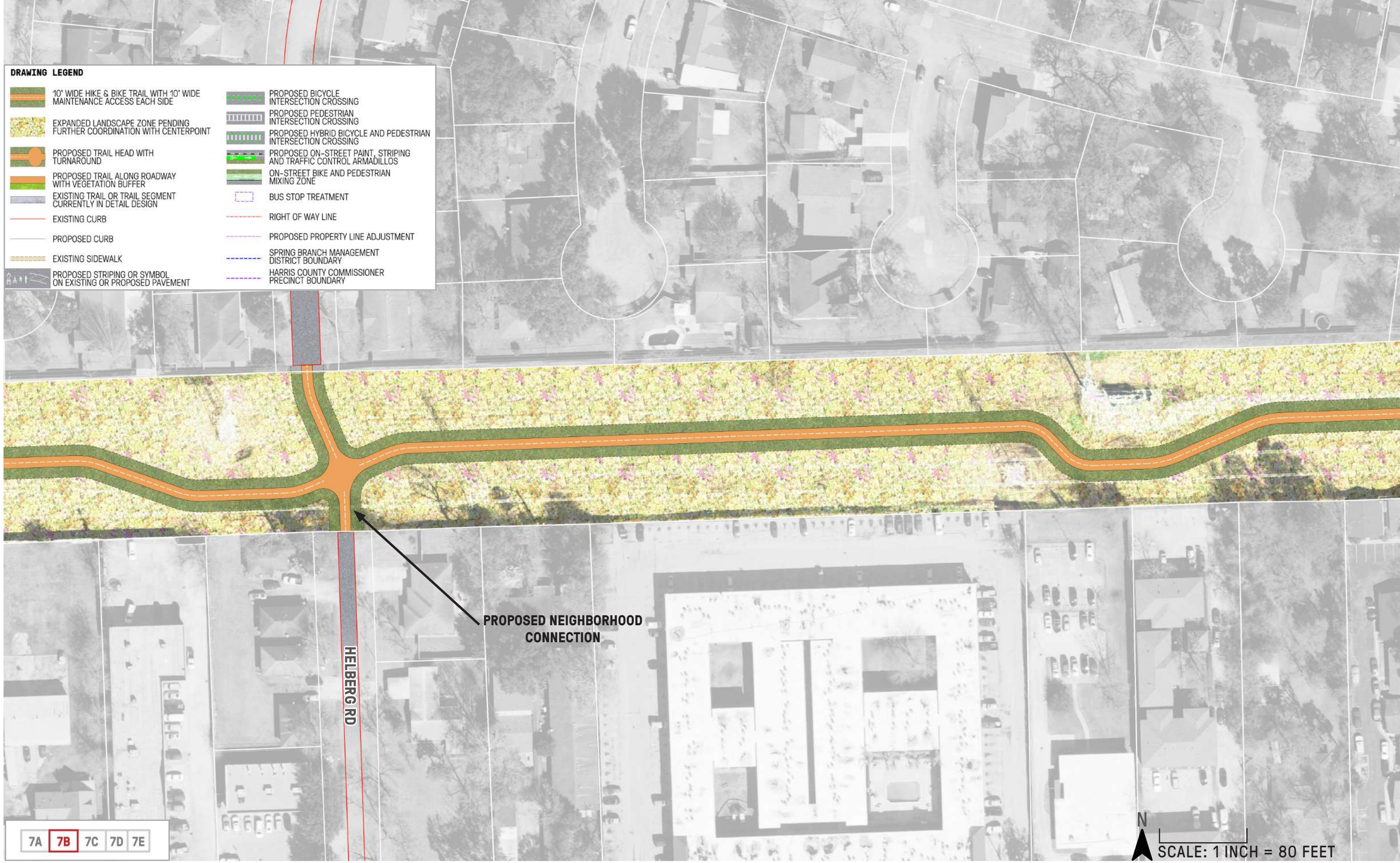
Expected (minimum) durations for design and approvals for bridges in Harris County are as follows (and may represent a best-case scenario):

- Schematic Design: 2-3 months
- Design Development and Construction Documentation (including design reviews, a Hydraulic and Hydrologic study, and cost estimation): 4-6 months
- HCFCD permitting: 2-3 months
- USACE permitting: 6-9 months
- Bidding: 2 months
- Construction: 9-12 months

Total: 25-35 months



PAGE 7A | SEGMENT 7 OF 7



PAGE 7B | SEGMENT 7 OF 7

DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
- PROPOSED TRAIL HEAD WITH TURNAROUND
- PROPOSED TRAIL ALONG ROADWAY WITH VEGETATION BUFFER
- EXISTING TRAIL OR TRAIL SEGMENT CURRENTLY IN DETAIL DESIGN
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIDEWALK
- PROPOSED STRIPING OR SYMBOL ON EXISTING OR PROPOSED PAVEMENT
- PROPOSED BICYCLE INTERSECTION CROSSING
- PROPOSED PEDESTRIAN INTERSECTION CROSSING
- PROPOSED HYBRID BICYCLE AND PEDESTRIAN INTERSECTION CROSSING
- PROPOSED ON-STREET PAINT, STRIPING AND TRAFFIC CONTROL ARMADILLOS
- ON-STREET BIKE AND PEDESTRIAN MIXING ZONE
- BUS STOP TREATMENT
- RIGHT OF WAY LINE
- PROPOSED PROPERTY LINE ADJUSTMENT
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

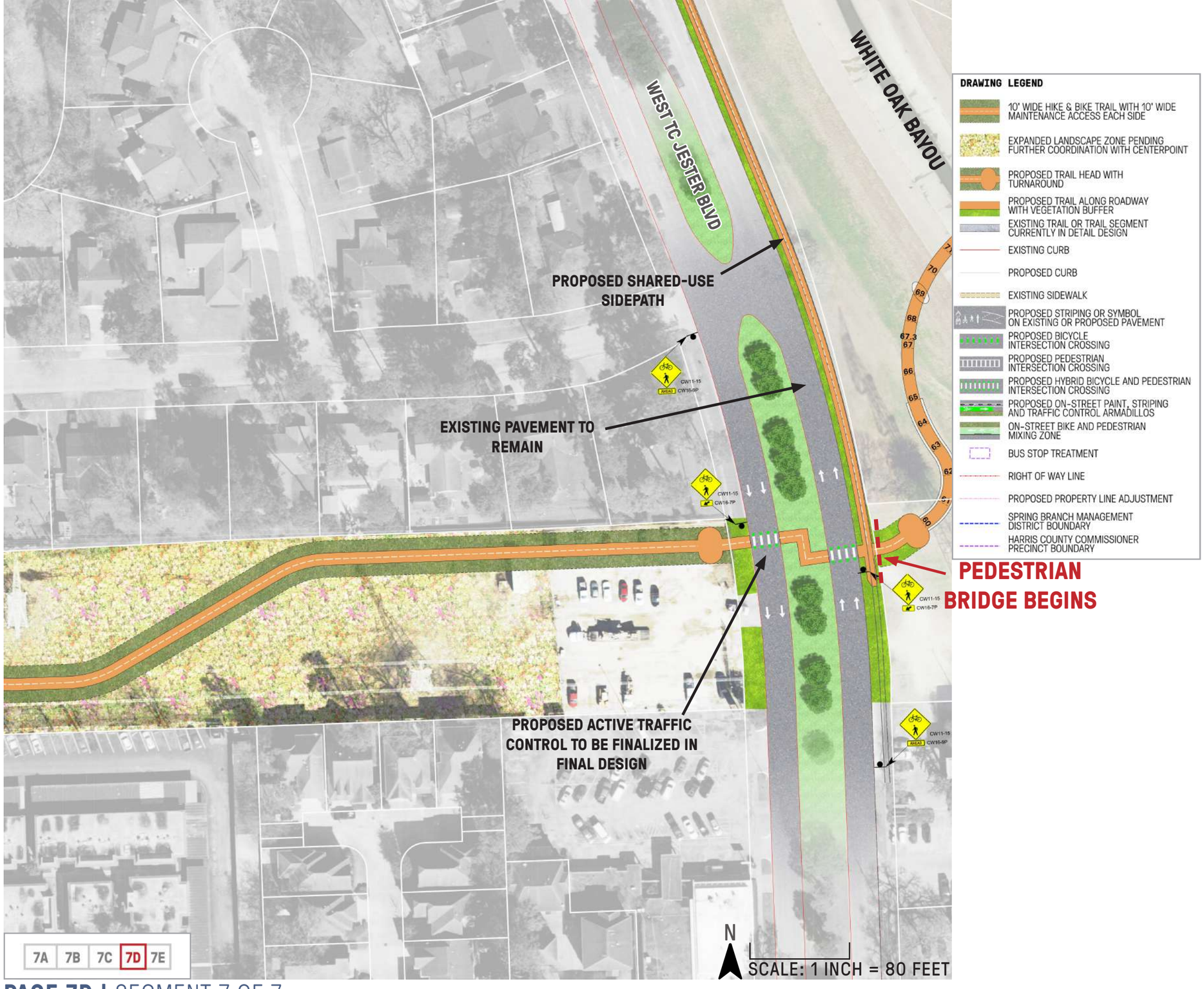
LLMER RD

7A | 7B | 7C | 7D | 7E

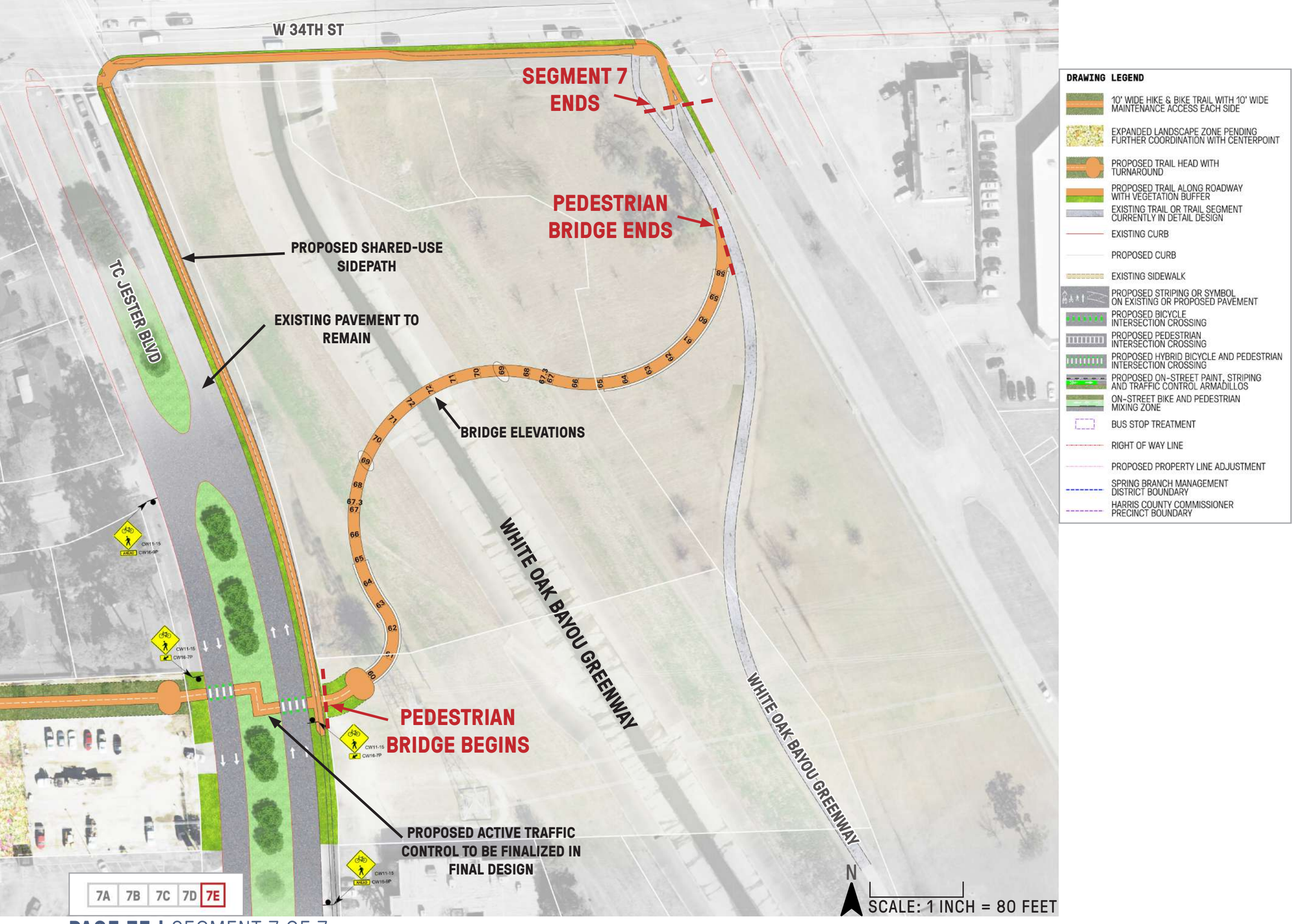
N

SCALE: 1 INCH = 80 FEET

PAGE 7C | SEGMENT 7 OF 7



PAGE 7D | SEGMENT 7 OF 7



DRAWING LEGEND

- 10' WIDE HIKE & BIKE TRAIL WITH 10' WIDE MAINTENANCE ACCESS EACH SIDE
- EXPANDED LANDSCAPE ZONE PENDING FURTHER COORDINATION WITH CENTERPOINT
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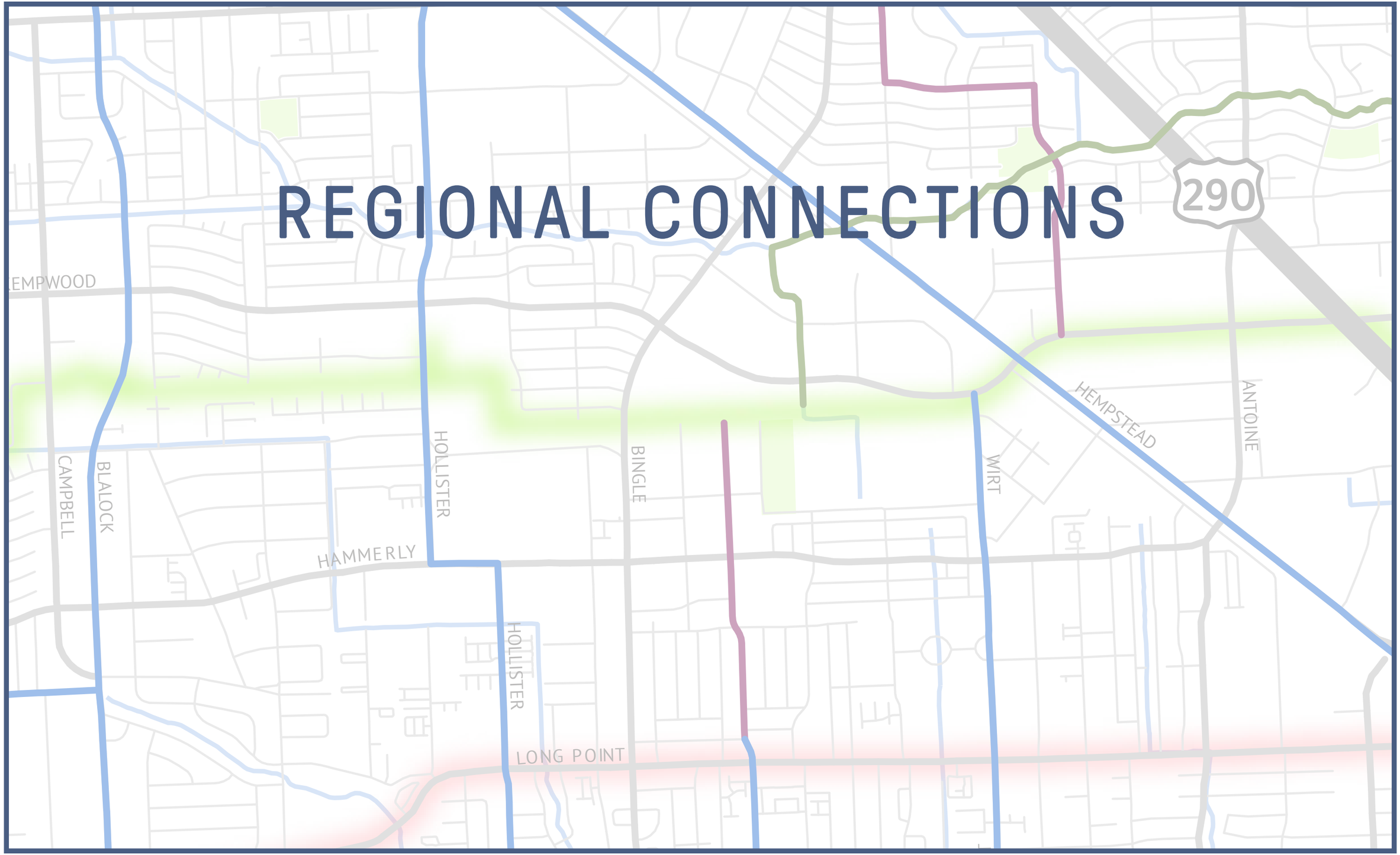
- SPRING BRANCH MANAGEMENT DISTRICT BOUNDARY
- HARRIS COUNTY COMMISSIONER PRECINCT BOUNDARY

REGIONAL CONNECTIONS



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DEVELOPMENT OF REGIONAL CONNECTIONS

The Spring Branch Trail, when completed, will provide a regional spine for people walking and bicycling. It will provide a safe, comfortable, and useful east-west connection through communities that currently have limited access to safe and comfortable bicycling routes.

Building high quality trails, bikeways, and sidewalks increase the number of people walking and bicycling within a community. However, building infrastructure is just one of many steps to be taken to improve mobility choices for a community and increase the share of people walking and bicycling. An essential step is to ensure that infrastructure investments are focused around developing a network of safe and comfortable bikeways and sidewalks.

The Spring Branch Trail will provide almost 11 miles of high comfort bikeways that are designed for cyclists of all ages and all abilities. There is an exciting opportunity for SBMD, the City, and other organizations to expand on this east-west corridor to ensure communities both north and south of the trail have access to and from the trail and to continue to build-out a quality bicycle network for Spring Branch.

A regional connections analysis was conducted along with the schematic design of the Spring Branch Trail to begin to define a bikeway network developed around the trail. The analysis began by evaluating the existing *Houston Bike Plan* (2017) recommendations along with recommendations from previous SBMD studies including the *Spring Branch Comprehensive Plan* and *Reimagine Long Point.*

The Steering Committee was consulted for the analysis and provided invaluable input into priority corridors, preferred connections, and barriers to overcome. City staff was consulted throughout this process to ensure alignment. The public provided positive support of building out a network of bikeways along with the development of the Spring Branch Trail to expand the reach of the trail and to continue to build a high-quality bikeway network for Spring Branch.

The regional connections analysis resulted in the development of a recommended bikeway network, built on the development of the Spring Branch Trail east-west spine, as shown in **Figure 5.12**. The proposed network shows recommended bikeway corridors along with the recommended facility type. Facility types are identified using the *Houston Bike Plan* naming convention.

Facility types defined within **Figure 5.12** and summarized in **Table 5.3** are based on previous recommendations, existing corridor geometry and length, existing motor vehicle volumes and speeds, and surrounding land uses. The Toolbox presented in the previous chapter was an input into facility type recommendations and should be used when developing future projects based on presented regional connections within this section.

To better define implementation strategies and project definition, the proposed bikeway network was segmented into three implementation categories: priority, medium-term and long-term, as shown in **Figure 5.13**. Priority corridors are highlighted on the following pages in **Figure 5.14** through **Figure 5.17**. All medium-term and long-term recommendations are summarized in **Table 5.3**.

The bikeway recommendations included here will need to be coordinated with City of Houston staff for potential inclusion in the City's CIP, but can be supported and promoted by Spring Branch Management District.

CONSIDERATIONS FOR IDENTIFYING REGIONAL CONNECTIONS AND DEFINING PRIORITIZATION

Location & Connections to Key Destinations
Location was a key element in identifying regional connections. A well developed bicycle network provides multiple routes, connecting north-south and east-west, to provide safe and reliable routes to key destinations without a bicyclist having to travel far out of their way. For the Spring Branch Trail regional network, north-south connections were ideally spaced every 1/2 mile.

Connections to key destinations were also considered when identifying regional connections. Providing connections to and from the Spring Branch Trail to schools, grocery stores, retail clusters, and transit. Connections over barriers, including drainage channels, thoroughfares, and freeways, were also considered.

The location of the proposed regional connection was a factor in defining prioritization. The location of the proposed connection in relation to each Spring Branch Trail segment was considered, with connection near Tier 1 segments having higher priority.

Corridor Geometry & Characteristics
Existing corridor geometry, including existing right-of-way and roadway pavement was assessed for each regional connection.

Roadway geometry assessed the feasibility of installing of an all ages and abilities bikeway by evaluating if a bikeway could be installed without a roadway rebuild or without right-of-way acquisitions. Corridors with roadway geometry that could sufficiently fit a bikeway without a reconstruction were given a higher priority.

Pavement condition was also assessed. Roadways with poor existing pavement would require at least a pavement overlay for the installation of an bikeway within the existing curbs. Bikeway installation on roadways with poor pavement is very unsafe for a bicyclist.

Traffic data, if available, was also reviewed. Traffic data is an important consideration when defining a bikeway facility type, as highlighted within the Toolbox in the previous chapter.

The network presented in **Figure 5.12** is based on all ages and abilities bikeway design principles. A corridor with geometry and characteristics that are unable to support an all ages and abilities bikeway, either through reconstruction or retrofit, was not considered. Constructing below standard bikeways has been shown to deter bicyclists. If Spring Branch wants to support a strong bicycling community, maintaining a high standard of design and implementation for not only the Spring Branch Trail but also the regional connections is paramount.

Ease of Implementation
Ease of implementation was the most critical factor in defining prioritization. For corridors that would require a full rebuild instead of a retrofit, they were put into the medium-term or long-term priority bucket. Projects that could be implemented rapidly without a roadway rebuild and providing strong network utility were considered priority projects.

The Spring Branch Trail will be the **central link** and **east-west spine** of a Spring Branch bicycle network designed for **all ages and all abilities** connecting neighborhoods, schools, parks, and other major destinations.

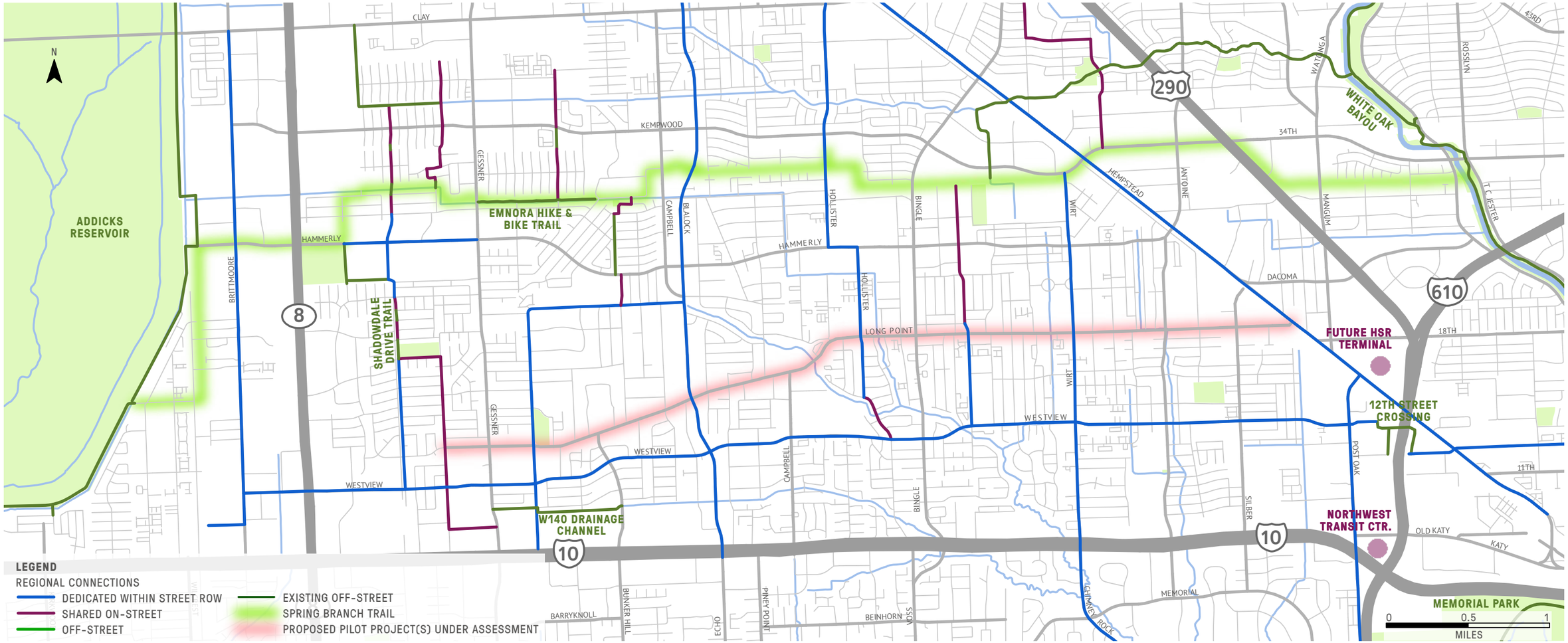


FIGURE 5.12 REGIONAL CONNECTIONS INTERSECTING THE SPRING BRANCH TRAIL

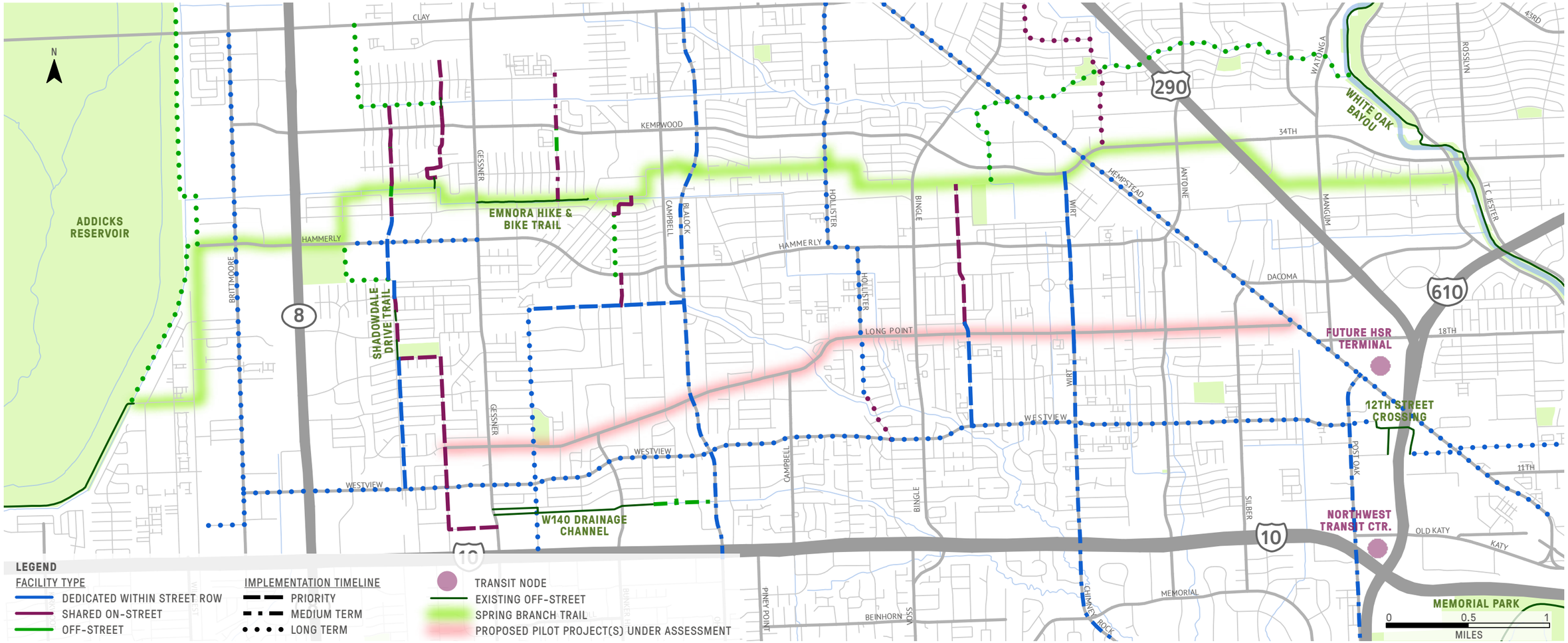
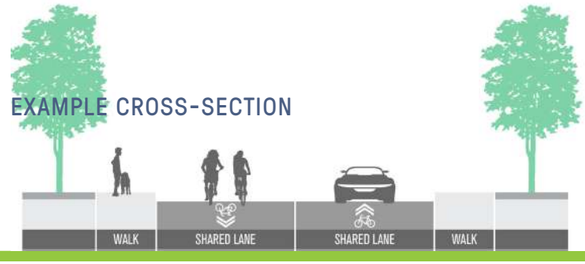


FIGURE 5.13 PRIORITIZATION OF REGIONAL CONNECTIONS INTERSECTING THE SPRING BRANCH TRAIL

REGIONAL CONNECTION

SHADOWDALE & CONRAD SAUER

SHORT-TERM
DEDICATED FACILITY WITHIN ROW



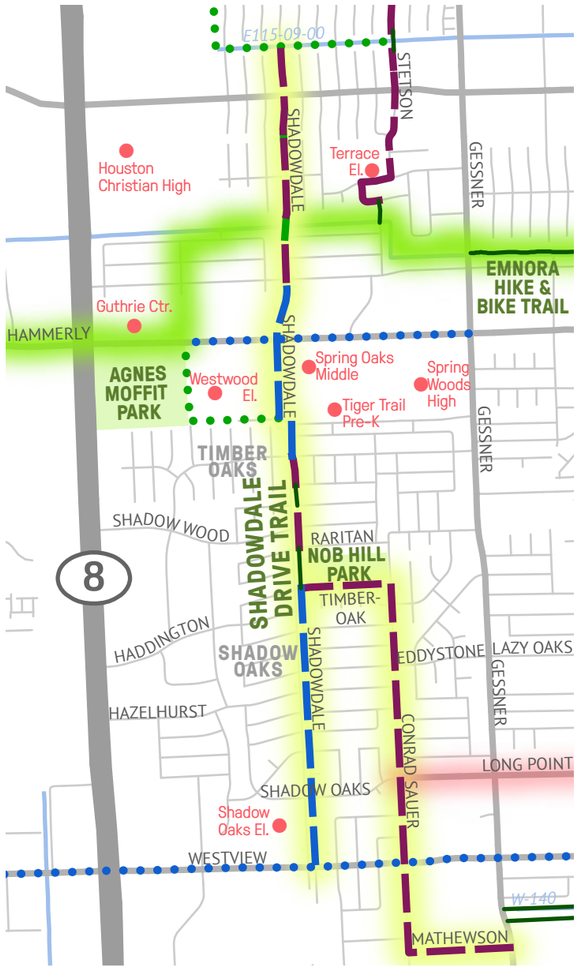


FIGURE 5.14 SHADOWDALE/CONRAD SAUER CORRIDOR

DESCRIPTION:

Shadowdale Drive is a north-south street that intersects Segment 3 of the Spring Branch Trail. The corridor also intersects West Hammerly Boulevard between Beltway 8 and Gessner Road, as shown in **Figure 5.14**. Shadowdale extends from an east-west drainage channel (E115-09-00) north of Kempwood Drive south to Westview Drive and operates as a local collector for the nearby neighborhoods.

Due to the existing roadway geometry, surrounding land uses, and destinations along the corridor, the Shadowdale Drive corridor has been highlighted as a priority regional connection for the Spring Branch Trail. The corridor provides direct connections to Nob Hill Park, Spring Oaks Middle School, Tiger Trail Pre-K Program, Spring Woods High School, and Shadow Oaks Elementary. It also provides improved access to Houston Christian High School and Terrace Elementary School.

This proposed priority bikeway corridor is recommended to continue south along Conrad Sauer Drive from Timberoak Drive (at Nob Hill Park) south past Westview Drive to Mathewson Lane. Mathewson Lane is a key connection across Gessner Road to the soon to be completed east-west multi-use path along drainage ditch W-140.

The Conrad Sauer Drive proposed bikeway provides a direct connection to the Long Point Road corridor which may possibly include high-comfort bikeways along Long Point Drive. Conrad Sauer also provides additional connections to large commercial developments near IH 10 and initiates bikeway connectivity into Memorial City. Connecting to Memorial City will require thorough analysis and review due to the IH 10 barrier and the geometry of Gessner Road at IH 10.

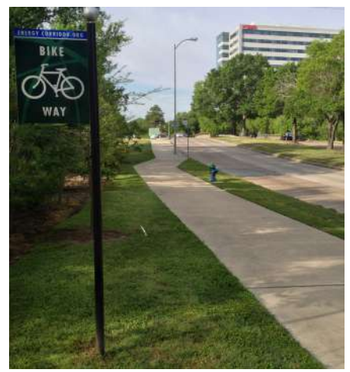
The recommended facilities for this corridor are neighborhood bikeway (purple) and dedicated on-street bikeway (blue), as shown in **Figure 5.14**. On-street bikeway could include either a bikeway within the roadway curbs or a shared-use side path. Existing City of Houston counts available via GIMS indicate that Shadowdale Drive vehicular volumes are over 7,000 vehicles per day, which would required a separate facility for bicyclists.

Final design should evaluate the entire corridor, assess existing pavement type and geometry, collect motor vehicle speeds and volumes and develop final recommendations on bikeway type.

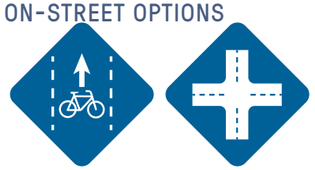
KEY HIGHLIGHTS:

- Connects to existing trails along Shadowdale Drive and under-construction multi-use path along W-140
- Connects multiple residential neighborhoods to each other
- Intersects Long Point Road corridor
- Provides direct connections to 4 schools and improves connections to 2 schools
- Within SBMD district boundaries
- Initiates connections south to Memorial City
- Existing roadway geometry and characteristics indicate straightforward roadway retrofit for proposed bikeway

NEIGHBORHOOD BIKEWAY



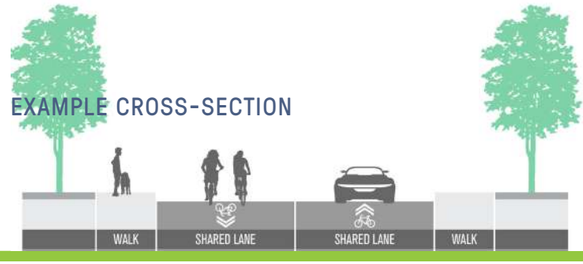
ON-STREET OPTIONS



REGIONAL CONNECTION

STETSON LANE

SHORT TERM
NEIGHBORHOOD BIKEWAY



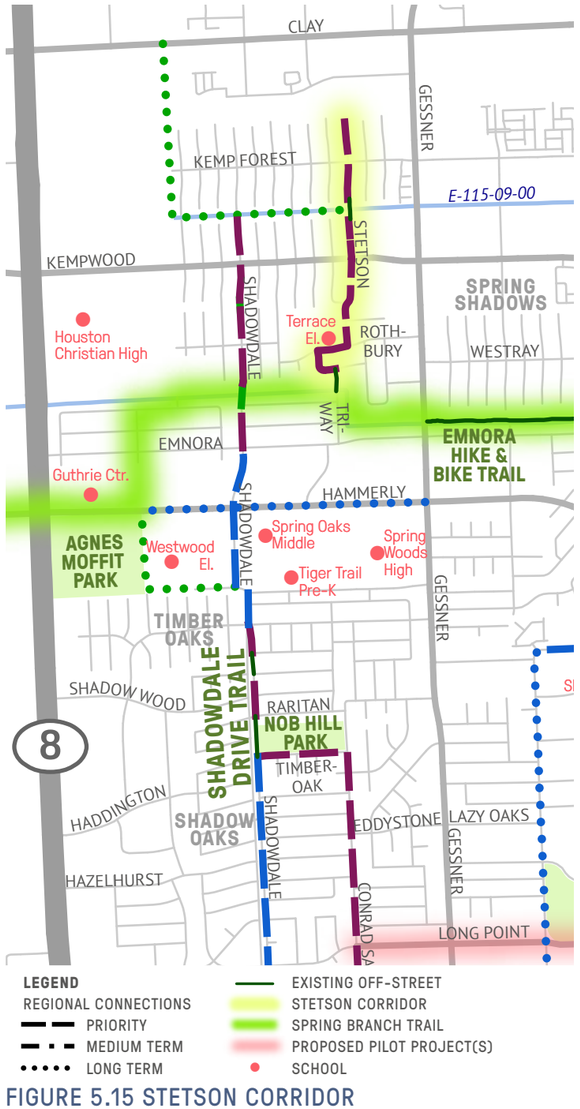


FIGURE 5.15 STETSON CORRIDOR

DESCRIPTION:

Stetson Lane is a north-south neighborhood street that currently has a connection across the CenterPoint easement at Triway Lane. This existing connection will intersect Segment 3 of the Spring Branch Trail and has been incorporated into the design. From Triway Lane, Stetson Lane continues north past Kempforest Drive and terminates within the residential neighborhood.

Stetson Lane, while only 0.85 miles long, provides connections across Kempwood Drive and the E-115-09 drainage ditch, as shown in **Figure 5.15**. Both Kempwood Drive and E-115-09 are barriers to connectivity for people walking and bicycling to and from the adjacent neighborhoods. The proposed corridor also provides a direct connection from the Spring Branch Trail to Terrace Elementary School.

Stetson Lane runs parallel to the HEB Grocery Store located at the southwest corner of the Kempwood Drive at Gessner Road intersection.

The recommended facility for this corridor is a neighborhood bikeway (purple) as shown in **Figure 5.15**. Existing roadway geometry and characteristics indicate a straightforward roadway retrofit for the proposed neighborhood bikeway. Special attention should be paid to the intersection of Stetson Lane at Kempwood Drive to ensure save crossings for all users.

KEY HIGHLIGHTS:

- Connects Spring Branch Trail to multiple residential neighborhoods
- Has existing connections across E-115-09 drainage ditch
- Provides direct connections to Terrace Elementary
- Within SBMD district boundaries
- Connects to HEB Grocery Store
- Existing roadway geometry and characteristics indicate straightforward roadway retrofit for proposed neighborhood bikeway

NEIGHBORHOOD BIKEWAY

REGIONAL CONNECTION

PECH ROAD

SHORT TERM
NEIGHBORHOOD BIKEWAY

EXAMPLE CROSS-SECTION

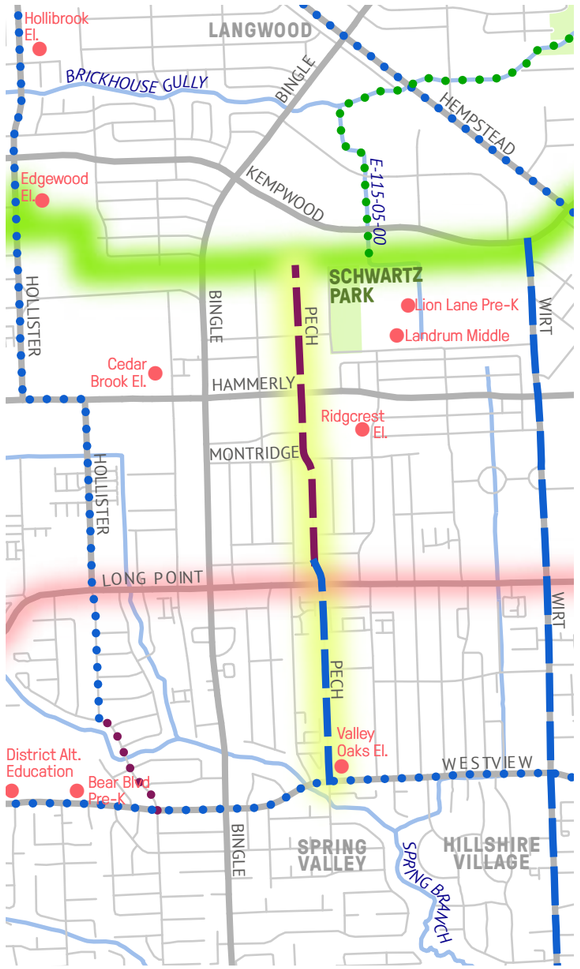


FIGURE 5.16 PECH CORRIDOR

DESCRIPTION:

The Pech Road priority bikeway corridor is 1.5 miles long and connects to Segment 5 (Phase 1) of the Spring Branch Trail that is expected to begin construction in 2020. The Pech Road proposed bikeway extends from the trail to Westview Drive providing connections to Ridgecrest Elementary School and Valley Oaks Elementary School.

The Pech Road intersections at both Long Point Road and Westview Drive are signalized which improves the experience of crossing for people walking and bicycling. Land uses along Pech Road vary, including single family residential, multifamily residential, commercial, and retail. The proposed bikeway provides utility in traveling to and from these destinations.

While the recommended corridor shown in **Figure 5.16** terminates at Westview Drive, Pech Road continues south to the Spring Branch tributary of Buffalo Bayou Greenway where a pedestrian bridge provides a connection for people bicycling and walking across the tributary into the City of Spring Valley Village.

The recommended facilities for this corridor are neighborhood bikeway (purple) and dedicated on-street bikeway (blue), as shown in **Figure 5.16**. North of Long Point Drive, Pech Road is a two lane residential roadway with existing speed humps. The surrounding land uses and roadway characteristics indicate this segment of Pech Road could become a neighborhood bikeway with minimal construction.

Between Long Point Drive and Westview Drive, Pech Lane is 42 to 44-feet wide and in good condition with existing speed cushions. The corridor provides two travel lanes and permits parking along both curbs. The existing roadway width provides an opportunity to retrofit the corridor to provide a protected bikeway while maintaining on-street parking along one curb. Final design should evaluate the entire corridor, assess existing pavement type and geometry, collect motor vehicle speeds and volumes and develop final recommendations on bikeway design.

KEY HIGHLIGHTS:

- Connects multiple residential neighborhoods to each other including connections to Spring Valley Village
- Provides connections to multiple commercial and retail areas
- Intersects Long Point Road corridor
- Provides direct connections to 2 schools
- Intersects METRO Bus Routes 56 Hammerly, 26 Long Point/Cavalcade, and 72 Westview
- Within SBMD district boundaries
- Existing roadway geometry and characteristics indicate straightforward roadway retrofit for proposed bikeway

NEIGHBORHOOD BIKEWAY

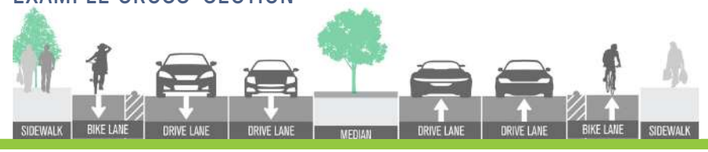
ON-STREET BIKEWAY

REGIONAL CONNECTION

WIRT ROAD

SHORT TERM
DIRECTIONAL BIKEWAY

EXAMPLE CROSS-SECTION



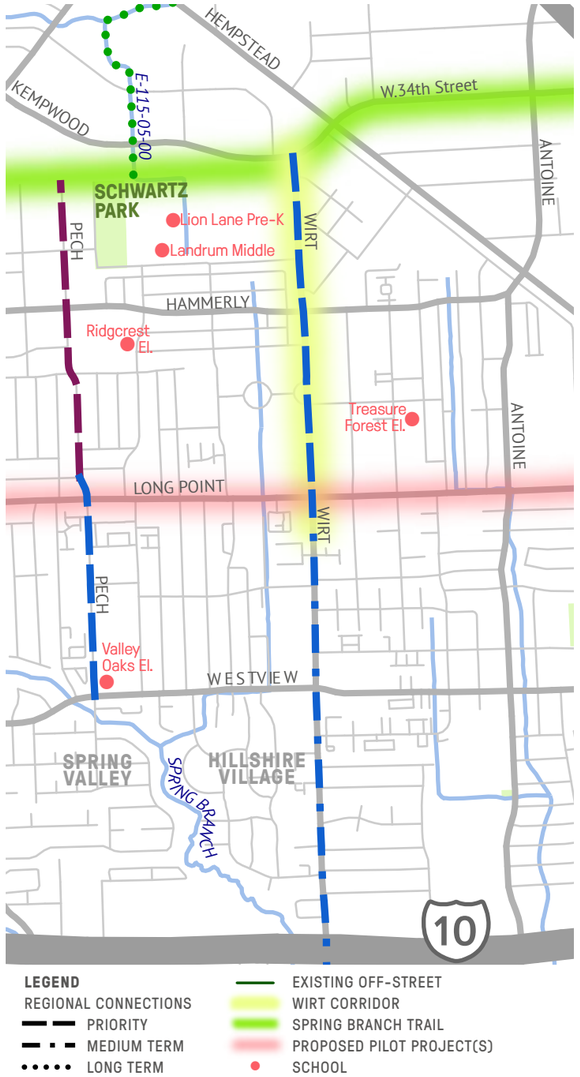


FIGURE 5.17 WIRT CORRIDOR

DESCRIPTION:

Wirt Road from Kempwood Drive to Long Point Road is a Major Thoroughfare classified as a T-4-80 on the City of Houston's Major Thoroughfare and Freeway Plan (MTFP). South of Long Point Road, Wirt Road is classified as a T-4-70, indicating a narrower right-of-way.

As shown on **Figure 5.17**, Wirt Road between Kempwood Drive and Long Point Drive is classified as a priority bikeway corridor. South of Long Point Drive, it is classified as a medium-term bikeway corridor.

Wirt Road between Kempwood Drive and Long Point Road was recently reconstructed as a four-lane, divided roadway, with 5- to 6-foot bicycle lanes. This cross-section does not meet the all ages and abilities standard because it lacks vertical deflection between the bikeway and the high vehicular speeds and volumes along Wirt Road. However, the cross-section includes approximately 28-feet of pavement on each side of the median which provides for an opportunity to re-stripe the roadway with a high-comfort bikeway. It is recommended that a minimum 8-foot protected bikeway be installed with one 10-foot vehicular lane and one 11-foot vehicular lane in each direction.

South of Long Point Road the cross-section is narrower (25-feet of pavement in each direction) which prohibits a near-term retrofit; construction that would alter the pavement width or add a sidepath would be required.

The Wirt Road priority bikeway provides an indirect connection from the Spring Branch Trail to Treasure Forest Elementary School. The corridor also provides a direct connection from the trail to the Long Point Road corridor and other clusters of commercial and retail.

Final design should evaluate the entire corridor, assess existing roadway characteristics, collect motor vehicle speeds and volumes, review intersection operations, and develop final recommendations on bikeway design.

KEY HIGHLIGHTS:

- Connects multiple residential neighborhoods to each other including connections to Spring Valley Village
- Provides connections to multiple commercial and retail areas
- Intersects Long Point Road corridor
- Provides direct connections to Treasure Forest Elementary School
- Provides high-comfort bikeway to Fiesta Mart grocery store on Wirt Road
- Intersects METRO Bus Routes 56 Hammerly, 26 Long Point/Cavalcade, and 36 Kempwood
- Within SBMD district boundaries
- Existing roadway geometry and characteristics indicate straight forward roadway retrofit for proposed bikeway

ON-STREET BIKEWAY

MEDIUM & LONG TERM REGIONAL CONNECTIONS

BUILDING THE SPRING BRANCH BICYCLE NETWORK

TABLE 5.3 MEDIUM-TERM AND LONG-TERM REGIONAL CONNECTIONS RECOMMENDATIONS

REGIONAL CONNECTION	PRIORITY	FACILITY TYPE	EXTENTS	LENGTH	KEY HIGHLIGHTS	ADDITIONAL NOTES & CONSIDERATIONS
Addicks Reservoir North and South Connections	Long-term	Off-Street Trail	» Continuation of Segment 1 north » Hammerly Boulevard existing terminus north to beyond Clay Road near Brittmoore Park Drive along CenterPoint easement parallel to Addicks Dam » Continuation of trail adjacent to Addicks Reservoir south, west of Segment 1	2.3+ Miles	» Off-street connection north, parallel to Addicks Dam, past Clay Road » Included on *Houston Bike Plan* Long Term Vision » New addition to *Houston Bike Plan* Long Term Vision to make connection to Chatterton Bridge along base of Addicks Reservoir	» Continues to build strong off-street trail network near Addicks Reservoir and can be continued to provide connection to neighborhoods north of the Reservoir » Southern portion of this was considered as an alternative to Segment 1 alignment and could be considered when beginning design for Segment 1
Ottawa Trail	Long-term	Off-Street Trail	» Intersects Segment 2 » Along existing Ottowa Trail easement south of Hammerly Boulevard between Agnes Moffitt Park and Westwood Elementary School into Timber Oaks neighborhood » Also includes proposed trail along southern boundary of Westwood Elementary School to connect to Shadowdale Drive	0.5 Miles	» Provides additional connection from Spring Branch into Timber Oaks neighborhood » Provides additional connections to Agnes Moffitt Park and Westwood Elementary School	» Not considered a priority corridor due to the ability for the existing connection to be made via Westwood Elementary School internal circulation and the recommended Shadowdale Drive corridor
Hammerly Extension	Long-term	Sidepath	» Continuation of Segment 2 proposed sidepath east from Guthrie Center to Gessner Road.	0.80 Miles	» Provides connection from Spring Branch Trail to Spring Oaks Middle School, Tiger Trail Pre-K Program, and Spring Woods High School	» ROW is approximately 80 feet, which is likely to require an easement for proposed sidepath » Coordination with SBISD could provide additional space for an expanded pedestrian realm and a wide sidepath » Not considered a priority corridor due to existing sidewalks along Hammerly Boulevard that can provide the last mile connection to school complex from Spring Branch Trail
Brittmoore Road	Long-term	Bikeway within corridor ROW	» Intersects Segment 2 » Brittmoore Road between Clay Road and Day Road	3 Miles	» Provides connections between Clay Road and Westview Drive west of Beltway 8 » Included on *Houston Bike Plan*	» ADT on Brittmoore Road is 15,000 to 20,000, with high vehicular speeds, and high percentage of truck traffic » Corridor used as alternative to Beltway 8 » Pavement in good condition, reconstruction unlikely » Would require a full corridor study and likely a full or partial rebuild for bikeway installation
Rosefield Drive	Medium-term	Neighborhood Bikeway/Off-Street Trail	» Rosefield Drive north from Segment 4 to new off-street trail east of new residential development (Park at Spring Shadows), across Kempwood Drive north to Kempforest Drive and new residential development at former Pine Crest Golf Club	0.8 Miles	» Provides connections from Segment 4 into residential neighborhoods north and across Kempwood Drive » Provides connections to The Monarch School, Northbrook Middle School, and Spring Shadows Elementary School	» Neighborhood bikeway could be installed with short-term retrofit north to Park at Spring Shadows » Requires coordination with Park at Spring Shadows development to continue route north of Kempwood Drive » Active traffic control recommended at Kempwood Drive intersection

MEDIUM & LONG TERM REGIONAL CONNECTIONS

BUILDING THE SPRING BRANCH BICYCLE NETWORK (CONTINUED)

TABLE 5.3 (CONTINUED) MEDIUM-TERM AND LONG-TERM REGIONAL CONNECTIONS RECOMMENDATIONS

REGIONAL CONNECTION	PRIORITY	FACILITY TYPE	EXTENTS	LENGTH	KEY HIGHLIGHTS	ADDITIONAL NOTES & CONSIDERATIONS
Springrock Lane to Emnora Lane to HCFCD Ditch W-140-13 to Parana Drive to Neuens Road to Witte Road	Long-term *(Some segments could be completed short or medium term)*	Off-Street/ On-Street Bikeway/ Sidepath	» Springrock Lane and Emnora Lane from Northbrook High School to W-140-13 » W-140-13 to Hammerly Boulevard » Parana Drive between Hammerly Boulevard and Neuens Road *(sidepath recommended)* » Neuens Road between Parana Drive and Witte Road *(on-street bikeway recommended)* » Witte Road between Neuens Road and IH-10 *(on-street bikeway recommended)*	2.75 Miles	» Would be a key connection south to retail developments along IH-10 including HEB » Connections to Spring Wood Middle School and Pine Shadows Elementary » Provides connection to Haden Park » Intersects Long Point Road corridor including proposed improvements to that corridor » Intersects new off-street trail along ditch W140-1	» Neuens Road is currently within the City CIP for reconstruction, on-street bikeway should be included within redesign » Witte Road bikeway likely to require full rebuild with curb and gutter » Nuens Road bikeway could continue east to intersect Blalock and proposed future bikeway » Active traffic control recommended at Hammerly Boulevard and Westview Drive intersections » Possible challenges related to slopes along ditch W-140-13
Blalock Road	Medium-term	Bikeway within corridor ROW	» From north of Clay to south of IH-10	3.25+ Miles	» Key north-south connection in Spring Branch connecting neighborhoods and commercial areas » Provides connections over multiple drainage ditches that often prohibit connectivity between residential neighborhoods	» Wide median provides opportunity to reallocate space from median to dedicated bikeway without requiring ROW acquisition; would require further detailed study to finalize preferred bikeway » 20,000 to 30,000 ADT north of Long Point; existing bike lanes substandard
Hollister Street	Long-term	Bikeway within corridor ROW/ Neighborhood Bikeway	» Clay Road To Westview Drive (includes short segment of Bracher Street south of Long Point Drive)	3 miles	» Provides connections from Segment 5 to Hollibrook Elementary, Edgewood Elementary, and Cedar Brook Elementary » Connection to Long Point Road retail corridor and proposed improvements to that corridor	» 5,000 - 6,000 ADT near Segment 5 » Some segments are open ditch drainage with poor existing pavement, likely requiring reconstruction in future, providing opportunity for construction of on-street bikeway
North Post Oak Road	Medium-term	Bikeway or sidepath within corridor ROW	» Hempstead Road to Old Katy Road (and further south)	1+ Miles	» Key connection to Northwest Transit Center and planned High Speed Trail Terminal	» 14,000 – 15,000 ADT » From Clarkson Lane south, there is an existing narrow bike lane providing an opportunity to relocate space from the median to retrofit a wider, higher comfort protected bikeway
Hempstead Road	Long-term	Sidepath within corridor ROW	» From north of Clay road to 12th Street	4.5+ Miles	» Provides connection from Spring Branch Trail to Northwest Transit Center and planned High Speed Trail Terminal » Provides connections to retail/employment	» 20,000 – 21,000 ADT » There are plans to reconstruct Hempstead road to accommodate planned high speed rail terminal route » Bike Plan shows bikeway extending from Kansas Street up to Brittmoore Road and US 290 near Jersey Village
Bolin Road	Long-term	On-Street Bikeway/ Neighborhood Bikeway	» North from Segment 6 along West 34th Street to Bolin road terminus at Lodge Street, could be continued further north	1+ Mile	» Provides connection to Benbrook Elementary » Connections from Segment 6 to neighborhood northwest of Hempstead Road » Provides connection over Brickhouse Gully	» Existing Bolin Road north of West 34th Street is in poor condition with lack of sidewalks and curb and gutters, likely to need reconstruction of the roadway for bikeway installation
Brickhouse Gully	Long-term	Off-street Trail	» North from Segment 5 along Brickhouse Gully, connecting to White Oak Bayou	3+ Miles	» Provides connection to neighborhoods north of CenterPoint easement connecting Spring Branch Trail to White Oak Bayou another way	» Brickhouse Gully has numerous public property owners but also quite a few private ones with multiple places to cross under bridges, highways, railroads that require coordination