BRENTWOOD
Pedestrian Connectivity Study

MAY 2018

Kimley»Horn

Toole Design Group

TEAM MEMBERS

City of Brentwood

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Toole Design Group

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TABLE OF CONTENTS

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EXECUTIVE SUMMARY

This report would not be possible without the hard work and dedication of the Brentwood Bike and Pedestrian Ad Hoc Committee. In 2015, the Brentwood Board of Commissioners created the Committee to provide the board with recommendations for improvements involving bike and pedestrian facilities. The Committee completed a report summary in 2016 to improve these facilities, enhancing network user safety, improved accessibility to points of interest, and to promote healthier communities. One of the Committee's key recommendations was to study east-west pedestrian networks in the City, leading to the Pedestrian Connectivity Study.

In 2017, the City of Brentwood launched a Pedestrian Connectivity Study to help identify a feasible route to safely cross Interstate 65. Currently, I-65 Divides the City, acting as a barrier for pedestrians who wish to travel east/west across the interstate. Concord Road is an area of importance when it comes to pedestrian connectivity, as there are a number of popular points of interest along the corridor. The successful connection across I-65 will enhance Brentwood's entire transportation network—linking together not only Concord Road, but also connecting many existing multi-use paths, sidewalks, parks, businesses, and schools across the City. Attempting to overcome this considerable barrier comes with challenges, but the successful completion of such a connection will bring immense opportunity for Brentwood residents as an alternative means of travel.

The design team worked closely with City of Brentwood staff and community members to identify opportunities to safely and efficiently cross I-65. A site and feasibility analysis was performed by considering existing conditions, preferable routes, site restrictions, cost, and overall feasibility of successful implementation.

Throughout the planning process, it was vital that the community was given a voice to express opinions and concerns and that these were carefully taken into consideration. As a result of the public engagement process, the best connection opportunities were realized and the options were narrowed down to two. The design team thoroughly investigated these two final options, weighing preferable facility locations based on construction feasibility and costs. From this research and analysis, the design team came to a final solution that best fits the needs of the City of Brentwood and community members.

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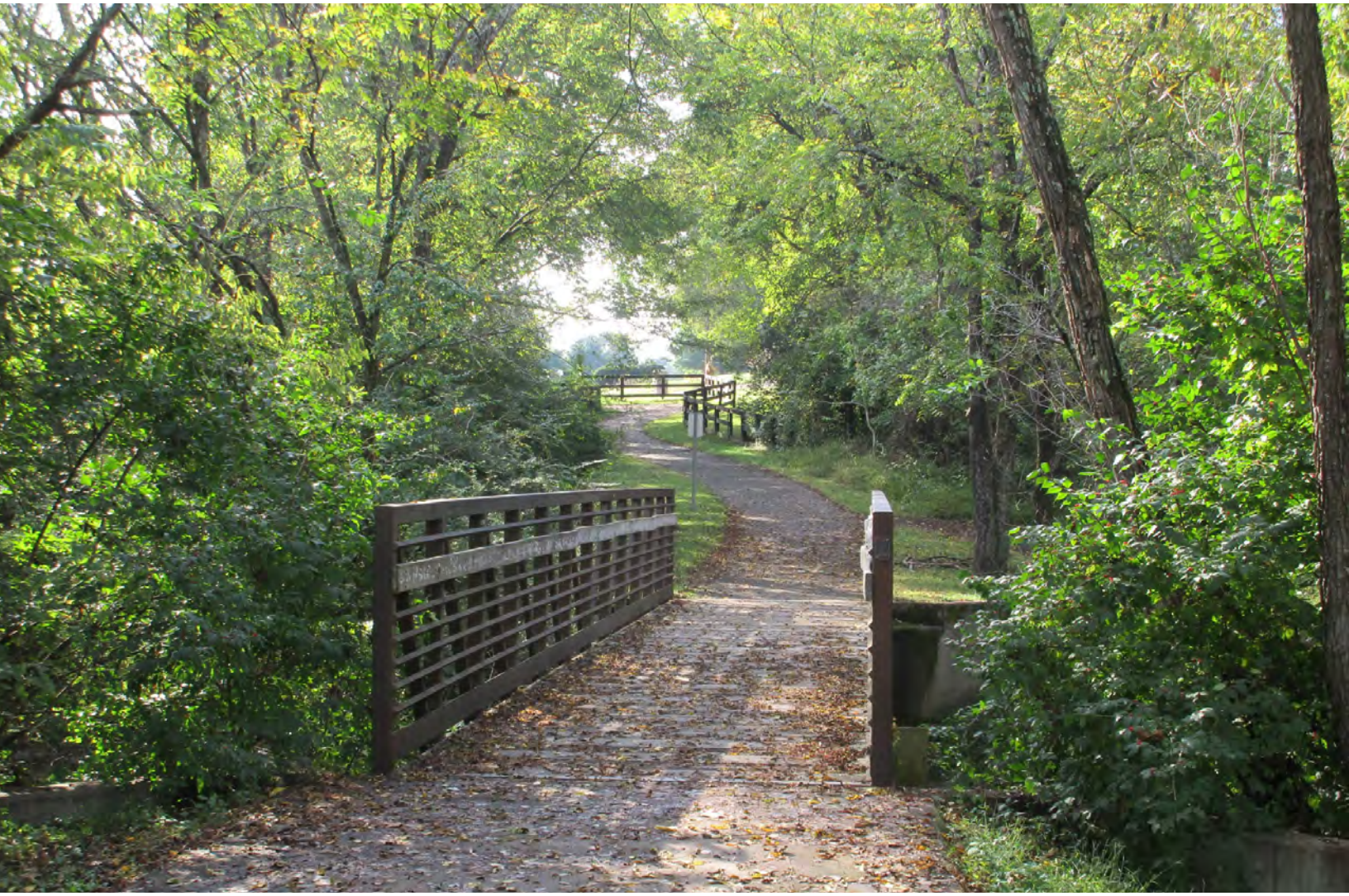
Existing Conditions

EXISTING CONDITIONS

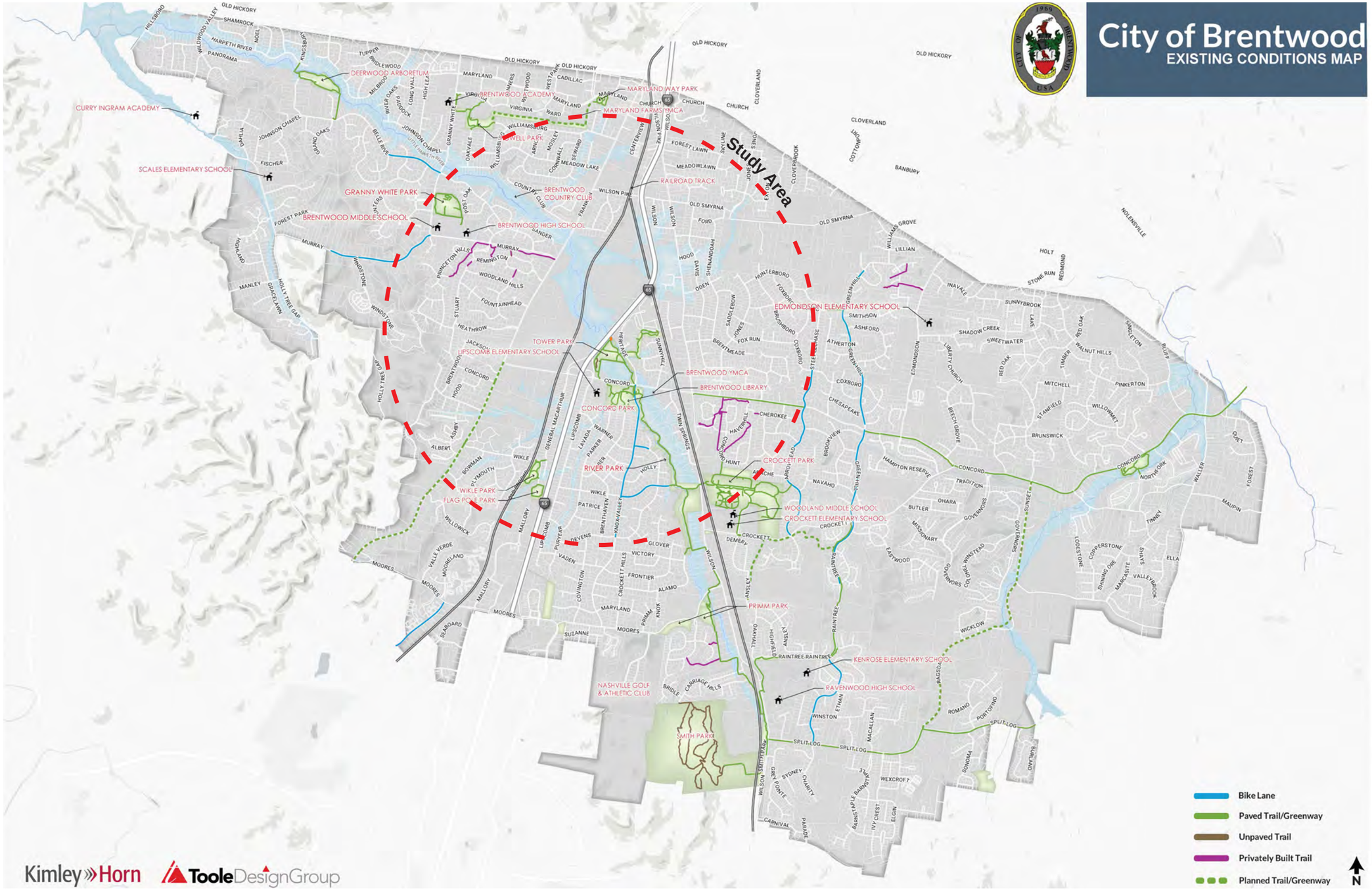
Located between two major Middle-Tennessee cities, Nashville and Franklin, the City of Brentwood has the opportunity to connect to regional pedestrian transportation routes. The Franklin Road corridor is the artery that feeds travelers through the City at a local level. Franklin Road is currently in the process of becoming more utilized, with the addition of a multi-use path adjacent to the corridor. This new pedestrian route will ultimately connect Franklin to Nashville, offering Brentwood a chance to connect to this larger network.

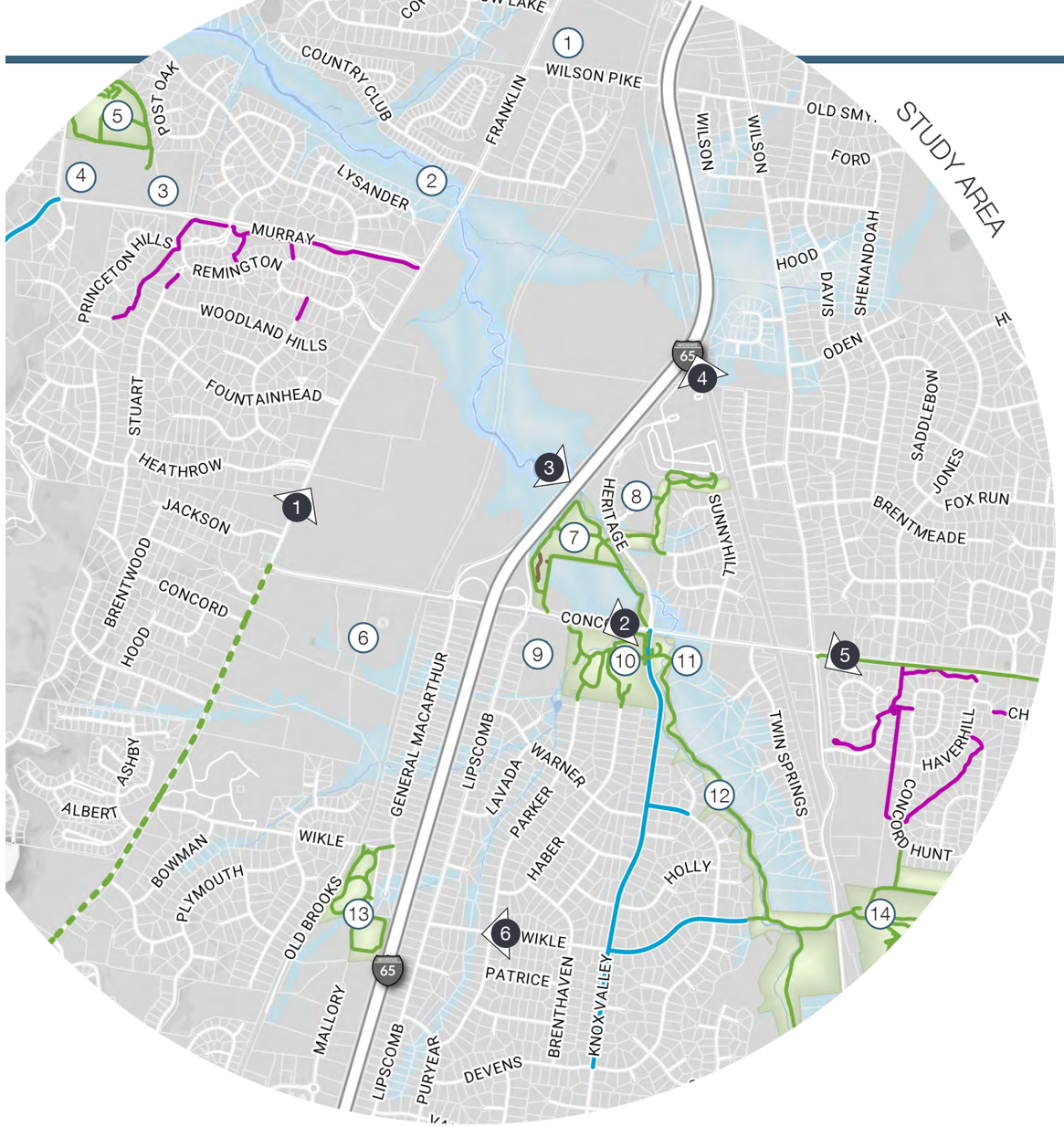
There are many existing pedestrian routes within the City of Brentwood. These multi-use paths, trails, and bike lanes often connect, creating a larger network within the City for travel; however, the I-65 corridor divides these opportunities. This makes it difficult to link the different modes of transportation together and, ultimately, connect residents to all public and private points of interest within the City.

While the east and west pedestrian routes are separated, each side offers connections to parks, schools, businesses, public facilities, and private neighborhoods and residences. The connections on the east side are cohesive and provide safe and accessible routes to destinations. Using the west transportation system, which offers fewer facilities, will likely result in using road shoulders, sidewalks, or travel lanes to link destinations. Connecting the east and west facilities will offer residents more opportunities to travel to the many points of interest the City of Brentwood offers.



STUDY AREA


City of Brentwood
EXISTING CONDITIONS MAP
Study Area
CURRY INGRAM ACADEMY
SCALES ELEMENTARY SCHOOL
GRANNY WHITE PARK
BRENTWOOD MIDDLE SCHOOL
BRENTWOOD HIGH SCHOOL
DEERWOOD ARBORETUM
BRENTWOOD ACADEMY
MARYLAND WAY PARK
MARYLAND FARMS YMCA
GOWELL PARK
BRENTWOOD COUNTRY CLUB
RAILROAD TRACK
EDMONDSON ELEMENTARY SCHOOL
TOWER PARK
LIPSCOMB ELEMENTARY SCHOOL
BRENTWOOD YMCA
BRENTWOOD LIBRARY
CONCORD PARK
RIVER PARK
WIKLE PARK
FLAG POLE PARK
CROCKETT PARK
WOODLAND MIDDLE SCHOOL
CROCKETT ELEMENTARY SCHOOL
PRIMM PARK
KENROSE ELEMENTARY SCHOOL
RAVENWOOD HIGH SCHOOL
NASHVILLE GOLF & ATHLETIC CLUB
SMITH PARK
Bike Lane
Paved Trail/Greenway
Unpaved Trail
Privately Built Trail
Planned Trail/Greenway
N
Kimley»Horn
TooleDesignGroup



POINTS OF INTEREST

1. Commercial District
2. Brentwood Country Club
3. Brentwood High School
4. Brentwood Middle School
5. Granny White Park
6. Church Campus
7. Tower Park
8. Indoor Sports Complex
9. Lipscomb Elementary
10. Brentwood Public Library
11. Brentwood Family YMCA
12. River Park
13. Wikle and Flag Pole Park
14. Crockett Park

*See page 7 for corresponding study area photos for above map.

LEGEND

- Bike Lane
- Paved Trail/Greenway
- Unpaved Trail
- Privately Built Trail
- Planned Trail/Greenway

N

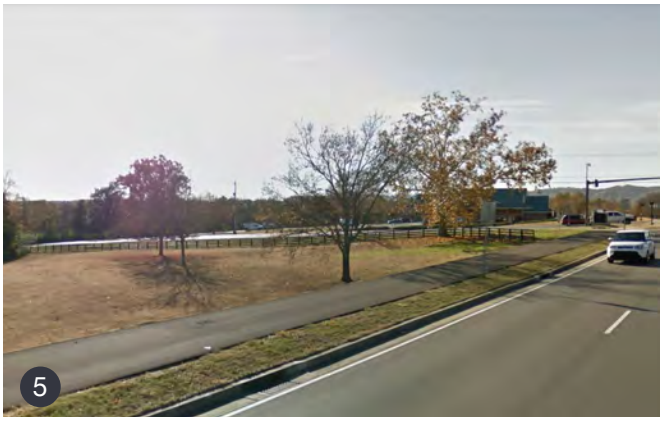
EXISTING STUDY AREA PHOTOS

Franklin Road is the main artery running north/south through the City. There are currently no existing pedestrian facilities along the corridor between Concord Road and Murray Lane. There is currently a plan for the construction of a multi-use path along Franklin Road traveling south from Concord Road to the City limits, providing an opportunity for future connections.

Crossing I-65 poses the greatest challenge in providing a safe, connected pedestrian network throughout the City of Brentwood. Sidewalks along Concord Road are inconsistent with most being four feet in width. These sidewalk facilities are not preferred for safe, reliable access to destination locations for pedestrians and cyclists. The potential for a separated multi-use path would be ideal along this busy five-lane corridor.

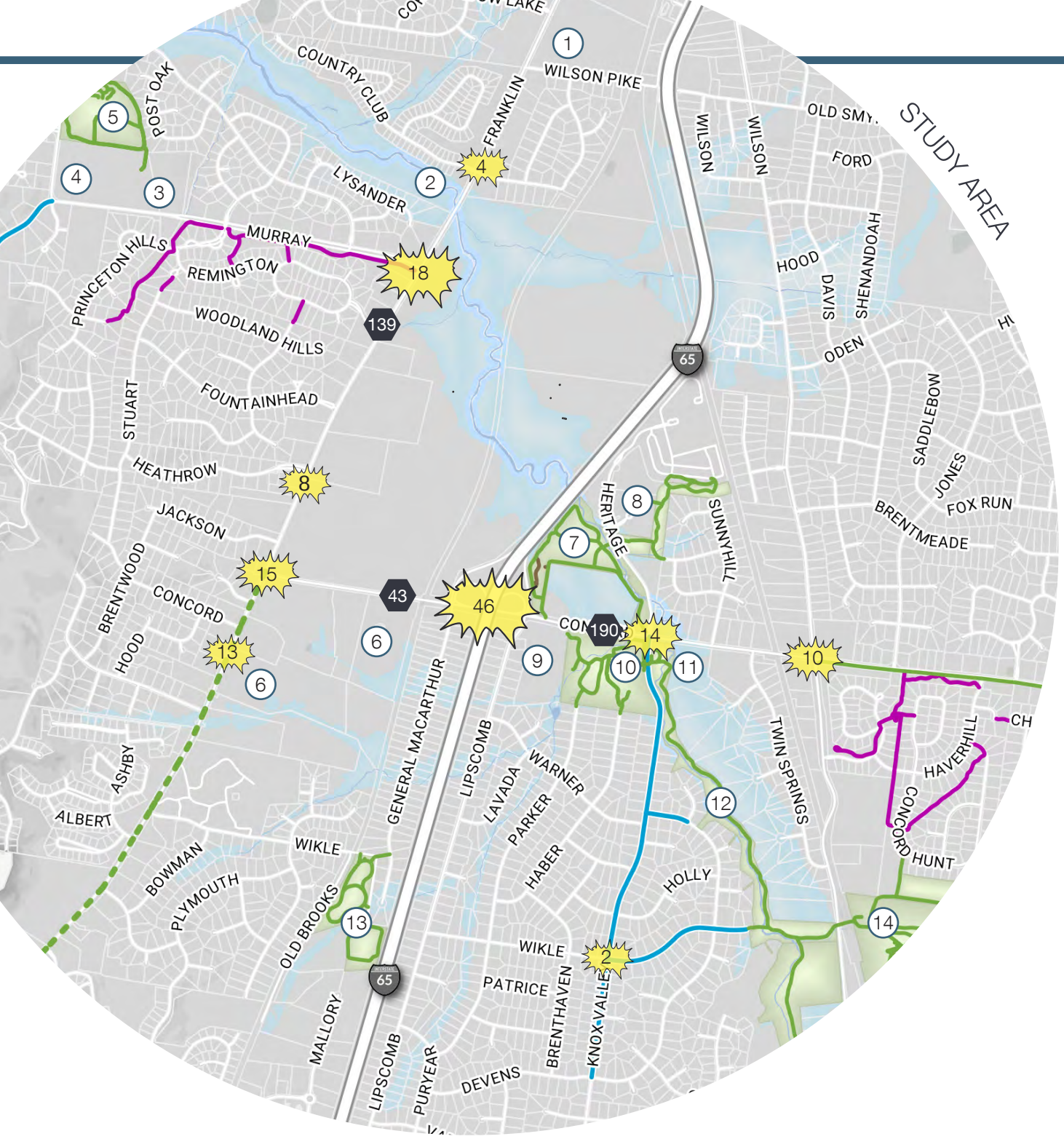
Located on the north side of Tower Park, the Little Harpeth River runs underneath I-65 through a large culvert. There is the potential to use this culvert for a multi-use path connection to safely cross the interstate; however, this scenario presents some challenges.

Following the CSX railroad corridor north from Concord Road, the railroad passes underneath I-65. The City of Brentwood could potentially use this underpass for a multi-use path connection.



The existing multi-use path facility, located just east of Wilson Pike, gives residents the opportunity to use a safe route of travel, although gaps remain in this system that need to be addressed.

Wikle Road connects to Crockett Park via sidewalk traveling through tunnels under Wilson Pike and the CSX railroad. Using Wikle Road as a pedestrian connection to cross I-65 via bridge or tunnel could pose as a viable solution.



POINTS OF INTEREST

1	Commercial District	8	Indoor Sports Complex
2	Brentwood Country Club	9	Lipscomb Elementary
3	Brentwood High School	10	Brentwood Public Library
4	Brentwood Middle School	11	Brentwood Family YMCA
5	Granny White Park	12	River Park
6	Church Campus	13	Wikle and Flag Pole Park
7	Tower Park	14	Crockett Park

LEGEND

139 43 190 Traffic Count Station # (TDOT, 2012-2016)

Areas of High Crash Volume per Intersection (TDOT, 2013-2017)

TRANSPORTATION CHARACTERISTICS AND ISSUES

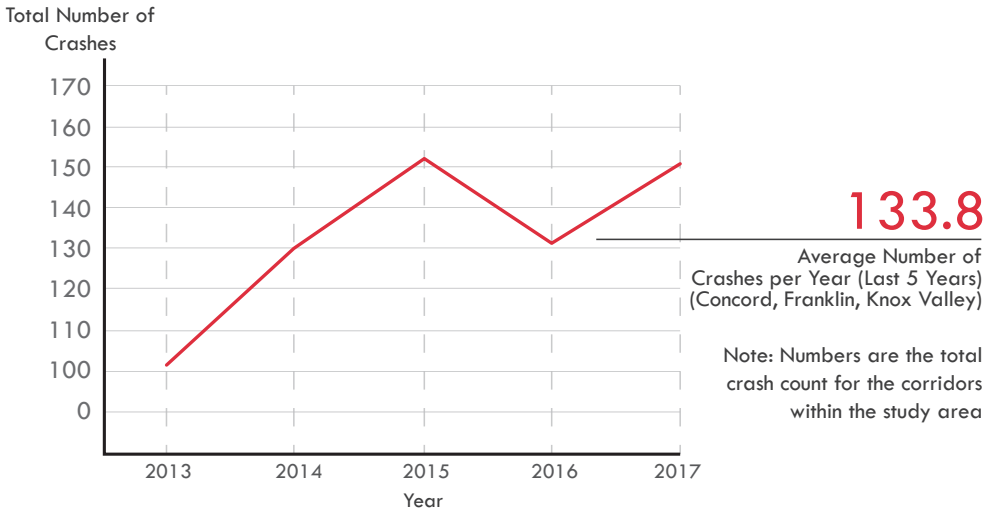
Vehicular Traffic Counts

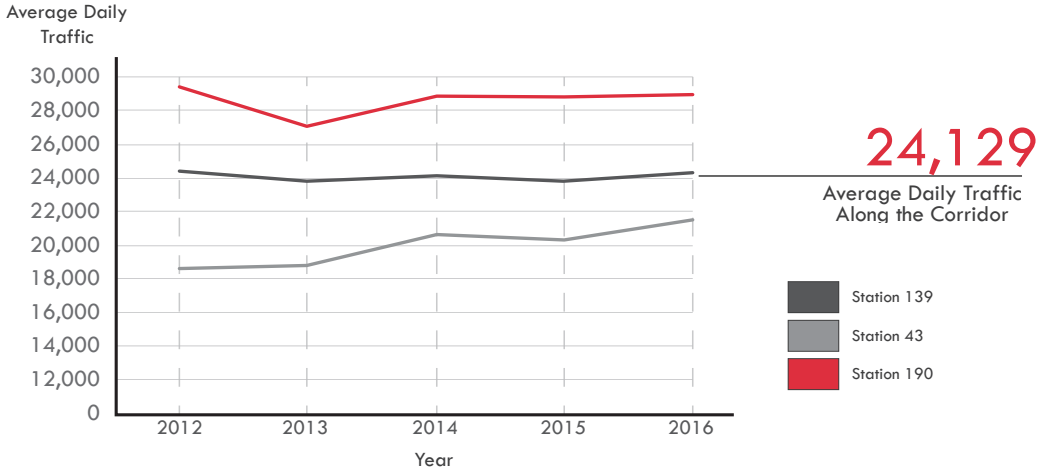
Annualized average daily traffic (AADT) volumes were obtained from the Tennessee Department of Transportation (TDOT) within the project area. This data was used to determine the traffic growth rate between 2012-2016 along the corridor. Overall, traffic volumes experienced an increase due to the growing Middle Tennessee region.

Vehicular Crash Data

Crash data points also were obtained from TDOT. Five years of data were analyzed by crash type, time of crash, contributing causes of crash, and roadway conditions. An average number of 133.8 crashes per year were reported on Concord Road, Franklin Road, and Knox Valley Road corridors within the study area in the last five years, none of which involved pedestrians were reported.

Analysis of the crash data revealed that key intersections within the study area required additional review for safety and connection concerns. Several intersections need to be analyzed along Concord Road—Wilson Pike, Knox Valley Road, the I-65 on- and off-ramps, and Franklin Road. Along the Franklin Road corridor, the intersection with Murray Lane required additional analysis, as these intersections have the highest concentration of crashes in the last five years and that number continues to grow.





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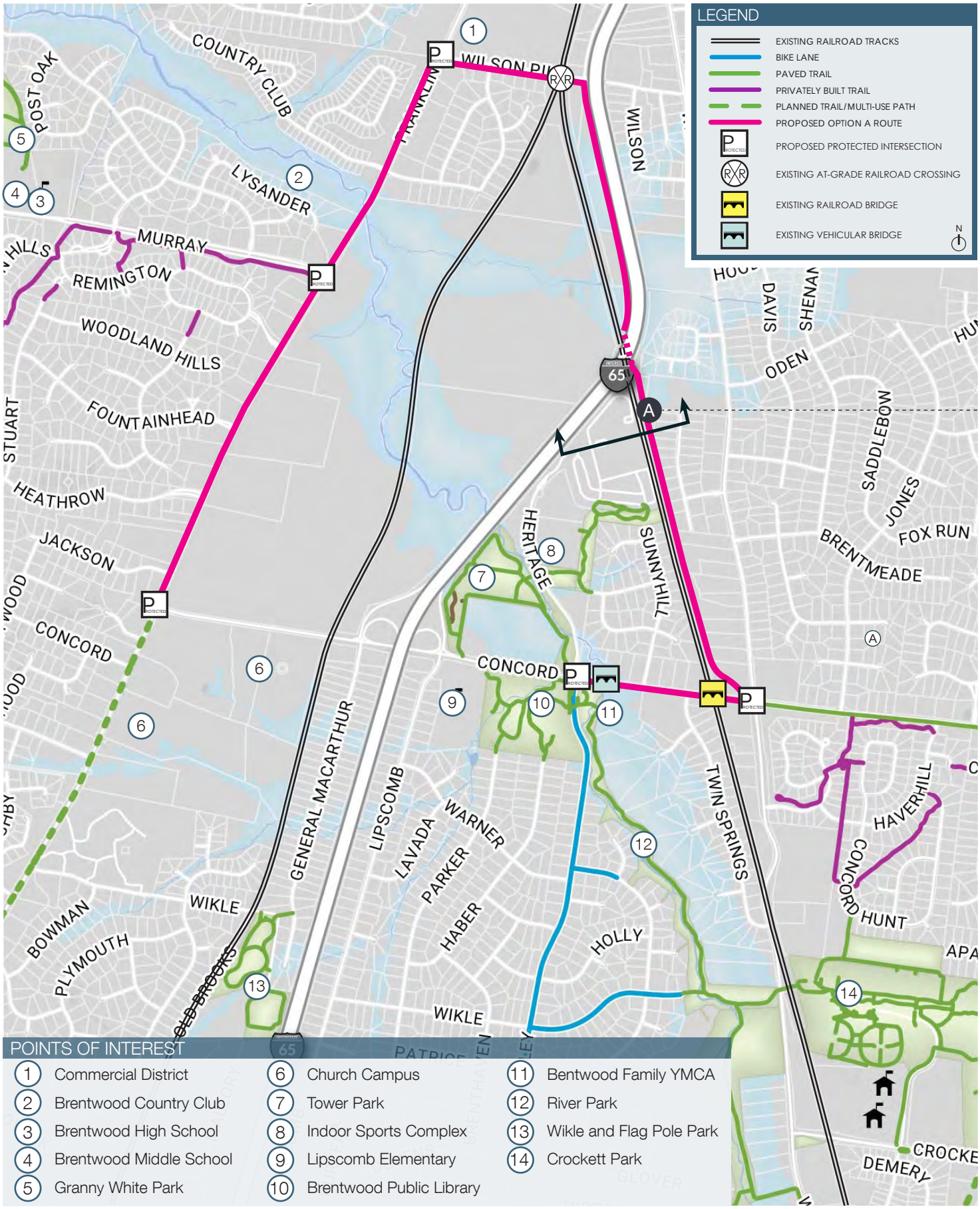
Scenario Development


LEGEND
EXISTING RAILROAD TRACKS
BIKE LANE
PAVED TRAIL
PRIVATELY BUILT TRAIL
PLANNED TRAIL/MULTI-USE PATH
PROPOSED OPTION A ROUTE
PROPOSED PROTECTED INTERSECTION
EXISTING AT-GRADE RAILROAD CROSSING
EXISTING RAILROAD BRIDGE
EXISTING VEHICULAR BRIDGE
N
POINTS OF INTEREST
1 Commercial District
2 Brentwood Country Club
3 Brentwood High School
4 Brentwood Middle School
5 Granny White Park
6 Church Campus
7 Tower Park
8 Indoor Sports Complex
9 Lipscomb Elementary
10 Brentwood Public Library
11 Bentwood Family YMCA
12 River Park
13 Wikle and Flag Pole Park
14 Crockett Park
COUNTRY CLUB
POST OAK
LYSANDER
MURRAY
REMINGTON
WOODLAND HILLS
FOUNTAINHEAD
HEATHROW
JACKSON
CONCORD
FRANKLIN
WILSON PIKE
WILSON
DAVIS
SHENAN
ODEN
SADDLEBOW
JONES
FOX RUN
BRENTMEADE
HERITAGE
SUNNYHILL
GENERAL MACARTHUR
LIPSCOMB
LAVADA
WARNER
PARKER
HABER
HOLLY
TWIN SPRINGS
HAVERHILL
CONCORD HUNT
WIKLE
BOWMAN
PLYMOUTH
OLD BROOKS
DEMERY
65
A

OPTION A

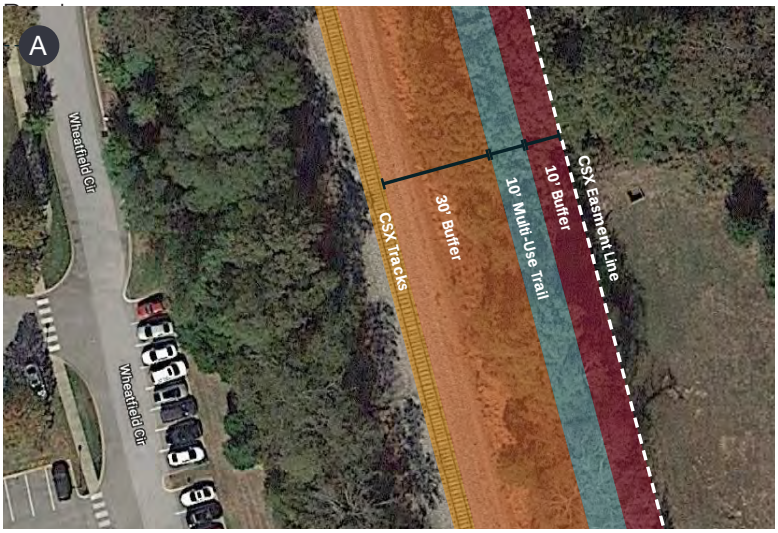
Connecting from the existing shared-use path lane on Knox Valley Drive, a multi-use path heads east on the north side of Concord Road. Once the route reaches Wilson Pike, it heads north adjacent to the existing CSX railroad right-of-way on the east side, passing underneath I-65 until it reaches Wilson Pike Circle. This option requires significant coordination with CSX to ensure the safety and security of the users. As shown below, the multi-use path will stay clear of the railroad tracks, in addition to fence and plant buffers. When the path reaches the I-65 underpass, the buffer between it and the tracks will need to lessen to stay within the existing constraints. A raised route and fencing will help address safety concerns in this area, allowing for grade separation between the train and the pedestrian user, increasing visibility and safety. The clear path that this route already provides is a benefit; however, it leads the user farther north than some might prefer. Once at Wilson Pike Circle, a multi-use path heads west, connecting to Franklin Road. Here is where a proposed path along the east side of Franklin Road will head south until reaching the proposed protected intersection at Murray Lane, and continuing to the proposed protected intersection at Concord

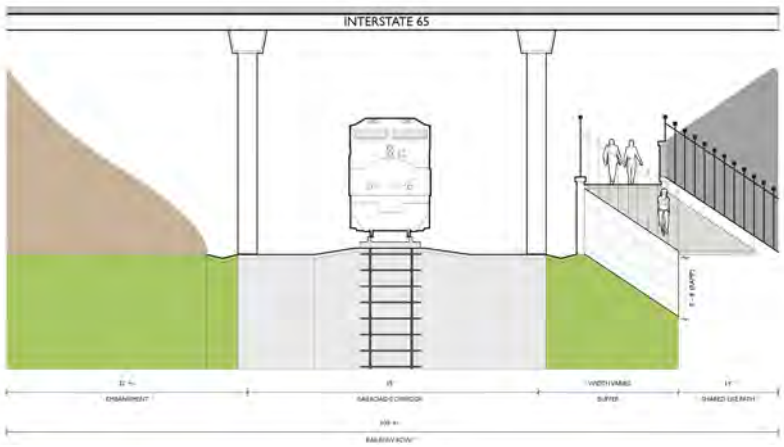
Benefits

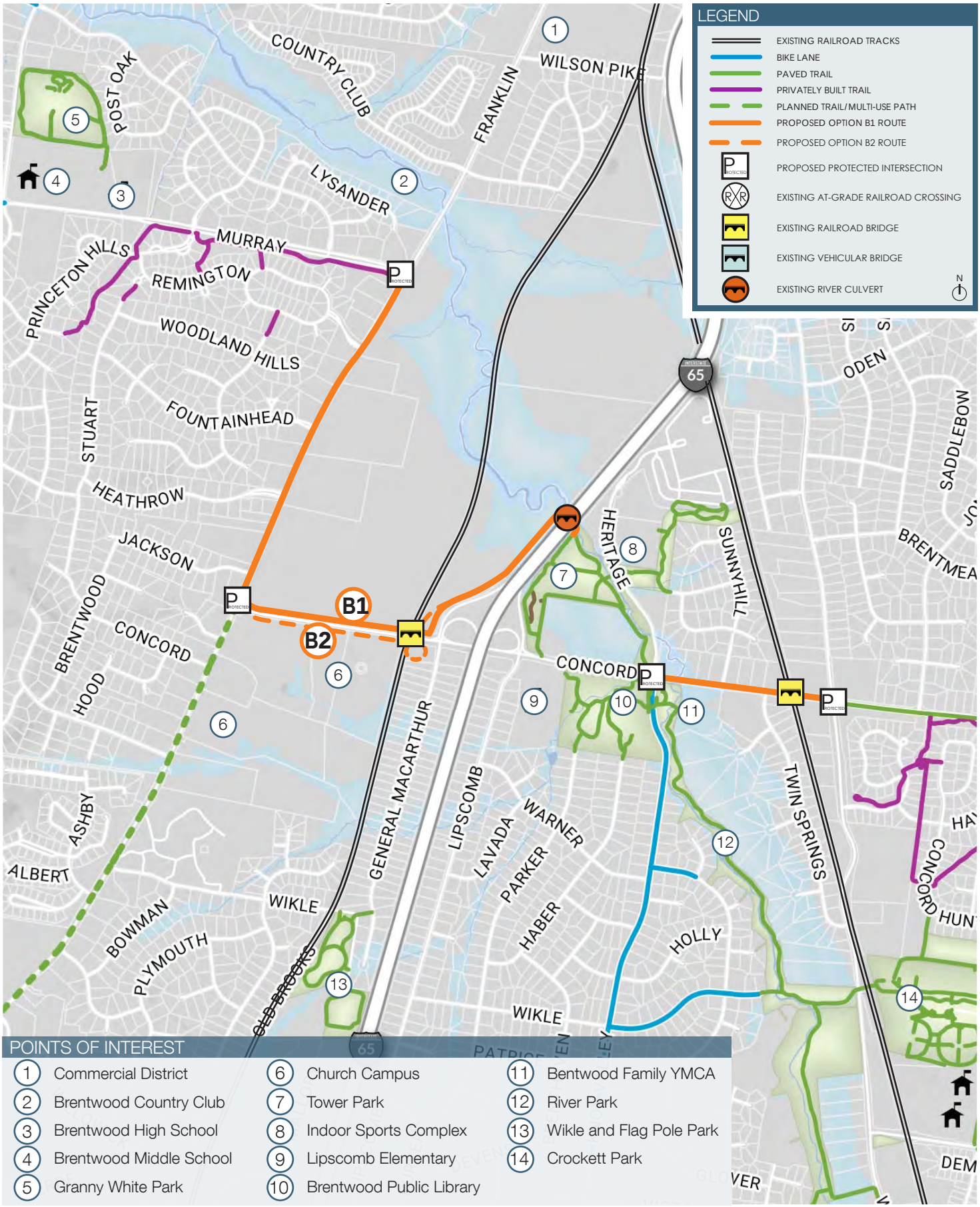
1. Use of level grade CSX right-of-way for easier bikability
2. Reduced traffic conflicts
3. CSX right-of-way offers a natural, aesthetic route alternative

Challenges

1. Concord Road bridge and roadway constraints
2. CSX train safety measures and approvals
3. Acquisition of private property






LEGEND
EXISTING RAILROAD TRACKS
BIKE LANE
PAVED TRAIL
PRIVATELY BUILT TRAIL
PLANNED TRAIL/MULTI-USE PATH
PROPOSED OPTION B1 ROUTE
PROPOSED OPTION B2 ROUTE
PROPOSED PROTECTED INTERSECTION
EXISTING AT-GRADE RAILROAD CROSSING
EXISTING RAILROAD BRIDGE
EXISTING VEHICULAR BRIDGE
EXISTING RIVER CULVERT
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COUNTRY CLUB
WILSON PIKE
FRANKLIN
POST OAK
LYSANDER
MURRAY
PRINCETON HILLS
REMINGTON
WOODLAND HILLS
FOUNTAINHEAD
STUART
HEATHROW
JACKSON
BRENTWOOD
CONCORD
HOOD
ASHBY
ALBERT
BOWMAN
PLYMOUTH
WIKLE
OLD BROOKS
GENERAL MACARTHUR
LIPSCOMB
LAVADA
WARNER
PARKER
HABER
HOLLY
WIKLE
TWIN SPRINGS
SUNNYHILL
HERITAGE
CONCORD
ODEN
SADDLEBOW
BRENTMEA
CONCORD HUN
B1
B2
65
POINTS OF INTEREST
1 Commercial District
2 Brentwood Country Club
3 Brentwood High School
4 Brentwood Middle School
5 Granny White Park
6 Church Campus
7 Tower Park
8 Indoor Sports Complex
9 Lipscomb Elementary
10 Brentwood Public Library
11 Bentwood Family YMCA
12 River Park
13 Wikle and Flag Pole Park
14 Crockett Park

OPTION B1

Connecting from the proposed multi-use path along Concord Road between Wilson Pike and Tower Park, this route heads north through Tower Park until reaching the park's northern end. The route then continues west underneath I-65 by one of three options—taking advantage of the existing Little Harpeth River culvert, boring a new tunnel underneath the interstate, or traveling over the interstate by way of a new pedestrian bridge. Transforming the culvert into a usable path is the recommended solution.

Once across the interstate, this route travels south along TDOT exit-ramp right-of-way until reaching Concord Road. Here, a multi-use path travels west along the north side of Concord Road and continues until reaching Franklin Road, heading north along the east side of Franklin Road until meeting the proposed protected intersection at Murray Lane.

Benefits

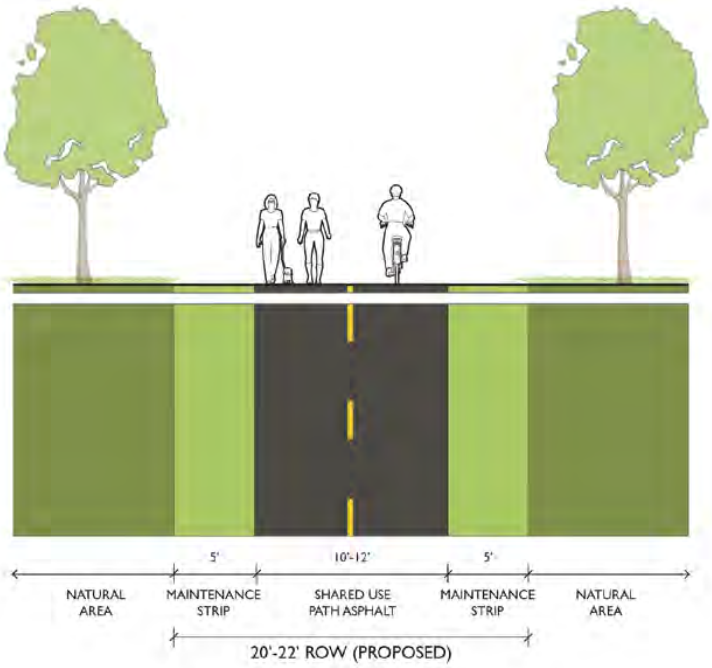
1. Short route allows convenient connectivity
2. Reduced traffic conflicts
3. Aesthetic park connection
4. Ability to continue route along Little Harpeth River through Turner property

Challenges

1. Concord Road bridge and roadway constraints
2. TDOT right-of-way availability
3. Acquisition of private property
4. Need to continue north along Franklin Road to connect to the commercial district

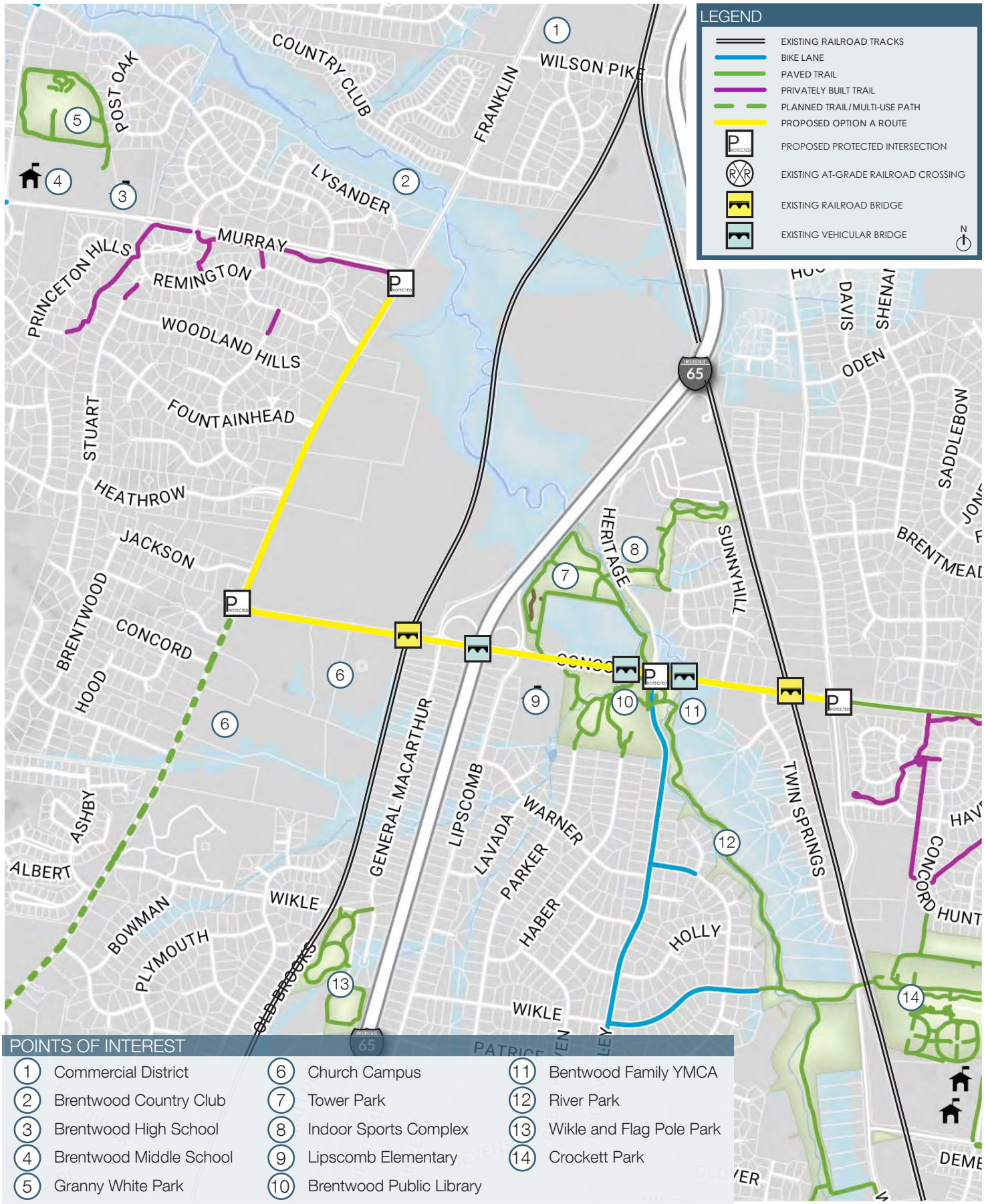
OPTION B2

With a slight modification to Option B1, Option B2 utilizes the existing railroad bridge to travel underneath Concord Road before looping up to meet Concord Road elevation before continuing to Franklin Road. The disadvantage of this alternative is that the user must cross back over Concord Road once they reach Franklin Road to continue north to the commercial district.



TRAIL ALONG I-65 EXIT RAMP

Tower Park Connection from Concord


LEGEND
EXISTING RAILROAD TRACKS
BIKE LANE
PAVED TRAIL
PRIVATELY BUILT TRAIL
PLANNED TRAIL/MULTI-USE PATH
PROPOSED OPTION A ROUTE
PROPOSED PROTECTED INTERSECTION
EXISTING AT-GRADE RAILROAD CROSSING
EXISTING RAILROAD BRIDGE
EXISTING VEHICULAR BRIDGE
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COUNTRY CLUB
WILSON PIKE
FRANKLIN
POST OAK
LYSANDER
MURRAY
PRINCETON HILLS
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WOODLAND HILLS
FOUNTAINHEAD
STUART
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PARKER
HABER
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CONCORD HUNT
65
POINTS OF INTEREST
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12 River Park
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14 Crockett Park

OPTION C

Connecting to the existing multi-use path at the corner of Wilson Pike and Concord Road, this option continues the path west along the south side of Concord Road until reaching Franklin Road. The CSX railroad bridge between Wilson Pike and Twin Springs has many restrictions and the multi-use path will likely need to remain within the existing bridge constraints. Once at Franklin Road, the path heads north along the east side of Franklin Road until the proposed protected intersection at Murray Lane. The likelihood of needing to construct four new, standalone bridges over I-65, one railroad, and two rivers is high, thus becoming a costly option. The benefit of this route is it provides multiple connections to Tower Park, Concord Park, the Brentwood YMCA, and the Brentwood Library. Although this option is less safe than others, the addition of four protected intersections creates a more bike and pedestrian-friendly environment for users.

Benefits

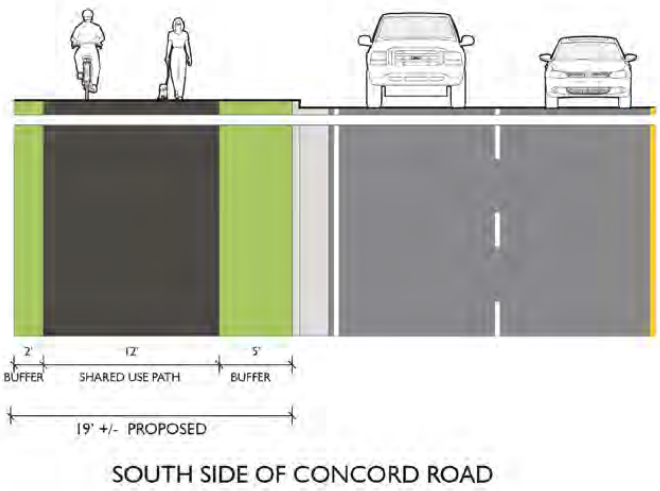
1. Direct route makes travel easy
2. Connections to many existing parks and multi-use paths
3. Path already exists on the south side of Concord Road east of Wilson Pike

Challenges

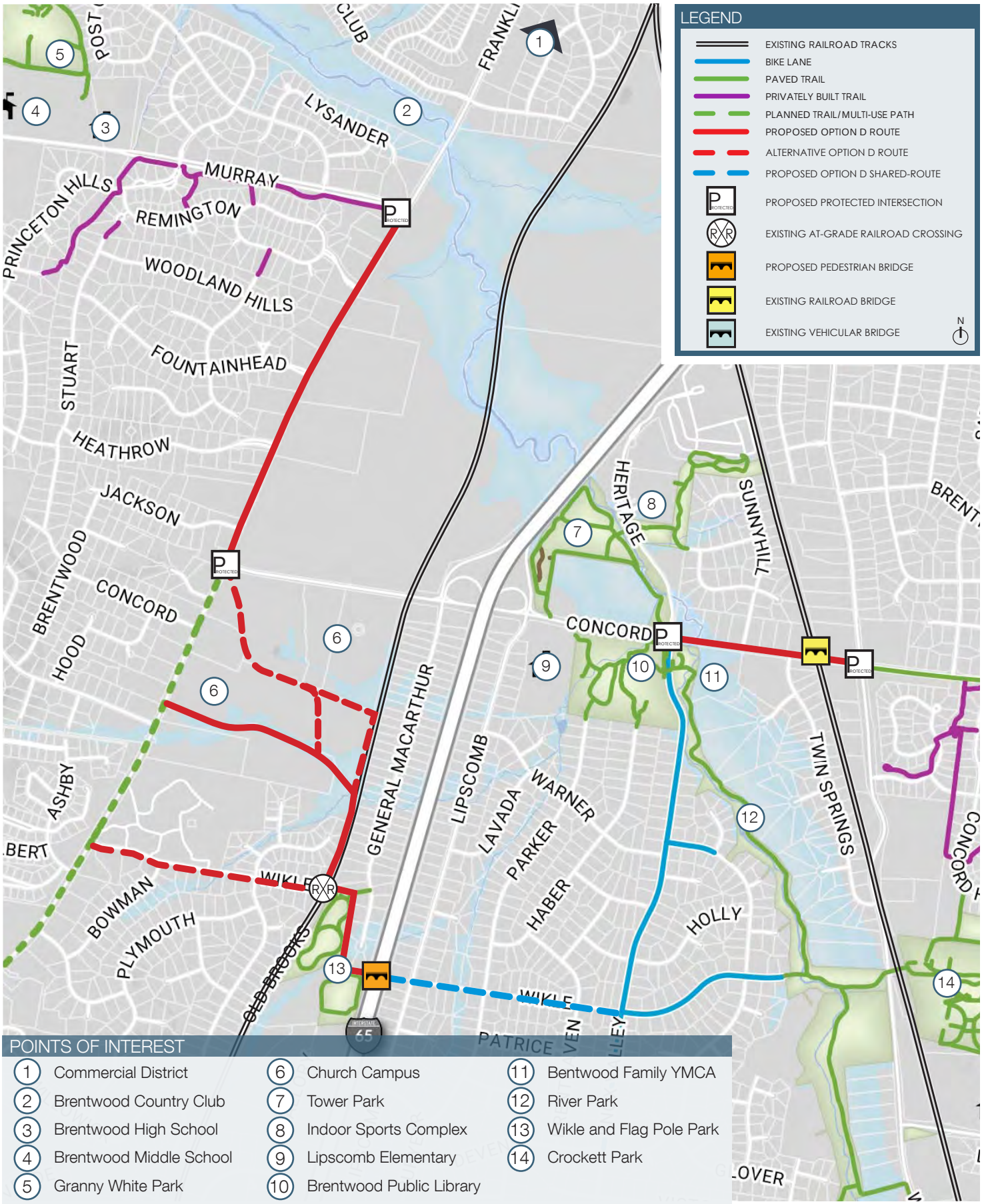
1. Multiple Concord Road bridges and roadway constraints
2. Many traffic conflicts
3. High cost due to potential bridges and retaining wall applications
4. Need to continue north along Franklin Road to connect to the commercial district

To cross I-65 with this option, it is likely that a new, separated pedestrian bridge will need to be implemented due to restrictions on the existing bridge.

Recommendation from the Brentwood Bike & Pedestrian Ad Hoc Committee report (2016)



SOUTH SIDE OF CONCORD ROAD


LEGEND
EXISTING RAILROAD TRACKS
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PAVED TRAIL
PRIVATELY BUILT TRAIL
PLANNED TRAIL/MULTI-USE PATH
PROPOSED OPTION D ROUTE
ALTERNATIVE OPTION D ROUTE
PROPOSED OPTION D SHARED-ROUTE
PROPOSED PROTECTED INTERSECTION
EXISTING AT-GRADE RAILROAD CROSSING
PROPOSED PEDESTRIAN BRIDGE
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OPTION D

Connecting from Knox Valley Drive, this route travels west on Wikle Road by way of a shared-use travel lane. Once the route meets I-65, it will transition into a multi-use path trail, traveling over the interstate via pedestrian bridge. This bridge will be ADA accessible and offer the City a wayfinding experience that provides the potential of showcasing the Brentwood name and logo. Once across the interstate, a multi-use path traverses north through Flagpole Park and Wikle Park, taking advantage of the existing at-grade railroad crossing. There are several alternative routes to reach Franklin Road from Wikle Park, including continuing west along Wikle Road or utilizing property lines and waterways that travel northwest.

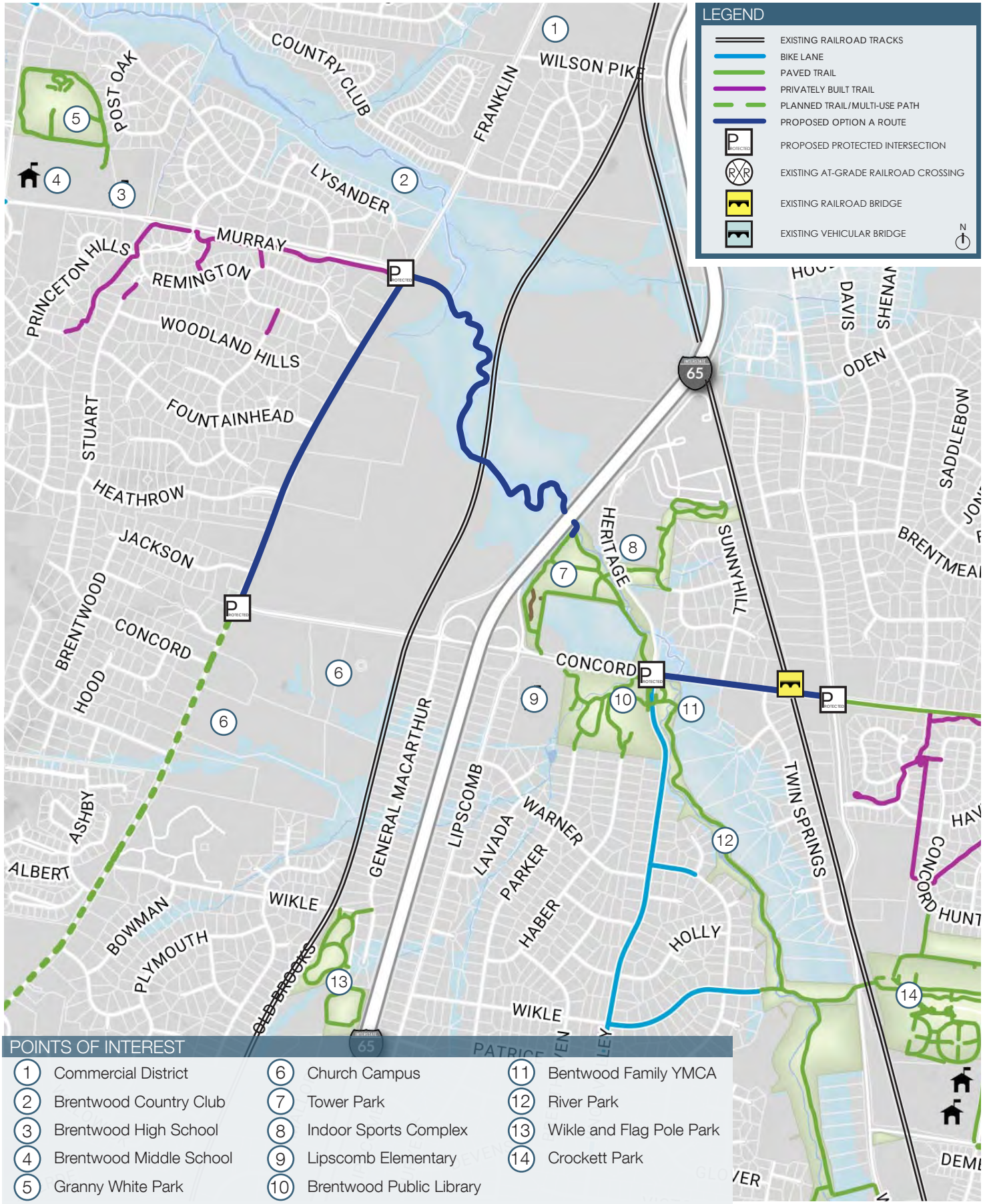
The recommended path from Wikle Park heads north along CSX right-of-way until traveling west along waterways and the property line of the church campus until reaching Franklin Road. Here, the route meets the proposed multi-use path that stretches from south Brentwood north to Concord Road. At the intersection of Concord Road and Franklin Road, a newly proposed multi-use path continues along the east side of Franklin Road until meeting the proposed protected intersection at Murray Lane.

Benefits

1. Fewer conflicts with high-volume roadways
2. Connects directly to Crockett Park
3. Aesthetic connection through Wikle Park
4. Iconic gateway/entrance into Brentwood

Challenges

1. Proposed pedestrian bridge over I-65
2. Shared-use travel lane is not ideal for pedestrian use
3. Route is farther south, creating longer commutes to the north side of Brentwood
4. Need to continue path north along Franklin Road to connect to the commercial district
5. Acquisition of private property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PLANNED TRAIL/MULTI-USE PATH
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N
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STUART
HEATHROW
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BRENTWOOD
CONCORD
HOOD
ASHBY
ALBERT
BOWMAN
PLYMOUTH
WIKLE
OLD SMITH SPRINGS
GENERAL MACARTHUR
LIPSCOMB
LAVADA
WARNER
PARKER
HABER
HOLLY
WIKLE
HERITAGE
SUNNYHILL
TWIN SPRINGS
DAVIS
ODEN
SADDLEBOW
BRENTMEAD
CONCORD HUNT
65

OPTION E

Connecting from the proposed multi-use path along Concord Road between Wilson Pike and Tower Park, this route heads north through Tower Park until reaching the park's northern end. The route then continues west underneath I-65 by one of three options—taking advantage of the existing Little Harpeth River culvert, boring a new tunnel underneath I-65, or traveling over the interstate by way of a new pedestrian bridge. Transforming the culvert into a usable path is the recommended solution, although design challenges do exist.

Once across the interstate, the route travels northwest along the Little Harpeth River, traveling through the existing Turner property. This option has been discussed through the years, and is not likely to come to fruition unless the property's status changes. Once to Franklin Road, a multi-use path heads south along the east side until reaching the proposed protected intersection at Concord Road.

Benefits

1. Short route allows convenient connectivity
2. Reduced vehicle pedestrian conflicts
3. Aesthetic park connection

Challenges

1. Only feasible under a development plan or City acquisition of property
2. Concord Road bridge and roadway constraints
3. TDOT right-of-way availability
4. Need to continue north along Franklin Road to connect to the commercial district

Little Harpeth River

Existing Culvert

Turner Property

COMMUNITY OUTREACH AND CITY STAFF COMMENTS

On January 23, 2018 the design team conducted a public meeting at the Brentwood Library. Inviting the community as well as City staff, the team gathered attendees' thoughts and opinions in an open house-style meeting. This feedback helped develop a clearer picture of the feasibility of the proposed options as well as the priorities of the community.

Open House Activities

The design team conducted two activities to obtain feedback from the attendees. The results of these are shown on the following page.

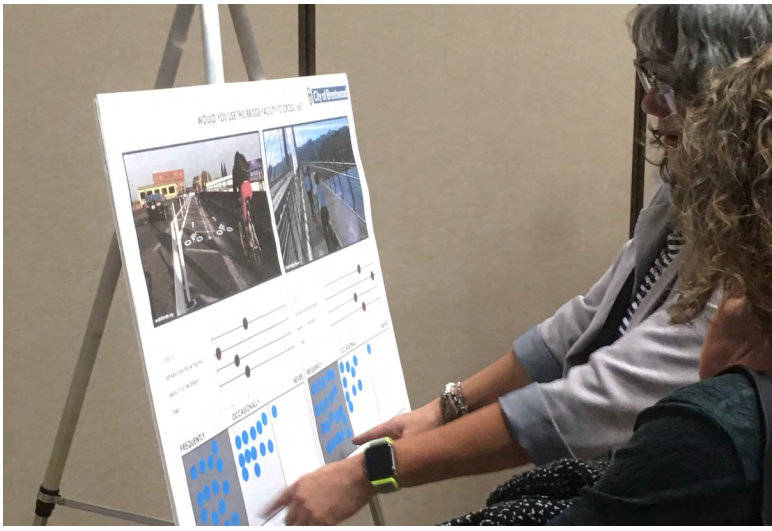
Alternatives Scorecard

After learning about each of the six options, attendees were then asked to vote for their top three choices while considering the trail length, probable cost, degree of separation from the street, and number of properties impacted for each option. Options B1 and C were the most popular, giving way to a detailed analysis of both options by the design team.

Bridge Facility Alternatives

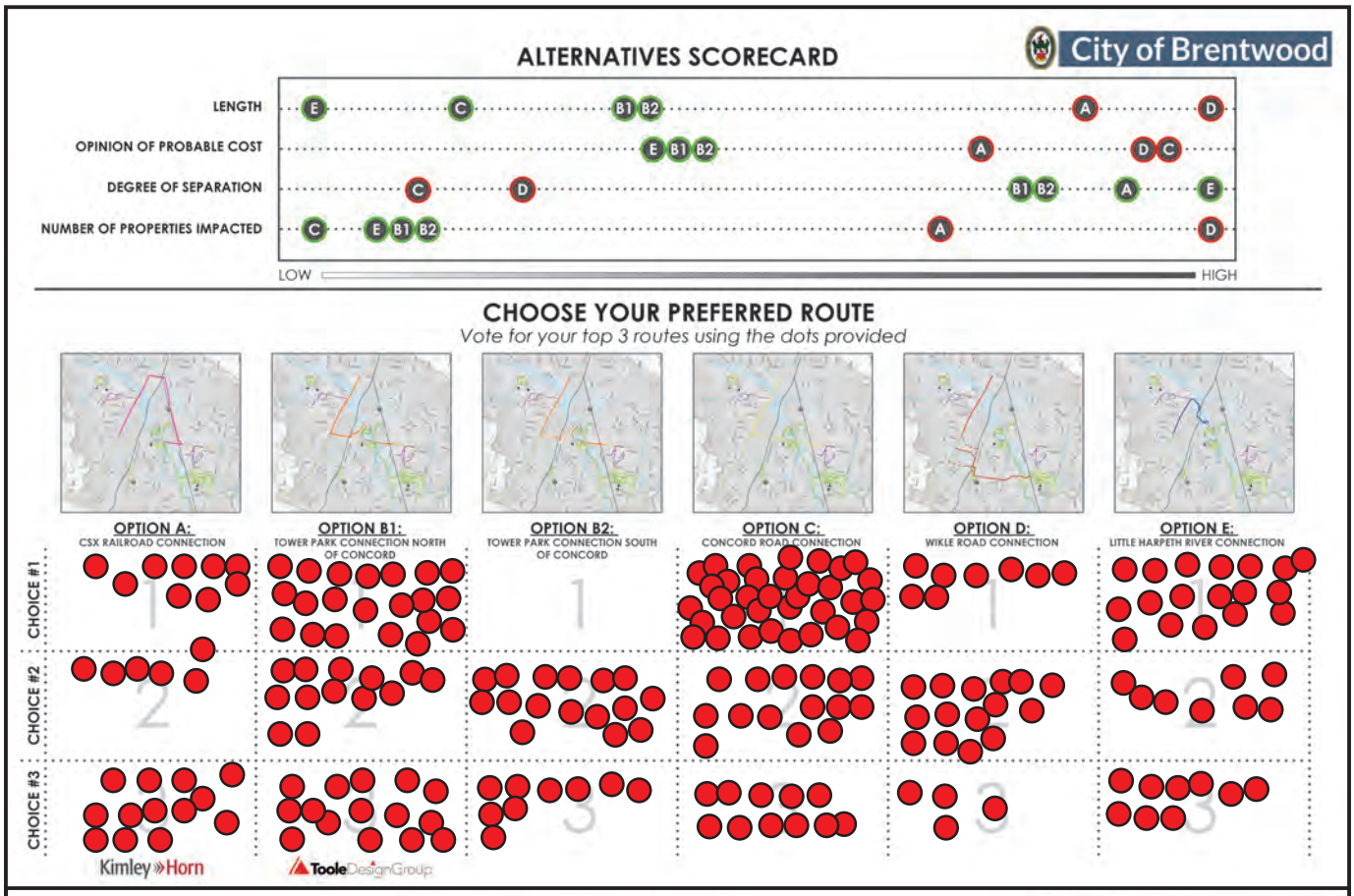
Each of the six options requires the crossing of existing bridges along Concord Road. The attendees were asked the likelihood of using one of two crossing alternatives—pedestrian facility within the existing bridge constraints or a separated bridge for pedestrian use only. The end result was that the community would frequently use either design solution. This provides the design team flexibility in the final design option.

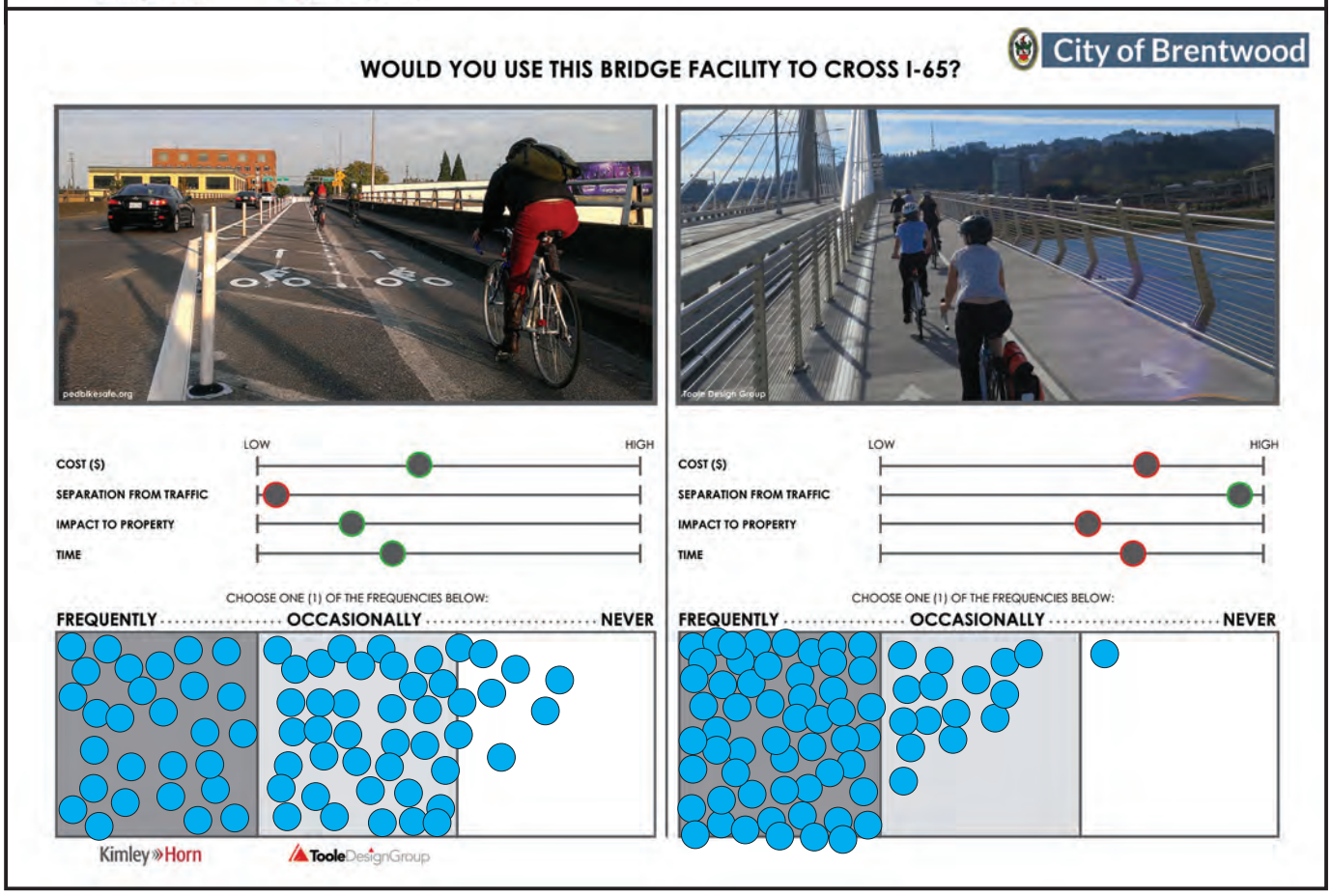
The design team discussed the existing routes with open house attendees, giving them a chance to understand current facilities and how potential solutions would alter and add to the roles they typically travel.

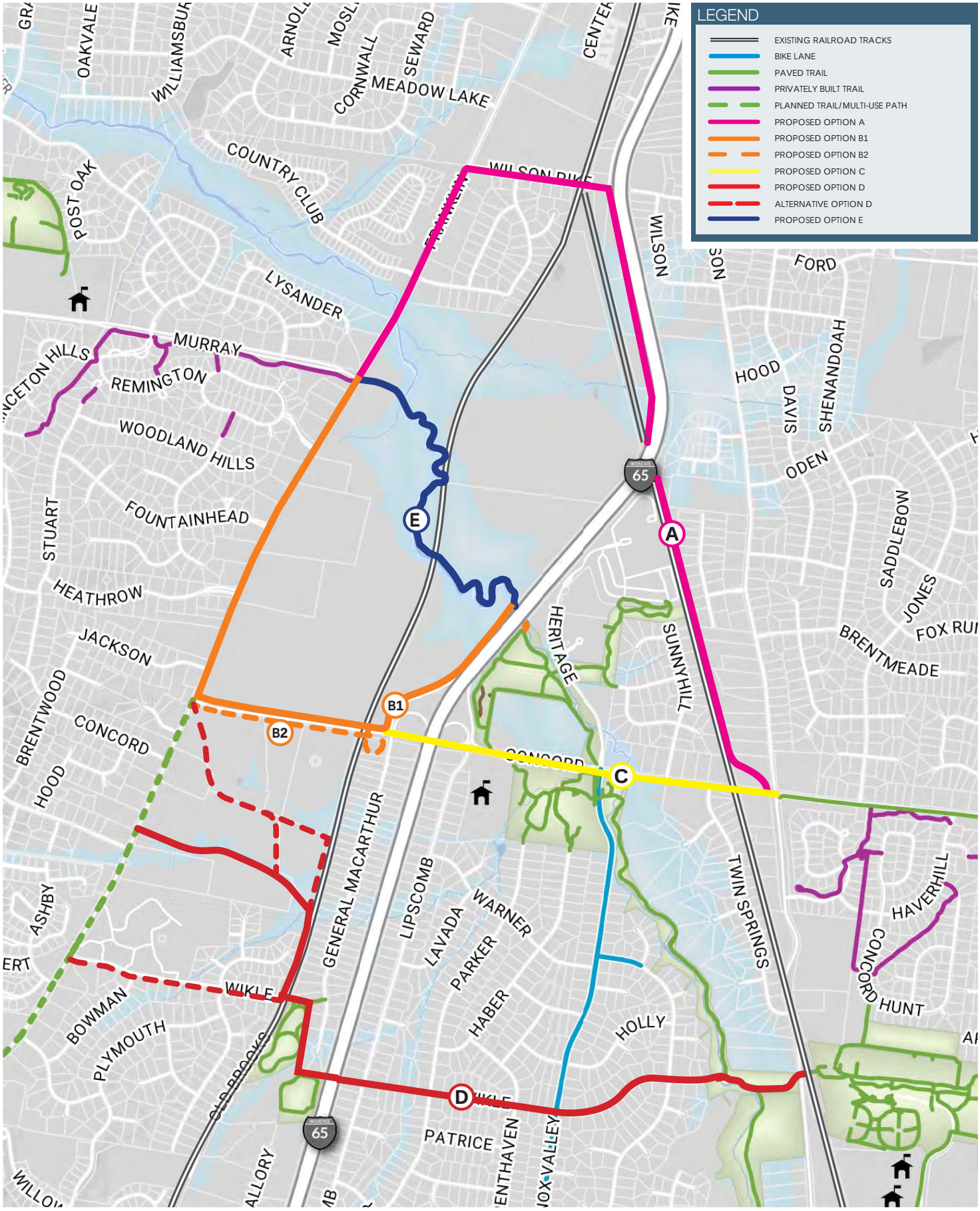


There are many design challenges that come with the potential route options. Asking the community what facility types they prefer was a great way to learn how they perceive safety and one route option to another.

Obtaining feedback from the community was a vital part of the design process. Learning what routes residents currently travel and where they would travel if given the option is important information that offers insight into which option is best suited for the community.


City of Brentwood
ALTERNATIVES SCORECARD
LENGTH
OPINION OF PROBABLE COST
DEGREE OF SEPARATION
NUMBER OF PROPERTIES IMPACTED
LOW
HIGH
CHOOSE YOUR PREFERRED ROUTE
Vote for your top 3 routes using the dots provided
OPTION A:
CSX RAILROAD CONNECTION
OPTION B1:
TOWER PARK CONNECTION NORTH OF CONCORD
OPTION B2:
TOWER PARK CONNECTION SOUTH OF CONCORD
OPTION C:
CONCORD ROAD CONNECTION
OPTION D:
WIKLE ROAD CONNECTION
OPTION E:
LITTLE HARPETH RIVER CONNECTION
CHOICE #1
CHOICE #2
CHOICE #3
Kimley»Horn
Toole Design Group


City of Brentwood
WOULD YOU USE THIS BRIDGE FACILITY TO CROSS I-65?
pedbikesafe.org
Toole Design Group
LOW
HIGH
COST ($)
SEPARATION FROM TRAFFIC
IMPACT TO PROPERTY
TIME
CHOOSE ONE (1) OF THE FREQUENCIES BELOW:
FREQUENTLY
OCCASIONALLY
NEVER
Kimley»Horn
Toole Design Group


LEGEND
EXISTING RAILROAD TRACKS
BIKE LANE
PAVED TRAIL
PRIVATELY BUILT TRAIL
PLANNED TRAIL/MULTI-USE PATH
PROPOSED OPTION A
PROPOSED OPTION B1
PROPOSED OPTION B2
PROPOSED OPTION C
PROPOSED OPTION D
ALTERNATIVE OPTION D
PROPOSED OPTION E
OAKVALE
WILLIAMSBURG
CORNWALL
SEWARD
MEADOW LAKE
COUNTRY CLUB
POST OAK
LYSANDER
MURRAY
REMINGTON
WOODLAND HILLS
FOUNTAINHEAD
STUART
HEATHROW
JACKSON
BRENTWOOD
CONCORD
HOOD
ASHBY
BOWMAN
PLYMOUTH
WILSON
FORD
HOOD
DAVIS
SHENANDOAH
ODEN
SADDLEBOW
JONES
BRENTMEADE
HERITAGE
SUNNYHILL
TWIN SPRINGS
HAVERHILL
CONCORD HUNT
GENERAL MACARTHUR
LIPSCOMB
LAVADA
WARNER
PARKER
HABER
HOLLY
WIKLE
PATRICE
65
A
B1
B2
C
D
E

OPTION REPORT CARD

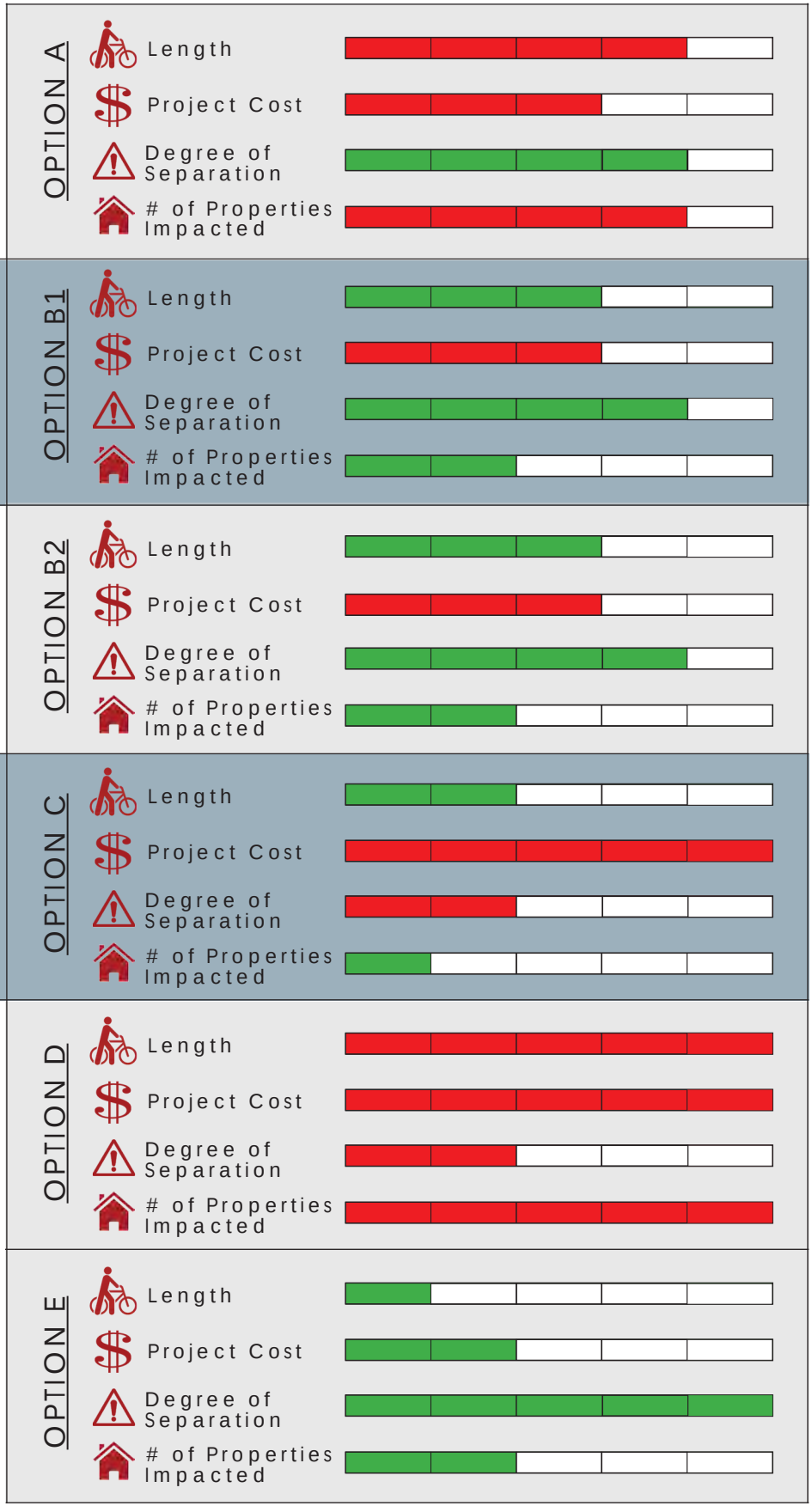
The design team narrowed the potential options down to the two most popular and feasible using City staff comments, public input, and analysis. The following pages detail each alternative.

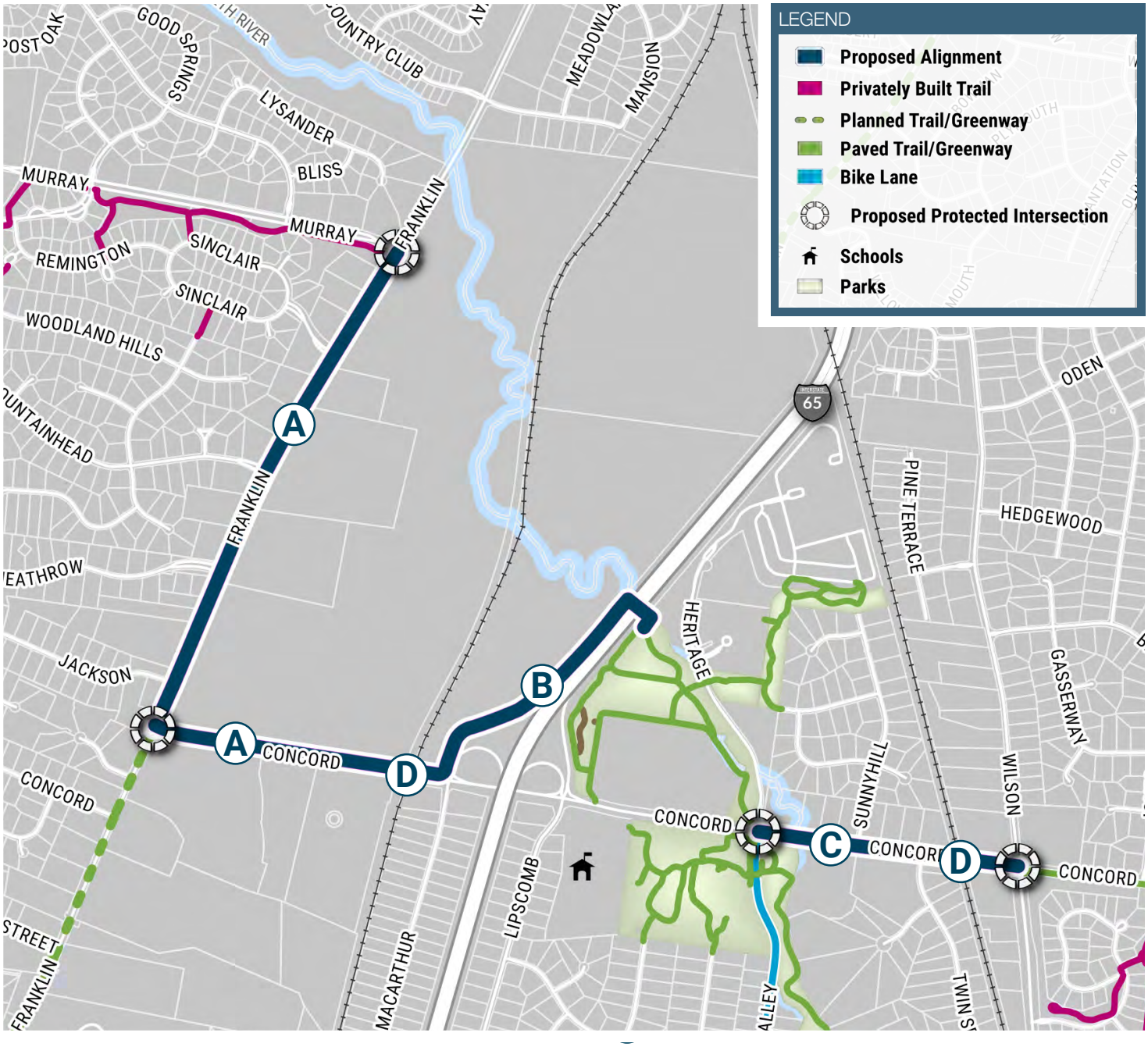
Good

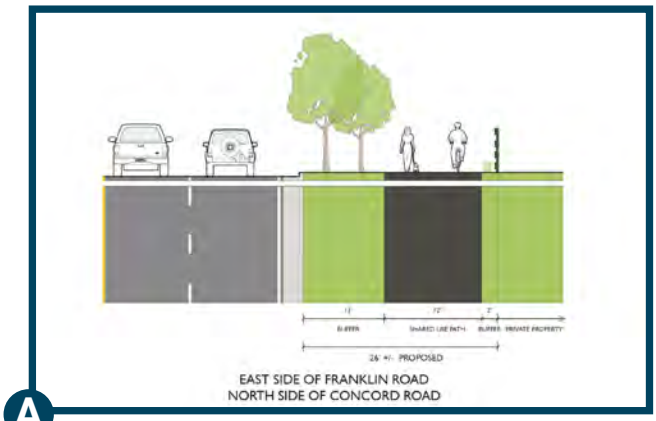
Poor

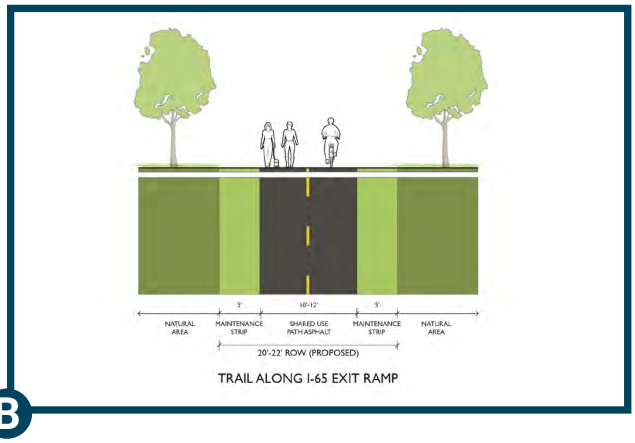
TOP 2 CHOICE

TOP 2 CHOICE




LEGEND
Proposed Alignment
Privately Built Trail
Planned Trail/Greenway
Paved Trail/Greenway
Bike Lane
Proposed Protected Intersection
Schools
Parks
GOOD SPRINGS
LYSANDER
BLISS
MURRAY
SINCLAIR
REMINGTON
WOODLAND HILLS
FRANKLIN
MEADOWLA
MANSION
ODEN
PINE TERRACE
HEDGEWOOD
HERITAGE
GASSERWAY
SUNNYHILL
WILSON
JACKSON
CONCORD
LIPSCOMB
MACARTHUR
ALLEY
TWIN
65
A
B
C
D


EAST SIDE OF FRANKLIN ROAD
NORTH SIDE OF CONCORD ROAD
A


TRAIL ALONG I-65 EXIT RAMP
B

OPTION B1

Benefits

1. Short route allows convenient connectivity: With this option, the route stays central to the City, allowing for convenient access to cross I-65.
2. Reduced traffic conflicts: Utilizing the existing Tower Park trails, this option takes users off of the busy Concord route, benefiting families.
3. Aesthetic park connection: Opportunity for users to enjoy a more natural, scenic route.
4. Future connectivity opportunities: The crossing location of I-65 presents an opportunity to continue a multi-use path along the Little Harpeth River if the Tuner property becomes accessible in the future.

Challenges

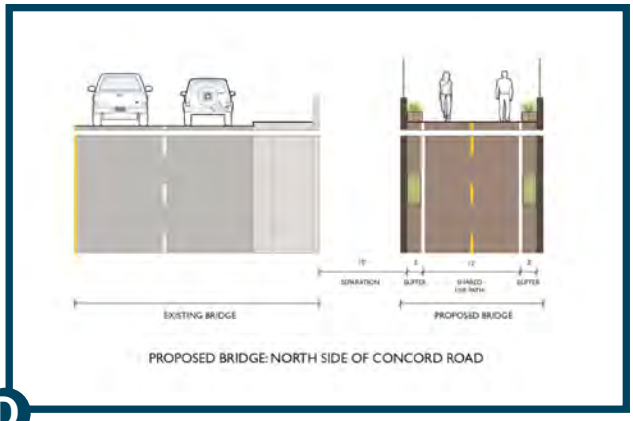
1. Concord Road bridges and roadway constraints: Like all options, a number of bridges will need to be built in order to utilize the Concord corridor.
2. TDOT right-of-way availability: The City will need to work with TDOT in order to successfully implement a multi-use path along the I-65 exit-ramp.
3. Acquisition of private property: Although less private property will be required, the acquisition of property will still be necessary.
4. Need to continue north along Franklin Road to connect to the Commercial District: Connecting from the proposed protected intersection at Concord Road and Franklin Road, the multi-use path will need to continue north in order to connect to the Commercial District.

Option Statistics

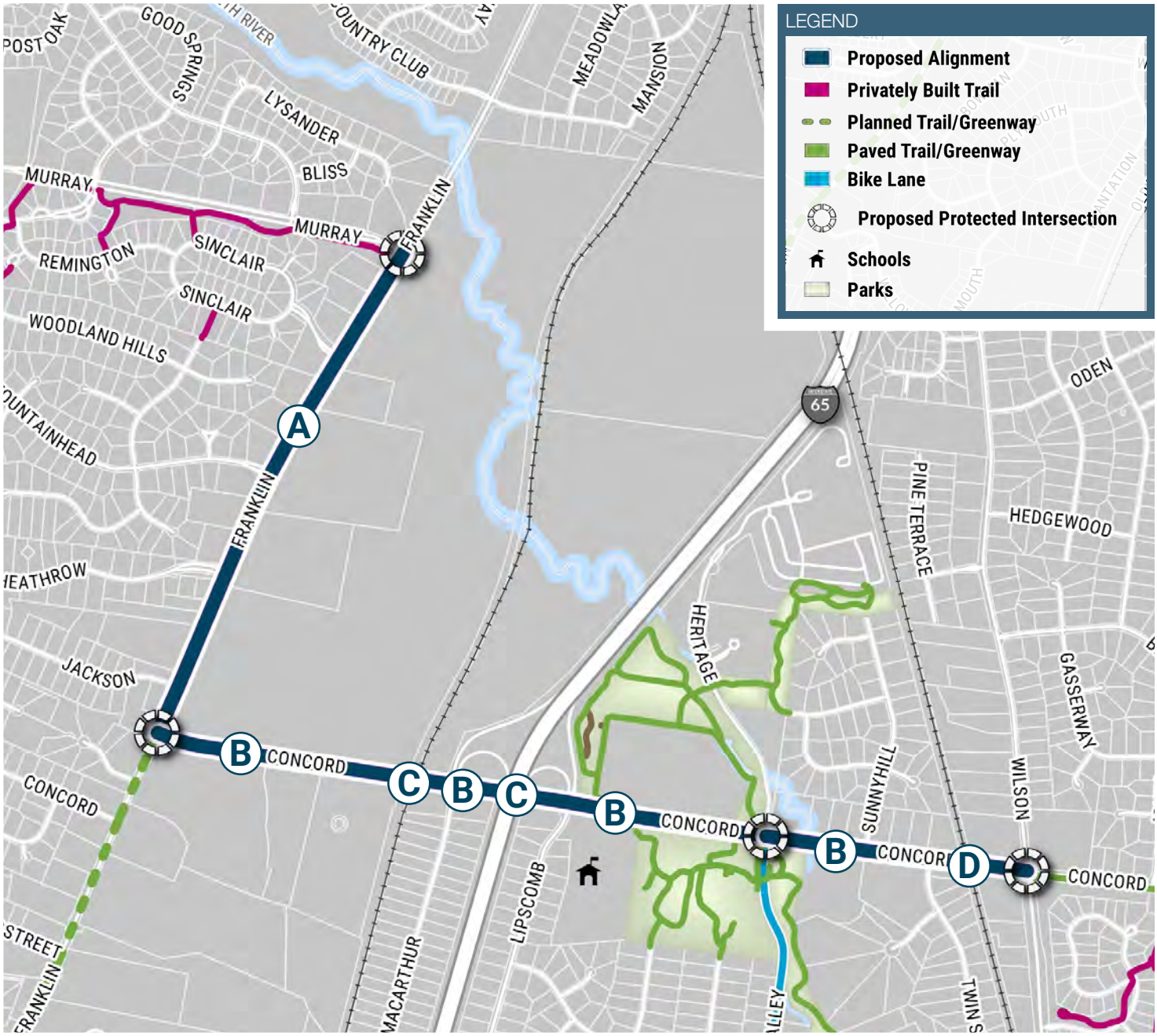
Overall Cost Range: $5.75-$8.6 Million
Total linear feet: 16,880’
Approx. Number of bridges: 2-4
Approx. Number of tunnels: 0-1
Number of protected intersections: 4

$5.75 - 8.6M

C



D


LEGEND
Proposed Alignment
Privately Built Trail
Planned Trail/Greenway
Paved Trail/Greenway
Bike Lane
Proposed Protected Intersection
Schools
Parks
POST OAK
GOOD SPRINGS
LYSANDER
BLISS
MURRAY
MURRAY
FRANKLIN
REMINGTON
SINCLAIR
SINCLAIR
WOODLAND HILLS
MEADOWLA
MANSION
COUNTRY CLUB
65
ODEN
PINE TERRACE
HEDGEWOOD
HERITAGE
GASSERWAY
WILSON
THIHANNUS
LIPSCOMB
MACARTHUR
FRANKLIN
JACKSON
CONCORD
CONCORD
CONCORD
CONCORD
CONCORD
A
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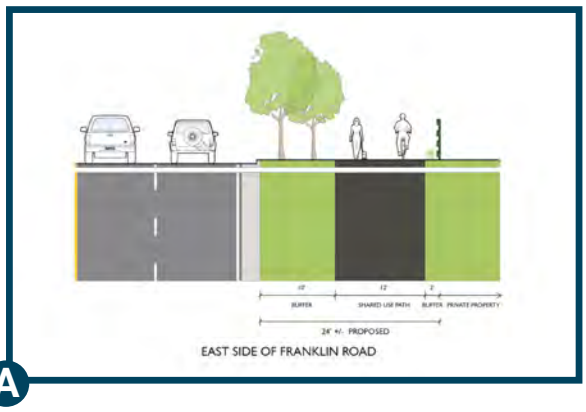
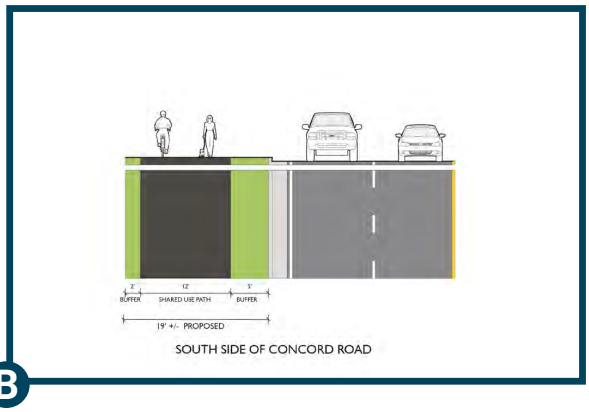
C
B
C
B
B
D


EAST SIDE OF FRANKLIN ROAD
A


SOUTH SIDE OF CONCORD ROAD
B

OPTION C

Benefits

1. Direct route makes travel easy: This option provides the most direct route, creating a bike-friendly route to safely cross I-65.
2. Connections to many existing parks, multi-use paths, and destinations: Each option presents opportunity to connect to the existing network of facilities, but this option provides a route that directly connects to many of the places of interest along the Concord Road corridor.
3. Path already exists on the south side of Concord Road: The existing multi-use path on Concord Road that ends at Wilson Pike provides a great opportunity to simply continue the path west towards Franklin Road; although, challenges are present with this option.

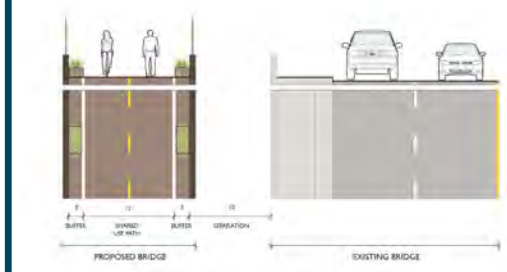
Challenges

1. Construction restrictions along south side of Concord Road: There are many construction challenges along Concord Road, alternative path types will need to be assessed in order to discover the best option.
2. Multiple Concord Road bridges and retaining wall applications: This alternative requires 4 pedestrian bridges and multiple retaining walls in order to implement the multi-use path on the south side of Concord Road. There are alternatives to a single multi-use path along Concord as explored in the next chapter, but further study would need to be conducted to determine their potential of constructibility.
3. Many traffic conflicts: The proposed protected intersections on the corridor helps ease vehicular/pedestrian conflicts, but there are many instances where the multi-use path would interfere with driveways.
4. High cost due to potential bridges and retaining wall applications: Although this route would be the most direct and most cyclist-friendly, it would also be the highest in cost out of all options due to the many pedestrian bridges and required retaining features.
5. Need to continue north along Franklin Road to connect to the Commercial District: Connecting from the proposed protected intersection at Concord Road and Franklin Road, the multi-use path will need to continue north in order to connect to the Commercial District.

Option Statistics

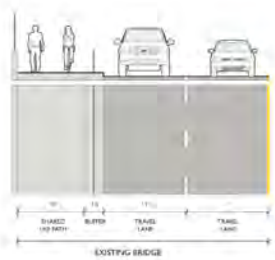
Overall Cost: $9.0 Million
Total linear feet: 14,960’
Approx. Number of bridges: 4
Number of protected intersections: 4

$9.0M



PROPOSED BRIDGE: SOUTH SIDE OF CONCORD ROAD

C



EXISTING BRIDGE: SOUTH SIDE OF CONCORD ROAD

D

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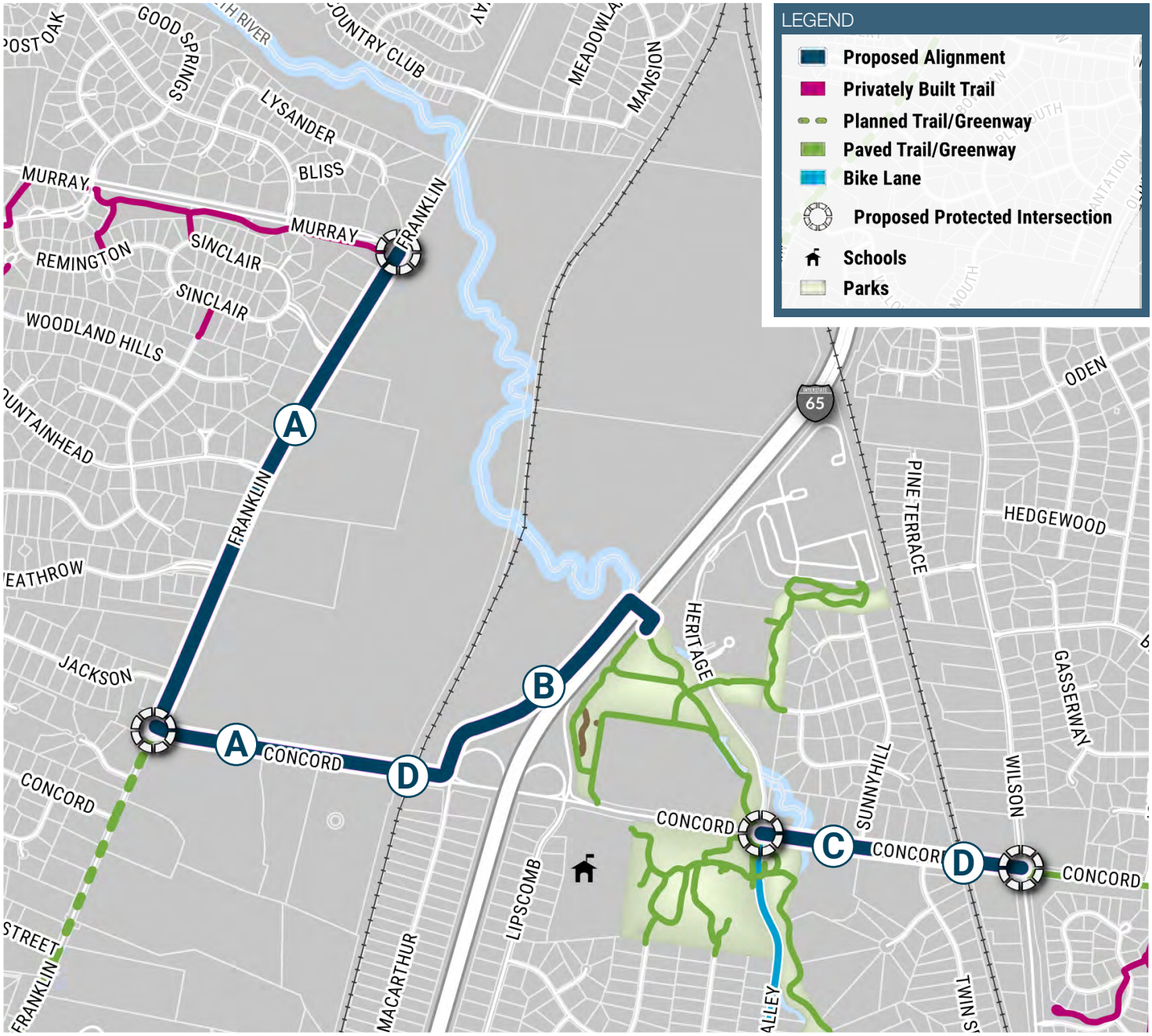
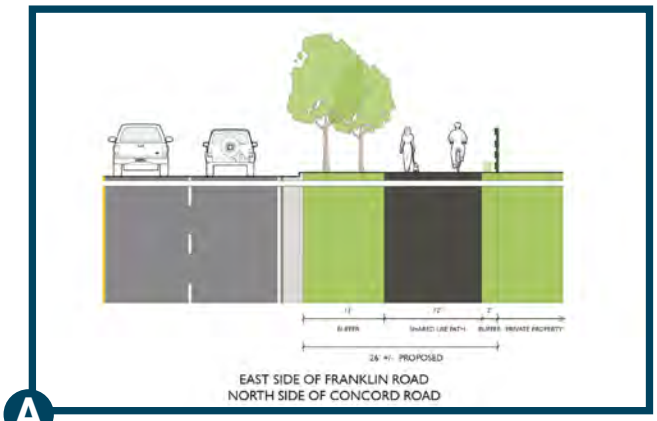
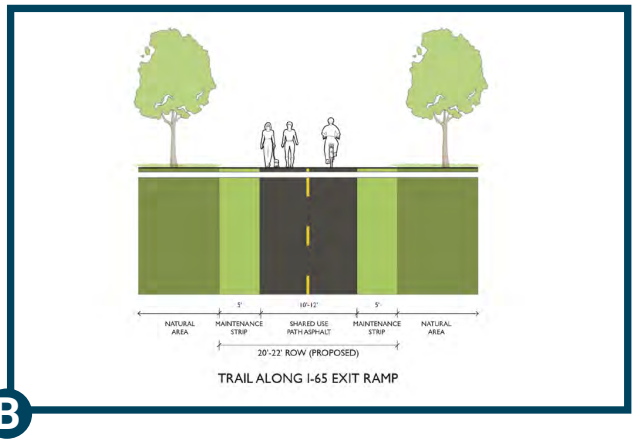
Final Recommendations


LEGEND
Proposed Alignment
Privately Built Trail
Planned Trail/Greenway
Paved Trail/Greenway
Bike Lane
Proposed Protected Intersection
Schools
Parks
MURRAY
FRANKLIN
SINCLAIR
REMINGTON
WOODLAND HILLS
BLISS
LYSANDER
GOOD SPRINGS
MEADOWLA
MANSION
ODEN
PINE TERRACE
HEDGEWOOD
HERITAGE
GASSERWAY
WILSON
SUNNYHILL
JACKSON
CONCORD
LIPSCOMB
MACARTHUR
65
A
B
C
D


EAST SIDE OF FRANKLIN ROAD
NORTH SIDE OF CONCORD ROAD
A


TRAIL ALONG I-65 EXIT RAMP
B

RECOMMENDED OPTION

Through site research and inventory, City staff and public input, site analysis, cost estimating, and consideration of the citywide pedestrian network and safety, the design team recommends Option B1.

Based on the stated criteria during the design process, this option is the most feasible and will enable the City of Brentwood to best connect existing and new facilities. There are design challenges that come with this option, but it can have the largest impact to the community if successfully implemented. This option can also be accomplished in phases, with phase 1 being the connection between Tower Park and Franklin Road, as this link is the priority of the project.

Utilizing and connecting to the existing pedestrian network was an important factor to take into consideration during this process. Option B1 best considers the existing routes and completes an important break in the network, enabling pedestrians to safely cross I-65 without crossing paths with the condensed traffic near the on- and off-ramps on Concord Road. This option takes advantage of the existing trails within Tower Park, giving the user a scenic route away from the heavily-used Concord Road. This option also provides the opportunity to expand pedestrian routes through the Turner property as described in Option E. Should the property be available to incorporate a new multi-use path along the Little Harpeth River, Option B1 allows for a smooth transition of this pedestrian facility. With fewer vehicle-pedestrian conflicts comes safer, more pedestrian-friendly facilities that all community members will be able to use. This option is recommended by the design team for its safety, community acceptance, constructibility, number of available alternatives to safely cross I-65, and the ability to easily implement future connecting routes. The follow pages outline the alternatives of crossing I-65 at the north end of Tower Park.

I-65 Crossing Alternatives

The design team considered various methods of crossing I-65 using Option B1. These included taking advantage of the existing Little Harpeth River culvert, boring a new tunnel underneath I-65, or traveling over the interstate with a new pedestrian bridge. Transforming the culvert into a usable path is the recommended solution, although design challenges do exist. Pages 34-36 provide more detail of each alternative.

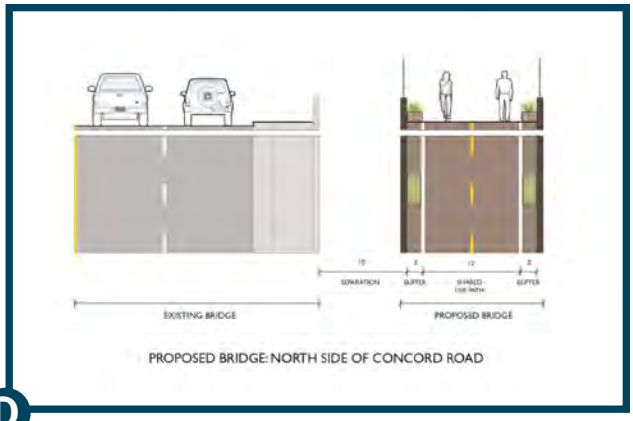
Concord Road Multi-Use Path Alternatives

During the site and option analysis, the design team explored various alternatives of how to most efficiently travel between Knox Valley and Wilson Pike despite the many limitations and construction constraints. Pages 37-38 explore several potential solutions to this vital pedestrian corridor.

Protected Intersections

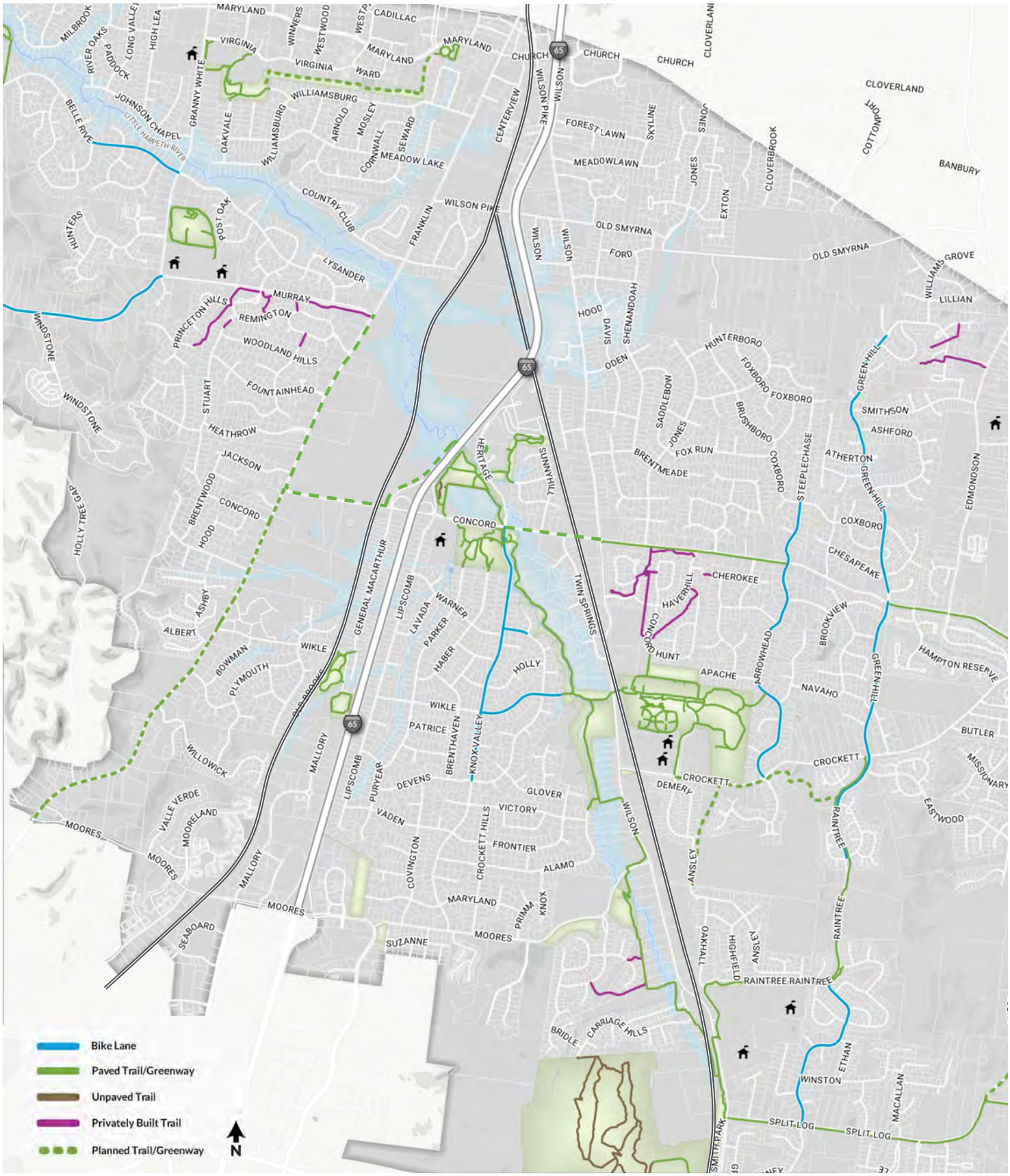
Through study area analysis with traffic counts and crash data, it became clear that four intersections along the pedestrian travel route should be focused on pedestrian and vehicular safety and security. The implementation of protected intersections at these four locations offers an opportunity for updated travel routes and safety upgrades to help protect both drivers and pedestrians, especially with the increasing number of daily drivers and annual yearly crashes along the corridors. Pages 39-43 provide more information on these intersections.

C



D

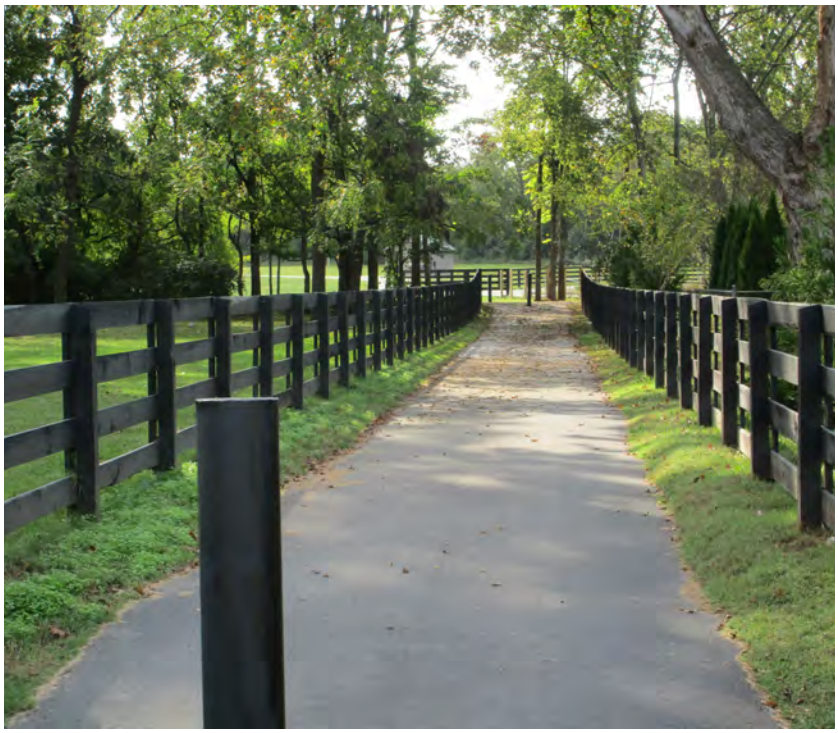
PROPOSED TRANSPORTATION NETWORK



CITY TRANSPORTATION NETWORK

With the construction of the new multi-use path connection, both families and experienced cyclists will be able to utilize this new facility to safely and efficiently cross I-65. The recommended option presents many opportunities:

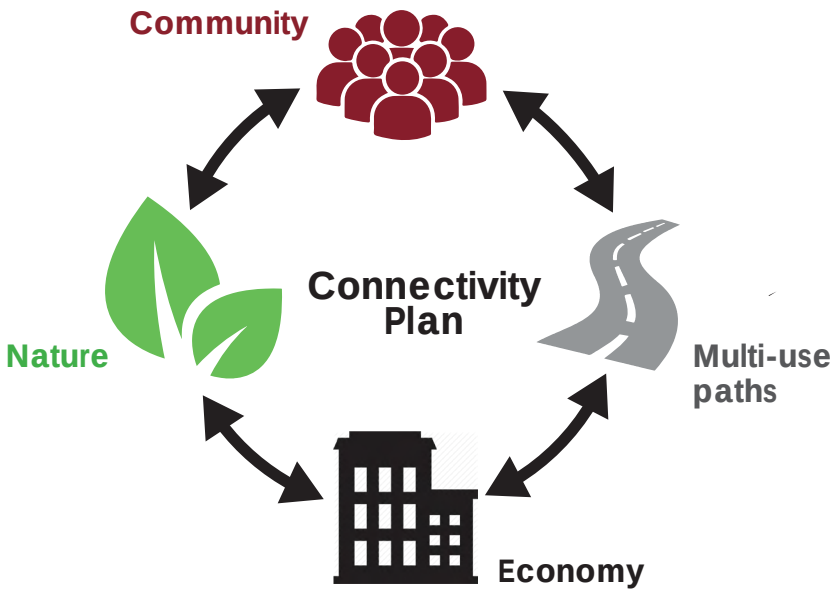
1. Short route allows convenient connectivity
2. Reduced traffic conflicts
3. Aesthetic park connection
4. Future connectivity opportunities



What are the benefits of Multi-use paths?

Multi-use paths provide benefits to the community in the following forms:

- Health — Multi-use paths provide crucial opportunities for accessible and free outdoor recreation. Communities with these networks often see a reduction in health care costs per citizen.
- Economic — Well designed and maintained alternative transportation networks help elevate property values of surrounding properties while also helping local businesses by creating an economic interest in the area. Many employers look for these features/opportunities for employees when selecting a new site or location.
- Preservation — Trail systems allow the community to interact with the natural environment, bringing awareness to local preservation efforts.



I-65 CROSSING ALTERNATIVE #1

Convert Existing River Culvert into Usable Multi-Use Path

This alternative is recommended by the design team. This crossing utilizes the Little Harpeth River culvert. One of three 12'x12' channels would be used to accommodate a multi-use path to cross under I-65. In this scenario, the southernmost (far-right) channel floor surface would need to be raised enough to use as a pedestrian route, while still allowing the passage of water from the Little Harpeth River during large storm events. This option would require a hydraulic analysis of the culvert and capacity to ensure it does not create flooding impacts as well as TDOT approval before it could be considered a viable option.

$250K

Example project:
Town Creek Greenway, Gallatin, TN
The City of Gallatin repurposed an existing stream culvert into a usable greenway to allow the safe movement of pedestrians underneath a three-lane roadway.

I-65 CROSSING ALTERNATIVE #2

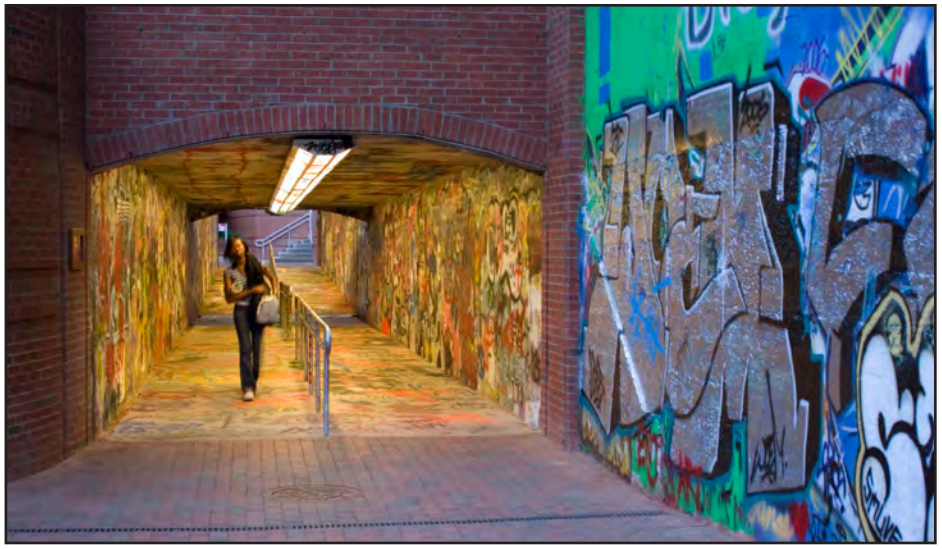
Create a new tunnel underneath interstate-65

Another alternative to cross I-65 is to bore a new pedestrian tunnel underneath the interstate. This alternative comes at a higher cost, but ensures a safe passage.

There is an existing pedestrian tunnel on the south side of Brentwood near Crockett Park (pictured below). This tunnel connects Crockett Park to Wikle Road, traveling beneath the CSX railroad and Wilson Pike. The proposed tunnel underneath I-65 will be similar, connecting Tower Park with Concord Road and ultimately connecting to Franklin Road and Brentwood's commercial district. The challenges to this option are providing adequate drainage due to the floodway, the potential utility conflicts in the boring route, and safety.

$2.3M

Example project:
North Carolina State University, Free Expression Pedestrian Tunnel, Raleigh, NC
This project transformed a beloved icon of campus architecture into a functional, safe, and accessible public space that reconnected the north and south campuses.



I-65 CROSSING ALTERNATIVE #3

Create a New Bridge Over interstate-65

The final alternative to cross I-65 is constructing a new pedestrian bridge. This bridge would be ADA accessible and give the City an opportunity to implement a wayfinding experience that could showcase the Brentwood name and logo, similar to the Alcoa, Tennessee example below. This option, while expensive, gives the user a safe, reliable way to cross the interstate.

This image shows the north corner of Tower Park. In this alternative, the existing multi-use path would lead to the proposed pedestrian bridge over I-65. Challenges to this option include height clearance over the interstate, additional right-of-way acquisition, floodway coordination, and the high cost.

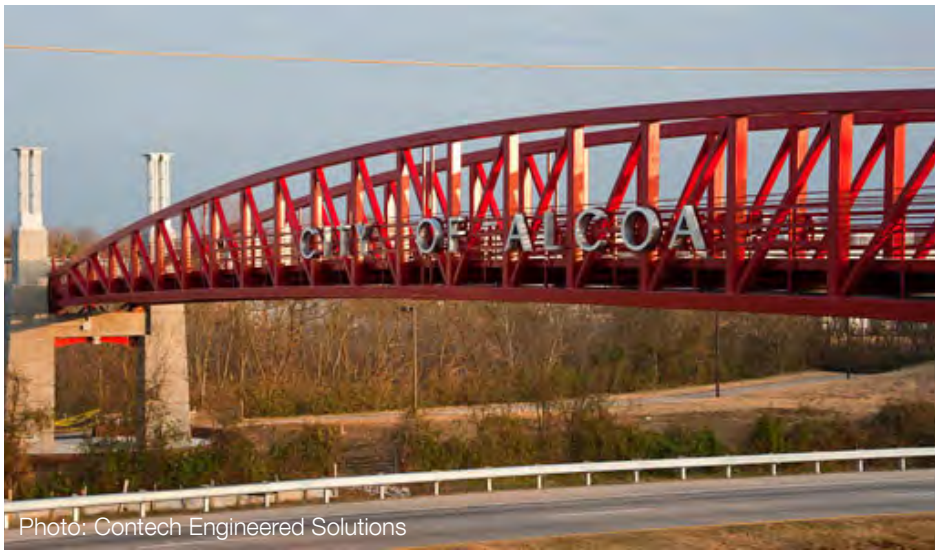
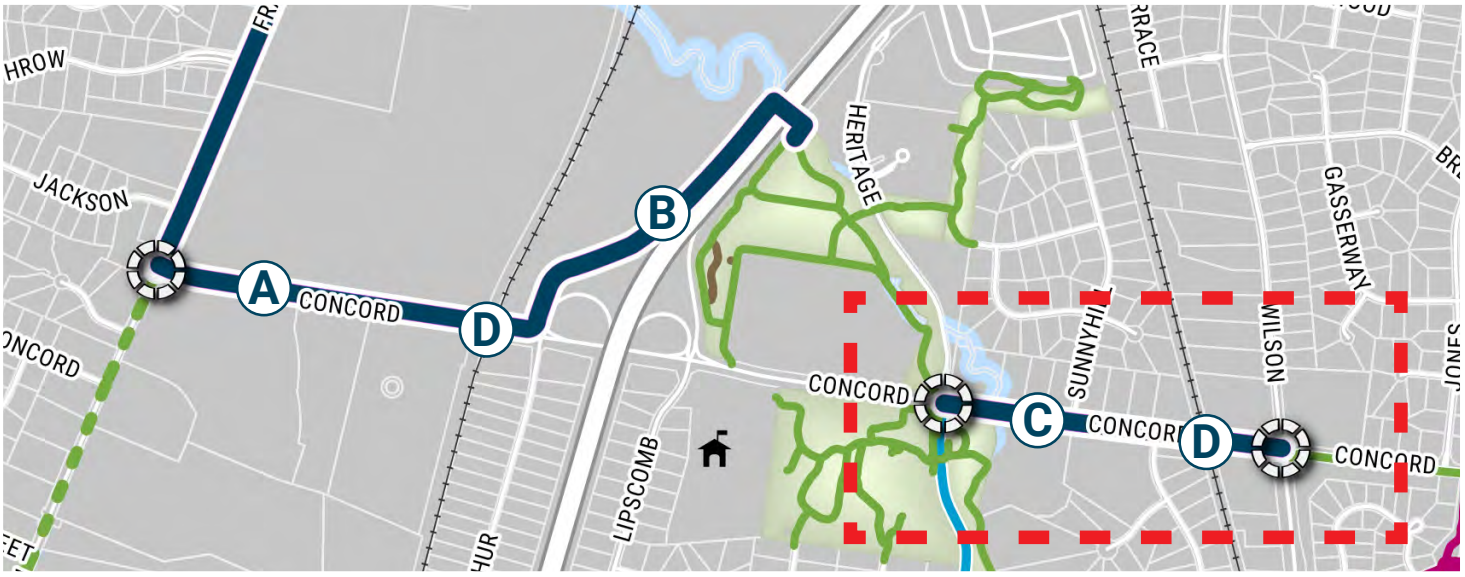


Photo: Contech Engineered Solutions

$2.5M

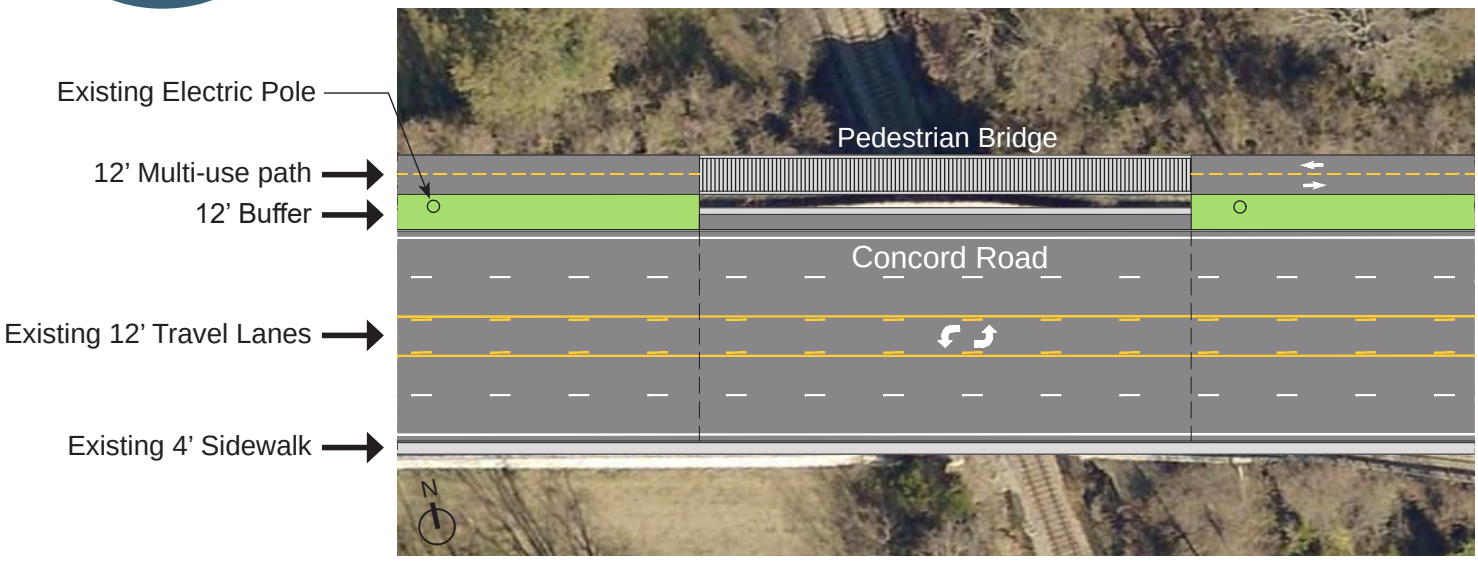
Example project:
Pedestrian Bridge, Alcoa, TN
The City of Alcoa constructed an ADA accessible pedestrian bridge spanning approximately 250 feet over State Route 129.

CONCORD ROAD MULTI-USE PATH ALTERNATIVE #1

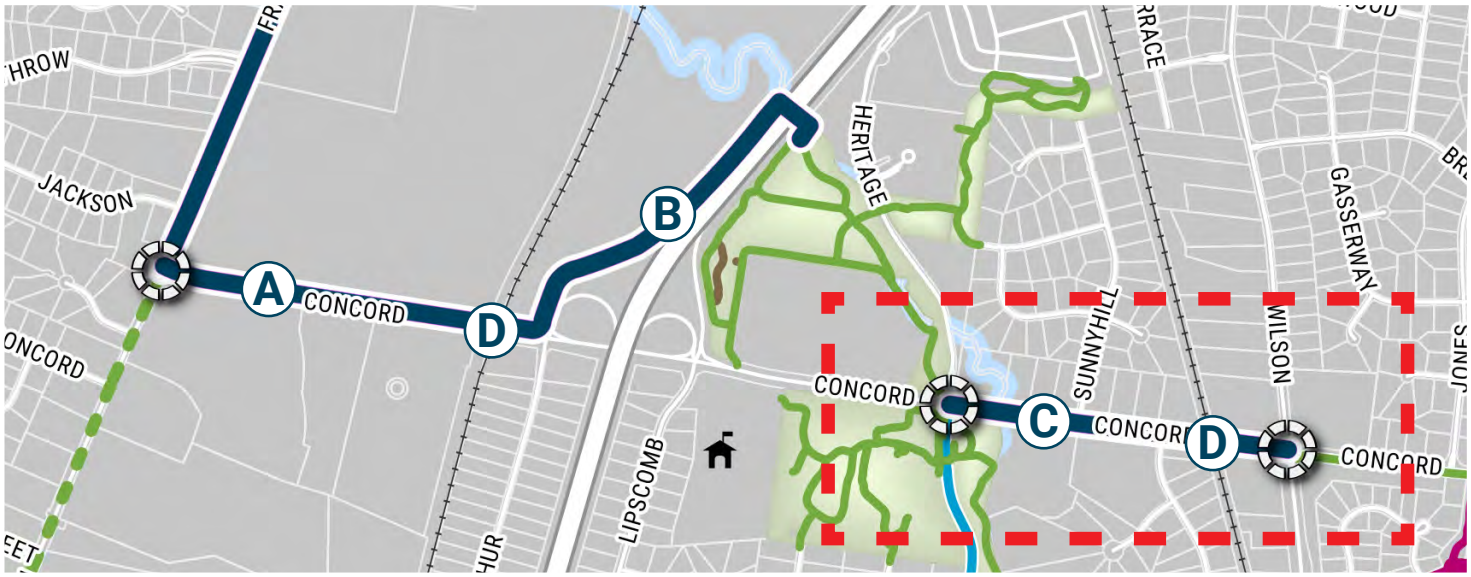


$2.1M

This alternative is recommended by the design team. Providing the safest route for bicyclists and pedestrians, this alternative allows users to travel parallel to Concord Road, while being separated by a 12' landscape buffer. A pedestrian truss bridge will be needed to cross the existing CSX railroad and the Little Harpeth River just east of Tower Park. Due to the level of safety, constructibility and overall connectivity, this alternative is best suited to connect the existing pedestrian facilities between Wilson Pike and Tower Park.



CONCORD ROAD MULTI-USE PATH ALTERNATIVE #2

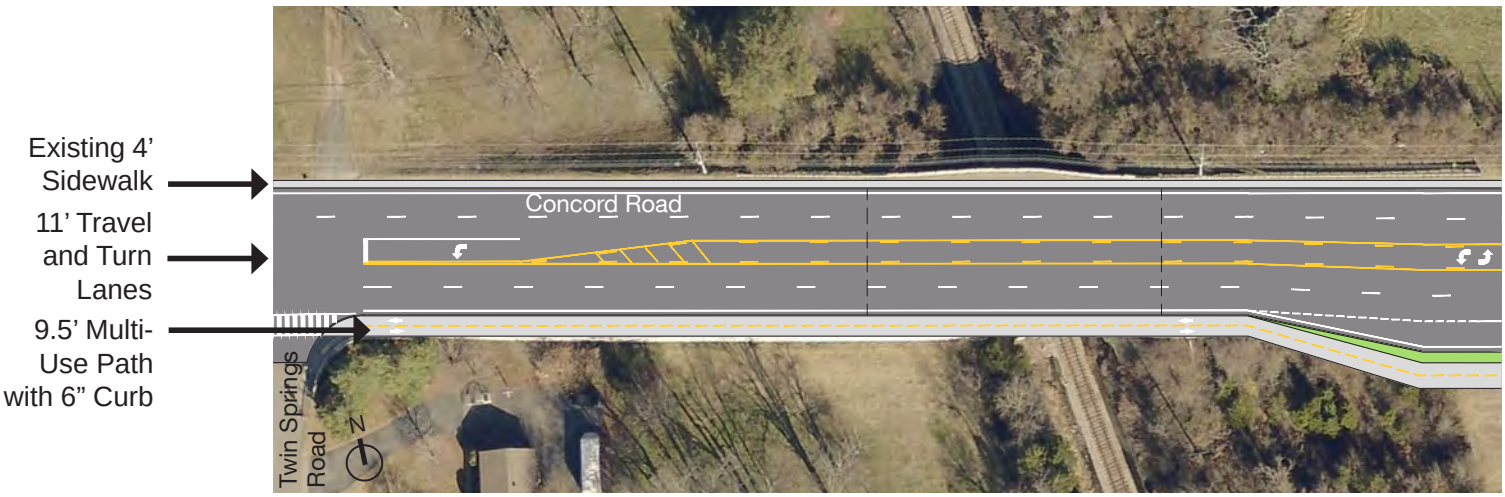


$1.5M

By narrowing the five existing 12-foot lanes on Concord Road between Knox Valley and Wilson Pike to 11-foot lanes, this alternative makes way for a 9.5-foot-wide multi-use path on the south side of Concord Road. In addition, narrowing each travel lane by one foot will provide a curb and gutter between the multi-use path and travel lanes.

This option is similar to the existing multi-use path along the south side of Concord Road between Arrowhead Drive and Wilson Pike.

Further analysis should be done to determine the feasibility of this alternative.



PROTECTED INTERSECTIONS

When considering pedestrian improvements, it is important to recognize relationships between vehicular and pedestrian connections. Through study area analysis with traffic counts and crash data, it became clear that four intersections along the pedestrian travel route should be focused on pedestrian and vehicular safety and security. Protected intersections create an environment that elevates the visual movements of pedestrians and bicyclists, allowing for a more consistent and comfortable atmosphere for everyone.

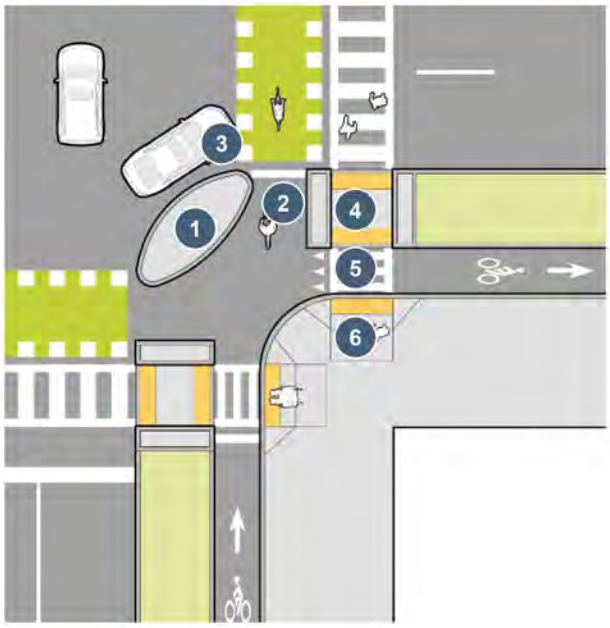
WHY PROTECTED INTERSECTIONS?

- INTUITIVE AND COMFORTABLE
- PROVIDE CLEAR RIGHT-OF-WAY ASSIGNMENT
- PROMOTE PREDICTABILITY OF MOVEMENT
- IMPROVED VISIBILITY AT CONFLICTS
- REDUCED NUMBER OF CONFLICTS
- SPACE FOR TURNING BICYCLISTS TO WAIT

ANATOMY OF A PROTECTED INTERSECTION

1. CORNER REFUGE ISLAND
2. FORWARD BICYCLE QUEUING AREA
3. MOTORIST YIELD ZONE
4. PEDESTRIAN CROSSING ISLAND
5. PEDESTRIAN CROSSING OF SEPARATED BIKE LANE
6. PEDESTRIAN CURB RAMP

A BUFFER OF 6' OR GREATER HAS BEEN SHOWN TO PROVIDE A 50% REDUCTION IN CRASHES COMPARED TO CONVENTIONAL BIKE LANES

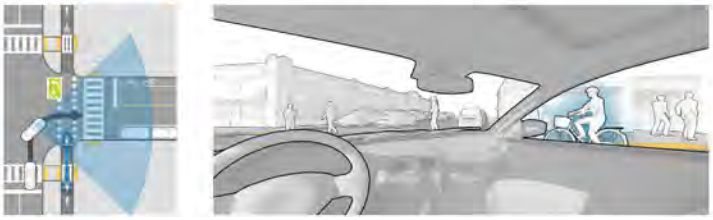


Source: MassDOT Design Guide

VISIBILITY AT CONFLICT POINTS

MOTORIST'S VIEW AT CONVENTIONAL BIKE LANE

MOTORIST'S VIEW AT SEPARATED BIKE LANE

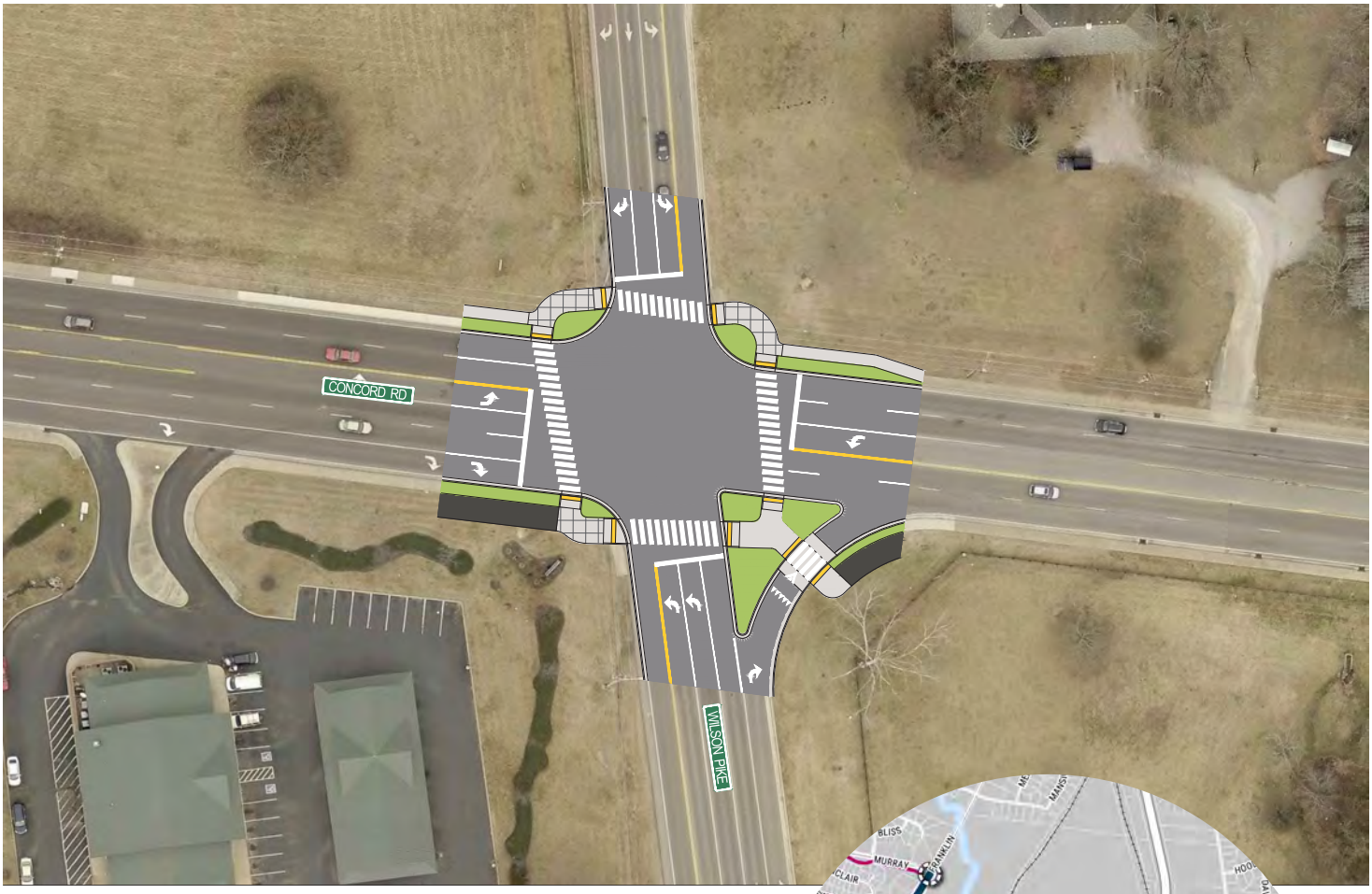


Source: MassDOT Design Guide

PROTECTED INTERSECTION

Concord Road at Wilson Pike

The intersection of Concord Road and Wilson Pike improves the connection to the existing multi-use path east of Wilson Pike. Continuing access from this existing connection is vital to the community, allowing residents the availability to travel west towards the Brentwood Library, YMCA, Tower Park and other points of interest.



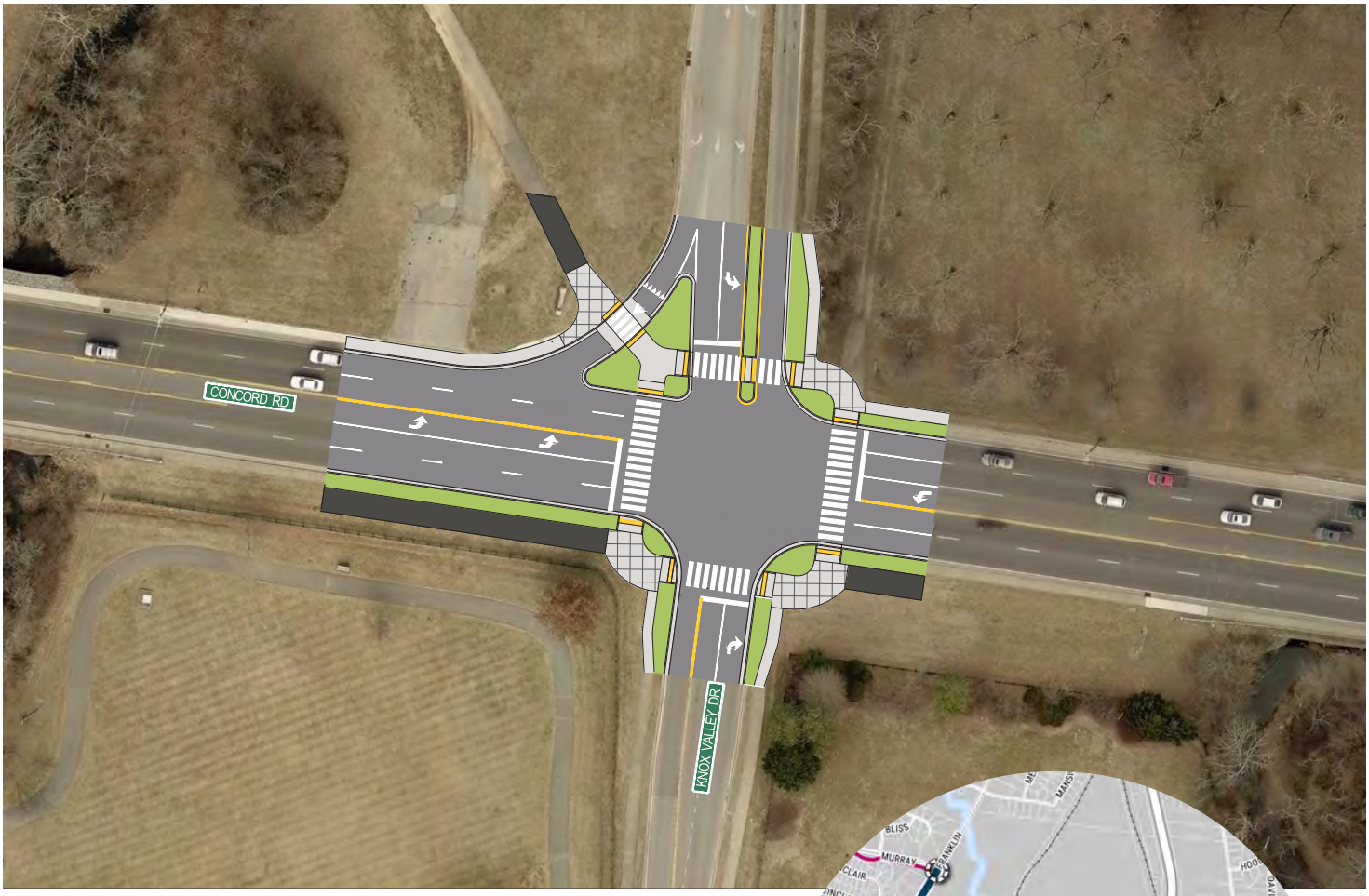
Protected Intersection Elements

1. Reduced curb radii to decrease traffic speeds
2. Raised pedestrian crossing off Wilson Pike turn-lane
3. Enhanced curb ramps and landings
4. Multi-use path connections

PROTECTED INTERSECTION

Concord Road at Knox Valley Drive

The intersection of Concord Road and Knox Valley Drive is an important connection to the existing Tower Park facilities. Utilizing raised medians, landscape buffers, and raised crosswalk on the right turn-lane of Heritage Way, this protected intersection provides improved access to Tower Park and beyond.



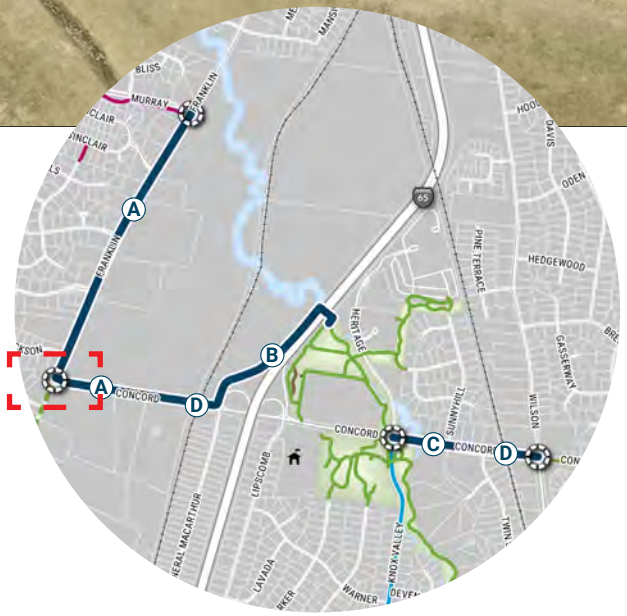
Protected Intersection Elements

1. Reduced curb radii to decrease traffic speeds
2. Pedestrian refuge within Heritage Way median
3. Raised pedestrian walk off Heritage Way turn-lane
4. Enhanced curb ramps and landings
5. Multi-use path connections

PROTECTED INTERSECTION

Franklin Road at Concord Road

Approval has been finalized for a multi-use path that travels north from south Brentwood until reaching Concord Road. The continuation of a multi-use path north along Franklin Road is a must, allowing residents to safely and efficiently travel to the commercial district. A protected intersection at Franklin Road and Concord Road is important in establishing the pedestrian realm, providing safe travel.



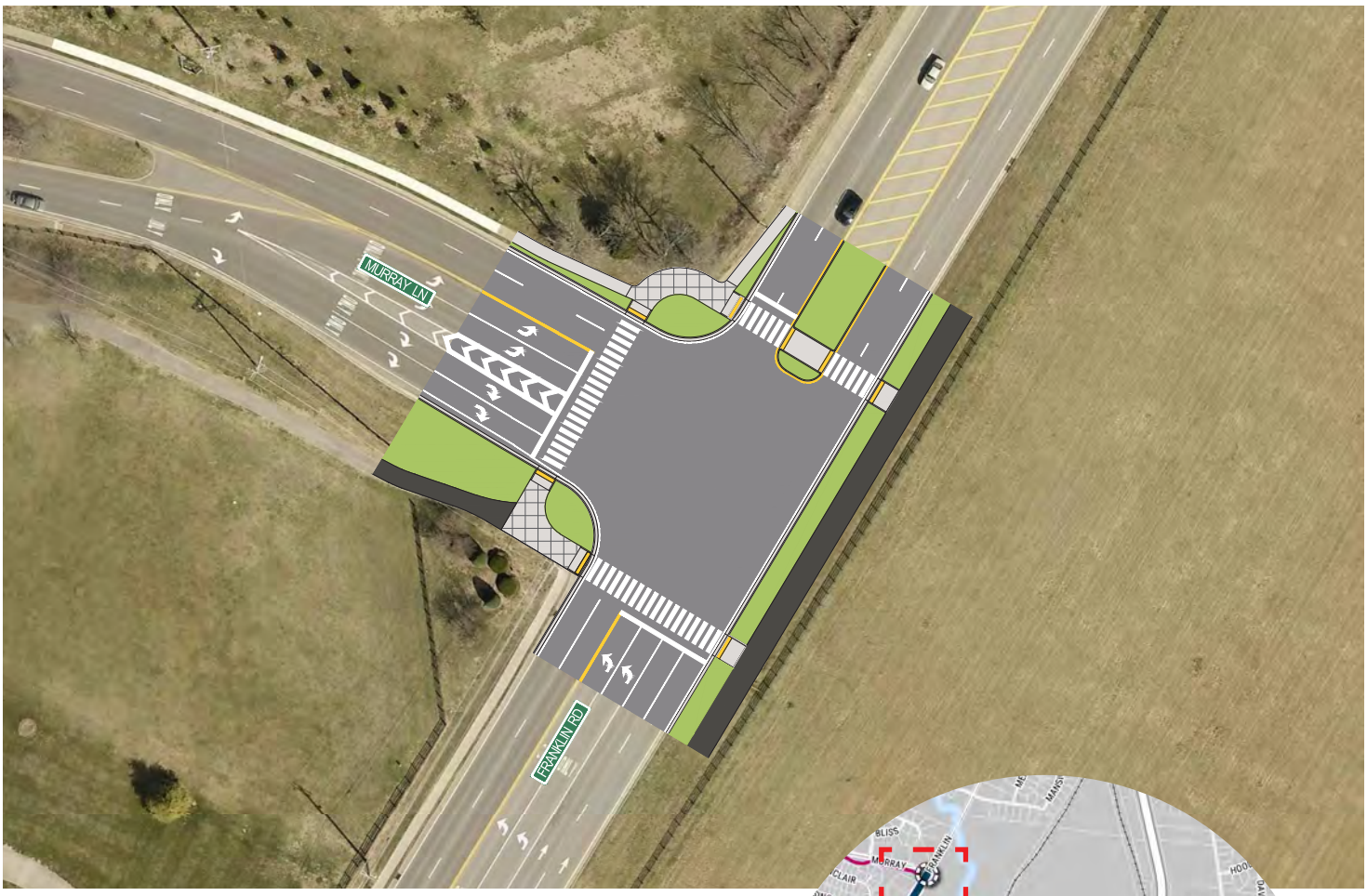
Protected Intersection Elements

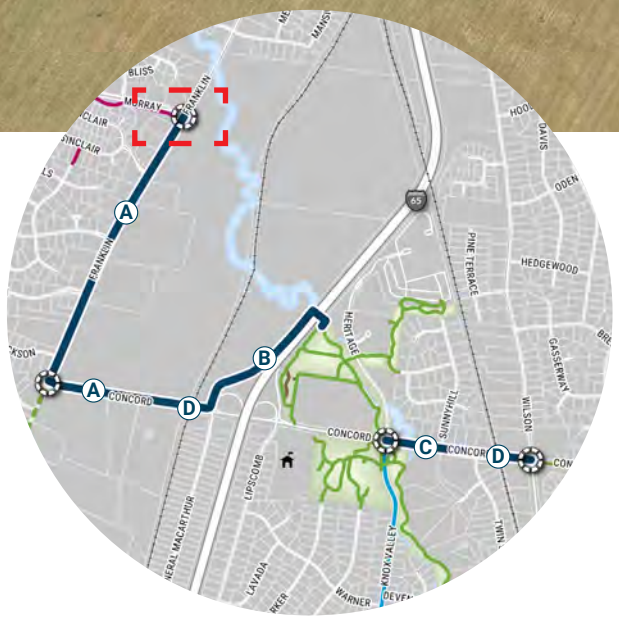
1. Reduced curb radii and removal of northbound channelized right-turn lane onto Concord to decrease traffic speeds
2. Enhanced curb ramps and landings
3. Multi-use path connections

PROTECTED INTERSECTION

Murray Lane at Franklin Road

Franklin Road is a major thoroughfare in the City of Brentwood. Currently, it is difficult for residents to safely cross this corridor, so it is important to create a more formal atmosphere to establish pedestrian routes. By implementing raised medians, crosswalks and protected shoulders at Franklin Road and Murray Lane, this intersection becomes a safer pedestrian crossing.





Protected Intersection Elements

1. Reduced curb radii to decrease traffic speeds
2. Pedestrian refuge within Franklin Road median
3. Enhanced curb ramps and landings
4. Multi-use path connections