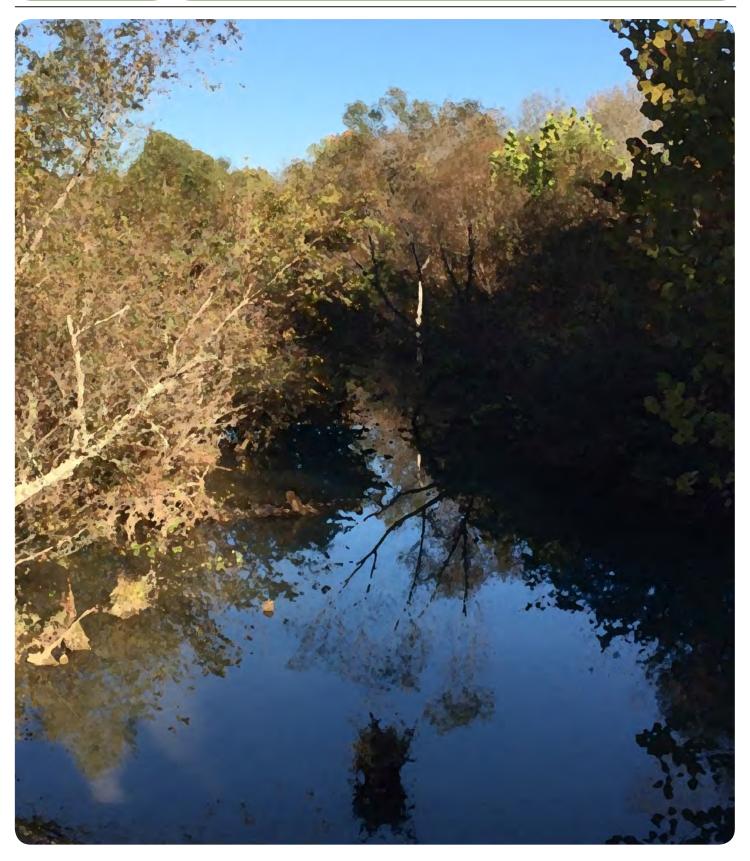
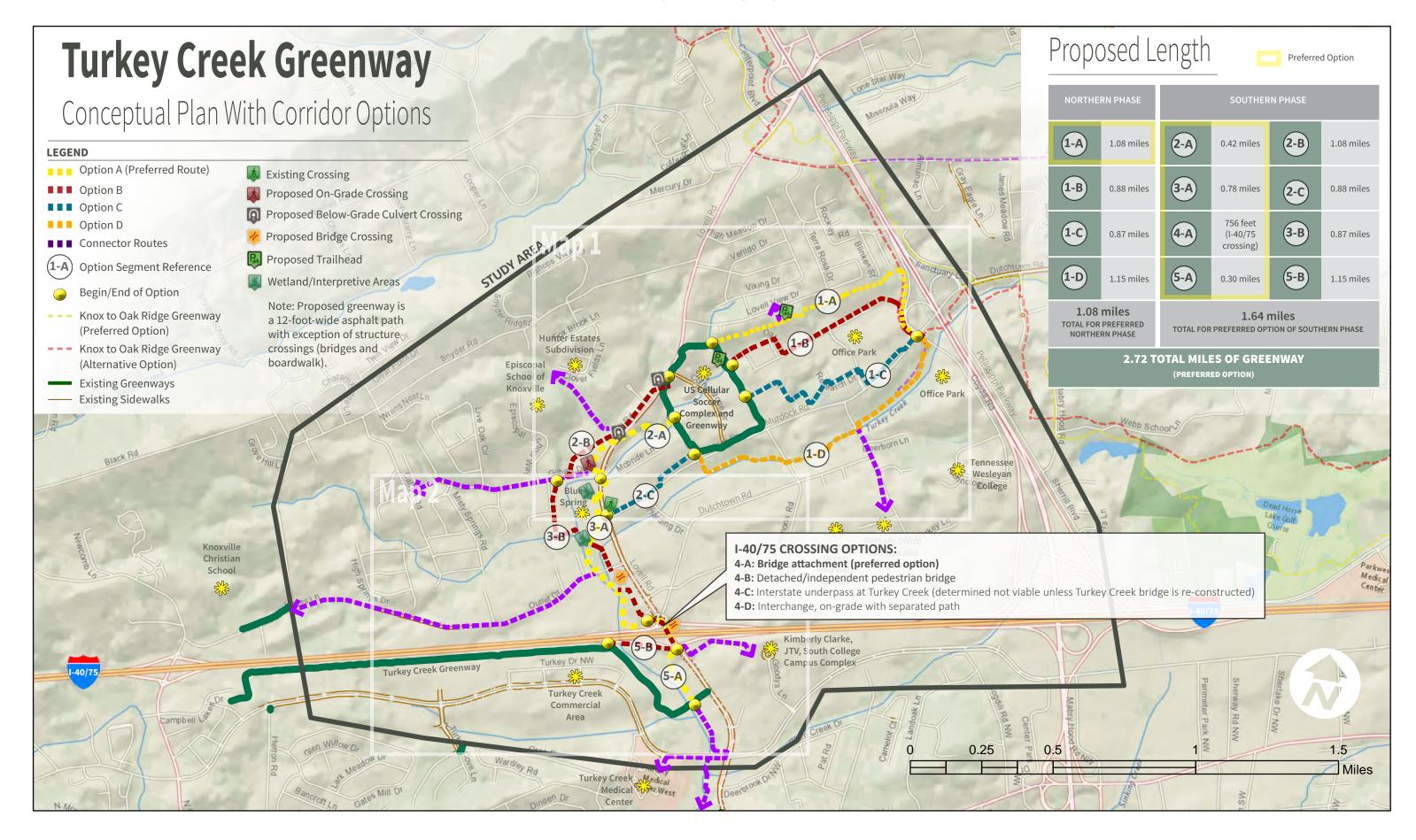
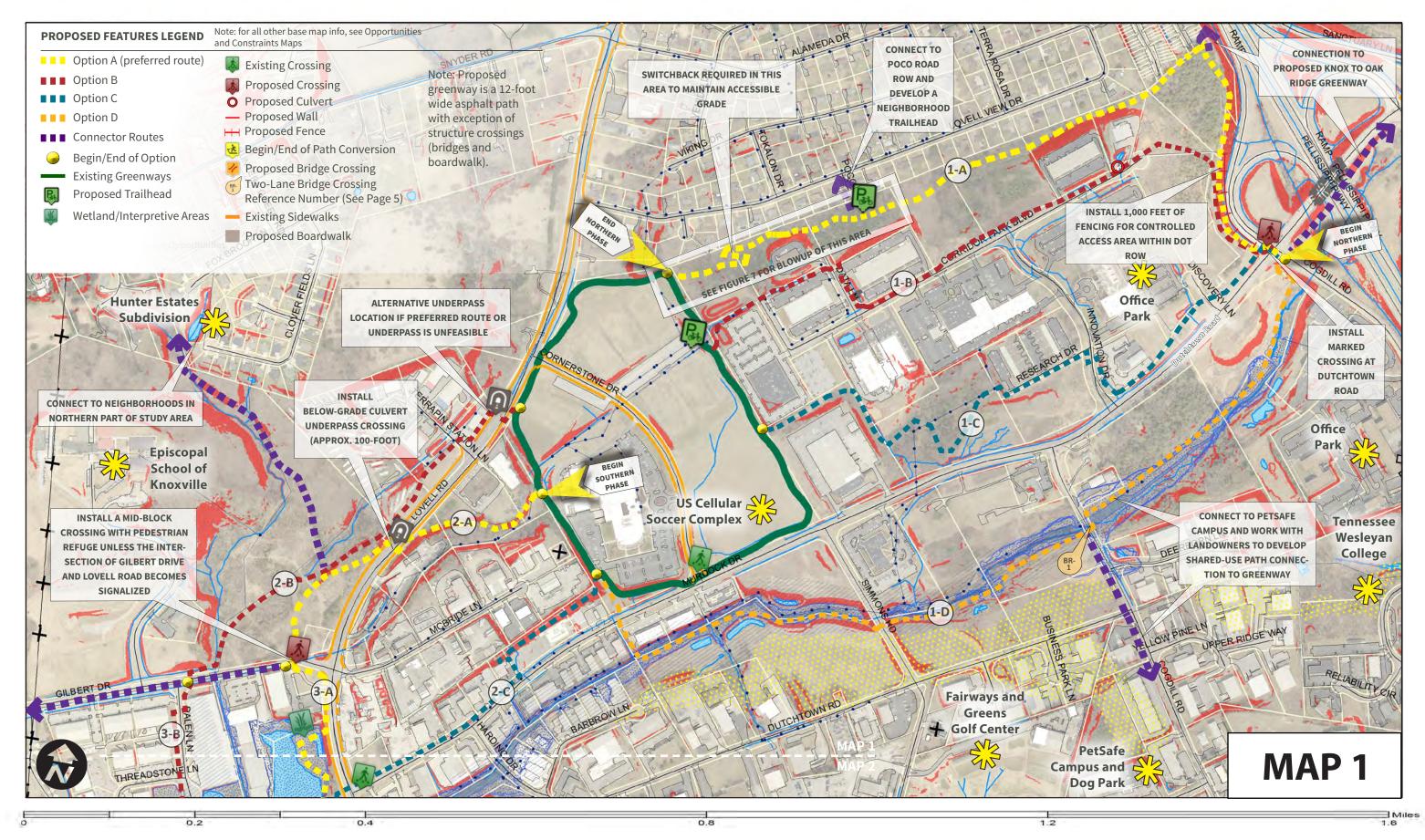
Part C

Corridor Design

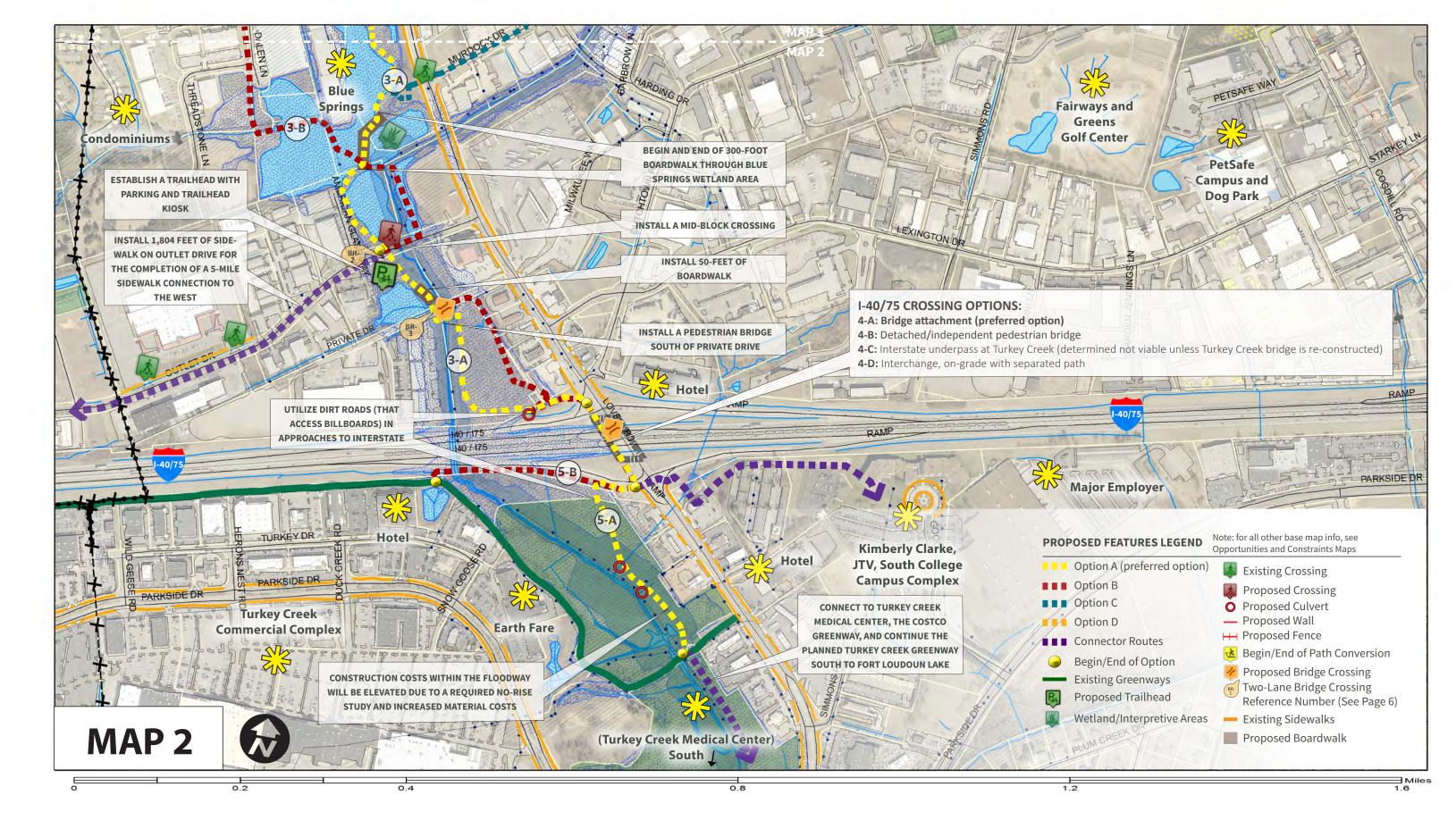


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Turkey Creek Greenway Study • Corridor Design



Turkey Creek Greenway Study • Corridor Design

Part C: Corridor Design

Part C: Corridor Design

Phasing and Overarching Design Features

This plan provides guidance for a 2.72-mile planned greenway. The greenway is divided into two phases—a northern and southern phase—for ease of implementation. Design recommendations are outlined in the following pages. While one phase may be constructed before the other, planning and corridor acquisition for both phases should be underway concurrently. This can allow for seized opportunities, such as incorporating the greenway into land development, negotiating easements, and integrating active transportation requests into regional and state transportation planning efforts.

These phases have not been prioritized, but should be once additional landowner outreach identifies areas where donated or low-cost easements are most likely to be acquired.

Northern Phase From Pellissippi Parkway to US Cellular Soccer Fields

The Preferred Route

Option 1-A. Option 1-A is the preferred

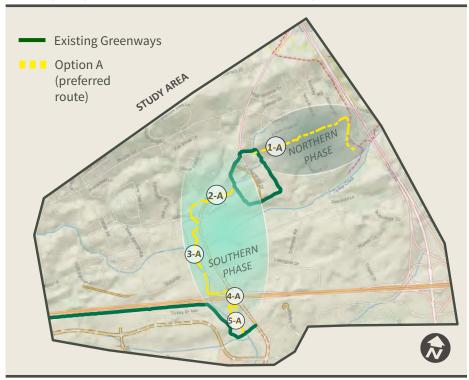
alignment as it is most encompassed by nature as it travels along a forested ridgeline, with potential views, connections to neighborhoods to the north and connection to the office park to the south. This choice is informed by feedback from the Technical Advisory Committee as well as public surveys, which reveal a preference for trails in a natural setting. This route also requires the least amount of road crossings and greenway corridor to acquire.

Costs and Length of the Preferred Greenway Alignment

PHASE	TOTAL COST* (Construction & Permitting)	COST PER LINEAR FOOT	COST PER MILE	TOTAL MILES
NORTHERN PHASE (Pellissippi Parkway to US Cellular Greenway)	\$859,600*	\$150	\$795,920	1.08 Mi.
SOUTHERN PHASE (US Cellular Greenway to existing Turkey Creek Greenway)	\$2,534,700*	\$293	\$1,545,540	1.64 Mi.
TOTAL:	\$3,394,300 Total For Construction	2.72 Mi.		

^{*} Note: Cost is approximate and rounded-off based on cost estimates developed from 2014-2016. Costs should be adjusted for inflation.

Phasing Diagram of the Preferred Greenway Alignment



Alternative Routes

Option 1-B and 1-C. Either of these routes could be used to travel through the office park, and may be preferred if future office park expansions are willing to accommodate the greenway as part of their development plans.

Option 1-D, Least Preferred Route. This option is not preferred due to its multiple creek and road crossings.

Corridor Design Recommendations for the Preferred Option

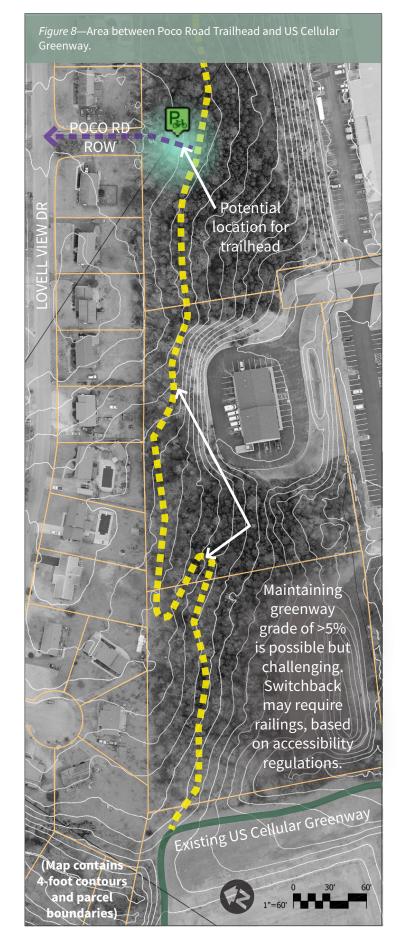
Recommendations for the preferred alignment (Option 1-A) of the northern phase includes the following:

Develop a Marked Crossing at the Western

Interchange of the Dutchtown Road/Pellissippi
Parkway Interchange. The proposed greenway
crossing of this interchange is shown in the Knox to
Oak Ridge Greenway Study. The study indicates how
a greenway user can cross the interchange east to
west toward the corner of Dutchtown and Cogdill
Roads. A marked crosswalk should be installed, which
will cross Dutchtown Road on the western end of the
interchange.

Use Pellissippi Parkway TDOT Right-of-Way (ROW) for Approximately 1,050 Feet. This ROW can serve as space to gradually elevate the greenway above the Parkway, with significant tree buffer and elevation difference to provide for a positive user experience. A powerline is also located within this ROW, so coordination regarding shared use should be considered. An elevation gain of approximately 70 feet will be necessary to reach the ridgeline from the Dutchtown Road/Pellissippi Parkway Interchange. This would require approximately a quarter of a mile of length to maintain accessible grade without the need for handrails. The connection from the ROW to the ridgeline would require a secured corridor involving up to two private properties. Navigation either completely within one or along the boundaries of both of these parcels will be necessary to access the ridgeline.

Consider the Knox to Oak Ridge Greenway Alternative Alignment as the Preliminary Alignment if Alternative 1-A is chosen. The proposed Knox to Oak Ridge Greenway alternative connects to Parkway



Heights, a high-density townhome development, and continues to use TDOT ROW. The Knox to Oak Ridge greenway alternative may be considered as preferred as both greenways would share the same alignment within TDOT ROW.

Utilize the Undeveloped Ridgeline. This ridgeline has not been developed, possibly due to topographic constraints. Based on careful contour study, the topography allows for a greenway that can be maintained at a 5% or less grade. At least one or more switchbacks may be needed (see Figure 8 for one identified location). Corridor acquisition (involving 7 parcels minimum) will be necessary. Four of these parcels are under the same ownership and are currently undeveloped. These encroachments would be relatively contained along the upper boundaries of the parcels.

Develop a Trailhead Near Poco Road's Terminus. The adjacent single-family neighborhood north of the greenway can be accessed by using Poco Road's ROW. The trailhead would include signage and possibly other amenities.

Connect To Most Northern Part of the US Cellular Greenway and Secure the Greenway For Permanent Use As Part of the Turkey Creek Greenway. A significant portion of the US Cellular greenway should be adopted as part of the Turkey Creek Greenway. Since this existing greenway is privately owned and leased to Knox County, an agreement should secure the greenway as permanent because it is such a critical segment of the larger Turkey Creek Greenway.



Develop An Official Trailhead at the US Cellular Fields Parking Lot. An existing parking lot could provide trailhead amenities, including a kiosk and wayfinding signage.

Beyond the Corridor—Northern Phase Recommended Connections

Recommended connections include:

- Connect to Parkway Heights and the Proposed Knox to Oak Ridge Greenway. Connectivity to Parkway Heights would provide greenway access to the residents of more than 150 properties. Option 1-A overlaps with the Knox to Oak Ridge Greenway alternative for over 1,000 feet. This may make a compelling reason to make this Knox to Oak Ridge alternative the preferred alignment traveling north, ultimately connecting office parks, Pellissippi State Community College, and Oak Ridge. Installation of controlled access fencing of approximately 1,000 feet will likely be needed if TDOT ROW is utilized.
- Connect to Neighborhood North of Option 1-A. This connection would potentially have a trailhead with parking and connect into the ROW of Poco Road.
- Connect to PetSafe Campus. Pedestrian/bicycle facilities along Cogdill Road would provide a direct connection to the current and planned campus for this major employer. Cogdill Road has significant elevation changes that may deter some users. Additionally, it has no sidewalks, bicycle lanes, or shoulders. These challenges indicate a need for planning and implementation of pedestrian and bicycling facilities on Cogdill Road. The County might also consider working with private developers along Alternative Option 1-D to develop a greenway connector that connects from Cogdill Road along Turkey Creek and terminating at the Dutchtown Road/Pellissippi Parkway Interchange.
- Connect to the Existing US Cellular Greenway.





Southern Phase From US Cellular Soccer Fields to Existing Turkey Creek Greenway

The Preferred Route

The preferred route attempts to maintain as much separation from the road as possible while being located within the more congested/developed area of the study. Key constraints that shape the alignment along the Southern Phase are navigating a Lovell Road crossing, protecting and simultaneously celebrating the Blue Springs wetland complex, and crossing Interstate 40/75. Lovell Road parallels a majority of the Southern Phase. Lovell Road experiences heavy volumes of traffic traveling at a speed that is not conducive to at-grade mid-block crossings. Once west of Lovell, the corridor enters undeveloped parcels, which provide relatively unconstrained alignment possibilities that can be negotiated with landowners. After crossing Gilbert Drive, the corridor enters Blue Springs, a wetland complex that provides an incredible opportunity for natural interpretation, but demands a higher cost of implementation and maintenance. The preferred alignment is a combination of the following routes:

Option 2-A. Option 2-A is preferred, as it maintains the most distance from roads and development. This option also travels through a small patch of forest before crossing Lovell Road, allowing users to be encompassed by tree canopy while paralleling a drainage way. A below-grade crossing of Lovell Road is preferred, as it requires the least amount of ground excavation for a greenway underpass and its approach ramps. This alignment option will require corridor acquisition through a minimum of three properties. The greenway would be located on the perimeter of two of these properties, but would require running through one property as the alignment works its way along a drainage way to Lovell Road.

Option 3-A. This route traverses through the Blue Springs wetland complex by utilizing a boardwalk system. While a boardwalk may increase the cost of the greenway and add long-term maintenance considerations, the user will feel much removed from the built environment and experience excellent waterfowl viewing opportunities. As this route travels further south, it parallels Turkey Creek, with a significant visual and audible separation from Lovell Road.

Option 4-A, the Preferred Attached Bridge Crossing of Interstate 40/75. This option is the preferred route because of the cost savings compared with a detached pedestrian bridge, and the safety benefit compared with using the shoulders on Lovell Road. This option removes greenway users almost completely from the Lovell Road Bridge and provides a 10-foot wide shared use path for crossing the Interstate. This option is not as ideal as the separated pedestrian bridge because users will still need to navigate on-grade crossings of the on and off-ramps of the freeway.

Option 5-A. This option utilizes an existing dirt road that services the billboard on the southwest corner of the Interstate 40/75 interchange. It allows for immediate immersion into the Turkey Creek floodplain and the natural area south of the Interstate.



Alternative Routes

Option 2-B. Option 2-B can alternatively be used if there are land acquisition barriers to the preferred option. Option 2-B utilizes a below-grade culvert crossing at Lovell Road, but would cross further north and require negotiation with the landowners to the west, rather than staying within Lovell Road's ROW completely.

Option 2-C. This option could be pursued if the two below-grade culvert crossings are deemed unfeasible or cost prohibitive. There are significant utilities (like electric and sewer), which may need to be relocated. Further study may reveal that utility relocation is just as costly as a greenway underpass, making this option less desirable. Additional negative aspects of this option include multiple driveway cuts/access points that introduce hazardous conditions to greenway users.

Option 3-B. This option could be elected if there are land acquisition issues with the preferred option. It crosses an equivalent amount of wetland/ponded areas, so construction and maintenance costs would be similar to the preferred option.

Options 4-B, 4-C, and 4-D Interstate Crossing Alternatives. The design details for the Interstate 40/75 crossing options are discussed further below.

Option 5-B. This option stays mostly within DOT ROW, with a similar distance to the Interstate as the existing Turkey Creek Greenway. Based on public and stakeholder feedback this alternative is not preferred because of its low quality user experience. Its only advantage is it has fewer impacts to the floodway than Option 5-A.

Corridor Design Recommendations for the Preferred Option

Install A Below-Grade Greenway Underpass On Lovell Road. Two recommended crossing areas have been identified on the Corridor Design maps based on grade drops that can be used in the ramp design. Option 2-A has the preferred below-grade crossing. Greenway underpasses are increasingly common and can be

constructed within a matter of days. A "cut and cover" operation is relatively typical and would involve temporary deconstruction of the road and lane closure (maintaining operable lanes during the process). Prefabricated concrete box culverts are placed together and lighting installed. Ramps designed to AASHTO standards access the box culvert. Lovell Road ROW can be used on the ramp approaches to and from the culvert underpass. Vehicle barriers are placed ongrade above the underpass. See Figure 9 for examples of greenway below-grade culvert underpasses. Culvert underpasses like this typically cost between \$250,000 and \$450,000.



Figure 9—Example of a below-grade greenway underpass ("cut and cover") that can be utilized to cross under Lovell Road.

Envision With the Episcopal School of Knoxville the Potential for the Greenway Alignment. A portion of the Southern Phase travels through Episcopal School property. Whether this property is envisioned for campus expansion, commercial, or residential use, there is huge potential to integrate the greenway into the development. Flexibility for greenway alignment can be explored because much of the southern part of the property is relatively flat.

Install a Mid-block Crossing on Gilbert Drive. Gilbert Drive currently has an over-wide intersection with Lovell Road that includes a turn lane. Because there is no signal at this intersection, introducing pedestrians to the intersection would not be recommended. A pedestrian refuge island is recommended at this mid-block crossing. Gilbert Drive appears to have enough ROW to widen the road to allow a pedestrian refuge to be located just west of the turning lane for the intersection. Alternatively, if a signal is installed at Gilbert Drive, formal intersection improvements should be pursued.

Construct a Boardwalk System That Flows Through and Showcases the Blue Springs Wetland Area. The area surrounding Blue Springs has incredible scenic value and also considerable environmental constraints including wetlands, floodway, and potentially rare flora and fauna. A boardwalk system would be the best approach to minimize impact and navigate through fluctuating waters. An approximately 300-foot boardwalk is proposed, but some lengths of this may be eliminated if high ground is identified during a more detailed level of design. This boardwalk system should integrate wildlife viewing platforms and resting areas.

Outlet Drive Mid-Block Crossing: A mid-block crossing of Outlet Drive will need to occur as the proposed alignment emerges from the wetland/boardwalk system. Outlet Drive currently has a center turn lane allowing for a pedestrian refuge if desired. However, due to lower traffic volumes, this is not necessarily needed.

Establish A Trailhead at Outlet Drive. There is a 3-acre undeveloped area (as part of a pet boarding facility) off Outlet Drive that is a prime location for a trailhead. It is assumed this area is undeveloped due to flooding constraints and ponding. However, some portion of the area is maintained as a grass lawn and, based on natural resource mapping data, appears not to be ponding or within the floodway. Positioning a trailhead here would have ideal proximity for users to access the greenway and the Blue Springs wetland and boardwalk.

Install a Boardwalk That Passes Through a Ponded Area and Floodway. A continuous boardwalk of approximately 50 feet would traverse this area and would ramp up in elevation to meet the grade of the private drive to the south.

Develop a Mid-Block Crossing On the Private Drive. This drive may be private or may have County ROW. In discussion with the County, ownership of this drive is unclear. This issue should be investigated further, but regardless of ownership, a simple mid-block crossing would be used.



Install a Pedestrian Bridge South of the Private Drive Road (Southwest of Harley Davidson Facility). Crossing back over Turkey Creek will be necessary to gain access to the eastern side of the creek, to begin the oach to Interstate 40/75. Locating a pedestrian bridge just south of the private drive (which currently crosses

approach to Interstate 40/75. Locating a pedestrian bridge just south of the private drive (which currently crosses the creek) will reduce the chance of flooding and hydrologic impacts, and will allow room for bridge abutments. Additional costs to build this bridge within the Turkey Creek floodway will likely include the need for a no-impact flood study.

Utilize Existing Access Road to Billboard. An existing dirt access road ascends to a billboard near the northwest corner of the Lovell Road and the I-40/75 Interchange. Greenways can accommodate utility vehicles, which would include design for vehicle width and depth of compacted base to bear vehicle weight. Elevation gain from the floodplain to the interchange is approximately 30 feet, so switchbacks (and possible railing) may be necessary.

Interstate 40/75 Crossing Options. There are several design options to consider for crossing of the interstate. The options are prioritized based on stakeholder feedback, user experience, cost, and constructibility. The following options considered are:

Interstate 40/75 Crossing Options

Option	Crossing Type	Opportunities & Constraints	Ranking (1 being most desirable option and 4 being least)	Cost	TDOT Comments:
Option 4-A (Preferred Option)	Lovell Road and I-40/75 Interchange, Bridge Attachment (see Figure 10)	Potential for pedestrian refuge islands should be explored further. Wide 10- to 12-foot emergency shoulders (See Figure 3) may allow for pedestrian refuge islands. Offand on-ramps would have some safety challenges for users, even if pedestrian islands and crossings were in place.	This option would still require users to have atgrade crossing at the freeway entrance and exit.	\$500,000- \$700,000 ¹	A detailed bridge and engineering study is needed, but this option is probably feasible. TDOT has concerns about physically separated pedestrian refuge islands.
Option 4-B	Detached Pedestrian Bridge— Crossing From Existing Turkey Creek Greenway to North Side of Interstate (see Figure 11)	Ramps beginning at grade with the interchange would double back (see Figure 11 for an example of this), gradually elevating at a 5% grade to gain required clearance above semi trucks. Bridge span would be approximately 400 feet.	This option would be the most expensive, but could be an iconic gateway to West Knoxville and would completely separate users from interaction with the Interstate. Because of the high cost of this option, it is considered second in ranking.	\$4-7 million	A detailed bridge and engineering study is needed. The existing abutment would likely not support a separate bridge.
Option 4-C	Turkey Creek Interstate Underpass	TDOT may in the long term redesign this bridge, at which time this crossing could be studied. Clearance and flooding issues would likely make this option unfeasible in its current state.	This option is not currently viable but may be if bridge is re-constructed.	TBD, not enough knowledge of existing conditions to determine	TDOT was not asked to comment on this option.
Option 4-D	Lovell Road and I-40/75 Interchange, On- grade Crossing With Separated Path (see Figure 12)	TDOT prefers opportunity to install a 5-foot sidewalk (with curb) and a 4-5-foot bicycle lane. Wide 10- to 12-foot emergency shoulders (See Figure 3) may allow for a separated path as well as potential for pedestrian refuge islands. Off- and on-ramps would have some safety challenges for users, even if pedestrian islands and crossings were in place.	This option is the least preferred due to user experience and safety. Onstreet crossing could create safety conflicts with drivers exiting and entering the freeway and little separation can be afforded for the user.	\$150,00-300,00 (depending on types of separation like refuge islands, barriers, etc)	The addition of an 8-foot separated path (with barrier) or sidewalk is not feasible without further modification based on existing shoulder width, drainage, and hydraulic requirements along with roadway design standards for turning vehicles. TDOT has concerns about physically separated pedestrian refuge islands.

^{1.} TDOT provided cost for Buck Karnes bridge attachment, which was \$1,318 per linear foot (in 2005). Using this cost, would put this bridge attachment at \$1.3 million. It is recommended to use the cheaper FRP option.

Turkey Creek Greenway Interstate 40/75 Crossing Options

Figure 10—BRIDGE ATTACHMENT (OPTION 4-A)

FRP (fiberglass reinforced polymer) and aluminum bridge attachments are cutting-edge materials that can reduce weight 10-20%, compared to traditional steel bridges.

The Buck Karnes Bridge attachment in Knoxville sets a precedent for re-adapting existing bridges. Cost for this bridge is estimated to be significantly more than the FRP option.





Figure 11—DETACHED PEDESTRIAN BRIDGE (OPTION 4-B)



Example conveys how ramps would navigate over on- and off-ramps and the interstate. The example shown is the Galveston Street Bicycle and Pedestrian Bridge in Chandler, AZ. The bridge cost \$3.8 million to build. *Image courtesy of Arizona DOT.*



Figure 12—ON-GRADE CROSSING WITH SEPARATED PATH (OPTION 4-D)



Utilize Existing Billboard Access Road Traveling South of the Interstate. A dirt access road terminates at the billboard near the southwestern corner of the Lovell Road and I-40/75 Interchange. The access road descends into the Turkey Creek floodplain. This access road could be utilized, but does travel through an extensive portion of the floodway. Construction costs will be higher within the floodplain due to a required no-rise study and additional construction materials to allow for adequate drainage in a low-lying area. Furthermore, shared ROW for use of this roadway will need to be further explored.

Beyond the Corridor—Southern Phase Recommended Connections:

Recommended connections include:

- Connect to Both the Episcopal School of Knoxville and the Neighboring Hunter Estates Subdivision. A connection coming off of the Preferred Option 2-A connects to both the school and neighborhood by using the school's land. An additional easement on private subdivision land is needed to connect into the Hunter Estate's community center (owned by the Hunter Estates Home Owners Association). Connection to Hunter Estates would also allow connection to the rapidly developing higher-density residential area north of Snyder Road.
- Improve Pedestrian and Bicycle Facilities Along Gilbert Drive. Gilbert Drive connects to a large area of single-family homes and a more recently developed condo complex. Gilbert Drive may have adequate ROW for bicycle lanes or sidewalks. There are currently no facilities and no shoulder. This road is also fairly winding, with poor sight distance, further creating the need for safe pedestrian and bicycle facilities.
- Connect All Of Outlet Drive to Complete the Connection to North Campbell Station Road and Farragut North of the Interstate. Only a third of a mile (1,804 feet) is needed to complete a 5-mile stretch of sidewalk on the north side of Outlet Drive, traveling west to Farragut and North Campbell Station Road. This connection is critical to connect pedestrians and bicyclists across the Interstate and to Turkey Creek Greenway. There currently is no pedestrian/bicycle crossing of the Interstate for Farragut north of the Interstate. These small improvements to Outlet Drive and ultimately Turkey Creek Greenway would tie this area of Farragut into the larger bicycle/pedestrian network of Farragut, Knoxville, and Oak Ridge.
- Connect to Kimberly Clarke, JTV, and South College Campus. This would require the crossing of Lovell Road at the Interstate/Lovell Road interchange. There are currently no marked crossings at the signalized interchange. Marked crossings should be accommodated as part of the larger design of the Interstate crossing. Several landowners, including the campus, would need to agree to a sidewalk or greenway connection.
- Continue the Turkey Creek Greenway, Connecting to the Costco Greenway, and Further South to the Tennessee River. Knox County owns a significant portion of land surrounding Turkey Creek traveling south. Wetlands and ponds along the creek may increase greenway construction costs, but could create a continuous half-mile stretch from the southern terminus of the greenway to the Costco Greenway. Turkey Creek Greenway is planned to ultimately travel south along Turkey Creek to Concord Cove Park and the proposed Concord Greenway on Fort Loudoun Lake, which is an impoundment to the Tennessee River.



Overall Corridor Recommendations

Partnerships

Develop Partnership With a Few Key Landowners In the Greenway Study Area. Building relationships with a few key landowners should begin as the greenway corridor right-of-way is planned and secured. These landowners include several technology companies and the developers of the office park in the northern phase area. Partnership and buy-in from US Cellular is key. The Episcopal School of Knoxville holds one of the larger tracts of land critical in the southern phase area. Harley Davidson, All Creatures (pet boarding and supplies), and a few other land owners are critical to helping this greenway happen.

Develop Advocates From Nearby Business and Neighborhoods. Neighboring corporations like PetSafe, Cisco, and the Turkey Creek Land Partners can be advocates and donors to the greenway. Neighborhood associations can also be brought on board to help build political support.

Tell A "Big Story" That Isn't Just About the Greenway

Craft A Larger Story About the Importance of the Turkey Creek Natural Area. The proposed greenway is more than a bicycle and pedestrian connector, it provides opportunity to tie together large swaths of natural land, which are the last remaining natural areas in a rapidly urbanizing environment. This swath edge, defined as the floodplain, can create a connected natural corridor that has huge benefits to wildlife, and can mitigate flooding caused by increased stormwater from urbanization. It can create passive recreation opportunities in a wild area that is at the front door of many neighborhoods. When this greenway is sold to the community, sell it as a larger experience with a larger purpose than the greenway.

Develop Loop Routes off the Spine of the Greenway

Alternatives proposed in this study can be integrated as a loop system that allow office workers to use short segments during lunch, or those accessing trailheads to return to the same area. These route options can be offered to landowners as they develop their property.

See Connectors as Critical

The connections identified in this plan are just as critical as the greenway itself, as they are the arteries that feed into the "heart" of the greenway. With the exception of Dutchtown and Lovell Road, few bicycle and pedestrian facility options are currently available in this area. Connections on Outlet Drive, Gilbert Drive, and Cogdill Drive should be planned for and implemented along with the greenway.

Advocate For a Safe, Separated, and Iconic Crossing of Interstate 40/75

Advocate for Safety. A separated pedestrian bridge may be an ideal crossing option for the Interstate, but may not be an easy sell due to cost. If an attached bridge is in discussion with TDOT, great means should be taken to provide for the safest design for greenway users so they do not come into conflict with vehicles that use the freeway on- and offramps. These ramps are currently signalized but provide no refuge for pedestrians/bicyclists.

Advocate for a Bridge That Can Serve as a West Knoxville Iconic Gateway. Most pedestrian bridges on interstates today go beyond just having a functional structure by integrating "context-sensitive design." Investment into the aesthetic design of a bridge will create a visual landmark for the region, serving as a gateway to West Knox County, Farragut, and the Turkey Creek Commercial Area.