TRENTON ROAD CONNECTOR

BIKE & PEDESTRIAN FEASIBILITY STUDY
May 2020

Raleigh

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ACKNOWLEDGEMENTS

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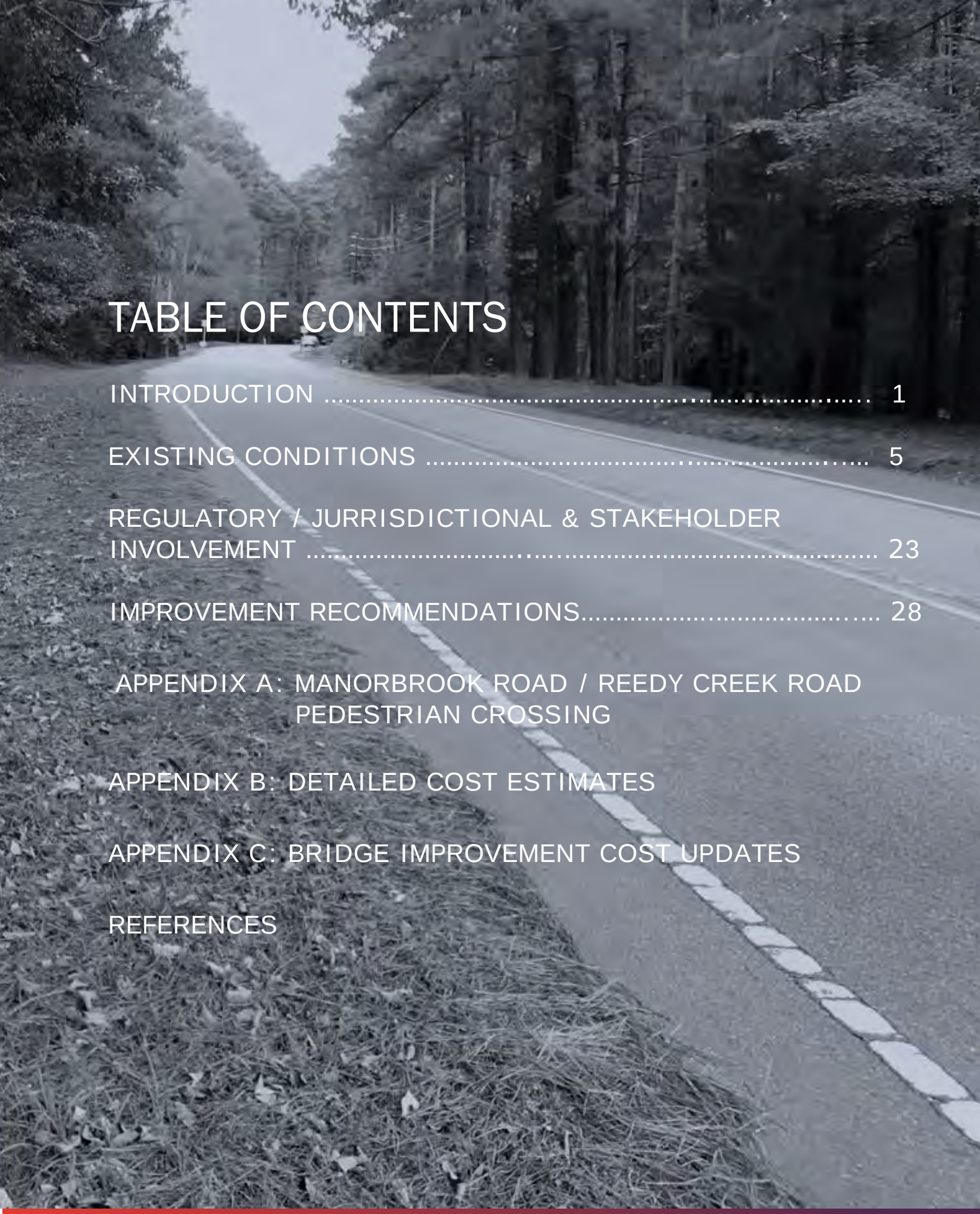

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INTRODUCTION

Introduction

The Trenton Road Connector is a proposed 0.75-mile sidepath along Trenton Road between the bridge over I-40 and the William B. Umstead State Park Entrance at Reedy Creek Road. See Figure 1. Vicinity Map on page 3. This feasibility study provides an overview of the available options considered to provide a pedestrian facility along Trenton Road that minimizes property impacts.

The Trenton Road Connector sidepath alternatives considered include a 5-foot sidewalk, 8-foot sidepath, and 10-foot sidepath widths. All alternatives and are separated from the roadway by either a ditch or curb and gutter. The alternatives were influenced by a multitude of factors to develop feasible recommendations that are able to be constructed with minimal property acquisition, are safe for users, are permittable, respect the natural environment, allow for the challenges associated with utilities, and provide a realistic construction budget for the project based on the current state of construction.

In addition to the facility recommendations located along Trenton Road this feasibility study also provides a recommendation for a pedestrian crossing of Reedy Creek Road near the intersection with Manorbrook Road. This marked crossing of Reedy Creek Road will connect the residents of The Lakes At Umstead to the Reedy Creek Greenway Tail.

This feasibility study does not consider improvements to the bridge over I-40. It only updates the anticipated construction costs associated with bridge improvements that were identified in the *City of Raleigh's 2013 Feasibility Study For I-40 Overpass Pedestrian Retrofits & Construction of Proposed Sidewalks Along Trenton, Buck Jones, Avent Ferry, Lake Dam, Trailwood, and Rock Quarry Roads* to reflect the current state of the construction market and pricing.

Vicinity Map

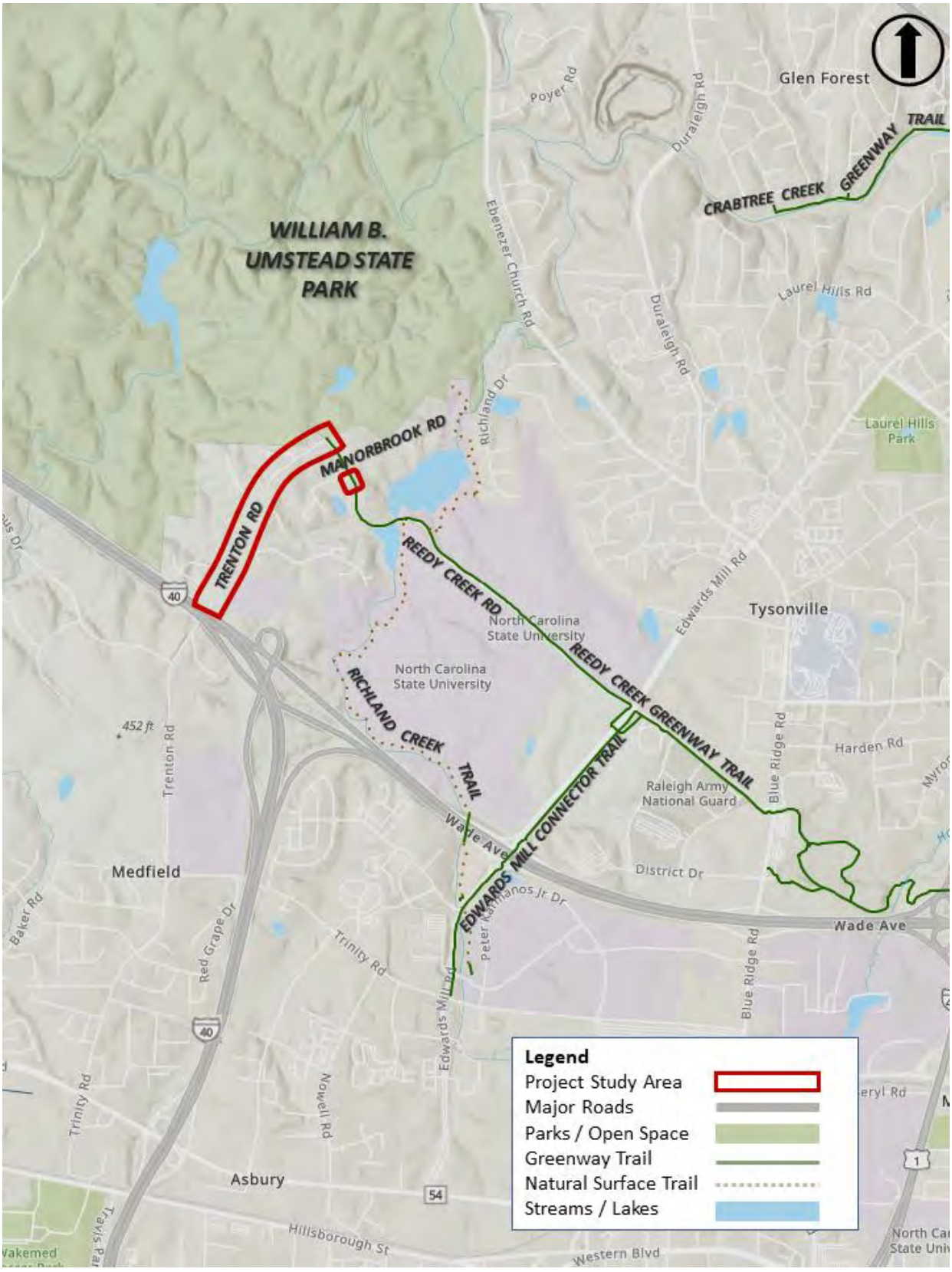

Figure 1. Vicinity Map

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EXISTING CONDITIONS

Existing Condition Inventory & Analysis

The primary feasibility study area for the Trenton Road Connector is approximately 0.75-miles in length. The southern terminus of the primary study area begins at the bridge over I-40. The northern terminus of the primary study area ends at Reedy Creek Road where it connects to William B. Umstead State Park.

In addition to the primary study area, an additional secondary study area is included along Reedy Creek Road to determine the feasibility of a marked pedestrian crossing near the intersection of Manorbrook Road. The study areas are shown in Figure 2 on Page 7.

The study areas are primarily bounded by the following subdivisions: Trenton Pointe, Westridge, The Woods At Umstead Trinity Farms, Trenton Place, and The Lakes At Umstead.

This chapter summarizes the existing condition analysis of the project area. The analysis identifies the constraints that will impact design, and opportunities for the project to connect to existing pedestrian and bicycle networks.

Land Use and Community Resources

Land use along Trenton Road is primarily residential with the exemption of William B. Umstead State Park lands in the northwest section of the study area, and a State of North Carolina property in the southeast portion of the study area. There are several residential and subdivision entrances along the corridor. There are no schools, businesses, churches, hospitals, police stations or nursing homes along the study corridor. Land use and residential neighborhoods can be found in Figure 2 on page 7.

According to the NC Historic Preservation Office (NCHPO) HPOWEB mapping interface, there is one historic property located at 3700 Trenton Road. This property is the Trinity House, which is designated as a Raleigh Historic Landmark as per the Historic Landmark Ordinance, but it is not listed on the National Register. Once the location of the proposed improvements are determined a consultation with the state HPO may be needed to ensure impacts to historic resources are avoided. See Figure 2 on Page 7 for Trinity House location.

Trinity House – Raleigh Historic Landmark Per The Historic Landmark Ordinance.

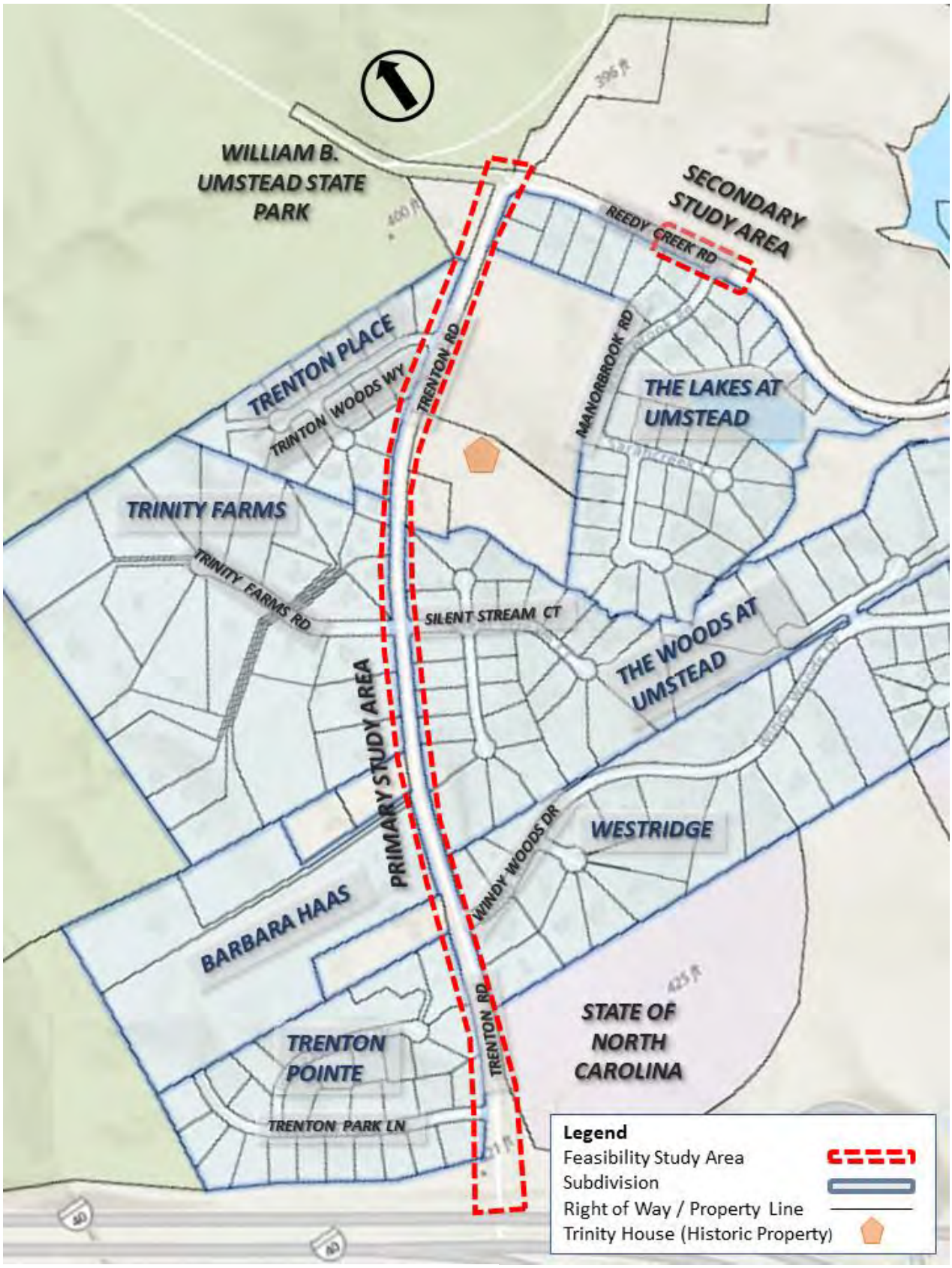


Figure 2. Study Area

Right-of-Way and Property Ownership

The available right-of-way varies along the corridor from a maximum of approximately 207-feet at the southern end of the study area to a minimum of approximately 58-feet north of Silent Stream Court. See Figure 3 for right-of-way widths along the corridor.

The majority of properties along the corridor are privately owned, with the exception of the parcels owned by the State of North Carolina and William B. Umstead State Park.

The majority of improvements located along Trenton Road can likely be contained within the right-of-way, however, property easements or acquisitions will likely be needed to construct retaining walls or slopes, relocate utilities, tie driveways, install or construct drainage improvements, etc.

Easement locations and type are design dependent, in that they will vary with the facility ultimately selected for construction. Property impacts and easement needs will be identified and quantified during design.

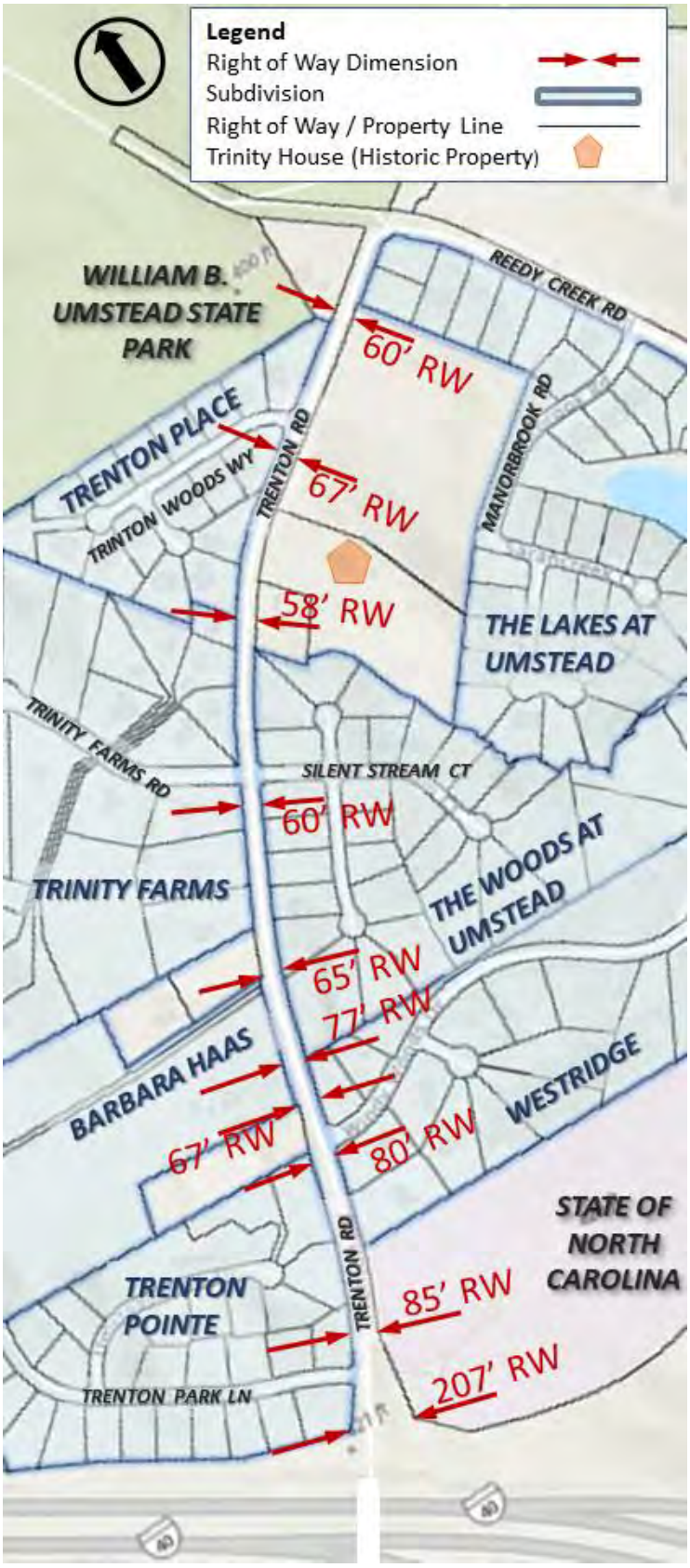


Figure 3. Right-Of-Way In Study Area

Overlay Districts

Sections of the study area are located in the Metro Park Overlay District (MPOD) and the Special Highway Overlay District (SHOD-1). See Figure 4 for the Overlay Districts in the study area.

The MPOD is an Environmental Overlay District defined in Article 5.2.2 of the City of Raleigh's Unified Development Ordinance. Part of the overlay's intent is to preserve and protect the integrity of large natural parks that serve the citizens of Raleigh, the region, and the state.

This project will need to comply with Section 5.2.2 E.2 Impervious Surface Coverage – Final permitting of the proposed project will need to comply with the allowed impervious surface areas that drain into the Metro-Park (William B. Umstead State Park).

The SHOD-1 is a Corridor Overlay District defined in Article 5.3 of the City of Raleigh's Unified Development Ordinance. The overlay's intent is to protect and preserve the natural scenic beauty along designated major access corridors and specified principal arterials. This overlay district is not anticipated to have any impact on the alternatives being considered.

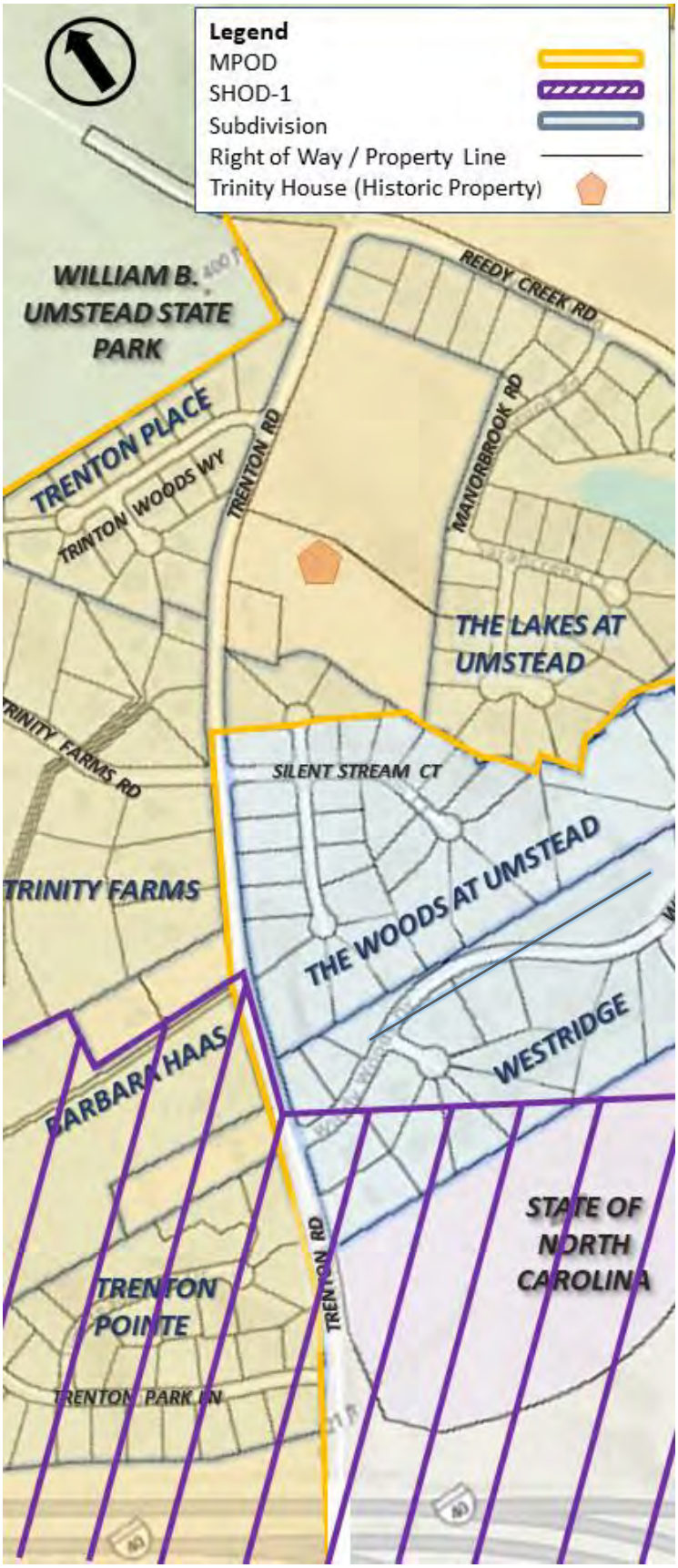


Figure 4. Overlay Districts In The Study

Traffic Features and Data

Trenton Road

Trenton Road (shown below) is a two-lane roadway with one travel lane in each direction throughout the entire study area. The typical section is comprised of 10-foot travel lanes with variable shoulder widths. In general, the total shoulder width varies between 6-foot and 10-foot, with a paved shoulder adjacent to the travel lanes that varies between 3-foot and 6-foot. A 5-foot asphalt sidewalk exists on the west side of the roadway between the bridge over I-40 and Windy Woods Drive. Depending on the location, the side slopes of the roadway are composed of a ditch section with steep front and back slopes, or a steep fill section.

Trenton Road Looking North Near Trenton Pointe Subdivision

Reedy Creek Road

In general, Reedy Creek Road (shown below) is a two-lane roadway, with raised islands between main access points. In the area of the proposed pedestrian crossing, Reedy Creek Road is a 2-lane roadway with gentle ditch and fill slopes. The travel way is comprised of 11-foot travel lanes and 12-foot shoulders with a 3-foot paved shoulder adjacent to the travel lanes. Reedy Creek Greenway Trail is constructed adjacent to the northbound shoulder.

Reedy Creek Road Looking Southeast Near William B. Umstead State Park Subdivision

Street / Driveway Entrances

All connecting streets along the study areas are two-lane roads with stop signs at the entrance to Trenton Road. The number of street and driveway's connecting to Trenton Road between I-40 and Reedy Creek Road are summarized below.

	West Side of Trenton Road	East Side of Trenton Road
Street	3	2
Driveway	9	6
Total	12	8

Speed Limit

Trenton Road has a posted speed limit of 35 mph from I-40 to just north of Trinity Farms, where it becomes 25 mph to the northern extent of the study corridor. Reedy Creek Road has a posted speed limit of 25 mph in the study area. The sharp curve at the north end of study area 1 has an advisory 10 mph posting.

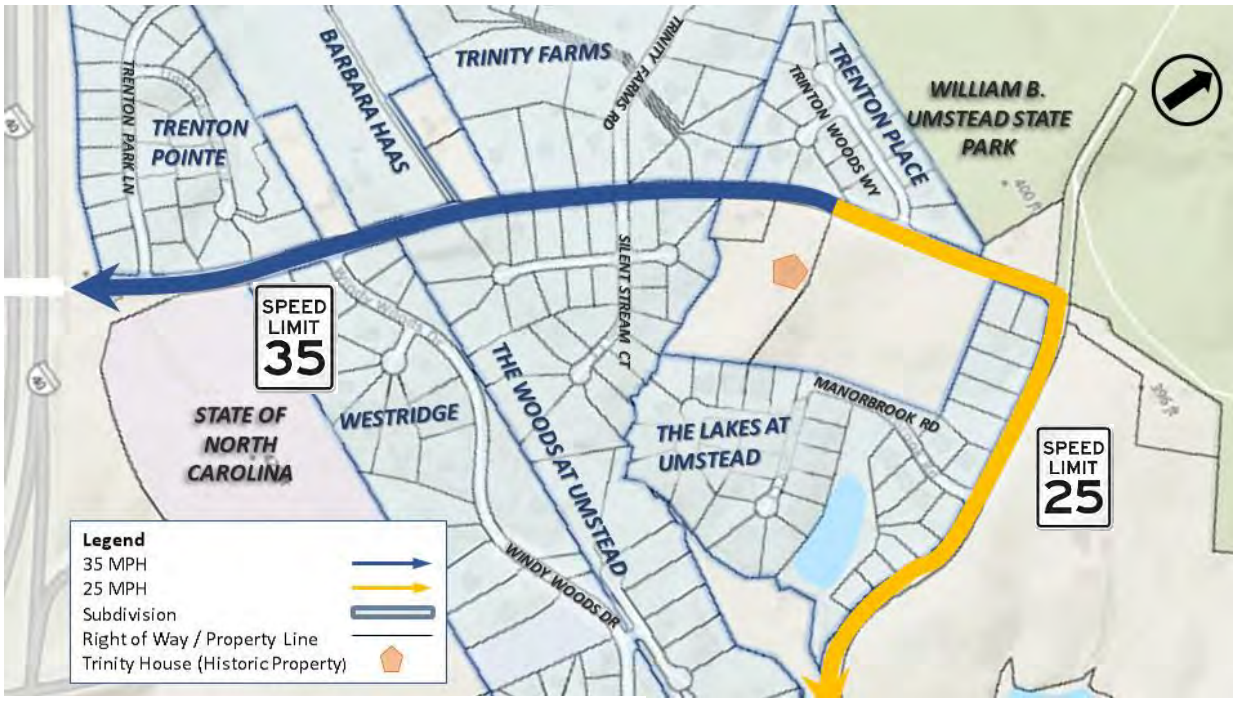


Figure 5. Speed Limits In Study Area

Traffic Volume

The most recent available traffic data along the corridor was taken in 2018 by NCDOT. Based on their findings, the Average Annual Daily Traffic (AADT) along the corridor is 2400 vehicles per day (vpd). The corridor has seen significant traffic increases since 2003 when AADT was reported as 250 vpd.

Typical Cross Sections

Figure 6 and 7 illustrate existing typical cross-sections along Trenton Road. Actual roadway and right-of-way widths vary.

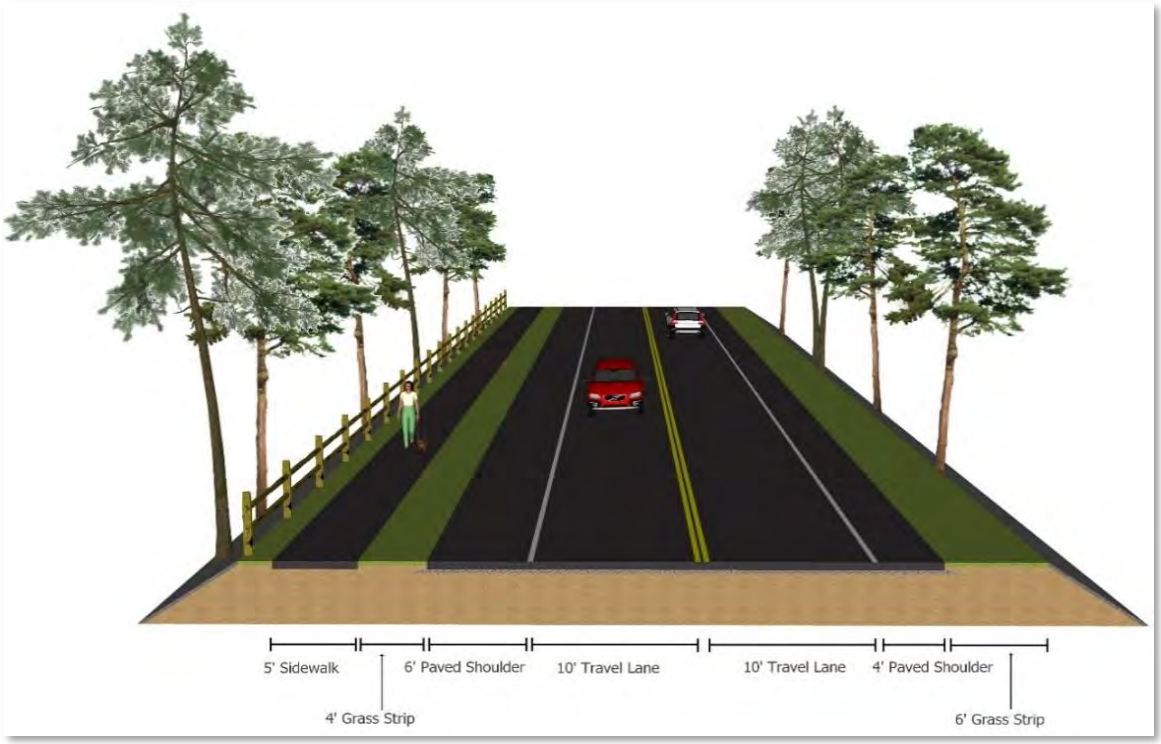


Figure 6: Cross-Section Between I-40 Bridge And Windy Woods Road

Opportunities and constraints for Trenton Road between I-40 and Windy Woods Road include:

Opportunities:

- *The existing right-of-way throughout this section varies from approximately 80-feet to 207-feet.*
- *A pedestrian crossing at Windy Woods could allow safe crossing into the Westridge neighborhood off Windy Woods Road.*
- *Curb and gutter could be added to the roadway to keep improvements within existing right-of-way.*
- *A marked bike crossing at Trenton Park Lane could allow safe crossing of Trenton Road for northbound cyclists to enter a sidepath.*

Constraints:

- *Steep fill slopes exist on the west side of the roadway north of Trenton Park Lane for approximately 600-feet.*

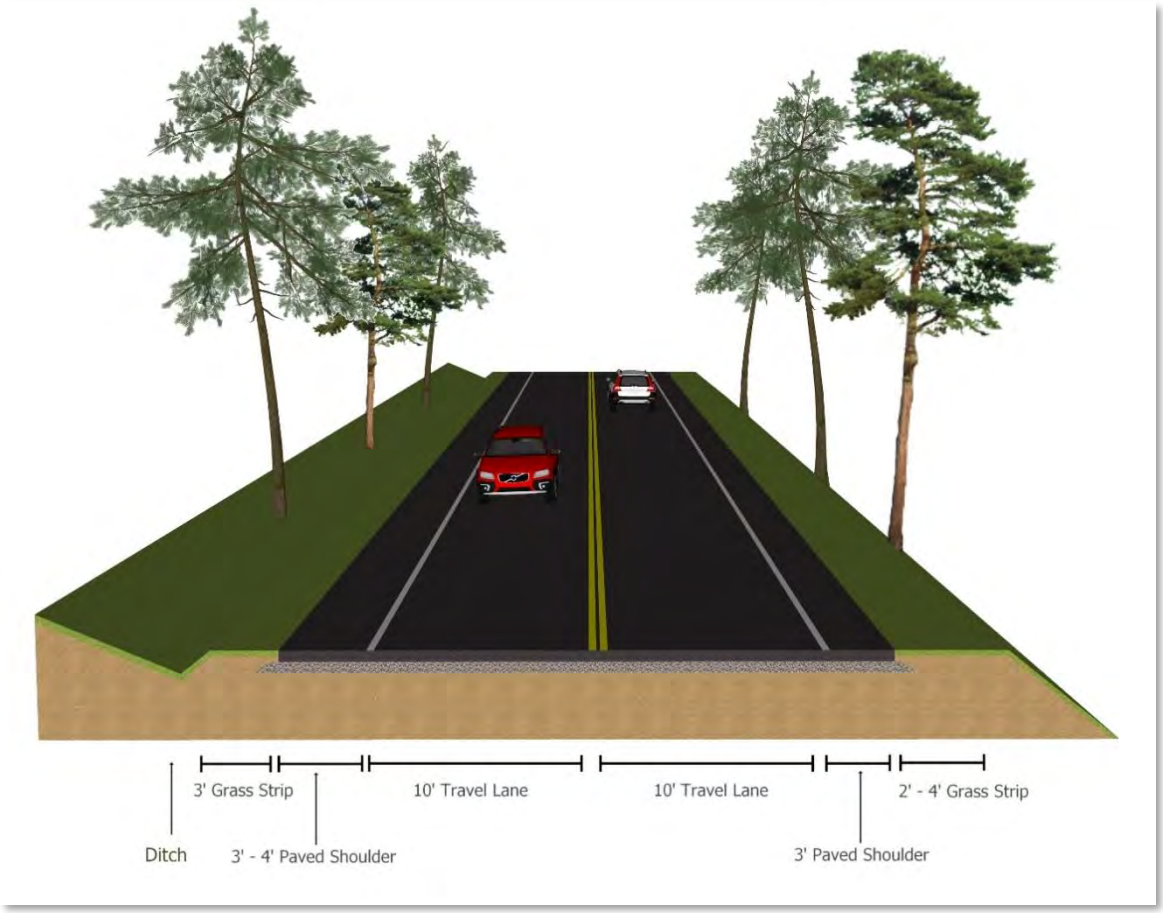


Figure 7: Cross-Section Between Windy Woods Road And Reedy Creek Road

Opportunities and constraints for Trenton Road between Windy Woods Road and Reedy Creek Road include:

Opportunities:

- *The exiting paved shoulder could be narrowed to allow more room for a sidewalk or sidepath.*
- *A pedestrian crossing could be added at Silent Stream Court to connect to the existing sidewalk network in The Woods At Umstead.*
- *Curb and gutter could be added to the roadway to keep improvements within existing right-of-way.*

Constraints:

- *Right-of-Way varies throughout the section between approximately 58-feet and 80-feet.*
- *Some properties have installed landscape screening buffers near the right of way line. These could be impacted.*
- *Service poles for electrical connections could require relocation.*
- *There are some mature trees in or adjacent to the right-of-way that could be impacted by construction.*

Pedestrian Network

Sidewalks

There are currently several sections of 5-foot wide asphalt and concrete sidewalk within study areas 1 and 2. See Figure 8 on page 15 for detailed sidewalk locations.

A 5-foot wide asphalt sidewalk exists on the west side of Trenton Road between the bridge over I-40 and Windy Woods Road (See Photo 1). This sidewalk is separated from traffic by a grass strip. There is currently no curb-and-gutter in place along Trenton Road.

Several of the side streets within the study area have 5-foot wide concrete sidewalks. These streets include:

- Trenton Park Lane has sidewalk on the north side of the road. (See Photo 2).
- Silent Stream Court has sidewalks on the south side of the road. (See Photo 3).
- Trenton Woods Way has sidewalks on the south side of the road. This sidewalk does extend to the intersection with Trenton Road.

The project connects to the Reedy Creek Greenway Trail on the northern end at the William B. Umstead State Park entrance. The Reedy Creek Greenway Trail is separated from Reedy Creek Road with either fencing or a grass median. (See Photo 4).

Photo 1 - Trenton Road - Asphalt Sidewalk From Bridge Over I-40 To Windy Woods Road.

Photo 2 - Trenton Park Lane – Sidewalk On North Side Of Roadway Connecting To Asphalt Sidewalk On Trenton Road.

Photo 3 - Silent Stream Court – Sidewalk Connection To Trenton Road.

Photo 4 - Reedy Creek Road – 10-Foot Greenway Trail On East Side Of Roadway.

Curb Ramps

Curb ramps are in place at Trenton Park Lane. The sidewalk on Trenton Road currently ends before the intersection of Trenton Road and Windy Woods Drive. There are no curb ramps installed at Windy Woods Drive. Curb ramps will need to be installed at intersecting streets to ensure connectivity to the existing sidewalk networks.

Intersections and Pedestrian Crossings

There are currently no marked crosswalks along Trenton Road. The addition of a pedestrian crossing of Reedy Creek Road near Manorbrook Road will be examined as part of this project. A pedestrian crossing at Silent Stream Court will also be considered to allow access to existing sidewalks.

Pedestrian Noted Walking Along Shoulder.

Figure 8. Existing Sidewalk Locations

Although pedestrian facilities do not exist throughout the entirety of the study area, many pedestrians utilize the roadways, and it is shown as a heavily trafficked area by foot in fitness tracking software Strava (lighter color/ thicker line = higher use).

Bikeway Network

On-Street Bike Facilities

There are currently no bike lanes or separated bike facilities along Trenton Road in the proximity of the project corridor, and there are currently no plans to install on-street bike facilities.

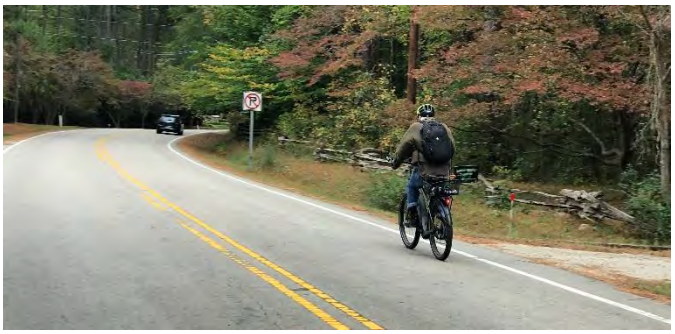
Off-Road Bike Facilities

The Reedy Creek Greenway Trail is located at the northern end of the corridor near William B. Umstead State Park.

Bike Raleigh currently identifies Trenton Road as a "Preferred Route" for cyclists with a "Difficult Connection" near the bridge over I-40. In the 2016 plan update, the route is included on the Ten-Year priority list and is identified as a separated trail / greenway trail.

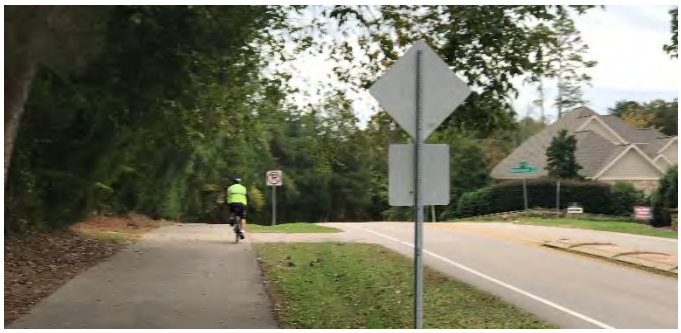
Although bicycle facilities do not exist throughout the entirety of the study areas, several cyclists were witnessed along Trenton Road and Reedy Creek Road and the roads are shown as a heavily used by bike in fitness tracking software Strava (thicker red line = higher use).

Bicycle Use Noted Along Trenton Road Shoulder.



Bicycle Use Noted Along Trenton Road.

Bicycle Use Noted Along Reedy Creek Road Near Location Of Proposed Pedestrian Crossing.



Reedy Creek Greenway Trail Near William B. Umstead State Park.

Crash Data

There have been no reported bicycle or pedestrian crashes recently along the corridor, according to NCDOT Bicycle and Pedestrian Crash data, (March 21, 2019). However, due to the residential nature of the area, as well as the existing sidewalk and greenway trail system in the area, adding connecting pedestrian and/or bicycle facilities along the corridor would increase safety for pedestrians and cyclists in the area, while allowing connection to existing facilities.

Bicycle Connectivity

The existing Reedy Creek Greenway Trail, and William B. Umstead State Park are located centrally within the triangle region and provide bicycling connections to other existing and proposed bikeways. Users can utilize the existing Reedy Creek Greenway Trail to connect into the Rocky Branch Greenway Trail which connects into Downtown Raleigh, and the larger Capital Area Greenway Trail network where users can ultimately connect to the Neuse River Greenway Trail via the Walnut Creek Greenway Trail. From there users can travel south to Clayton or north to Wake Forest and Knightdale.

Trail users can utilize the William B. Umstead State Park trails to connect into the Town of Cary and Town of Morrisville greenway trail networks, and ultimately reach the American Tobacco Trail which connects south to Apex, or north to Durham.

The Triangle I-40 Bikeway (along I-40) is a planned unfunded project that would connect the Trenton Road Connector facility (once built) to RTP, RDU Airport, and Davis Drive.

Funding from NC Capital Area Metropolitan Planning Organization (CAMPO) is being evaluated for the Triangle I-40 Bikeway. The connection of the Triangle I-40 Bikeway to Trenton Road will be determined during the Triangle I-40 Bikeway project.

The addition of a sidewalk or sidepath on Trenton Road would connect the Reedy Creek Greenway Trail to the planned but unfunded Triangle I-40 Bikeway allowing pedestrian and bike connections from downtown Raleigh to RDU Airport, RTP, and Durham via Davis Drive.

Prior Plans

The *2030 Raleigh Comprehensive Plan, the Capital Area Greenway Trail Planning & Design Guide*, the *BikeRaleigh Plan,* and the *Strategic Plan* are prior planning efforts by the City of Raleigh that have identified the need for a bike-ped connection along Trenton Road, or support the project through guidance. The recent plans were reviewed for context, and a brief summary of their recommendations are noted below.

The *BikeRaleigh Plan* (May 2016) recommends a separated bikeway along Trenton Road as part of the Long-Term Plan.

The *Capital Area Greenway Trail Planning & Design Guide* (November 2014) recommends a Greenway Trail connector trail along Trenton Road between I-40 and Reedy Creek Road.

The *2030 Raleigh Comprehensive Plan* (October 7, 2009) recommends a side trail on the east side of Trenton Road in the section being examined in this study. This side trail is shown connecting to the existing Reedy Creek Greenway Trail.

Raleigh's Strategic Plan (November 2019) guides the work of the city as it grows. The *Transportation & Transit Objective 2, Initiative 2.*1's goal is to identify and implement projects that strengthen connections between modes. *Initiative 2.4's* goal is to make investments to position select greenway trails as transportation options. This project supports both initiatives by providing choice of mode and provides a facility that will allow transportation options.

Not only will adding the bike-ped connection help to achieve the goals outlined in the above-mentioned studies, it will also help meet the goals of the *2030 Raleigh Comprehensive Plan* by supporting the growth of active living facilities, enhancing access to Raleigh's recreation and natural resource facilities and providing better interconnectivity between parks, greenway trails and open spaces.

Utilities

The project study areas contain several overhead and underground utilities. See Figure 9 on page 20 for visible utility locations noted on-site.

Overhead utility lines are located on the west side of Trenton Road between the bridge over I-40 and Trenton Park Lane. North from Trenton Park Lane to just south of Trenton Woods Way, overhead utilities are located on the east side of the road. Near Trenton Woods Way, the overhead utilities switch back to the west side of Trenton Road until Reedy Creek Road where they cross to the southern side of Reedy Creek Road. Based on the available data it is likely that no distribution poles will be impacted, however supply poles providing power to two residences along the corridor may require relocation.

There is evidence of underground utilities throughout the project study areas (see photos). During field visits, prior utility locating markings were present on the ground and were noted. The utilities marked along the corridor included: gas, fiber, water, and sewer. Based on the facility types proposed, it is likely that utility relocations will be minimal.

Duke Power Service Pole, AT&T Underground Fiber, And Spectrum Cable TV Services Located Near The Right-Of-Way

AT&T Underground Fiber Installation Near Existing Asphalt Sidewalk. Google Fiber Is Located On East Side Of Road.

Major Utility Facilities Located Near Intersection Of Trenton Road And Reedy Creek Road Can Be Avoided.

PSNC Gas Marker – Gas Line Location Is Evident Throughout Most Of The Project Area

Utility Map

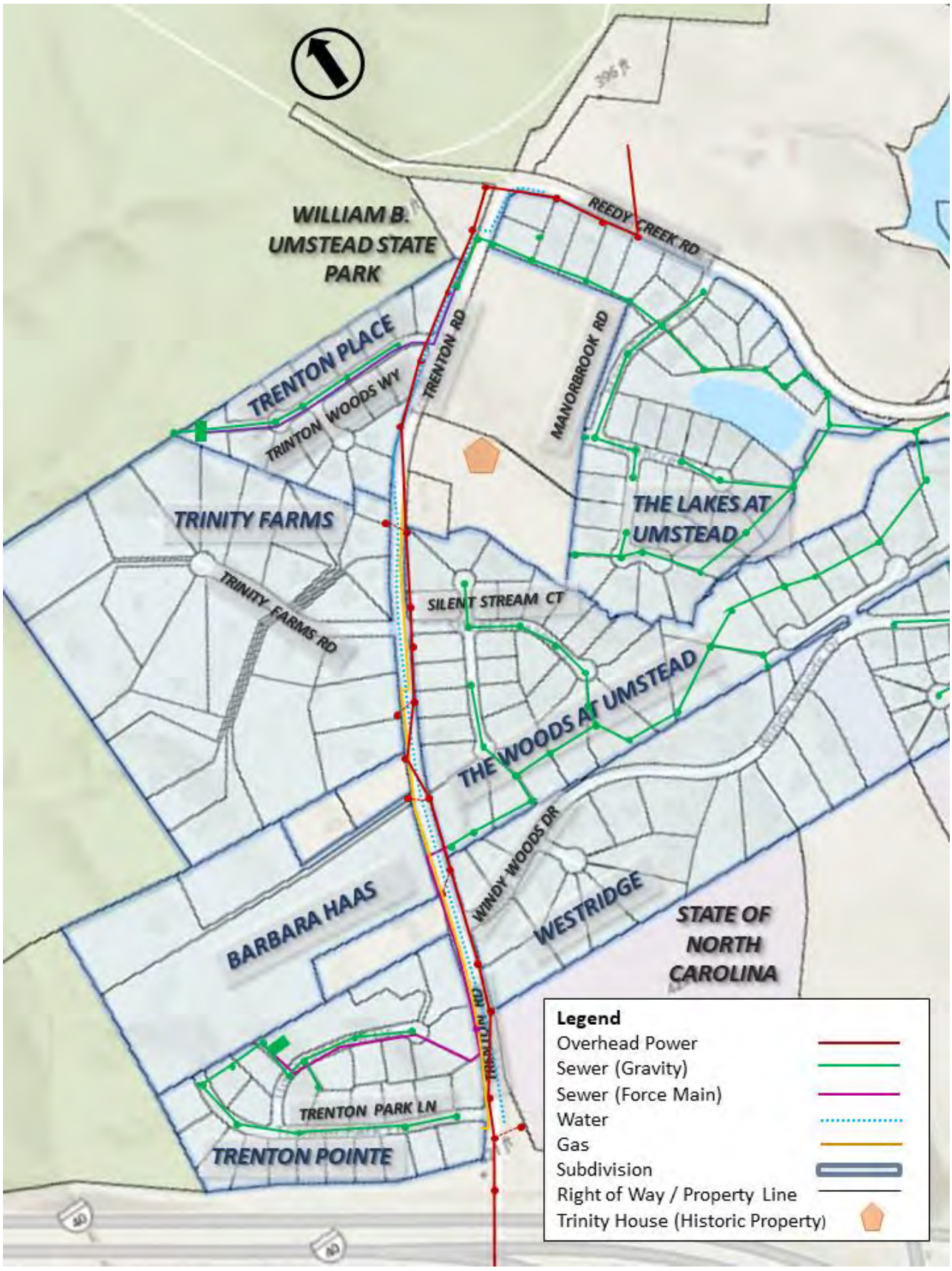


Figure 9. Utility Map (Underground Fiber, Not Shown For Clarity)

Environmental Conditions

A detailed environmental study was not completed for the project but will be required in later stages of project development. Known environmental features in the study area are illustrated in Figure 10 on page 22.

In order to assess potential impacts to environmental features in the area, Geographic Information System (GIS) level research and a preliminary site review were completed. Review of National Wetlands Inventory (NWI) mapping indicated that there are no wetlands or streams located within the project corridor. There are also no floodplains in the study area according to Flood Emergency Management Agency (FEMA) floodplain mapping. Consultation with the Superfund Section during later project stages will ensure that any Underground Storage Tanks or Superfund sites are known and avoided. There are no NCDOT Mitigation Sites present along the corridor.

A review the North Carolina Natural Heritage Program (NCNHP) database of documented Natural Areas and Managed Areas determined that there are several Managed Areas and Natural Areas in the vicinity of the study area. William B. Umstead State Park is both a Natural Area and Managed Area located adjacent to the northwest portion of the corridor. One Wake County Open Space Managed Areas is located adjacent to the southeast portion of the corridor, and one east of the study area, north of Reedy Creek Drive. Schenck Memorial Forest Managed Area and Richland Creek Hardwood Forest Natural Area are both located to the east of the corridor. The NCNHP database also illustrated that there is a large percentage of Prime Farmland along the corridor. If it is later determined the project will receive federal funds, it may be subject to the Federal Farmland Protection Action (FFPA) and further consultation with the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) will be required to determine what the farmland conversion impact rating is for the project and whether mitigation of farmland conversion is required.

Species with the federal status of endangered (E) or threatened (T) are protected under provisions of the Endangered Species Act (ESA) of 1973 as amended (16 C USC 1531 et. Seq.). Any action likely to adversely affect a species classified as federally protected will be subject to review by the United States Fish and Wildlife Service (USFWS). As of November 10, 2019, the USFWS lists three endangered species for Wake County: Red-cockaded woodpecker (*Picoides borealis*), Dwarf wedgemussel (*Alasmidonta heterodon)* and Michaux's sumac (*Rhus michauxii).* The Bald Eagle is also listed by the USFWS as being present in Wake County. Although the species is not endangered or threatened, management of the species is subject to the Bald and Golden Eagle Protection Act, first enacted in 1940. Future field evaluations will be required to determine whether habitat for any listed protected species is present within the corridor. In later project development, the proposed corridor will be submitted for review through NCNHP's online screening tool to determine whether there are records of important natural communities, natural areas, or conservation/managed areas within the proposed project boundary. Consultation with USFWS would be requested if needed. Until further project development, it is unknown

whether any natural or managed areas or species will be impacted by the project works or if further consultation is required.

Environmental Features Map

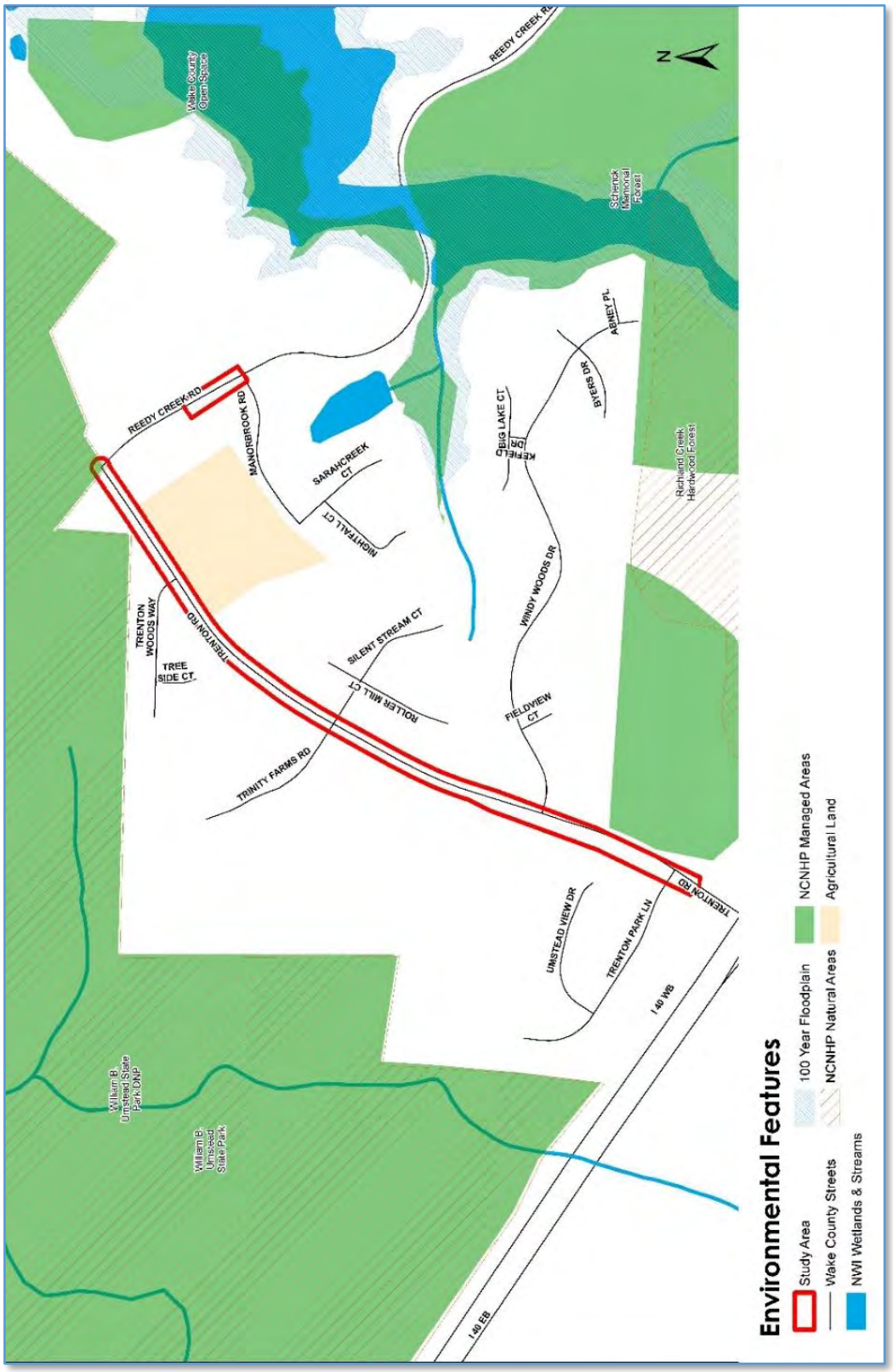


Figure 10. Environmental Features In The Study Area

REGULATORY / JURRISDICTIONAL & STAKEHOLDER INVOLVEMENT

REGULATORY/ JURRISDICTIONAL & STAKEHOLDER INVOLVEMENT

During the feasibility study, the following regulatory / jurisdictional agencies and stakeholders were identified for consultation:

- Wake County
- Town of Cary
- NCDOT
- Trenton Road Property Owners – 2020 Parks Bond Open House Meeting

Throughout the development of the concepts, meetings or conversations were had with the identified parties to refine the concepts, determine planned improvements, identify any hurdles, and gauge the level of support for the project moving forward.

This chapter details consultation with government agencies that could impact the project feasibility.

Once project feasibility is determined community stakeholders will be informed of the findings. Detailed public input will be sought during design development.

Wake County

The Trenton Road Connecter is identified in Wake County's Triangle I-40 Bikeway plan as a connection point into the City of Raleigh's Capital Area Greenway network.

The Triangle I-40 Bikeway is a proposed, unfunded 14 to 16-foot-wide bicycle-pedestrian connector between Raleigh, Durham, and RTP paralleling I-40, connecting many recreational, employment, and existing trail networks. See Figure 12.

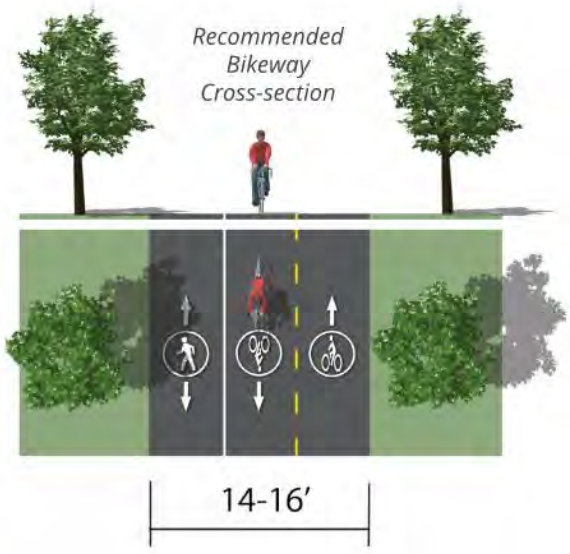


Figure 12. I-40 Bikeway Typical Section

At the time of this writing, the preliminary planning document has been completed and Wake County is supporting the Capital Area Metropolitan Planning Organization (CAMPO) in the Triangle I-40 Bikeway "functional design" effort.

A consultant has been selected to move the Triangle I-40 Bikeway project forward into the "functional design" stage where opportunities and constraints will further be identified and studied, and alignments will be identified. During the development of the Trenton Road recommendations CAMPO was still in contract negotiations, so no additional information is available at this time.

Town of Cary

The consultant, City of Raleigh Staff, and Town of Cary staff met to discuss the identified improvements, and to determine what, if any improvements were being considered for Trenton Road within the Town of Cary jurisdiction.

Currently, bike and pedestrian improvements are identified for the roadway in the Town of Cary Bike and Hike Map, as well as the Town of Cary 2012 Greenways Master Plan. See Figure 13. However, no current projects are identified or budgeted along Trenton Road by Town of Cary.

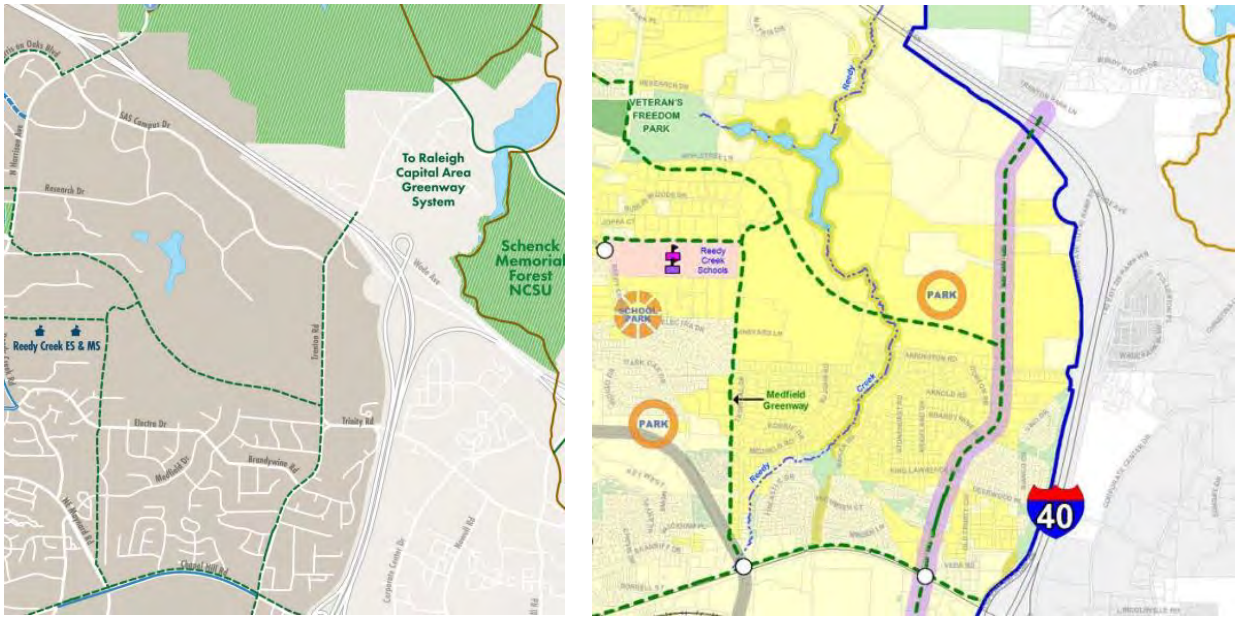


Figure 13. Town of Cary Bike and Hike Map / Town of Cary 2012 Greenway Master Plan

From this meeting, it was determined that SAS (an employment center) is currently developing a site (Building A) that is adjacent to Trenton Road. The site plan provides an easement for a greenway between the entrance of the solar farm to SAS Campus Drive.

The Town of Cary has accepted a fee-in-lieu for the greenway on this development. The payment has or will be applied to the town's General Fund and is not earmarked for improvements along Trenton Road.

The Town of Cary was supportive of the City of Raleigh's Trenton Road Connector, as it will define the gap along Trenton Road, and could spur bicycle and pedestrian accommodations along the roadway within Cary's jurisdiction.

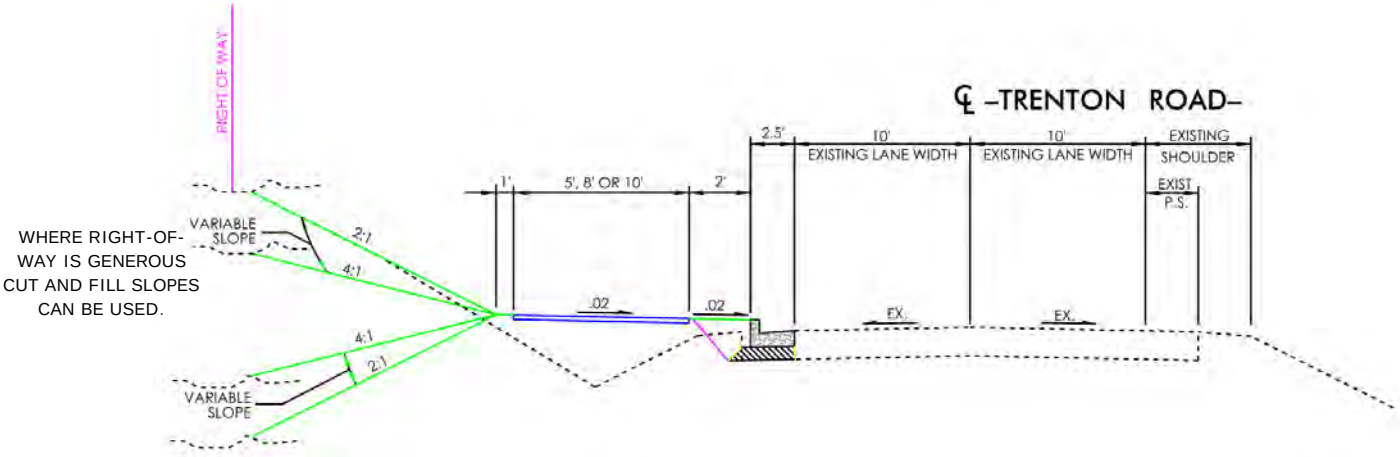
At this time, the facility within Cary's jurisdiction is anticipated to be located adjacent to the southbound lane and will utilize their "Standard Street-Side Trail" Standard Detail 09000.04. This detail includes a 10' trail, located 5-foot behind the curb and gutter

NCDOT

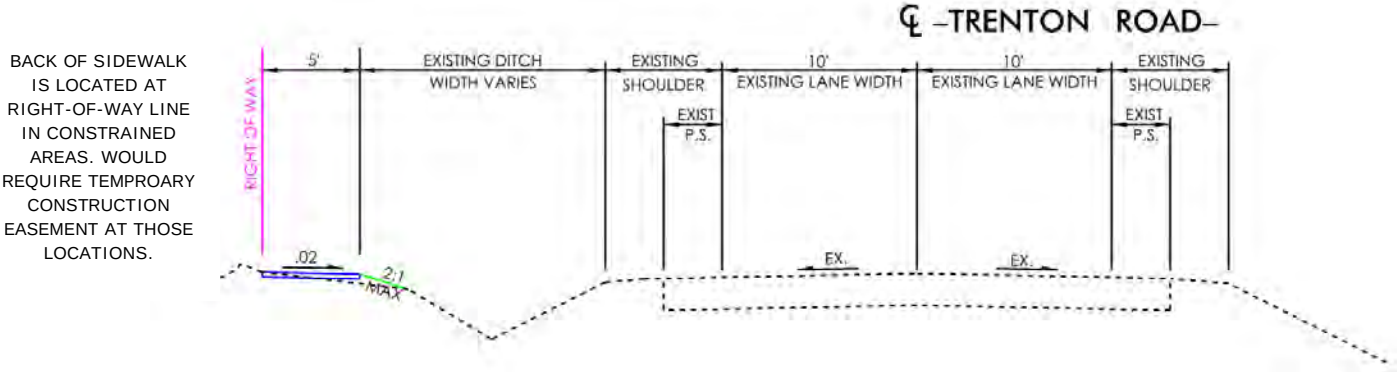
The consultant, City of Raleigh Staff, and NCDOT staff met to discuss the improvements, and to determine what, if any NCDOT improvements were being considered for Trenton Road within limits of the project.

From this meeting it was determined that NCDOT is open to allowing improvements within the right-of-way, as long as NCDOT standards and design practices are followed, and drainage needs of the roadway are met. To meet the drainage needs of the roadway and minimize property impacts, either a curb and gutter typical section, or a roadway ditch typical section with sidewalk located behind the ditch will be acceptable.

CONSTRUCT SIDEWALK /SIDEPATH BEHIND CURB AND GUTTER



CONSTRUCT SIDEWALK BEHIND EXISTING DITCH



In addition to the typical section, NCDOT provided the following feedback related to the project:

- NCDOT has no preference related to the facility width.
- Crosswalks need to be high visibility type, with appropriate advance warning signs installed.
- Rectangular rapid flashing beacons (RRFB's) are not warranted at this time.
- Improvements should be limited to the area between Trenton Park Lane and the Reedy Creek Greenway Trail, as there are no pedestrian facilities on the bridge to connect to.

2020 Parks Bond Project Open House Meetings

The Raleigh Parks, Recreation and Greenway Board (PRGAB) hosted special meetings and regularly scheduled meetings to discuss potential bond projects. During these open houses City of Raleigh project staff met with property owners from the Trenton Road area to discuss Feasibility Study Recommendations.

IMPROVEMENT RECOMMENDATIONS

Overview

This chapter summarizes recommendations to accommodate improvements for pedestrians and bicyclists along the corridor.

The alternatives considered in this study include 5-foot sidewalks, 8-foot sidepaths, and 10-foot sidepaths. All alternatives considered include separation from vehicular traffic by either curb and gutter or a ditch section. The alternative locations considered include both the northbound and southbound sides of Trenton Road.

Neighborhood and Regional Context and Importance

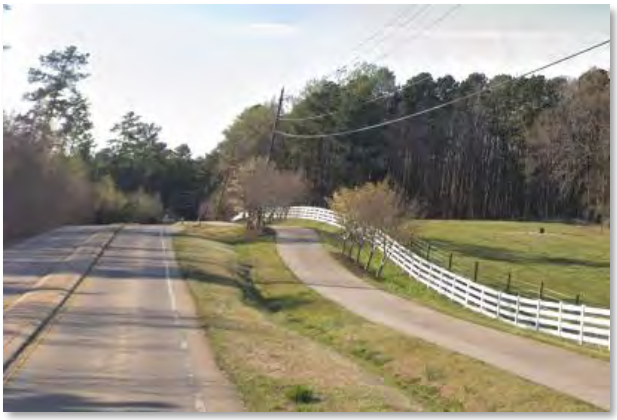
The Trenton Road Connector will be centrally located within the region. Currently, its primary purpose is to provide safe neighborhood connection for pedestrians and cyclists to William B. Umstead State Park. However, the project provides secondary and future benefits that will likely exceed the current purpose as a recreational trail connection amenity. In the future, it is anticipated that this project will provide connection to the planned but unfunded Town of Cary facility along Trenton Road (south of the I-40 bridge), as well as provide connection for City of Raleigh residents to the proposed but currently unfunded Triangle I-40 Bikeway.

Design Principals

The feasibility review has been informed by the Guiding Principles and Design Guideline Principals as described in the Capital Area Greenway Planning & Design Guide. By allowing these principles to guide the review and design elements within the study areas, the sidewalk or sidepath when completed may become both a recreational and transportation resource.

Recreational and Transportation Resource

The sidewalk or sidepath has the possibility to provide a low-stress transportation alternative to motorized transportation allowing users to connect from their neighborhoods to William B. Umstead State Park, the greater Capital Area Greenway System, as well as the greenway systems of Cary, Morrisville, Apex, and Durham by connection through William B. Umstead State Park. In the future, the sidepath may also connect to the proposed but currently unfunded Triangle I-40 Bikeway, as well as the Town of Cary Trenton Road improvements.



Reedy Creek Greenway Trail Functions As Both A Recreational Resource And A Transportation Resource.

Sidepath Location

From the possible alternatives that were evaluated, routes located along the southbound lanes were selected for further study. Early in the review, it was determined that sidepath placement along the southbound lanes was desirable from both a continuity standpoint as well as a safety standpoint.

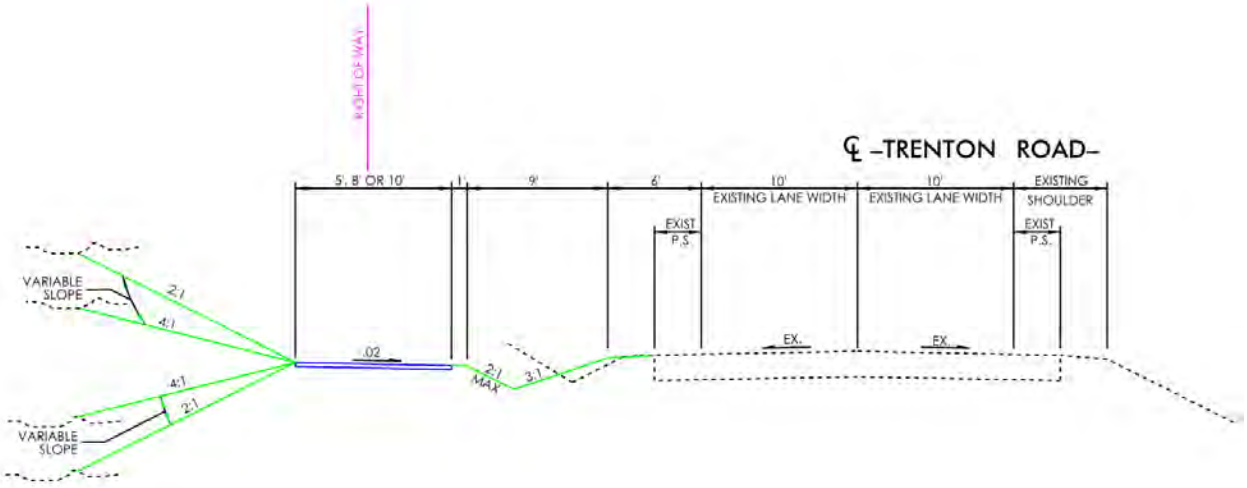
- Continuity - The existing Reedy Creek Greenway Trail, the entrance to William B. Umstead State Park, as well as planned Town of Cary improvements are located along the southbound lane.

- Safety – Placing the sidepath along the northbound lanes would require a mid-block crossing of Trenton Road, creating a conflict point with users and motorized vehicles. In the future, an additional crossing would likely be needed to continue south of the I-40 bridge on any Town of Cary developed improvements, which are slated to be located along the southbound lane.

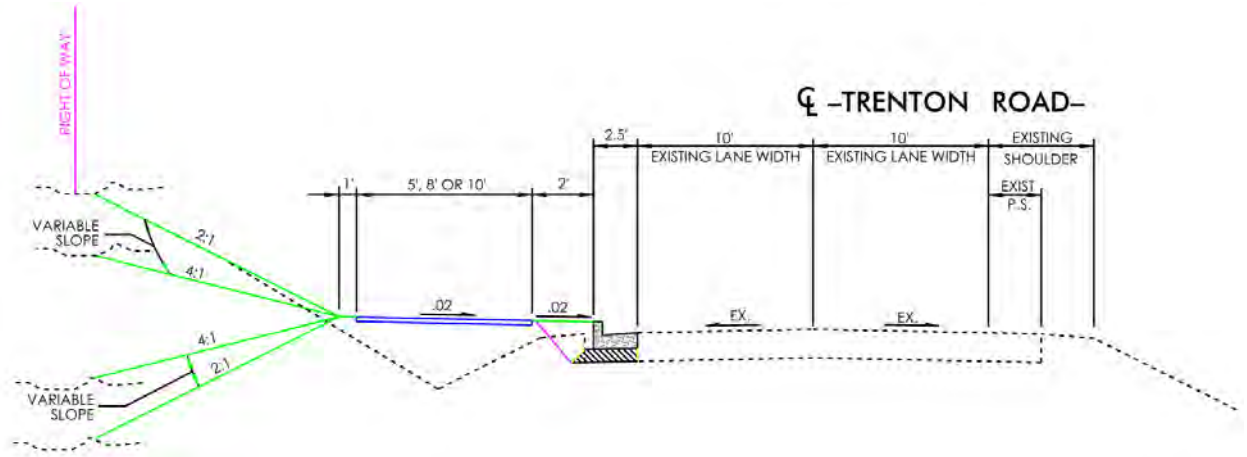
Alternatives Considered

The sidewalk and sidepath alternatives considered were determined during project scoping and influenced by the findings from the existing condition analysis as well as input from NCDOT. The sidewalk and sidepaths studied include options for a 5-foot, 8-foot, and 10-foot alternatives. In each case, the sidewalk or sidepath is separated from traffic by either a ditch section or a curb and gutter section. See proposed typical sections on Page 31.

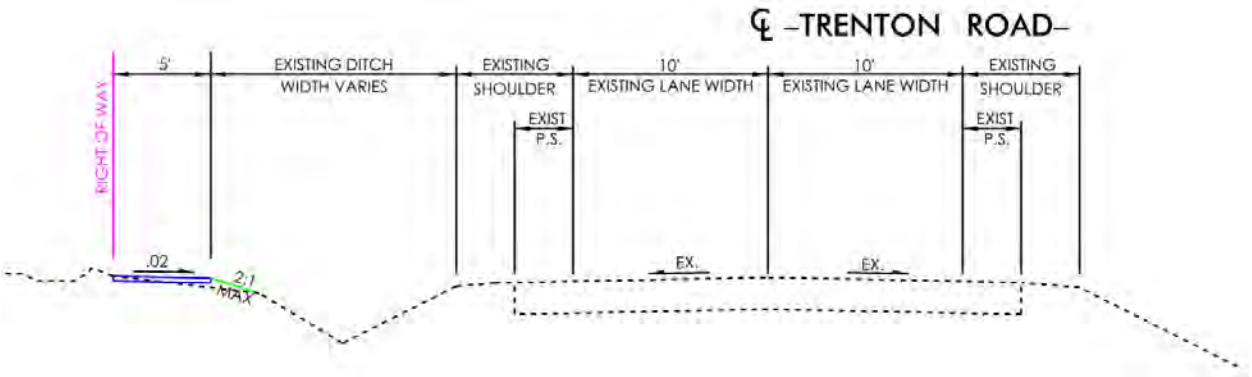
5′, 8′, and 10′ Alternatives Located Behind Improved Shoulder and Ditch



5′, 8′, and 10′ Alternatives Located Behind Curb and Gutter



5′ Sidewalk Located Behind Existing Roadway Ditch



5-Foot Sidewalk Overview

The 5-foot sidewalk alternative will retain the existing 5-foot asphalt sidewalk that is located between the bridge over I-40, and the northern property line associated with the Trenton Pointe subdivision. From there it will continue northward to the William B. Umstead State Park entrance and connect to the Reedy Creek Greenway Trail.

See maps on pages 35 and 36 for shoulder section alternatives.
The shoulder section improvements will include:

- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A crosswalk at Silent Stream Court, providing connection to the Woods at Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Drainage work, and cross pipe extensions.
- Utility adjustments.

See map on page 38 for curb and gutter alternative.
The curb and gutter section improvements will include:

- Installation of curb and gutter along southbound lane of Trenton Road.
- Installation of drainage network.
- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A crosswalk at Silent Stream Court, providing connection to the Woods At Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Concrete driveway turnouts at driveways.
- Utility adjustments.

8-Foot Sidepath Overview

The existing 5-foot asphalt sidewalk and wide asphalt shoulder that is currently located between the bridge over I-40 and Trenton Park Lane will be retained in this alternative to avoid bridge upgrades.

From Trenton Park Lane to the northern property line associated with the Trenton Pointe subdivision the asphalt shoulder will be replaced with either a shoulder section, or a curb and gutter section, depending on the selected alternative. Due to steep slopes, a short retaining wall and fencing will be required behind the greenway north of Trenton Park Lane.

From there it will continue northward to the William B. Umstead State Park entrance and connect to the Reedy Creek Greenway Trail.

See map on page 37 for shoulder section alternative.
The shoulder section improvements will include:

- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A retaining wall and fencing will be required north of Trenton Park Lane.
- A crosswalk at Silent Stream Court, providing connection to the Woods at Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Drainage work, and cross pipe extensions.
- Utility adjustments.

See map on page 38 for curb and gutter alternative.
The curb and gutter section improvements will include:

- Installation of curb and gutter along southbound lane of Trenton Road.
- Installation of drainage network.
- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A retaining wall and fencing will be required north of Trenton Park Lane.
- A crosswalk at Silent Stream Court, providing connection to the Woods at Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Concrete driveway turnouts at driveways.
- Utility adjustments.

10-Foot Sidepath Overview

The existing 5-foot asphalt sidewalk and wide asphalt shoulder that is currently located between the bridge over I-40 and Trenton Park Lane will be retained in this alternative to avoid bridge upgrades.

From Trenton Park Lane to the northern property line associated with the Trenton Pointe subdivision the asphalt shoulder will be replaced with either a shoulder section, or a curb and gutter section, depending on the selected alternative. Due to steep slopes, a short retaining wall and fencing will be required behind the sidepath north of Trenton Park Lane.

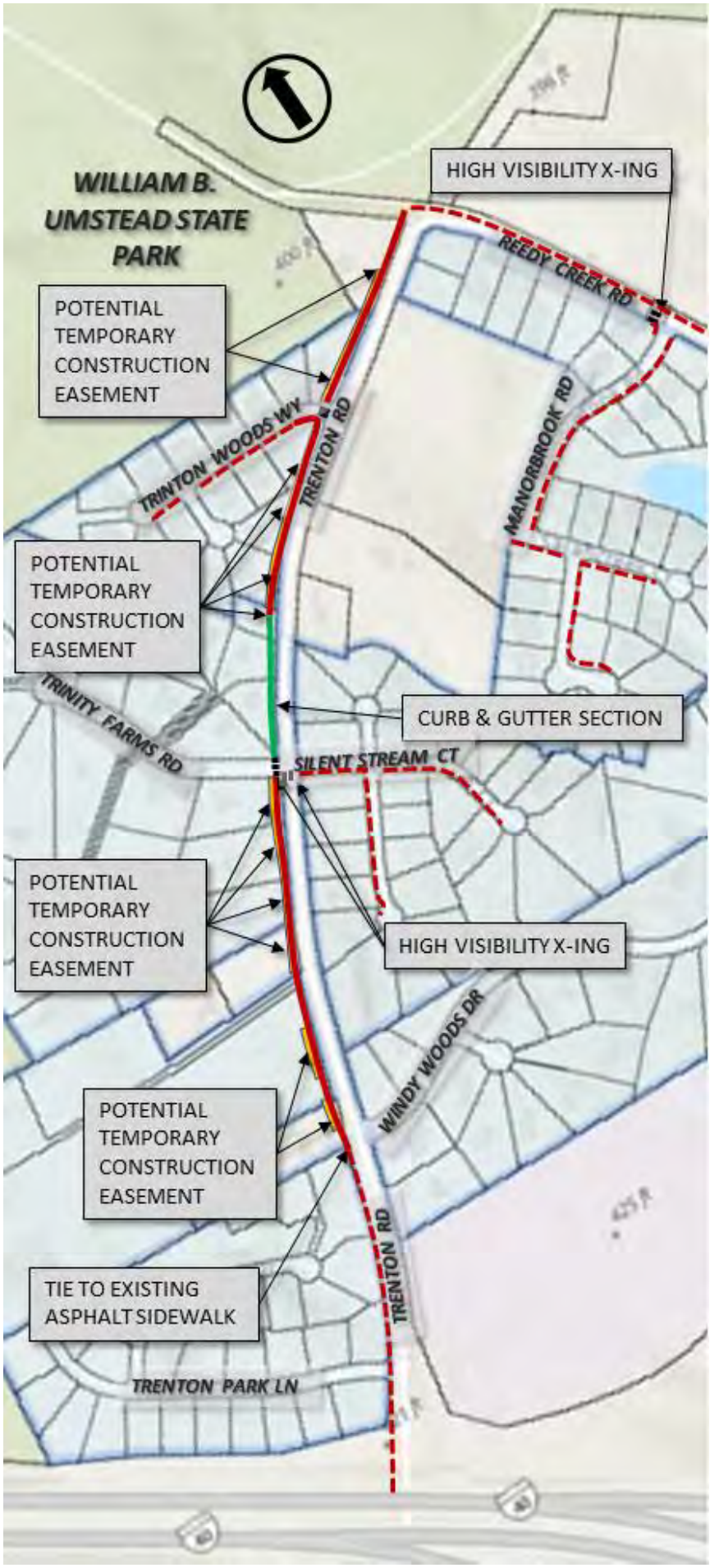
As the 10-foot sidepath nears Trinity Farms Road it must utilize a curb and gutter section and a retaining wall on the back side of the sidepath to be located within the right-of-way. From a location approximately 700 feet north of Trinity Farms Road, the 10-foot sidepath can continue northward to the William B. Umstead State Park entrance and connect to the Reedy Creek Greenway utilizing either a shoulder section or a curb and gutter section.

See map on page 37 for shoulder section alternative.
The shoulder section improvements will include:

- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A retaining wall and fencing will be required north of Trinity Farms Road.
- A crosswalk at Silent Stream Court, providing connection to the Woods at Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Drainage work, and cross pipe extensions.
- Utility adjustments.
- Curb and gutter and retaining walls are required near Trinity Farms Road

See map on page 38 for curb and gutter alternative.
The curb and gutter section improvements will include:

- Installation of curb and gutter along southbound lane of Trenton Road.
- Installation of drainage network.
- Curb ramps and marked crosswalks at Trinity Farms Road and Trenton Woods Way.
- A retaining wall and fencing will be required north of Trinity Farms Road.
- A crosswalk at Silent Stream Court, providing connection to the Woods at Umstead sidewalk network.
- Marked crosswalk at Trenton Park Lane.
- Concrete driveway turnouts at driveways.
- Utility adjustments.
- Retaining walls are required near Trinity Farms Road.



5' SIDEWALK BEHIND EXISTING DITCH

This alternative proposes a 5-foot sidewalk to be constructed behind the existing ditch. The alternate assumes that the existing ditch is hydraulically adequate to convey the current roadway drainage and the drainage associated with the addition of the sidewalk.

This alternative retains the existing 5-foot asphalt sidewalk between the bridge over I-40, and Windy Woods Drive.

The back edge of proposed sidewalk is generally located at grade, 2-foot from the right-of-way line, with construction occurring between the right-of-way line and the roadway shoulder

This alternate includes a short curb and gutter section north of Trinity Farms Road to minimize easement acquisition.

Some temporary construction easements acquisition is associated with this alternative to provide flexibility during construction and relocate electrical service poles.

This alternative may impact existing vegetation screening along the study area.

Opinion of Construction Cost (2020)

$444,000

Construction cost reflects the anticipated bid costs for a contractor to construct the project.

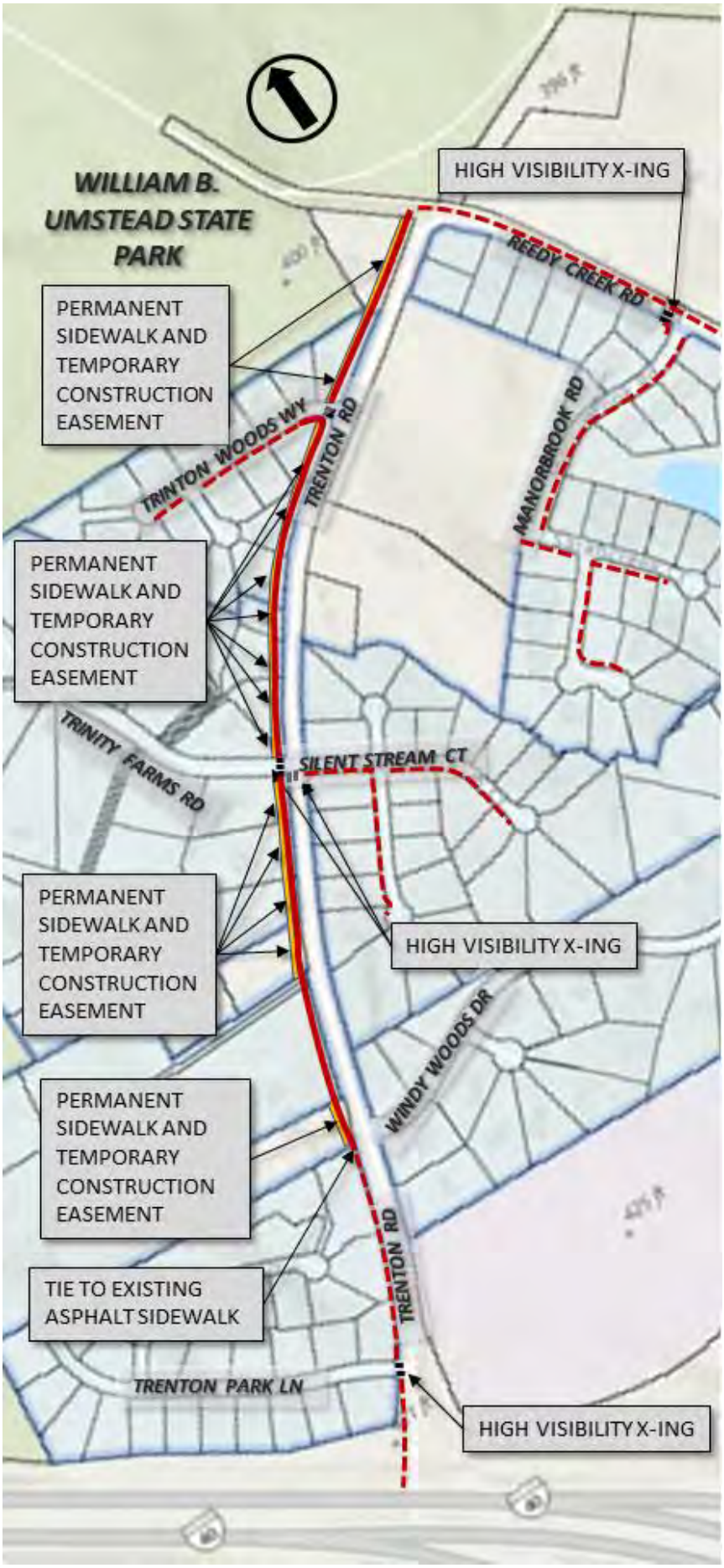
Opinion of Total Project Cost (2020)

$677,400

Total project cost includes anticipated construction cost, survey, design, easement acquisition, permitting, construction administration and inspection.

Total project cost does not include utility relocation costs, or mitigation costs as these are highly dependent on avoidance and design measures.

See Appendix B for detailed cost breakdowns.



5' SIDEWALK BEHIND NEW ROADWAY DITCH

This alternative proposes a 5-foot sidewalk to be constructed in conjunction with a new standard roadway ditch section. This improvement includes a 6' total shoulder width, and ditch construction in compliance with NCDOT standards. The sidewalk will be located on the back side of the ditch.

This alternative retains the existing asphalt path between the bridge over I-40, and Windy Woods Drive.

Permanent sidewalk and temporary construction easement acquisition is associated with this alternative. The wider shoulder and ditch section move the sidepath outside of the existing right-of-way throughout the majority of the study area.

This alternative will impact existing vegetation screening along the study area.

Opinion of Construction Cost (2020)

$476,300

Construction cost reflects the anticipated bid costs for a contractor to construct the project.

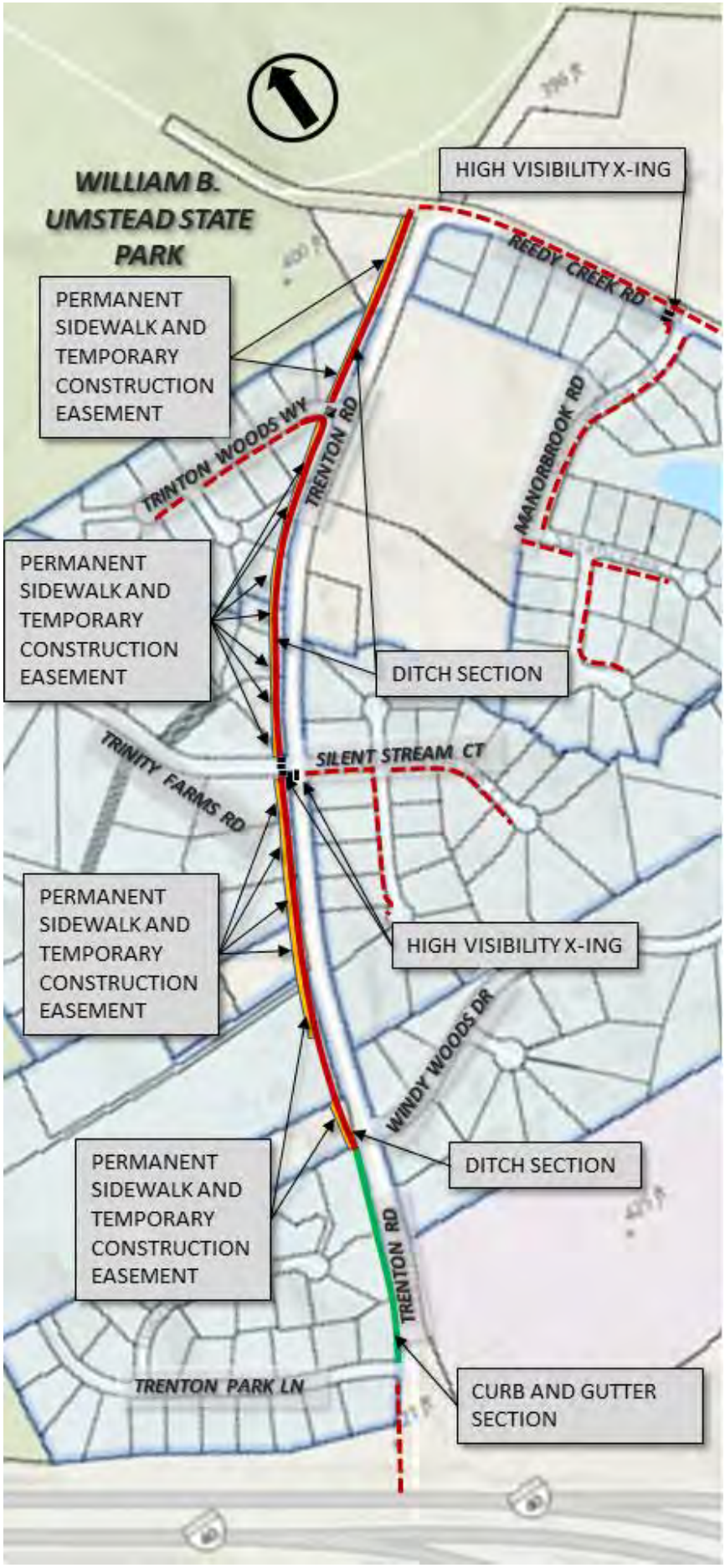
Opinion of Total Project Cost (2020)

$835,550

Total project cost includes anticipated construction cost, survey, design, easement acquisition, permitting, construction administration and inspection.

Total project cost does not include utility relocation costs, or mitigation costs as these are highly dependent on avoidance and design measures.

See Appendix B for detailed cost breakdowns.



8′ & 10′ SIDEPATH BEHIND NEW ROADWAY DITCH

This alternative proposes either an 8-foot, or 10-foot sidepath to be constructed in conjunction with a new standard roadway ditch section. This improvement includes a 6′ total shoulder width, and ditch construction in compliance with NCDOT standards. The sidepath will be located on the back side of the ditch.

Due to steep slopes, both alternatives replace the shoulder section with a curb and gutter section and remove the existing 5-foot asphalt sidewalk between Trenton Park Lane and Windy Woods Drive. A short retaining wall will be required along this section to contain the fill slope.

Permanent sidewalk and temporary construction easement acquisition is associated with this alternative. The wider shoulder and ditch section move the sidepath outside of the existing right-of-way throughout the majority of the corridor.

This alternative will impact tree screening along the corridor.

Opinion of Construction Cost (2020)

8′ Sidepath - $853,600

10′ Sidepath – 956,450

Construction cost reflects the anticipated bid costs for a contractor to construct the project.

Opinion of Total Project Cost (2020)

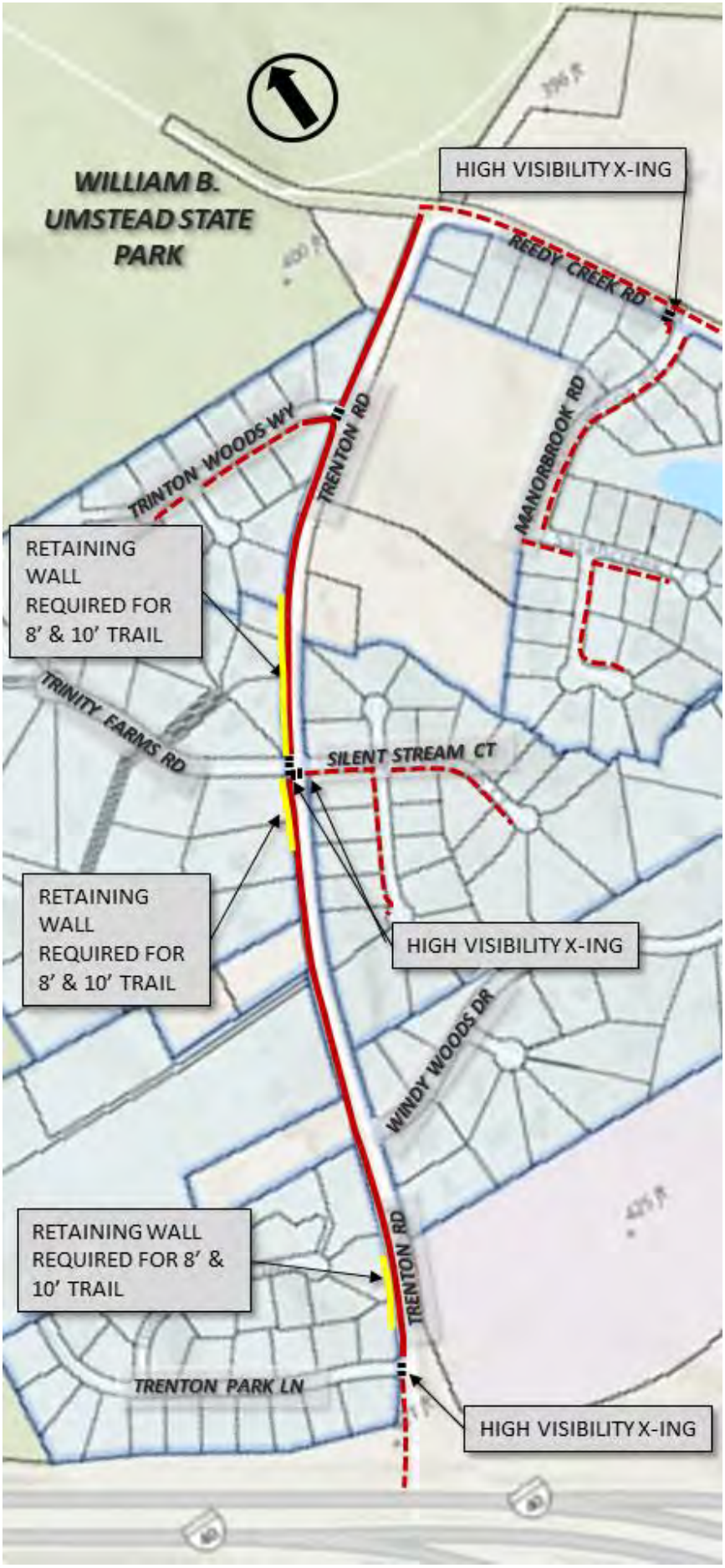
8′ Sidepath - $1,320,750

10′ Sidepath - $1,462,100

Total project cost includes anticipated construction cost, survey, design, easement acquisition, permitting, construction administration and inspection.

Total project cost does not include utility relocation costs, or mitigation costs as these are highly dependent on avoidance and design measures.

See Appendix B for detailed cost breakdowns.



5', 8', OR 10' SIDEPATH BEHIND CURB AND GUTTER

This alternative proposes sidepath improvements to be constructed in conjunction with adding curb and gutter to the roadway.

These alternatives replace the shoulder section with a curb and gutter section and remove the existing asphalt path between Trenton Park Lane and Windy Woods Drive.

Retaining walls will be required at some locations to contain the slopes associated with the 8' and 10' alternatives.

Temporary construction easement acquisition can be minimal with these designs. Retaining walls can be used to contain the slopes behind the sidewalk or sidepath.

These alternatives may impact tree screening along the corridor.

Opinion of Construction Cost (2020)

5' Sidewalk - $819,200

8' Sidepath - $1,360,800

10' Sidepath - $1,606,300

Construction cost reflects the anticipated bid costs for a contractor to construct the project.

Opinion of Total Project Cost (2020)

5' Sidewalk – $1,130,100

8' Sidepath - $1,745,400

10' Sidepath - $2,059,600

Total project cost includes anticipated construction, survey, design, easement acquisition, permitting, construction administration and inspection.

Total project cost does not include utility relocation costs, or mitigation costs as these are highly dependent on avoidance and design measures.

See Appendix B for detailed cost breakdowns.

Factors for Consideration

The alternatives considered meet the goal of providing a pedestrian connection along Trenton Road while minimizing property acquisitions. The alternative ultimately selected to move forward into design, permitting, and construction by the City will need to balance the available budget with property impacts, quality of user experience, and stakeholder support.

Cost –The Capital Area Greenway Master Plan notes that "*trail improvements should achieve the maximum benefit for their cost and connect with private improvements*". An opinion of probable cost was developed for each alternative. The alternatives begin and end at the same defined point for easy comparison. See chart below for anticipated construction and total project cost.

Property Impacts – A primary goal of this study is to define improvements that minimize property impacts and acquisition and can be constructed within the existing right-of-way to the maximum extent possible. Property acquisition can often be difficult, time consuming, and costly.

Of the alternatives considered, the following alternatives will require the least amount of easement acquisition: 5-foot sidewalk constructed behind existing ditch, 5-foot sidewalk, 8-foot sidepath, and 10-foot sidepath constructed behind curb and gutter. These alternatives can be largely be contained within the existing right-of-way, however, there will be some need for temporary construction easements and there may be a need for permanent easements to construct the sidepath at constrained locations or to relocate utilities.

The improved shoulder and ditch section alternatives will require a greater amount of permanent easement and temporary construction easement acquisition, as the sidewalk or sidepath will fall outside of the current right-of-way. See chart below for anticipated permanent easements associated with each alternative.

	Width	Opinion of Probable Construction Cost (2020)	Opinion of Probable Total Project Cost (2020)	Anticipated Permanent Easement (Acre)
Behind Existing Ditch	5	$444,000.00	$677,400.00	0
Improved Shoulder and Ditch Section	5	$476,300.00	$835,550.00	0.6
	8	$853,600.00	$1,320,750.00	0.8
	10	$956,450.00	$1,462,100.00	0.9
Curb & Gutter Section	5	$819,200.00	$1,130,100.00	0
	8	$1,360,800.00	$1,745,400.00	0
	10	$1,606,300.00	$2,059,600.00	0

Anticipated Construction Cost, Total Project Cost, And Permanent Easements. See Detailed Breakdown Of Cost In Appendix B For Additional Information.

Quality of User Experience / Sidepath Width Preference – Quality of user experience and sidewalk or sidepath width preference go "hand in hand", as wider sidewalks or sidepaths are generally preferred as they create fewer user conflicts and allow for a higher level of service.

The Capital Area Greenway Planning and Design Guide and the Bike Raleigh Plan both include the Trenton Road improvements, as a separated path. The Capital Area Greenway Planning and Design Guide further clarifies the recommendation as a Proposed Greenway Connector Trail, which according to the guide has a preferred width of 10-feet. All sidepaths considered in this study are separated from the roadway either by curb and gutter or shoulder section.

Support – Regulatory / jurisdictional support is paramount to move the project forward. Trenton Road is an NCDOT maintained roadway. Improvements will require their support to move forward and design and construction will need to follow their standards and policies.

NCDOT- NCDOT is open to allowing improvements within the right-of-way, as long as their standards and design practices are followed, and drainage needs of the roadway are met.

From conversations with NCDOT it was determined that a sidewalk or sidepath located behind the existing ditch can be considered. During the design of the sidewalk or sidepath, the existing ditch will need to be reviewed to ensure that it is adequately sized to handle the existing roadway drainage, as well as any additional drainage related to the sidepath.

NCDOT is also open to improvements of the roadway typical section. Depending on the alternative, these improvements may include installation of a curb and gutter section, or construction of a standard roadway ditch section with the sidewalk or sidepath located behind the ditch.

Town of Cary- The Town of Cary has provided support for the project. Their long-range plans include a 10-foot wide sidepath along Trenton Road on the south side of the I-40 bridge.

Recommendations

Based on the concepts studied, the identified factors for consideration, and the goals identified at the onset of the study of providing a pedestrian connection along Trenton Road while minimizing property impacts, the following alternatives should be considered:

- 5-foot sidewalk behind existing ditch
- 5-foot sidewalk behind curb and gutter
- 8-foot sidepath behind curb and gutter
- 10-foot sidepath behind curb and gutter

These alternatives result in the least amount of easements required to construct the pedestrian connection. As with any improvement, there exists a public desire that must be balanced by budgetary constraints. The alternative ultimately selected to move forward will need to balance the public desire with the available budget.

APPENDIX A

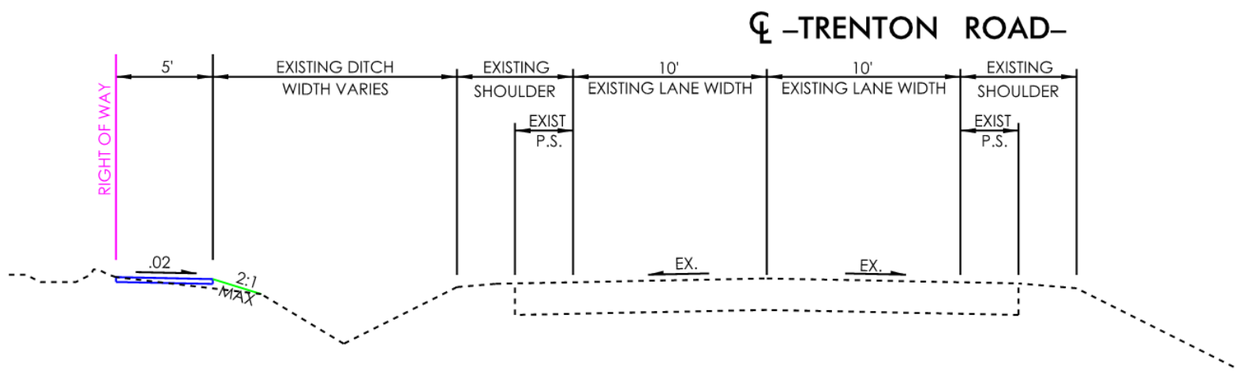
MANORBROOK ROAD / REEDY CREEK ROAD
PEDESTRIAN CROSSING


REEDY CREEK RD AND
MANORBROOK RD CROSSING
SSD = REQUIRED STOPPING SIGHT DISTANCE
FOR 25 MPH ADJUSTED FOR GRADE
MANORBROOK RD
REEDY CREEK RD
SSD = 184'
SSD = 205'

APPENDIX B

DETAILED MAPS AND COST ESTIMATES


5' SIDEWALK BEHIND EXISTING DITCH
LEGEND
GRADING EXTENT
2'-6" CURB & GUTTER
SIDEWALK
TRENTON PARK LANE
TRINITY FARMS ROAD
TRENTON WOODS WAY
TRENTON ROAD
SILENT STREAM COURT
WILLIAM B. UMSTEAD STATE PARK
WINDY WOODS ROAD
TRENTON ROAD
REEDY CREEK RD


℄ –TRENTON ROAD–
RIGHT OF WAY
5'
EXISTING DITCH
WIDTH VARIES
EXISTING
SHOULDER
EXIST
P.S.
10'
EXISTING LANE WIDTH
10'
EXISTING LANE WIDTH
EXISTING
SHOULDER
EXIST
P.S.
.02
2:1
MAX
EX.
EX.

Trenton Road Connector **Feasibility**

Trenton Rd

Windy Woods Road to Umstead State Park

5' Sidewalk Behind Existing Ditch

Includes Short Curb and Gutter Section North of Trinity Farms Rd.

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 75,000.00	$ 75,000.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	200.0	FT	$ 35.00	$ 7,000.00
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 52.00	$ -
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 86.00	$ -
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 132.00	$ -
10	1121000000-E	520	Aggregate Base Course	0.0	Tons	$ 30.00	$ -
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	0.0	Tons	$ 120.00	$ -
13	1575000000-E	610	ASP FOR PLANT MIX	0.0	Tons	$ 500.00	$ -
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	0.0	Tons	$ 500.00	$ -
15	2286000000-N	840	Masonary Drainage Structure	0.0	EA	$ 2,200.00	$ -
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	0.0	EA	$ 650.00	$ -
17	2374000000-N	840	Frame with Grate & Hood (All Types)	0.0	EA	$ 550.00	$ -
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	474.0	LF	$ 20.00	$ 9,480.00
19	2591000000-E	848	4" Concrete Sidewalk	1703.0	SY	$ 45.00	$ 76,635.00
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	0.0	LF	$ 15.00	$ -
24	3575000000-E	SP	DECORATIVE FENCE RESET	20.0	LF	$ 50.00	$ 1,000.00
25	4072000000-E	903	SUPPORT, 3-LB STL U-CHANNEL	48.0	LF	$ 65.00	$ 3,120.00
26	4102000000-N	904	Sign Erection Type E	4.0	EA	$ 88.00	$ 352.00
27	4589000000-N	SP	Traffic Control	1.0	LS	$ 45,000.00	$ 45,000.00
28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3000.0	LF	$ 3.50	$ 10,500.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	0.5	ACR	$ 1,675.00	$ 837.50
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
34	6029000000-E	SP	Tree Protection Fence	2705.0	LF	$ 3.25	$ 8,791.25
35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	0.5	ACR	$ 3,350.00	$ 1,675.00
38	6087000000-E	1660	Mowing	0.5	ACR	$ 220.00	$ 110.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	0.0	SF	$ 175.00	$ -
47	3575000000-N	SP	Bike/Ped Safety Rail	0.0	LF	$ 70.00	$ -
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

Length **0.765 Mi.**

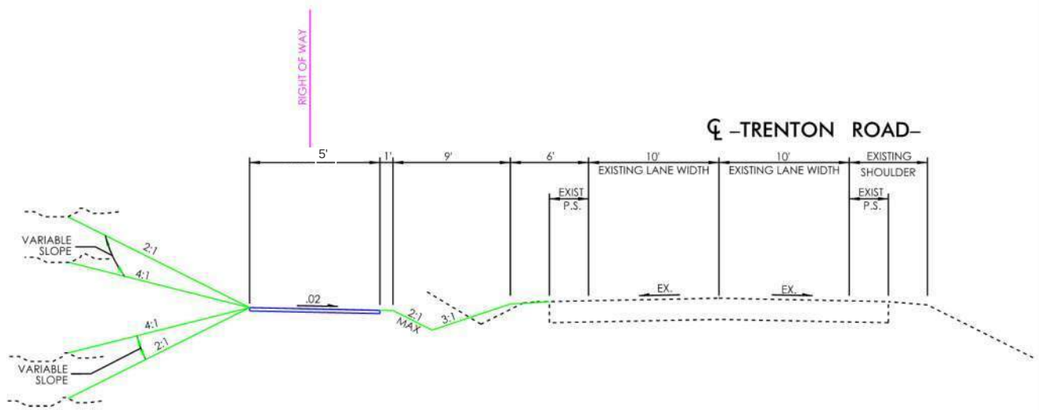
Subtotal					**$ 328,842.00**
Misc Items & Contingency (35%)					$ 115,094.70
Opinion of Probable Construction Cost					**$ 443,936.70**
Survey and Design					$ 150,000.00
Property Acquisition	0.00	AC	$ 200,000.00		$ -
City of Raleigh Permitting					$ 3,000.00
Federal / State Permitting (USACE, DEQ)					$ 500.00
CEI & CA 18%					$ 79,908.61
Opinion of Total Project Cost					**$ 677,345.31**

Note: Utilities Relocation Costs are not included.

Note: Easement acquisition is based on average land value along the corridor. No discounts have been taken for easements.

Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly dependend on avoidance measures and stormwater design treatments.


5' SIDEWALK
IMPROVED SHOULDER
& DITCH SECTION
TRENTON PARK LANE
TRENTON ROAD
WINDY WOODS ROAD
TRINITY FARMS ROAD
SILENT STREAM COURT
TRENTON WOODS WAY
WILLIAM B. UMSTEAD
STATE PARK
TRENTON ROAD
REEDY CREEK RD


RIGHT OF WAY
℄ –TRENTON ROAD–
5'
1'
9'
6'
10'
EXISTING LANE WIDTH
10'
EXISTING LANE WIDTH
EXISTING
SHOULDER
EXIST
P.S.
EXIST
P.S.
EX.
EX.
.02
2:1
MAX
3:1
VARIABLE
SLOPE
2:1
4:1
4:1
2:1
VARIABLE
SLOPE

Trenton Road Connector **Feasibility**

Trenton Rd

Windy Woods Road to Umstead State Park

5' Sidewalk Improved Shoulder & Ditch Section

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 80,000.00	$ 80,000.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	400.0	FT	$ 35.00	$ 14,000.00
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 52.00	$ -
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 86.00	$ -
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	36.0	LF	$ 132.00	$ 4,752.00
10	1121000000-E	520	Aggregate Base Course	0.0	Tons	$ 30.00	$ -
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	0.0	Tons	$ 120.00	$ -
13	1575000000-E	610	ASP FOR PLANT MIX	0.0	Tons	$ 500.00	$ -
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
15	2286000000-N	840	Masonary Drainage Structure	2.0	EA	$ 2,200.00	$ 4,400.00
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	2.0	EA	$ 650.00	$ 1,300.00
17	2374000000-N	840	Frame with Grate & Hood (All Types)	0.0	EA	$ 550.00	$ -
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	475.0	LF	$ 20.00	$ 9,500.00
19	2591000000-E	848	4" Concrete Sidewalk	1703.0	SY	$ 45.00	$ 76,635.00
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	0.0	LF	$ 15.00	$ -
24	3575000000-E	SP	DECORATIVE FENCE RESET	20.0	LF	$ 50.00	$ 1,000.00
25	4072000000-E	903	SUPPORT, 3-LB STL U-CHANNEL	48.0	LF	$ 65.00	$ 3,120.00
26	4102000000-N	904	Sign Erection Type E	4.0	EA	$ 88.00	$ 352.00
27	4589000000-N	SP	Traffic Control	1.0	LS	$ 45,000.00	$ 45,000.00
28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3000.0	LF	$ 3.50	$ 10,500.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	0.5	ACR	$ 1,675.00	$ 837.50
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
34	6029000000-E	SP	Tree Protection Fence	2705.0	LF	$ 3.25	$ 8,791.25
35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	0.5	ACR	$ 3,350.00	$ 1,675.00
38	6087000000-E	1660	Mowing	0.5	ACR	$ 220.00	$ 110.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	0.0	SF	$ 175.00	$ -
47	3575000000-N	SP	Bike/Ped Safety Rail	0.0	LF	$ 70.00	$ -
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

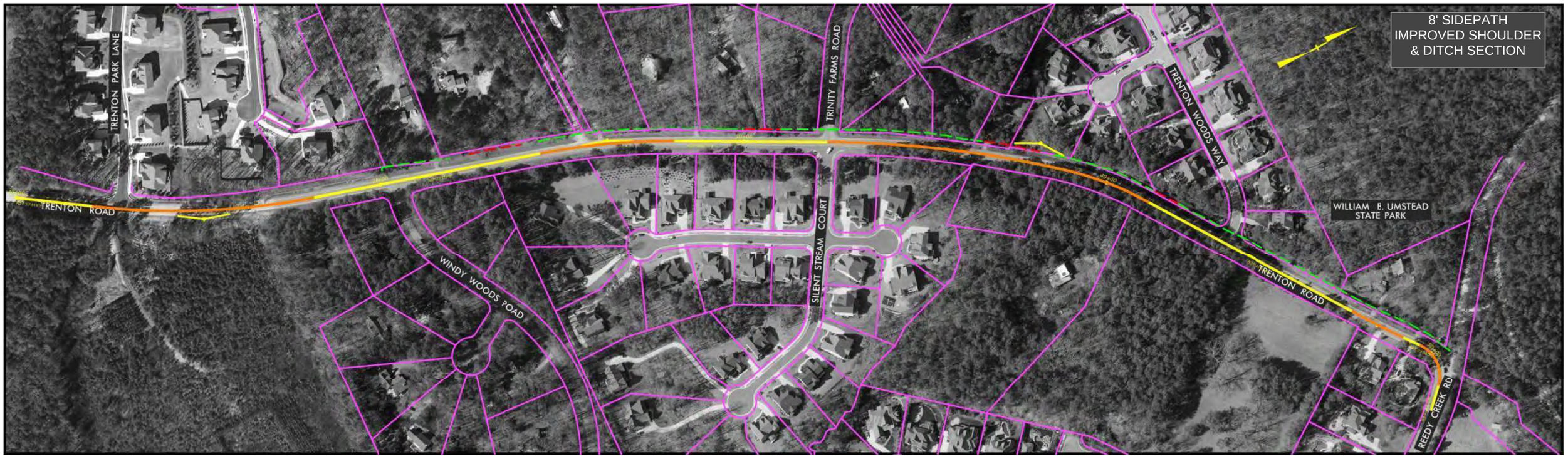
Length **0.765 Mi.**

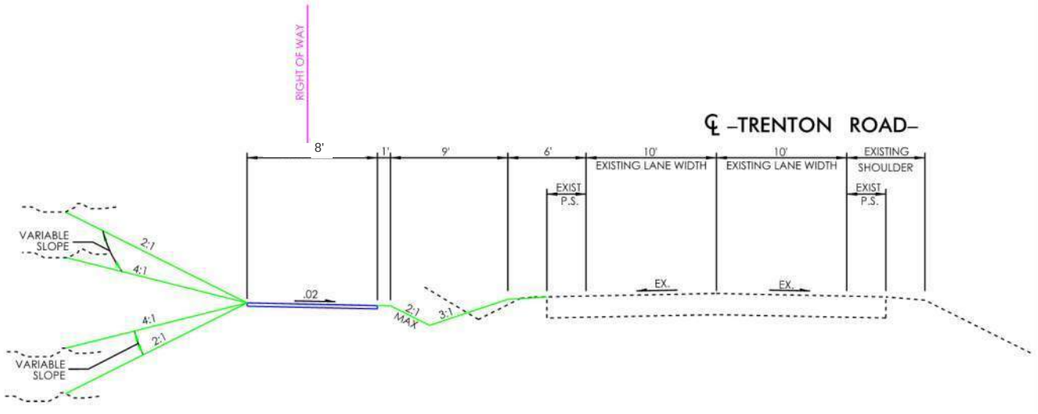
Subtotal					**$ 352,814.00**
Misc Items & Contingency (35%)					$ 123,484.90
Opinion of Probable Construction Cost					**$ 476,298.90**
Survey and Design					$ 150,000.00
Property Acquisition	0.60	AC	$ 200,000.00		$ 120,000.00
City of Raleigh Permitting					$ 3,000.00
Federal / State Permitting (USACE, DEQ)					$ 500.00
CEI & CA 18%					$ 85,733.80
Opinion of Total Project Cost					**$ 835,532.70**

Note: Utilities Relocation Costs are not included.

Note: Easement acquisition is based on average land value along the corridor. No discounts have been taken for easements.

Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly


8' SIDEPATH
IMPROVED SHOULDER
& DITCH SECTION
TRENTON PARK LANE
TRENTON ROAD
TRINITY FARMS ROAD
SILENT STREAM COURT
WINDY WOODS ROAD
TRENTON WOODS WAY
WILLIAM B. UMSTEAD
STATE PARK
TRENTON ROAD
REEDY CREEK RD


RIGHT OF WAY
℄ –TRENTON ROAD–
8'
1'
9'
6'
10'
EXISTING LANE WIDTH
10'
EXISTING LANE WIDTH
EXISTING
SHOULDER
EXIST
P.S.
EXIST
P.S.
EX.
EX.
.02
2:1
MAX
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VARIABLE
SLOPE
2:1
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SLOPE

Trenton Road Connector **Feasibility**
Trenton Rd
Windy Woods Road to Umstead State Park
8' Sidepath Improved Shoulder & Ditch Section

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 105,000.00	$ 105,000.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	400.0	FT	$ 35.00	$ 14,000.00
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 52.00	$ -
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 86.00	$ -
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	36.0	LF	$ 132.00	$ 4,752.00
10	1121000000-E	520	Aggregate Base Course	1859.0	Tons	$ 30.00	$ 55,770.00
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	385.0	Tons	$ 120.00	$ 46,200.00
13	1575000000-E	610	ASP FOR PLANT MIX	30.0	Tons	$ 500.00	$ 15,000.00
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
15	2286000000-N	840	Masonary Drainage Structure	2.0	EA	$ 2,200.00	$ 4,400.00
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	2.0	EA	$ 650.00	$ 1,300.00
17	2374000000-N	840	Frame with Grate & Hood (All Types)	0.0	EA	$ 550.00	$ -
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	0.0	LF	$ 20.00	$ -
19	2591000000-E	848	4" Concrete Sidewalk	0.0	SY	$ 45.00	$ -
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	180.0	LF	$ 15.00	$ 2,700.00
24	3575000000-E	SP	DECORATIVE FENCE RESET	620.0	LF	$ 50.00	$ 31,000.00
25	4072000000-E	903	SUPPORT, 3-LB STL U-CHANNEL	48.0	LF	$ 65.00	$ 3,120.00
26	4102000000-N	904	Sign Erection Type E	4.0	EA	$ 88.00	$ 352.00
27	4589000000-N	SP	Traffic Control	1.0	LS	$ 45,000.00	$ 45,000.00
28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3830.0	LF	$ 3.50	$ 13,405.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	1.0	ACR	$ 1,675.00	$ 1,675.00
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
34	6029000000-E	SP	Tree Protection Fence	2705.0	LF	$ 3.25	$ 8,791.25
35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	2.0	ACR	$ 3,350.00	$ 6,700.00
38	6087000000-E	1660	Mowing	1.0	ACR	$ 220.00	$ 220.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	850.0	SF	$ 175.00	$ 148,750.00
47	3575000000-N	SP	Bike/Ped Safety Rail	476.0	LF	$ 70.00	$ 33,320.00
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

Length **0.765 Mi.**

Subtotal					**$ 632,296.50**
Misc Items & Contingency (35%)					$ 221,303.78
Opinion of Probable Construction Cost					**$ 853,600.28**
Survey and Design					$ 150,000.00
Property Easement Acquisition	0.80	AC	$ 200,000.00		$ 160,000.00
City of Raleigh Permitting					$ 3,000.00
Federal / State Permitting (USACE, DEQ)					$ 500.00
CEI & CA 18%					$ 153,648.05
Opinion of Total Project Cost					**$ 1,320,748.32**

Note: Utilities Relocation Costs are not included.

Note: Easement acquisition is based on average land value along the corridor. No discounts have been taken for easements.

Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly


10' SIDEPATH
IMPROVED SHOULDER
& DITCH SECTION
TRENTON PARK LANE
TRENTON ROAD
WINDY WOODS ROAD
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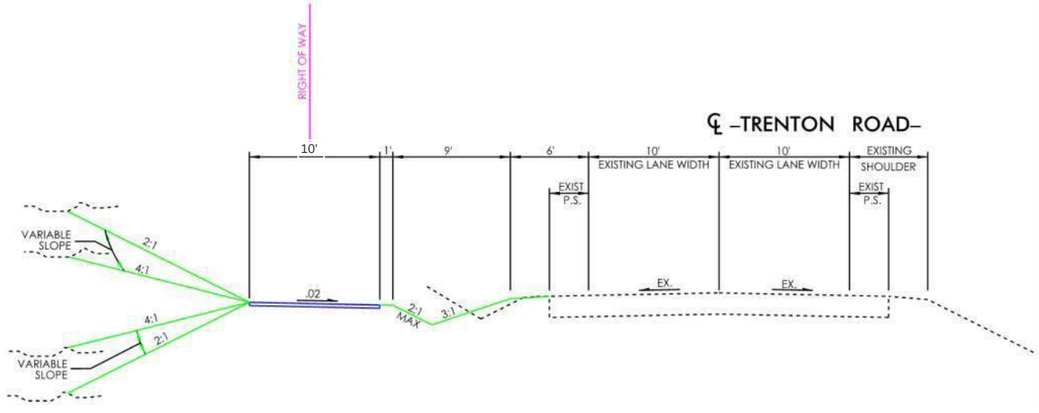
RIGHT OF WAY
℄ –TRENTON ROAD–
10'
1'
9'
6'
10'
EXISTING LANE WIDTH
10'
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SHOULDER
EXIST
P.S.
EXIST
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VARIABLE
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2:1
4:1
.02
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Trenton Road Connector **Feasibility**
Trenton Rd
Windy Woods Road to Umstead State Park
10' Sidepath Improved Shoulder & Ditch Section

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 117,000.00	$ 117,000.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	400.0	FT	$ 35.00	$ 14,000.00
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 52.00	$ -
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	0.0	LF	$ 86.00	$ -
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	36.0	LF	$ 132.00	$ 4,752.00
10	1121000000-E	520	Aggregate Base Course	2155.0	Tons	$ 30.00	$ 64,650.00
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	494.0	Tons	$ 120.00	$ 59,280.00
13	1575000000-E	610	ASP FOR PLANT MIX	40.0	Tons	$ 500.00	$ 20,000.00
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
15	2286000000-N	840	Masonary Drainage Structure	4.0	EA	$ 2,200.00	$ 8,800.00
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	2.0	EA	$ 650.00	$ 1,300.00
17	2374000000-N	840	Frame with Grate & Hood (All Types)	2.0	EA	$ 550.00	$ 1,100.00
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	711.0	LF	$ 20.00	$ 14,220.00
19	2591000000-E	848	4" Concrete Sidewalk	0.0	SY	$ 45.00	$ -
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	180.0	LF	$ 15.00	$ 2,700.00
24	3575000000-E	SP	DECORATIVE FENCE RESET	620.0	LF	$ 50.00	$ 31,000.00
25	4072000000-E		SUPPORT, 3-LB STL U-CHAN	48.0	LF	$ 65.00	$ 3,120.00
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28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3830.0	LF	$ 3.50	$ 13,405.00
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31	6015000000-E	1615	Temporary Mulching	1.0	ACR	$ 1,675.00	$ 1,675.00
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35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	2.0	ACR	$ 3,350.00	$ 6,700.00
38	6087000000-E	1660	Mowing	1.0	ACR	$ 220.00	$ 220.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
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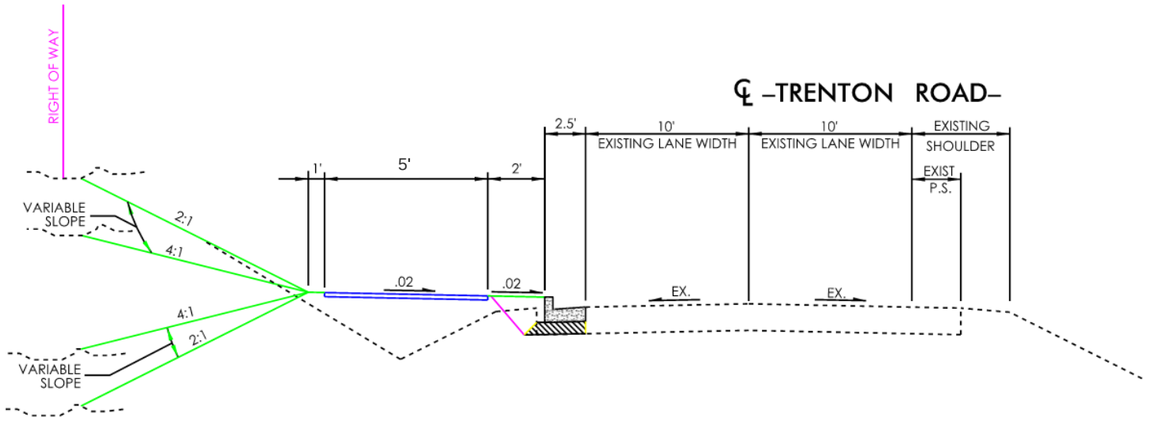
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	950.0	SF	$ 175.00	$ 166,250.00
47	3575000000-N	SP	Bike/Ped Safety Rail	476.0	LF	$ 70.00	$ 33,320.00
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

Length **0.765 Mi.**

Subtotal					**$ 708,476.50**
Misc Items & Contingency (35%)					$ 247,966.78
Opinion of Probable Construction Cost					**$ 956,443.28**
Survey and Design					$ 150,000.00
Property Acquisition	0.9	AC	$ 200,000.00		$ 180,000.00
City of Raleigh Permitting					$ 3,000.00
Federal / State Permitting (USACE, DEQ)					$ 500.00
CEI & CA 18%					$ 172,159.79
Opinion of Total Project Cost					**$ 1,462,103.06**

Note: Utilities Relocation Costs are not included.
Note: Easement acquisition is based on average land value along the corridor. No discounts have been taken for easements.
Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are


5' SIDEWALK WITH CURB AND GUTTER
LEGEND
GRADING EXTENT
2'-6" CURB & GUTTER
SIDEWALK /MUP
RETAINING WALL
TRENTON PARK LANE
TRENTON ROAD
TRINITY FARMS ROAD
TRENTON WOODS WAY
WILLIAM B. UMSTEAD STATE PARK
WINDY WOODS ROAD
SILENT STREAM COURT
TRENTON ROAD
REEDY CREEK RD


RIGHT OF WAY
℄ –TRENTON ROAD–
VARIABLE SLOPE
2:1
4:1
1'
5'
2'
.02
.02
2.5'
10'
EXISTING LANE WIDTH
10'
EXISTING LANE WIDTH
EXISTING SHOULDER
EXIST P.S.
EX.
EX.
4:1
2:1
VARIABLE SLOPE

Trenton Road Connector **Feasibility**

Trenton Rd

Windy Woods Road to Umstead State Park

5' Sidewalk with Curb and Gutter

Retains Existing Asphalt Sidepath Between Trenton Park Lane and Windy Woods Road

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 90,000.00	$ 90,000.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	0.0	FT	$ 35.00	$ -
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2250.0	LF	$ 52.00	$ 117,000.00
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	750.0	LF	$ 86.00	$ 64,500.00
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	36.0	LF	$ 132.00	$ 4,752.00
10	1121000000-E	520	Aggregate Base Course	0.0	Tons	$ 30.00	$ -
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	0.0	Tons	$ 120.00	$ -
13	1575000000-E	610	ASP FOR PLANT MIX	0.0	Tons	$ 500.00	$ -
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
15	2286000000-N	840	Masonary Drainage Structure	6.0	EA	$ 2,200.00	$ 13,200.00
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	0.0	EA	$ 650.00	$ -
17	2374000000-N	840	Frame with Grate & Hood (All Types)	6.0	EA	$ 550.00	$ 3,300.00
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	3068.0	LF	$ 20.00	$ 61,360.00
19	2591000000-E	848	4" Concrete Sidewalk	1703.0	SY	$ 45.00	$ 76,635.00
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	0.0	LF	$ 15.00	$ -
24	3575000000-E	SP	DECORATIVE FENCE RESET	176.0	LF	$ 50.00	$ 8,800.00
25	4072000000-E	903	SUPPORT, 3-LB STL U-CHANNEL	48.0	LF	$ 65.00	$ 3,120.00
26	4102000000-N	904	Sign Erection Type E	4.0	EA	$ 88.00	$ 352.00
27	4589000000-N	SP	Traffic Control	1.0	LS	$ 45,000.00	$ 45,000.00
28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3000.0	LF	$ 3.50	$ 10,500.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	1.0	ACR	$ 1,675.00	$ 1,675.00
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
34	6029000000-E	SP	Tree Protection Fence	2705.0	LF	$ 3.25	$ 8,791.25
35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	2.0	ACR	$ 3,350.00	$ 6,700.00
38	6087000000-E	1660	Mowing	1.0	ACR	$ 220.00	$ 220.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	0.0	SF	$ 175.00	$ -
47	3575000000-N	SP	Bike/Ped Safety Rail	0.0	LF	$ 70.00	$ -
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

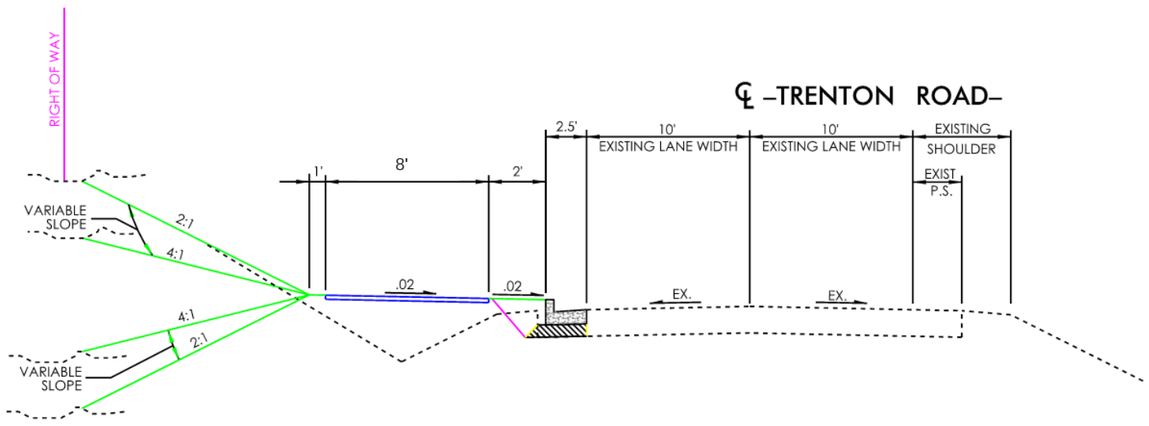
Length **0.765 Mi.**

Subtotal	**$**	**606,746.50**
Misc Items & Contingency (35%)	$	212,361.28
Opinion of Probable Construction Cost	**$**	**819,107.78**
Survey and Design	$	160,000.00
Property Acquisition	$	-
City of Raleigh Permitting	$	3,000.00
Federal / State Permitting (USACE, DEQ)	$	500.00
CEI & CA 18%	$	147,439.40
Opinion of Total Project Cost	$	1,130,047.17

Note: Utility relocation costs are not included.

Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly


8' SIDEPATH WITH CURB AND GUTTER
LEGEND
GRADING EXTENT
2'-6" CURB & GUTTER
SIDEWALK /MUP
RETAINING WALL
TRENTON PARK LANE
TRENTON ROAD
RETAINING WALL
RETAINING WALL
RETAINING WALL
TRINITY FARMS ROAD
SILENT STREAM COURT
WINDY WOODS ROAD
WILLIAM B. UMSTEAD STATE PARK
TRENTON ROAD
REEDY CREEK RD


RIGHT OF WAY
℄ –TRENTON ROAD–
VARIABLE SLOPE
2:1
4:1
1'
8'
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2.5'
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EXISTING LANE WIDTH
10'
EXISTING LANE WIDTH
EXISTING SHOULDER
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.02
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EX.
4:1
2:1
VARIABLE SLOPE

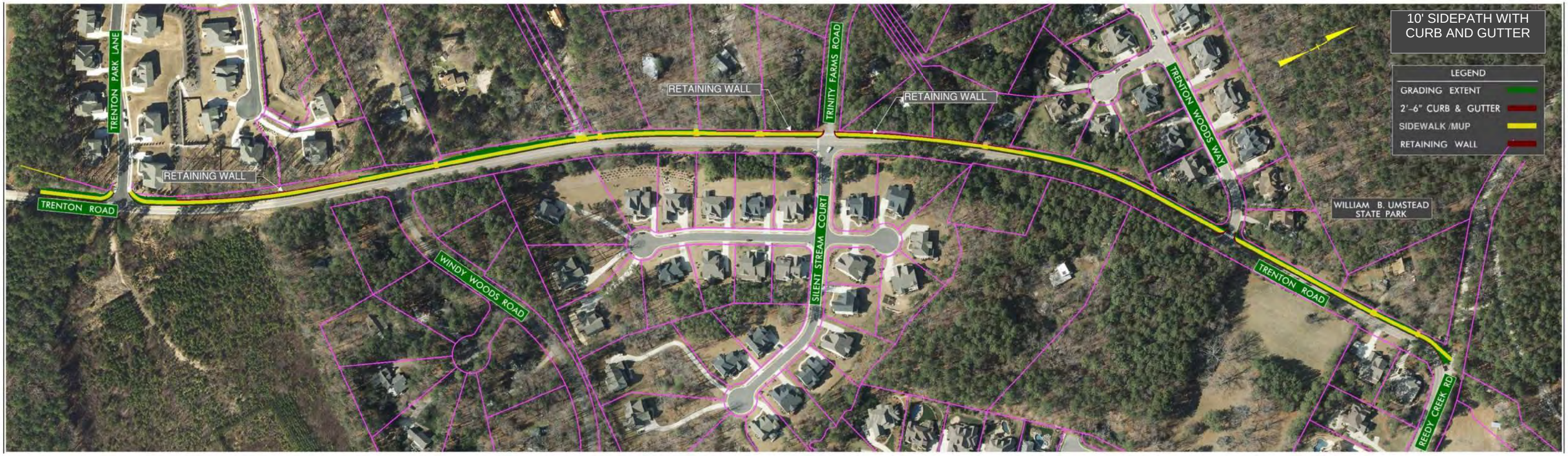
Trenton Road Connector **Feasibility**
Trenton Rd
Windy Woods Road to Umstead State Park
8' Sidepath with Curb and Gutter

Line Item	Item No.	Sec No.	Description	Qty	Unit	Price	Amount
1	0000400000-N	801	Construction Surveying	1.0	LS	$ 12,500.00	$ 12,500.00
2	0036000000-E	225	Undercut Excavation	50.0	CY	$ 55.00	$ 2,750.00
3	0043000000-N	226	Comprehensive Grading	1.0	LS	$ 121,300.00	$ 121,300.00
4	0195000000-E	265	Select Granular Material	10.0	CY	$ 60.00	$ 600.00
5	0196000000-E	270	Geotextile for Soil Stabilization	1300.0	SY	$ 3.50	$ 4,550.00
6	0343000000-E	310	15" Side Drain Pipe	0.0	FT	$ 35.00	$ -
7	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2250.0	LF	$ 52.00	$ 117,000.00
8	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	750.0	LF	$ 86.00	$ 64,500.00
9	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	36.0	LF	$ 132.00	$ 4,752.00
10	1121000000-E	520	Aggregate Base Course	1898.0	Tons	$ 30.00	$ 56,940.00
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	403.0	Tons	$ 120.00	$ 48,360.00
13	1575000000-E	610	ASP FOR PLANT MIX	30.0	Tons	$ 500.00	$ 15,000.00
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
15	2286000000-N	840	Masonary Drainage Structure	10.0	EA	$ 2,200.00	$ 22,000.00
16	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	0.0	EA	$ 650.00	$ -
17	2374000000-N	840	Frame with Grate & Hood (All Types)	10.0	EA	$ 550.00	$ 5,500.00
18	2549000000-E	846	2'-6" Concrete Curb and Gutter	4049.0	LF	$ 20.00	$ 80,980.00
19	2591000000-E	848	4" Concrete Sidewalk	0.0	SY	$ 45.00	$ -
20	2605000000-N	848	Curb Ramp	6.0	EA	$ 2,500.00	$ 15,000.00
21	2612000000-E	848	6" Concrete Driveway	90.0	SY	$ 75.00	$ 6,750.00
22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	180.0	LF	$ 15.00	$ 2,700.00
24	3575000000-E	SP	DECORATIVE FENCE RESET	622.0	LF	$ 50.00	$ 31,100.00
25	4072000000-E		SUPPORT, 3-LB STL U-CHAN	48.0	LF	$ 65.00	$ 3,120.00
26	4102000000-N	904	Sign Erection Type E	4.0	EA	$ 88.00	$ 352.00
27	4589000000-N	SP	Traffic Control	1.0	LS	$ 45,000.00	$ 45,000.00
28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3830.0	LF	$ 3.50	$ 13,405.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	1.0	ACR	$ 1,675.00	$ 1,675.00
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
34	6029000000-E	SP	Tree Protection Fence	2705.0	LF	$ 3.25	$ 8,791.25
35	6029000000-E	SP	Safety Fence	200.0	LF	$ 3.50	$ 700.00
36	6042000000-E	1632	1/4" Hardware Cloth	250.0	LF	$ 10.00	$ 2,500.00
37	6084000000-E	1660	Seeding And Mulching	2.0	ACR	$ 3,350.00	$ 6,700.00
38	6087000000-E	1660	Mowing	1.0	ACR	$ 220.00	$ 220.00
39	6090000000-E	1661	Seed For Repair Seeding	50.0	LB	$ 10.50	$ 525.00
40	6093000000-E	1661	Fertilizer For Repair Seeding	0.3	TON	$ 2,125.00	$ 531.25
41	6096000000-E	1662	Seed For Supplemental Seeding	50.0	LB	$ 8.50	$ 425.00
42	6108000000-E	1665	Fertilizer Topdressing	1.0	TON	$ 1,600.00	$ 1,600.00
43	6114500000-N	1667	Specialized Hand Mowing	10.0	MHR	$ 145.00	$ 1,450.00
44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	1518.0	SF	$ 175.00	$ 265,650.00
47	3575000000-N	SP	Bike/Ped Safety Rail	30.0	LF	$ 70.00	$ 2,100.00
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

Length **0.765 Mi.**

Subtotal	**$**	**1,007,986.50**
Misc Items & Contingency (35%)	$	352,795.28
Opinion of Probable Construction Cost	**$**	**1,360,781.78**
Survey and Design	$	136,100.00
Property Acquisition	$	-
City of Raleigh Permitting	$	3,000.00
Federal / State Permitting (USACE, DEQ)	$	500.00
CEI & CA 18%	$	244,940.72
Opinion of Total Project Cost	$	1,745,322.49

Note: Utilities and Right of Way Costs are not included
Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly dependend on


10' SIDEPATH WITH CURB AND GUTTER
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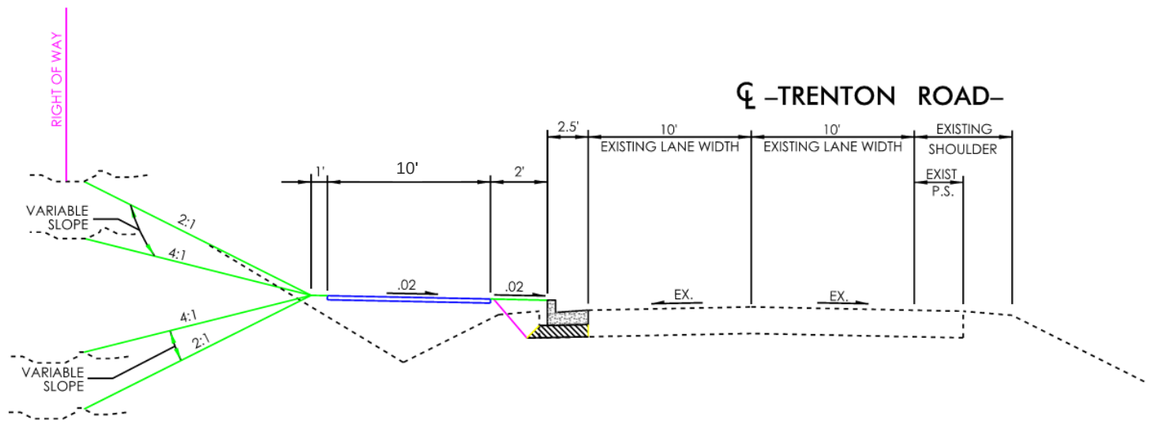
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Trenton Road Connector **Feasibility**
Trenton Rd
Windy Woods Road to Umstead State Park
10' Sidepath with Curb and Gutter

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10	1121000000-E	520	Aggregate Base Course	2201.0	Tons	$ 30.00	$ 66,030.00
11	1220000000-E	545	INCIDENTAL STONE BASE	200.0	Tons	$ 42.00	$ 8,400.00
12	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	504.0	Tons	$ 120.00	$ 60,480.00
13	1575000000-E	610	ASP FOR PLANT MIX	40.0	Tons	$ 500.00	$ 20,000.00
14	1693000000-E	654	Asphalt Plant Mix, Pavement Repair	3.0	Tons	$ 500.00	$ 1,500.00
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22	2815000000-N	858	Adjust of Drop Inlet	2.0	EA	$ 1,300.00	$ 2,600.00
23	3345000000-E	864	Remove and Reset Existing Guardrail	180.0	LF	$ 15.00	$ 2,700.00
24	3575000000-E	SP	DECORATIVE FENCE RESET	150.0	LF	$ 50.00	$ 7,500.00
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28	4702000000-E	1205	Thermoplastic Pavement Marking Lines (24",120 MILS)	160.0	LF	$ 20.00	$ 3,200.00
29	6000000000-E	1605	Temporary Silt Fence	3830.0	LF	$ 3.50	$ 13,405.00
30	6012000000-E	1610	Sediment Control Stone	90.0	TON	$ 60.00	$ 5,400.00
31	6015000000-E	1615	Temporary Mulching	1.0	ACR	$ 1,675.00	$ 1,675.00
32	6018000000-E	1620	Seed For Temporary Seeding	100.0	LB	$ 8.00	$ 800.00
33	6021000000-E	1620	Fertilizer For Temporary Seeding	1.0	TON	$ 2,200.00	$ 2,200.00
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44	6117000000-N	SP	Response For Erosion Control	13.0	EA	$ 430.00	$ 5,590.00
45	6132000000-N	SP	Concrete Washout Structure	1.0	EA	$ 1,270.00	$ 1,270.00
46	8802040000-E	453	CIP GRAVITY RETAINING WALLS	2312.0	SF	$ 175.00	$ 404,600.00
47	3575000000-N	SP	Bike/Ped Safety Rail	502.0	LF	$ 70.00	$ 35,140.00
48	4434000000-N	SP	Solar RFB Assembly	2.0	EA	$ 5,000.00	$ 10,000.00

Length **0.765 Mi.**

Subtotal	**$**	**1,189,786.50**
Misc Items & Contingency (35%)	$	416,425.28
Opinion of Probable Construction Cost	**$**	**1,606,211.78**
Survey and Design	$	160,700.00
Property Acquisition	$	-
City of Raleigh Permitting	$	3,000.00
Federal / State Permitting (USACE, DEQ)	$	500.00
CEI & CA 18%	$	289,118.12
Opinion of Total Project Cost	$	2,059,529.89

Note: Utility relocation costs are not included.
Note: Mitigation costs associated with nutrient offsets are not included in the above project costs. These costs are highly

APPENDIX C

BRIDGE IMPROVEMENT COST ESTIMATES

BRIDGE MODIFICATION UPDATES FROM PRIOR STUDY

TIP No. **I-40 Bridge Pedestrian Retrofit** **Functional** County: **Wake**
Route: **SR 1655 (Trenton Rd.)**
From **SAS Campus Just South of I-40 to 600' North of I-40** **CONSTR. COST**
Typical Section **Widening of Existing Bridge**

Line Item	Des	Sec No.	Description	Quantity	Unit	Price (2013)	Amount (2013)	Updated Price	Updated Amount
			Clearing and Grubbing	1.15	Acre	$ 12,000.00	$ 13,800.00	$ 15,000.00	$ 17,250.00
			Borrow Excavation	3,400.00	CY	$ 10.25	$ 34,850.00	$ 25.00	$ 85,000.00
			Unclassified Excavation	800.00	CY	$ 9.50	$ 7,600.00	$ 20.00	$ 16,000.00
			Drainage Existing Location	1.00	LS	$ 125,664.00	$ 125,664.00	$ 150,000.00	$ 150,000.00
			Fine Grading	0.00	SY	$ 3.00	$ -	$ 4.00	$ -
			Pavement Widening	1,260.00	SY	$ 56.00	$ 70,560.00	$ 65.00	$ 81,900.00
			New Pavement	1,600.00	SY	$ 27.00	$ 43,200.00	$ 55.00	$ 88,000.00
			Pavement Resurfacing	0.00	SY	$ 7.00	$ -	$ 15.00	$ -
			2'-6" Concrete Curb and Gutter	2,900.00	LF	$ 13.25	$ 38,425.00	$ 21.00	$ 60,900.00
			4" Concrete Sidewalk	0.00	SY	$ 27.00	$ -	$ 30.00	$ -
			Wheel Chair Ramp	6.00	Each	$ 1,200.00	$ 7,200.00	$ 2,025.00	$ 12,150.00
			Erosion Control	1.50	Acres	$ 12,000.00	$ 18,000.00	$ 30,000.00	$ 45,000.00
			Upgrade Traffic Signal	0.00	Each	$ -	$ -	$ -	$ -
			Traffic Signal (New)	0.00	Each	$ -	$ -	$ -	$ -
			Traffic Control	1.00	LS	$ 41,000.00	$ 41,000.00	$ 45,000.00	$ 45,000.00
			Removal of Pavement Markings	0.00	LF	$ 4.00	$ -	$ 5.00	$ -
			Thermo and Markers	0.00	Miles	$ 16,000.00	$ -	$ 20,000.00	$ -
			Precast Concrete Barrier	30.00	LF	$ 105.00	$ 3,150.00	$ 200.00	$ 6,000.00
			Remove Exist. Guardrail	400.00	LF	$ 5.00	$ 2,000.00	$ 10.00	$ 4,000.00
			Remove and Reset Guardrail	225.00	LF	$ 43.50	$ 9,787.50	$ 60.00	$ 13,500.00
			Guardrail	425.00	LF	$ 16.25	$ 6,906.25	$ 17.00	$ 7,225.00
			Type III Anchor Unit	4.00	Each	$ 1,500.00	$ 6,000.00	$ 1,850.00	$ 7,400.00
			CAT-1	2.00	Each	$ 525.00	$ 1,050.00	$ 675.00	$ 1,350.00
			GRAU 350	2.00	Each	$ 2,000.00	$ 4,000.00	$ 3,200.00	$ 6,400.00
			Structures						
				1.00	LS	$ 703,800.00	$ 703,800.00	$ 850,000.00	$ 850,000.00
									$ -
			Utility Construction			$ -	$ -	$ -	$ -
			Relocate Existing Waterline			$ -	$ -	$ -	$ -
			Relocate Existing Sewer Line						
			Misc. & Mob (15% Strs&Util)	1.00	LS		$ 105,570.00		$ 127,500.00
			Misc. & Mob (35% Functional)	1.00	LS		$ 151,617.46		$ 226,476.25

Lgth **0.36 Mi.**

Contract Cost …….. ……..	$ 1,394,180.21	$ 1,851,051.25
E. & C. 15% …….. ……..	$ 209,127.03	$ 277,657.69
Construction Cost	**$ 1,603,307.24**	**$ 2,128,708.94**

Note: Utilities and Right of Way Costs are not included

TIP No. **I-40 Bridge Pedestrian Retrofit** **Functional** County: **Wake**
Route: **SR 1655 (Trenton Rd.)**
From **SAS Campus Just South of I-40 to 600' North of I-40** **CONSTR. COST**
Typical Section **Greenway Bridge**

Line Item	Des	Sec No.	Description	Quantity	Unit	Price (2013)	Amount (2013)	Updated Price	Updated Amount
			Clearing and Grubbing	2.50	Acre	$ 12,000.00	$ 30,000.00	$ 15,000.00	$ 37,500.00
			Borrow Excavation	0.00	CY	$ 10.25	$ -	$ 25.00	$ -
			Unclassified Excavation	7,200.00	CY	$ 9.50	$ 68,400.00	$ 20.00	$ 144,000.00
			Drainage Existing Location	1.00	LS	$ 174,522.00	$ 174,522.00	$ 200,000.00	$ 200,000.00
			Fine Grading	0.00	SY	$ 3.00	$ -	$ 4.00	$ -
			Pavement Widening	1,400.00	SY	$ 56.00	$ 78,400.00	$ 65.00	$ 91,000.00
			New Pavement	1,700.00	SY	$ 27.00	$ 45,900.00	$ 55.00	$ 93,500.00
			Pavement Resurfacing	0.00	SY	$ 7.00	$ -	$ 15.00	$ -
			2'-6" Concrete Curb and Gutter	2,900.00	LF	$ 13.25	$ 38,425.00	$ 21.00	$ 60,900.00
			4" Concrete Sidewalk	0.00	SY	$ 27.00	$ -	$ 30.00	$ -
			Wheel Chair Ramp	1.00	Each	$ 1,200.00	$ 1,200.00	$ 2,025.00	$ 2,025.00
			Erosion Control	2.70	Acres	$ 12,000.00	$ 32,400.00	$ 30,000.00	$ 81,000.00
			Upgrade Traffic Signal	0.00	Each	$ -	$ -	$ -	$ -
			Traffic Signal (New)	0.00	Each	$ -	$ -	$ -	$ -
			Traffic Control	1.00	LS	$ 41,000.00	$ 41,000.00	$ 45,000.00	$ 45,000.00
			Removal of Pavement Markings	0.00	LF	$ 4.00	$ -	$ 5.00	$ -
			Thermo and Markers	0.00	Miles	$ 16,000.00	$ -	$ 20,000.00	$ -
			Pedestrian Safety Rail	520.00	LF	$ 40.00	$ 20,800.00	$ 128.00	$ 66,560.00
			Precast Concrete Barrier	100.00	LF	$ 105.00	$ 10,500.00	$ 200.00	$ 20,000.00
			Remove Exist. Guardrail	425.00	LF	$ 5.00	$ 2,125.00	$ 10.00	$ 4,250.00
			Remove and Reset Guardrail	225.00	LF	$ 43.50	$ 9,787.50	$ 60.00	$ 13,500.00
			Guardrail	600.00	LF	$ 16.25	$ 9,750.00	$ 17.00	$ 10,200.00
			Type III Anchor Unit	6.00	Each	$ 1,500.00	$ 9,000.00	$ 1,850.00	$ 11,100.00
			CAT-1	2.00	Each	$ 525.00	$ 1,050.00	$ 675.00	$ 1,350.00
			GRAU 350	2.00	Each	$ 2,000.00	$ 4,000.00	$ 3,200.00	$ 6,400.00
			Structures						
			Foundations	1.00	LS	$ 61,000.00	$ 61,000.00	$ 73,000.00	$ 73,000.00
			Installation	1.00	LS	$ 120,000.00	$ 120,000.00	$ 150,000.00	$ 150,000.00
			Bridge Deck	1.00	LS	$ 55,000.00	$ 55,000.00	$ 122,500.00	$ 122,500.00
			Capstone Pedestrian Truss Bridge (Option #1)	1.00	LS	$ 810,000.00	$ 810,000.00	$ 900,000.00	$ 900,000.00
			Utility Construction						
			Relocate Existing Waterline						
			Relocate Existing Sewer Line						
			Misc. & Mob (15% Strs&Util)	1.00	LS		$ 156,900.00		$ 186,825.00
			Misc. & Mob (35% Functional)	1.00	LS		$ 202,040.83		$ 310,899.75

Lgth **0.36 Mi.**

Contract Cost …….. ……..	$ 1,982,200.33		$ 2,631,509.75
E. & C. 15% …….. ……..	$ 297,330.05		$ 394,726.46
Construction Cost	**$ 2,279,530.37**		**$ 3,026,236.21**

Note: Utilities and Right of Way Costs are not included

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