JOHNSTON COUNTY, NORTH CAROLINA

MOUNTAINS-TO-SEA TRAIL

MASTER PLAN • OCTOBER 2006

PREPARED BY:
GREENWAYS INCORPORATED
2006

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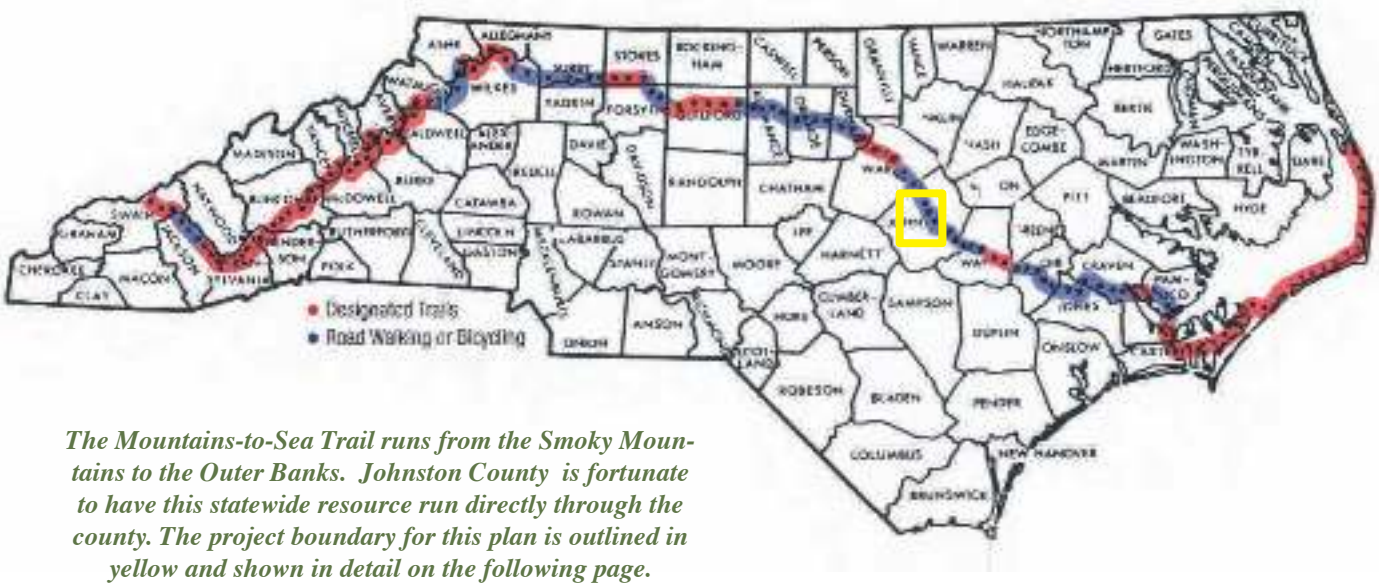
Chapter Outline:

1.0 Statement of Purpose

In February of 2006, the State of North Carolina Department of Environment and Natural Resources (NCDENR) Division of State Parks, along with North Carolina Department of Transportation (NCDOT) Pedestrian and Bicycle Division, the County of Johnston, the Town of Clayton, and the Town of Smithfield, commissioned with Greenways Incorporated to prepare a Master Plan for Johnston County's portion of the statewide Mountains-to-Sea Trail (MST). The purpose of this Master Plan Report is to describe why the trail is needed, what the trail system will entail, and how to make it a reality.

1.1 North Carolina's Mountains-To-Sea Trail (MST)

The MST Master Plan for Johnston County is part of a larger goal for a continuous trail stretching from the Smoky Mountains in the west, to North Carolina's Outer Banks in the east. This trail started in the 1970's when the North Carolina General Assembly passed the North Carolina Trails System Act. The vision was strongly supported by a series of secretaries of the Department of Natural and Community Development. The original plan narrowed the trail's route down to a 20-mile wide corridor, and then called for volunteers across the state to help narrow down the possible trail routes. Since then, volunteers, government agencies, nonprofit organizations, and private landowners have worked together to complete half of the nearly 1000-mile trail. The MST takes the form of various land based trail types, from footpaths to paved trails, to on-road facilities. Portions of the trail are also water-based, allowing access to rivers for canoeing, kayaking and tubing. While



The Mountains-to-Sea Trail runs from the Smoky Mountains to the Outer Banks. Johnston County is fortunate to have this statewide resource run directly through the county. The project boundary for this plan is outlined in yellow and shown in detail on the following page.

some of the MST has been completed in population centers, the majority of the existing trail lies within State and National Park Service and U.S. Forest Service lands. Allen de Hart, author of Hiking North Carolina's Mountains-to-Sea Trail, has this to say about the trail:

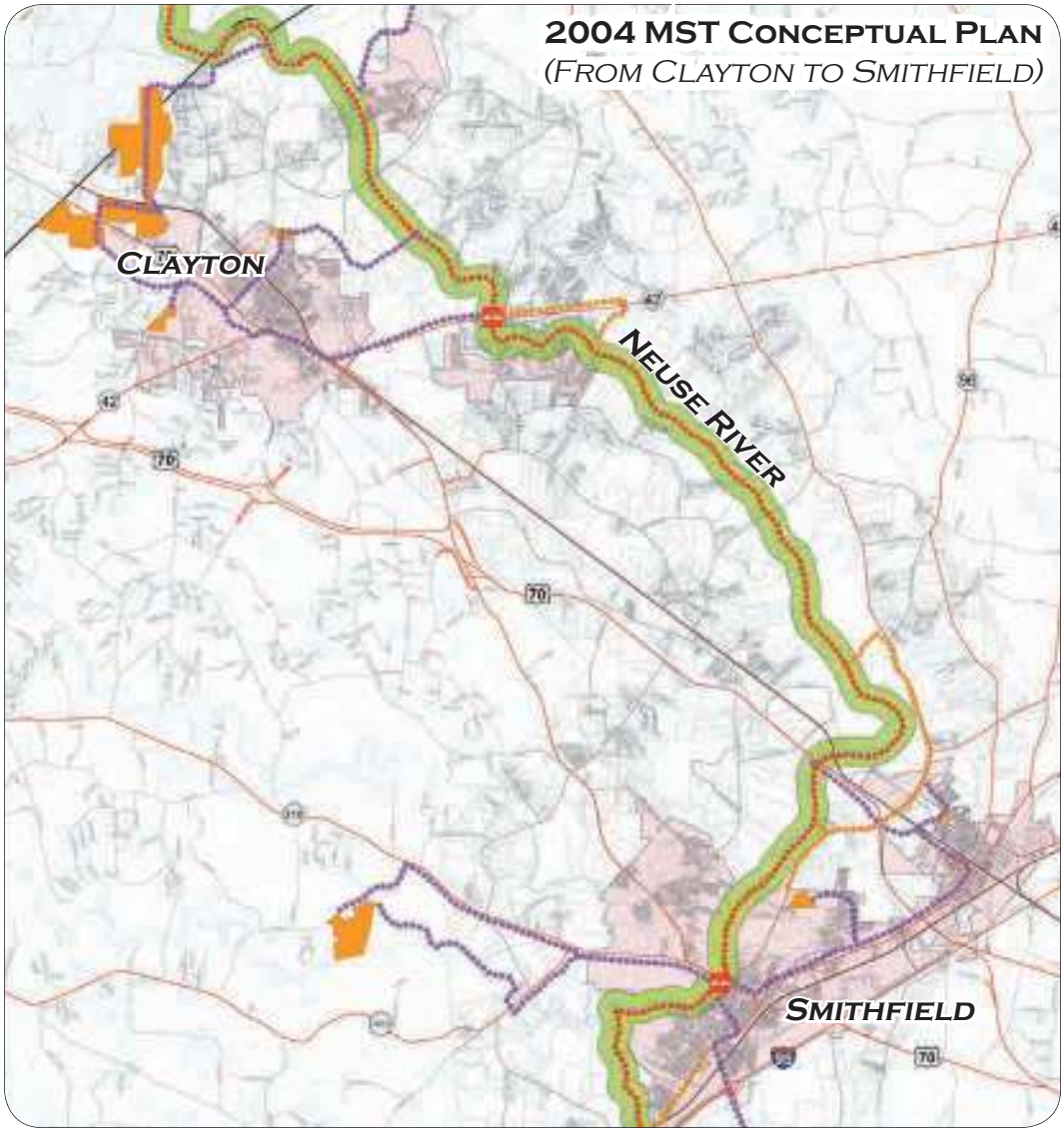
> *"North Carolina's Mountains-to-Sea Trail offers some of the most rewarding hiking experiences in the East. Covering nearly 1,000 miles, it stretches from Clingman's Dome, the highest peak in the Great Smoky Mountains National Park, to Jockey's Ridge, the largest sand dune on the Atlantic Coast. The route, a mix of some 500 miles of designated and planned hiking trails and 500 miles of state bicycle paths also used for hiking, winds through three national parks, three national forests, seven state parks, two wilderness areas, and two wildlife refuges, as well as farming communities and small towns." (de Hart, 2000)*

Once completed, North Carolina's Mountains-to-Sea Trail will become an attraction for hikers and cyclists from all parts of the country, especially for those traveling along the adjoining Appalachian Trail and East Coast Greenway. It will also serve as an economic stimulus for local communities and serve local residents by offering additional transportation and recreation opportunities. In addition to the MST's economic and recreational benefits, the corridor itself will also protect riparian buffers, provide wildlife habitat, and conserve biological, scenic, cultural, and historical resources of statewide significance (see Chapter 3, Benefits of the MST, for more information on trail and greenway benefits).

1.2 Vision for the MST-East Plan

The MST-East Plan was prepared in 2004, entitled, *A Conceptual Plan for the MST: Falls Lake Dam to Cedar Island*. The Neuse River became the 'backbone' of the MST for eastern North Carolina because of the State's focus on promoting clean water in the Neuse, and because there are a number of local governments along the river with existing or planned greenways.

The MST-East Plan broadly identifies the MST as a 2000' corridor along the Neuse River (1000' on each side), highlighting existing trails and water access points, and proposing alternate routes, spur trails, and proposed water access. The 2004 conceptual routes for northwestern Johnston County are shown below. These proposals have been analyzed, modified, and incorporated into the Johnston County MST Plan.



The 2004 MST-East Plan broadly identifies the Johnston County section of the MST as a 2000' corridor along the Neuse River (shown here in green).

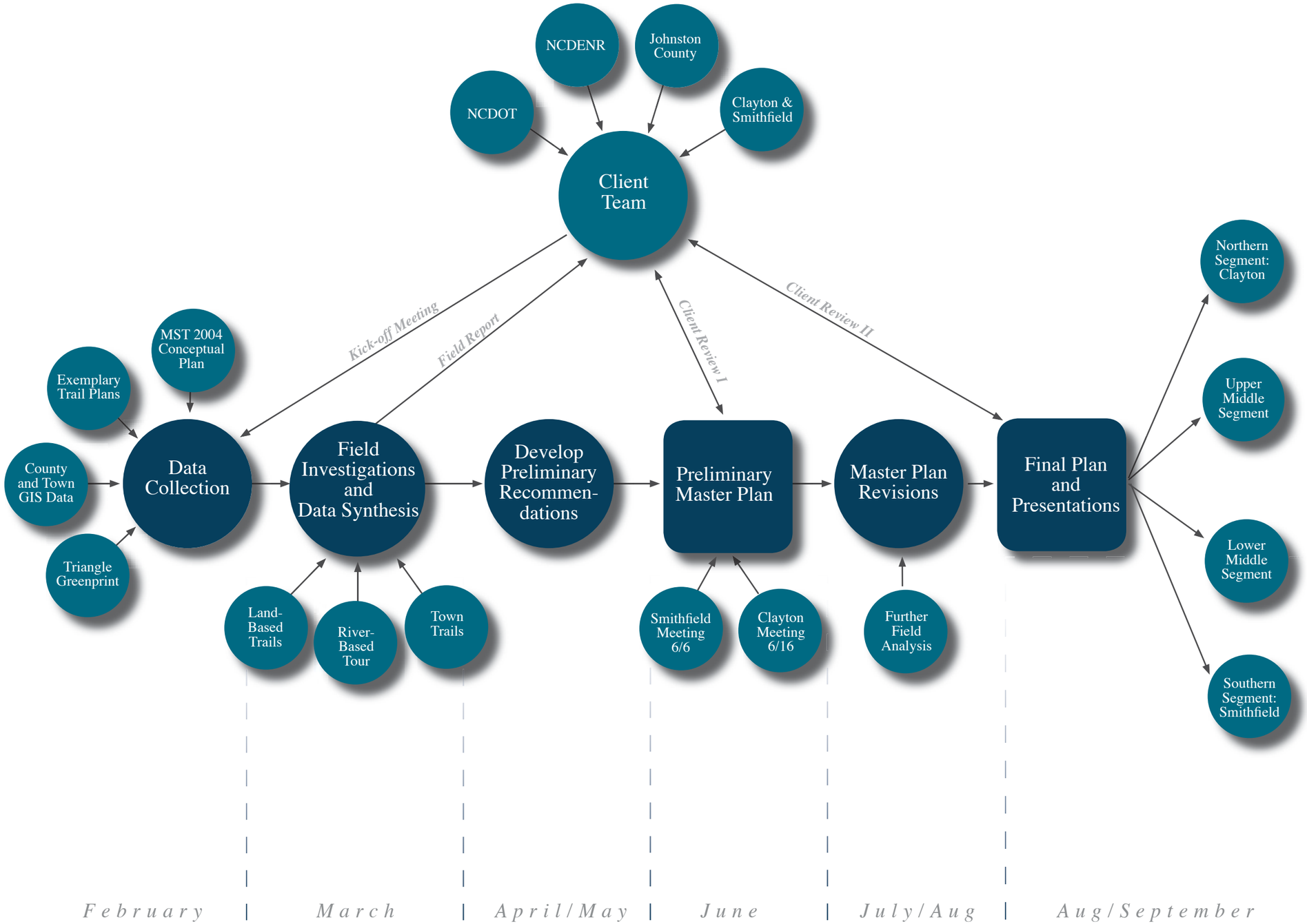
The vision for the trail along the Neuse River was developed through a collaborative planning process involving regional task force meetings, input from existing local greenway plans, farmland protection efforts, and water and land protection efforts. The vision is that of a land and water trail system, featuring a footpath for hiking that could transition to a multi-use trail as it connects through various cities and towns from Wake to Carteret County. The water-based portion is essentially already existing, but needs additional access points and enhanced promotion to realize its potential. The MST-East Plan states the following as part of the vision:

> *"In years to come, residents and visitors will be able to travel from the State's Capital through natural areas, historic areas, and scenic areas to the Coast. Stops can be made along the way to shop and visit in the towns and cities that serve as hubs along the route...The completed MST-East will also provide connections to additional trail systems that link to communities and destinations not immediately on the MST route. This will involve collaborative planning among municipal, county, regional, state and federal agencies. Some portions of the trail will serve as protected natural areas. Other alternatives will serve as alternative transportation corridors for walkers or cyclists." (MST-East Plan, 2004)*

The Johnston County MST, from the Town of Clayton to the Town of Smithfield, draws from this vision. This portion of the MST will take the form of a multi-use trail along the Neuse River, connecting the towns and their fast-growing subdivisions through alternative transportation, while at the same time, both protecting the natural environment along the Neuse and drawing economic benefits from both local and regional trail users.

1.3 The MST Planning Process for Johnston County

The following diagram shows the planning process used to develop this plan. The diagram runs chronologically from left to right, outlining the steps taken from February 2006 to September 2006. The primary deliverables included a field report, a preliminary draft plan, the final plan, and presentations.


NCDENR
Johnston County
NCDOT
Clayton & Smithfield
Client Team
Kick-off Meeting
Field Report
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Client Review II
MST 2004 Conceptual Plan
Exemplary Trail Plans
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Preliminary Master Plan
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Northern Segment: Clayton
Upper Middle Segment
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February
March
April/May
June
July/Aug
Aug/September

Benefits for Johnston Co. 2

Chapter Outline:

2.0 Johnston County: From Quiet Countryside to Rapid Growth

2.0.1 Natural Characteristics and Local History

Johnston County is located on the western edge of North Carolina's coastal plain region, just east of the fall line which divides the low lying sands, clays, and shoals of the coastal plain from the harder rock of the Piedmont. West of Johnston County, the fall line that divides these regions represents both a boundary for shipping transportation on the Neuse River and an opportunity for manufacturing from waterpower. These natural characteristics resulted in the development of cities and towns along the Neuse River such as Smithfield, which even today affect the health of the river as it flows through into Johnston County.

Pine forests dominate the ecology of Johnston County. The sandy soils and gentle incline into the foothills make the area naturally predisposed to agriculture . The railroad made more markets accessible, and by the mid-1800's, cotton production replaced subsistence farming, playing an important role in the development of Johnston County. Government agricultural regulations and declining cotton prices during the Great Depression permanently transferred the region's cash crop to tobacco.

The seat of Johnston County is the Town of Smithfield, established in 1771. Smithfield, the first town in the county, contains a park along the Neuse River where the landing of the 1700's Smith's Ferry gave the town its start. Today, the Smithfield Town Commons along the Neuse is the only existing portion of the MST in Johnston County.

2.0.2 The 4th Fastest Growing County in the State

Smithfield is the largest town in Johnston County, with a population of 11,510, according to the 2000 Census. The Town of Clayton is the second largest, with 6,975, followed by Selma, with a population of 5,914.

The total estimated population of Johnston County in 2004 was 141,640. With a growth rate of 12.1% between 2000 and 2003, Johnston County is the fourth fastest growing county in the state of North Carolina.

2.0.3 The Neuse River Basin

A key feature of Johnston County is the Neuse River, the basin of which completely encompasses Johnston County. The river is the longest in North Carolina and becomes the widest river in the United States, as it spreads to six miles at the Pamlico Sound. The expansive Neuse River Basin contains 3,880 miles of streams and rivers, and includes 74 municipalities. The population of people living within the Neuse River Basin in 2000 was 1,320,379, which was then 16.4% of the state's entire population.

Currently, within the westernmost portion of the basin, 61% of the Neuse River watershed is forest and 16% is agriculture. The remaining 17% of the watershed is urban and suburban development. Under both high and low 'buildout' scenarios (possible scenarios for future levels of growth), all agricultural land and some forested areas are predicted to be lost to development by 2025 .

While the predicted losses of rural landscapes and productive farmland are significant, they are compounded further by the threats to wildlife habitat and water quality in the basin. The Neuse River is home to multiple rare and endangered species, some of which are only found in the Neuse River. The culmination of this special habitat and surrounding development creates a need for protection. In 2000, 140 miles of streams were impaired by urban stormwater runoff, a figure that is growing as the population within the basin grows.

The Neuse River Basin has been experiencing intense development pressure that is expected to continue in the coming decades. Right: The Neuse River in Smithfield.

The "Neuse Rules," a statewide legislation put forth in 1998, was meant to reduce pollutants entering the Neuse River. According to the legislation, there must be a 50-foot riparian buffer along all natural streams, lakes, ponds, and estuarine waters belonging to the Neuse River Basin. Except for activities existing prior to the legislation, the first 20 feet of the buffer must remain undisturbed, and some limited uses are allowed within the next 30 feet. See Appendix A for related Ordinances in Johnston County.

2.1 Top 7 Benefits of the MST for Johnston County

Communities across the United States are realizing the advantages of providing quality trail systems to their residents and visitors alike. North Carolina's MST provides Johnston County an opportunity to create a crucial link in a statewide trail system that capitalizes on growth while maintaining the area's small-town charm and natural beauty. Trails and greenways provide this unique opportunity through a variety of benefits that will ultimately affect the sustainability of Johnston County's economic, environmental, and social health. These benefits include:

- **Creating Value and Generating Economic Activity**
- **Facilitating the Use of Alternative Transportation**
- **Improving Health through Active Living**
- **Clear Skies, Clean Rivers, and Thriving Wildlife**
- **Protecting People and Property from Flood Damage**
- **Enhancing Cultural Awareness and Community Identity**
- **Protecting Farmland and Openspaces**

Numerous studies have made the positive link between trails and their benefits abundantly clear. The degree to which a particular type of benefit is realized depends largely upon the nature of the greenway and trail system being implemented. Some systems are more recreation and transportation based, while others are more conservation based. The sections below describe how trails and greenways create these opportunities in general, while offering some examples of how each benefit could be realized in Johnston County. A list of resources is provided at the end of the chapter for more information.

2.2 Creating Value and Generating Economic Activity

The MST will bring economic benefits to Johnston County, including raising real property values, increasing tourism and recreation-related revenues, and if combined with 'smart growth' planning, it can offer savings in the cost of public services.

There are many examples, both nationally and locally, that affirm the positive connection between greenspace and property values[1]. Residential properties will realize a greater gain in value the closer they are located to trails and greenspace. According to a 2002 survey of recent homebuyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the

second most important community amenity out of a list of 18 choices[2]. Additionally, the study found that 'trail availability' outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers. Findings from two reputable sources (The Trust for Public Land, *The Economic Benefits of Parks and Open Space*, and The Rails-to-Trails Conservancy, *Economic Benefits of Trails and Greenways)* illustrate how this value is realized in property value across the country:

Trails Increase Real Property Values

- *Apex, NC:* The Shepard's Vineyard housing development added $5,000 to the price of 40 homes adjacent to the regional greenway – and those homes were still the first to sell[3].
- *Front Royal, VA*: A developer who donated a 50-foot-wide, seven-mile-long easement along a popular trail sold all 50 parcels bordering the trail in only four months.
- *Salem, OR:* land adjacent to a greenbelt was found to be worth about $1,200 and acre more than land only 1000 feet away.
- *Oakland, CA:* A three-mile greenbelt around Lake Merritt, near the city center, was found to add $41 million to surrounding property values.
- *Seattle, WA:* Homes bordering the 12-mile Burke-Gilman trail sold for 6 percent more than other houses of comparable size.
- *Brown County, WI*: Lots adjacent to the Mountain Bay Trail sold faster for an average of 9 percent more than similar property not located next to the trail.
- *Dayton, OH:* Five percent of the selling price of homes near the Cox Arboretum and park was attributable to the proximity of that openspace.

These examples show how Johnston County's development community can take advantage of future trail networks, providing access to them or even incorporating them into their site designs, creating a win-win situation for the developer and the local community.

Damascus, VA loves its trails, as they generate $2.5 million annually. Though it lacks the mountains found in Damascus, the proposed trail in Johnston is approximately the same length and near a much larger population base.

Tourism and recreation-related revenues from trails and greenways come in several forms. Trails and greenways create opportunities in construction and maintenance, recreation rentals (such as bicycles, kayaks, and canoes), recreation services (such as shuttle buses and guided tours), historic preservation, restaurants and lodging. Tourism is currently ranked the number one economic force in the world. The excerpts below illustrate how powerful trails can be in stimulating tourism and economic opportunities:

Trail Tourism Creates Economic Impacts

- *The Outer Banks, NC:* Bicycling is estimated to have an annual economic impact of $60 million and 1,407 jobs supported from the 40,800 visitors for whom bicycling was an important reason for choosing to vacation in the area. The annual return on bicycle facility development in the Outer Banks is approximately nine times higher than the initial investment[4].
- *Damascus, VA:* At the Virginia Creeper Trail, a 34-mile trail in southwestern Virginia, locals and non-local spend approximately $2.5 million annually related to their recreation visits. Of this amount, non-local visitors spend about $1.2 million directly in the Washington and Grayson County economies[5].
- *Morgantown, WV:* The 45-mile Mon River trail system is credited by the Convention and Visitors Bureau for revitalizing an entire district of the city, with a reported $200 million in private investment as a direct result of the trail[6].
- *Tallahassee, FL:* The Florida Department of Environmental Protection Office of Greenways & Trails estimate an economic benefit of $2.2 million annually from the 16-mile St. Marks Trail[8].
- *San Antonio, TX:* Riverwalk Park, created for $425,000, has surpassed the Alamo as the most popular attraction for the city's $3.5-billion tourism industry[7].
- *Pittsburgh, PA:* Mayor Tom Murphy credits trail construction for contributing significantly to a dramatic downtown revitalization.
- *Allegheny Passage, PA:* The direct economic impact of the trail exceeded $14 million a year, encouraging the development of several new businesses and a rise in property value in the first trailhead town.
- *Leadville , CO:* In the months following the opening of the Mineral Belt Trail, the city reported a 19 percent increase in sales tax revenues.
- *Dallas, TX:* The 20-mile Mineral Wells to Weatherford Trail attracts 300,000 people annually and generates local revenues of $2 million.
- *Milford, DE:* The Mispillion River Greenway is credited with inspiring downtown reinvestment with 250 people now working in a downtown that was vacant 10 years earlier.
- *Nicholas County, WV*: Each fall, rafters pump $20 million into the local economy for the 24-mile scenic stretch of the Gauley River.
- *Pacific Grove, CA:* The Chamber of Commerce President estimates approximately 4.5 million visitors annually in the area for the Monterey Bay Trail.

Businesses catering directly to trail users, such as cottages, bike rentals, and restaurants, all contribute to the economic impact of trails.

Some of the trail examples on the previous page feature unparalleled natural landscapes that contribute to the impressive figures they generate. North Carolina's statewide MST will feature many unique landscapes that rival these examples, in some cases surpassing them. Johnston County should aim to attract similar economic benefits as those noted above, especially considering that the County lies between the capital region's growing population base and the increasingly popular coastal region of North Carolina. The County also plays a unique role for the MST, hosting the section of trail that transitions from the piedmont to the coastal plain. This positions Johnston County strategically as a start and end point for cross-state trail users who wish to complete the MST one section at a time.

2.3 Facilitating the Use of Alternative Transportation

The sprawling nature of land development patterns today often leaves residents and visitors with no choice but to drive, even for short trips. In fact, two-thirds of all trips we make are for a distance of five miles or less. Surveys by the Federal Highway Administration show that Americans are willing to walk as far as two miles to a destination and bicycle as far as five miles. Greenway-based bikeways and walkways, as part of a local or regional transportation system, offer effective transportation alternatives by connecting homes, workplaces, schools, parks, downtowns, and cultural attractions.

In Johnston County, the MST will provide local and regional alternative transportation links that are currently non-existent. Residents who live in subdivisions near the Town of Clayton will be able to walk or bike downtown for work, or simply weekend recreation. Residents in Smithfield will be able to circulate through town in a safe, efficient, and fun way: walking or biking. Residents throughout the corridor will be able to move freely along the MST and town trails without paying increasingly high gas prices and sitting in the ever-growing automobile traffic. Last but not least, once the MST is connected from Clayton to Raleigh, avid cyclists will find the 16-mile commute highly feasible.

2.4 Improving Health through Active Living

The MST in Johnston County will contribute to the overall health of trail users by offering people attractive, safe, accessible places to bike, walk, hike, jog, skate, and even places to enjoy water-based trails. In short, the trails system will create better opportunities for active lifestyles.

The design of our communities—including towns, subdivisions, transportation systems, parks, trails and other public recreational facilities—affects people's ability to reach the recommended 30 minutes each day of moderately intense physical activity (60 minutes for youth). According to the Centers for Disease Control and Prevention (CDC), "Physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic"[9].

The MST plan aims to expand some the County's existing opportunities for active living, such as canoeing on the Neuse. (Photo courtesy of the Clayton Parks and Recreation)

In identifying a solution, the CDC determined that by creating and improving places in our communities to be physically active, there could be a 25 percent increase in the percentage of people who exercise at least three times a week[10]. This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits[11]. Additionally, as people become more physically active outdoors, they make connections with their neighbors that contribute to the health of their community.

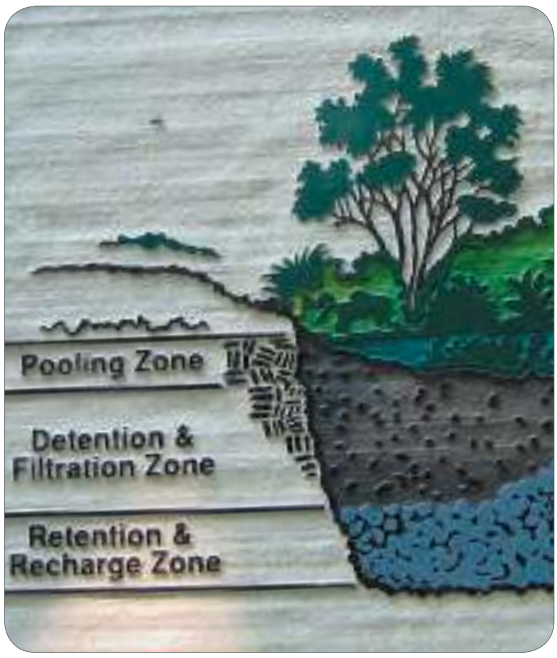
Many public agencies are teaming up with foundations, universities, and private companies to launch a new kind of health campaign that focuses on improving people's options instead of reforming their behavior. A 2005 Newsweek Magazine feature, *Designing Heart-Healthy Communities*, cites the goals of such programs (italics added): "The goals range from updating restaurant menus to restoring mass transit, but the most visible efforts focus on making the built environment more conductive to *walking and cycling*."[12] Clearly, the connection between health and trails is becoming common knowledge. The Rails-to-Trails Conservancy puts it simply: "Individuals must choose to exercise, but communities can make that choice easier."

2.5 Clear Skies, Clean Rivers, and Thriving Wildlife

There are a multitude of environmental benefits from trails and greenways that help to protect the essential functions performed by natural ecosystems. Greenways protect and link fragmented habitat and provide rare opportunities for protecting plant and animal species. Trails and greenways reduce air pollution by two

Greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, including the wildlife that depends on those water bodies remaining clean.

significant means: first, they provide enjoyable and safe alternatives to the automobile, which reduces the burning of fossil fuels; second, they protect large areas of plants that create oxygen and filter air pollutants such as ozone, sulfur dioxide, carbon monoxide and airborne particles of heavy metal. Greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.



Signs such as these, entitled, "Improving Water Quality in Your Community" offer information on local environmental issues.

As an educational tool, trail signage can be designed to inform trail-users about water quality issues particular to the Neuse River and its surrounding land uses, including tips on how to improve water quality. Similarly, a greenway can serve as a hands-on environmental classroom for people of all ages to experience natural landscapes, furthering environmental awareness.

2.6 Protecting People and Property from Flood Damage

Greenways also serve as natural floodplains by protecting land along rivers and streams. According to the Federal Emergency Management Agency (FEMA), the implementation of floodplain ordinances is estimated to prevent $1.1 billion in flood damages annually. By restoring developed floodplains to their natural state and by limiting development within the floodplain, many riverside communities are preventing potential flood damages and related costs[13]. This aspect of greenways is particularly relevant to Johnston County, as indicated by local newspaper headlines: "Floodwaters cause damage" (The Herald, June 20, 2006). The article reported that, according to the National Weather Service, "the Neuse River rose seven feet above flood stage, cresting at 22.95 feet on Friday and swamping some homes in the county." Reports like these are a good indication that land within the Neuse River floodplain should not be built upon. See Appendix A for Johnston County's Floodplain Ordinance.

The trail could serve as major attraction in the region by recognizing, honoring, and connecting Johnston County's many cultural and historical resources. Right: Smithfield's theatre on the Town Commons along the Neuse River.

2.7 Enhancing Cultural Awareness and Community Identity

Greenways can serve as connections to our heritage by preserving historic places and by providing access to them. They provide a sense of place and an understanding of past events by drawing the public to historic and cultural sites. Trails often provide access to historic features such as battlegrounds, bridges, buildings, and canals that otherwise would be difficult to access or interpret. For example, Virginia's statewide Civil War site preservation initiative includes trails that feature more than 190 sites that had never been interpreted prior to the start of the program in 1993. More locally, the six-mile Bethabara Trail and Greenway in Winston-Salem, North Carolina draws people to the birthplace of the city, allowing tourists and trail users to learn about the specific history of their community.

Johnston County has its own unique history, its own features and destinations, and its own historic downtowns and beautiful pastoral landscapes. By recognizing, honoring, and connecting these features through the MST, the combined result could serve as major attraction for those outside of the region. Being aware of the historical and cultural context when naming trails and designing trail features will further enhance the overall trail-user experience.

2.8 Protecting Farmland and Open Spaces

The establishment of greenways and the protection of open space go hand-in-hand. Similarly, when greenways pass through agricultural areas, as proposed in Johnston County, they also help to protect farmland by introducing local landowners to a wide range of tools for land conservation and farmland preservation. According to the American Farmland Trust, a national group of farmers and conservationists,

sprawling development and a changing farm economy are increasing pressures on agricultural communities throughout North Carolina's Piedmont. According to the Trust,

> *"Counties eager to promote economic growth may assume that the building boom will increase revenues and fund needed services. However, Cost of Community Services (COCS) studies recently completed in Orange, Almance and Union counties show the opposite: residential properties actually cost the county more in needed services than they provided in revenue, while farm and forestland owners paid more than their fair share of taxes." (American Farmland Trust, 2006)*

By establishing a greenway along the Neuse River, Johnston County can establish the use of farmland preservation strategies, spreading awareness of its importance, and preventing the mistakes of Orange, Alamance and Union Counties.

2.9 Improving Quality of Life in Johnston County

A greenway system for Johnston County will contribute to the overall quality of life for its residents by improving the personal health of individuals, promoting the economic development of regional tourism, enhancing and protecting the environmental quality of the Neuse River corridor, conserving the heritage of the rural culture, and by offering area residents a choice to walk or bike for their local trips.

Right: Clayton Community Park, courtesy of Clayton Parks and Recreation Department.

Chapter 2 Footnotes

[1] American Planning Association. (2002). *How Cities Use Parks for Economic Development*.

[2] National Association of Realtors and National Association of Home Builders. (2002). *Consumer's Survey on Smart Choices for Home Buyers*.

[3] Rails to Trails Conservancy. (2005). *Economic Benefits of Trails and Greenways*.

[4] NCDOT and ITRE. (2006). *Bikeways to Prosperity: Assessing the Economic Impact of Bicycle Facilities*.

[5] Virginia Department of Conservation. (2004). *The Virginia Creeper Trail: An Assessment of User Demographics, Preferences, and Economics*.

[6] Rails to Trails. (Danzer, 2006). *Trails and Tourism*.

[7] American Planning Association. (2002). *How Cities Use Parks for Economic Development*.

[8] Rails to Trails. (Danzer, 2006). *Trails and Tourism*.

[9] U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (1996). *Physical Activity and Health: A Report of the Surgeon General*.

[10] U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2002). *Guide to Community Preventive Services*.

[11] Rails-to-Trails Conservancy. (2006) *Health and Wellness Benefits*.

[12] Newsweek Magazine. (10/3/2005). *Designing Heart-Healthy Communities*.

[13] Federal Emergency Management Agency. (2005) *Building Stronger: State and Local Mitigation Planning*.

Existing Conditions 3

3.0 Overview

This chapter draws upon field observations and input from local government planning and park and recreation departments to evaluate the existing conditions of the Johnston County MST corridor. The purpose of this chapter is to determine opportunities and constraints for land-based and water-based trail development.

3.1 Opportunities

Generally, the opportunities include, A) Potential sites for canoe access, B) Connections to existing and potential trail corridors, and C) Connections to local downtown areas. Also, the Neuse River has significant potential to be better recognized as a regional destination for water-based trail recreation, such as canoeing, kayaking, and fishing. Altogether, twenty-seven specific opportunities are identified (starting on page 20), with maps showing the location of each. The water access points and trail corridors with the greatest near-term potential are noted below.

3.1.1 Potential River Access Points

1) A future Town of Clayton Parks and Recreation site will provide access on the west side of the river, approximately 2000 feet downstream from Covered Bridge Road (Opportunity #9 on pages 20 & 21). This site will also serve as a trailhead for the future Sam's Branch Greenway, and possibly the MST. While it is only two miles north of the existing water access point described below, this site is still important for water access as it is on a much larger parcel, offering greater opportunities for trail and trail head amenities.

2) The existing water access point at the NC 42 bridge (Opportunity #16 on pages 20 & 21) could be enhanced to become more user-friendly. The site currently has no trash receptacles, vulgar graffiti, and no signs to offer users information on water-based trail distance, safety, or natural/historical interpretation.

The first round of fieldwork started at the canoe access point below Highway 42 and SR 1705.

3) Another opportunity for river access exists on the north side of Fire Department Road (Opportunity #28 on pages 22 and 23). This site was originally proposed in the 2004 Conceptual Plan for the MST. The site provides a convenient mid-point between existing river access sites at NC 42 and Smithfield's Neuse Commons (approximately 5.5 miles from the existing access at NC 42, and approximately 8.5 miles to the existing access at Smithfield Commons). The site is large, cleared and level, but vehicular access from the road does not exist.

4) The NCDOT parcel just south of US Highway 70, on the east side of the river, may have potential for water access (Opportunity #38 on pages 24 and 25). The site will require further investigation as to specific potential access points on the parcel and possible site contamination from nearby tank farms. Because of the industrial nature of the surrounding area, opportunity #28 should be given a higher priority. However opportunity #38 should still be considered, as it brakes up the 8.5 mile stretch of river noted above.

The NCDOT parcel mentioned above was the southernmost site considered for new water access in the study area. The Neuse River Commons in Smithfield (less than three miles downstream) provides an adequate, existing facility for water access in that portion of the corridor.

3.1.2 Potential Trail Corridors and Connections

1) The future routing of Wake/Raligh trails will connect to Clemmons State Forest, offering a potential direct route for the MST into the Town of Clayton (Opportunity #3 on pages 20 and 21).

2) The Sam's Branch Greenway, running along a creek and sewer easement towards Downtown Clayton, will connect the MST to the town (Opportunity #10 on pages 20 and 21).

3) The Town of Smithfield has existing trails that are currently expanding through the Buffalo Creek Corridor (Opportunity #47 on pages 26 and 27). This trail system parallels the proposed MST route and should therefore be incorporated as part of the MST.

3.2 Constraints

The identified constraints consist primarily of A) Private property along the preferred routes, B) Noise pollution in several locations along the trail, and C) The proximity of hunting/game lands to the preferred route. Twenty-one individual constraints are identified throughout the project corridor, starting on the following page. Below some of the main constraints are addressed.

3.2.1 Private Property along Preferred Route

The issue of private property and public access is a fundamental aspect of greenway planning, and the MST in Johnston County is no different. Strategies for creating win-win situations between land owners and trail advocates are used successfully in communities all across the United States. More information about such strategies can be found in this plan's chapter on implementation. Also, the many economic benefits and public purposes of greenways are well defined in Chapter 2, specifically addressing the increased property value associated with trails and greenways.

3.2.2 Noise and Visual Pollution

The noise pollution experienced during the field work along the Neuse River was from three primary sources: new home construction, trucks and automobiles on bridges, and the water treatment plant. The visual pollution along the corridor consisted mainly of utility structures and new homes with no landscape buffer facing the river. Some of these negative aspects may simply be unavoidable, such as noise from cars and homes with river views. However some solutions may exist: Coordination with treatment plant officials may result in a reduction of noise-producing operations during special river- and trail-related events; also, construction of the trail can include landscaping elements that shield utility structures from trail users, and may even reduce some associated noise pollution.

3.2.3 Hunting and Gameland Proximity

Existing dirt roads and pathway corridors were noted along the east bank of the river (Constraint #32 on pages 24 and 25), several of which feature deer blind towers. If public access is gained along the preferred route, particular attention should be given to avoiding any potential conflict between hunters and trail users.

Existing Conditions Maps

The project corridor is broken down into four sections for further analysis. Nearly fifty individual opportunities and constraints are listed in the following pages, with a map for each section that shows the location of each opportunity or constraint. These maps also show the Neuse River, its floodway and floodplain, tributaries and creeks, incorporated areas, major roads, and parcel lines.

Existing Conditions : Countyline To NC 42

1. **Opportunity:** The Town of Clayton has access along the east side of the river through a planned unit development (PUD), from near the countyline, downstream to Mark's Creek.
2. **Constraint:** Johnston County land cover data identifies marsh areas here, along the south and west side of the river.
3. **Opportunity:** Future routing of Wake/Raligh trails will connect to Clemmons State Forest.
4. **Opportunity:** Connecting the MST to the Mark's Creek corridor would be a huge asset to the trail system. The nearby Mark's Creek rural lands are identified as a regional land conservation focus area.
5. **Constraint:** Shallow water in the floodplain, just south of Mark's Creek, serves as an obstacle to the trail.
6. **Opportunity:** Subdivision connected to the river with future Town of Clayton property; potential to connect to downtown with the MST.
7. **Opportunity:** An existing Town of Clayton sewer easement provides a cleared and level corridor along the east side.
8. **Opportunity:** Covered Bridge Road at the Neuse River has been identified by the Town of Clayton as potential site for a bike/ped bridge.
9. **Opportunity:** Future site for river access and a major trail head, currently owned by the Town of Clayton.
10. **Opportunity:** The Sam's Branch Greenway will run along this floodplain, connecting Downtown Clayton to the MST.
11. **Opportunity:** Future Little Creek Greenway to T.O.C. Park.
12. **Opportunity:** Connect to Downtown Clayton. The town will serve as an attraction along the route, and those living in the area will have access to the trail system.
13. **Opportunity:** Future Town of Clayton Property.
14. **Constraint:** A golf course is on the east side of the Neuse.
15. **Constraint:** A golf course is on the west side of the Neuse.
16. **Opportunity:** An existing water access point is located here, at the NC 42 bridge. The site could be enhanced to be more user-friendly.
17. **Opportunity:** The Town of Clayton and NCDOT are working together to provide a bike/ped sidepath that would run along the south side of NC 42

Shallow water in the floodplain, just south of Mark's Creek.

Mark's Creek.

Sam's Branch.

Downtown Clayton.

Johnston County
Mountains to Sea Trail

EXISTING CONDITIONS:
Countyline to NC 42

- Neuse River
- Floodway
- Floodplain
- Incorporated Area
- Major Roads
- SR State Road
- US US Highway

Wake County
Johnston County

Neuse River

Mark's Creek

Sam's Branch Creek

Little Creek

CLAYTON

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

70 42 1003

Existing Conditions : NC 42 to Fire Dept. Road

18 **Opportunity:** The NCDOT Division of Bicycle and Pedestrian Transportation recommends that the NC 42 bridge accommodate bicycles and pedestrians when it is replaced, in addition to enhancements to the existing river access underneath the bridge.

19 **Constraint:** A subdivision with parcels abutting the river.

20 **Opportunity:** An alternate route to the private trail along the river may be available as a sidepath along NC 42, and then south along this floodplain and back to the river.

21 **Opportunity:** The Town of Clayton has a greenway underway along this small creek, connecting the incorporated subdivision to NC 42.

22 **Constraint:** A private trail runs along the east bank of the Neuse, through an existing subdivision.

23 **Constraint:** A subdivision with parcels and a golf course abutting the river.

24 **Opportunity:** A small Town of Clayton parcel is located here, on the west side of the river.

25 **Constraint:** New subdivision construction abutting the river.

26 **Constraint:** A subdivision with parcels abutting the river.

27 **Constraint:** A subdivision with parcels abutting the river.

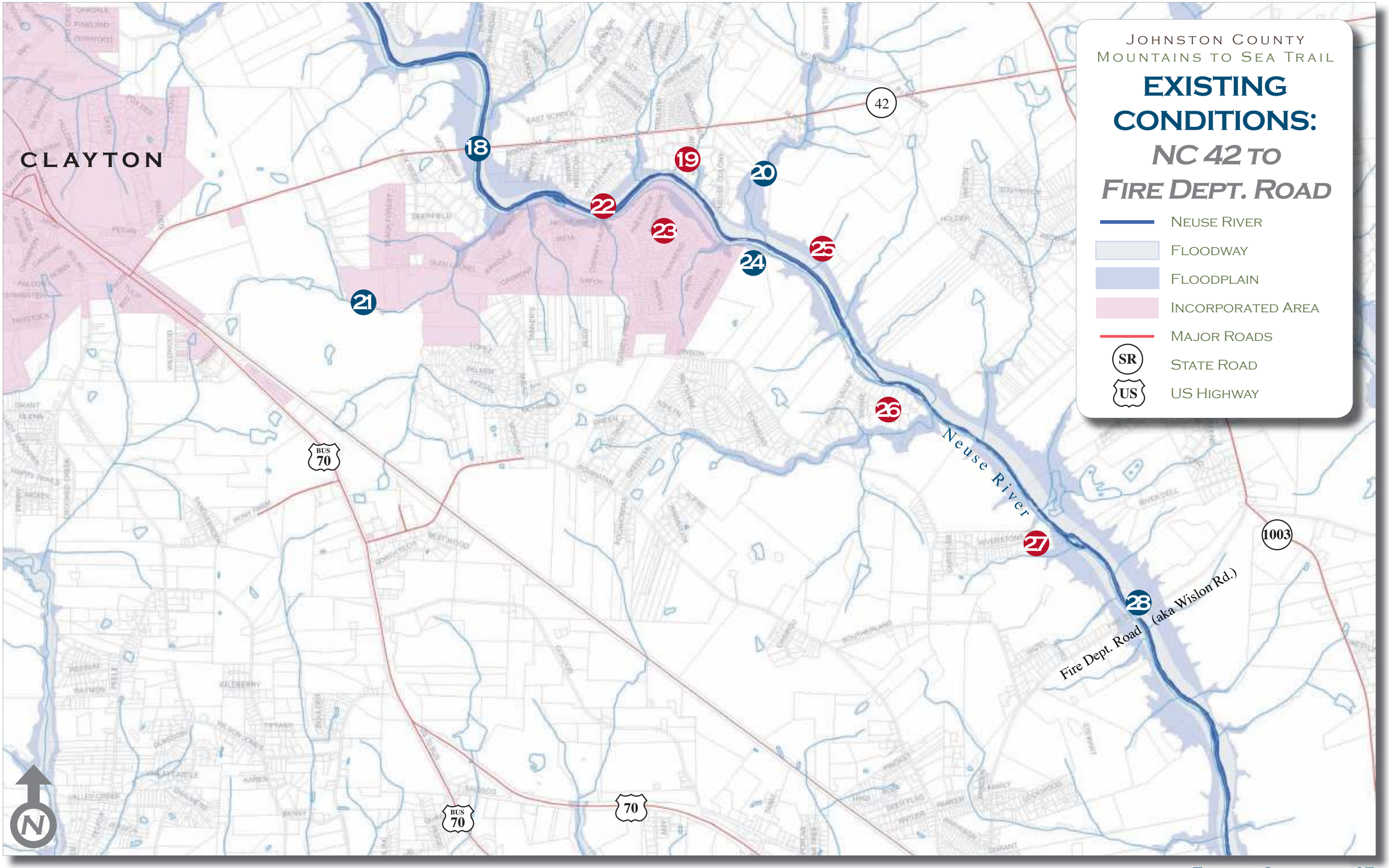
28 **Opportunity:** The bridge at Fire Department Road (aka Wilson Road) provides an excellent opportunity for a major trail head location. Access to the northern quadrant (shown a bottom, right) will require a small side road, due to the long approach of the bridge. The site lies approximately halfway between the project corridor's only two existing water access points: NC 42 bridge and Smithfield Commons.

An MST fieldwork team assembles under the existing NC 42 river access point.

Existing private trail.

New subdivision construction along the river.

Bridge at Fire Dept. Road.



JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

EXISTING CONDITIONS:

NC 42 TO FIRE DEPT. ROAD

- NEUSE RIVER
- FLOODWAY
- FLOODPLAIN
- INCORPORATED AREA
- MAJOR ROADS
- SR — STATE ROAD
- US — US HIGHWAY

Existing Conditions : Fire Dept. Road to US 70

29 **Opportunity:** In the Lower Middle Section, parcels on the east side of the river are larger and less divided than those on the west side, offering more feasible opportunities for working with local land owners.

30 **Constraint:** The water treatment plant is a source of major noise pollution along this portion of the River corridor. While its location is on the west side of the river, the parcel is rather large and may have restrictions on public access.

31 **Constraint:** Trail surfacing options may be limited in this portion of the corridor due to the marsh paralleling the river.

32 **Constraint:** Some corridors exist here, along the eastern side of the river. Well-maintained deer blind towers, however, suggest they are currently used for hunting.

33 **Constraint:** This is the future site of a large Town of Selma Quarry. Public access through and/or adjacent to quarries is usually prohibited due safety precautions.

34 **Constraint:** Steep slopes along this portion of the trail may present some difficulty in trail development. At the same time, these locations may offer unique views of the river and will provide some trail users with a section for incline training along the slope.

35 **Constraint:** US 70 and the railroad serve as significant constraints to routing the trail east (in order to circumvent the quarry and the prison). Such a route would require potentially dangerous at-grade crossings, or expensive grade-seperated crossings.

36 **Constraint:** This is the site of the State of North Carolina Department of Corrections. Public access will be limited at best near this facility.

37 **Opportunity:** A parcel owned by the North Carolina Department of Transportation (NCDOT) is located here, with access to the Neuse River. The NCDOT is an active supporter of the MST.

38 **Opportunity:** A second, much larger NCDOT parcel also has access to the Neuse River here, just south of the US 70 bridge. This site may require further study in regards to potential pollution from the nearby tank farms.

39 **Constraint:** This is a largely industrial area with frequent train stops and large trucks serving the tank farms.

40 **Opportunity:** Town of Smithfield greenways will connect most easily to trail located on the *east* side of the river.

41 **Opportunity:** Connect to Historic Downtown Selma. As noted for Clayton in the Northern Section, a long standing goal of the MST is to connect the trail and trail users with the cities and towns along the way.

Johnston County water treatment plant on the Neuse River.

Existing corridor along the river.

Steep slopes along the bank.

Railroad bridge near US 70.

JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

EXISTING CONDITIONS:

FIRE DEPT. ROAD TO US 70

- NEUSE RIVER
- FLOODWAY
- FLOODPLAIN
- INCORPORATED AREA
- MAJOR ROADS
- SR — STATE ROAD
- US — US HIGHWAY

Fire Dept. Road (aka Wislon Rd.)

Neuse River

29 30 31 32 33 34 35 36 37 38 39 40 41

70 96 1003 BUS 70 39

SMITHFIELD

SELMA

N

Existing Conditions : US 70 to I - 95

42 **Constraint:** Private land use along Neuse River will be especially prohibitive of public access in ares where residents have staked their claim to the land in the form of gazebos, fishing cabins, and other structures, as they have done in this area

43 **Constraint:** Livestock grazing along the river pose challenges to public access, though many incentives exist to land owners who wish to preserve their working lands. Organizations such as American Farmland Trust are made up of farmers and conservations who work together for win-win situations.

44 **Constraint:** Sixteen individual parcels are located along this small portion of the Neuse River. An alternative route will circumvent the challenges associated with negotiating access through so many parcels for a relatively short distance of river access.

45 **Opportunity:** The Neuse Riverwalk and river access at Smithfield Town Commons offer a positive start for establishing both the MST water based-trail, and the land based trail.

46 **Opportunity:** Connections into Downtown will provide an excellent opportunity for MST users to visit Historic Smithfield, and for Smithfield residents to enjoy the trail.

47 **Opportunity:** A new Town of Smithfield greenway is currently underway within existing easements along the Buffalo Creek Corridor.

48 **Opportunity:** Although not yet officially recognized, this is area is known as a Native American cultural site, with natural springs. Such a site could serve as a unique interpretive park along the MST.

Private structures along the river bank.

Livestock grazing along the river bank.

Smithfield Commons

Downtown Smithfield

Johnston County
Mountains to Sea Trail

EXISTING CONDITIONS:
US 70 to I-95

- Neuse River
- Floodway
- Floodplain
- Incorporated Area
- Major Roads
- SR — State Road
- US — US Highway
- 95 — Interstate Highway

Recommended Trail System 4

Chapter Outline:

4.0 Trail Alignment Methodology

The development of the recommend trail system was guided by a combination of proposals from existing plans, the 2004 MST-East Workshops, field analysis of opportunities and constraints, and input from the client team (The Town of Clayton, Town of Smithfield, Johnston County, the North Carolina Department of Transportation Bicycle and Pedestrian Division, and the North Carolina Department of Environment and Natural Resources). Input from all of the above sources was synthesized into a draft set of recommendations and then refined, using the five steps described below.

4.0.1 Identifying Opportunities

All existing public parks, trails, easements, and dedicated open space within the project corridor were collected from federal, state, county, municipal, and non-profit sources. These locations were identified as opportunities for trail alignment. Additionally, other public lands were considered as potential partners in trail development, such as county schools and vacant town properties. Finally, large, single-owner agricultural tracts were regarded as having a higher potential for future trail alignment than most other non-public land uses.

4.0.2 Identifying Constraints

The next step was identifying areas that the trail could not traverse, such as heavy-industrial areas, a correctional facility, a water treatment plant, and highways with no feasible means to cross. Similarly, environmentally sensitive areas, such as wetlands and lands identified as "Environmentally Sensitive Area Districts" (See Appendix A) were considered less appropriate for the proposed trail's 10-foot paved cross section. Also, while proximity *to* subdivisions was considered as an opportunity for connectivity, trail alignment *through* them was considered as a constraint to be avoided, due to the higher density of separate and individual private parcels.

4.0.3 Weighing the Opportunities and Constraints

After determining the major obstacles and opportunities for the trail's alignment, it became clear that the east side of the Neuse River is the most feasible for the majority of trail (see pages 22-29). This is due to the east side's existing easements, town-owned properties and existing trails. Conversely, the west side of the river contained less existing opportunities for public access, and instead, more constraints. The State Correctional Facility, the Johnston County Water Treatment Facility, and a future Town of Selma rock quarry are all located on the west side of the river. Incidentally, if the trail were aligned away from the river and around two of these obstacles, then either an at-grade trail crossing at both US 70 and the railroad would be required, or an expensive grade-separated crossing would be required at each.

4.0.4 Determining Trail Access to the Towns

Many of the benefits of the MST, such as the economic, transportation, health, and quality of life benefits, depend upon the trail connecting to local users and destinations (See Chapter 2). Hence, connecting the MST to the Towns of Clayton and Smithfield became a major component in deciding upon trail alignment in Johnston County. For example, while most trail opportunities are on the east side of the river, the trail crosses to the opposite side in Clayton, in order to ensure that residents have access to the trail and that trail users have access to the Town. In Smithfield, the choice for a town connector was clear, as the construction for the Buffalo Creek Greenway will begin very soon. Some in-town portions of trail will consist of sidewalks and bicycle routes that are marked with MST signage. This strategy takes advantage of existing downtown bicycle and pedestrian facilities, while allowing trail users to easily connect back to the MST.

4.0.5 Evaluating Overall Trail Connectivity

As decisions were made regarding trail alignment, overall connectivity was taken into account. For example, if opportunities (parks and greenways) are located on one side of the river, and constraints (an industrial area and a highway) are located on the other, then it makes sense to continue the route where opportunities connect and constraints are avoided. Evaluating each opportunity and constraint helped to form a rational basis for the overall routing of the trail.

4.1 Trail System Overview

The MST for Johnston County will consist of a mainline running primarily along the east bank of the Neuse River. Various town trails are included in this plan that connect the MST to the Town of Clayton, the Town of Smithfield, and possibly to the Town of Selma (depending on the Town of Selma's interest in connecting to the system). A water-based trail, or 'Blueway' already runs the length of the project corridor. This plan also recommends new drop-in water access points near Covered Bridge Road and Wilson Road (aka Fire Department Road), and enhancements to the existing access points at NC 42 and Smithfield Town Commons.

Refer to Appendix B for Trail Design Guidelines

4.1.1 Trail Types

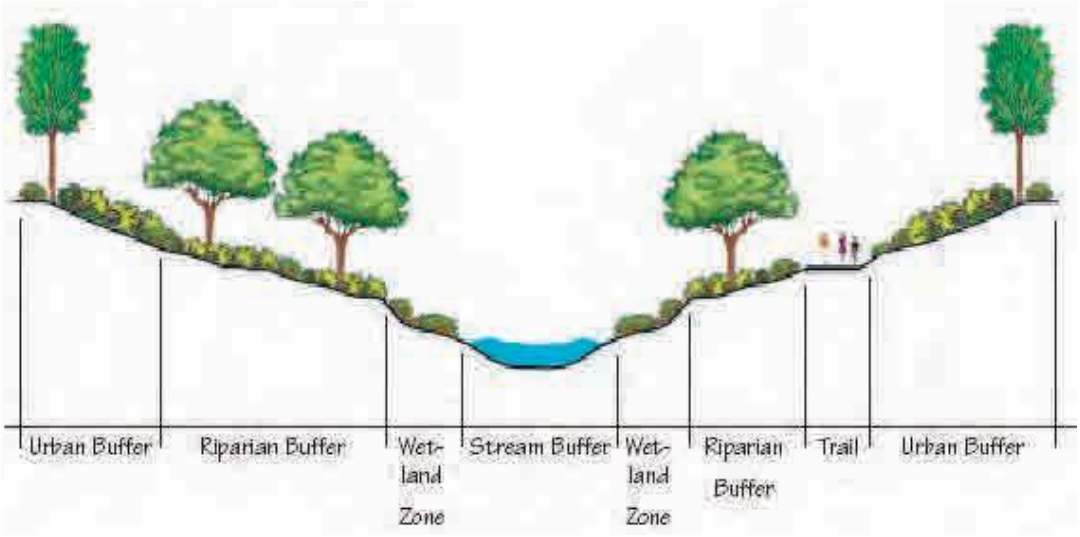
Multi-Use Paved Trail

The mainline of the MST and the connecting town trails will consist of a minimum 10-foot wide, paved multi-use trail, with 18-inch crushed-stone shoulders on each side. This designation applies for the following reasons:

- Anticipated high-use of the trails;
- Use of the trail as a transportation route;
- Much of the trail lies within the floodplain; and
- The trail connects with urban settings and a growing population base.

Several user groups, such as bicyclists, joggers, wheelchair users, and rollerbladers, will require the designated paved surface (10 to 12 feet wide). Although asphalt is the most common paved surface used for greenway trails, concrete is best for areas experiencing frequent flooding. Portions of trail that contain environmentally sensitive areas may require more natural surfacing options.

An example of a 10' Paved Multi-Use Trail.



Typical Greenway Corridor with Stream Buffer

On-Road Trails (sidewalks and bikeways,

This designation would apply to corridors in the Downtown Areas of Clayton and Smithfield, where off-road options are not possible. These corridors will function as connections between the off-road trails and major origins and destinations of the towns, allowing them to benefit from potential MST-related tourism. On-road trails will consist of minimum 5-foot wide sidewalks for pedestrian use and bikeways for cyclists. Bikeways can vary from 5-foot wide bicycle lanes (complete with pavement striping and signage) to 4-foot wide paved roadway shoulders to a 14-foot wide curb lane (to be shared by cyclists and motorists). The bikeways identified for Downtown Clayton and Smithfield will likely consist of signed, shared roadways, where cyclists are able to share the road with lower traffic speeds and volumes.

Multi-Use Unpaved Trails

For the near-term development of some town trails, it may be more financially feasible to start with some unpaved sections (although at least one trail in each town should be paved immediately that connects to the MST). These non-paved trails could be slated for future paving, as additional funding becomes available. The unpaved trails could be surfaced with gravel or crushed stone (10 to 12 feet wide) for use by several user groups, such as bicyclists, joggers, and equestrians. Wheelchair users and persons with strollers can use unpaved trails if they are designed to ADA standards and surfaced with compacted crushed stone.

Water Based Trail

The MST Blueway for Johnston County will span the entire project corridor along the Neuse River. The designation of a water-based trail applies to the Neuse River because it can successfully accommodate and support canoeing, kayaking, and tubing. Water based trails can be designed with features and facilities that make this activity more enjoyable, including educational signage systems, improved rapids, safety systems, picnic areas, etc.

4.1.2 Paddle Trail Access Sites and Trailheads

The North Carolina Department of Environment and Natural Resources (NC DENR) State Trails Program is developing standards for designated paddle (water-based) trail access sites. The following recommendations for Johnston County's MST water access sites (near Covered Bridge Road, NC 42, Fire Dept. Road, and Smithfield Town Commons) were derived from NC DENR's draft standards. These sites should provide the following:

Refer to Appendix B for Trail Design Guidelines

- Natural but well maintained pathway from parking to water access
  - Pathway at least 6 feet wide
  - Grass not higher that 5 inches
  - Tree overhang not lower than 14 feet
  - Grade must not exceed 20%

- If a pathway from parking area to water access exceeds 1500 feet, a permanently affixed canoe or kayak stand must be positioned every 1000 feet

- A designated and well maintained parking site must be delineated by signs meeting NCDOT visibility requirements

- Digital pictures of the parking, pathway, and access areas must be displayed for reference on a publicly accessible website

- Website must display conditions of access site
  - 12-month log with bimonthly updates must be displayed at all times
  - 60-month data must be available upon request.

- Informational signs containing emergency contact numbers, as well as contact numbers for the managing partner, must be displayed
  - on the website
  - at the parking space area
  - within 150 feet of the access site

- Access waterway must be firm, compacted, and permanently delineated

- Minimum construction for facilities

- Seating at access

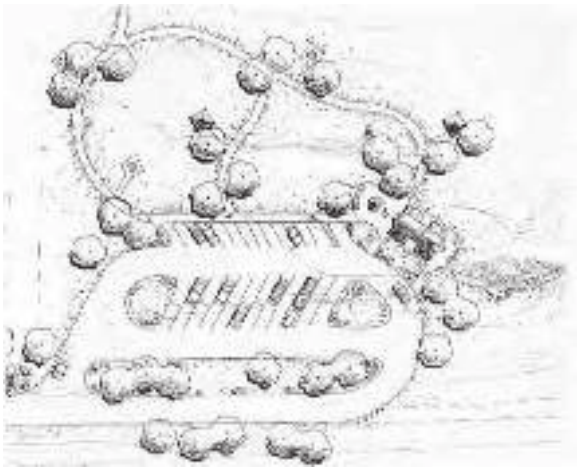
- Interpretive signs must be available

- Garbage cans must be permanently in place and trash must be removed a weekly basis

- Lights in parking and picnic areas must be available

- Maintenance staff for facility

Major Trailhead Example



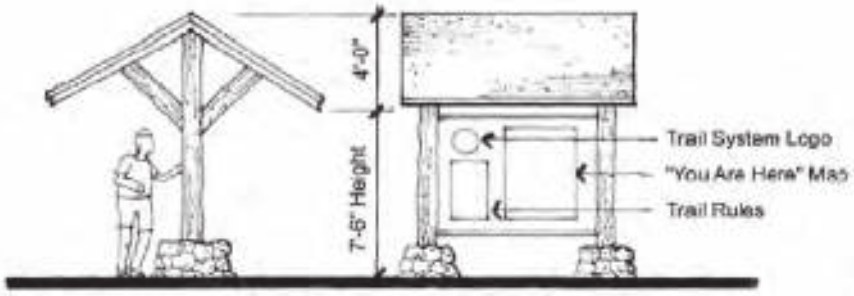
Minor Trailhead Example

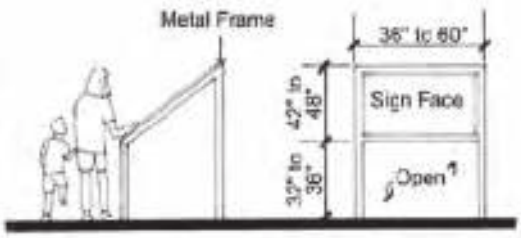
Major trailheads may provide more amenities, such as interpretive exhibits, restrooms, water fountains, picnic tables, parking, signage, etc. Minor trailheads contain fewer of these amenities, and can be used to connect a smaller number of people to surrounding trails, open space, and parks, etc.

4.1.2 Trail Amenities Overview

- *Entry and Regulatory Signage* should be provided at trailheads, informing trail users of where they are, where they are going, and what the rules are. Safety tips and the direction of area destinations should be included in the wayfinding signage.
- *Interpretive Signage* should also be provided at major trailheads, offering a brief history of the area (Clayton, Smithfield, or Johnston County), the Neuse River, and/or the MST. These signs could also provide environmental education, including information on local plant and animal species found within the corridor (See page 13 for an example).

Trailhead Information Installation Examples





Example Wayfinding Signage

- *Trash Receptacles*. At a minimum, 22-gallon or 32-gallon containers should be located at each entrance way and each seating area near the trail (benches and picnic tables). They should be accessible to both trail users and trail maintenance personnel, about 3- feet from the trail.
- *Benches* should be provided at trailheads, plus at the downtown entry/exit points. Additionally, certain locations along the trail may provide ideal settings for benches, such as in scenic areas, or at intervals between long stretches of trail.
- *MST Wayfinding Signage* should be provided along the mainline trail at 1) entry/exit points along the trail, 2) at major changes in direction, and 3) at major transitions in environment, such as from a greenway trail to a downtown sidewalk and bikeway.
- *Bollards* are intended to provide separation between vehicles and trail users. Removable bollards can be installed to provide trail access for emergency and maintenance vehicles. These should be located wherever there is potential for vehicles to enter the trail system: at each road crossing and at some trailheads (depending on site design).
- *Bike Racks* should be placed in both Downtown Clayton and Downtown Smithfield. Cyclists will be more inclined to explore these towns if they have a safe place to lock their bikes, within a convenient distance from a main pedestrian walkway.

Pole-mounted Signs (ink on reflective sign blanks)

CONFIRMATION

DESTINATION

Pavement Marking Examples (cut-out thermoplastic shapes)

REINFORCEMENT

CONFIRMATION

DIRECTION CHANGE

4.1.3 Total Trail Distance and Cost Estimates *(See Chapter 5 for further breakdown of these estimates)*

	Demolition	Quantity	Cost /	Unit	Subtotal
A	Clearing and grubbing understory (20' wide)	2,522,540	$0.25	sf	$630,635.00
	Dumping Fees (6% of Demolition total)				$37,838.10
				Demolition Total	**$668,473.10**
	Site Development	**Quantity**	**Cost /**	**Unit**	**Subtotal**
B	**Off-Road Facility** *143,655 lf (27.2 miles)*				
1	Temporary tree protection/silt fence	143,655	$4.00	lf	$574,620.00
2	Trail grading (0-5 cu ft/lf)	143,655	$3.00	lf	$430,965.00
3	10' wide multi-use asphalt trail	143,655	$35.00	lf	$5,027,925.00
4	2' wide gravel shoulder (both sides)	287,310	$6.00	lf	$1,723,860.00
6	Bike/Ped Bridges	1,123	$550.00	lf	$617,650.00
7	Drainage culverts (36" reinforced concrete pipe)	2	$40.00	lf	$80.00
8	Seeding or mulching trail edges (5' both sides)	287,310	$0.12	sf	$34,477.20
C	**On-Road Facility** *15,840 lf (3 miles)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	142	$60.00	ea	$8,520.00
2	Crosswalks	46	$500.00	ea	$23,000.00
3	Sidewalk (5' wide)	38,655	$3.00	sf	$115,965.00
D	**Utilities**				
1	Solar powered light	12	$5,400.00	ea	$64,800.00
2	Solar powered light pole	12	$1,300.00	ea	$15,600.00
3	Emergency phones	20	$2,500.00	ea	$50,000.00
E	**Signage**				
1	Mile Markers	29	$200.00	ea	$5,800.00
2	Trail and street regulatory/warning signs	23	$200.00	ea	$4,600.00
3	Directional signs	26	$200.00	ea	$5,200.00
4	Educational signs	10	$300.00	ea	$3,000.00
F	**Site Amenities**				
1	Benches	38	$400.00	ea	$15,200.00
2	Bicycle racks (holds 9 bikes)	7	$400.00	ea	$2,800.00
3	Drinking fountains	2	$2,000.00	ea	$4,000.00
4	Picnic tables/ tables	11	$500.00	ea	$5,500.00
5	Trash receptacles (32-gallon, steel)	4	$250.00	ea	$1,000.00
6	Bollards (3 per trail/road intersection)	15	$300.00	ea	$4,500.00
7	Parking (10-car lot)	2	$20,000.00	ea	$40,000.00
8	Parking (20-car lot)	1	$50,000.00	ea	$50,000.00
			te Development Total		**$8,164,442.20**
	Subtotals				
A	**Demolition**				**$668,473.10**
B	**Off-Road Facility**				**$8,409,577.20**
C	**On-Road Facility**				**$147,485.00**
D	**Utilities**				**$130,400.00**
E	**Signage**				**$18,600.00**
F	**Site Amenities**				**$123,000.00**
G	**Additional Costs***				**$284,673.00**
	SUBTOTAL				**$9,782,208.30**
	Contingency			15%	**$1,467,331.25**
	TOTAL				**$11,249,539.55**

** 'Additional Costs' includes the proposed bike/ped bridge at Covered Bridge Road and the excavation and dumping fees for the replacement of trail at Smithfield Town Commons.*
***Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes.*

4.1.4 Total Maintenance Cost Estimates

Annual Trail Maintenance Breakdown (Based on National Averages)	
Drainage and Storm Channel Maintenance	$500 per mile
Sweeping/Blowing Debris off Trail Tread	$1,200 per mile
Pickup and Removal of Trash	$1,200 per mile
Weed Control and Vegetation Management	$1,000 per mile
Mowing of 3-foot Grass Shoulder Along Trail	$1,200 per mile
Minor Repairs to Trail Furniture/Safety Features	$500 per mile
Maintenance Supplies for Work Crews	$300 per mile
Equipment Fuel and Repairs	$600 per mile
Total Annual Maintenance Cost	**$6,500 per mile**
27.2 Proposed Miles of Off-Road Trail x $6,500 per mile =	**$176,800**

**Does not include On-Road Trail or Water-based Trail*

4.1.5 Right-Of-Way Acquisition (See Chapter 5 for alternative conservation tools)

Land Price Per Acre Johnston County	
Average Price per Acre (Farmland, Undeveloped, and Vacant)	**$11,874**
Total Off-Road Trail Length	= 143,655 feet
x 100 ft corridor width	= 14,365,500 sf
Converted to Acres	= 329.8 acres
329.8 Acres x $11,874 per Acre =	**$3,916,045**

**Average price per acre determined by a comparative market analysis. The analysis used information from the Triangle MLS (Multiple Listing Service) database and is believed to be accurate but not guaranteed. The report included forty-three closed land sales on 10+ acre parcels in Johnston County, from 6/20/2005 to 6/20/2006.*

***According to the Town of Smithfield Planning Department, average price per acre is closer to $15,000, in which case the total would be $4,947,000.*

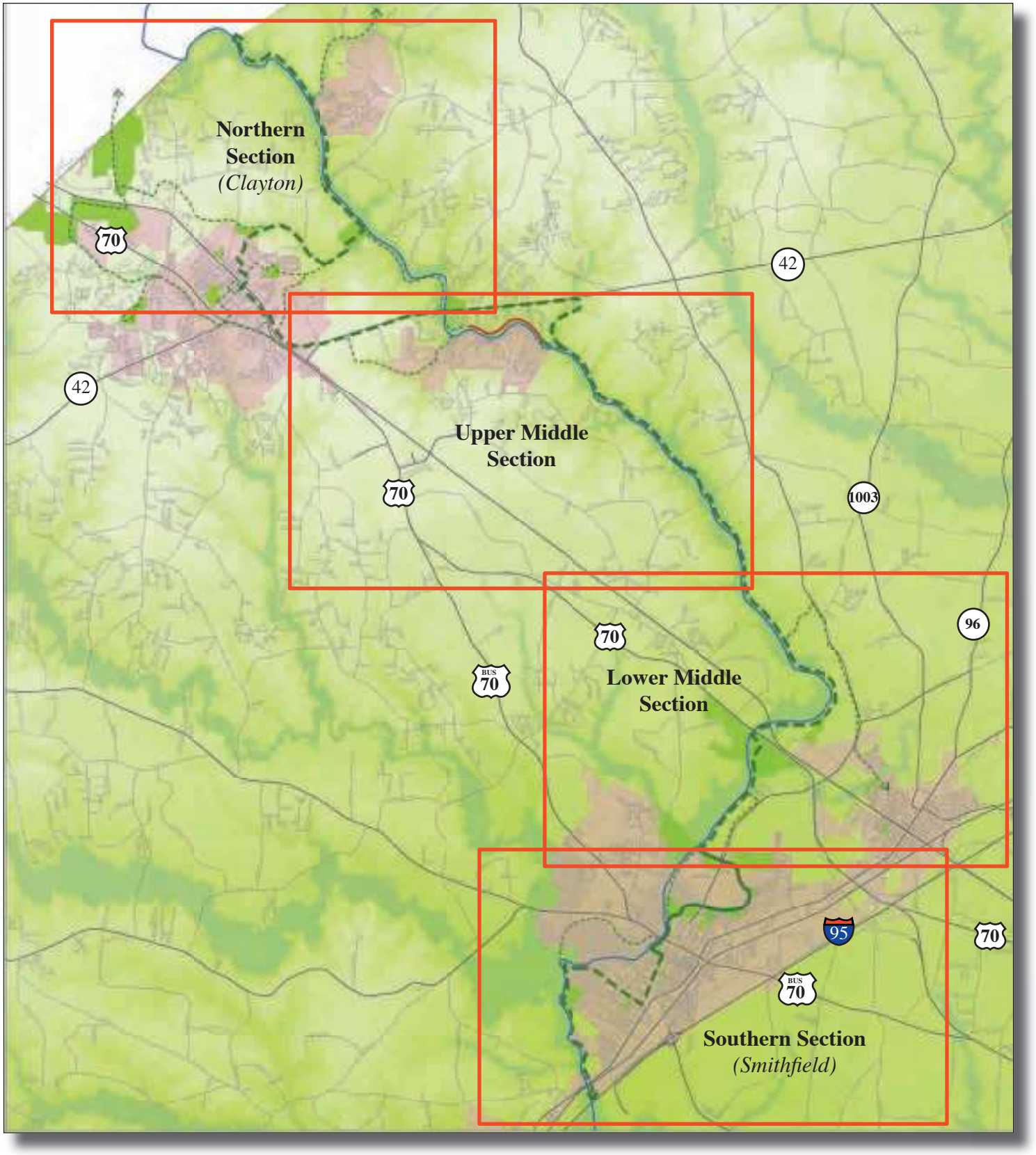
4.2 Trail System by Section

The trail breaks down into the following sections: Northern Section, Upper Middle Section, Lower Middle Section, and Southern Section (Section names should be designated upon implementation to reflect local identity and preferences). These sections a broken down further into twenty trail segments, outlined in Chapter 5: Implementation.

Trail distance calculations are outlined below for each section (on-road facilities included those recommended in Downtown Clayton and Downtown Smithfield). For the purposes of this MST plan, only the MST mainline and trails connecting directly into Smithfield and Clayton were included in these calculations.

Trail Sections: Approximate Distances		**10' Wide Paved Multi-Use Trail**	**On-Road Trail** (Signed sidewalks & bikeways)	**Water-based Trail**
Northern Section	*Feet*	55,635	9,360	31,300
	Miles	10.5	1.8	5.9
Upper Middle Section	*Feet*	30,635	0	29,000
	Miles	5.8	0	5.5
Lower Middle Section	*Feet*	36,725	0	39,000
	Miles	7.0	0	7.4
Southern Section	*Feet*	20,660	6,480	39,500
	Miles	3.9	1.2	7.5
Trail Type Totals	*Feet*	**143,655**	**15,840**	**138,800**
	Miles	**27.2**	**3.0**	**26.3**

**Does not include existing trail or the Buffalo Creek Greenway.*


Northern Section
(Clayton)
Upper Middle Section
Lower Middle Section
Southern Section
(Smithfield)
70
42
42
70
1003
70
96
BUS 70
95
70
BUS 70

4.2.1 Northern Section

The Northern Section of the MST has many elements that will attract a variety of users. To the north, the trail will eventually draw users from the Raleigh Greenway system, and similarly, trail users from Johnston County will be able to connect directly to parks and other destinations in Wake County. Nearly the entire Northern Segment lies within a regional 'Conservation Focus Area'. According to the Triangle Land Conservancy, the nearby Mark's Creek Rural Lands are "the Triangle's most unique and urgent land conservation opportunity." (Triangle Land Conservancy, 2006)

Preferred Route and Alignment

Starting at the Wake/Johnston county line, both sides of the Neuse River could connect the MST to Wake County and Raleigh's greenway system. On the *west* side, the trails could connect through Clemmons State Forest, then to Downtown Clayton through an extension of the proposed Sam's Branch Greenway.

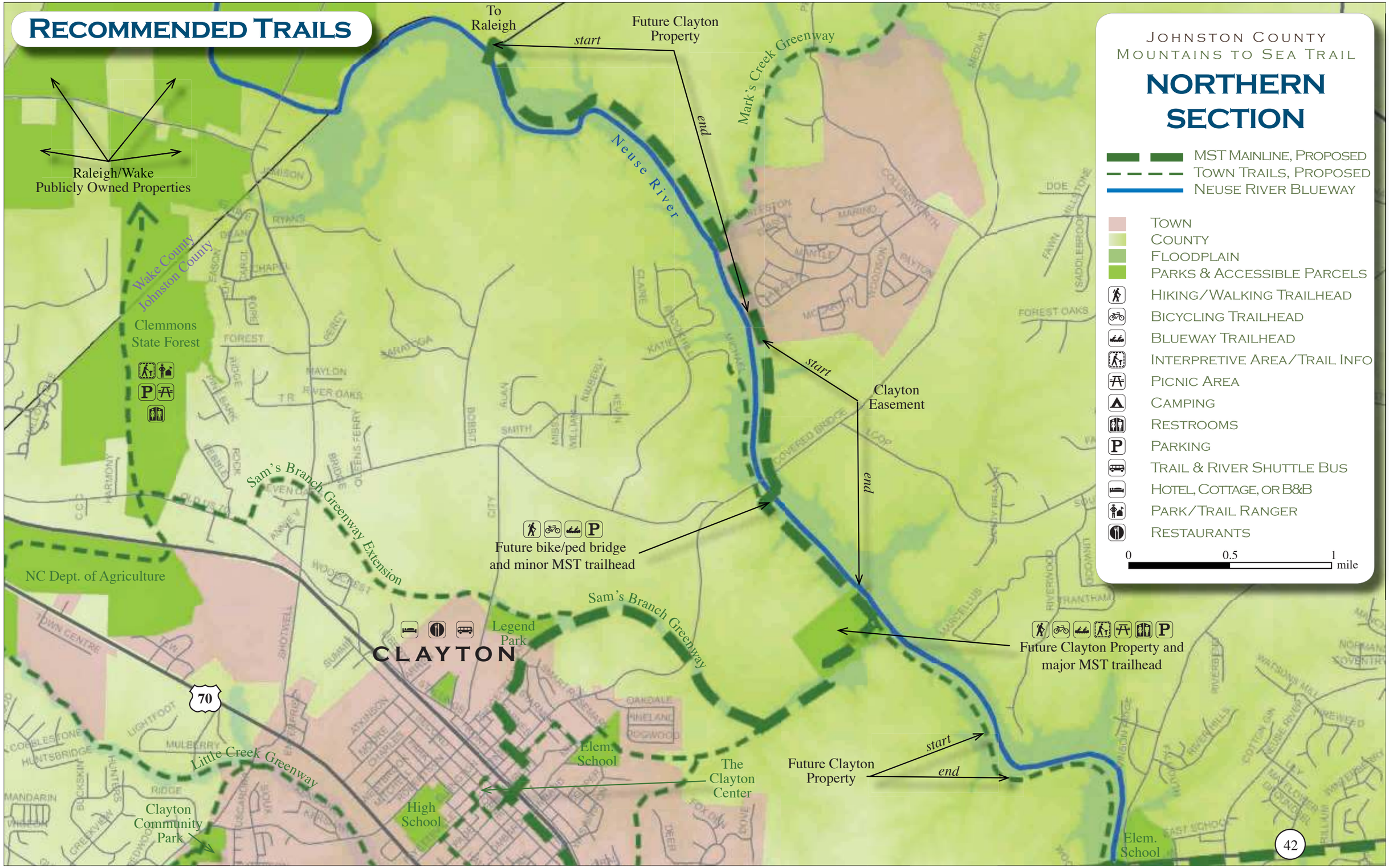
On the *east* side of the River the MST will connect with the Mark's Creek corridor. Also, the Town of Clayton has identified future town-owned property along the east side of the Neuse River, from the county line downstream, connecting with existing easements. The MST on the east side will continue downstream until reaching Covered Bridge Road, where the Town of Clayton proposes a covered bicycle and pedestrian bridge across the Neuse River (paralleling the automobile bridge). After crossing the Neuse, the trail would follow the river's west bank downstream to a town-owned parcel that would serve as a trailhead for several town-trail connectors, including 1) Sam's Branch Greenway, 2) a trail south of Sam's Branch (tying into Clayton near Cooper Elementary), and 3) a trail that branches off before the school, south towards the intersection of NC 42 and US 70. This town-owned parcel will also serve as a water-based trailhead, offering a drop-in spot for canoes, kayaks and tubes.

Some sidewalks and roads in Downtown Clayton will be signed as part of the MST, so that bikers and hikers can navigate the Town from Sam's Branch Greenway. Also, a bicycle and pedestrian side path has been proposed to follow NC 42 from US-70 (near Downtown) to Buffalo Road (along the south side of 42). The sidepath is proposed as part of the future NC 42 road widening.

Additional Clayton Trails will include the following:

- A town trail will continue along the west side of the river, from the aforementioned town-owned parcel, to the NC 42 Bridge. This trail will run along the banks of the Neuse, or within a utility corridor that parallels the river, depending on feasibility.
- The Little Creek Greenway offers an opportunity for greater connectivity in Clayton, as does an extension to the Sam's Branch Greenway.
- A trail near Glen Laurel Road, just south of NC 42, will connect an existing subdivision near the river to Downtown Clayton.

Recommended Trails



Johnston County
Mountains to Sea Trail

NORTHERN SECTION

- MST Mainline, Proposed
- Town Trails, Proposed
- Neuse River Blueway

- Town
- County
- Floodplain
- Parks & Accessible Parcels
- Hiking/Walking Trailhead
- Bicycling Trailhead
- Blueway Trailhead
- Interpretive Area/Trail Info
- Picnic Area
- Camping
- Restrooms
- Parking
- Trail & River Shuttle Bus
- Hotel, Cottage, or B&B
- Park/Trail Ranger
- Restaurants

0 0.5 1 mile

Local Attractions in the Northern and Upper Middle Segments

Area attractions include, but are not limited to, the following:

- The Clemmons Educational State Forest, which is used as a living environmental education center, is located just outside of Clayton. Ranger-conducted programs are available to groups visiting the Forest and visitors will enjoy hiking and picnicking. An extension of Sam's Branch greenway will eventually connect to this regional greenspace resource.
- The Clayton Center on Second Street is a premier cultural and performing arts destination for both locals and visitors alike. Since opening on New Year's Eve 2002, over 50,000 people have come through the doors of The Clayton Center to enjoy a performance.
- The Coffee Mill on S Lombard Street is a Town of Clayton destination that may be attractive to trail users. The shop also features local artists and musicians.
- The Morning Glory Inn, on East Second Street is an example of Clayton's unique and authentic options for lodging. Inns such as these could be an attraction to MST trail users, and conversely, the trail can serve as an attraction to those staying in town.

4.2 Upper Middle Section

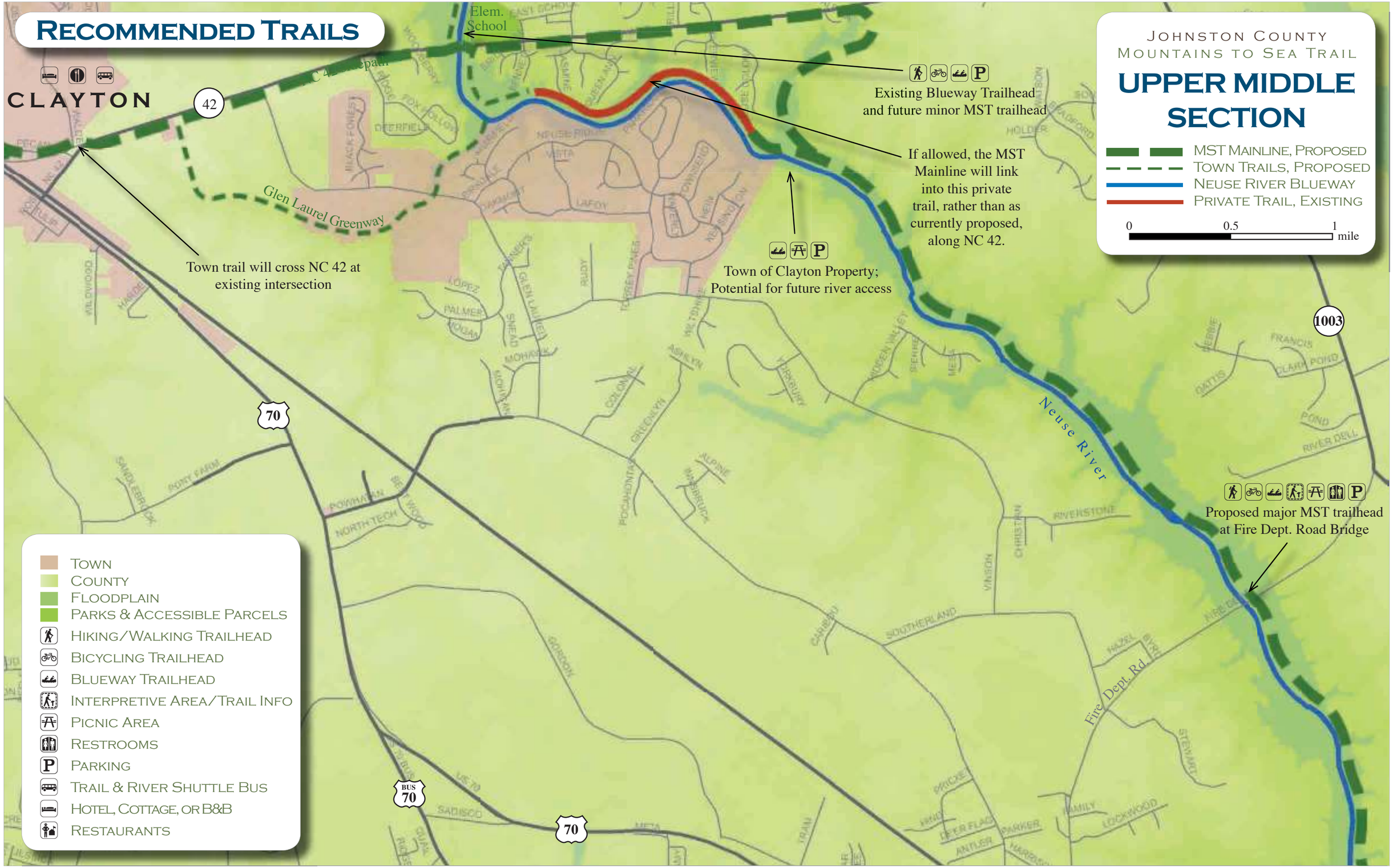
Preferred Route and Alignment

There are several pending options for the MST at the NC 42 bridge. If public access is granted or negotiated through the existing private trail to the south, then the trail will pass under the NC 42 bridge and connect to the existing trail. If public access is not granted or negotiated, then the trail will become an on-road or side-path facility that runs along NC 42 East for nearly 2 miles, as proposed in the MST 2004 Conceptual Plan. The trail would then follow a floodplain and creek back to the Neuse River, south of the existing subdivision.

The MST continues downstream through mainly agricultural land uses. However, some subdivision construction has already begun in portions of this segment. Steps should be taken immediately to negotiate or ensure public access through new developments.

The Johnston County MST's most important river access opportunity exists at the Fire Department Road (aka Wilson Road) Bridge. The northern quadrant at the intersection of the river and bridge provides a clear and level area for construction of trailhead parking and related improvements. This location is important because it lies directly in between existing water access points, providing a much needed midway entry and exit point along the Neuse. Such a trailhead would substantially increase the 'Blueway's" marketability and accessibility for new and/or novice water-based trail users. A long access road will be required, as the approach to the bridge itself does not currently provide access to the riverbank.

Recommended Trails



Johnston County
Mountains to Sea Trail

Upper Middle Section

- MST Mainline, Proposed
- Town Trails, Proposed
- Neuse River Blueway
- Private Trail, Existing

0 0.5 1 mile

4.3 Lower Middle Section

Preferred Route and Alignment

South of Fire Department Road bridge, the MST continues through primarily agricultural areas, crossing only three large parcels for more that two miles. After this stretch, some existing corridors may guide specific trail alignment. Two large utility easements, one, sewer, and one power cross this section of the MST and could provide connections to Buffalo Road, should they become useful with future growth.

As the trail continues southward, the land use transitions into a low-density residential area, with some agricultural uses. As the MST approaches US-70, it crosses through an NCDOT parcel, and into and industrial area. Connections to the Town of Selma are limited due to the large tank farms separating the town from the river, though the aforementioned utility corridors to the north may provide access via Buffalo road.

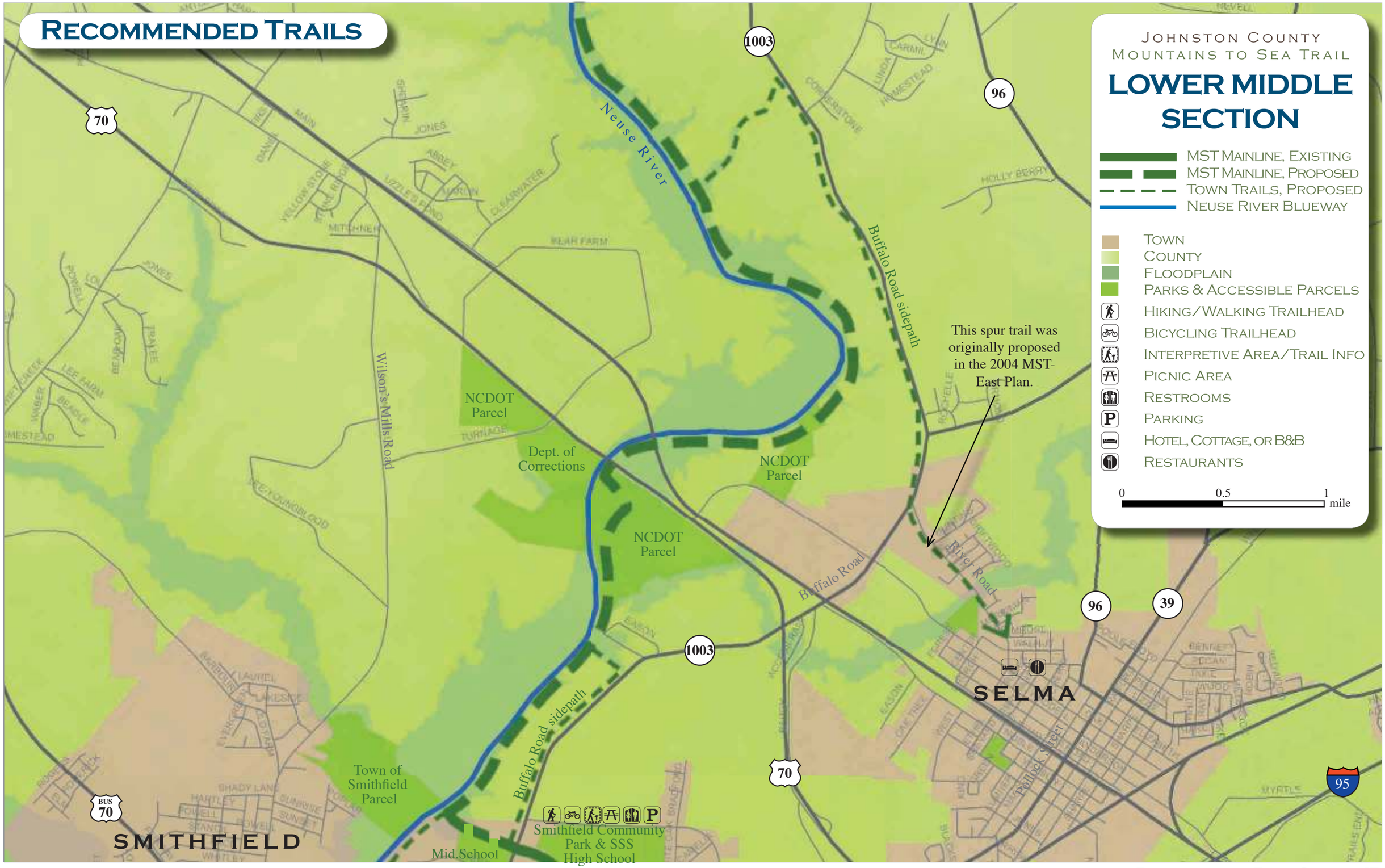
The MST would travel under the railroad bridge, under the US-70 bridge, and into a large NCDOT parcel. At this point the trail could continue in two directions: 1) as preferred, along the Neuse River, or 2) along and alternate route, in the form of a sidepath along Buffalo Road. When the Town of Smithfield and NCDOT widen this portion of Buffalo Road, a sidepath on the westside should be provided in the plans as an alternate route for the MST, should the river-side route not become available. Each of these two options lead to the northernmost portion of the Buffalo Creek Greenway, and into the Southern Section of the MST.

Local Attractions in the Lower Middle and Southern Sections

Area attractions include, but are not limited to, the following:

- Downtown Selma: Over 25 antique stores line the streets of Uptown Selma.
- The Smithfield Community Park, when completed will offer: 2 tot lots, 2 sand volleyball courts, 4 lighted tennis courts, 3 lighted softball fields, 2 horseshoe courts, 3 picnic shelters w/tables & grills, 1 baseball field, 2 basketball courts, 2 youth soccer fields, interpretive nature trail, concession/restroom building, 8-10 fitness stations, lighted SR. league baseball field, lighted youth football/multipurpose field, Double batting cage facility, lighted pair of tennis courts, 7000 lf of walking trail, associated driveway and parking areas.
- Downtown Smithfield offers the Johnston County Heritage Center, the Ava Gardner Museum, and a host of shops and restaurants.
- Smithfield Town Commons includes a five block nature park along the Neuse River with nature trails, picnic tables, a boat ramp, an amphitheater, and a Boy Scout hut.
- A (potential) Native American Interpretive Area is located south of the Smithfield's sewer plant and north of I-95 on the east side of the River. The site is not yet designated as culturally or historically significant, but Town of Smithfield officials claim it is worth further study as an interpretive area.

Recommended Trails



4.4 Southern Section

Preferred Route and Alignment

For the Southern Section, the MST starts by following the Buffalo Creek Greenway. The northernmost portion of the Buffalo Creek Greenway begins at a Middle School and Smithfield Community Park. An at-grade crossing will connect the greenway from the school to the park, across Buffalo Road. From the park, the greenway will travel through easements along the Buffalo Creek floodplain, bordering some residential areas to the south and east. Roughly half way through the 3-mile greenway, it connects to two more parks: Bingham Park and Talton Park. This portion of the trail also connects to a hospital and more residential areas near the parks.

From Talton Park, the greenway travels about a half-mile towards the Neuse River where it connects to the Smithfield Town Commons. From here, access to Downtown Smithfield is easily available through existing sidewalks.

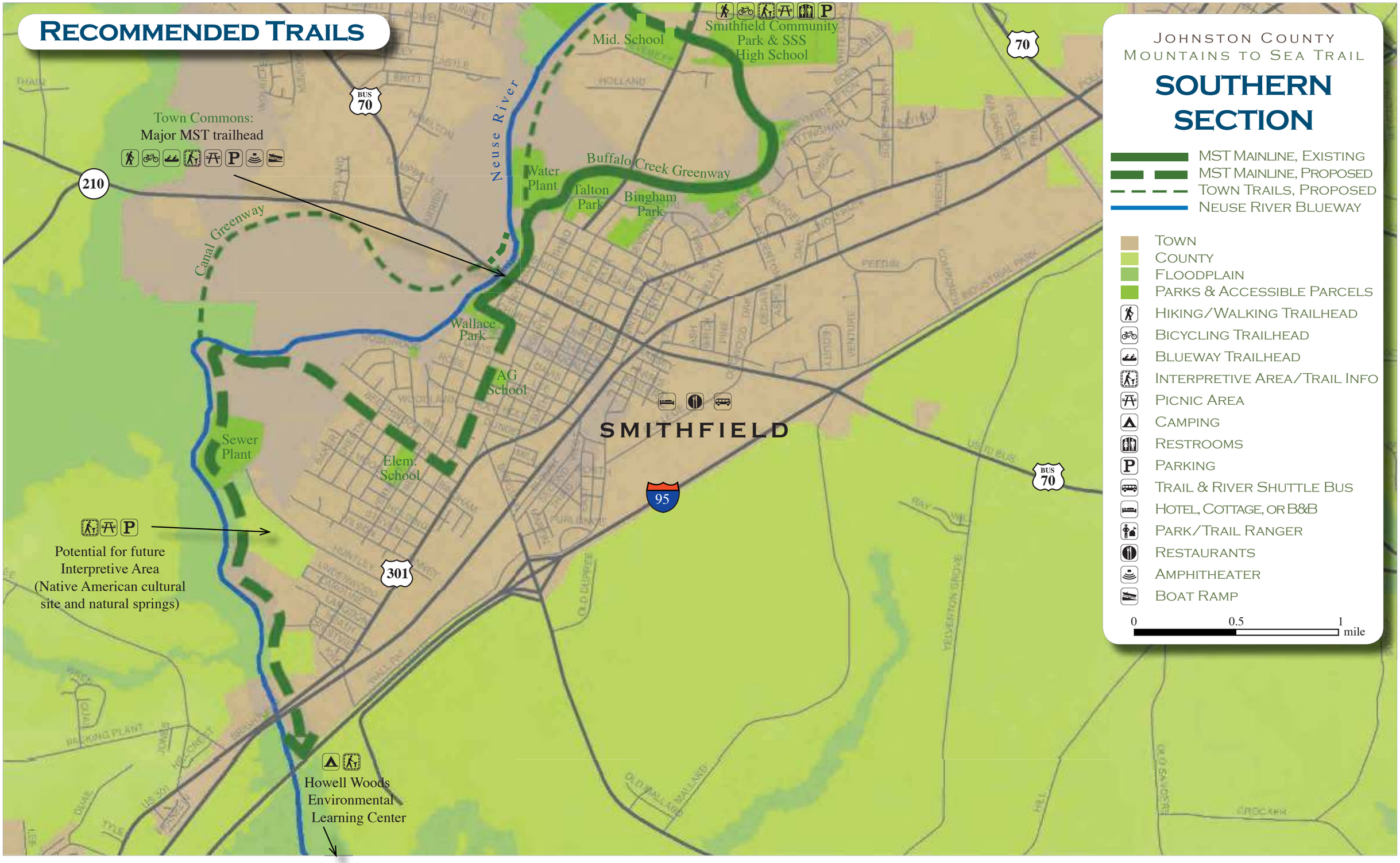
An alternate route to the Buffalo Creek Greenway is along the Neuse River, from the Middle School to Smithfield Town Commons. This is less of a priority since the Buffalo Creek Greenway is already planned, programmed, and almost entirely funded. The alternate route, however would provide a 'loop' for Smithfield trail users to exercise, recreate, and in some cases, commute.

From Smithfield Town Commons, the Buffalo Creek Greenway ends, and the MST follows the Neuse River to Wallace Park, where it transitions to an On-Road trail (sidewalks and bikeways). The on-road portion of the MST in Smithfield travels along Second Street from Wallace Park, past Johnston County's School for the Academically Gifted (AG School), then down to Sanders Street. At Sanders Street the on-road trail heads west, back towards the river, passing by an Elementary School. This on-road system is through a residential area with low-volume traffic for bicyclists and existing sidewalks (on Second Street) for pedestrians. MST signage will direct trail users back to the paved multiuse trail along the Neuse River.

Once back on the Neuse, the trail follows the river downstream past a sewer plant and to a potential interpretive area for Native American culture and natural springs. If this site proves to be feasible for interpretation, it may be a desirable end point for the trail in the near-term, rather than at the more industrial project boundary of I-95.

*Trails in the Town of Clayton and the Town of Smithfield are shown on page 48 for reference.

Recommended Trails



Johnston County
Mountains to Sea Trail

SOUTHERN SECTION

- MST Mainline, Existing
- MST Mainline, Proposed
- Town Trails, Proposed
- Neuse River Blueway

- Town
- County
- Floodplain
- Parks & Accessible Parcels
- Hiking/Walking Trailhead
- Bicycling Trailhead
- Blueway Trailhead
- Interpretive Area/Trail Info
- Picnic Area
- Camping
- Restrooms
- Parking
- Trail & River Shuttle Bus
- Hotel, Cottage, or B&B
- Park/Trail Ranger
- Restaurants
- Amphitheater
- Boat Ramp

0 0.5 1 mile


CLAYTON TRAILS
5
2.5
0
miles
70
42
Town of Clayton
42


SMITHFIELD TRAILS
5
2.5
0
miles
70
BUS 70
Town of Selma
70
Town of Smithfield
95
BUS 70

5 Implementation

Chapter Outline:

5.0 Overview

Implementation of the Johnston County section of the Mountains-to-Sea Trail will require a cooperative effort among state and local governments, working in partnership with landowners along the route. The purpose of this chapter is to define strategies that will lead to future development of the trail. Key strategies include securing trail right-of-way, identifying and setting aside funding for trail construction, and instituting public safety and management plans for the constructed trail. It is anticipated that the trail will be developed in phases, with initial phases occurring in Clayton and Smithfield. Subsequent phases will occur in more rural areas of Johnston County after trail right-of-way has been secured.

5.1 Client Team Action Plan

There are several early actions that the client team needs to take to begin the implementation process. First, the towns of Smithfield and Clayton need to have this master plan accepted and adopted as an element of their comprehensive plan. The same is true for Johnston County. Adopting this plan enables these communities to gain access to state and federal funds that support trail construction.

The next step will be for each jurisdiction to work on early phase development of the "mainline" segments of the trail, which are shown in detail in the last section of this chapter. For Smithfield and Clayton, this involves the development of specific trail segments, including "town trails" that connect the towns to the Neuse River corridor. For Johnston County, this first step will involve working with landowners to secure trail right-of-way and then subsequently building trail segments.

The following pages (52-55) outline specific near-term, mid-term, and long-term action steps for each participating government agency to implement this plan. The short term strategies include pilot projects that *could* be funded by NCDOT, with an expected equitable allocation of funds between Johnston County, the Town of Clayton and the Town of Smithfield.

MST Projects for the Town of Clayton

The Town of Clayton is committed to developing a section of the MST through the center of its community, to take advantage of the economic, transportation and recreation benefits that this will provide. Clayton's pilot project includes a mile of trail from Covered Bridge Road to "Sam's Branch" Greenway (named for the tributary stream that connects Downtown Clayton to the Neuse River). Segment 3 (see page 73) illustrates the routing of this portion of trail along the Neuse River.

For Segment maps, please refer to pages 73-113.

As part of this pilot project, the Town of Clayton and NCDOT will design a bicycle/pedestrian bridge over the Neuse River, near Covered Bridge Road (also part of Segment 3). Initially, this bridge will connect the existing subdivisions on the east side of the river with Sam's Branch Greenway and Downtown Clayton on the west side. In the long-term, the bridge will also provide connections for the planned unit developments (already under construction), and possibly to a future Mark's Creek Greenway.

Another priority project for the Town of Clayton involves the 'on-road' portion of trail through town (Segments 4 and 5) with a side path that runs along NC 42 (Segments 6 and 7). The on-road portion will consist of sidewalk improvements and a signed bike route, while the side path is to be included in the future widening of NC 42. These improvements will provide greater connectivity for residents in downtown and southeastern Clayton.

MST Projects for the Town of Smithfield

The Town of Smithfield has identified several near term projects for implementation of the MST. First, as the Buffalo Creek Greenway is completed, the Town of Smithfield aims to connect that greenway to the Neuse River and the MST corridor by crossing Buffalo Road and continuing the trail through Smithfield Middle School (in Segment 16).

Also, as one of the key features of Johnston County's MST, the existing trail at Town Commons, which is currently sub-standard and in need of repair, will be upgraded with the same cross section consistent with the rest of the MST: 10'-wide paved asphalt with 2' wide gravel shoulders (Segment 17).

Finally, the proposed MST mainline segments south of the town (Segments 19 and 20) are identified by NCDOT as having strong potential for a pilot project, since these portions of trail run along the Neuse River. Once completed, an on-road route along Second Street and Sanders Street will link the existing trail at Town Commons to this new portion along the river.

Johnston County Trail Right-of-Way

Johnston County can begin immediately working with landowners along the proposed route of the MST to secure trail right-of-way. Trail segments 7 through 15 illustrate the route and alignment for the County to focus on. It is recommended that a minimum of 100-feet of trail right-of-way be secured by the County to provide enough space to both develop the trail and provide ample separation between the trail and private landowners.

JOHNSTON COUNTY MST ACTION STEPS

TASKS	LEAD AGENCY AND SUPPORT GROUPS	DETAILS	APPROXIMATE TIMELINE	PAGE REFERENCES
INITIAL ACTION STEPS				
Adopt this Plan as an element of town and county comprehensive plans.	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department** Support Groups: clubs, businesses and non-profits related to recreation, tourism, conservation and the environment/outdoors	Information should be provided to town and county councils before review for adoption, including: 1) Letters of support for the plan from local organizations and citizen groups 2) The Johnston County Greenway Benefits Brochure and 3) The Executive Summary	**Complete by mid-November 2006**	Page 51
Determine who will lead implementation	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	This person should be active in setting up and organizing project team meetings on at least a quarterly basis to carry out initial action steps encourage continued progress in implementation.	**Complete by November 2006**	See the 'Acknowledgements' page for project contributors as of September 2006
Continue to hold MST Project Team Meetings	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	At each meeting, team members should be prepared to 1) discuss progress since previous meeting 2) identify problems encountered and potential solutions, and 3) set goals to meet by the next quarterly meeting	**Continuous process** (Begin no later than Fall 2006)	See the 'Acknowledgements' page for project contributors as of September 2006
Designate (or employ) staff to carry out trail implementation tasks.	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	Recommend using current Planning Department staff where/when possible.	**Designate staff by November 2006 and/or employ staff by early 2007**	N/A
Partner with a local land trust and/or land manager.	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	1) Identify potential partner agencies 2) Meet and define mutual goals 3) Outline strategy for land/project corridor conservation	**Begin no later than November 2006**	Pages 55-59
Meet with local stakeholders to implement plan.	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department** Support group: Local Land Trusts	1) Identify potential stakeholders, such as landowners, local business leaders, key political figures, and local community leaders 2) Work with local land trusts to build alliances with landowners	**Ongoing; Begin no later than November2006**	Chapter 2 and Pages 55 56
Identify specific funding sources for implementation	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	Appendix C identifies nearly forty different potential sources for funding; Cost estimates are provided by trail segment at the end of Chapter 5.	**Begin no later than December 2006**	Appendix C and Pages 74-113
Make changes to County development code regarding the current interpretation of 'trails' as structures and regarding 'greenways' in adopted plans.	**Johnston County Planning Department**	Intent is to establish rational interpretation of the land development code to reduce flood hazards and encourage trail implementation.	**Begin no later than December 2006**	Pages A-1 and A-4
Establish an information exchange and MST promotion program with local chambers of commerce	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	Regularly scheduled updates on project progress to promote the MST locally and regionally (could coincide with Project Team meetings)	**Continuous process ; Begin no later than December 2006**	Chapter 2 and *Benefits of Greenways Brochure*
SHORT TERM STRATEGIES (FY 06-08)				
Build trail along Neuse River (in Segment 3)	**Town of Clayton Planning Department** Support Group: NCDOT	1) Set up meeting with NCDOT to secure funding. 2) Secure right-of-way from Sam's Branch to Covered Bridge Road along west side of the Neuse River, 3) Survey and flag centerline, 4) Build trail	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 22 and 42; Page 78 outlines route
Design & build signature bike/ped bridge over the Neuse River (in Segment 3)	**Town of Clayton Planning Department** Support Group: NCDOT	1) Acquire right-of-way; 2) Work with NCDOT to design the bridge; 3) Secure funding required to build the bridge; 4) Begin construction.	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 22 and 42; Page 78 outlines associated cost-estimates for the bridge abutments and bridge deck.
Connect the MST/Buffalo Creek Greenway to the Neuse River (in Segment 16).	**Town of Smithfield Planning Department** Support Group: NCDOT	1) Set up meeting with NCDOT to secure funding. 2) Secure right-of-way, 3) Survey and flag centerline, 4) Build trail and crossing improvements (at Buffalo Road near Smithfield Community Park and Smithfield Middle School).	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 48-49 and Page 105
Build trail along Neuse River (in Segments 19 and 20), including an interpretive area/destination for the MST	**Town of Smithfield Planning Department** Support Group: and TOS Parks and Recreation, NCDENR, and local historical/cultural organizations	1) Identify outside funding sources, 2) Set up meeting with NCDOT to secure additional funding, 3) Acquire right-of-way; 4) develop a conceptual plan for the interpretive site; 5) survey and flag the trail centerline; 6) build the trail and interpretive site	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 28-29, 48-49, and 110-113
Upgrade existing Town Commons Trail along the Neuse River with standard cross section.	**Town of Smithfield Planning Department** Support Groups: NCDOT and NCDENR	1) Set up meeting with NCDOT to secure funding (incorporating TIP funds), 2) Demolish and remove old trail. 3) Build new 10' wide paved asphalt trail with 2' wide gravel shoulders	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 52-53 and 106-107
Develop a paddle trail access site (trailhead) on the Neuse River at the Fire Department Road bridge (a.k.a. Wilson Road bridge).	**Johnston County Planning Department** Support Group: NCDENR	1) Set up meeting with NCDOT and NCDENR to secure funding, 2) Secure right-of way, 3) Develop a conceptual plan for the site; 4) Develop construction documents; 5) Make improvements to the site.	**Ongoing until built; Begin step 1 no later than December 2006**	Pages 24-25, 35, 44-45, 94-95
Continue greenway projects already underway in Clayton and Smithfield	**Clayton and Smithfield Planning Departments**	Begin construction documents for Sam's Branch Greenway in Clayton and continue construction of Buffalo Creek Greenway	**Ongoing until built; Begin construction of Sam's Branch Greenway by Summer 2007**	Pages 22-23, 28-29, 42 43, 48-49, 52-53, 78-81, 104-107
Institute public safety and management regulations for the Johnston County MST	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	Draw from text and language recommended in Chapter 5, section 5.3 to develop a safety and management policy document to be endorsed by the county and all participating towns.	**Complete by Summer 2007**	Pages 60-70

Johnston County MST Action Steps (Cont'd)

Tasks	Lead Agency and Support Groups	Details	Approximate Timeline	Page References
Short Term Strategies (FY 06-08) - Continued				
Develop a paddle trail access site (trailhead) at the future Town of Clayton property south of Covered Bridge Road (at confluence of Sam's Branch and the Neuse River).	**Town of Clayton Planning Department** Support Group: NCDENR and TOC Parks and Recreation	1) Develop a conceptual plan for the site (in Segment 3); 2) Secure funding; 3) Develop construction documents; 4) Make improvements to the site.	**Begin no later than Fall 2007**	Pages 22-23, 35, 42-43, 78-79
Enhance the paddle trail access site (trailhead) on the Neuse River at NC 42	**Johnston County Planning Department** Support Group: NCDENR	1) Set up meetings with NCDOT and NCDENR to develop and coordinate a conceptual plan for the site; 2) Identify funding sources; 3) Develop construction documents; 4) Make improvements to the site.	**Begin no later than 2008**	Pages 22-23, 35, 45, 86-87
Provide On-Road improvements in Clayton to safely connect to and encourage use of MST/Sam's Branch Greenway	**Town of Clayton Planning Department** Support Group: NCDOT	1) Identify outside funding sources, 2) Set up meeting with NCDOT to secure additional funding, 3) Make improvements	**Begin no later than 2008**	Pages 42-43, 80-83, B6 B7
Provide On-Road improvements to Second and Sanders Street to safely connect to and encourage use of MST, south of Downtown	**Town of Smithfield Planning Department** Support Group: NCDOT	1) Identify outside funding sources, 2) Set up meeting with NCDOT to secure additional funding, 3) Make improvements	**Begin no later than 2008**	Pages 48-49, 108-109, B6-B7
Provide a sidepath in the future NCDOT widening of NC 42 *and* bike/ped accommodations on the future NC 42 bridge over the Neuse River.	**NCDOT** Support Group: Town of Clayton	1) Advocate for the inclusion of the sidepath and bridge accommodations during the design stage, 2) Include said facility recommendations in all related town planning documents, 3) follow the design and implementation stages of the NC 42 widening to ensure inclusion of said facilities.	**Continuous process**	Pages 44-45 and Pages 84-87
Pursue acquisition projects for MST segments	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation) Support Groups: Local Land Trusts	Focus on priority segments where right-of-way does not exist or is not expected to exist in the near future	**Continuous process**	Pages 55-59
Mid-Term Strategies (FY09-11)				
Continue to hold MST Project Team Meetings	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	Continue meetings; develop and implement promotional strategy for the completed portions of land and water-based trail, relying on local partnerships, stakeholders, and volunteers	**Continuous process**	N/A
Pursue acquisition projects for remaining MST segments	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation) Support Groups: Local Land Trusts	Focus on priority segments in Smithfield and Clayton that remain incomplete.	**Continuous process**	Pages 55-59
Update Cost Estimates	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	Using spreadsheets created in 2006, add in 2009 figures for construction and/or materials; Use experience from short-term project implementation.	**Complete by FY 2009**	pp. 74-113
Update and identify funding sources for mid-term projects	**Town of Clayton Planning Department, Town of Smithfield Planning Department, Johnston County Planning Department**	Appendix C identifies nearly forty different potential sources for funding in 2006; Use new, 2009 cost estimates	**Complete by FY 2009**	Appendix C; pp. 74-113
By 2011, the entire MST Plan should undergo a thorough review and evaluation to ensure that it is up to date.	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	The existing conditions will need to be updated for new opportunities and constraints; recommendations will need to be re-prioritized.	**Begin in 2011**	N/A
Long Term Strategies (FY12-16)				
Continue to hold MST Project Team Meetings	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	Continue meetings; Concentrate on filling gaps in the built-trail network and look to regional and/or countywide connections	**Continuous process**	N/A
Pursue new tasks/priority projects identified in the 2011 Johnston County MST Update	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation)	New tasks could include new spur/town connector trails; regional connector trails, trail management and maintenance; expanding marketing and promotion, etc.	**Continuous process**	N/A
Pursue acquisition projects identified in the 2011 Johnston County MST Update	**Project Team** (Staff from the Town of Clayton, Town of Smithfield, Johnston County, NCDOT Bike/Ped Division, NCDENR State Parks and Recreation) Support Groups: Local Land Trusts	Focus on remaining acquisition in segments 8-15	**Continuous process**	Pages 55-59

The County will most likely acquire much of the needed trail right-of-way as landowners submit residential, commercial and retail land development plans for approval. This chapter of the master plan offers some different strategies that landowners and the County may want to consider in order to secure trail right-of-way.

Aside from securing trail right-of-way, Johnston County can also work with the North Carolina Department of Environment and Natural Resources (NCDENR) and the Town of Clayton to establish paddle trail access sites along the Neuse River. Three sites have been identified as having strong potential for future river access:

-First, the potential paddle trail access site at Fire Department Road (a.k.a. Wilson Road) Bridge is noted on pages 20, 24, 35 and 44, and is located in Segment 11. This should be considered Johnston County's pilot project for implementation.

-Second, the potential paddle trail access site near Covered Bridge Road (in Segment 3) is described on pages 19, 22, 35 and 42.

-Third, the existing paddle trail access site at NC 42 (in Segment 7) could benefit from improvements described on pages, 19, 22, and 35.

5.2 Methods for Securing Trail Right-of-Way

There are many different ways for the County, Smithfield and Clayton to secure trail right-of-way for the MST. The recommended alignment of the MST follows publicly owned land wherever possible. However, it will be necessary to work with landowners along the entire route to secure trail right-of-way. The following text provides a list of options that should be considered in securing right-of-way for the MST. Funding sources for acquiring right-of-way and trail development are described and provided in Appendix C of this master plan.

The following sections detail a list of specific strategies including the formation of partnerships and a toolbox of acquisition options.

5.2.1 Partnerships

The municipalities of Johnston County should pursue partnerships with land trusts and land managers to make more effective use of their land acquisition funds and strategies. The following offers recommendations on how these partnerships could be strengthened

Land Trusts

Land trust organizations, such as the Triangle Land Conservancy and the Trust for Public Lands, to name just two, are valuable partners, when it comes to acquiring land and rights-of-way for greenways. These groups can work directly with landowners and conduct their business in private so that sensitive land transactions are handled in an appropriate manner. Once the transaction has occurred, the land trust will usually convey the acquired land or easement to a public agency, such as a town or county for permanent stewardship and ownership.

Private Land Managers

Another possible partnership that could be strengthened would be with the utility companies that manage land throughout Johnston County. Trails and greenways can be built on rights-of-ways that are either owned or leased by electric and natural gas companies. Electric utility companies have long recognized the value of partnering with both local communities, non-profit trail organizations and private land owners to permit their rights-of-ways to be used for trail development. This has occurred all over the United States and throughout North Carolina.

The Towns and municipalities of Johnston County should actively update and maintain relationships with private utility and land managers to ensure that community wide bicycle, pedestrian and greenway system can be accommodated within these rights-of-way. The respective municipalities will need to demonstrate to these companies that maintenance will be addressed, liability will be reduced and minimized and access to utility needs will be provided.

5.2.2 Greenway Acquisition Tools

The following menu of tools describe various methods of acquisition that can be used by landowners, land conservation organizations, the Town of Clayton, the Town of Smithfield, Johnston County and other municipalities to acquire greenway lands.

Land Management

Management is a method of conserving the resources of a specific greenway parcel by an established set of policies called management plans for publicly owned greenway land or through easements with private property owners. Property owners who grant easements retain all rights to the property except those which have been described in the terms of the easement. The property owner is responsible for all taxes associated with the property, less the value of the easement granted. Easements are generally restricted to certain portions of the property, although in certain cases an easement can be applied to an entire parcel of land. Easements are transferable through title transactions, thus the easement remains in effect perpetually.

Management Plans: The purpose of a management plan is to establish legally binding contracts which define the specific use, treatment, and protection for publicly owned greenway lands. Management plans should identify valuable resources; determine compatible uses for the parcel; determine administrative needs of the parcel, such as maintenance, security, and funding requirements; and recommend short-term and long-term action plans for the treatment and protection of greenway lands.

Conservation Easement: This type of easement generally establishes permanent limits on the use and development of land to protect the natural resources of that land. When public access to the easement is desired, a clause defining the conditions of public access can be added to the terms of the easement. Dedicated conservation easements can qualify for both federal income tax deductions and state tax credits. Tax deductions are allowed by the Federal government for donations of certain conservation easements. The donation may reduce the donor's taxable income.

Preservation Easement: This type of easement is intended to protect the historical integrity of a structure or important elements in the landscape by sound management practices. When public access to the easement is desired, a clause defining the conditions of public access can be added to the terms of the easement. Preservation easements may qualify for the same federal income tax deductions and state tax credits as conservation easements.

Public Access Easements: This type of easement grants public access to a specific parcel of property when a conservation or preservation easement is not necessary. The conditions of use are defined in the terms of the public access easement.

Government Regulation
Regulation is defined as the government's ability to control the use and development of land through legislative powers. The following types of development ordinances are regulatory tools that can meet the challenges of projected suburban growth and development as well as conserve and protect greenway resources.

Dedication/Density Transfers: Also known as incentive zoning, this mechanism allows greenways to be dedicated for density transfers on development of a property. The potential for improving or subdividing part or all of a parcel of property, can be expressed in dwelling unit equivalents or other measures of development density or intensity. Known as density transfers, these dwelling unit equivalents may be relocated to other portions of the same parcel or to contiguous land that is part of a common development plan. Dedicated density transfers can also be conveyed to subsequent holders if properly noted as transfer deeds.

Negotiated Dedications: This type of mechanism allows municipalities to negotiate with landowners for certain parcels of land that are deemed beneficial to the protection and preservation of specific stream corridors. This type of mechanism can also be exercised through dedication of greenway lands when a parcel is subdivided. Such dedications would be proportionate to the relationship between the impact of the subdivision on community services and the percentage of land required for dedication-as defined by the US Supreme Court in Dolan v Tigard.

Fee-in-Lieu: To complement negotiated dedications, a fee-in-lieu program may be necessary to serve as a funding source for other land acquisition pursuits. Based on the density of development, this program allows a developer the alternative of paying money for the development/protection of greenways in lieu of dedicating greenway lands. This money is then used to implement greenway management programs or acquire additional greenway land.

Reservation of Land: This type of mechanism does not involve any transfer of property rights but simply constitutes an obligation to keep property free from development for a stated period of time. Reservations are normally subject to a specified period of time, such as 6 or 12 months. At the end of this period, if an agreement has not already been reached to transfer certain property rights, the reservation expires.

Buffer / Transition Zones: This mechanism recognizes the problem of reconciling different, potentially incompatible land uses by preserving greenways that function as buffers or transition zones. Care must be taken to ensure that the use of this mechanism is reasonable and will not destroy the value of a property.

Subdivision Exactions: An exaction is a condition of development approval that requires development to provide or contribute to the financing of public facilities at their own expense. For example, a developer may be required to build a greenway on-site as a condition of developing a certain number of units because the development will create the need for new parks or will harm existing parks due to overuse. This mechanism can be used to protect or preserve greenway lands, which are then donated to either a Town or Johnston County. Consideration should be given to include greenway development in future extraction programs.

Acquisition

Acquisition requires land to be donated or purchased by a government body, public agency, greenway manager, or qualified conservation organization.

Donation or Tax Incentives: In this type of acquisition, a government body, public agency, or qualified conservation organization agrees to receive the full title or a conservation easement to a parcel of land at no cost or at a "bargain sale" rate. The donor is then eligible to receive a federal tax deduction of up to 30 to 50 percent of their adjusted gross income. Additionally, North Carolina offers a tax credit of up to 25 percent of the property's fair market value (up to $5000). Any portion of the fair market value not used for tax credits may be deducted as a charitable contribution. Also, property owners may be able to avoid any inheritance taxes, capital gains taxes, and recurring property taxes.

Fee Simple Purchase: This is a common method of acquisition where a local government agency or private greenway manager purchases property outright, Fee simple ownership conveys full title to the land and the entire "bundle" of property rights including the right to possess land, to exclude others, to use land, and to alienate or sell land.

Easement Purchase: This type of acquisition is the fee simple purchase of an easement. Full title to the land is not purchased, only those rights granted in the easement agreement. Therefore the easement purchase price is less that the full title value.

Purchase / Lease Back: A local government agency or private greenway organization can purchase a piece of land and then lease it back to the seller for a specified period of time. This lease may contain restrictions regarding the development and use of the property.

Bargain Sale: A property owner can sell property at a price less than the appraised fair market value of the land. Sometimes the seller can derive the same benefits as if the property were donated. Bargain Sale is attractive to sellers when the seller wants cash for the property, the seller paid a low cash price and thus is not liable for high capital gains tax, and/or the seller has a fairly high current income and could benefit from the donation of the property as an income tax deduction.

Overlay Zones: An overlay zone and its regulations are established in addition to the zoning classification and regulations already in place.

Option / First Right of Refusal: A local government agency or private organization establishes an agreement with a public agency or private property owner to provide the right of first refusal on a parcel of land that is scheduled to be sold. This form of agreement can be used in conjunction with other techniques, such as an easement to protect the land in the short-term. An option would provide the agency with sufficient time to obtain capital to purchase the property or successfully negotiate some other means of conserving the greenway resource.

Purchase of Development Rights: A voluntary purchase of development rights involves purchasing the development rights from a private property owner at a fair market value. The landowner retains all ownership rights under current use, but exchanges the rights to develop the property for cash payment.

Condemnation: The practice of condemning private land for use as a greenway is viewed as a last resort policy. Using condemnation to acquire property or property rights can be avoided if private and public support for the greenway program is present. Condemnation is seldom used for the purpose of dealing with an unwilling property owner. In most cases, condemnation has been exercised when there has been an absentee property ownership, when the title of the property is not clear, or when it becomes apparent that obtaining the consent for purchase would be difficult because there are numerous heirs located in other parts of the United States or different countries.

Eminent Domain: The right of exercising eminent domain should be done so with caution by the community and only if the following conditions exist: 1) the property is valued by the community as an environmentally sensitive parcel of land, significant natural resource, or critical parcel of land, and as such has been defined by the community as irreplaceable property; 2) written scientific justification for the community's claim about the property's value has been prepared and offered to the property owner; 3) all efforts to negotiate with the property owner for the management, regulation, and acquisition of the property have been exhausted and that the property owner has been given reasonable and fair offers of compensation and has rejected all offers; and 4) due to the ownership of the property, the timeframe for negotiating the acquisition of the property will be unreasonable, and in the interest of pursuing a cost effective method for acquiring the property, the community has deemed it necessary to exercise eminent domain.

5.3 Greenway Facility Safety and Security

Safety is a duty and obligation of all public facility managers. Therefore, as the construction documents for the Mountains-To-Sea Trail are completed, appropriate local, state, and federal agencies should review these plans and specifications to ensure that they meet all existing regulations.

In order to provide reasonable and ordinary safety measures, the Towns and municipalities impacted by the Mountains-To-Sea Trail should develop a cohesive coalition and implement a Safety and Security Program. This program should consist of well-defined safety and security policies; the identification of trail management, law enforcement, emergency and fire protection policies; and a system that offers timely response to the public for issues or problems related to safety and security. The coalition of governments will need to implement internal coordination for safety and security between Parks and Recreation, Police, Fire, Public Works, and Legal Departments. Additionally, procedures and policies should be established for external coordination between the Towns, Johnston County and local alliances, local neighborhood watch associations, and "Adopt-a-Greenway" organizations. Important components of the Safety and Security Program should include:

1) Establishment of a Safety Committee or Coordinator
2) Preparation of a Trail Safety Manual for employees and agencies
3) Establishment of User Rules and Regulations
4) Development of Greenway and Trails Emergency Procedures
5) Preparation of a Safety Checklist for the trail
6) Preparation of a trail user response form
7) A system for accident reporting and analysis
8) Regular Maintenance and Inspection Program
9) Site and Facility Development and Review
10) Public Information Program
11) Employee Training Program for Safety and Emergency Response
12) Ongoing Research and Evaluation of Program Objectives

The program should always discourage the general public from using any segment of the Mountains-To-Sea Trail that is under construction. Trail segments should not be considered officially opened for public use until a formal dedication ceremony and authorized agents of the Towns and/or County have completed an official opening. Individuals who use greenway segments that are under construction, without written permission from an authorized agent, should be deemed in violation of the Mountains-To-Sea Trail Hours of Operation policy.

Hours of Operation

The consultant recommends that the Mountains-To-Sea Trail be operated like all other non-lighted public parks and recreation facilities open for public use from dawn to dusk, 365 days a year, except as specifically designated by the local Parks and Recreation Departments. The consultant recommends that individuals who are found using these facilities after dusk and before dawn, be deemed in violation of these hours of operation and subject to fines and/or prosecution.

Trail User Rules and Regulations

One of the emerging safety issues in greenway trail planning, design, and development is multi-user conflict. Typically, these conflicts are caused by overuse of a trail. However, other factors may be lead to user conflicts and problems including poorly designed and engineered trail alignments, inappropriate user behavior, or inadequate facility capacity. The most effective trail use management plan is a well-conceived safety program that provides the individual user with a Code of Conduct for the trail, sometimes called a Trail Ordinance. Several multi-use trail systems across the United States have adopted progressive ordinances for public use. The consultant recommends that the following Rules and Regulations be implemented for the Mountains-To-Sea Trail. These rules should be displayed in both brochures and on information signs throughout the Trail. The consultant recommends that these rules and regulations be reviewed by the appropriate authorities and legally adopted by the Towns and Johnston County.

1) **Be Courteous:** All Trail users, including bicyclists, joggers, walkers, wheelchairs, skateboarders and skaters, should be respectful of other users regardless of their mode of travel, speed, or level of skill. Never spook animals; like horses and dogs - talk to them in a calm voice as you approach. Respect the privacy of adjacent landowners.

2) **Keep Right:** Always stay to the right as you use the Trail, or stay in the lane that has been designated for your user group. The exception to this rule occurs when you need to pass another user.

3) **Pass on the Left:** Pass others going in your direction on their left. Look ahead and behind to make sure that your lane is clear before you pull out an around the other user. Pass with ample separation. Do not move back to the right until you have safely gained distance and speed on the other user. Faster traffic should always yield to slower and oncoming traffic.

4) **Give Audible Signal When Passing:** All users should give a clear warning signal before passing. This signal may be produced by voice, bell, or soft horn. Voice signals might include “Passing on the Left!” or “Cyclist on the left!” Always be courteous when providing the audible signal - profanity is unacceptable.

5) **Be Predictable:** Travel in a consistent and predictable manner. Always look behind before changing position on the Trail, regardless of your mode of travel.

6) **Control Your Bicycle:** Inattention, even for a second can cause disaster —always stay alert! Maintain a safe and legal speed at all times.

7) **Don’t Block the Trail:** When in a group, including your pets, use no more than half the trailway, so as not to block the flow of other users. If users approach your group from both directions, form a single line, or stop and move to the far right edge of the Trail to allow safe passage by these users.

8) **Yield when entering or Crossing Trails:** When entering or crossing a Trail at uncontrolled intersections, yield to traffic already using the other trail.

9) **The Use of Lights:** When using a Trail during periods of low visibility each cyclist should be equipped with proper lights. Cyclists should have a white light that is visible from five hundred feet to the front, and a red or amber light that is visible from five hundred feet to the rear. Other Trail users should use white lights (bright flashlights) visible two hundred fifty feet to the front, and wear light or reflective clothing.

10) **Don't Use this Trail Under the Influence of Alcohol or Drugs:** It is illegal to use this Trail if you have consumed alcohol in excess of the statutory limits, or if you have consumed illegal drugs. Persons who use a prescribed medication should check with their doctor or pharmacist to ensure that it will not impair their ability to safely operate a bicycle or other wheeled vehicle.

11) **Cleanup Your Litter:** Please keep this Trail clean and neat for other users to enjoy. Do not leave glass, paper, cans, or other debris on or near the trail. Please clean up after your pets. Pack out what you bring in —and remember to always recycle your trash.

12) **Keep Pets on Leashes:** All pets must be kept on a secure and tethered leash. Failure to do so will result in fines and possible detention of the pet.

13) **Use the Buddy System:** Use the Trail system with a friend!

14) **Trail Subject to Flash Flooding:** Please be aware that the Mountains-To-Sea Trail is officially closed during times when floodwaters overflow the creek banks and cover the Trail surface. For your personal safety, please be prepared to leave the Trail immediately during periods of heavy rainfall.

15) **Swimming Prohibited:** Swimming is prohibited in creeks and tributary streams.

16) **Vegetation Removal:** It is illegal to remove vegetation of any type, size, or species from the Trail. Please contact the appropriate Parks and Recreation Department or Planning Department should you have concerns about noxious weeds, poisonous vegetation, dying or dead vegetation, or other concerns about vegetation growth in the greenway.

17) **Share the Trail!** Always exercise due care and caution when using the Trail!

Police/Park Ranger Patrol and Emergency Response System

In order to provide effective patrol and emergency response to the needs of trail users and adjacent property owners, the consultant recommends that the various cities and county Police and Sheriff Departments and Parks and Recreation Departments work together, to develop a specific patrol and emergency response plan for the Mountains-To-Sea Trail. This plan should define a cooperative law enforcement strategy for the trail based on the capabilities of different agencies and services typically required for the facility. There will be numerous phases of the trail until

completion, each consultant as they are hired for each phase should be required to work with the designated departments/agencies to deliver a site plan that illustrates: points of access to the trail; approved design details for making these access points safe, secure, and accessible to law enforcement officials; and potential locations for a system of cellular-type emergency phones. The consultant will also work with appropriate officials to locate other mechanisms or project elements that will aid local agencies in managing the trail in a safe and secure manner.

The Police, Sheriffs, Parks, and Recreation Departments should also define an emergency response system in conjunction with appropriate local Fire Stations and Paramedical units that defines which agencies should respond to 911 calls, and provides easy-to-understand routing plans and access points for emergency vehicles. Local hospitals should be notified of these routes so that they may also be familiar with the size and scope of the project. The entire Trail system will be designed and developed to support a minimum gross vehicle weight of 6.5 tons to allow emergency vehicle access.

At all public entrances to the Mountains-To-Sea Trail, appropriate signage should be installed to notify Trail users of the potential for flash flooding and the need to quickly exit the trail during periods of heavy rainfall.

Risk Management and Liability

The design, development, management, and operation of the Mountains-To-Sea Trail must be carefully and accurately executed in order to provide a resource that protects the health, welfare, and safety of the public.

Liability most often occurs when a facility has been under-designed for the intended volume of use; when management of the facility is poor; or when unexpected accidents occur because the trail manager failed to recognize the possibilities of a potentially hazardous situation. To reduce the exposure to liability, Towns and County should have in place the following measures prior to opening the first phase of the trail:

1) A complete maintenance program that provides the appropriate duty or level of care to trail users;
2) A risk management plan that appropriately covers all aspects of the trail
3) A comprehensive working knowledge of public use laws and recent case history applicable in North Carolina

Public use of the Mountains-To-Sea Trail should be covered under existing municipal policies for the use of parkland and public spaces. The Towns and County should exercise reasonable care in the construction of all trail facilities to reduce hazardous, public nuisance and life threatening situations. The Mountains-To-Sea Trail is available for public use as defined by the Hours of Operation Policy; therefore, any individual found using the Trail outside the normal hours of operation would not be covered by the municipal insurance policies for public use.

The Towns and County should exercise reasonable care in the design and construction of all Trail facilities to reduce hazardous, public, nuisance and life threatening situations. The Trail should become available for public use as defined under the Hours of Operation Policy; any individual found using the Trail outside the normal hours of operation should be treated as a trespasser.

Studies of Trail Liability

A study by the Rails to Trails Conservancy (RTC) provides a primer on trail-related liability issues and risk management techniques. Below is a section of the report that addresses concerns in the proposed Haw River Greenway corridor. The report was written by Hugh Morris of RTC in cooperation with the National Park Service: Rivers, Trails, and Conservation Assistance Program.

Concerns and Solutions

There are two primary categories of people who might be concerned about liability issues presented by a trail: the trail managing and owning entity (typically a public entity) and private landowners. Private landowners can be divided into two categories, those who have provided an easement for a trail over their land and those who own land adjacent to a trail corridor.

Similarly, there may be a pre-existing corridor traversing or lying adjacent to their property such as a former rail corridor that has been converted to a trail. In either situation, private landowners may have some concerns about the liability should a trail user stray onto their land and become injured. In the first instance, where an easement is granted, the concern may be over injuries on both the granted right-of-way as well as injuries that may occur on land under their control that is adjacent to the trail. Under the latter condition, where the landowner has no ownership interest in the trial, the landowner will only be concerned with injury to trail users wandering onto their property and getting hurt or perhaps a tree from their property falling onto the trail.

In general, people owning land adjacent to a trail -- whether the trail is an easement granted by them or is held by separate title -- foresee that people using the trail may be endangered by a condition on their land. Potential hazards such as a pond, a ditch, or a dead tree may cause the landowner to worry about liability for a resulting injury. The landowners may reduce their liability by taking the following actions (BCEMC 1997, p. 58):

1) Work with trail designers to have the trail located away from hazards that cannot be corrected
2) Make it clear that trail users are not invited onto the adjoining land. This can be aided by having the trail designer develop signs, vegetative screening, or fencing.
3) If a hazardous condition does exist near the trail, signs should be developed to warn trail users of the hazard if it cannot be mitigated.

Of particular concern to adjacent landowners are attractions to children that may be dangerous, such as a pond. Many states recognize that children may trespass to explore an attractive nuisance. These states require a legal responsibility to children, even as trespassers, that is greater than the duty of care owed to adults (BCEMC 1997, p.58).

If a landowner provides an easement for a public-use-trail, the easement contract should specify that the managing agency will carry liability insurance, will design the trail to recognized standards and will develop and carry out a maintenance plan. The landowner may also request that an indemnification agreement be created in their favor.

Abutting property owners frequently express concerns about their liability to trail users. In general, their liability, if any, is limited and is defined by their own actions in relation to the trail. If an abutting property owner possesses no interest in the trail, then he or she does not have any right or obligation to warn trail users about defects in the trail unless the landowner creates a dangerous condition on the trail by his own act or omission. In that event, the abutting landowner would be responsible for his own acts or omissions that caused the injury to a third party using the trail, just as the operator of one car is responsible to the operator of another for an accident he caused on a city street (Montange 1989, p. 127).

Forms of Protection

There are three legal precepts, either alone or in combination that define and in many cases limit liability for injury resulting from trail use. The first is the concept of duty of care, which speaks to the responsibility that a landowner (private or public) has to anyone on his or her land. Second is the Recreational Use Statute (RUS), which is available in all 50 states and provides protection to private landowners and some public landowners who allow public free access to land for recreational purposes. For those public entities not covered by a RUS, states tend to have a tort claims act, which defines and limits governmental liability. Third, for all private and public parties, liability insurance provides the final line of defense. Trail owners can also find much protection through risk management.

Duty of Care

Tort law, with regard to finding fault for an incident that occurs in a particular location is concerned with the "class" of person who incurs the injury, and the legal duty of care that a landowner owes a member of the general public varies from state to state but is generally divided into four categories. In most states, a landowner's responsibility for injuries depends on the status of the injured person. A landowner owes increasingly greater duties of care (i.e.; is more at risk) if the injured person is a "trespasser", a "licensee", an "invitee", or a "child".

Trespasser -- a person on land without the landowner's permission, whether intentionally or by mistaken belief that they are on public land. Trespassers are due the least duty of care and therefore pose the lowest level of liability risk. The

landowner is generally not responsible for unsafe conditions. The landowner can only be held liable for deliberate or reckless misconduct, such as putting up a trip wire. Adjacent landowners are unlikely to be held liable for injuries sustained by trespassers on their property.

Licensee -- a person on land with the owner's permission but only for the visitor's benefit. This situation creates a slightly higher liability for the landowner. For example, a person who is permitted to hunt on a farm without paying a fee, if there were no RUS, would be classified as a licensee. If the landowner charged a fee, the hunter would probably be classified as an invitee. Again, the landowner is not responsible for discovering unsafe conditions; however, the landowner must provide warning of the known unsafe conditions.

Invitee -- a person on the owner's land with the owner's permission, expressly or implied, for the owner's benefit, such as a paying customer. This is the highest level of responsibility and therefore carries the highest level of liability. The owner is responsible for unknown dangers that should have been discovered. Put in a different way, the landowner has a duty to:

1) Inspect the property and facilities to discover hidden dangers;
2) Remove the hidden dangers or warn the user of their presence;
3) Keep the property and facilities in reasonably safe repair: and
4) Anticipate foreseeable activities by users and take precautions to protect users from foreseeable dangers.

The landowner does not insure the invitee's safety, but must exercise reasonable care to prevent injury. Generally, the landowner is not liable for injuries caused by known, open, or obvious dangers where there has been an appropriate warning. For example, customers using an ice rink open to the public for a fee would be invitees.

Child -- even if trespassing, some states accord children a higher level of protection. The concept of "attractive nuisance" is particularly relevant to children. Landforms such as ponds can be attractive to children who, unaware of potential danger, may be injured if they explore such items.

Prior to the widespread adoption of RUS' by the states (see discussion below), this classification system defined the liability of adjacent landowners. Even now, trail managers or private landowners who charge a fee are at greater risk of liability because they owe the payee a greater responsibility to provide a safe experience.

Thus, where no RUS exists or is unavailable, trail users would be of the licensee class, provided the trail manager does not charge an access fee. If a trail manager charges a fee, the facility provider tends to owe a greater duty of care to the user and thus has a greater risk of liability if a trail user is injured due to a condition of the trail.

Recreational Use Statutes (RUS)

The Council of State Governments produced a model recreational use statute (RUS) in 1965 in an effort to encourage private landowners to open their land for public recreational use by limiting the landowner's liability for recreational injuries when access was provided without charge (Kozlowski, p. V1D1).

Recreational use statutes are now on the books in all 50 states. These state laws provide protection to landowners who allow the public to use their land for recreational purposes. The theory behind these statutes is that if landowners are protected from liability they would be more likely to open up their land for public recreational use and that, in turn, would reduce state expenditures to provide such areas. To recover damages, an injured person must prove "willful and wanton misconduct" on the part of the landowner, essentially the same duty of care owned to a trespasser. However, if the landowner is charging a fee for access to the property, the protection offered by the recreational use statue is lost in most states.

The preamble of the model RUS is clear that it was designed for private landowners but the actual language of the model legislation does not differentiate between private and public landowners. The result is that while some states have followed the intent of the model statute and limited the immunity to private landowners, other states have extended the immunity either to cover public landowners legislatively or judicially (Goldstein 1997, p. 788).

Under the Federal Tort Claims Act, the federal government is liable for negligence like a private landowner under the law of the state. As a result, RUS's intended for private individuals have been held applicable to the federal government where it has opened land up for public recreation (Kozlowski, p. V1D1).

Under lease arrangements between a public agency and a private landowner, land can be provided for public recreation while the public agency agrees to defend and protect the private landowner. The private landowner may still be sued but the public agency holds the landowner harmless, taking responsibilities for the cost of defending a lawsuit and any resulting judgments (Kozlowski, p. V1D2).

While state RUS's and the court interpretations of these laws vary somewhat, a few common themes can be found. The statues were created to encourage landowners to make their land available for public recreation purposes by limiting their liability provided they do not charge a fee. The RUS limits the duty of care a landowner would otherwise owe to a recreational licensee to keep his or her premises safe for use. It also limits a landowner's duty to warn of dangerous conditions provided such failure to warn is not considered grossly negligent, willful, wanton, or reckless. The result of many of these statues is to limit landowner liability for injuries experienced by people partaking in recreational activities on their land. The existence of a RUS may also have the effect of reducing insurance premiums for landowners whose lands are used for recreation (BCEMC 1997, p. 58).

These laws do not prevent somebody from suing a trail manager/owner or a private property owner who has made his or her land available to the public for recreational use, it only means the suit will not advance in court if certain conditions hold true. Thus, the trail manager/owner may incur costs to defend himself of herself. Such costs are the principal reason for purchasing liability insurance.

Risk Management

All of the above-mentioned forms of protection aside, perhaps the best defense a trail manager has are sound policy and practice for trail maintenance and usage. Developing a comprehensive technique is the best defense against an injury-related lawsuit (BCEMC 1997, p. 60).

Trails that are properly designed and maintained go a long way to ward off any potential liability. There are some general design guidelines (AASHTO and MUTCD) that, if adhered to, can provide protection by showing that conventional standards were used in designing and building the trail. Trails that are designed in accordance with recognized standards or "best practices" may be able to take advantage of any design immunities under state law. Within the spectrum of public facilities, trails are quite safe, often less risky than roads, swimming pools and playgrounds.

The managing agency should also develop a comprehensive maintenance plan that provides for regular maintenance and inspection. These procedures should be spelled out in detail in a trail management handbook and a record should be kept of each inspection including what was discovered and any corrective action taken. The trail manager should attempt to ward off or eliminate any hazardous situations before an injury occurs. Private landowners that provide public easements for a trail should ensure that such management plans are in place and used to reduce their own liability. Key points include (BCEMC 1997, p. 57); (LTA 1991, p. 8).

During trail design and development:

- Develop an inventory of potential hazards along the corridor
- Create a list of users that will be permitted on the trail and the risks associated with each
- Identify all applicable laws
- Design and location of the trail such that obvious dangers are avoided. Warnings of potential hazards should be provided, and mitigated to the extent possible
- Trail design and construction should be completed by persons who are knowledgeable about design guidelines, such as those listed in AASHTO and MUTCD documents
- Trail regulations should be posted and enforced.

Once the trail is open for use:

- Regular inspections of the trail by a qualified person who has the expertise to identify hazardous conditions and maintenance problems.
- Maintenance problems should be corrected quickly and documented. Where a problem cannot be promptly corrected, warnings to trail users should be erected.

- Procedures for handling medical emergencies should be developed. The procedures should be documented as well as any occurrence of medical emergencies.
- Records should be maintained of all inspections, what was found, and what was done about it. Photographs of found hazardous conditions can be useful.

These risk management techniques will not only help to ensure that hazardous conditions are identified and corrected in a timely manner, thereby averting injury to trail users, but will also serve to protect the trail owner and managing agency from liability. Showing that the agency had been acting in a responsible manner can serve as an excellent defense in the event that a lawsuit develops (BCEMC 1997, p. 58).

Managing Special Situations

The following are circumstances that the Rails-to-Trails Conservancy has heard about through numerous conversations with local trail advocates who have expressed concern about situations that might present themselves. For the most part, these situations can be addressed through management techniques.

Hunting adjacent to Trails

Some trails traverse public and/or private land that may at certain periods permit hunting. Such proximity can expose trail users to potential injury. Like pesticide use, hunting tends to take place at limited times during the year. Thus a similar mitigation technique can be used: post signs at the trail heads when hunting season is open. While the landowner may technically be liable for such an incident because it is generally unlawful to conduct a hazardous activity that can migrate into adjacent property, simple warnings to trail users can provide trail mangers with notification of when such activity will occur. Trails can also be closed during specific times of the year to allow hunting to take place unabated.

Use of Volunteers for Trail Work

Trail mangers often use volunteers for routine trail maintenance or even for trail construction. What happens if the volunteer is injured while performing trial-related work? What happens if an action taken by a volunteer leads to an injury of a trail user? First, make sure your insurance covers volunteer workers. Second, the trail manager should be protected from any user injury created by an act of a volunteer provided the act is not one of willful or reckless misconduct. The Federal Volunteer Protection Act of 1997 protects the volunteer worker. This act protects volunteers of nonprofit organizations or governmental entities. The Act states that such volunteers are not liable for harm caused by their acts of commission or omission provided the acts are in good faith.

References:

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4. Ferster, A. and M. Jones. 1996. “Addressing Liability to Rails with Trails.” Rails-to-Trails Conservancy, Washington, D.C.

5. Goldstein, D. 1997. The Recreation Use of Land and Water Act: Lory v. City of Philadelphia.” Duquesne Law Review, Vol. 35, Num. 3, Spring 1997.

6. Kozlowski, J. C. et al._____. “The Supply of Recreational Land and Landowner Liability: Recreational Use Statutes Revisited.”

7. LTA, 1991. “Land Trust Liability and Risk Management.” Exchange: Journal of the Land Trust Alliance. Vol. 10, No. 1.

8. Montange, C., 1989. “Preserving Abandoned Railroad Rights-of-Way for Public Use: A Legal Manual.” Rails-to-Trails Conservancy, Washington, D.C.

9. RTC, 1996. “Acquiring Rail Corridors: A How To Manual.” Edited by Jeff Allen and Tom Iurino, Rails-to-Trails Conservancy in Cooperation with the National Park Service. Washington, D.C.
10. RTC, 2000. “Rails-with-Trails: Design, Management, and Operating Characteristics of 61 Trails Along Active Rail Lines.” Rails-to-Trails Conservancy. Washington, D.C., 2000.

11. TCRP, 1998. “Strategies to Minimize Liability under Federal and State Environmental Laws.” Transit Cooperative Research Program, Legal Research Digest. Transportation Research Board, National Research Council, Washington, D.C.

5.4 Segment Cut Sheets and Cost Estimates

Some of the recommended trails from Chapter 4 are broken down into twenty project ‘cut sheets’ on the following pages. The trails selected for the cut sheets represent the MST mainline along the Neuse River, with two trails connecting to Clayton and Smithfield (Sam’s Branch Greenway and Buffalo Creek Greenway, respectively). In addition to the trail routing, the cut sheets also contain the following elements:

- A 150’ Buffer For Trail Routing
- The Neuse River
- Tributaries
- 10’ Contours
- The Nuese River Floodway
- The 100 Year Floodplain
- Marsh (from Johnston County Land Cover GIS Data)
- Stream Crossing Points along Nuese for the MST
- Parcels and North Carolina Parcel Pin Numbers
- Zoning and Land Use Information

The zoning code labels shown on the cut sheets (for example, PUD, AR, etc.) are each defined in the tables on pages 71-72.

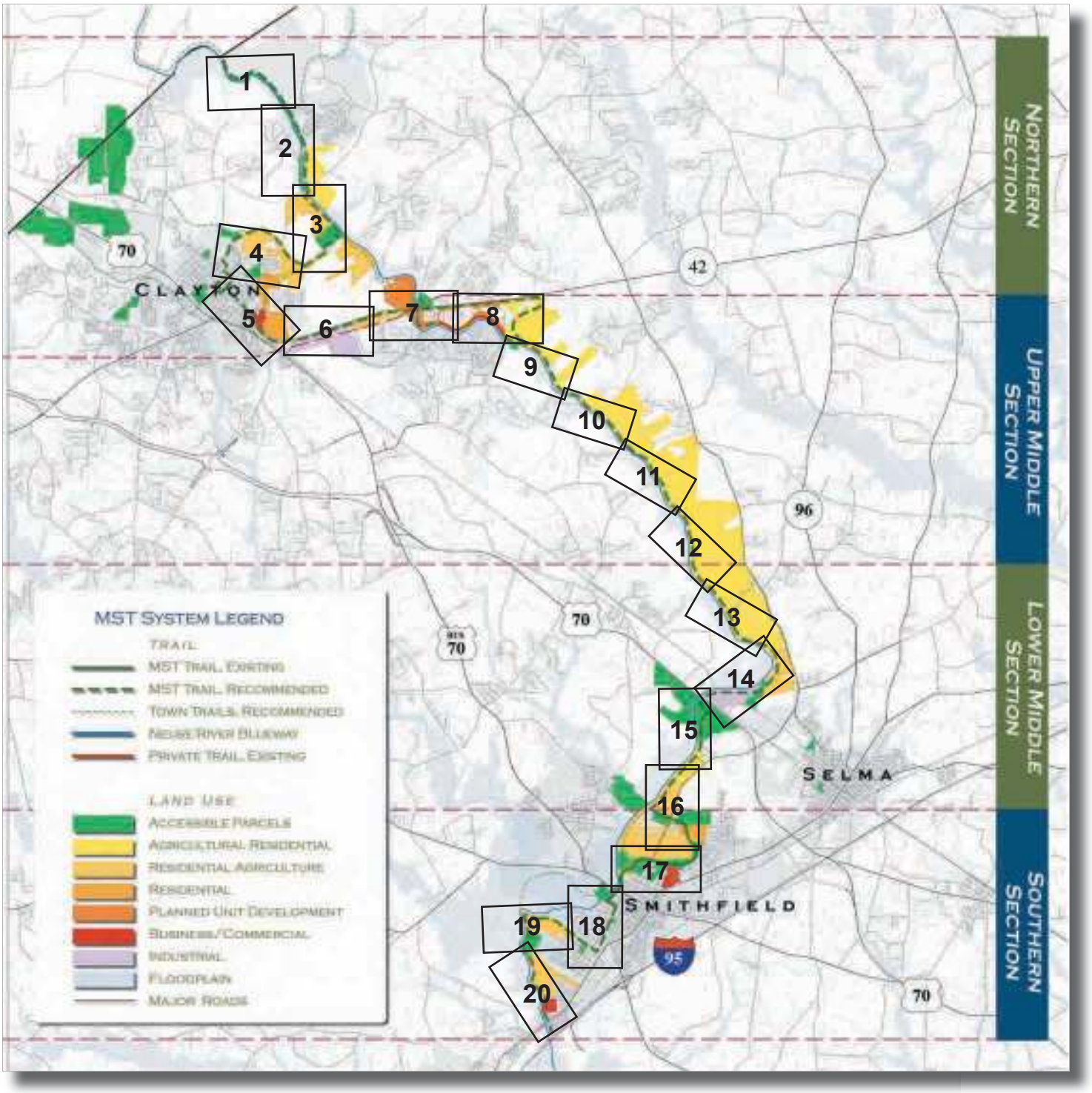
A cost estimate table is provided for each segment. The costs that are outlined include the following categories: demolition, off-road facilities, on-road facilities, utilities, signage, and site amenities. Estimates were gathered from many sources, including recent trail-building efforts, local sales representatives, and review by NCDOT engineers. A summary of the estimates is provided on pages 38-39.

These cut sheets can be used as an implementation tool for Johnston County, the Town of Clayton, and the Town of Smithfield to identify portions of the trail that they feel are buildable and manageable, segment by segment. The cost of land was not included in these estimates since there are many alternatives to buying the land outright (as discussed earlier in this chapter), any of which would off-set a land price estimate by widely varying degrees. However, the average cost of land required for each segment can be determined by using the average cost of land in Johnston County ($12,000 per acre in 2006; see page 39).

Zoning Codes	Definitions
Johnston County	
AR	Agricultural and Residential. This includes houses, churches, etc. With a special use permit, uses can include kennels, day cares, community centers, etc.
RR	Resort/Residential. Campgrounds, stables, marinas, etc.
R-MHP	Residential-Mobile Home Parks.
OI	Office and Institutional. Hospitals, doctor's offices, banks, libraries, etc.
GB	General Business. Hotels, gas stations, lumber yards, auto repair, restaurants, etc.
CB	Community Business. Churches, restaurants, day care, convenience stores, etc.
I-1	Light Industrial. Boat sales, cabinet shops, lumber yards, electronics manufacturing, pharmeceutical manufacturing, industrial supply sales and service, etc.
I-2	Heavy Industrial. Auto repair garages, junk yards, sawmills, concrete plants, milling operations, etc.
PUD	Planned Unit Development. Comprehensively planned communities where some light business is to be expected as part of the development.
IHI	Interstate Highway Interchange. Uses commonly found at the interchange of interstates. These include restaurants, gas stations, grocery stores, hotels, offices, etc.
AR/R-40	Residential and Agricultural. Utilize well and septic systems. Includes churches, home businesses, etc. Minimum lot size is 40,000 sq ft.
R-30	Single family residential utilizing some form of public water. Minimum lot size is 30,000 sq ft.
R-20	Single family residential utilizing some form of public water. Minimum lot size is 20,000 sq ft.
R-10	Single and multifamily residential, utilizing public water and sewer. Density max 4 per acre. Minimum lot size is 10,000 sq ft.
R&R	Resort/Residential. Campgrounds, stables, marinas, etc.
O&I	Office and Institutional. Hospitals, doctor's offices, banks, libraries, etc.
HB-4	Highway Business. Gas Stations, car lots, restaurants, etc.
SC-3	Shopping Center.
CB-2	Community Business. New and used auto parts, day care, industrial equipment sales, etc.
GB-1	General Business. Bascially any business, excluding industrial uses.
I-1	Light Industrial. Boat sales, cabinet shops, lumber yards, electronics manufacturing, pharmeceutical manufacturing, industrial supply sales and service, etc.
I-2	Heavy Industrial. Auto repair garages, junk yards, sawmills, concrete plants, milling operations, etc.
CLD	County Landfill.
IHD	Interstate Highway. Uses commonly found at the interchange of interstates. Restaurants, gas stations, grocery stores, hotels, offices, etc.
MHPD	Mobile Home Park district. Mobile Home parks.

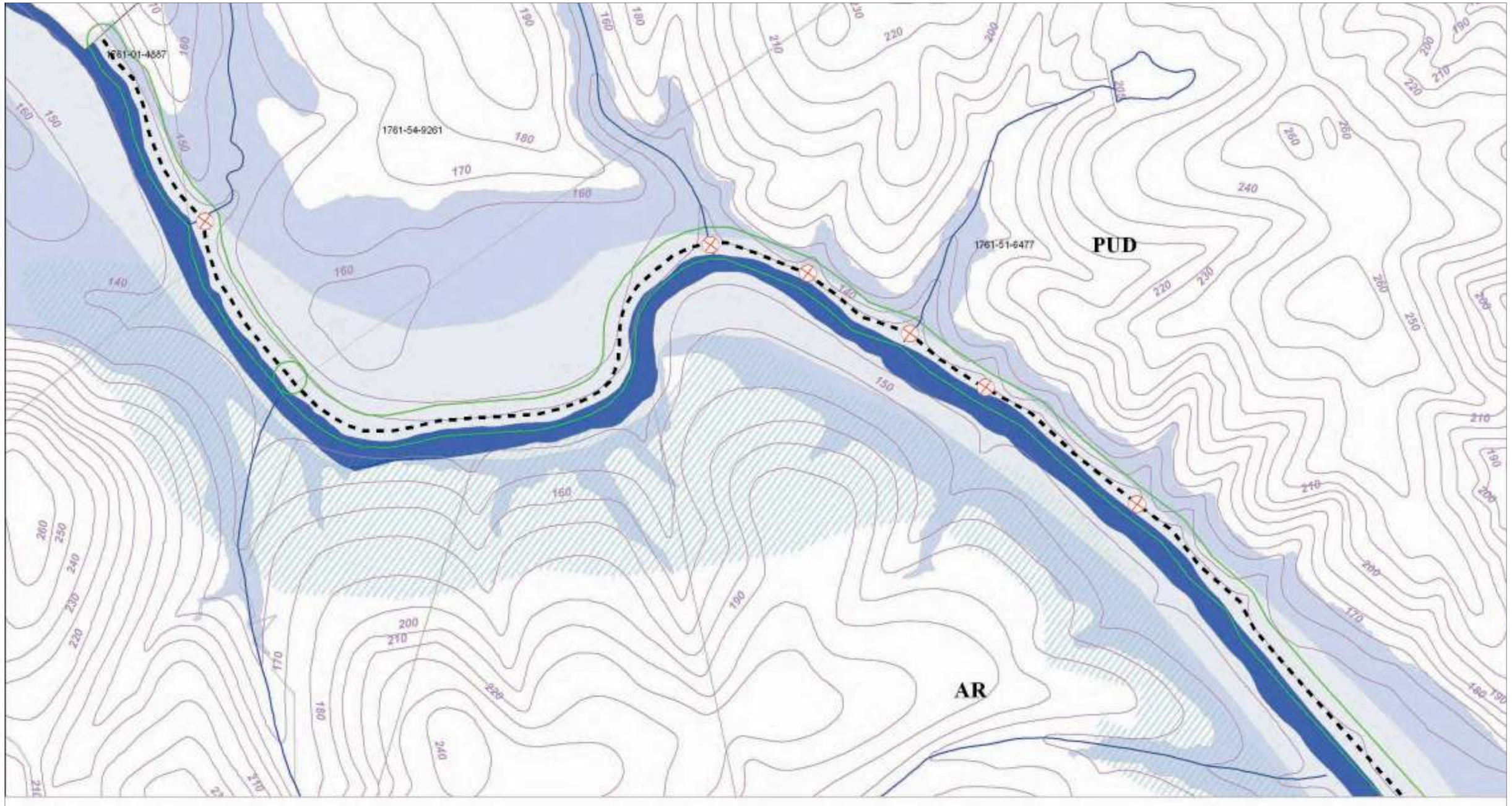
Town of Clayton	
AR/R-40/20	Residential District. Principal use is for large lot single family residential development and for agricultural purposes.
R-10	Residential District. Principal use of land is for single family dwellings with adequate lot areas and multi-family dwellings on larger lots to ensure adequate open space.
R-8	Principal use of for single family residences with adequate lot areas to ensure relatively low density development in the district.
R-6	Residential District. Principal use of the land is for single family and multi-family residences in relatively high density neighborhoods.
O-I	Office and Institutional District. Established primarily for the development of offices and institutions which have similar development characteristics and require locations close to the more intensive commercial districts.
B-1	Central Business District. Permits concentrated development of permitted uses within the existing central business area of town.
B-2	Neighborhood Business District. Principal use of land is to provide for the retailing of goods and services to the adjacent residential neighborhood.
B-3	Highway Business District: Established for the development of offices, service uses, and business retailing durable and convenience goods for the community as a whole. These districts shall be restricted to areas located on major radial highways.
I-1	Industrial District. Principal use of land is for industries which can be operated in a relatively clean and quiet manner and which will not be obnoxious to nearby residential or business districts, warehousing and wholesaling activities, and research facilities. Regulations are intended to prohibit the use of land for industries that by their nature, may create some nuisance to surrounding properties.
I-2	Industrial District. Primary use of land is for heavy industries that by their nature may create some nuisance and which are not properly associated with nor compatible with residential, commercial, and service establishments.
MU-PD	Mixed Use Planned Development District. This includes some commercial uses, residential uses, and other uses within the same parcel of land.
Town of Smithfield	
R-20A	Residential-Agricultural. Provides for areas where the principal use of land is for low density residential and agricultural purposes.
R-10	Single Family Residential. Provides areas for conventional single-family neighborhoods.
R-8	Single, Two, and Multi-Family Residential. Provides areas where a mixture of housing types are allowed, some as permitted and others as conditional or special uses, with proper review, site planning, and designed controls. Planned unit developments are allowed in R-8 districts.
R-6	High Density Single, Two, and Multi-family Residential. Provides for older areas which have developed with a mixture of housing types at fairly high densities. Except in unusual circumstances, it will not be used in new areas, and additional property will not be considered for rezoning to this district.
R-MH	Mobile Home, Residential. Provides areas in which the principal uses of land are single-family dwellings, two family dwellings, and mobile homes on individual lots. Multi-family dwellings and mobile home parks are special uses in this district.
O&I	Office and Institutional. Provides areas for offices, institutional uses, and uses which are compatible with such uses.
B-1	Central Business. Provides for those uses which can provide and contribute to a strong retail and service core for downtown Smithfield.
B-2	General Business District. Provides for those business areas adjacent to the downtown core as well as other intensive and extensive business areas in Smithfield.
B-3	Highway Entranceway Business. Allows commercial uses with proper regulations and safeguards to promote the safe and efficient movement of traffic, and the orderly development of land along major arteries leading into town, while enhancing and preserving the environmental and aesthetic qualities of these areas. The proper location, and development of the uses along these corridors will contribute to and enhance trade, tourism, captial investment, and general welfare.
I	Industrial. Provides areas for those industrial uses which will be compatible with the Smithfield area and will not cause adverse effects for the area or adjacent uses.

MST Segment Locator and Land Use Map



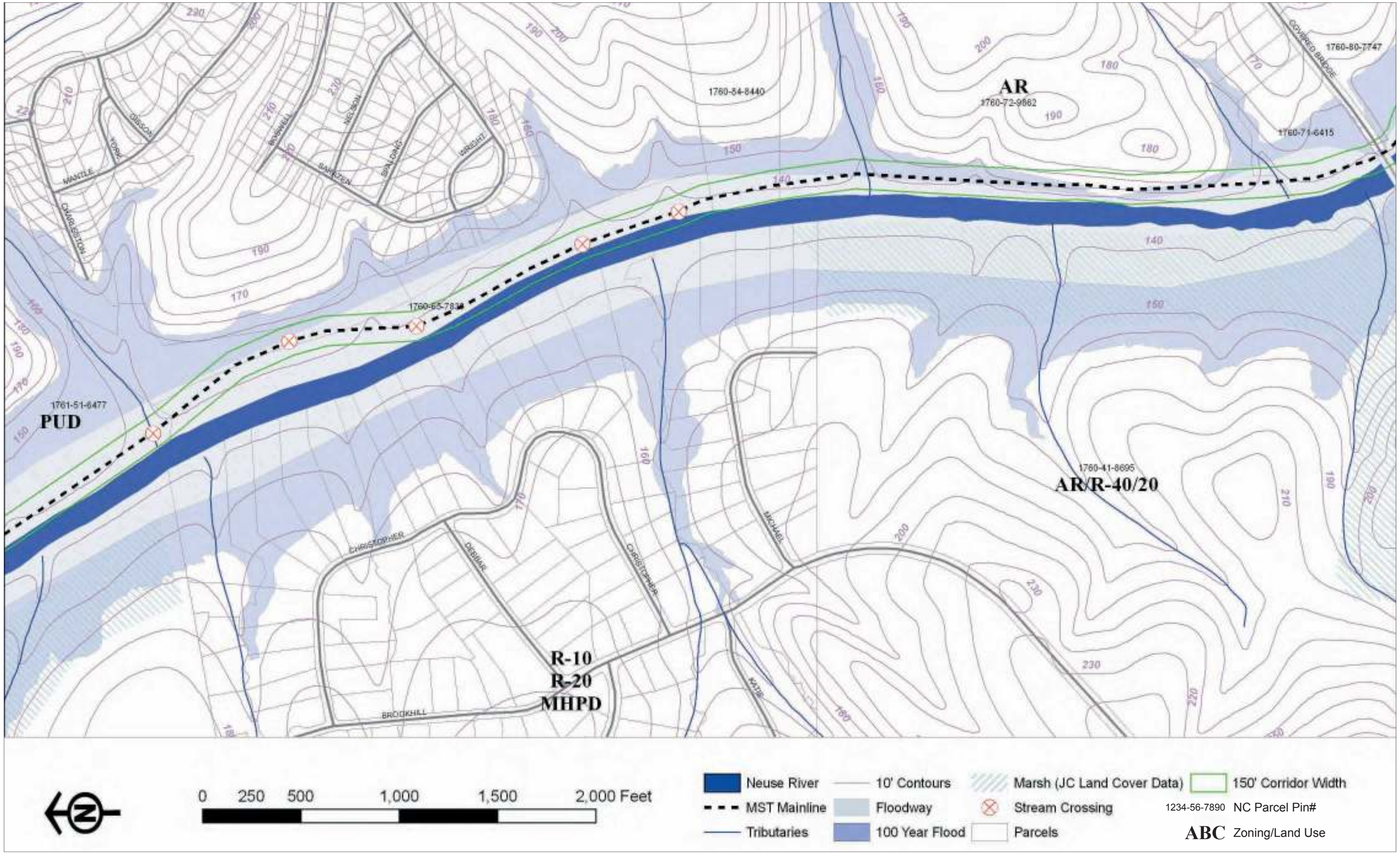
	Segment 1: 8,360 lf (1.58 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	167,200	$0.25	sf	$41,800.00
	Dumping Fees (6% of Demolition total)				$2,508.00
				Demolition Total	**$44,308.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(9,189 lf)*				
1	Temporary tree protection/silt fence	8,360	$4.00	lf	$33,440.00
2	Trail grading (0-5 cu ft/lf)	8,360	$3.00	lf	$25,080.00
3	10' wide multi-use asphalt trail	8,360	$35.00	lf	$292,600.00
4	2' wide gravel shoulder (both sides)	16,720	$6.00	lf	$100,320.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (6)	120	$550.00	lf	$66,000.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	16,720	$0.12	sf	$2,006.40
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	2	$2,500.00	ea	$5,000.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$492,206.40**
	Segment Subtotals				
A	**Demolition**				**$44,308.00**
B	**Off-Road Facility**				**$519,446.40**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$5,000.00**
E	**Signage**				**$400.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$569,954.40**
	Contingency			15%	**$85,493.16**
	SEGMENT TOTAL				**$655,447.56**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 1



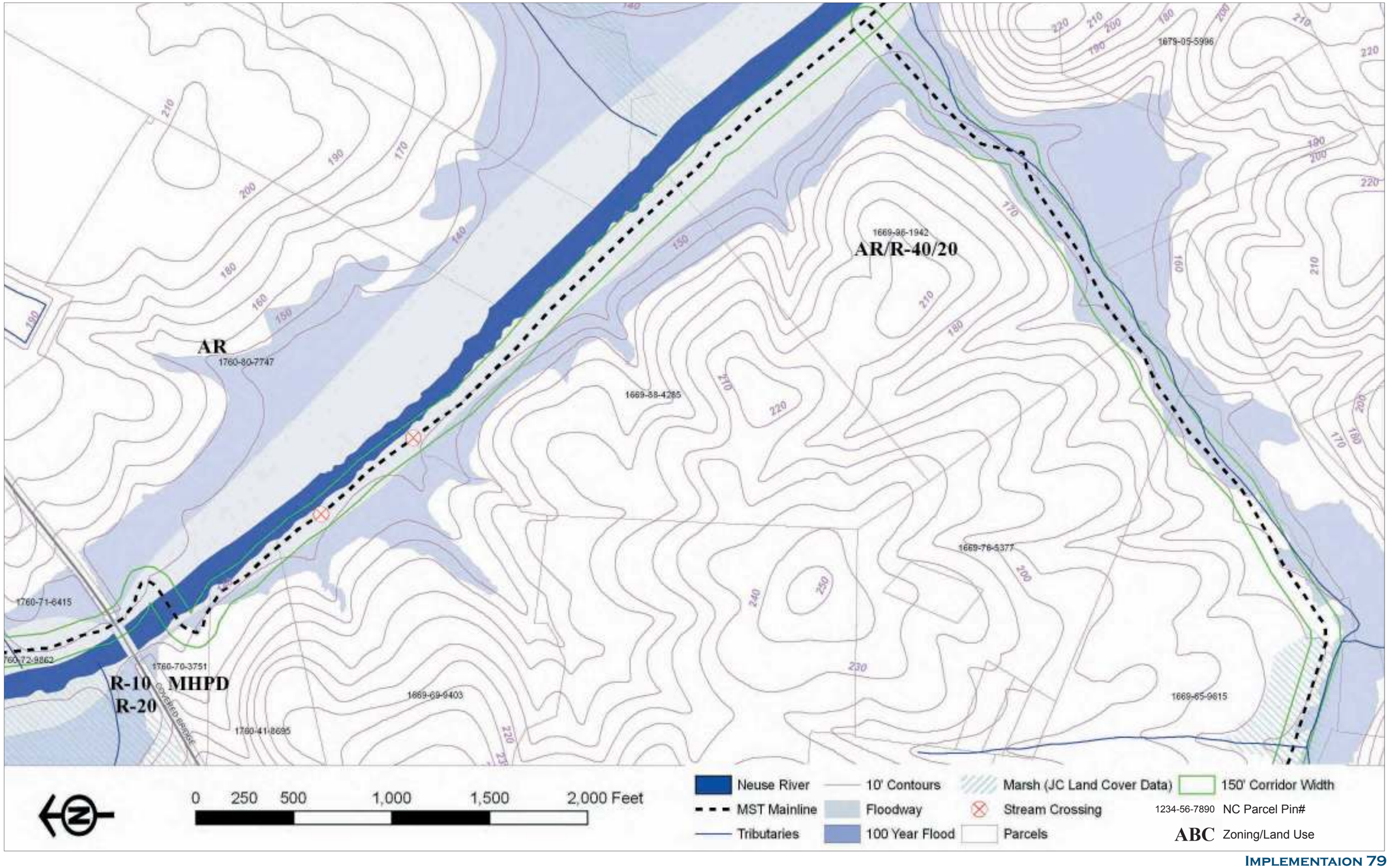
	Segment 2: 7,350 lf (1.39 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)*	78,600	$0.25	sf	$19,650.00
	Dumping Fees (6% of Demolition total)				$1,179.00
				Demolition Total	**$20,829.00**
	**Existing corridor partially cleared*				
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,350 lf)*				
1	Temporary tree protection/silt fence	7,350	$4.00	lf	$29,400.00
2	Trail grading (0-5 cu ft/lf)	7,350	$3.00	lf	$22,050.00
3	10' wide multi-use asphalt trail	7,350	$35.00	lf	$257,250.00
4	2' wide gravel shoulder (both sides)	14,700	$6.00	lf	$88,200.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (5)	150	$550.00	lf	$82,500.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	14,700	$0.12	sf	$1,764.00
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	0	$2,500.00	ea	$0.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	1	$300.00	ea	$300.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$453,264.00**
	Segment Subtotals				
A	**Demolition**				**$20,829.00**
B	**Off-Road Facility**				**$481,164.00**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$0.00**
E	**Signage**				**$700.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$503,493.00**
	Contingency			15%	**$75,523.95**
	SEGMENT TOTAL				**$579,016.95**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 2



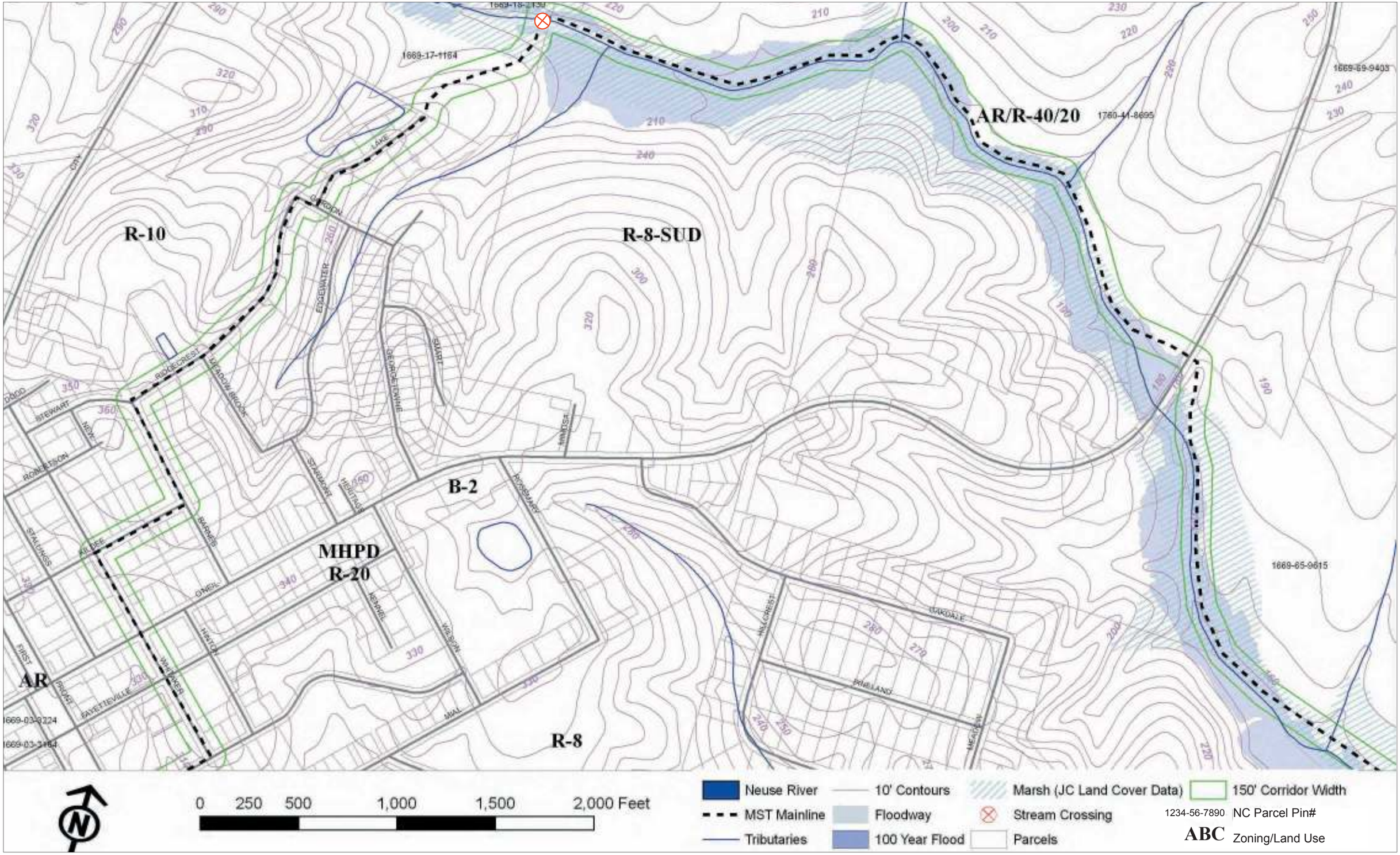
	Segment 3: 9,880 lf (1.87 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)*	49,400	$0.25	sf	$12,350.00
	Dumping Fees (6% of Demolition total)				$741.00
				Demolition Total	**$13,091.00**
	**Existing corridor partially cleared*				
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(9,655 lf)*				
1	Temporary tree protection/silt fence	9,655	$4.00	lf	$38,620.00
2	Trail grading (0-5 cu ft/lf)	9,655	$3.00	lf	$28,965.00
3	10' wide multi-use asphalt trail	9,655	$35.00	lf	$337,925.00
4	2' wide gravel shoulder (both sides)	19,310	$6.00	lf	$115,860.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (2)	32	$550.00	lf	$17,600.00
6.1	Bridge abutments (near Covered Bridge Road)	1	$17,273.00	pair	$17,273.00
6.2	Bridge deck (near Covered Bridge Road)	2,250	$100.00	sf	$225,000.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	19,310	$0.12	sf	$2,317.20
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	3	$5,400.00	ea	$16,200.00
2	Solar powered light pole	3	$1,300.00	ea	$3,900.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	1	$200.00	ea	$200.00
3	Directional signs	2	$200.00	ea	$400.00
4	Educational signs	2	$300.00	ea	$600.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	1	$400.00	ea	$400.00
3	Drinking fountains (with pet fountain)	1	$2,000.00	ea	$2,000.00
4	Picnic tables/ tables	3	$500.00	ea	$1,500.00
5	Trash receptacles (32-gallon, steel)	1	$250.00	ea	$250.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	1	$50,000.00	ea	$50,000.00
				Site Development Total	**$774,490.20**
	Segment Subtotals				
A	**Demolition**				**$13,091.00**
B	**Off-Road Facility**				**$783,560.20**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$22,600.00**
E	**Signage**				**$1,600.00**
F	**Site Amenities**				**$55,350.00**
	SUBTOTAL				**$876,201.20**
	Contingency			15%	**$131,430.18**
	SEGMENT TOTAL**				**$1,007,631.38**
	***Total for this segment includes a bridge over the Neuse River and a major MST trailhead.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 3



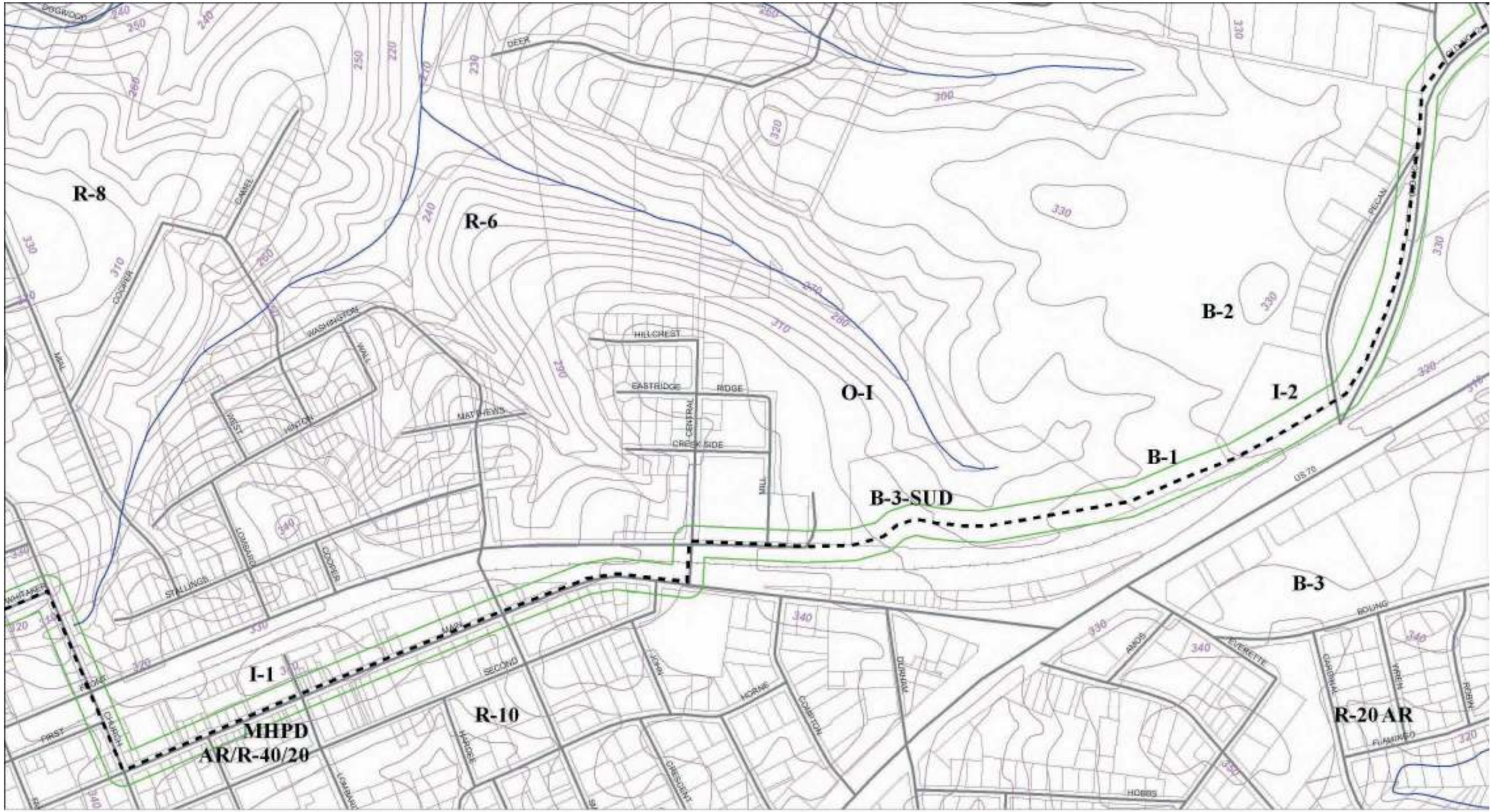
	Segment 4: 11,870 lf (2.25 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	144,800	$0.25	sf	$36,200.00
	Dumping Fees (6% of Demolition total)				$2,172.00
				Demolition Total	**$38,372.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,240 lf)*				
1	Temporary tree protection/silt fence	7,240	$4.00	lf	$28,960.00
2	Trail grading (0-5 cu ft/lf)	7,240	$3.00	lf	$21,720.00
3	10' wide multi-use asphalt trail	7,240	$35.00	lf	$253,400.00
4	2' wide gravel shoulder (both sides)	14,480	$6.00	lf	$86,880.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (1)	15	$550.00	lf	$8,250.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	14,480	$0.12	sf	$1,737.60
C	**On-Road Facility** *(4,630 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	40	$60.00	ea	$2,400.00
2	Crosswalks	3	$500.00	ea	$1,500.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	0	$2,500.00	ea	$0.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	1	$200.00	ea	$200.00
3	Directional signs	5	$200.00	ea	$1,000.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	1	$400.00	ea	$400.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	3	$300.00	ea	$900.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$378,787.60**
	Segment Subtotals				
A	**Demolition**				**$38,372.00**
B	**Off-Road Facility**				**$400,947.60**
C	**On-Road Facility**				**$3,900.00**
D	**Utilities**				**$0.00**
E	**Signage**				**$1,600.00**
F	**Site Amenities**				**$1,300.00**
	SUBTOTAL				**$446,119.60**
	Contingency			15%	**$66,917.94**
	SEGMENT TOTAL				**$513,037.54**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 4



	Segment 5: 9,210 lf (1.74 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)*	33,740	$0.25	sf	$8,435.00
	Dumping Fees (6% of Demolition total)				$506.10
				Demolition Total	**$8,941.10**
	*Existing corridor partially cleared				
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(4,480lf)*				
1	Temporary tree protection/silt fence	4,480	$4.00	lf	$17,920.00
2	Trail grading (0-5 cu ft/lf)	4,480	$3.00	lf	$13,440.00
3	10' wide multi-use asphalt trail	4,480	$35.00	lf	$156,800.00
4	2' wide gravel shoulder (both sides)	8,960	$6.00	lf	$53,760.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (1)	0	$550.00	lf	$0.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	8,960	$0.12	sf	$1,075.20
C	**On-Road Facility** *(4,730 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	46	$60.00	ea	$2,760.00
2	Crosswalks	12	$500.00	ea	$6,000.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	0	$2,500.00	ea	$0.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	8	$200.00	ea	$1,600.00
3	Directional signs	3	$200.00	ea	$600.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	0	$400.00	ea	$0.00
2	Bicycle racks (holds 9 bikes)	2	$400.00	ea	$800.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$237,035.20**
	Segment Subtotals				
A	**Demolition**				**$8,941.10**
B	**Off-Road Facility**				**$242,995.20**
C	**On-Road Facility**				**$8,760.00**
D	**Utilities**				**$0.00**
E	**Signage**				**$2,400.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$263,896.30**
	Contingency			15%	**$39,584.45**
	SEGMENT TOTAL				**$303,480.75**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 5



0 245 490 980 1,470 1,960 Feet

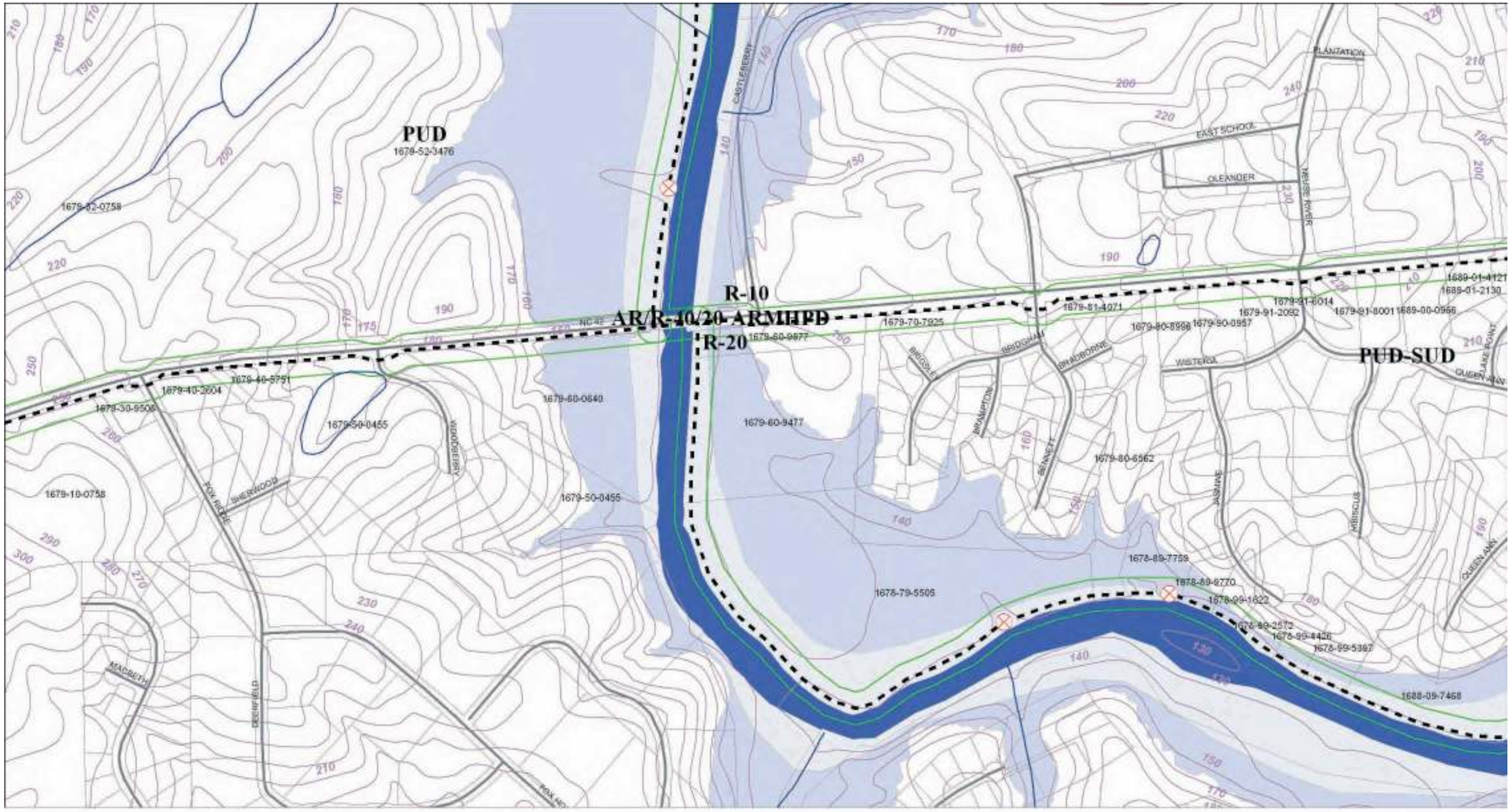
Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Wide Corridor
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

	Segment 6: 7,630 lf (1.45 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)*	107,300	$0.25	sf	$26,825.00
	Dumping Fees (6% of Demolition total)				$1,609.50
				Demolition Total	**$28,434.50**
	*Existing corridor partially cleared				
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,630lf)*				
1	Temporary tree protection/silt fence	7,630	$4.00	lf	$30,520.00
2	Trail grading (0-5 cu ft/lf)	7,630	$3.00	lf	$22,890.00
3	10' wide multi-use asphalt trail	7,630	$35.00	lf	$267,050.00
4	2' wide gravel shoulder (both sides)	15,260	$6.00	lf	$91,560.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (1)	0	$550.00	lf	$0.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	15,260	$0.12	sf	$1,831.20
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	6	$500.00	ea	$3,000.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	2	$200.00	ea	$400.00
3	Directional signs	2	$200.00	ea	$400.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$390,831.20**
	Segment Subtotals				
A	**Demolition**				**$28,434.50**
B	**Off-Road Facility**				**$413,851.20**
C	**On-Road Facility**				**$3,000.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$1,200.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$449,785.70**
	Contingency			15%	**$67,467.86**
	SEGMENT TOTAL				**$517,253.56**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

NORTHERN SECTION: SEGMENT 6

	Segment 7: 11,270 lf (2.13 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)*	201,100	$0.25	sf	$50,275.00
	Dumping Fees (6% of Demolition total)				$3,016.50
				Demolition Total	**$53,291.50**
	*Existing corridor partially cleared				
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(10,920 lf)*				
1	Temporary tree protection/silt fence	10,920	$4.00	lf	$43,680.00
2	Trail grading (0-5 cu ft/lf)	10,920	$3.00	lf	$32,760.00
3	10' wide multi-use asphalt trail	10,920	$35.00	lf	$382,200.00
4	2' wide gravel shoulder (both sides)	21,840	$6.00	lf	$131,040.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (2)	40	$550.00	lf	$22,000.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	21,840	$0.12	sf	$2,620.80
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	6	$500.00	ea	$3,000.00
D	**Utilities**				
1	Solar powered light	3	$5,400.00	ea	$16,200.00
2	Solar powered light pole	3	$1,300.00	ea	$3,900.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	3	$200.00	ea	$600.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	1	$300.00	ea	$300.00
F	**Site Amenities**				
1	Benches	0	$400.00	ea	$0.00
2	Bicycle racks (holds 9 bikes)	1	$400.00	ea	$400.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	2	$500.00	ea	$1,000.00
5	Trash receptacles (32-gallon, steel)	1	$250.00	ea	$250.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	1	$20,000.00	ea	$20,000.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$599,170.80**
	Segment Subtotals				
A	**Demolition**				**$53,291.50**
B	**Off-Road Facility**				**$614,300.80**
C	**On-Road Facility**				**$3,000.00**
D	**Utilities**				**$22,600.00**
E	**Signage**				**$1,300.00**
F	**Site Amenities**				**$21,650.00**
	SUBTOTAL				**$716,142.30**
	Contingency			15%	**$107,421.35**
	SEGMENT TOTAL**				**$823,563.65**
	**This segment includes a minor MST trailhead. $200K of this trail will not need to be implemented if access is granted to the existing adjacent private trail.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

UPPER MIDDLE SECTION: SEGMENT 7

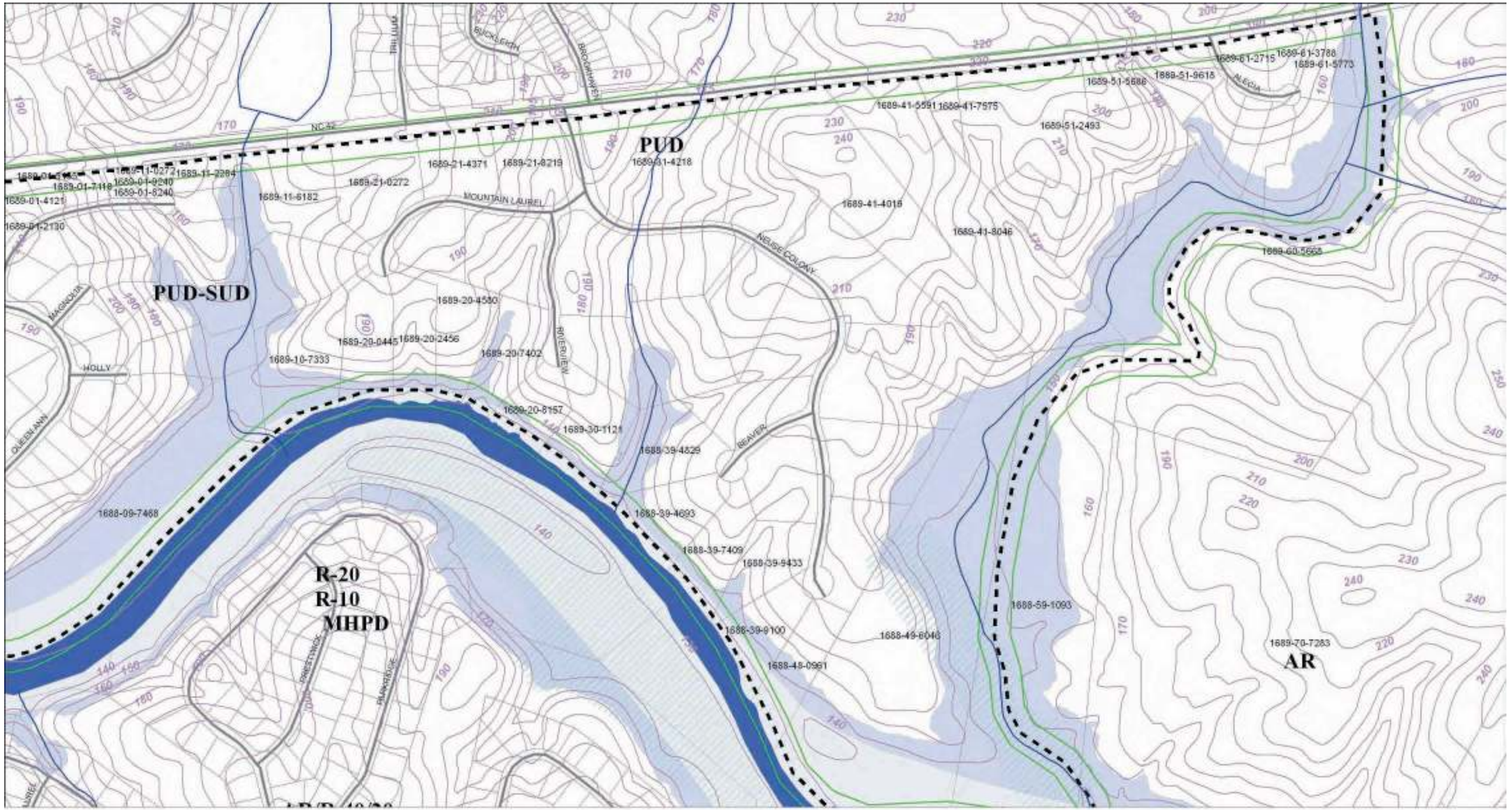


0 250 500 1,000 1,500 2,000 Feet

- Neuse River
- MST Mainline
- Tributaries
- 10' Contours
- Floodway
- 100 Year Flood
- Marsh (JC Land Cover Data)
- Stream Crossing
- Parcels
- 150' Corridor Width
- 1234-56-7890 NC Parcel Pin#
- ABC Zoning/Land Use

	Segment 8: 11,940 lf (2.26 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	238,800	$0.25	sf	$59,700.00
	Dumping Fees (6% of Demolition total)				$3,582.00
				Demolition Total	**$63,282.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(11,940 lf)*				
1	Temporary tree protection/silt fence	11,940	$4.00	lf	$47,760.00
2	Trail grading (0-5 cu ft/lf)	11,940	$3.00	lf	$35,820.00
3	10' wide multi-use asphalt trail	11,940	$35.00	lf	$417,900.00
4	2' wide gravel shoulder (both sides)	23,880	$6.00	lf	$143,280.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (0)	0	$550.00	lf	$0.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	23,880	$0.12	sf	$2,865.60
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	6	$500.00	ea	$3,000.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	3	$300.00	ea	$900.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$608,065.60**
	Segment Subtotals				
A	**Demolition**				**$63,282.00**
B	**Off-Road Facility**				**$647,625.60**
C	**On-Road Facility**				**$3,000.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$600.00**
F	**Site Amenities**				**$2,100.00**
	SUBTOTAL				**$719,107.60**
	Contingency			15%	**$107,866.14**
	SEGMENT TOTAL*				**$826,973.74**
	**This segment will not need to be implemented if access is granted to the existing adjacent private trail.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

UPPER MIDDLE SECTION: SEGMENT 8



	Segment 9: 6,970lf (1.32 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	139,400	$0.25	sf	$34,850.00
	Dumping Fees (6% of Demolition total)				$2,091.00
				Demolition Total	**$36,941.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(6,970 lf)*				
1	Temporary tree protection/silt fence	6,970	$4.00	lf	$27,880.00
2	Trail grading (0-5 cu ft/lf)	6,970	$3.00	lf	$20,910.00
3	10' wide multi-use asphalt trail	6,970	$35.00	lf	$243,950.00
4	2' wide gravel shoulder (both sides)	13,940	$6.00	lf	$83,640.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (4)	130	$550.00	lf	$71,500.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	13,940	$0.12	sf	$1,672.80
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$425,372.80**
	Segment Subtotals				
A	**Demolition**				**$36,941.00**
B	**Off-Road Facility**				**$449,552.80**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$400.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$490,193.80**
	Contingency			15%	**$73,529.07**
	SEGMENT TOTAL				**$563,722.87**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

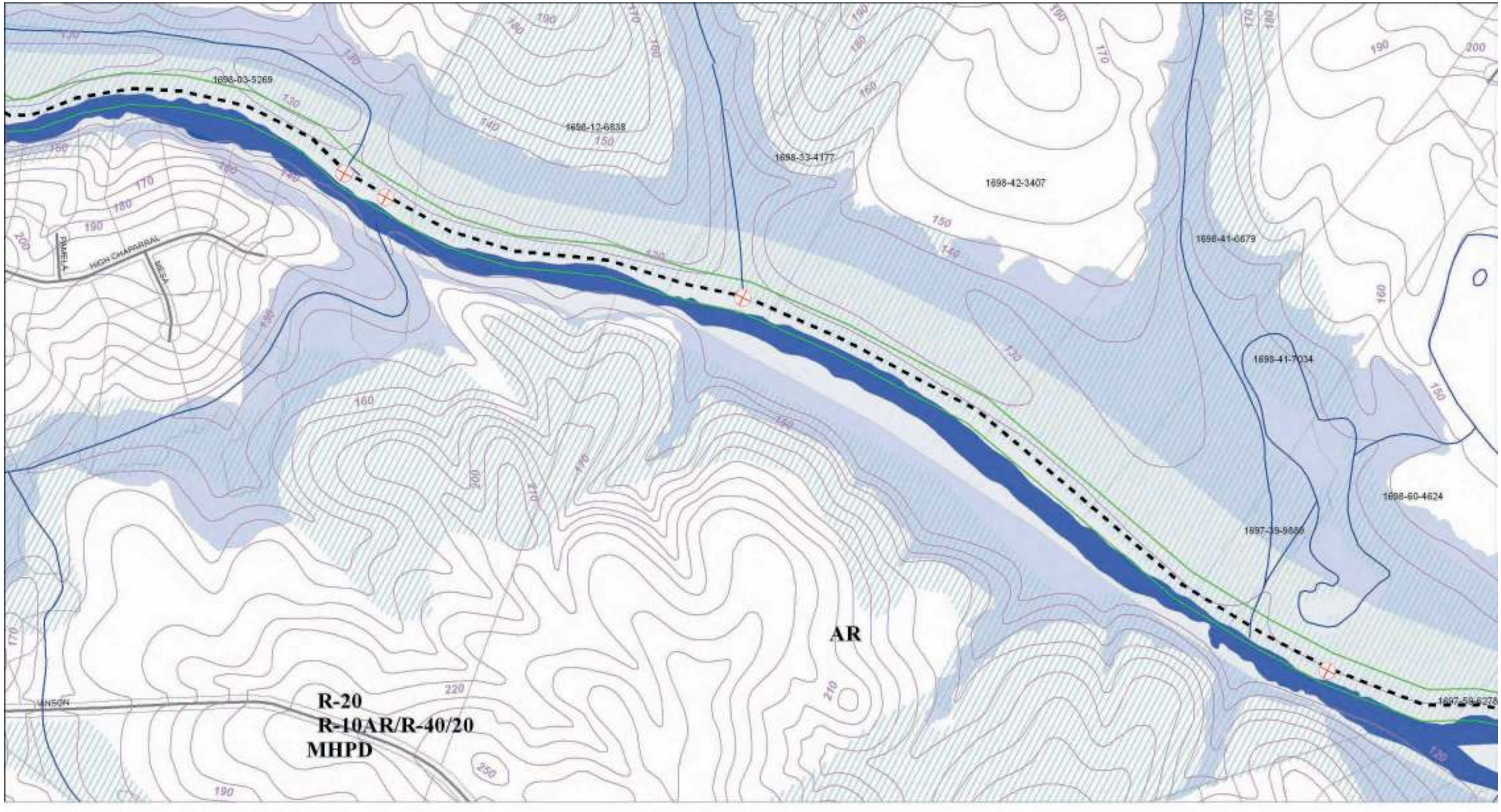
UPPER MIDDLE SECTION: SEGMENT 9

0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

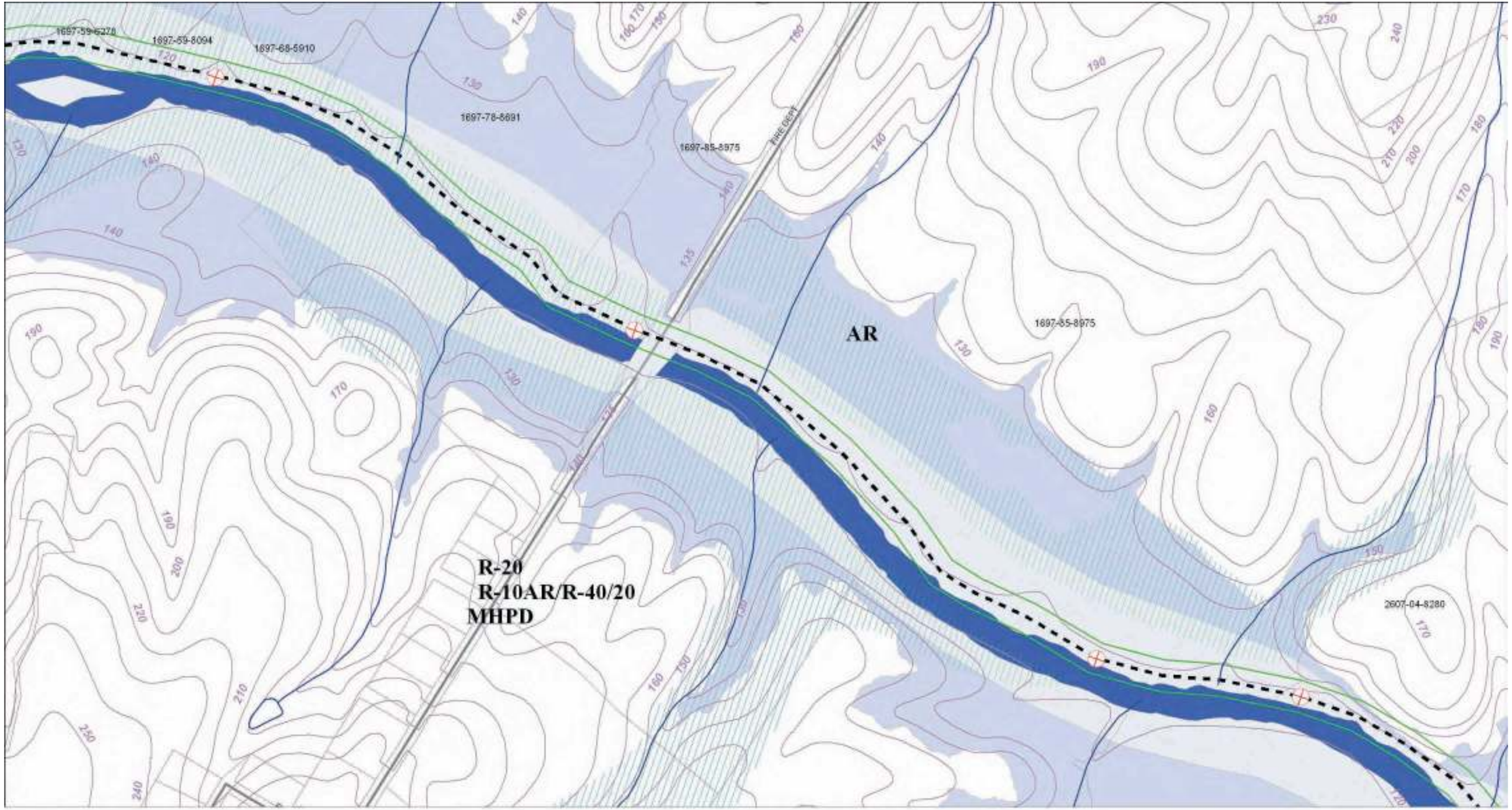
	Segment 10: 7,800 lf (1.48 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	156,000	$0.25	sf	$39,000.00
	Dumping Fees (6% of Demolition total)				$2,340.00
				Demolition Total	**$41,340.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,800 lf)*				
1	Temporary tree protection/silt fence	7,800	$4.00	lf	$31,200.00
2	Trail grading (0-5 cu ft/lf)	7,800	$3.00	lf	$23,400.00
3	10' wide multi-use asphalt trail	7,800	$35.00	lf	$273,000.00
4	2' wide gravel shoulder (both sides)	15,600	$6.00	lf	$93,600.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (3)	70	$550.00	lf	$38,500.00
7	Drainage culverts (36" reinforced concrete pipe)	1	$40.00	lf	$40.00
8	Seeding or mulching trail edges (5' both sides)	15,600	$0.12	sf	$1,872.00
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	0	$200.00	ea	$0.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$434,112.00**
	Segment Subtotals				
A	**Demolition**				**$41,340.00**
B	**Off-Road Facility**				**$461,612.00**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$400.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$506,652.00**
	Contingency			15%	**$75,997.80**
	SEGMENT TOTAL				**$582,649.80**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

UPPER MIDDLE SECTION: SEGMENT 10



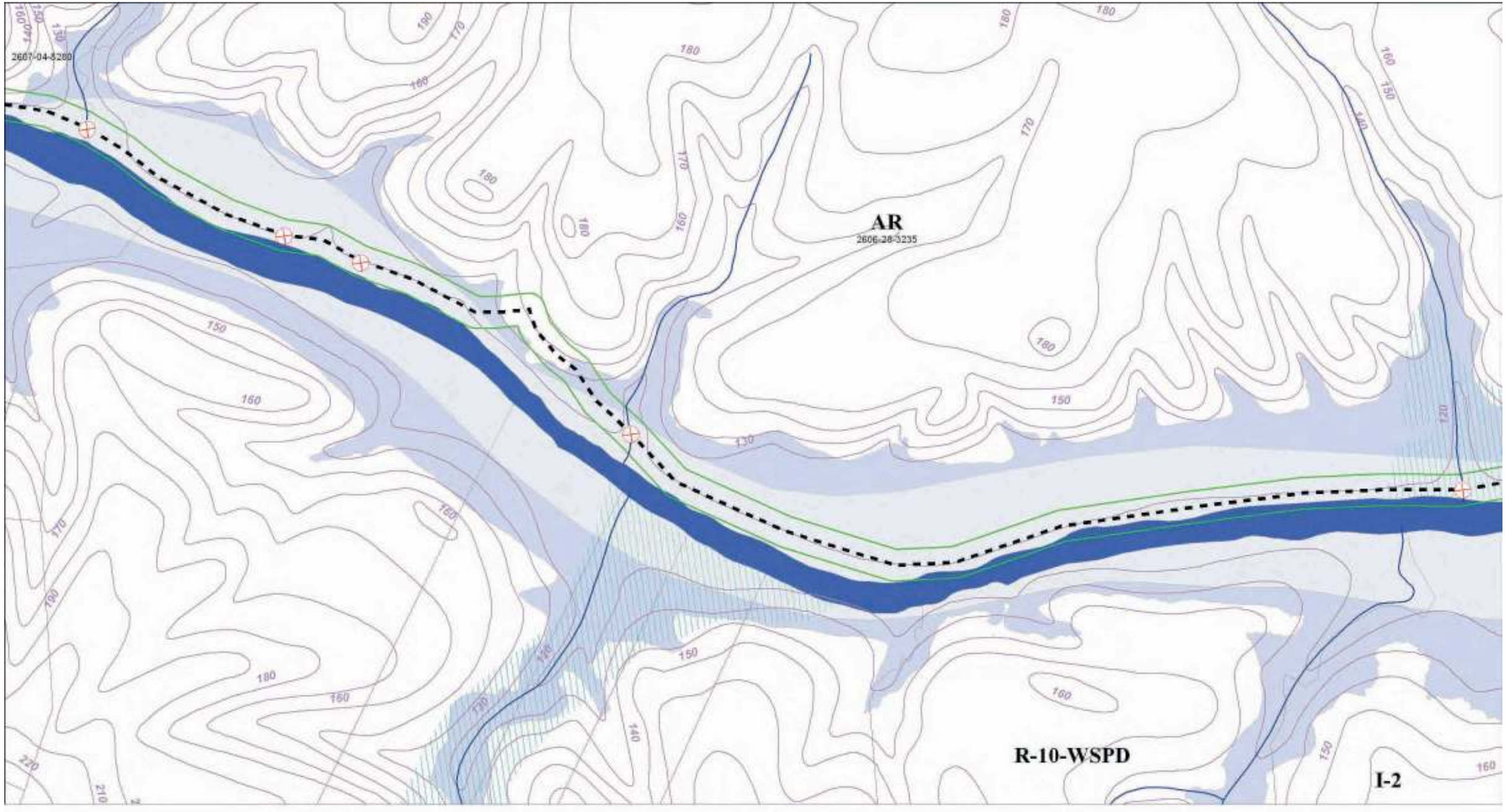
	Segment 11: 7,850 lf (1.49 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	157,000	$0.25	sf	$39,250.00
	Dumping Fees (6% of Demolition total)				$2,355.00
				Demolition Total	**$41,605.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,850 lf)*				
1	Temporary tree protection/silt fence	7,850	$4.00	lf	$31,400.00
2	Trail grading (0-5 cu ft/lf)	7,850	$3.00	lf	$23,550.00
3	10' wide multi-use asphalt trail	7,850	$35.00	lf	$274,750.00
4	2' wide gravel shoulder (both sides)	15,700	$6.00	lf	$94,200.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (4)	67	$550.00	lf	$36,850.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	15,700	$0.12	sf	$1,884.00
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	3	$5,400.00	ea	$16,200.00
2	Solar powered light pole	3	$1,300.00	ea	$3,900.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	1	$200.00	ea	$200.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	1	$300.00	ea	$300.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	1	$2,000.00	ea	$2,000.00
4	Picnic tables/ tables	3	$500.00	ea	$1,500.00
5	Trash receptacles (32-gallon, steel)	1	$250.00	ea	$250.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	1	$20,000.00	ea	$20,000.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$459,284.00**
	Segment Subtotals				
A	**Demolition**				**$41,605.00**
B	**Off-Road Facility**				**$462,634.00**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$22,600.00**
E	**Signage**				**$900.00**
F	**Site Amenities**				**$24,550.00**
	SUBTOTAL				**$552,289.00**
	Contingency			15%	**$82,843.35**
	SEGMENT TOTAL*				**$635,132.35**
	**This segment includes a minor MST trailhead.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes, ***or the access road for the trailhead.***				

UPPER MIDDLE SECTION: SEGMENT 11



	Segment 12: 7,230 lf (1.37 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	144,600	$0.25	sf	$36,150.00
	Dumping Fees (6% of Demolition total)				$2,169.00
				Demolition Total	**$38,319.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,230 lf)*				
1	Temporary tree protection/silt fence	7,230	$4.00	lf	$28,920.00
2	Trail grading (0-5 cu ft/lf)	7,230	$3.00	lf	$21,690.00
3	10' wide multi-use asphalt trail	7,230	$35.00	lf	$253,050.00
4	2' wide gravel shoulder (both sides)	14,460	$6.00	lf	$86,760.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (3)	70	$550.00	lf	$38,500.00
7	Drainage culverts (36" reinforced concrete pipe)	1	$40.00	lf	$40.00
8	Seeding or mulching trail edges (5' both sides)	14,460	$0.12	sf	$1,735.20
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	0	$200.00	ea	$0.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$405,675.20**
	Segment Subtotals				
A	**Demolition**				**$38,319.00**
B	**Off-Road Facility**				**$430,695.20**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$200.00**
F	**Site Amenities**				**$1,200.00**
	SUBTOTAL				**$472,914.20**
	Contingency			15%	**$70,937.13**
	SEGMENT TOTAL				**$543,851.33**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

UPPER MIDDLE SECTION: SEGMENT 12

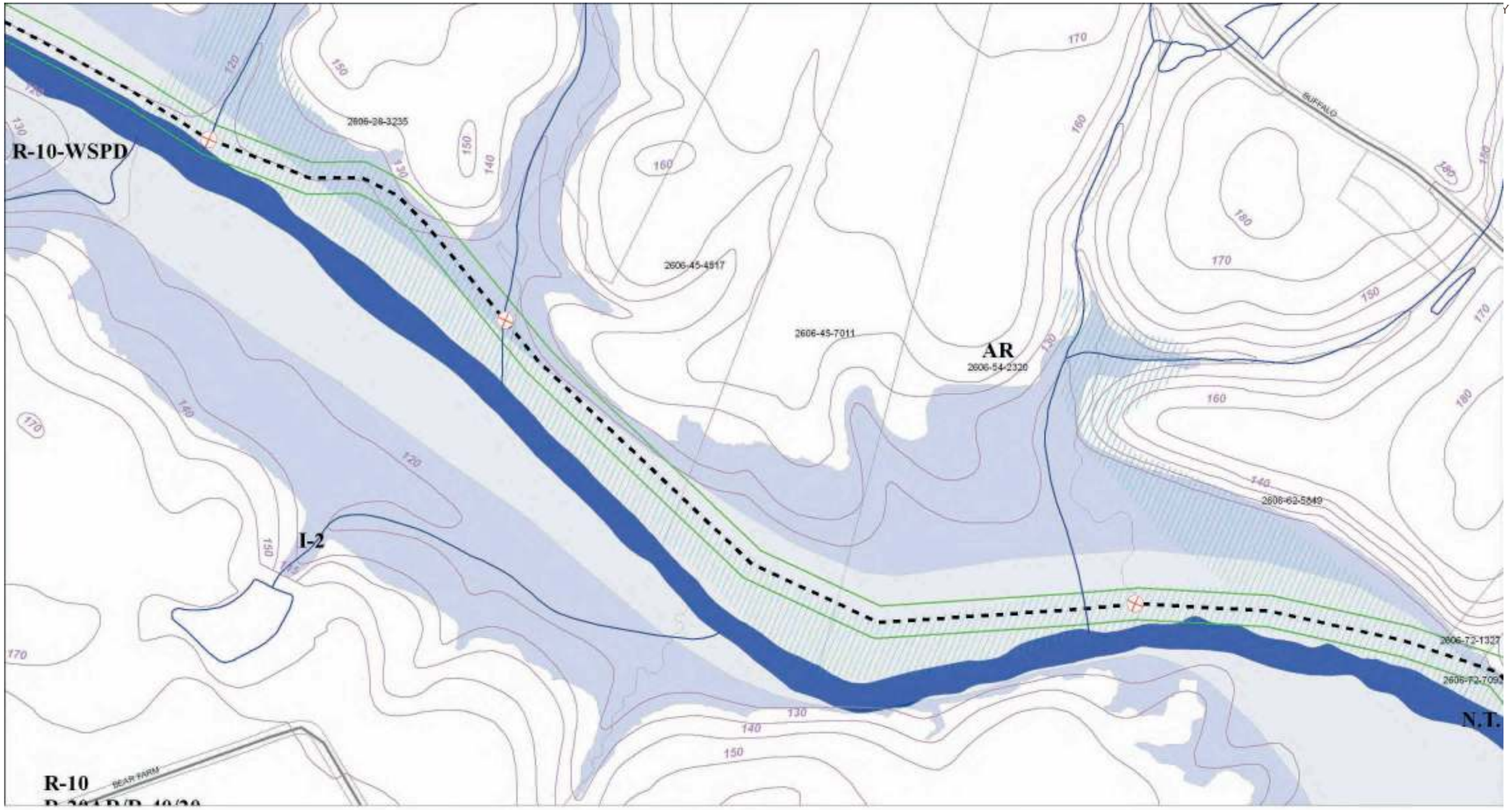


0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

	Segment 13: 6,890 lf (1.30 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	137,800	$0.25	sf	$34,450.00
	Dumping Fees (6% of Demolition total)				$2,067.00
				Demolition Total	**$36,517.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(6,890 lf)*				
1	Temporary tree protection/silt fence	6,890	$4.00	lf	$27,560.00
2	Trail grading (0-5 cu ft/lf)	6,890	$3.00	lf	$20,670.00
3	10' wide multi-use asphalt trail	6,890	$35.00	lf	$241,150.00
4	2' wide gravel shoulder (both sides)	13,780	$6.00	lf	$82,680.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (3)	90	$550.00	lf	$49,500.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	13,780	$0.12	sf	$1,653.60
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	0	$200.00	ea	$0.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$399,153.60**
	Segment Subtotals				
A	**Demolition**				**$36,517.00**
B	**Off-Road Facility**				**$423,213.60**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$200.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$463,230.60**
	Contingency			15%	**$69,484.59**
	SEGMENT TOTAL				**$532,715.19**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

LOWER MIDDLE SECTION: SEGMENT 13

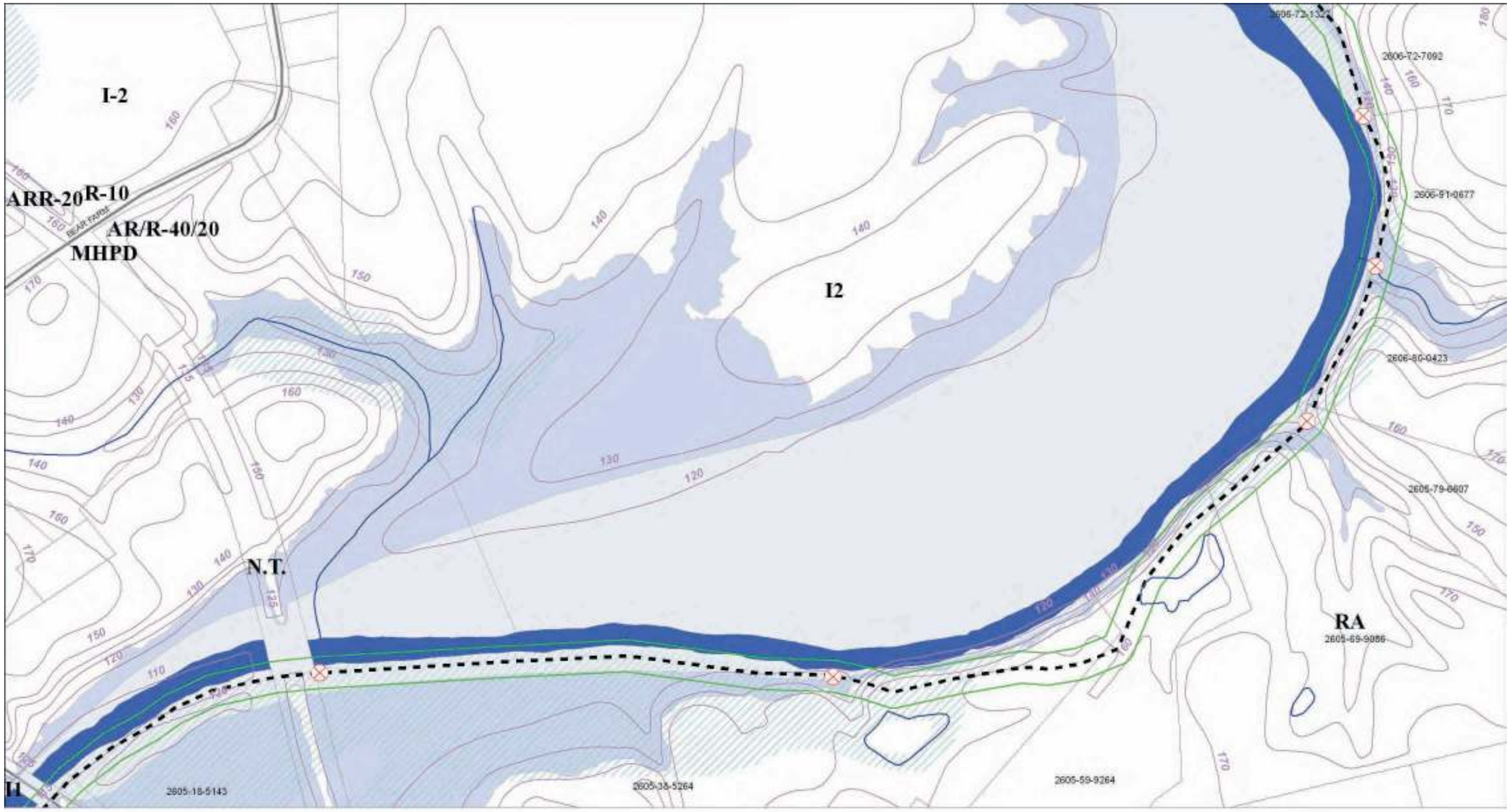


0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

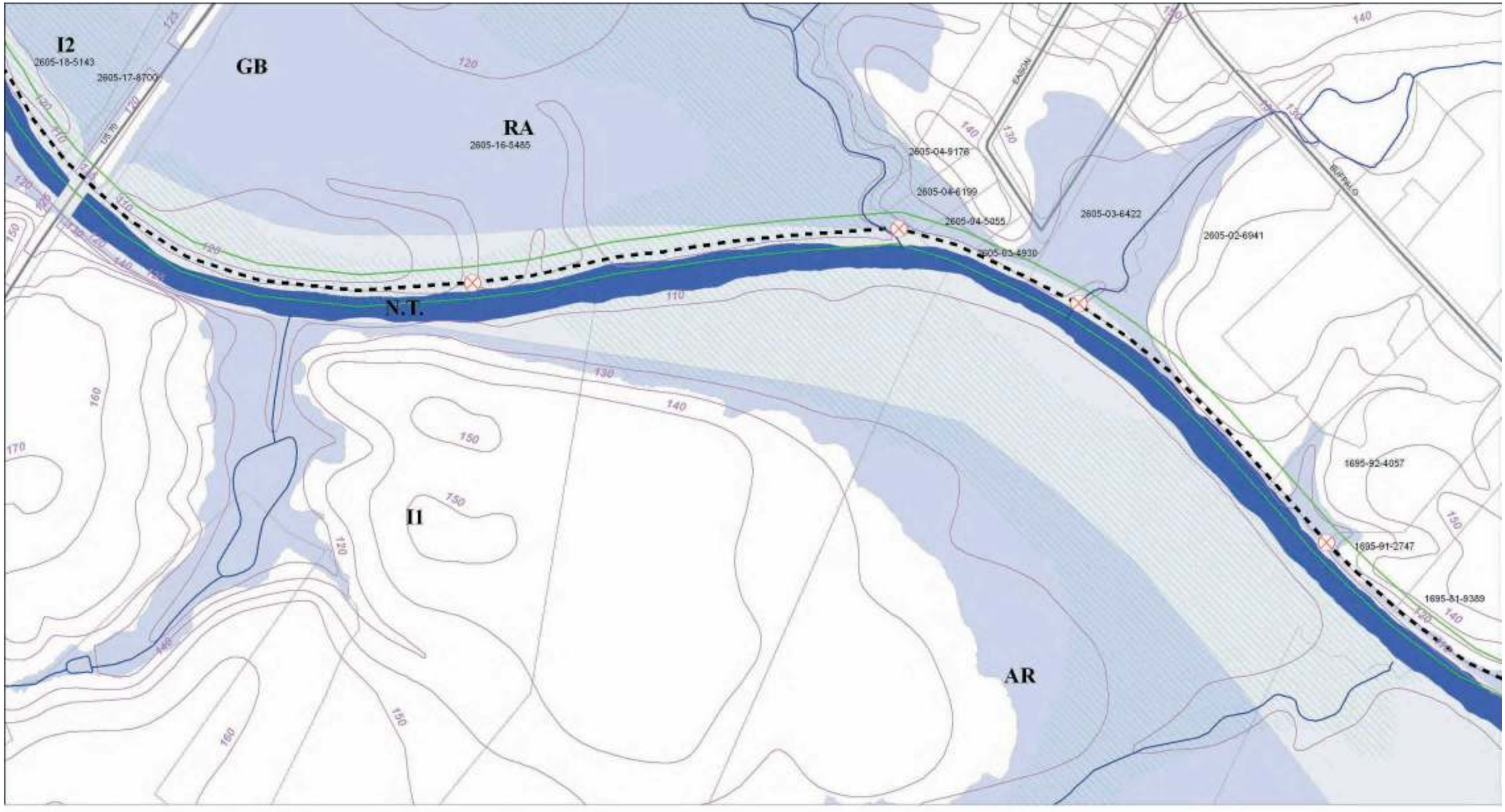
	Segment 14: 8,760 lf (1.66 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	175,200	$0.25	sf	$43,800.00
	Dumping Fees (6% of Demolition total)				$2,628.00
				Demolition Total	**$46,428.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(8,760 lf)*				
1	Temporary tree protection/silt fence	8,760	$4.00	lf	$35,040.00
2	Trail grading (0-5 cu ft/lf)	8,760	$3.00	lf	$26,280.00
3	10' wide multi-use asphalt trail	8,760	$35.00	lf	$306,600.00
4	2' wide gravel shoulder (both sides)	17,520	$6.00	lf	$105,120.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (5)	92	$550.00	lf	$50,600.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	17,520	$0.12	sf	$2,102.40
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	2	$2,500.00	ea	$5,000.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	0	$200.00	ea	$0.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$497,302.40**
	Segment Subtotals				
A	**Demolition**				**$46,428.00**
B	**Off-Road Facility**				**$525,742.40**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$5,000.00**
E	**Signage**				**$400.00**
F	**Site Amenities**				**$1,200.00**
	SUBTOTAL				**$578,770.40**
	Contingency			15%	**$86,815.56**
	SEGMENT TOTAL				**$665,585.96**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

LOWER MIDDLE SECTION: SEGMENT 14



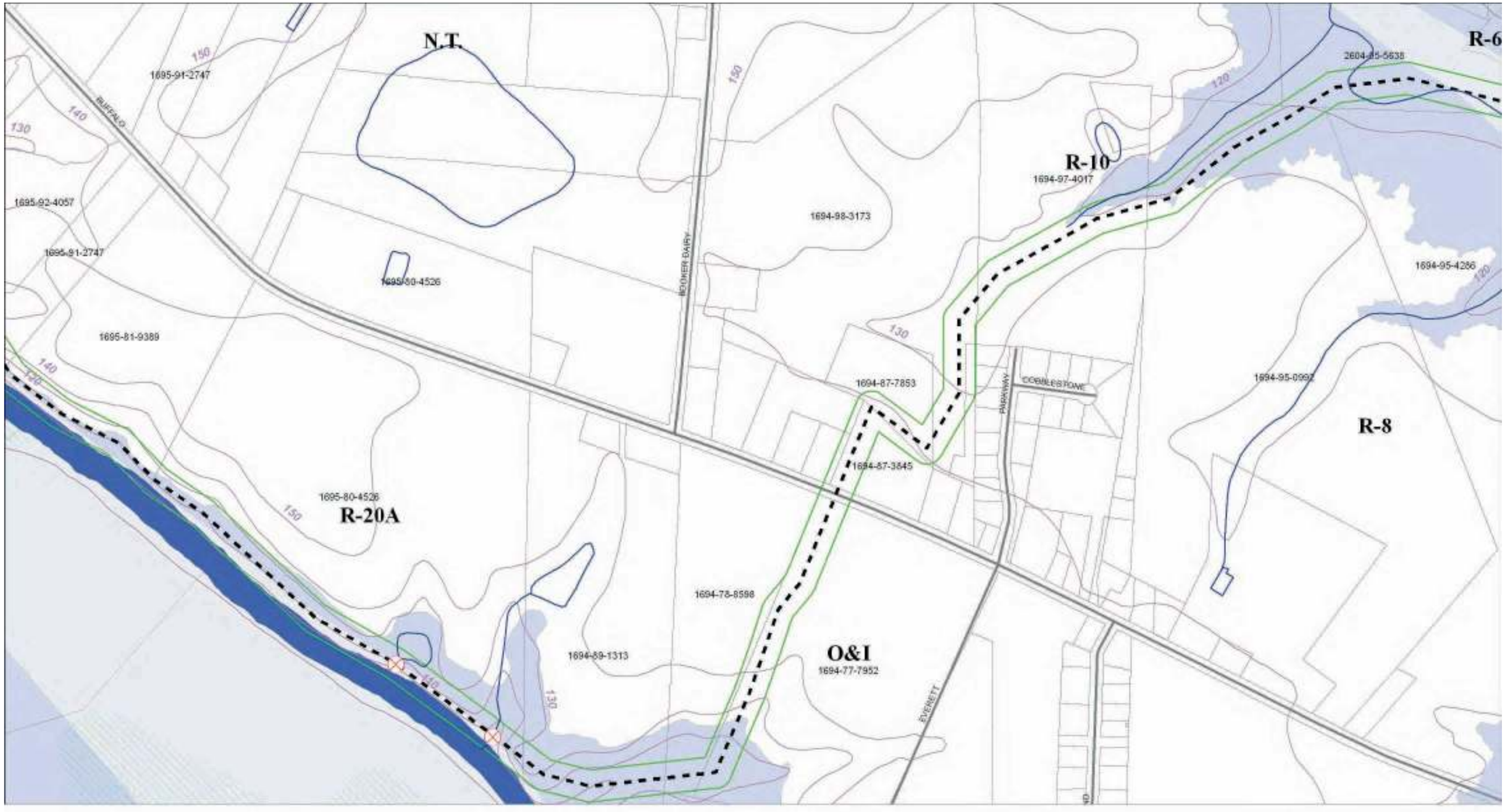
	Segment 15: 7,190 lf (1.36 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	143,800	$0.25	sf	$35,950.00
	Dumping Fees (6% of Demolition total)				$2,157.00
				Demolition Total	**$38,107.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,190 lf)*				
1	Temporary tree protection/silt fence	7,190	$4.00	lf	$28,760.00
2	Trail grading (0-5 cu ft/lf)	7,190	$3.00	lf	$21,570.00
3	10' wide multi-use asphalt trail	7,190	$35.00	lf	$251,650.00
4	2' wide gravel shoulder (both sides)	14,380	$6.00	lf	$86,280.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (4)	97	$550.00	lf	$53,350.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	14,380	$0.12	sf	$1,725.60
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	0	$200.00	ea	$0.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$418,075.60**
	Segment Subtotals				
A	**Demolition**				**$38,107.00**
B	**Off-Road Facility**				**$443,335.60**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$200.00**
F	**Site Amenities**				**$800.00**
	SUBTOTAL				**$484,942.60**
	Contingency			15%	**$72,741.39**
	SEGMENT TOTAL				**$557,683.99**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

LOWER MIDDLE SECTION: SEGMENT 15



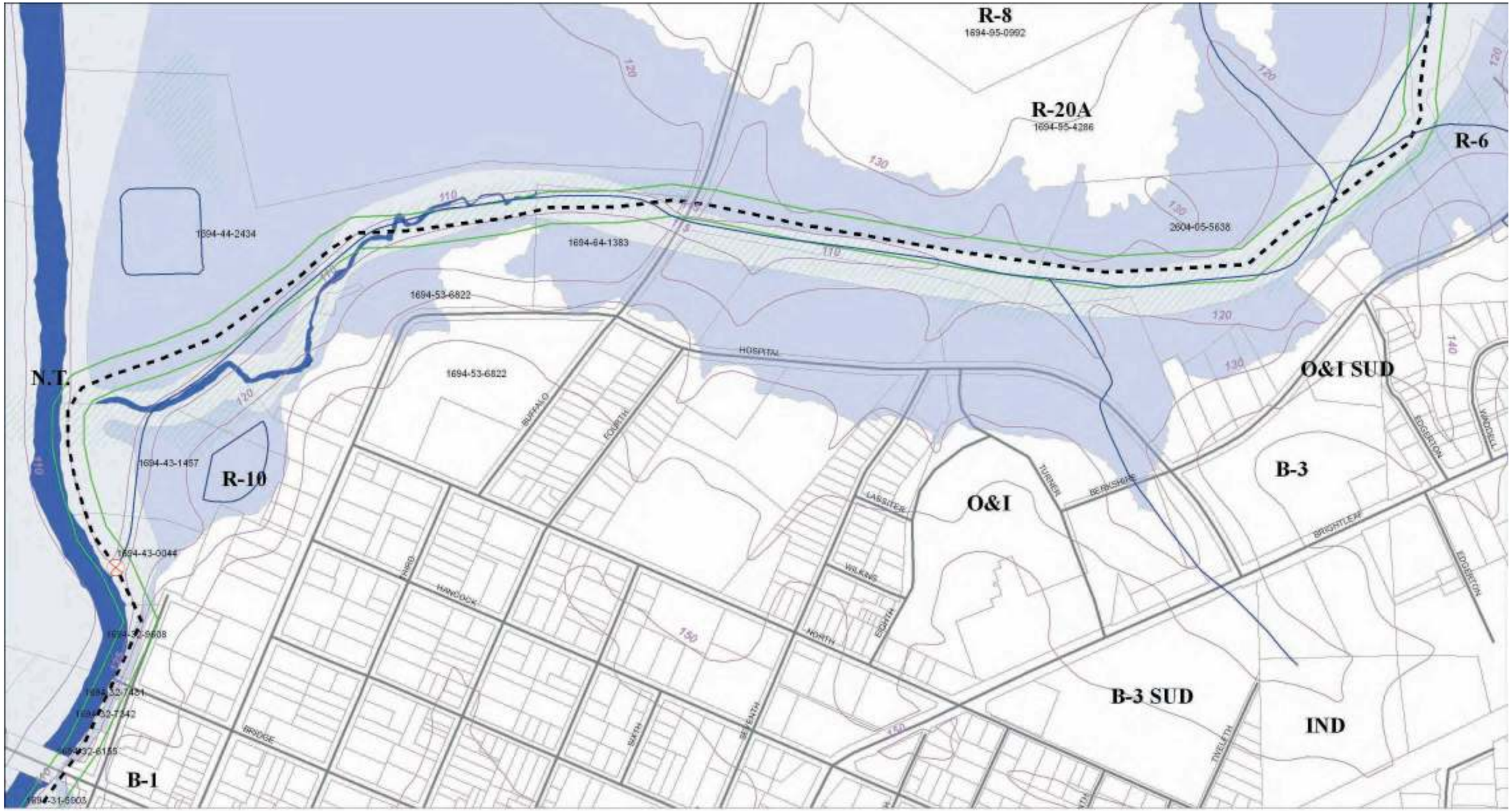
	Segment 16: 5,460 lf (1.03 miles)*				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	109,200	$0.25	sf	$27,300.00
	Dumping Fees (6% of Demolition total)				$1,638.00
				Demolition Total	**$28,938.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(5,460 lf)*				
1	Temporary tree protection/silt fence	5,460	$4.00	lf	$21,840.00
2	Trail grading (0-5 cu ft/lf)	5,460	$3.00	lf	$16,380.00
3	10' wide multi-use asphalt trail	5,460	$35.00	lf	$191,100.00
4	2' wide gravel shoulder (both sides)	10,920	$6.00	lf	$65,520.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (2)	45	$550.00	lf	$24,750.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	10,920	$0.12	sf	$1,310.40
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	1	$500.00	ea	$500.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	2	$200.00	ea	$400.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$304,260.40**
	Segment Subtotals				
A	**Demolition**				**$28,938.00**
B	**Off-Road Facility**				**$320,900.40**
C	**On-Road Facility**				**$500.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$1,000.00**
F	**Site Amenities**				**$1,200.00**
	SUBTOTAL				**$355,038.40**
	Contingency			15%	**$53,255.76**
	SEGMENT TOTAL*				**$408,294.16**
	**This segment estimate does not include 4,300 lf (0.81 miles) of the Buffalo Creek Greenway (see page 49), because it is already mostly funded.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

LOWER MIDDLE SECTION: SEGMENT 16



	Segment 17: 1,000 lf (1.89 miles)*				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtota**
A	Excavating old Town Commons trail (20' wide)	20,000	$2.00	sf	$40,000.0
	Dumping Fees (6% of Demolition total)				$2,400.0
				Demolition Total	**$42,400.0**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtota**
B	**Off-Road Facility** *(1000 lf)*				
1	Temporary tree protection/silt fence	1,000	$4.00	lf	$4,000.0
2	Trail grading (0-5 cu ft/lf)	1,000	$3.00	lf	$3,000.0
3	10' wide multi-use asphalt trail	1,000	$35.00	lf	$35,000.0
4	2' wide gravel shoulder (both sides)	2,000	$6.00	lf	$12,000.0
5	14' wide boardwalk	0	$280.00	lf	$0.0
6	Bike/Ped Bridge (1)	35	$550.00	lf	$19,250.0
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.0
8	Seeding or mulching trail edges (5' both sides)	2,000	$0.12	sf	$240.0
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.0
2	Crosswalks	1	$500.00	ea	$500.0
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.0
2	Solar powered light pole	0	$1,300.00	ea	$0.0
3	Emergency phones	2	$2,500.00	ea	$5,000.0
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.0
2	Trail and street regulatory/warning signs	2	$200.00	ea	$400.0
3	Directional signs	3	$200.00	ea	$600.0
4	Educational signs	1	$300.00	ea	$300.0
F	**Site Amenities**				
1	Benches	1	$400.00	ea	$400.0
2	Bicycle racks (holds 9 bikes)	1	$400.00	ea	$400.0
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.0
4	Picnic tables/ tables	0	$500.00	ea	$0.0
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.0
6	Bollards (3 per trail/road intersection)	3	$300.00	ea	$900.0
7	Parking (10-car lot)	0	$20,000.00	ea	$0.0
8	Parking (20-car lot)	0	$50,000.00	ea	$0.0
				Site Development Total	**$78,390.0**
	Segment Subtotals				
A	**Demolition**				**$42,400.0**
B	**Off-Road Facility**				**$73,490.0**
C	**On-Road Facility**				**$500.0**
D	**Utilities**				**$5,000.0**
E	**Signage**				**$1,700.0**
F	**Site Amenities**				**$1,700.0**
	SUBTOTAL				**$124,790.0**
	Contingency			15%	**$18,718.5**
	SEGMENT TOTAL*				**$143,508.5**
	**This segment estimate does not include 8,400 lf (1.6 miles) of the Buffalo Creek Greenway (see page 49), because it is already mostly funded. The 1,000 lf is to replace the existing Town Commons trail.*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

SOUTHERN SECTION: SEGMENT 17



0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

	Segment 18: 6,480 lf (1.23 miles)*				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	0	$0.25	sf	$0.00
	Dumping Fees (6% of Demolition total)				$0.00
				Demolition Total	**$0.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(0 lf)*				
1	Temporary tree protection/silt fence	0	$4.00	lf	$0.00
2	Trail grading (0-5 cu ft/lf)	0	$3.00	lf	$0.00
3	10' wide multi-use asphalt trail	0	$35.00	lf	$0.00
4	2' wide gravel shoulder (both sides)	0	$6.00	lf	$0.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (0)	0	$550.00	lf	$0.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	0	$0.12	sf	$0.00
C	**On-Road Facility** *(6,480 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	56	$60.00	ea	$3,360.00
2	Crosswalks	11	$500.00	ea	$5,500.00
3	Sidewalk (5' wide)	14,850	$3.00	sf	$44,550.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	0	$2,500.00	ea	$0.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	0	$200.00	ea	$0.00
3	Directional signs	2	$200.00	ea	$400.00
4	Educational signs	0	$300.00	ea	$0.00
F	**Site Amenities**				
1	Benches	0	$400.00	ea	$0.00
2	Bicycle racks (holds 9 bikes)	1	$400.00	ea	$400.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	3	$300.00	ea	$900.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$55,310.00**
	Segment Subtotals				
A	**Demolition**				**$0.00**
B	**Off-Road Facility**				**$0.00**
C	**On-Road Facility**				**$53,410.00**
D	**Utilities**				**$0.00**
E	**Signage**				**$600.00**
F	**Site Amenities**				**$1,300.00**
	SUBTOTAL				**$55,310.00**
	Contingency			15%	**$8,296.50**
	SEGMENT TOTAL*				**$63,606.50**
	**This segment estimate does not include the 2,390 lf (0.45 miles) of existing trail through Wallace Park (see page 49).*				
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

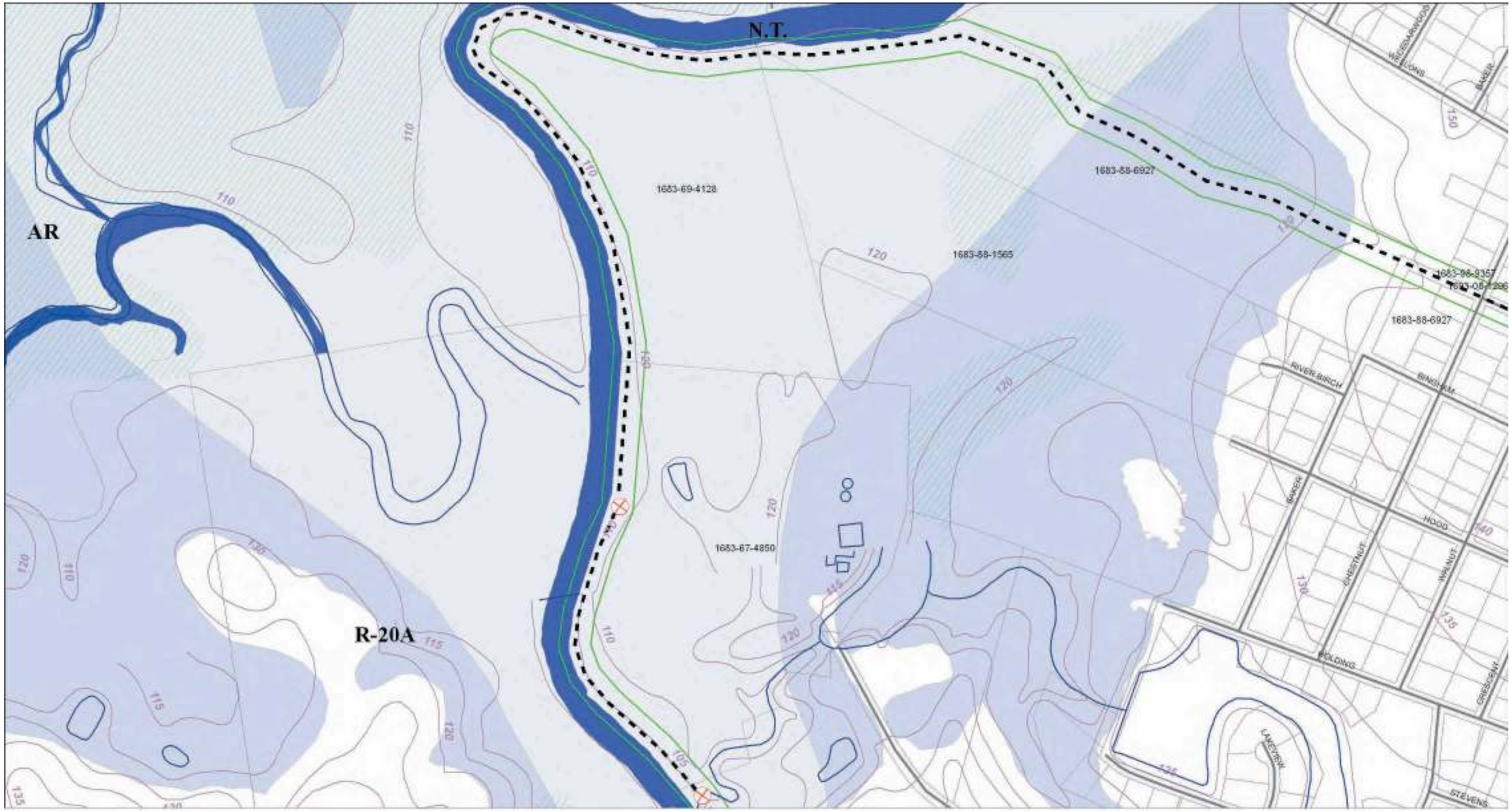
SOUTHERN SECTION: SEGMENT 18

0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

	Segment 19: 9,260 lf (1.75 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	185,200	$0.25	sf	$46,300.00
	Dumping Fees (6% of Demolition total)				$2,778.00
				Demolition Total	**$49,078.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(9,260 lf)*				
1	Temporary tree protection/silt fence	9,260	$4.00	lf	$37,040.00
2	Trail grading (0-5 cu ft/lf)	9,260	$3.00	lf	$27,780.00
3	10' wide multi-use asphalt trail	9,260	$35.00	lf	$324,100.00
4	2' wide gravel shoulder (both sides)	18,520	$6.00	lf	$111,120.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (2)	45	$550.00	lf	$24,750.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	18,520	$0.12	sf	$2,222.40
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	0	$5,400.00	ea	$0.00
2	Solar powered light pole	0	$1,300.00	ea	$0.00
3	Emergency phones	1	$2,500.00	ea	$2,500.00
E	**Signage**				
1	Mile Markers	2	$200.00	ea	$400.00
2	Trail and street regulatory/warning signs	2	$200.00	ea	$400.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	2	$300.00	ea	$600.00
F	**Site Amenities**				
1	Benches	3	$400.00	ea	$1,200.00
2	Bicycle racks (holds 9 bikes)	0	$400.00	ea	$0.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	0	$500.00	ea	$0.00
5	Trash receptacles (32-gallon, steel)	0	$250.00	ea	$0.00
6	Bollards (3 per trail/road intersection)	0	$300.00	ea	$0.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$495,272.40**
	Segment Subtotals				
A	**Demolition**				**$49,078.00**
B	**Off-Road Facility**				**$527,012.40**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$2,500.00**
E	**Signage**				**$1,600.00**
F	**Site Amenities**				**$1,200.00**
	SUBTOTAL				**$581,390.40**
	Contingency			15%	**$87,208.56**
	SEGMENT TOTAL				**$668,598.96**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

SOUTHERN SECTION: SEGMENT 19

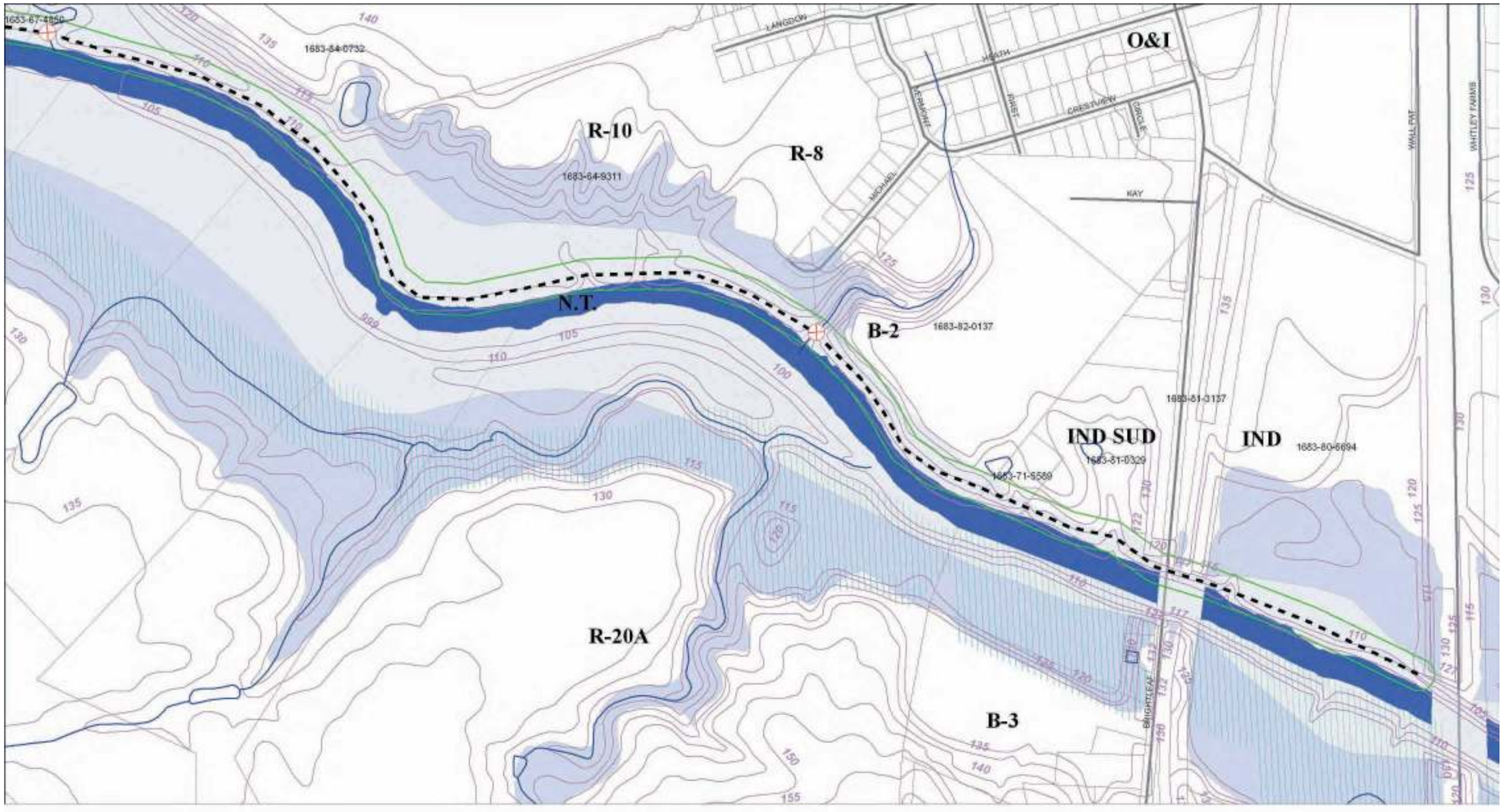


0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

	Segment 20: 7,670 lf (1.45 miles)				
	Probable Estimate of Construction Costs				
	2006				
	Demolition	**Quantity**	**Cost**	**Unit**	**Subtotal**
A	Clearing and grubbing understory (20' wide)	153,400	$0.25	sf	$38,350.00
	Dumping Fees (6% of Demolition total)				$2,301.00
				Demolition Total	**$40,651.00**
	Site Development	**Quantity**	**Cost**	**Unit**	**Subtotal**
B	**Off-Road Facility** *(7,670 lf)*				
1	Temporary tree protection/silt fence	7,670	$4.00	lf	$30,680.00
2	Trail grading (0-5 cu ft/lf)	7,670	$3.00	lf	$23,010.00
3	10' wide multi-use asphalt trail	7,670	$35.00	lf	$268,450.00
4	2' wide gravel shoulder (both sides)	15,340	$6.00	lf	$92,040.00
5	14' wide boardwalk	0	$280.00	lf	$0.00
6	Bike/Ped Bridge (1)	25	$550.00	lf	$13,750.00
7	Drainage culverts (36" reinforced concrete pipe)	0	$40.00	lf	$0.00
8	Seeding or mulching trail edges (5' both sides)	15,340	$0.12	sf	$1,840.80
C	**On-Road Facility** *(0 lf)*				
1	Pavement Bicycle Arrow Markings (thermoplastic)	0	$60.00	ea	$0.00
2	Crosswalks	0	$500.00	ea	$0.00
D	**Utilities**				
1	Solar powered light	3	$5,400.00	ea	$16,200.00
2	Solar powered light pole	3	$1,300.00	ea	$3,900.00
3	Emergency phones	2	$2,500.00	ea	$5,000.00
E	**Signage**				
1	Mile Markers	1	$200.00	ea	$200.00
2	Trail and street regulatory/warning signs	1	$200.00	ea	$200.00
3	Directional signs	1	$200.00	ea	$200.00
4	Educational signs	2	$300.00	ea	$600.00
F	**Site Amenities**				
1	Benches	2	$400.00	ea	$800.00
2	Bicycle racks (holds 9 bikes)	1	$400.00	ea	$400.00
3	Drinking fountains (with pet fountain)	0	$2,000.00	ea	$0.00
4	Picnic tables/ tables	3	$500.00	ea	$1,500.00
5	Trash receptacles (32-gallon, steel)	1	$250.00	ea	$250.00
6	Bollards (3 per trail/road intersection)	3	$300.00	ea	$900.00
7	Parking (10-car lot)	0	$20,000.00	ea	$0.00
8	Parking (20-car lot)	0	$50,000.00	ea	$0.00
				Site Development Total	**$429,240.80**
	Segment Subtotals				
A	**Demolition**				**$40,651.00**
B	**Off-Road Facility**				**$429,770.80**
C	**On-Road Facility**				**$0.00**
D	**Utilities**				**$25,100.00**
E	**Signage**				**$1,200.00**
F	**Site Amenities**				**$3,850.00**
	SUBTOTAL				**$500,571.80**
	Contingency			15%	**$75,085.77**
	SEGMENT TOTAL				**$575,657.57**
	Note: Does not include the following: construction staking, rock and unsuitable soils excavation, permitting fees, contractor overhead, profit, mobilization, bonds, taxes				

SOUTHERN SECTION: SEGMENT 20



0 250 500 1,000 1,500 2,000 Feet

Neuse River
MST Mainline
Tributaries
10' Contours
Floodway
100 Year Flood
Marsh (JC Land Cover Data)
Stream Crossing
Parcels
150' Corridor Width
1234-56-7890 NC Parcel Pin#
ABC Zoning/Land Use

Related County Ordinances A

Chapter Outline:

Zoning Districts

Stormwater Management

Riparian buffers

Flood Damage Prevention

Local Land Development Codes

Suggested changes to development codes in Johnston County, the Town of Clayton, and the Town of Smithfield include adding the following text regarding greenways in adopted plans:

"In any case in which a greenway is indicated on an adopted plan of [Johnston County, the Town of Clayton, or the Town of Smithfield] as being located on lands proposed for development, such greenway shall be dedicated and developed."

Other local communities in North Carolina have included similar requirements in development ordinance sections on *lot design* and/or *public place reservation*.

The MST and Johnston County's Land Development Code

Suggested modifications to Johnston County's Land Development Code include the changes noted above and those noted on page A-4. Selected Articles and Sections from Chapter 14 of Johnston County's Land Development Code are provided below for reference.

Article II. Zoning Districts

Sec. 14-75. Agricultural-residential district (AR).

(a) *Intent*. The agricultural-residential district (AR) is intended to encourage the continuance of agricultural uses as well as to ensure that residential development will occur at sufficient densities to provide for a range of housing opportunities throughout the county. Further, it is the intention of the regulations of this district to ensure that residential development having access and connecting to public water and sanitary sewer systems will occur within a healthful environment.

(f) *Provision of common open space or recreation area requirements*. All residential developments shall provide or dedicate common open space or recreation areas

suitable for the residents' common passive recreational use or make a payment in lieu of provision or dedication.

(g) *Minimum common open space or recreation area.* When common open space or recreational area must be provided or dedicated as part of a residential development, its total land area shall be at least ten percent of the total gross land area of the development, however total amount of open space provided can be no less that two acres in size. The required open space shall be contiguous, unless it is determined by the planning board that the required open space can be split and located at different places in a development. If a proposed development containswetlands and/or riparian or stream buffer areas, or overhead electric utility easements, they must be designated as common open space. However, these areas will not count toward the amount of required open space. If it can be demonstrated by the developer that this requirement presents an unreasonable hardship and strictly limits the amount of lots they can develop, then the planning board can allow these areas to be included in residential lots so long as all other requirements of this section are met.

(h) *Method of provision or dedication.* Land provided or dedicated for common open space or recreation purposes shall be designated on a final plat duly recorded with the county register of deeds. Such common open space land may be dedicated or deeded to an appropriate public body upon their acceptance, land trust, nonprofit, or for profit organization established for the purpose of land conservation or recreational purposes; or create a neighborhood or homeowner's association for the continuing maintenance and control of common open space or recreation area; or, held by the owner subject to the recording of a permanent conservation easement or similar open space or recreational land dedication.

(i) *Payments in lieu of provision or dedication.* In lieu of providing or dedicating common open space or recreation area required pursuant to this section, a developer of a subdivision or planned development may choose to make a payment to the county whereby the county may acquire common open space land. The county shall use such payment only for the acquisition or development of open space, recreation, or park sites to serve residents of the county. The amount of the payment shall be the product of the total number of lots or dwelling units proposed multiplied by that fee established in the county's annual schedule of fees. The developer shall make the payment before approval of a final plat or issuance of a land use permit; provided, however, that the planning director may allow phasing of payments consistent with the approved phasing of the development.

(j) *Access to open space.* All open space must be pedestrian accessible. Open space not contiguous to a proposed subdivision street must have a minimum of a 20 foot fee-simple access.

(Ord. of 7-10-2000, § 4.4.1; Ord. of 11-13-2000, § 4.4.1; Ord. of 2-12-2001, §§ 4.4.1.3, 4.4.1.6.1; Ord. of 7-9-2001; Amend. of 5-12-2003(1); Amend. of 8-11-2003; Amend. of 2-9-2004; Amend. of 7-12-2004, §§ A), B); Amend. of 12-12-2005(1); Amend. of 5-1-2006(1))

Sec. 14-103. Environmentally sensitive area district (ES).

(a) *Purpose and intent.* The environmentally sensitive area district (ES) is established as a district that overlays areas deemed environmentally sensitive. Development within this overlay district shall comply with the regulations of the underlying zoning district, provisions of this section and any other applicable sections of this article.

(b) *Definitions:*

(1) *Intermittent stream.* A natural drainage way, which shows up as a blue line on the USGA 7.5 minute quadrangle maps and has a contributing drainage area of 300 acres or more shall be considered an intermittent stream for purposes of this ordinance.

(2) *Perennial stream.* Perennial streams are streams that have essentially continuous flows. Perennial streams in the environmentally sensitive area are specifically designated to be Swift Creek, White Oak Creek, Little Creek (from the U.S. 70 Clayton bypass to Swift Creek), and the Little River (from the county line to NC 39).

(c) *Delineation of.*

(1) *Perennial stream buffers.* Perennial stream buffers shall be measured from the top of the channel bank and extend landward a minimum distance of 100 feet measured horizontally on a line perpendicular to the water body, subject to the following conditions:

a. The buffer shall be undisturbed and remain forested if currently forested.

b. If the existing buffer is not forested, it shall be maintained in a natural state and allowed to revegetate.

c. There shall be no fill allowed within the buffer area.

(2) *Intermittent stream buffers.* Intermittent stream buffers shall have two zones as described below:

a. Zone 1 shall be an undisturbed area extending from the channel bank landward a minimum of 30 feet measured horizontally on a line perpendicular to the water body.

b. Zone 2 shall be a vegetative buffer extending from the outer edge of zone 1 landward a minimum of 20 feet measured horizontally on a line perpendicular to zone 1.

(3) *Maintenance of buffers.* Zone 1 and zone 2 shall be maintained by the landowner or homeowners' association to maintain stormwater sheet flow to the maximum extent practical to provide for diffusion and infiltration of stormwater runoff and filtering of pollutants into the affected stream, consistent with maintenance criteria as set out in the county design manual.

(4) *Exemptions*. The following are exempt from the stream buffer requirements of this section:

a. Areas that are mapped on the USGS quadrangle map that do not exist on the ground.

b. Ponds and lakes created for animal watering, irrigation of farm lands, or other agricultural uses that are not part of a natural drainageway.

c. Where application of the requirements of this section would prevent all prospective use of a lot platted and recorded prior to May 26, 1998.

d. Water dependent structures that are designed, constructed, and maintained to provide the maximum nutrient removal, have the lease adverse affects on aquatic habitats and that protect water quality.

e. Roads, bridges, stormwater management facilities, ponds, and utilities where no other practical alternative exists. These structures shall be so located, designed, constructed, and maintained to have minimal disturbance, provide maximum nutrient removal, provide the least adverse effects on aquatic habitats and protect water quality to the maximum extent possible.

f. Ditches and manmade conveyances other than modified natural streams.

(5) *Flood hazard areas*. There shall be no development allowed within the areas of special flood hazard as defined in the county flood damage prevention ordinance, which shall be defined as residential and nonresidential structures, including improvements or additions to such structures. However, specifically allowed improvements include public utility structures, buried utilities, roadways and accessways, and recreational facilities as long as no structures are involved.

(Ord. of 7-10-2000, § 4.5.2; Ord. of 11-13-2000, § 4.5.2.2; Amend. of 3-7-2005)

The last sentence of Sec. 14-103 (5), states that recreational facilities are allowed "as long as no structures are involved." The County should not define trails as 'structures' in this context. Trails do not impede the flow of water, and furthermore, they can be designed with pervious surfaces so as not to contribute to run-off. Finally, trails provide access to floodprone areas so that these lands can be better managed to reduce hazards and improve stormwater flow. For more environmental benefits of trails, please refer to Chapter 2.

Article VII. Stormwater Management

Sec. 14-381. Purpose.

The purpose of this article is to establish minimum criteria to control and minimize quantitative and qualitative impacts of stormwater runoff from development within the county, a nutrient management program for new development in accordance with 15A NCAC 2B .0235 Neuse River Basin - Nutrient Sensitive Waters Management Strategy: Basinwide Stormwater Requirements and to establish regulations to provide additional protection within the environmentally sensitive area district (ES). Further, prudent site planning should include special consideration for the purposes of preserving natural drainageways, maximizing infiltration, and slowing stormwater runoff from individual sites en route to streams and rivers by use of effective runoff management, structural and nonstructural best management practices, drainage structures, and stormwater facilities.
(Ord. of 7-10-2000, § 9.1; Ord. of 1-2-2001, § 9.1)

Sec. 14-393. Riparian buffers.

Fifty-foot wide riparian buffers shall be maintained along both sides of a stream, river or other waterbody as required by the Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Riparian Buffers, Section 3(a-b). Riparian buffers shall be noted on the maps submitted for stormwater management plan approval and shall be noted on the final recorded map. Determinations of exemptions (as noted in 15A NCAC 2B.0233 Neuse River Basin: Nutrient Sensitive Waters ManagementStrategy: Protection and Maintenance of Riparian Buffers, Section 3(a-b)) shall be made by the NCDENR Division of Water Quality.

(Ord. of 7-10-2000, §§ 9.7, 9.8; Ord. of 1-2-2001, § 9.10)

Riparian buffer means an area of trees, shrubs, or other forest vegetation, that is adjacent to surface waters. For purposes of this article, surface water shall be present if the feature is approximately shown on either the most recent version of the county soil survey report prepared by the NRCS or the most recent version of the 1:24,000 scale (7.5 min.) quadrangle topographic maps prepared by the United States Geological Survey. Riparian buffers adjacent to surface waters that do not appear on either of the maps shallnot be subject to this article, except as noted in section 14-103.

Article VIII. Flood Damage Prevention

Sec. 14-421. Purpose.

The flood hazard areas of the county are subject to periodic inundation which results in loss of life, property, health and safety hazards; disruption of commerce and governmental services; extraordinary public expenditures of flood protection and relief; and impairment of the tax base, all of which adversely affect the public health, safety and general welfare. These flood losses are caused by the cumulative effect of obstructions in the floodplains causing increases in flood heights and velocities, and bythe occupancy in flood hazard areas by uses vulnerable to floods or hazardous to other lands which are inadequately elevated, floodproofed, or otherwise unprotected from flood damages.
(Ord. of 7-10-2000, § 10.1; Ord. of 11-7-2005)

Flood hazard boundary map (FHBM) means the official map of the county, issued by the Federal Emergency Management Agency, where boundaries of the areas of special flood hazard have been defined as zone A.

Flood insurance rate map (FIRM) means the official map of the county, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazard and the risk premium zones applicable to the county.

Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

Special flood hazard area (SFHA) means the land in the floodplain subject to a one percent or greater chance of being flooded in any given year as determined in section 14-426.

Sec. 14-425. Lands to which this article applies.

This article shall apply to all areas of special flood hazard within the jurisdiction of the county.

(Ord. of 7-10-2000, § 10.5.1)

Sec. 14-426. Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Emergency Management Agency in its latest flood insurance study for the county, with accompanying maps and other supporting data, and any revision thereto are adopted by reference and are declared a part of this article and such areas demonstrated to constitute floodway and floodplain, supported by flood study by a qualified professional engineer and accepted by the county.

(Ord. of 7-10-2000, § 10.5.2)

Sec. 14-481. Construction standards.

(a) In all areas of special flood hazard, the following provisions are required:

(1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

(2) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(3) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damages.

(4) Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

(6) New and replacement sanitary sewer systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the system[s] into floodwaters.

(7) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

(8) Any alteration, repair, reconstruction, or improvements to a structure which is in compliance with the provisions of this article shall meet the requirements of new construction as contained in this article.

(9) Nonconforming buildings or uses may not be enlarged, replaced or rebuilt unless such enlargement or reconstruction is accomplished in conformance with the provisions of this article; however, nothing in this article shall prevent the repair, reconstruction, or replacement of a building or structure existing on the effective date of the ordinance from which this article derives and located totally or partially within the floodway zone, provided that the bulk of the building or structure below base flood elevation in the floodway zone is not increased and provided that such repair, reconstruction, or replacements meet all of the other requirements of this article.

(10) New solid waste disposal facilities, hazardous waste management facilities, salvage yards, and chemical storage facilities shall not be permitted in special flood hazard areas, except by variance as specified in [subsection] 14-456(h). A structure or tank for chemical or fuel storage incidental to an allowed use or to the operation of a water treatment plant or wastewater treatment facility may be located in a special flood hazard area only if the structure or tank is either elevated or floodproofed to at least the regulatory flood protection elevation and certified according to section 14-455.

(11) No more than 20 percent of the floodplain per development may be filled unless a flood study (by a professional engineer) certifies that the BFE will increase less than 0.1' upstream.

(b) In all areas of special flood hazard where base flood elevation data has been provided, as set forth in section 14-426 or section 14-452(10), the following provisions are required:

(1) *Residential construction* . New construction or substantial improvement of any residential structure shall have the reference level (lowest floor, including basement), elevated no lower than the regulatory flood protection elevation (two feet above the base flood elevation.) Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided.

(2) *Nonresidential construction* . New construction or substantial improvement of any commercial, industrial, or nonresidential structure shall have the reference level (lowest floor, including basement), elevated no lower than the regulatory flood protection level (two feet above the level of base flood elevation). Structures located in A zones may be floodproofed in lieu of elevation provided that all areas of the structure below the required elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the official as set forth in subsection 14-455(5).

(3) *Manufactured homes*. Manufactured homes shall meet the following standards:

a. Manufactured homes that are placed or substantially improved on sites outside a manufactured home park or subdivision, in a new or expansion to an existing manufactured home park or subdivision, in an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood, must be elevated no lower than one foot above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.

b. Manufactured homes that are to be placed or substantially improved on sites in an existing manufactured home park or subdivision that are not subject to the provisions of subsection (b)(5) must be elevated so that the lowest floor of the manufactured home is elevated no lower than two feet above the base flood elevation, and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.

c. Manufactured homes shall be securely anchored to an adequatelyanchored foundation system to resist flotation, collapse, and lateral movement in accordance with the regulations for mobile homes and modular housing adopted by the state department of insurance pursuant to G.S. 143-143.15. Additionally, when the elevation would be met by an elevation of the chassis at least 36 inches or less above the grade at the sight, the chassis shall be supported by reinforced piers or other foundation elements of at leastequivalent strength. When the elevation of the chassis is above 36 inches in height, certification by a registered professional engineer is required.

d. An evacuation plan must be developed for evacuation of all residents of all new, substantially improved or damaged manufactured home parks or subdivisions located within floodprone areas. This plan shall be filed with and approved by the administrator and the local emergency management coordinator.

(4) *Recreation vehicles*. A recreational vehicle placed on a site shall either:

a. Be on a site for fewer than 180 consecutive days;
b. Be fully licensed and ready for highway use; or
c. Meet the requirements of this article.

(5) *Elevated buildings*. New construction or substantial improvements of elevated buildings that include fully enclosed areas that are usable solely for the parking of vehicles, building access or storage in an area other then a basement and which are subject to flooding shall be designed to preclude finished living space and be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

a. Designs for complying with this requirement must either be certified by a registered professional engineer or architect or meet the following minimum criteria:

1. Provide a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;
2. The bottom of all openings shall be no higher than one foot above grade; and
3. Openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwaters in both directions.

b. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator).

c. The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to enclose storage areas.

(6) *Temporary structures*. Prior to the issuance of a development permit for a temporary structure, the following requirements must be met:

a. All applicants must submit to the administrator prior to the issuance of the development permit a plan for the removal of such temporary structure in the event of a hurricane or flash flood warning notification. The plan must include the following information:

1. A specific time period for which the temporary use will be permitted;
2. The name, address and phone number of the individual responsible for the removal of the temporary structure;
3. The time frame prior to the event at which a structure will be removed (i.e., minimum of 72 hours before landfall of a hurricane or immediately upon flood warning notification);

4. A copy of the contract or other suitable instrument with a trucking company to ensure the availability of removal equipment when needed; and

5. Designation, accompanied by documentation, of a location outside the floodplain to which the temporary structure will be moved.

b. The information given in subsection (b)(6)a. shall be submitted in writing to the administrator for review and written approval.

(7) *Accessory structure*. When accessory structures (sheds, detached garages, etc.) are to be placed in the floodplain the following criteria shall be met:

a. Accessory structures shall not be used for human habitation (including work, sleeping, living, cooking or restroom areas);

b. Accessory structures shall not be temperature-controlled;

c. Accessory structures shall be designed to have low flood damage potential;

d. Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters.

e. Accessory structures shall be firmly anchored in accordance with the provisions of subsection (a)(1);

f. Service facilities such as electrical and heating equipment shall be elevated in accordance with the provisions of subsection (a)(4); and

g. Openings to relieve hydrostatic pressure during a flood shall be provided below the base flood elevation in conformance with the provisions of subsection (b)(5).

h. An accessory structure with a footprint less than 150 square feet that satisfies the criteria outlined above does not require an elevation or floodproofing certificate. Elevation or floodproofing certifications are required for all other accessory structures in accordance with section 14-455.

(8) *Floodways and nonencroachment areas*. Located within the areas of special flood hazard established in section 14-426 are areas designated as floodways and nonencroachement areas. The floodways and nonencroachment areas are extremely hazardous area due to the velocity of floodwaters which carry debris and potential projectiles and have erosion potential. The following provisions shall apply, in addition to standards outlined in section 14-481, within such floodway and nonencroachment areas:

a. No encroachments, including fill, new construction, substantial improvements and other developments shall be permitted unless it has been demonstrated through practice that the proposed encroachment would not result in any increase in the flood levels during the occurrence of the base flood. Such certification and technical data shall be prepared by a registered professional engineer and presented to the administrator.

b. If subsection (b)(6)a. is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of this division.

c. No manufactured homes shall be permitted, except in an existing manufactured home park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring and the elevation standards of subsection (b)(3) are met.

(9) *Nondevelopment areas*. There shall be no development allowed within the areas of special flood hazard inside the environmentally sensitive area (ESA), as defined in section 14-103. Development for the purposes of the special flood hazard inside the ESA shall be defined as residential and nonresidential structures, including improvements or additions to such structures. However, specifically allowed improvements include public utility structures, buried utilities, roadways and accessways, and recreation facilities as long as nostructures are involved.

(Ord. of 7-10-2000, §§ 10.7.1, 10.7.2; Ord. of 11-7-2005)

Design Guidelines B

Chapter Outline:

B.0 Overview

This section provides guidelines to both public and private entities for the future development of the Mountains To Sea Trail in Johnston County, North Carolina. The guidelines noted herein are based on the best practices in use throughout the United States, as well as accepted national standards for greenway facilities.

The guidelines should be used with the understanding that each greenway segment described in this plan is unique and that design adjustments will be necessary in certain situations in order to achieve the best results. Each segment should be evaluated on a case-by-case basis, in consultation with local or state bicycle and pedestrian coordinators, a qualified engineer and a landscape architect.

Facility design is a broad topic that covers many issues. This section provides guidelines for typical greenway facilities and is not a substitute for more thorough design and engineering work. For more in-depth information and design development standards, the following publications should be consulted:

Greenways: A Guide to Planning, Design and Development
Published by Island Press, 1993
Authors: Charles A. Flink and Robert Searns

Trails for the Twenty-First Century
Published by Island Press, 2nd ed. 2001.
Authors: Charles A. Flink, Robert Searns, Kristine Olka

Guide to the Development of Bicycle Facilities
Updated in 1999 by the American Association of State Highway Transportation Officials (AASHTO).

Manual on Uniform Traffic Control Devices (MUTCD)
Updated in 2000. Published by the U. S. Department of Transportation, Washington, DC

Mountain Bike Trails: Techniques for Design, Construction and Maintenance Published by Bike-Centennial, Missoula, MT

Construction and Maintenance of Horse Trails
Published by Arkansas State Parks

Universal Access to Outdoor Recreation: A Design Guide
Published by PLAE, Inc., Berkeley, CA, 1993

In all cases, the recommended guidelines in this report meet or exceed national standards. Should these national standards be revised in the future and result in discrepancies with this chapter, the national standards should prevail for all design decisions.

B.1 ADA Requirements

The Americans with Disabilities Act requires that portions of the Mountains-To-Sea Trail be accessible to persons with varying motor skills and abilities. Perhaps the best way to comprehend the importance of ADA is to understand that most of us, at some time in our life, will experience a temporary disability which will affect the way in which we make use of outdoor resources. The best examples include relying on crutches due to a broken leg; limited ambulatory movement due to a sprained muscle; or carrying two sacks of groceries from the car to the front door and not being able to see the ground or stairs below your feet. ADA benefits all Americans by making the outdoor environment more accessible.

For the Mountains-To-Sea Trail and spur trails, the consultant and client need to focus on several important issues related to ADA. One of these involves the "path of travel", which essentially means that from the point where an individual parks an automobile, the path of travel from the auto to the desired public resource and the length of trail throughout that resource all need to be clearly defined and free of barriers. For persons confined to a wheelchair, this means that parking spaces should be located in an area that provides optimal access to the greenway trail and complementary facilities. The consultant is proposing a 10-foot-wide asphalt or concrete paved primary trail which is wide enough to accommodate a variety of users, including persons who depend on wheelchairs for mobility. The consultant does not foresee circumstances at this time that would require special design solutions along the trail, or within designated trailheads, to accommodate users with special physical challenges.

B.2 Trail Signage System

A comprehensive system of signage is required throughout the project to ensure that information is provided to trail users regarding the safe and appropriate use of all facilities. Signage includes post- or pole-mounted signs and pavement striping.

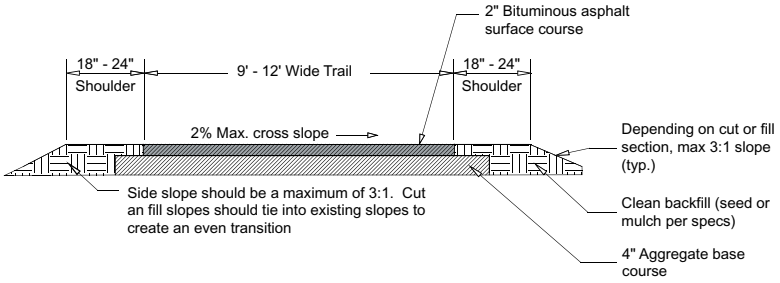
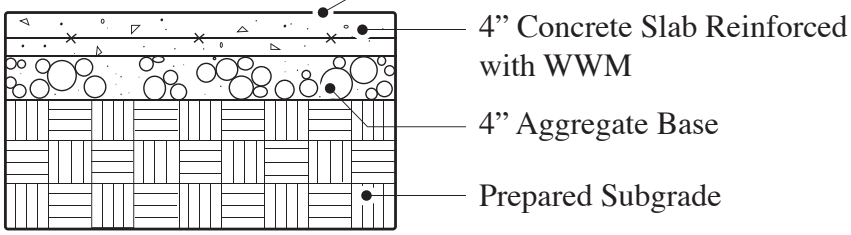
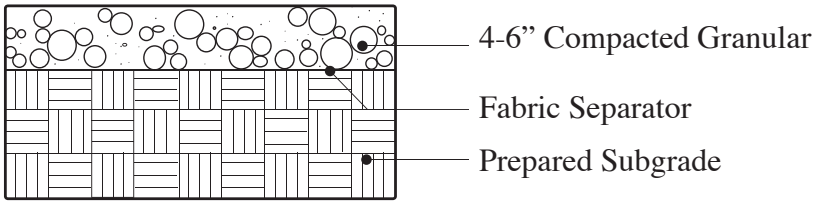
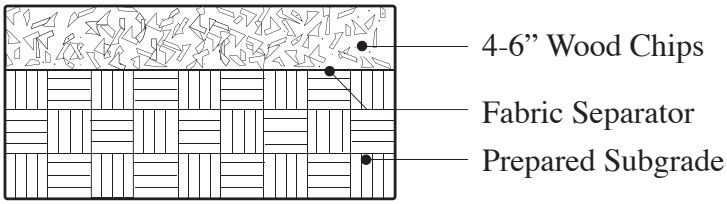
Signage is further divided into information signs, directional signs, regulatory signs and warning signs. Trail signage should be developed to conform to the (2001) Manual on Uniform Traffic Control Devices and the American Association of State Highway Transportation Official Guide for the Development of Bicycle Facilities. The needs of cyclists will require special attention, since this project is designed to accommodate bicycle traffic. The graphics on page thirty-seven illustrate examples of signage system proposed for installation along the Mountains-To-Sea Trail.

The consultant recommends the use of recycled waste materials and products in the construction of all signage for the project. Greenways Incorporated has already constructed one greenway project using all recycled waste materials which offer design versatility, often have a long life span, and require less long-term maintenance than similar products constructed from natural materials. Recycled plastic lumber and or concrete can be used for the construction of posts and poles, and recycled aluminum can be used for signs.

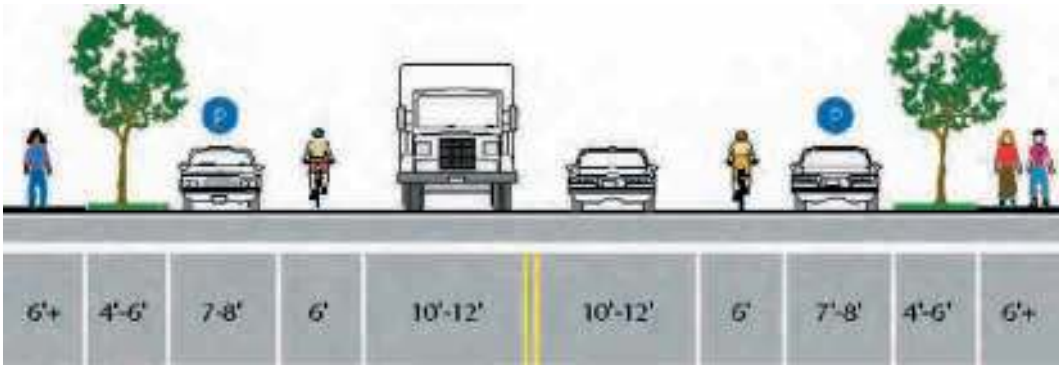
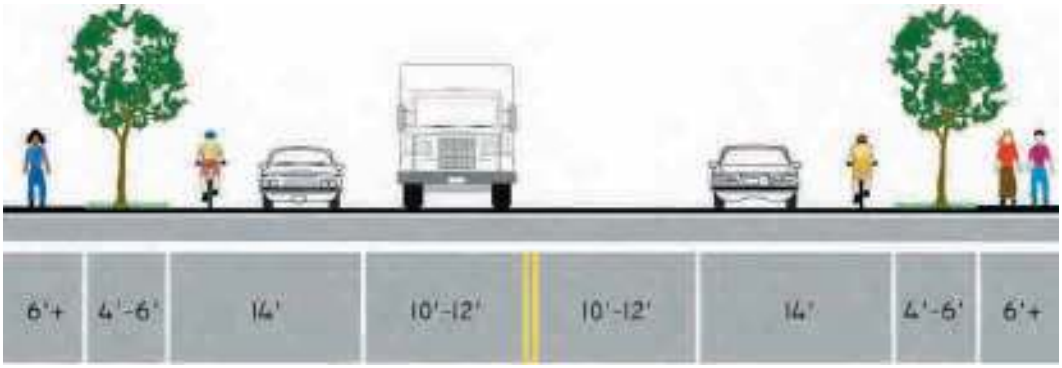
Canoeing and kayaking along the Neuse River

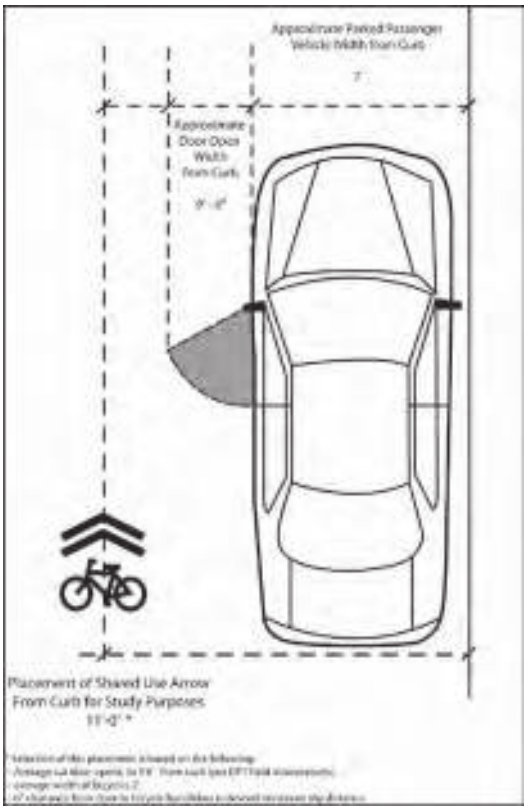
B.3 Facility Guidelines

(Continue on Pages B-4 to B-12)

Trail Surface Materials	Cross Section
Asphalt 	
Concrete 	
Granular Stone 	
Wood Chip 	

Description	Recommendations
Asphalt is a blackish composition of bitumens used for a variety of paving situations.	1. A 2 inch thick asphalt surface is appropriate for off-road trail use. 2. As with any construction project, soils should be tested by qualified individual to determine thickness of the aggregate base 3. Asphalt should be used only in areas of anticipated high use that do not contain environmentally sensitive features.
Concrete is a hard, solid material formed by mixing cement, water, and a conglomerate material such as gravel, sand, slag, or stone. Most often used in urban trail situations.	1. A 4 inch thick concrete surface is appropriate for off-road trail use. 2. The accompanying illustration details a higher use situation. 3. There are low impact instances when the concrete does not need steel reinforcement nor an aggregate base. These situations include an area where vehicles are never allowed, or areas where the subgrade is prepared in such a way that an aggregate base is not needed. Consult a soil specialist to help with the latter determination.
Granular consists of crushed stones and stone dust compacted into a firm surface	1. A 4-6 inch thick granular surface is appropriate for off-road trail use. 2. Mixing stone dust with the stone is preferred because the stone dust acts as a binding agent. 3. This soft but firm surface can accommodate multiple uses including walking, biking, jogging, and wheelchair use. 4. Granular stone is compatible with natural environments. 5. It should be noted that stone color can vary from quarry to quarry.
Wood chips when used as paving material create a soft, spongy surface.	1. A 4-6 inch thick wood chip surface is appropriate for off-road trail use. 2. This material provides an esthetic and soft surface for walking, hiking, and jogging. 3. Wood chips does not accommodate wheelchair or bicycle use. 4. Constant maintenance is required to maintain tail width. 5. This surface decomposes quite easily.

On-Road Facilities	Description
	Bicycle Lane with On-Street Parking on Moderate Volume Roadway
	Wide Outside Lane on Moderate Volume Roadway
	Shared Roadway on Low Volume, Low Speed Roadway



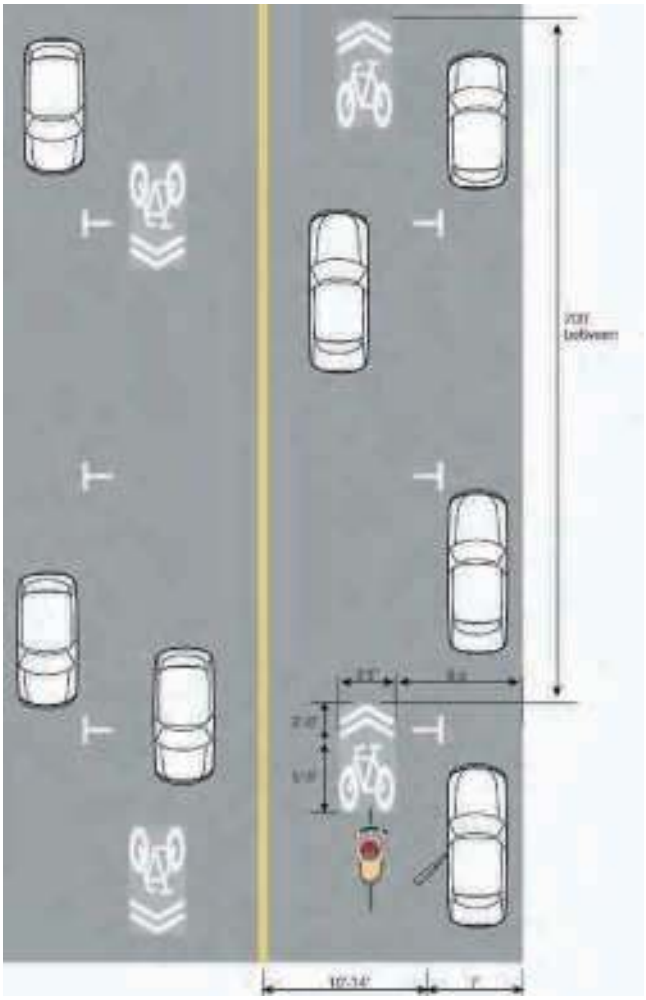
San Francisco Sharrow Dimensions

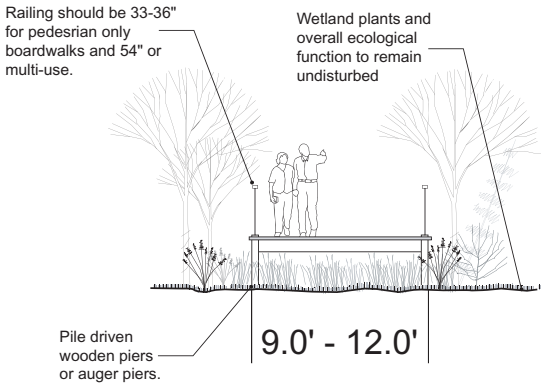
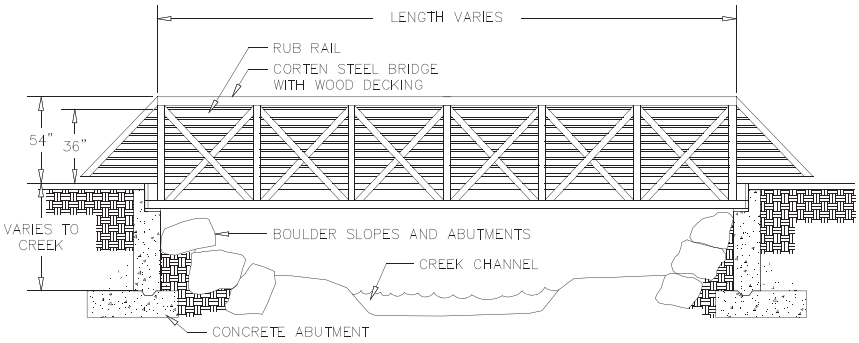
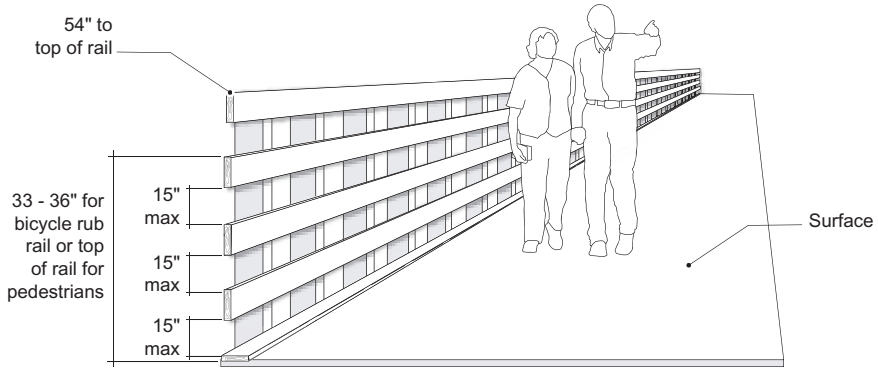
Bicycle Route "Sharrow" Stencil

Some U.S. cities have created a bicycle shared lane arrow (or "sharrow" stencil for use on designated on-road bicycle facilities where lanes are too narrow for striping designated bike lanes. The stencil can serve a number of purposes, such as making motorists aware of bicycles potentially traveling in their lane, showing bicyclists the appropriate direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent "dooring" collisions. Traditionally "sharrow" markings are used on roadways with on-street parallel parking. See figure below for placement guidelines.

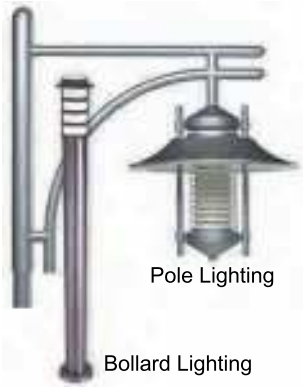
Denver and San Francisco have effectively used this treatment for several years. Other cities, such as Portland, Los Angeles, Gainesville, Cambridge, Oakland, Paris, Brisbane, Zurich, and Buenos Aires have begun to utilize this new treatment as well. The "sharrow" treatment is currently being considered for inclusion in the MUTCD, however local municipalities are encouraged to establish pilot programs on locally owned/maintained roadways.

Sharrow installed on Market Street, San Francisco

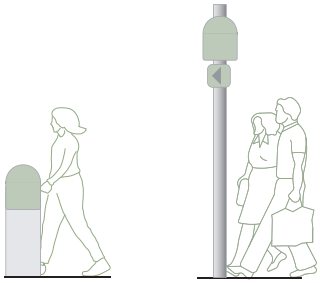
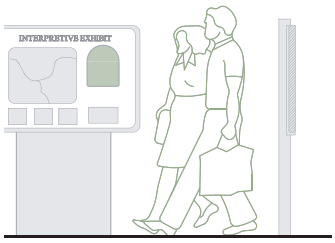
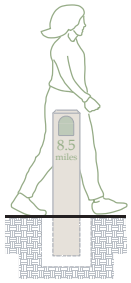


Trail Amenities	Cross Section
Boardwalk 	
Bicycle/Pedestrian Bridge 	
Railings 	

Description	Recommendations
Boardwalks are essentially wooden decks placed in environmentally sensitive areas where they function as "mini-bridges"	1. When the height of a boardwalk exceeds 30", railings are required 2. The thickness of the decking should be a minimum of 2" 3. Decking should be either non-toxic treated wood or recycled plastic. 3. The foundation normally consists of wooden posts or auger piers (screw anchors). Screw anchors provide greater support and last much longer. 4. Opportunities exist to build seating and signage into boardwalks. 5. In general, building in wetlands should be avoided. 6. For purposes of the MST in Johnston County, the trail should be routed so as to avoid the use of boardwalk whenever possible.
The function of a bridge in an off-road, multi-use trail situation is to provided access to the user over certain natural (i.e. streams) or man-made (i.e. roadways) features.	1. If a corridor already contains a bridge such as an abandoned rail bridge, an engineer should be consulted to assess the structural integrity before deciding to remove or reuse the bridge. 2. As a general rule, a multi-use trail bridge should support 6.25 tons. 3. Information about the load bearing capacity of bridges can be found in the American Association of State Highways and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges. 4. There are many options in terms of high quality, prefabricated pedestrian bridges available.
Railings are important safety features on bridges, some boardwalks or in any areas where there may be a hazardous drop-off.	1. At a minimum, railings should consist of a vertical top, bottom, and middle rail. Picket style fencing should be avoided as it may present a safety hazard for bicyclists. 2. A pedestrian railing should be 42" above the surface. 3. A bicyclist railing should be 54" above the surface. 4. The middle railing functions as a "rub rail for bicyclists and should be located between 33 and 36" above the surface. 5. Local, state, and/or federal regulations and building codes should be consulted to determine when it is appropriate to install a railing.

Trail Amenities	Description	Recommendations
Benches 	There are a wide variety of benches to choose from in terms of style and materials. The illustrated bench is a custom design that reflects the industrial feel of the warehouse district it is found in. Material selection should be based on the desired design theme as well as cost.	Due to a wide range of users, all benches should have a back rest. A bench should normally be 16 - 20" above ground with sturdy handrails on either side. The seating depth should be 18-20" and the length should vary between 60 - 90".
Other Seating 	Other more informal seating opportunities may exist along a trail or near a parking area where other furniture like a picnic table may be appropriate.	This type of furniture can be triangulated with cooking facilities, and a trash receptacle.
Lighting 	There are two basic types of suggested lighting illustrated: Pole lighting and Bollard lighting. Pole lighting is typically employed in high use areas such as an esplanade or where a trail meets a parking lot or other urbanized area. The bollards can be used to guide individuals along a trail to a specific location.	In general lighting is not appropriate for off-road trails where there is little or no development. A licensed and qualified lighting expert should be consulted before making any lighting design decisions. Doing so should reduce up-front fixed costs as well as long-term energy costs.

Trail Amenities	Description	Recommendations
Trash Receptacles 	Trash receptacles should be constructed of a suitable material to withstand the harsh elements of the outdoor environment. Additionally trash receptacles should ensure that litter is contained securely preventing contamination or spillage into the surrounding environment.	Trash receptacles should be placed along the trail and at all trailheads. Adequate trash receptacles will combat littering and preserve the natural environment for all trail users.
Bicycle Racks 	There are many types of bike racks available however the two recommended methods are to secure a bike in an enclosed storage, or to lock it to a rack as illustrated here.	A bike rack is recommended as the most inexpensive way to secure a bicycle. An enclosed structure with rented keys is appropriate only in very high bicycle use situations. As illustrated, bike racks can be designed to reinforce a particular design theme.
Vegetation Buffer 	A buffer vegetated buffer is used to separate the trail not only for floodplain protection and noise from the road, but also to screen the trail from nearby homes.	Buffer areas should be planted according to the plant community appropriate for the respective environment.

Trail Signage	Description	Recommendations
Trail Identity Logo 	The MST logo should be used to aid in reinforcing the trail's identity. Additionally local trail logos should compliment MST signage within the MST corridor. Signage should be simple, direct, and easy to identify.	A skilled graphic designer should be consulted when generating the design for local trail logos. Logos should be used as a consistent element throughout the length of the trail.
Directional Signage 	The MST logo can be attached to various street furniture to mark a roadside trail or to direct motorists and pedestrians to a formal trailhead. The MST Logo should be attached to a variety of pedestrian level signage throughout the trail.	The basic signage should consist of the MST logo and a directional arrow. Additional site specific information may be included such as distance to trailhead and/or specific trail name. To be viewed by a vehicle, the bottom of the sign should be mounted no lower than 10' above the ground. At the minimum, however, it can be mounted to a tree to mark the trail.
Educational Signage 	This is a large educational or interpretive signage that is placed at the trailhead. These should include easy to read and comprehend information about the trail.	As part of the trailhead, the overall design of this signage is the first experience most visitors will have with the trail. The design and information this sign communicates, will establish the trail identity and help to create a more unified, pleasurable experience.
Trail Bollards 	Trail bollards are distance markers placed at set intervals. These let folks know where they are on the trail as well as provide important information to those who may be vigorously tracking their exercising.	Typically these are constructed of either weather treated or stained wood although other materials may be selected. The MST logo may be included on these bollards as shown.

Funding Sources C

Chapter Outline:

C.0 Overview

Implementing the recommendations of this plan will require a combination of funding sources that include local, state, federal, and private money. This Appendix provides a listing of the most commonly used funds for greenway, bicycle and pedestrian projects in North Carolina. Fortunately, the benefits of protected greenways and alternative transportation are many and varied. Also, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA) funds a large number of federal sources listed in the Funding Table to protect the environment. This allows programs in Johnston County to access money earmarked for a variety of purposes including water quality, hazard mitigation, recreation, air quality, alternate transportation, wildlife protection, community health, and economic development. Competition is almost always stiff for state and federal funds, so it becomes imperative that local governments work together to create multi-jurisdictional partnerships and to develop their own local sources of funding. These sources can then be used to leverage outside assistance. The long term success of this plan will almost certainly depend on the dedication of a local revenue stream for bicycle and greenway projects.

It is important that Johnston County fully evaluate its available options and develop a funding strategy that can meet community needs, maximize local resources, and leverage outside funding. Financing will be needed to administer the continued planning and implementation process, acquire parcels or easements, and manage and maintain facilities.

Creative planning and consistent monitoring of funding options will likely turn up new opportunities not listed here.

The Funding Table included in this Appendix provides a synopsis of different Federal, State and Local funding sources available for implementing greenway, bicycle and pedestrian projects. To be eligible and successful in getting these funds, municipalities in Johnston County will generally need to provide a local match in many cases.

In pursuing these funding sources, Johnston County should follow the 'rolling thunder' strategy as opposed to 'big bang' so that the City/County can implement the low-cost projects first to show local commitment and to build the momentum from the ground up. In addition, Johnston County would need to set project priority based on five basic principles:

1. Piggyback with roadway, transit and pedestrian projects
2. Encourage work, non-work and school bicycle travel
3. Focus on Urban Core Areas
4. Provide geographic coverage and connectivity
5. Seek modal balance of investments

C.1 Funding Sources

A number of programs, agencies, websites, and resources provide access to funding and project development opportunities. These opportunities should be utilized in addition to the funding sources outlined in the Funding Table. These include:

North Carolina Division of Bicycle and Pedestrian Transportation
http://www.ncdot.org/transit/bicycle/

Bikes Belong Coalition
http://bikesbelong.org/

Safe Routes to School
http://www.saferoutesinfo.org/

National Center for Bicycling and Walking
http://www.bikewalk.org/

Pedestrian and Bicycle Information Center
http://www.bicyclinginfo.org/

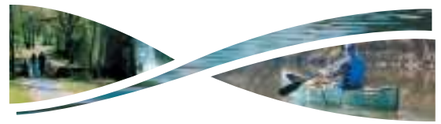
C.2 Funding Table

The Funding Table continues on the following four pages.

Funding Program	Source	Primary Purpose	Eligibility	Availability
National Highway System (NHS)	Federal	Improvements to roads that are part of the NHS and NHS Intermodal connectors	Construction of pedestrian and bicycle facilities on land adjacent to any highway on the NHS	Variable; Projects which parallel interstates or highways have the best potential
Surface Transportation Program (STP)	Federal	Construction resurfacing, and operational improvements for highways and bridges, including transit and other modes	Construction of pedestrian and bicycle transportation facilities; Non-construction projects for safe bicycle use; Upgrade public sidewalks to comply with the ADA. Projects do not have to be within the right-of-way of a Federal-aid highway	Variable; Good source for bicycle and pedestrian projects when combined with roadway projects
Surface Transportation Program Enhancements Set-aside, (STP-E) or Transportation Enhancement Activities (TEAs)	Federal	Funds twelve specific activities that include pedestrian and bicycle facility development, and safety/education activities	3 of the 12 categories are pedestrian and bicycle facilities, safety and education for pedestrians and bicyclists, and rail-trails. Primary source for independent bicycle projects in NC.	$4 million per year for independent bicycle projects set-aside for the NCDOT region that includes Johnston County
Office of Bicycle and Pedestrian Transportation	Federal	State may spend a portion of its federally allocated STP funds on bicycle and pedestrian facilities	Construction of pedestrian and bicycle facilities, including Rails-to-Trails projects and non-construction projects such as brochures, public service announcements, and route maps	Variable; Projects must be part of a long-range transportation plan
Environmental Protection Agency (EPA)	Federal	Funds used to improve air quality and reduce transportation-related emissions	Construction of bicycle facilities and greenways to reduce automobile use and promote bicycle use	Variable; funding provided through EPA's Office of Transportation and Air Quality (OTAQ)
Congestion Mitigation and Air Quality (CMAQ)	Federal	Funds projects in nonattainment and maintenance areas that reduce transportation related emissions	Construction of pedestrian and bicycle facilities; Non-construction projects for safe bicycle use. Projects do not have to be within the right-of-way of a Federal-aid highway, but must demonstrate an air quality benefit.	Annual variable program; Bicycle projects along Johnston County commuter routes have the best potential to receive CMAQ funding
Highway Safety Improvement Program (HISP)	Federal	Reduction in traffic fatalities and serious injuries on public roads.	Improvements for pedestrian/bicyclist safety; Construction of yellow-green signs at pedestrian/bicycle crossings and in school zones. Correction of hazardous locations including roadside obstacles, railway-highway crossing needs, and poorly marked roads that constitute a danger to bicyclists/pedestrians. Highway safety improvement projects on bicycle/pedestrian pathways or trails.	Variable; Good funding source for urban area crash-prone bicycle and pedestrian routes

JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

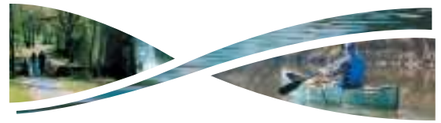
APPENDIX C:
FUNDING SOURCES TABLE



Funding Program	Source	Primary Purpose	Eligibility	Availability
Safe Routes to School (SRTS)	Federal	Enable and encourage children, including those with disabilities, to walk and bicycle to school; Make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; Facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools	Sidewalk improvements; Traffic calming and speed reduction improvements; Pedestrian and bicycle crossing improvements; On-street bicycle facilities; Off-street bicycle and pedestrian facilities Secure bicycle parking facilities; Traffic diversion improvements in the vicinity of schools; Public awareness campaigns and outreach; Traffic education and enforcement in the vicinity of schools; Student sessions on bicycle and pedestrian safety, health, and environment; Funding for training, volunteers, and managers of safe routes to school programs	New program authorized in August of 2005 under the new transportation act titled SAFETEA-LU (2005-2009); Johnston County would need to coordinate with NCDOT for available funding through 2009
Recreational Trails Program (RTP)	Federal	Develop and maintain recreational trails and trail-related facilities for nonmotorized/ motorized recreational trail uses	Nonmotorized or mixed use (motorized and nonmotorized) trails. Eligible categories are trail maintenance and rehabilitation, trailside or trailhead facilities, construction and maintenance equipment, trail construction, trail assessments, and trail safety and environmental protection education.	Variable; MST and other planned trails in Johnston County have the best potential
Land and Water Conservation Fund (LWCF)	Federal	Build a variety of park and recreation facilities, including trails and greenways.	Greenway and trail facilities	Variable; in North Carolina, allocated through DENR - State Division of Parks and Recreation; funding zeroed out for 2006-2007
Wetlands Reserve Program	Federal	Providing technical and financial assistance to landowners who want to restore and protect wetland and riparian areas and place sensitive areas under permanent easement	Open space and greenways in riparian buffers	Variable; a voluntary program available to landowners and administered through USDA's Natural Resource Conservation Service
National Endowment for the Arts	Federal	Funds arts-related programs through the Design Arts Program Assistance and provides links to other federal departments/agencies that offer funding opportunities for arts and cultural programs.	Can support development of ancillary greenway and bicycle facilities that incorporate and celebrate community culture, art, and history.	Variable
Highway Bridge Replacement and Rehabilitation (HBRRP)	Federal	Replace and rehabilitate deficient highway bridges and to seismically retrofit bridges	Pedestrian/bicycle facilities on highway bridges. If a highway bridge deck is replaced or rehabilitated, and bicycles are permitted at each end, then the bridge project must include safe bicycle accommodations	Variable

JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

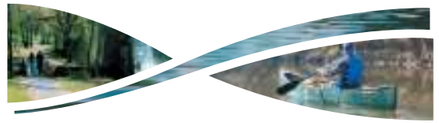
APPENDIX C:
FUNDING SOURCES TABLE



Funding Program	Source	Primary Purpose	Eligibility	Availability
Job Access and Reverse Commute Grants	Federal	Intended to transport welfare recipients and eligible low-income individuals to and from employment	Can fund pedestrian and bicycle-related services	Variable
Urbanized Area Formula Grants (Section 5307)	Federal	Transit capital and planning assistance to urbanized areas with populations over 50,000 and operating assistance to areas with populations of 50,000 - 200,000	Improve bicycle and pedestrian access to transit facilities and vehicles, including bike stations	Variable
Urbanized Area Formula Grants Transportation Enhancements Set-aside	Federal	1% set-aside of section 5307 funds for areas with population over 200,000 for 9 specific Transit Enhancement Activities	Pedestrian and bicycle access, bicycle storage facilities, and installing equipment to transport bicycles on buses	Variable
Community Development Block Grant (CDBG)	Federal	Directly provides funds to cities and towns for projects with community-wide benefits. Activities must benefit low to moderate income persons.	Greenways, trails, and bicycle facilities that provide increased safety, access, and transportation options	Variable, through US Department of Housing and Urban Development (HUD)
NC Department of Transportation, Division of Bicycle and Pedestrian Transportation (DBPT)	State	Single largest funding source for bicycle, pedestrian, and greenway projects; offers several programs including training, mapping, and sponsoring conferences in support of bicycle and pedestrian facility development	Construction of greenway and bicycle facilities	Variable
Transportation Improvement Program (TIP)	State	Improvements for bicycling and walking within a four year schedule of projects	Construction or improvement of greenway and bicycle facilities; Can be incidental (part of a highway or bridge project) or independent (bicycle or greenway project as standalone)	Variable; Determined by statewide MPO requests and priorities
Scenic Byways	State	Improvements to roadways selected as State scenic byways	Construction of bicycle facilities and sidepaths; Signage; Currently 45 routes in North Carolina	Variable, through STIP program; no direct set aside for regions of State
State Bicycle and Pedestrian Planning Grant Initiative	State	Provides communities with planning grants in support of the completion of community-wide bicycle and pedestrian plans	Development of bicycle plans for a community	Variable; $400,000 available for 18 municipalities in 2006
Small Cities Community Development Block Grants	State	Promote economic development; serve low to moderate-income neighborhoods	Greenways and parks that are part of a community's economic development plan may apply	$50 million available statewide for a variety of programs

JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

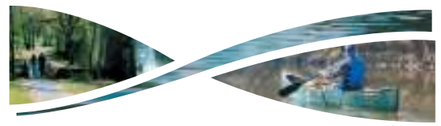
APPENDIX C: FUNDING SOURCES TABLE



Funding Program	Source	Primary Purpose	Eligibility	Availability
Highway Trust Fund	State	Freeway construction and rehabilitation	Limited, as the projects would need to be on interstate facilities	$6 million historically
State Construction	State	Highway construction	May be used for bicycle projects if combined with NC highway projects	$1 million per year set aside for regional independent bicycle projects
Governor's Highway Safety Program (GHSP)	State	Improve safety in NC	May be used for bicycle projects if there are traffic safety benefits	Variable annual program based on requests
North Carolina Parks and Recreation Trust Fund (PARTF)	State	Funds acquisition, development, and renovation of recreational areas	Acquisition and development of greenways and trails	Variable - typically no more than $250,000 can be requested by a local government per year
Clean Water Management Trust Fund (CWMTF)	State	Land and water protection by acquisition of buffers	Acquisition of land for greenways, environmental, educational, and recreational benefits	Variable - approximately $30 million a year placed in CWMTF
North Carolina Division of Water Quality	State	Curbing non-point source pollution	Development of greenways as part of restoration and improvement projects	Variable, nearly $1 million available
North Carolina Adopt-a-Trail Grant Program	State	Trail facility construction	Trail facility construction, trail maintenance, signage, trail brochures and maps	Operated by Trails Section of the NC Division of State Parks - typically grants are at $5,000 per project
North Carolina Natural Heritages Trust Fund	State	Acquisition and protection of important natural areas	Grants awarded for purchase of land for trails; greenway facility development	Variable
North Carolina Health and Wellness Trust Fund & Blue Cross/Blue Shield - Fit Together	State	Recognizes and rewards North Carolina communities' efforts to support physical activity and healthy eating initiatives	Efforts to support physical activity in the community, schools, and workplaces; could include improving access, information, and facilities for bicycling and walking	8 or 9 up to $30,000 2-year grants available
North Carolina Conservation Tax Credit	State	Provides incentive for landowners to donate conservation easements; program goal is to protect water supply watersheds and wildlife corridors, and develop greenways	Greenway facility development	Variable
Discretionary/Demonstration Projects (DP)	State	Demonstration project	Eligible	$2 million historically
Railroad Crossing (RR)	State	Improve safety	Eligible	$5 million historically

Johnston County
Mountains to Sea Trail

Appendix C:
Funding Sources Table



Funding Program	Source	Primary Purpose	Eligibility	Availability
City (L)	Local	Local funds such as CIP, impact fees, stormwater utility fees, taxes (sales, property, excise), exactions, partnerships, loans, and bond funds from the City	Eligible	Variable annual program
City	Local	Local trail sponsors and volunteer efforts; CityRacks Bicycle Parking Funding Program; Triangle Rails-to-Trails Conservancy	Eligible	Variable
Private (O) - Health, art, conservation, etc.	Private	American Greenways Eastman Kodak Awards, National Trails Fund, The Conservation Alliance, Foundation for the Carolinas, Land for Tomorrow Campaign, North Carolina Community Foundation, Bank of America Charitable Foundation, Inc., Duke Energy Foundation, Robert Wood Johnson Foundation, Trust for Public Land, Z. Smith Reynolds Foundation, Blue Cross/Blue Shield of North Carolina, American Heart Association, Cooper Institute	Eligible	Case specific

Sources: Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and NCDOT web sites

JOHNSTON COUNTY
MOUNTAINS TO SEA TRAIL

APPENDIX C: FUNDING SOURCES TABLE