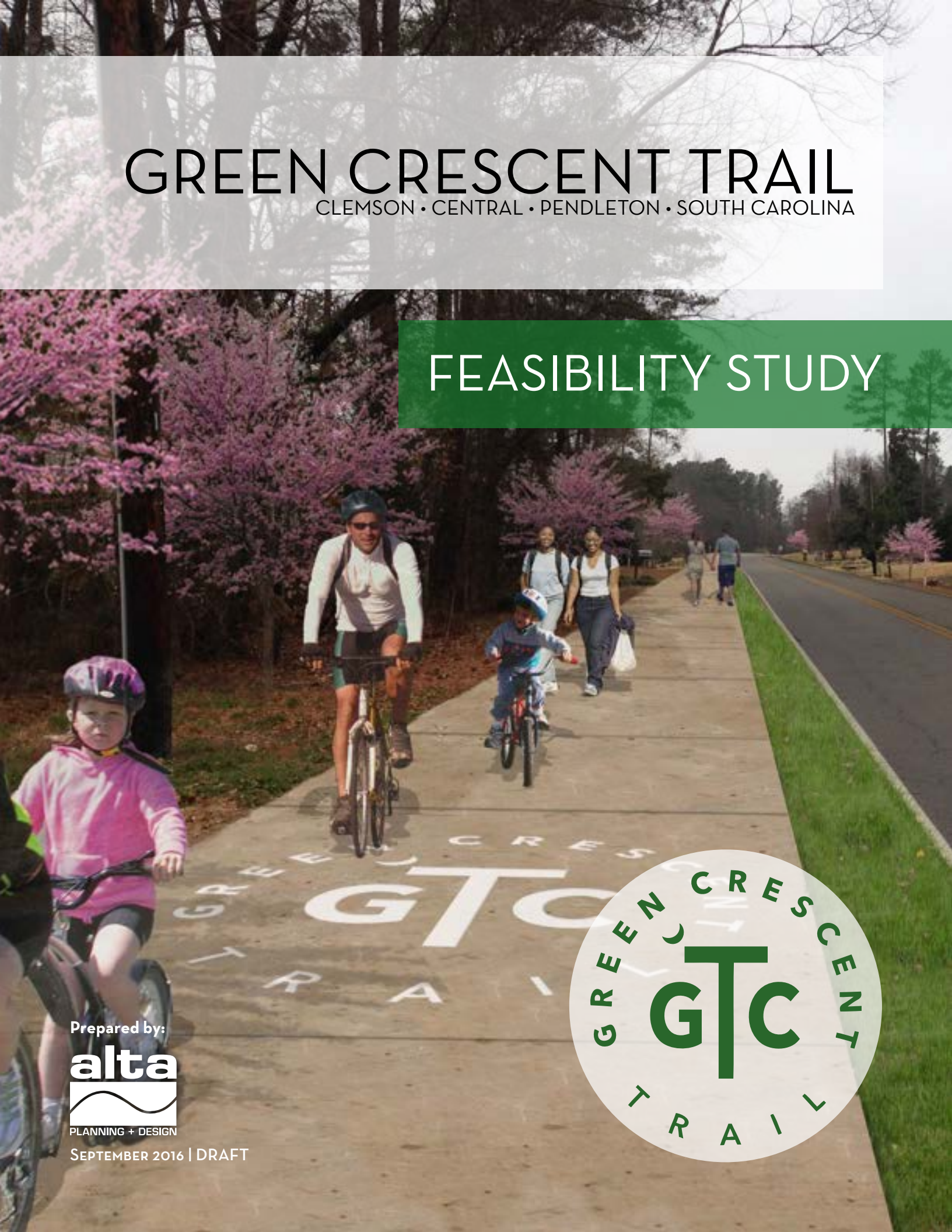
GREEN CRESCENT TRAIL

CLEMSON • CENTRAL • PENDLETON • SOUTH CAROLINA

FEASIBILITY STUDY



Prepared by:

alta PLANNING + DESIGN

SEPTEMBER 2016 | DRAFT

ACKNOWLEDGEMENTS

Public Participants

Thank you to the many area leaders and citizens who participated in this planning process through comment forms, interviews, and public meetings. Thanks also to the many individuals of the press and those engaged in social media throughout the process. A special thanks to the Friends of the Green Crescent, the Cities of Clemson and Central, and SCDOT for devoting staff time, space, and support.

Steering Committee

Thank you to the steering committee for their dedication to seeing the Green Crescent Trail become a reality.

Doug Barry – Town of Central

Andy Boyd – SCDOT

Chad Carson – Friends of the Green Crescent

Jamie Cathey – City of Clemson

Tanya DeOliveira – Clemson University

Ensley Feemster – Pickens County Council

Gary Gaulin – Friends of the Green Crescent

Dan Harding – Friends of the Green Crescent

Roger McKenzie – Southern Wesleyan University

Drake McNeary – Friends of the Green Crescent

Steve Miller – Town of Pendleton

Phillip Mishoe – Town of Central

Eric Newton – Friends of the Green Crescent

Eric Nielson – SouthPawCycles

Todd Steadman – City of Clemson

Chris Williams – Southern Wesleyan University

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I'd like to see trails that connect communities. i.e. a trail that would go from Clemson to Anderson to Greenville to Easley to Pickens and back to Clemson.
- Public Survey Response

Initial Green Crescent Trail Public Meeting.

1: Introduction

1.1 PROJECT PURPOSE

The Friends of the Green Crescent (FOTGC) is a newly formed 501(c)(3) working towards a more bicycle and walk-friendly future for the greater Clemson and Central area. In large part due to their work, there has been a recent surge in interest from residents and elected officials in new trail, sidewalk, and on-street bikeway development. A recent study conducted by the FOTGC in conjunction with Clemson University Architecture students identified several key improvements throughout the region that could make a substantial impact on bicycling and walking for transportation and recreation.

The FOTGC recognize the opportunities that exist with bicycle and pedestrians connections to community centers, existing trail systems, and key landmarks around the great Clemson-Central-Pendleton area. The FOTGC commissioned this study to explore the feasibility and routing of connections from the City of Central's Downtown Business District to Southern Wesleyan University (SWU), from SWU to Wal-Mart by way of SWU forest land and Road 18/Church Street, and from the City of Central's Downtown Business District along Highway 93 toward the City of Clemson. In addition, the feasibility study makes recommendations for connections in the City of Clemson along 18-Mile-Creek (Nettles Park to Pendleton Road), Berkeley Drive Corridor (Clemson Elementary, Countrywalk, Camelot, and the Downs), Pendleton Road (Highway 93 to Pacolet Milliken Property), Downtown Clemson/College Avenue to the northern portion of the Clemson University Experimental Forest.

The analysis and feasibility of these trail segments identify low-hanging fruit, initial phases and connections into other bicycle and pedestrian routes, address design guidelines of the proposed network, coordination with property owners affected by the trail, and funding strategies and sources for implementation.

1.2 PROJECT VISION + GOALS

1.2.1 Green Crescent Trail Mission

The Green Crescent Trail, through its creation and ongoing preservation, will dramatically improve quality of life in and around the Upstate of South Carolina with the possibility of attaining national recognition.

Community life and nature have always been intimately connected in this part of the country. v Thomas Green Clemson, the founder of Clemson University, was an agriculturalist here and gave his land to create "a high seminary of learning."

Today Clemson-area residents, students, employees, and visitors still cherish their village-style connection to the surrounding natural resources.

The Green Crescent Trail will enhance, protect, and promote this unique community-nature connection. The trail also will cultivate historical and cultural richness by highlighting local, historically significant people and places.

1.2.2 Project Vision

In addition to the overall mission of the Green Crescent trail, this the planning process identified the following key vision elements to guide the design of the trail network:

- **Create a network** of walkways, bikeways, and trails.
- **Capitalize on existing community strengths**, resources, and amenities.
- Improve the **safety and comfort** of bicycling and walking routes.
- Promote bicycling, walking, and trail usage as **recreation and transportation**.
- Ensure implementation.

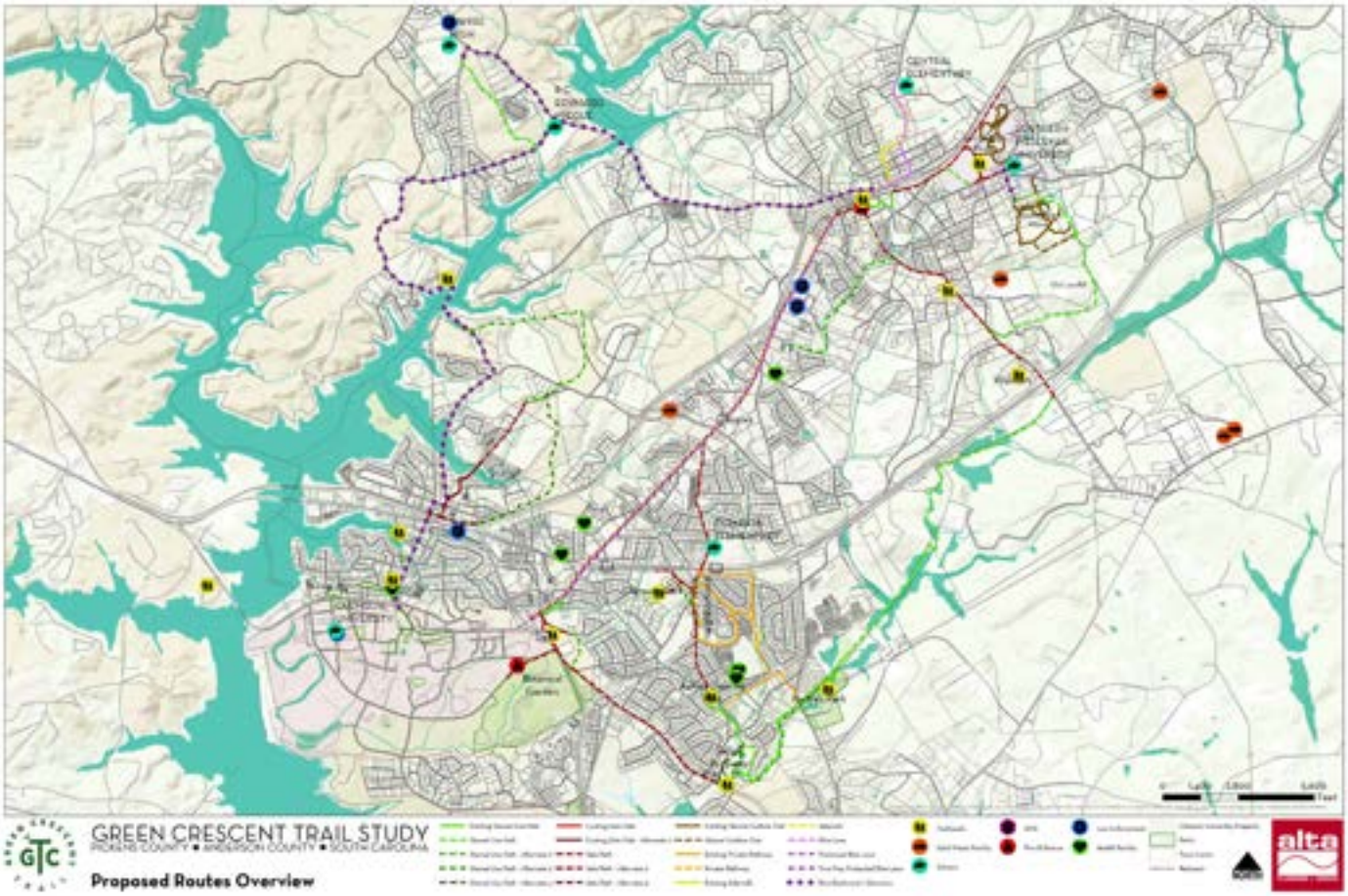
The design team and steering committee during field work.

1.3 THE PLANNING PROCESS

1.3.1 Steering Committee Meetings

Throughout the Implementation Plan's development, the Alta team was in regular contact with a Friends of the Green Crescent (FOTGC) point person to keep the group apprised of project efforts and to seek input at key decision points. This included in-person meetings, emails, telephone calls, and written documents.

An important element of this Implementation Plan was gathering input from key stakeholders in the implementation of greenway recommendations. FOTGC established a project steering committee to provide input at key decision points. Following the collection of existing conditions information, the team met with the project steering



Initial Green Crescent Trail Route map. Refer to Appendix A for a larger version of this map.

committee to provide an overview of the project and collect input on project prioritization. A second meeting was held with the project steering committee to present the draft recommendations and receive feedback on the findings.

1.3.2 Public Input

In conjunction with FOTGC and its partners, the Alta team held two evening public meetings (Central and Clemson). The agenda for the community meetings included a discussion of:

- The importance of bicycling, walking, and trails to the Greater Clemson-Central-Pendleton successes and quality of life
- The process for developing trail feasibility plans and designing/building trails, including federal statutes, federal and state ROW acquisition requirements, and implementation of federal or state funding for trail projects
- Goals and objectives for the study
- Opportunities and challenges to establishing the trail

After the presentation, Alta received input related to trail connectivity and alignment through an open discussion, interactive exhibits, and a public survey. The results of the survey are show below.

1.3.3 Field Work

The design team and members of the project steering committee visited the project site, walking potential trail alignments and documenting existing conditions. Field work allowed the designers to begin to field test initial ideas and to determine if there are any fatal flaws in future proposed designs. Taking site photos and measurements are key elements of the fieldwork process.

1.3.4 GIS Mapping

FOTGC and project partners provided necessary GIS data and other information to complete the mapping. Initial mapping was created to help guide the field work, meetings with the steering committee, and the public input sessions. The project team gathered information about existing and proposed greenways, bikeways, existing and proposed recreation facilities, capital improvement projects, and community destinations, such as schools and employment centers.

GREEN CRESCENT TRAIL NETWORK FEASIBILITY STUDY

1. Where do you live?

Clemson | Central | Pickens County | Other_____

2. What is your gender?

Male | Female | Prefer not to say

3. What is your age?

Under 19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+

4. What type of walking/biking facilities do you prefer?

Sidewalks | Paved Shoulders | On-Street Bike Lanes | Paved Greenways | Unpaved Trails

5. Have you ever used a walking path or trail in Clemson or Central such as the SWU hiking trails or Experimental Forest Trails?

Yes | No

If yes, how often?

Few times a year | Once a week | Once a month | More than once a week

6. Do you visit nearby destinations outside of Clemson/Central to use a trail or greenway?

Yes | No

If yes, how often?

Few times a year | Once a week | Once a month | More than once a week

7. Would you use trails more often if they were closer to you?

Yes | No

8. When you walk or bike what is the primary purpose of your trip? Select all that apply.

To get to work | Exercise | To enjoy nature | Dog walking | Socializing | I don't walk or bike

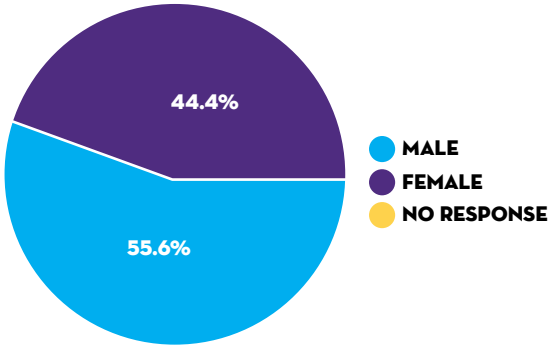
9. What do you think are the biggest factors discouraging bikers and walkers? Circle your top 3.

Lack of connected facilities | Lack of information or promotion | Unsafe crossings | Lack of time

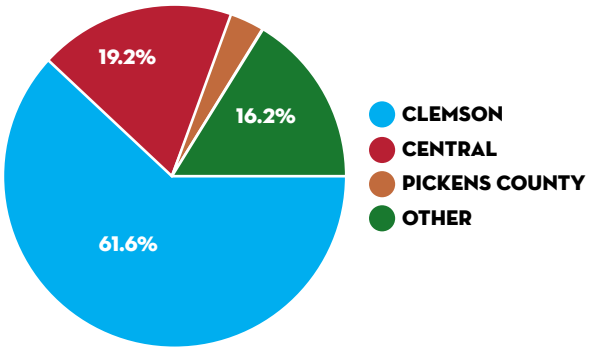
Lack of interest | Motor vehicle traffic | Lack of nearby destinations | Personal safety concerns

GO CONNECT TO THE GREEN CRESCENT - WWW.GREENCRESCENTTRAIL.ORG

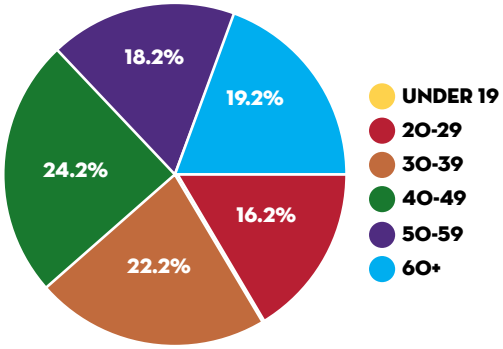
WHAT IS YOUR GENDER



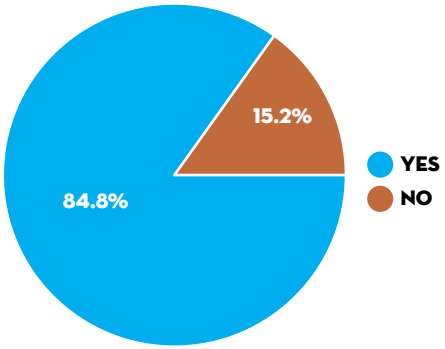
WHERE DO YOU LIVE?



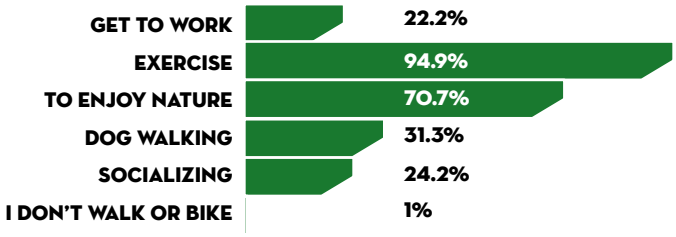
WHAT IS YOUR AGE?



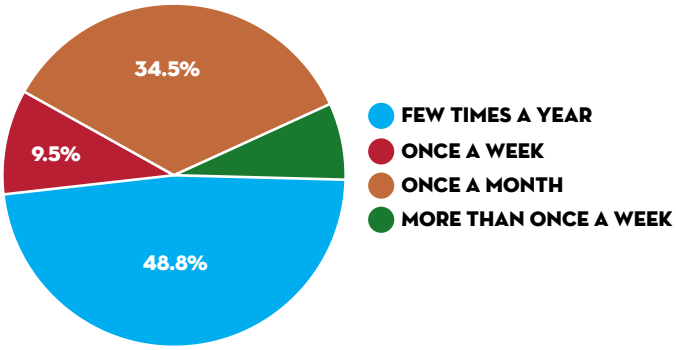
DO YOU VISIT NEARBY DESTINATIONS OUTSIDE OF CLEMSON/CENTRAL TO USE A TRAIL OR GREENWAY?



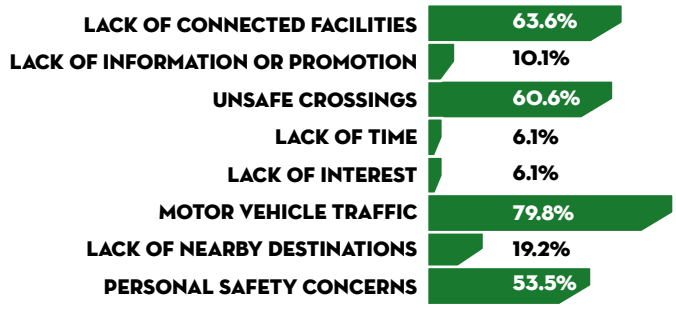
WHEN YOU WALK OR BIKE WHAT IS THE PRIMARY PURPOSE OF YOUR TRIP? SELECT ALL THAT APPLY.



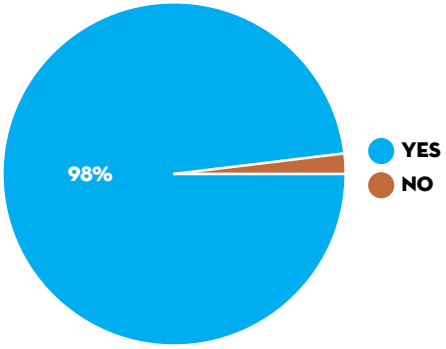
IF YES, HOW OFTEN?



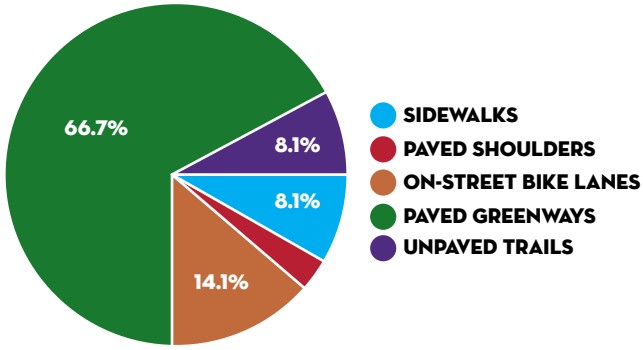
WHAT DO YOU THINK ARE THE BIGGEST FACTORS DISCOURAGING BIKERS AND WALKERS? CHOOSE 3.



WOULD YOU USE TRAILS MORE OFTEN IF THEY WERE CLOSER TO YOU?

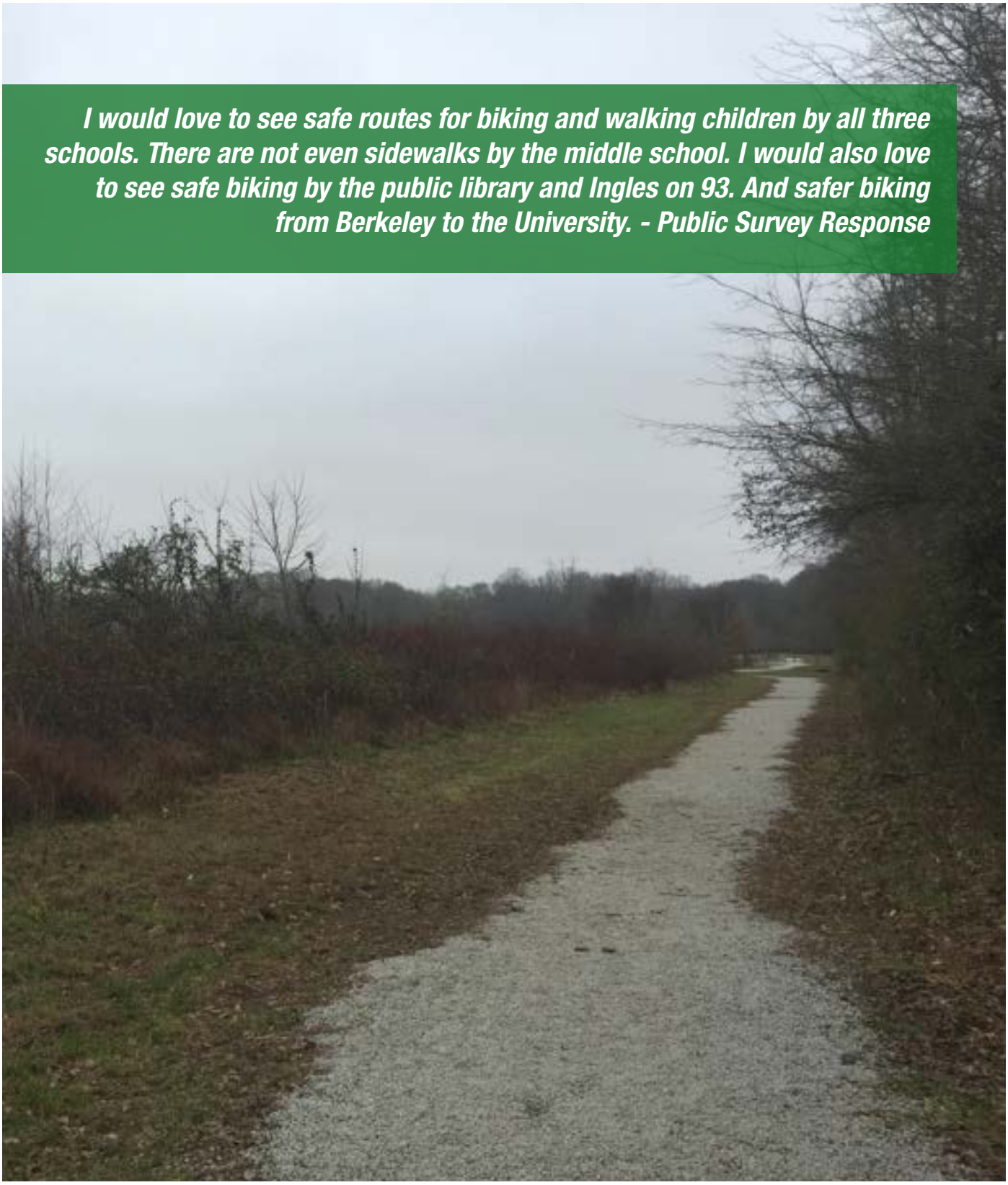


WHAT TYPE OF WALKING/BIKING FACILITIES DO YOU PREFER?



I'd like to see the greenway along 18 mile creek built first. I think this greenway will be the spine for the whole system. Once it is built, We'll need to connect to it via Pendleton and Berkely, etc. *- Public Survey Response*

I would love to see safe routes for biking and walking children by all three schools. There are not even sidewalks by the middle school. I would also love to see safe biking by the public library and Ingles on 93. And safer biking from Berkeley to the University. - Public Survey Response



Existing private trail in Patrick Square.

2: Existing Conditions

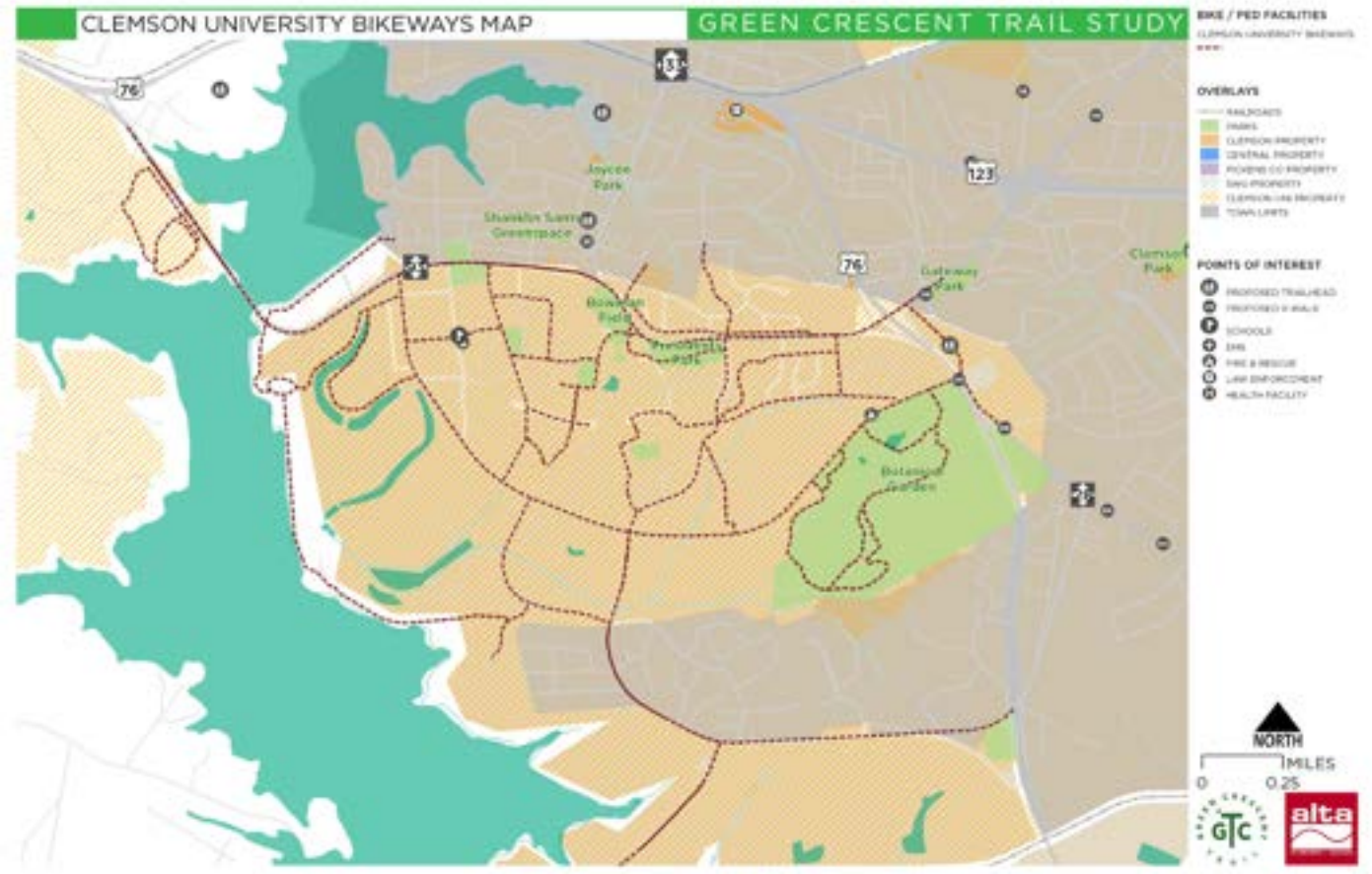
This chapter provides an overview of the major components of the existing environment for bicycling, walking, and trail development within the study area of Pickens and Anderson Counties. The assessment of existing conditions is based on information collected primarily from previous planning efforts, existing regional geographic information systems (GIS) data, field work, aerial imagery, and input from the Project Steering Committee and stakeholders.

The existing conditions analysis includes the following planning and policy review of key study areas and priority corridors. The chapter concludes with an overview of strengths and challenges for the development of the Green Crescent Trail.

2.1 STUDY AREAS

2.1.1 City of Clemson

The City of Clemson includes an abundance of job centers, educational institutions, residential communities, and commercial centers. In addition to ensuring that the City is safe for pedestrians, in 2011, the City of Clemson and Clemson University received renewed interest from the community to update, improve and enhance the City's bikeway infrastructure and to make biking facilities safer and more comfortable for all of its users. The focus of the City of Clemson's Bikeways Master Plan is the development of a bikeway network that serves utilitarian purposes,



Clemson University Bikeway Network

connecting citizens and visitors to routine destinations via safe, comfortable, and convenient bikeway facilities.

2.1.2 City of Central

The City of Central has approximately 3000 permanent residents, including many students from Southern Wesleyan University located in Central, the nearby Clemson University and Tri-County Technical College. Recreation amenities in Central include The Grand Central Station Disc Golf Course, The Central-Clemson Indoor Recreation Center, and numerous neighborhood parks.

2.1.3 Clemson University

Clemson University has an abundance of land, infrastructure, and destinations for students, staff, and the community. Existing planning efforts address on-campus trails, connections to the North and South Experimental Forest, as well as connections to key cultural and recreational destinations. The Green Crescent trail will capitalize on the existing efforts of the University, while ensuring safe pedestrian and bicycle connections to campus from the trail network

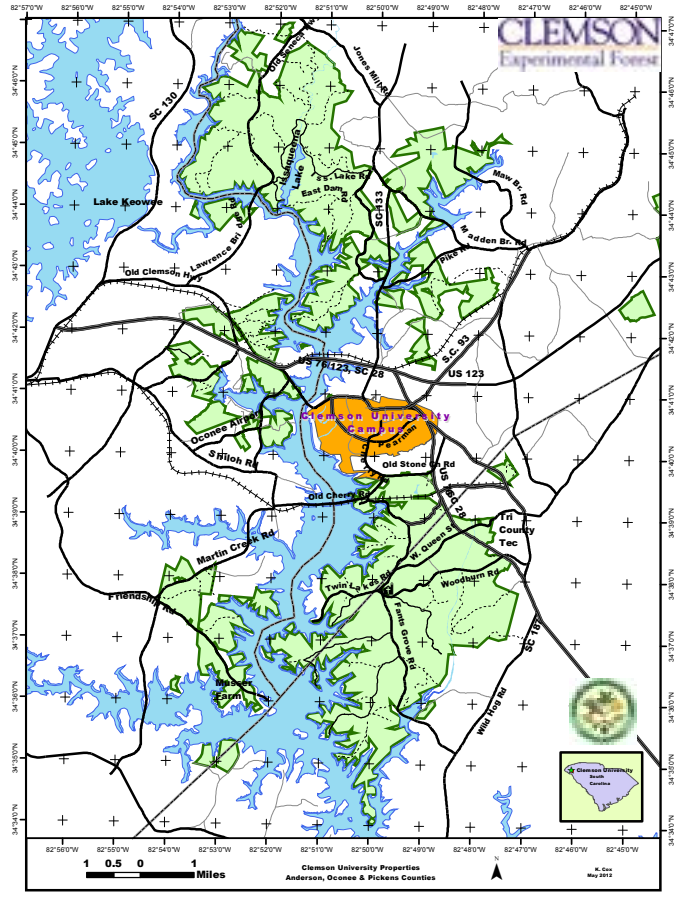
Experimental Forest

The Clemson Experimental Forest's 17,500 acres are dedicated to education, research and demonstration in order to better understand and manage forest resources for the benefit of society. The forest is managed strictly for perpetual sustained or improved yield of these products. The Clemson Experimental Forest personnel, equipment, supplies, roads, recreation facilities and maintenance are solely supported by revenue generated by the Forest.

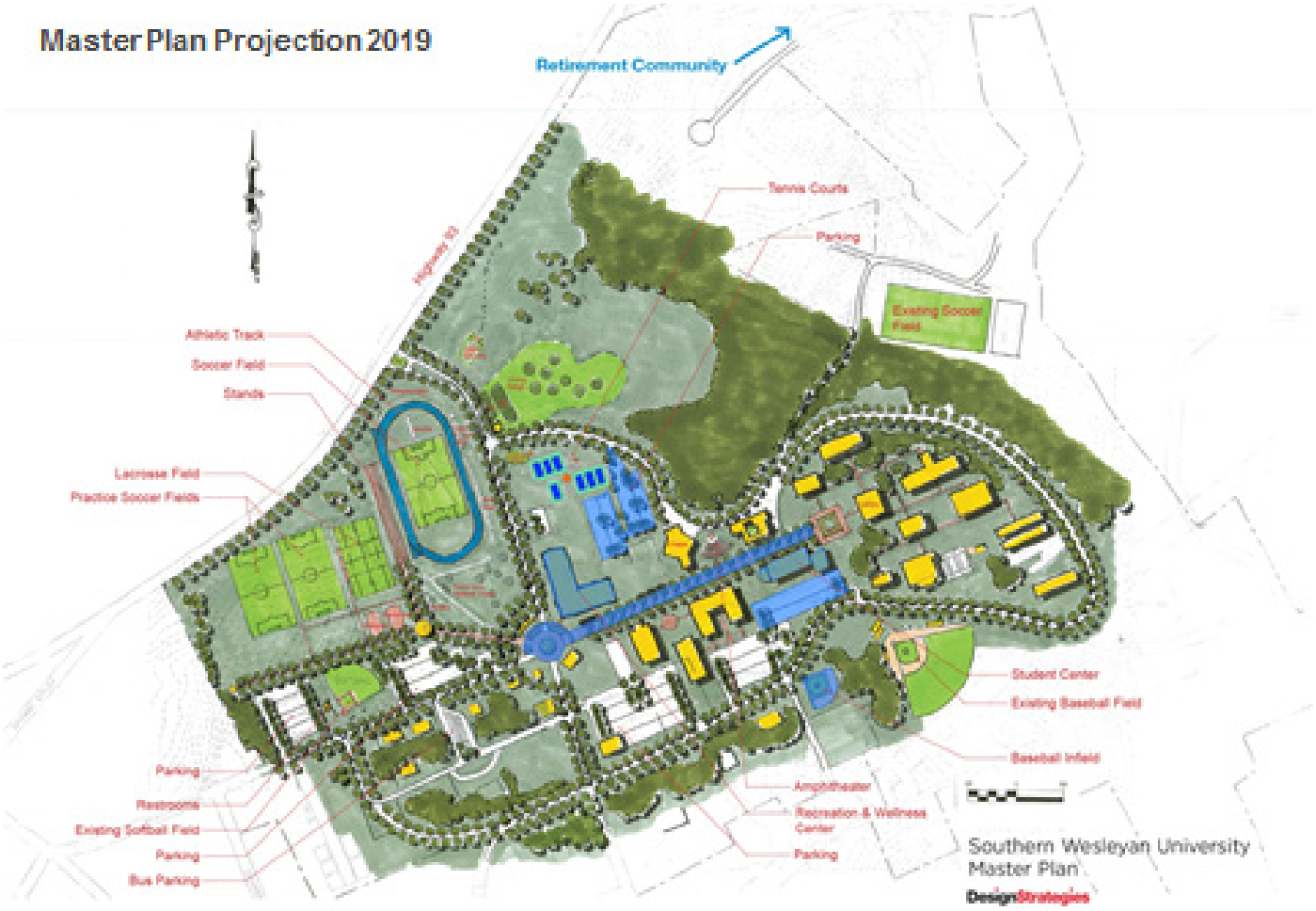
2.1.4 Southern Wesleyan University

Southern Wesleyan University is home to approximately 700 residential students pursuing degrees in more than forty areas of study. SWU implemented an updated master plan that seeks to transform Wesleyan Drive into a pedestrian walkway from Clayton Street to Fountain

City of Clemson Bikeway Network



Clemson University Property, including the campus and the experimental forest.



Southern Wesleyan University Master Plan

Square, while adding a Recreation and Wellness Center at corner of Clayton Street and Wesleyan Drive. In addition, there is a proposed Residence Hall across from Newton Hobson Chapel and Fine Arts Center, as well as a proposed Retirement Community at S.C. Highway 93 and Thomas Lane.

Hundred Acre Woods

The Hundred Acre Wood is on the campus of Southern Wesleyan University. This developing area will be the home to walking trails and a low ropes course for the SWU community.

Trails within Hundred Acre Woods at Southern Wesleyan University

2.2 EXISTING CORRIDORS

2.2.1 Highway 93

Within the Green Crescent Trail study area, Highway 93 connects the City of Central to the City of Clemson. The roadway varies 3 lanes to 5 lanes of travel, with some bike lanes. The corridor is home to Southern Wesleyan University, Clemson University, commercial centers, and numerous student housing developments for students and other residents.

2.2.2 Pendleton Road

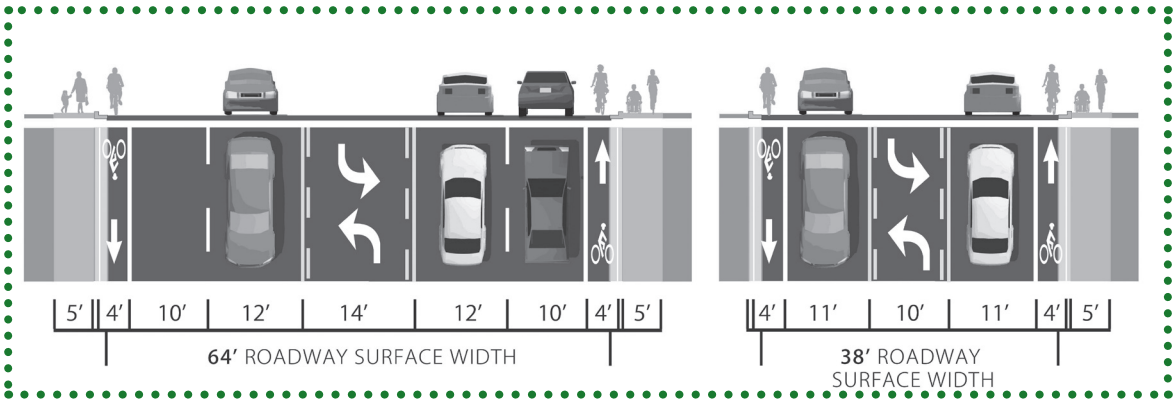
Pendleton Road is a two lane corridor with existing pedestrian facilities. The roadway connects Pendleton, SC and 18 Mile Creek to Clemson University.

2.2.3 Berkeley Drive

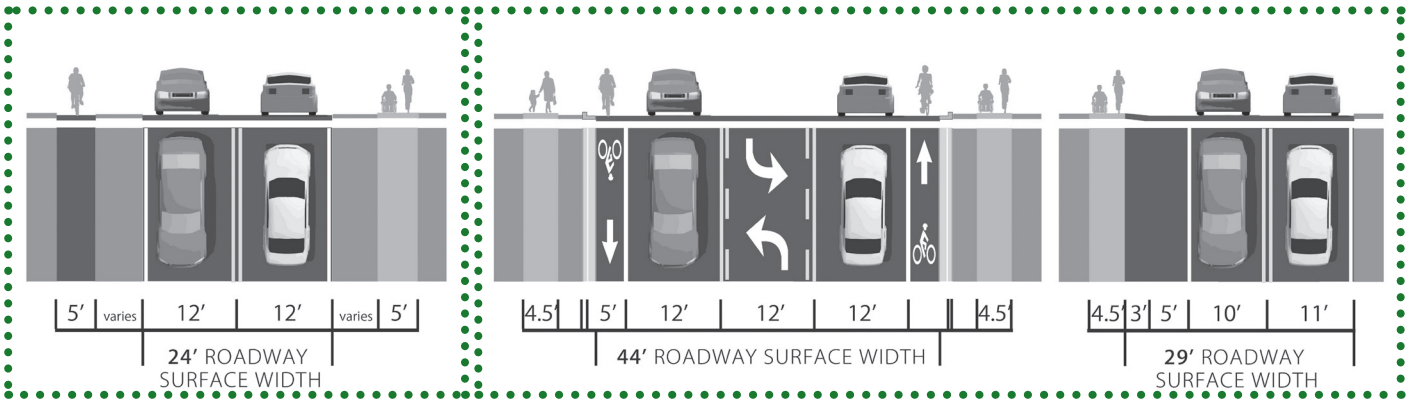
Berkeley Drive connects Highway 93 to Clemson Elementary School, numerous residential communities, and park facilities to 18 Mile Creek. The existing cross section varies from two lanes with parking to three lanes with bike lanes. A new pedestrian bridge is being designed to connect each side of Berkeley Drive over Highway 123 in Clemson.

2.3 OPPORTUNITIES + CONSTRAINTS ANALYSIS

The following photo inventory presents opportunities and constraints identified during field work within the study area. The numbering of the table figures corresponds with the callout boxes in the subsequent opportunities and constraints maps. Observed opportunities are shown in **GREEN** and constraints in **ORANGE**.



Highway 93: Typical existing conditions



Pendleton Road: Typical existing condition

Berkeley Drive: Typical existing conditions

1. Highway 93 between Central and Clemson presents a challenge for bicycle and pedestrian safety, due to the expansive roadway and high travel speeds. Existing bike lanes, where they are present, are narrow and under-utilized.

2. Excess Right of Way (ROW) along Church St may provide room for trail development within existing municipally owned land.

3. Existing utility easements provide opportunities for greenway and trail connections.

3. Existing access drives provide opportunities for paved trails with minimal on-site disturbance.

5. Private property owners who support the Green Crescent Trail may be able to facilitate trail connections between segments of the GCT.

6. Existing bridge infrastructure along 18 Mile Creek provides opportunities for trail crossings that are separated from vehicular traffic.

7. 18 Mile Creek crossings will need to account for existing erosion control issues, debris, and upstream development impacts.

8. At grade, midblock trail crossings will need to be designed to alert motorists of potential pedestrian and bicycle conflicts, to provide safe trail access.

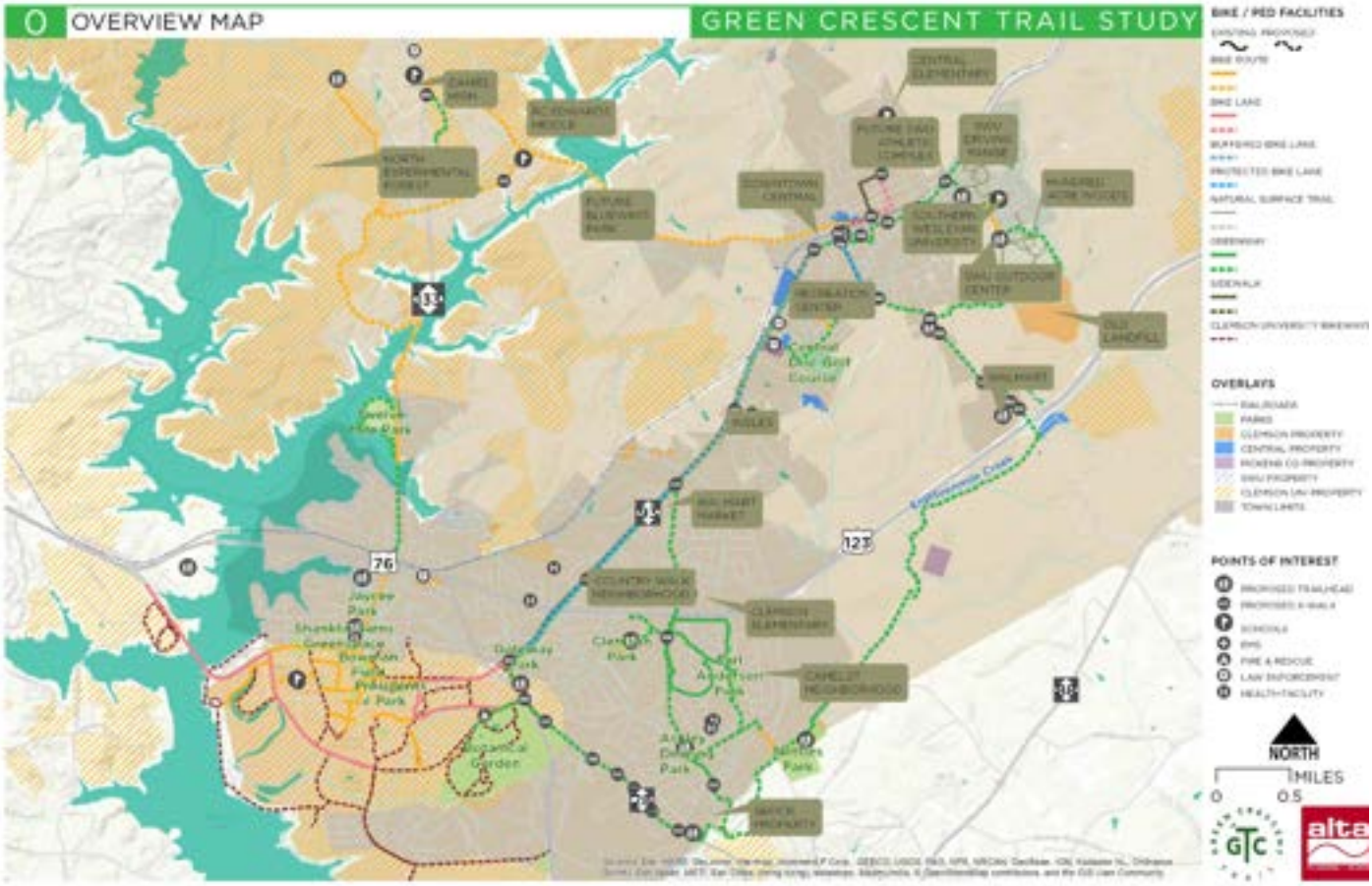
9. Existing park improvement projects (Tottles Place / Ashley Dearing Park) provide opportunities for off-street trail connections.

10. Under-utilized parking lanes and stormwater infrastructure provide opportunities for on-street bike connections to key destinations.

11. Existing storm drain infrastructure will need to be improved/modified to accommodate bicycle and pedestrian safety for on-street trail connections.

12. North Forest roadway connections provided limited ROW and steep grades for bicycle and pedestrian access.

Note: 11x17 version of this map and each section map can be found in Appendix A



Overall Green Crescent Route Map

The recommendations serve to create a network of walkways, bikeways, and trails, while improving the safety and comfort of bicycling and walking routes and promoting bicycling, walking, and trail usage as recreation and transportation.

3: Recommendations

3.1 INTRODUCTION

After existing conditions information was collected and analyzed, the Alta team developed detailed trail alignments and preliminary design for the following greenway routes:

- City of Central's Downtown Business District to Southern Wesleyan University (SWU)
- SWU to Wal-Mart by way of SWU forest land and Road 18/Church Street
- City of Central's Downtown Business District along Highway 93 toward the City of Clemson
- City of Clemson along 18-Mile-Creek (Nettles Park to Pendleton Road)
- Pendleton Road (Highway 93 to Pacolet Milliken Property)
- Berkeley Drive Corridor (Clemson Elementary, Countrywalk, Camelot, and the Downs)
- Downtown Clemson/College Avenue to North Experimental Forest

The team considered both near-term and long-term solutions that include on-street improvements to existing roadways and/or off-street improvements such as a path adjacent to the roadway. This evaluation determined the recommended alternatives on a segment by segment basis; highlighted intersection improvements needed for the final alternative; and evaluated the feasibility based on identified funding, property ownership, and local, state and federal design and environmental requirements.

The recommendations presented in this section reflect the primary goals of the project, to create a network of walkways, bikeways, and trails, while improving the safety and comfort of bicycling and walking routes and promoting bicycling, walking, and trail usage as recreation and transportation.

These recommendations ensure implementation by providing context sensitive strategies that capitalize on existing community strengths, resources, and amenities.

The following sections provide recommendations as to what facilities the FOTGC and its partners can feasibly implement in a cost-effective manner to meet the goals of this project. This chapter also provides resources that will aid in the final design, contracting, permitting, and construction of the trail. The chapter is broken down into the following sections:

- Trail types
- Priority trail alignments
- Detailed area concepts

3.2 TRAIL TYPES

The Green Crescent Trail traverses a diverse range of environments, including downtowns, arterial roadways, stream corridors, and utility easements. Due to the diverse nature of the landscape, there will be a diverse range of design solutions to accommodate safe bicycle and pedestrian facilities that fit within the existing context and utilize resources to the fullest potential. Proposed improvements will utilize the following bicycle and pedestrian facilities:

3.2.1 Shared-use Paths/Greenways

Shared-use paths are completely separated from motorized vehicular traffic. They are generally constructed within undeveloped corridors, such as within parks, open spaces, waterways, or utility corridors, though they may be located within a roadway right-of-way. Shared-use paths include bicycle paths, rail-trails or other facilities built for bicycle and pedestrian traffic.

3.2.2 Protected Bicycle Lanes/Cycle Track

Protected bicycle lanes are exclusive on-street bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes. Protected bicycle lanes are constructed in the roadway right-of-way and are separated from motorized vehicular traffic by a physical barrier, such as a concrete or landscaped buffer.

3.2.3 Bicycle Lanes/Buffered Bicycle lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. The minimum width for a bicycle lane is four feet; five- and six-foot bicycle lanes are typical for collector and arterial roads. Bicycle lanes can be striped on existing roadways, sometimes with modifications to travel lane widths and configuration. As a general practice, any local arterial or collector that is widened should incorporate bicycle lanes (or another separated bikeway, such as a protected bike lane/cycle track) with speed limit reduction considerations. Buffered bicycle lanes provide additional striping between the vehicular travel lane and the bicycle lane to provide an additional buffer between the different facility types.

3.2.4 Bicycle Routes

Bicycle routes, or signed shared roadways, are bicycle facilities that are shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided. Bicycle Route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

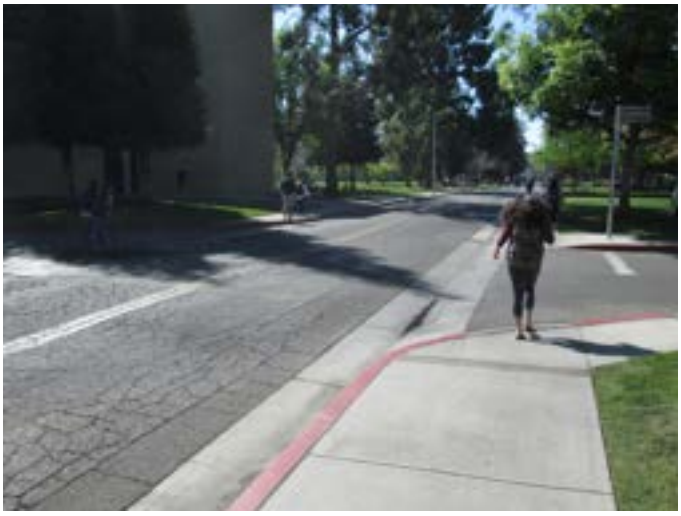
Shared-use Paths/Greenways

Protected Bicycle Lanes/Cycle Track

Bicycle Lanes

Buffered Bicycle Lanes

Bicycle Routes



Sidewalk

Natural Surface Trail

3.2.5 Sidewalk

Located within the roadway right of way, sidewalks serve pedestrian users and are a critical component of creating a walkable community. For the safety of pedestrians, as well as bicyclists, it is not recommended that adult bicyclists ride on sidewalks. In some areas, including downtown, bicycling on sidewalks is prohibited.

3.2.6 Natural Surface Trails

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired. Natural surface trails designed for bicycles are typically known as single track trails.

3.3 PRIORITY ALIGNMENTS

The following alignments are key segments of the proposed Green Crescent Trail. The alignments are broken down into implementable sections to connect key destinations throughout the network. The following pages provide additional details about the recommended facilities for each alignment.

City of Central's Downtown Business District to Southern Wesleyan University (SWU)

TYPE: Shared Use Paths and Bike Lanes

LENGTH: 1.4 miles

COST ESTIMATE: $3,097,000

IMPLEMENTATION STRATEGY: Roadway Reconstruction, Lane Reconfiguration and Restriping, New Greenway Construction

DESCRIPTION: The City of Central's Downtown Business District to Southern Wesleyan University (SWU) alignment utilizes existing park and campus infrastructure to provide a separated trail facility for much of the proposed route. On street connections are required where limited ROW and existing development prevent a dedicated off-street facility. As depicted above, school logos can be used to provide identity to this section of the trail network, while as functioning as wayfinding to SWU.

Note: 11x17 version of this map can be found in Appendix A

SWU to Wal-Mart by way of SWU forest land and Road 18/Church Street

TYPE: Shared Use Paths and Protected Bike Lanes, and Bike Routes

LENGTH: 3.7 miles

COST ESTIMATE: $5,376,000

IMPLEMENTATION STRATEGY: Roadway Reconstruction, Lane Reconfiguration and Restriping, New Greenway Construction

DESCRIPTION: Existing pavement along Church Street should be redistributed to accommodate a protected bicycle lane adjacent to the existing Sidewalk near downtown Central. The remainder of the corridor should include a separated shared use facility that parallels Church Street on the west side of the roadway. Where possible, add spot medians and landscaping for shade, aesthetics, and traffic calming.

Note: 11x17 version of these maps can be found in Appendix A

City of Central's Downtown Business District along Highway 93 toward the City of Clemson

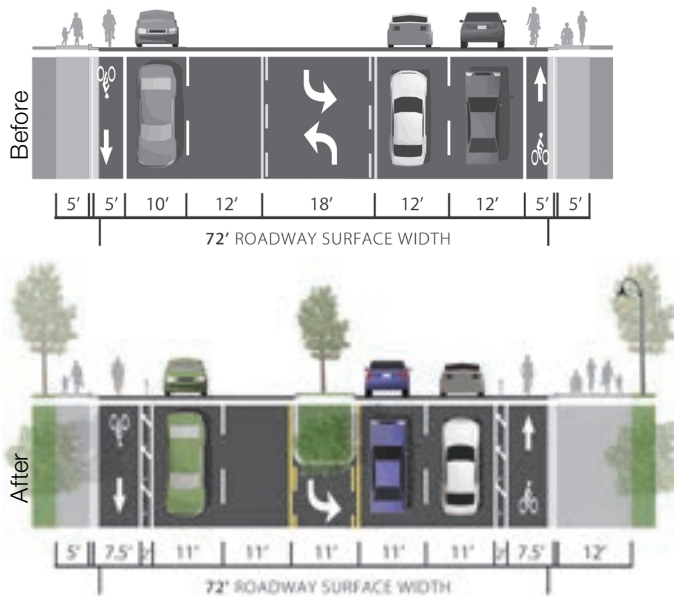
TYPE: Shared Use Paths, Buffered Bike Lanes and Bike Lanes

LENGTH: 3.6 miles

COST ESTIMATE: $6,294,000

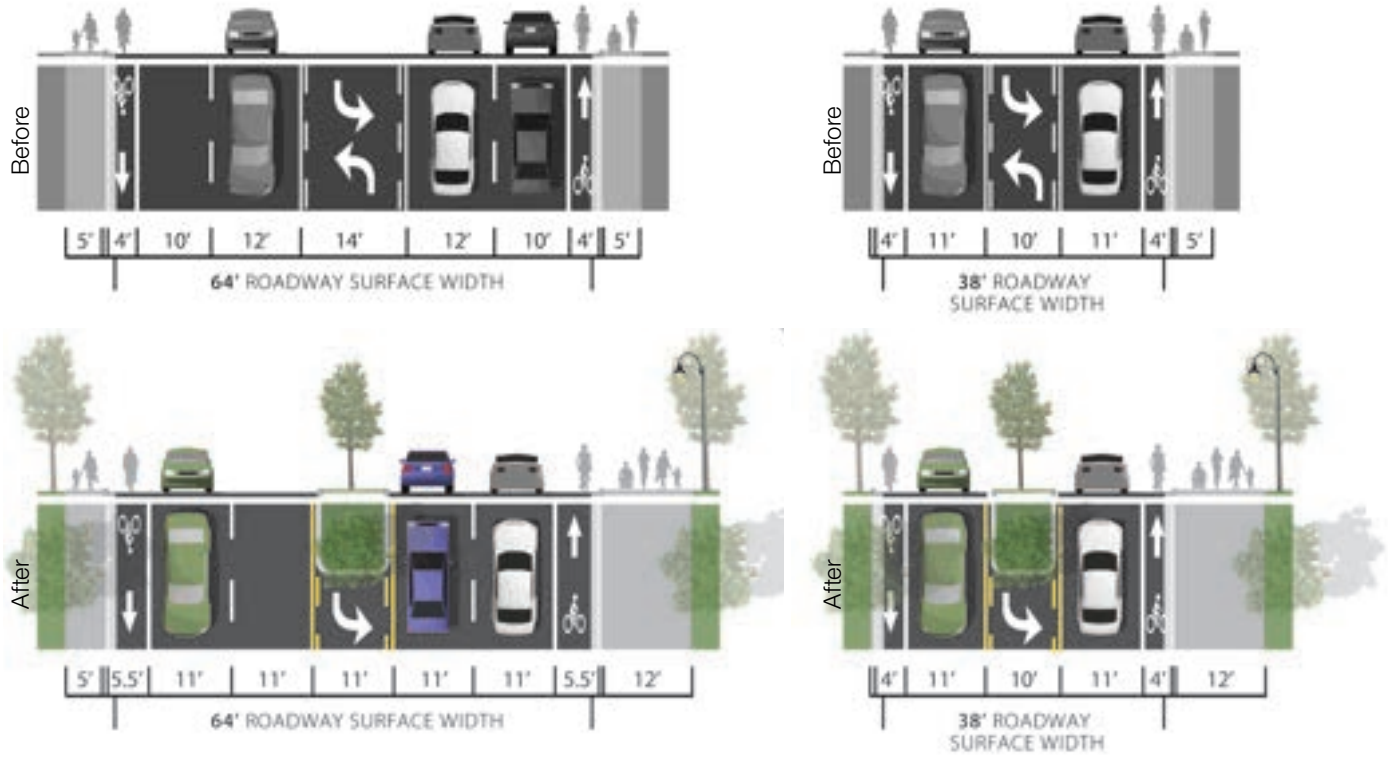
IMPLEMENTATION STRATEGY: Roadway Reconstruction, Lane Reconfiguration and Restriping, New Sidewalk Construction

DESCRIPTION: The priority recommendation for the Highway 93 corridor is to redistribute existing asphalt to provide wider bike lanes and protected bike lanes where possible. The existing sidewalk on the south side of the roadway should be widened to accommodate a shared bicycle and pedestrian facility, as well as improved high visibility pedestrian crossings with signage. Where possible, add spot medians and landscaping for shade, aesthetics, and traffic calming.



Proposed Cross Section at Gateway Park

Existing bike Lanes in these locations are a striped shoulder and are officially identified as a 'bike route'.



Proposed Cross Section at Berkeley Drive

Proposed Cross Section at Copperfield Drive

Note: 11x17 version of this map can be found in Appendix A

City of Clemson along 18-Mile-Creek (Nettles Park to Pendleton Road)

TYPE: Shared Use Paths

LENGTH: 4.7 miles

COST ESTIMATE: $7,016,000

IMPLEMENTATION STRATEGY: New Greenway Construction

DESCRIPTION: Following existing creeks, as shown on the route map, the proposed greenway will provide a separated trail facility with numerous community and recreation connections.

Note: 11x17 version of these maps can be found in Appendix A

Pendleton Road (Highway 93 to Pacolet Milliken Property)

TYPE: Shared Use Paths

LENGTH: 1.9 miles

COST ESTIMATE: $2,857,000

IMPLEMENTATION STRATEGY: Roadway Reconstruction, New Sidewalk and Greenway Construction

DESCRIPTION: Along Pendleton Road, the existing asphalt sidewalk should be widened to 10-12' for shared bicycle and pedestrian use. Where possible, it is recommended to provide a vegetative buffer between the greenway and the vehicular traffic. At grade roadway crossings should also include high visibility crosswalks, signage, and pedestrian signals where appropriate.

Note: 11x17 version of this map can be found in Appendix A

Berkeley Drive Corridor (Clemson Elementary, Countrywalk, Camelot, and the Downs)

TYPE: Shared Use Paths

LENGTH: 2.3 miles

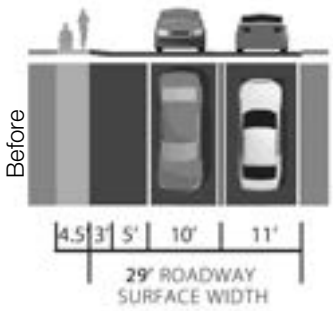
COST ESTIMATE: $4,330,000

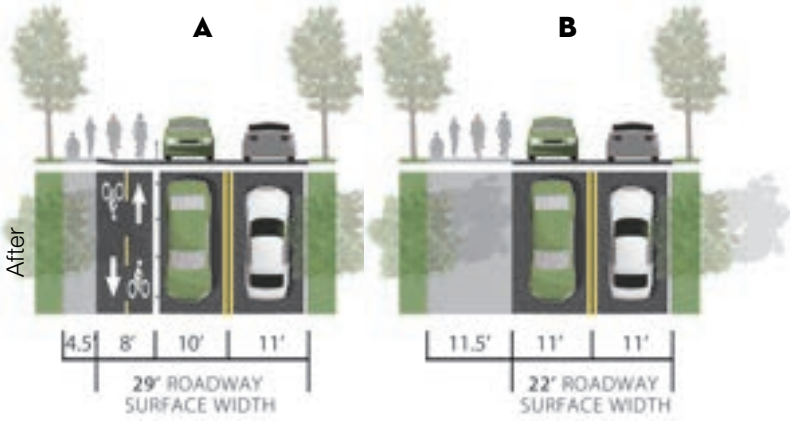
IMPLEMENTATION STRATEGY: Roadway Reconstruction, Lane Reconfiguration and Restriping, New Sidewalk Construction

DESCRIPTION: Proposed improvements along Berkley Drive include road reconfiguration to create a two-way protected bicycle facility and/or a shared use path. North of highway 123, it is recommended to add a shared use path along the south side of the roadway to supplement the existing bicycle lanes for users of all ages and abilities.

South of highway 123, the GCT can be implemented in phases. The first phase can redistribute an existing under-utilized parking lane for use as a two-way bicycle facility. Improvements would include striping, flexible delineator posts, and modifications to storm drainage inlets to accommodate a protected bicycle facility. See the cross section "Proposed A" on the following page. With additional resources, the curb and be moved to accommodate a concrete shared use path adjacent to the roadway. Where ROW is available, the path could be buffered from vehicular traffic with a vegetative buffer, as shown above.

Existing pathways within Country Walk could also be connected to the proposed Green Crescent Trail so that the Country Walk Neighborhood has access to the expanded trail system, and so that the community has access to the existing trail system.





Berkeley Drive: North of Highway 123

Berkeley Drive: South of Highway 123

Note: 11x17 version of this map can be found in Appendix A

Downtown Clemson/College Avenue to North Experimental Forest

TYPE: Shared Use Paths and Bike Routes

LENGTH: 4.1 miles

COST ESTIMATE: $3,794,000

IMPLEMENTATION STRATEGY: Roadway Reconstruction, New Greenway Construction

DESCRIPTION: The existing roadway should be restored and repaved to accommodated cyclists. Share the road and bicycle route signage should be added to corridors that connect to the North Forest. A proposed greenway will connect Daniel high School to RC Edwards Middle School, providing a recreation amenity as well as safe bicycle and pedestrian connection for students.

View of 18 Mile Creek from Nettle Park.

I'd like to see the greenway along 18 mile creek built first. I think this greenway will be the spine for the whole system. Once it is built, We'll need to connect to it via Pendleton and Berkely, etc. *- Public Survey Response*

4: Implementation

4.1 OVERVIEW

The connections within the Greater Clemson-Central-Pendleton area provide a crucial spine for users wishing to walk and bicycle to destinations such as neighborhoods and parks. It also has the potential to tie into other important destinations.

The Alta team worked with project stakeholders to identify future phases of the proposed trail connections, tying it in with other existing and planned walking and bicycling improvements in the area (including existing and proposed Clemson University facilities). This chapter provides recommendations on next steps towards implementing these project segments.

In addition to developing action steps, priority segments, and cost estimates, this chapter explores funding options from public and private sources to finance design, engineering, and/or construction of the potential greenway routes. By contacting a network of funding specialists around South Carolina, the Southeast, and the U.S. to determine the availability and requirements for grants, the team identified potential matching and major funding sources, associated criteria and requirements.

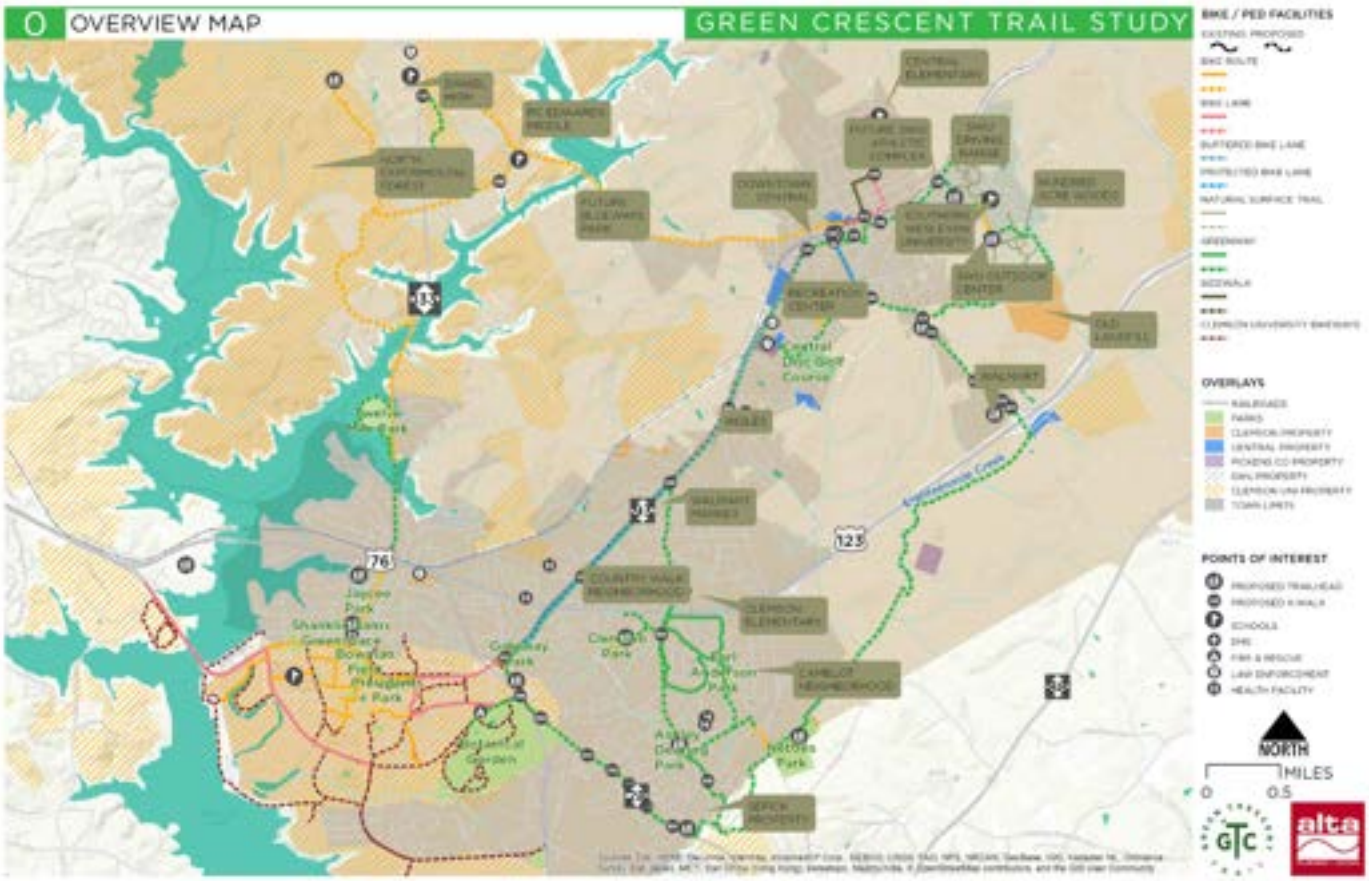
4.2 ACTION STEPS

The next step for implementing the Green Crescent Trail is to begin to develop engineering drawings for priority alignments, while seeking funding for design, engineering, and construction of the proposed alignment.

1. Local governments (Clemson, Central, Pendleton, Pickens County, Anderson County, etc.) should adopt this Plan and integrate the recommendations into local planning and transportation studies.
2. Develop preliminary engineering (30% drawings) for phase 1 of a single priority greenway routing identified as a low-hanging fruit by the Steering Committee.
   - This will aide in the grant writing process in requesting adequate funding and providing a shovel ready project. This will also help to spur the development of this project by addressing some of the initial, complex design and alignment issues that may seem daunting to engineering or design staff who may be unfamiliar with greenway design. Installation of this initial project will help generate momentum for future projects in the greenway network.
3. Write grants to seek initial project funding for design and implementation, such as a SC PRT Recreational Trails Program grant application.
4. Once funding is acquired, implement the phase one alignment to foster momentum for the project.
5. Engage the public and the media to capitalize on initial projects and to gather additional support and momentum for future phases.
6. Leverage local resources and public support to lobby local governments to implement additional phases of the plan, while continuing to seek additional private and institutional funding.

4.3 PHASING, PRIORITIZATION + COST ESTIMATES

The primary pathway alignment was broken down into nine segments which can be implemented in phases based on planned construction activities, perceived need, and logical termini. For these nine trail sections, the project team developed planning level cost estimates, based on construction costs for similar projects in the region, to provide a sense of funding needs as the project moves forward towards implementation.



Overview Map: Nine segments can be implemented in phases.

The map above presents the nine recommended trail segments which can be additionally broken down into phases. Refer to Appendix A.2 for detailed phase maps of each section. If funds are available to implement multiple phases concurrently, this has the opportunity to provide additional cost savings.

4.3.1 Opinion of Probable Costs

Tables on the following pages indicate development costs by phase. All cost estimates should be considered with the following notes and limitations in mind:

- This "Opinion of Probable Cost" (OPC) should not be considered a guaranteed maximum cost, but instead is a professional opinion of probable construction costs at the time of this study. Costs should be revisited every two years and updated accordingly. It should be anticipated that bids and actual costs will vary from this OPC.
- The "Contingency", as utilized, is a percentage of calculated costs, which is added to the subtotal. The Contingency helps compensate for unknown elements or conditions, variations in quantities used, and other unforeseen circumstances.
- A separate "Contingency Fund" should be developed above and beyond the total figure in the OPC. This fund will provide for modifications to the design, higher than anticipated costs, and other program alterations after construction initiation.

OPINION OF PROBABLE COSTS

The below cost estimates were calculated with the following costs as factors.

- Grading & Drainage (Including Curb & Gutter) = $118 / LF
- Asphalt Surface & Base (12' width) = $43 / LF
- Concrete Surface & Base (6' width) = $25 / LF
- Signage = $400 / EA
- Flexible Bollard = $100 / EA
- Thermoplastic Striping = $3 / LF
- Pavement Markings = $300 / EA

Item Description	Quantity	Unit	Unit Cost	Total
1 | Central to SWU				
Phase 1				
12' Multi Use Path Greenway	1,343	LF	$144	$193,392
12' Multi Use Side Path	3,110	LF	$160	$497,600
Phase 2				
12' Multi Use Path Greenway	1,602	LF	$144	$230,688
12' Multi Use Side Path	2,910	LF	$160	$465,600
6' Sidewalk	331	LF	$90	$29,790
Phase 3				
Natural Surface Trail	831	LF	$55	$45,705
12' Multi Use Side Path	2,661	LF	$160	$425,760
Additional Items				
Bridge	100	LF	$2,000	$200,000
Trailhead @ Existing Park	1	LS	$25,000	$25,000
Trailhead @ Clayton Welcome Center	1	LS	$25,000	$25,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	6	EA	$2,500	$15,000
Signage (Wayfinding, Safety, etc.)	1	LS	$12,500	$12,500
Subtotal				$2,166,035
Mobilization	7%			$151,622
Clearing & Grubbing	1%			$21,660
Additional Amenities & Landscaping	5%			$108,302
Design & Engineering Fee	10%			$216,604
Contingency	20%			$433,207
Project Total				$3,097,430

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
2 | Central / SWU to Walmart				
Phase 1				
12' Multi Use Path Greenway	7,714	LF	$144	$1,110,816
12' Multi Use Side Path	898	LF	$160	$143,680
Natural Surface Trail	124	LF	$55	$6,820
Bike Route	1,364	LF	$3	$4,092
Phase 2				
Protected Two Way Bike Lane	1,766	LF	$18	$31,788
Bike Route	2,120	LF	$3	$6,360
12' Multi Use Path Greenway	4,474	LF	$144	$644,256
12' Multi Use Side Path	2,822	LF	$160	$451,520
Phase 3				
12' Multi Use Side Path	4,101	LF	$160	$656,160
Additional Items				
Vehicular Lane Restriping	1,800	LF	$12	$21,600
Bridge	50	LF	$2,000	$100,000
Trailhead @ SWU Outdoor Center	1	LS	$75,000	$75,000
Trailhead @ Walmart	1	LS	$25,000	$25,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	9	EA	$2,500	$22,500
Signage (Wayfinding, Safety, etc.)	1	LS	$25,000	$25,000
Subtotal				**$3,324,592**
Mobilization	7%			$232,721
Clearing & Grubbing	1%			$33,246
Additional Amenities & Landscaping	5%			$166,230
Design & Engineering Fee	10%			$332,459
Contingency	20%			$664,918
Project Total				**$4,754,167**

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
3 | Central to Central Elementary				
Phase 3				
6' Sidewalk	567	LF	$24	$13,608
One Way Bike Lane	10,474	LF	$5	$52,370
Additional Items				
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	2	EA	$2,500	$5,000
At Grade Railroad Crossing	1	EA	$20,000	$20,000
Signage (Wayfinding, Safety, etc.)	1	LS	$11,000	$11,000
Subtotal				**$101,978**
Mobilization	7%			$7,138
Clearing & Grubbing	1%			$1,020
Additional Amenities & Landscaping	5%			$5,099
Design & Engineering Fee	10%			$10,198
Contingency	20%			$20,396
Project Total				**$145,829**

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
4 | Central to Clemson				
Phase 1				
Buffered One Way Bike Lane	19,460	LF	$10	$194,600
Protected One Way Bike Lane	16,708	LF	$16	$267,328
Phase 2				
6' Sidewalk	3,778	LF	$90	$340,020
12' Multi Use Side Path	19,051	LF	$160	$3,048,160
12' Multi Use Path Greenway	102	LF	$144	$14,688
Additional Items				
Vehicular Lane Restriping	36,168	LF	$12	$434,016
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	21	EA	$2,500	$52,500
Signage (Wayfinding, Safety, etc.)	1	LS	$50,000	$50,000
Subtotal				**$4,401,312**
Mobilization	7%			$308,092
Clearing & Grubbing	1%			$44,013
Additional Amenities & Landscaping	5%			$220,066
Design & Engineering Fee	10%			$440,131
Contingency	20%			$880,262
Project Total				**$6,293,876**

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
5 | Walmart to Nettles Park				
Phase 1				
12' Multi Use Path Greenway	13,888	LF	$144	$1,999,872
Phase 2				
12' Multi Use Side Path	1,193	LF	$160	$190,880
Additional Items				
Bridge	50	LF	$2,000	$100,000
Pedestrian Bridge @ Hwy 123	400	LF	$2,000	$800,000
Trailhead @ Nettles Park	1	LS	$50,000	$50,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	1	EA	$2,500	$2,500
Signage (Wayfinding, Safety, etc.)	1	LS	$15,000	$15,000
Subtotal				$3,158,252
Mobilization	7%			$221,078
Clearing & Grubbing	1%			$31,583
Additional Amenities & Landscaping	5%			$157,913
Design & Engineering Fee	10%			$315,825
Contingency	20%			$631,650
Project Total				$4,516,300

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
6 | Nettles Park to Berkeley Drive				
Phase 1				
12' Multi Use Path Greenway	3,969	LF	$144	$571,536
Phase 2				
12' Multi Use Path Greenway	5,477	LF	$144	$788,688
Additional Items				
Bridge	150	LF	$2,000	$300,000
Trailhead @ Sefick Property	1	LS	$150,000	$150,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	1	EA	$2,500	$2,500
Signage (Wayfinding, Safety, etc.)	1	LS	$9,000	$9,000
Subtotal				$1,821,724
Mobilization	7%			$127,521
Clearing & Grubbing	1%			$18,217
Additional Amenities & Landscaping	5%			$91,086
Design & Engineering Fee	10%			$182,172
Contingency	20%			$364,345
Project Total				$2,605,065

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
7 | Clemson to Eighteen Mile Creek				
Phase 1				
12' Multi Use Side Path	9,675	LF	$160	$1,548,000
Phase 2				
12' Multi Use Side Path	2,314	LF	$160	$370,240
Additional Items				
Trailhead @ Clemson Parking Lot	1	LS	$50,000	$50,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	7	EA	$2,500	$17,500
Signage (Wayfinding, Safety, etc.)	1	LS	$12,000	$12,000
Subtotal				$1,997,740
Mobilization	7%			$139,842
Clearing & Grubbing	1%			$19,977
Additional Amenities & Landscaping	5%			$99,887
Design & Engineering Fee	10%			$199,774
Contingency	20%			$399,548
Project Total				$2,856,768

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
8 | Berkeley Drive				
Phase 1				
12' Multi Use Path Greenway	1,155	LF	$144	$166,320
12' Multi Use Side Path	4,865	LF	$160	$778,400
Phase 2				
12' Multi Use Side Path	4,773	LF	$160	$763,680
Phase 3				
12' Multi Use Side Path	2,462	LF	$160	$393,920
12' Multi Use Path Greenway	4,914	LF	$144	$707,616
Bike Route	962	LF	$3	$2,886
Bridge	50	LF	$2,000	$100,000
Additional Items				
Trailhead @ Ashley Dearing Park	1	LS	$25,000	$25,000
Trailhead @ Clemson Park	1	LS	$25,000	$25,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	18	EA	$2,500	$45,000
Signage (Wayfinding, Safety, etc.)	1	LS	$20,000	$20,000
Subtotal				$3,027,822
Mobilization	7%			$211,948
Clearing & Grubbing	1%			$30,278
Additional Amenities & Landscaping	5%			$151,391
Design & Engineering Fee	10%			$302,782
Contingency	20%			$605,564
Project Total				$4,329,785

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

Item Description	Quantity	Unit	Unit Cost	Total
9 | Clemson / Central to Forest				
Phase 1				
12' Multi Use Path Greenway	4,528	LF	$144	$652,032
12' Multi Use Side Path	2,306	LF	$160	$368,960
Bike Route	3,763	LF	$3	$11,289
12' Boardwalk	1,204	LF	$500	$602,000
Phase 2				
Bike Route	3,398	LF	$3	$10,194
Phase 3				
12' Multi Use Path Greenway	4,422	LF	$144	$636,768
Bike Route	31,368	LF	$3	$94,104
Additional Items				
Vehicular Lane Restriping	2,305	LF	$12	$27,660
Trailhead @ Experimental Forest	1	LS	$200,000	$200,000
Crosswalk (Thermoplastic, MUTCD Signage, etc.)	2	EA	$2,500	$5,000
Signage (Wayfinding, Safety, etc.)	1	LS	$45,000	$45,000
Subtotal				**$2,653,007**
Mobilization	7%			$185,710
Clearing & Grubbing	1%			$26,530
Additional Amenities & Landscaping	5%			$132,650
Design & Engineering Fee	10%			$265,301
Contingency	20%			$530,601
Project Total				**$3,793,800**

Land aquisition and legal fees are not included as a part of this opinion of probable costs. Recreational easments should be aquired as part of these project's development processes.

TABLE 4.1: PROPERTY OWNERS IMPACTED BY PROPOSED ROUTES

#	OWNER NAME	MAILING ADDRESS	LEGAL DESCRIPTION	PARCEL ID
1	BOOTH HENRY DAVID	PO BOX 297, SANDY SPRINGS, SC 29679	SE/SIDE ISAQUEENA TRAIL, PICKENS CTY & ANDERSON CTY (039-00-01-003)	4063-09-17-9291
2	BOOTH HENRY DAVID + CAROL ANN T	PO BOX 297	-	-
3	BOOTH HENRY DAVID + CAROL ANN T	PO BOX 297	-	-
4	BURTON TIMBERLAND LLC C/O DOYLE C BURTON	150 WHISPERING WIND TR, LONG CREEK, SC 29658	SE/SIDE CALHOUN MEM HWY PLAT 12/277	4064-00-52-1785
5	BURTON TIMBERLAND LLC C/O DOYLE C BURTON	150 WHISPERING WIND TR, LONG CREEK, SC 29658	S/CHAPMAN HILL RD HWY 123	4064-00-52-8903
6	CARC INC	500 DOWNS LOOP, CLEMSON, SC 29631-2035	N/SIDE DOWNS LOOP PLAT 59/136, PLAT 599/ 345	4063-05-09-6481
7	CLEMSON DOWNS PROPERTY OWNERS ASSOC	500 DOWNS LOOP, CLEMSON, SC 29631-2035	S/SIDE DOWNS LOOP	4063-05-08-1316
8	DONALD WADE	525 PORTER ROAD, PENDLETON, SC 29670	N/SIDE PORTER RD	4064-00-50-6135
9	DUCWORTH JOHN WILLIAM III	509 CHERRY RD, CLEMSON, SC 29631-1805	BERKLEY FOREST LOT 89 PLAT 234/10A PLAT 36/444	4053-08-97-9943
10	DURHAM HAROLD BUDDY JR + TRACY R	1040 N MECHANIC ST	-	-
11	DURHAM HAZEL J	1005 CENTRAL RD	-	-
12	ELZERMAN ALAN W	109 MORGAN DR, CENTRAL, SC 29630-3302	NE/SIDE PENDLETON RD PLAT 316/7	4053-07-58-0671
13	FISHER ERIC T	102 HILL PINE COURT, CLEMSON, SC 29631	BERKLEY FOREST LOT 90, PLAT 21/41	4053-08-97-8867
14	HART DEBORAH	133 RESCUE RD, PENDLETON, SC 29670-0000	N/SIDE PORTER RD	4064-00-50-9630
15	ISAQUEENA CORP	2201 4TH ST N STE 200, ST PETERSBURG, FL 33704	TRACT S/SIDE HWY 123 PLAT 65/61 PLAT 19/331	4064-00-71-3530
16	JONES MARIETTA H	100 HILL PINE CT, CLEMSON, SC 29631	BERKLEY FOREST LOT 91, PLAT 12R/110	4053-08-97-7759
17	K N ASSOCIATES OF SENECA	302 STONO CT, PIEDMONT, SC 29673	S/SIDE CHAPMAN HILL RD	4064-00-64-6627
18	MARTIN EWARD H	ANDERSON, SC 29621	-	4074-00-18-8573
19	MCCALL LISA M	CLEMSON, SC 29633, CLEMSON, SC 29633	-	4074-00-17-4518
20	PATRICK SQUARE REMAINDER	-	-	4064-18-41-0867
21	SEFICK STEPHEN A	220 ISSAQUEENA TR, CLEMSON, SC 29631	S/SIDE ISAQUEENA TRAIL PLAT 19/22 P/O PLAT 61/139	4063-09-05-3980
22	SEFICK STEPHEN A	220 ISSAQUEENA TRAIL, CLEMSON, SC 29631	S/SIDE ISAQUEENA TRAIL	4063-09-06-2301
23	SEFICK STEPHEN A + LYNETTE E	220 ISSAQUEENA TRL	-	-
24	SWANEY LEWIS F	805 CENTRAL RD	-	-

25	SWIECZKOWSKI THOMAS	108 HILL PINE CT, CLEMSON, SC 29631	BERKLEY FOREST LOT 087 PLAT 245/6A, PLAT 21/817	4063-05-08-1170
26	TO HO LLC	7919 LIBERTY HWY, LIBERTY, SC 29657-9419	DOVE CIRCLE DOVE HILL LOT 1- 13 PLAT 24/972	4054-20-72-7380
27	WATKINS J H	18481 PINEHURST ST, DETROIT, MI 48221-1956	S/SIDE NICHOLSON DR	4075-09-16-7210
28	WOODWARD RICHARD H	106 HILL PINE CT, CLEMSON, SC 29631-2312	BERKLEY FOREST LOT 88	4063-05-08-0060
29	YOUNGBLOOD LAND CO LLC	1909 EAST MAIN STREET, EASLEY, SC 29640	TRACT S/SIDE HWY 123 PLAT 65/61 PLAT 19/331 PLAT 315/11,12 PLAT 71/117	4074-00-05-6772

Property Owner Information Provided by Pickens & Anderson Counties
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4.4 FUNDING SOURCES + ACQUISITION STRATEGIES

4.4.1 Overview

When considering possible funding sources for bicycle and pedestrian networks, it is important to consider that not all construction activities will be accomplished with a single funding source. Bicycle and pedestrian funding is administered at all levels of government, federal, state, local and through private sources. The following sections identify potential matching and major funding sources, and the criteria for bicycle and pedestrian projects and programs. Refer to Appendix B for detailed funding sources.

4.4.2 Property Owners

Using existing parcel information in GIS, ownership information was inventoried for each parcel adjoining the proposed Green Crescent Trail corridor. This information is useful because it gives the managing jurisdiction and other project partners current status of ownership along the corridor. Knowing the nature of current ownership affects the value of the corridor and other project constraints, and can also influence acquisition costs. The nature of the property analysis was not exhaustive as it was limited to the public information on record and is, thus, for informational purposes only. Property law is a very complex topic, and even after a search of the available public information, there may still be uncertainty regarding ownership that can only be addressed through a legal investigation by a right-of-way specialist, title company, or attorney. Nonetheless, the information collected for the parcels along the Green Crescent Trail provides a good current picture of the status of ownership along the corridor.

Until a professional land survey and deed research is completed for all effected parcels, actual easement widths and limits can only be estimated using GIS. And finally, all adjacent private property owners should be notified of the project intent and their concerns understood prior to the design of each phase. If easements are to be obtained, a qualified right-of-way specialist should speak individually to each party to negotiate the purchase of property for the trail corridor.

4.4.3 Acquisition Strategies

Detailed acquisition strategies can be found in Appendix C.

4.5 APPLICABLE DESIGN GUIDELINES

4.5.1 State and National Design Guidelines and Standards

At the state and national levels, there are existing guidelines that apply to shared-use paths, and pedestrian and bicycle facilities. While these documents are not absolute standards, many public agencies require projects to meet the guidelines as a minimum condition for key dimensions including slope, horizontal and vertical clearances, and surface condition, signage, and pavement markings. In addition, all applicable local design and construction standards will need to be followed. These key documents published by The American Association of State Highway and Transportation Officials (AASHTO), the U.S. Department of Transportation (USDOT), and others include:

4.5.2 AASHTO Guidelines for the Development of Bicycle Facilities

The most recent version of this nationally recognized document is the 4rd Edition, dated 2012. The guide is described by AASHTO as follows:

This guide provides information on how to accommodate bicycle travel and operations in most riding environments. It is intended to present sound guidelines that result in facilities that meet the needs of bicyclists and other highway users. Sufficient flexibility is permitted to encourage designs that are sensitive to local context and incorporate the needs of bicyclists, pedestrians, and motorists.

Manual on Uniform Traffic Control Devices

The 2009 Federal MUTCD includes Part 9: Traffic Controls for Bicycle Facilities, along with detailed guidelines for pedestrian facilities crossings, and is available on-line at: http://mutcd.fhwa.dot.gov/kno_2009.htm.

Universal Design/ADA Access

Good universal design for The Green Crescent Trail will ensure access for everyone no matter their physical abilities. In addition, all greenway paths and other trails that receive funding from state or federal sources must conform to the Americans with Disabilities Act (ADA) guidelines, and Public Rights of Way Accessibility Guidelines (PROWAG). The Federal Highway Administration publishes a guidebook entitled Designing Sidewalks and Trails for Access. Chapter 5, Trail Design for Access is the most relevant portion of the report and is available on-line at: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/

Other Sources

Other sources reviewed for this Feasibility Study include:

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
- South Carolina Department of Transportation Highway Design Manual and Engineering Directive Memoranda

4.5.3 Crime Prevention Through Environmental Design (CPTED)

Personal safety, both real and perceived, heavily influences a trail user's decision to use a trail and a community's decision to embrace a trail system. Proper design must address both the perceived safety issues (i.e., feeling safe or fear of crime) and actual safety threats (i.e., infrastructure failure and criminal acts). Creating a safe trail environment goes beyond design and law enforcement and should involve the entire community. The most effective and most visible deterrent to illegal activity on the trail and at the trailhead will be the presence of legitimate users. Getting as many "eyes on the corridor" as possible is a key deterrent to undesirable activity. CPTED is a proactive approach to deterring undesired behavior in neighborhoods and communities. CPTED is defined as "the proper design and effective use of the built environment that can lead to a reduction in the fear and incidence of crime and an improvement in the quality of life." The basic premise of CPTED is that the arrangement and design of buildings and open spaces can encourage or discourage undesirable behavior and criminal activity. A report prepared for the National Institute of Justice noted that "physical features influence behavior" and the "[offenders] prefer to commit crimes that require the least effort, provide the highest benefits and pose the lowest risks." When all spaces have a defined use and the use is clearly legible in the landscape,

it is easier to identify undesired behavior. The following 4 principals guide CPTED:

- Principle #1: Natural Surveillance
- Principle #2: Natural Access Control
- Principle #3: Territorial Reinforcement
- Principle #4: Maintenance

The following elements include CPTED principals as they apply to the Green Crescent Trail

Community Engagement

Active and informed community members are a tremendous resource. Forming volunteer patrol groups, a trail ambassador program, and an Adopt-a-Pathway program would create strong community connections to the trail project. Volunteer patrol groups, such as the one in Anchorage, Alaska, have been used successfully to assist local government by reporting on trail conditions, picking-up litter, and filing safety reports. Trail ambassadors (see this link to a program in Pennsylvania: ('http://bit.ly/S8biPn' for the Schuylkill River Heritage Area Trail Ambassadors) can provide guidance and interpretive services, organize trail rides or walks, carry informational material, and generally promote the trail. The Adopt-A-Trail program utilizes volunteers to provide general care and maintenance of trail. Community service organizations, school classes or clubs, church groups, and businesses are often looking for outlets to support the community. Adopting trails promotes land stewardship and physical fitness and helps build community connections.

Fencing

Fencing can serve as a key design element in a trail corridor to define trail edges and delineate between public and private property. Fencing and access will be an especially important consideration when working with agencies

CPTED principals provide visibility to make trail users feel safe and deter crime.

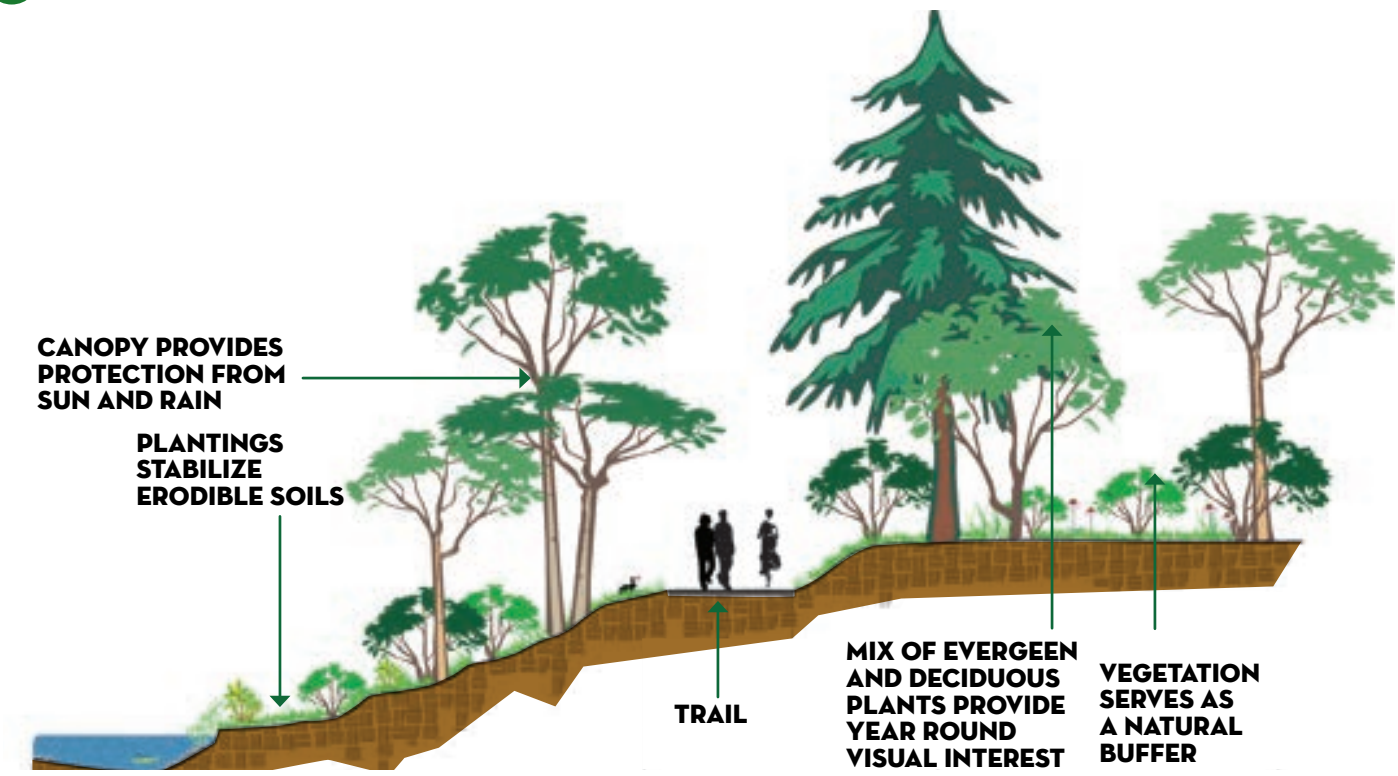


Diagram of landscaping and vegetative screening practices.

such as the US Army Corps of Engineers in connecting to dike trails. Fencing installed along the trail corridor should be permeable, where feasible, to encourage natural surveillance opportunities along the trail. Where the trail is fenced for long stretches, intermittent openings should be located to allow trail users to enter and exit the trail. Access points to the trail should be at locations with good visibility from the surrounding neighbors. Fencing should also adhere to guidelines found in AASHTO bicycle and pedestrian guidelines described in the previous section.

Landscaping/Vegetative Screening

Landscaping that obstructs natural surveillance and allows entrapment areas or "hiding" places should be avoided.

- All groundcover and shrubs to be trimmed to a max. 36" above ground level height.
- Trees should be trimmed up to provide a minimum of 8' of vertical clearance within the trail corridor.
- Hostile landscaping material (e.g. vegetation with thorns) can be used in strategic areas to discourage off-path use and eliminate entrapment areas. For example, Pyracantha, a native evergreen shrub with a dense thorny structure, provides a natural barrier and wildlife habitat.

Lighting

Adequate pedestrian-scaled lighting helps trail users observe their surrounding and respond to potential threats. Where lighting is installed on trails and pathways, the illumination should:

- Be adequate to identify a face up to 20 yards away.
- Have full cut-off fixtures to reduce light pollution.
- Provide uniform coverage, eliminating dark pockets.
- Provide good color rendition (the measure of light quality to replicate colors as viewed on a typical sunny day).
- Not be obstructed by tree canopies.

The use of metal halide or light emitting diode (LED) lamps are recommended, as they provide excellent color rendition. Color rendition is especially important when describing identifying features such as hair, clothing, and vehicle color. Light quality is as important as the quantity. Poor lighting, whether too bright or not bright enough, can diminish safety.

Lighting should respond to the conditions of the site and meet the minimum standards set forth by the Illuminating Engineering Society of North America (IESNA).

Litter

Litter along the Green Crescent Trail corridor should be removed by staff or volunteer effort. Litter receptacles should be placed at access points, such as trailheads, and intersections with other access points. The trail should be patrolled for litter (not in receptacles) at least once a week and after any special events held on the trail.

4.5.4 Trail Amenities

When designing functional, attractive, and inviting trails, the small details matter. Elements such as a lighting fixtures, public art, benches, and other amenities help create a unique identity for each trail. It is important that these details work together to create a complete experience for all users.

Trash and Recycling Receptacles

Trash and recycle receptacles provide for proper maintenance and appearance of the trail system. For recycling receptacles, signage should be provided indicating what recyclables are accepted. Consider including educational signage about the importance of recycling and the environmental benefits.

- Locate receptacles at each trailhead and each seating area (one per every one picnic table, one per every two benches).
- In areas with adequate sunlight, consider compacting receptacles for trash and recyclables that use smart technology (such as Big Belly®).
- Placement of other receptacles will depend upon the location of concessions, facilities and areas of group activities.
- Receptacles need to be accessible to maintenance personnel and trail users.
- Receptacles should be selected using the following criteria:
- Expected trash/recycling amount
- Maintenance and collection program requirements
- Types of trail classification
- Durability
- Animal proof
- Receptacles should be set back a minimum of 3 feet from the edge of the trail.

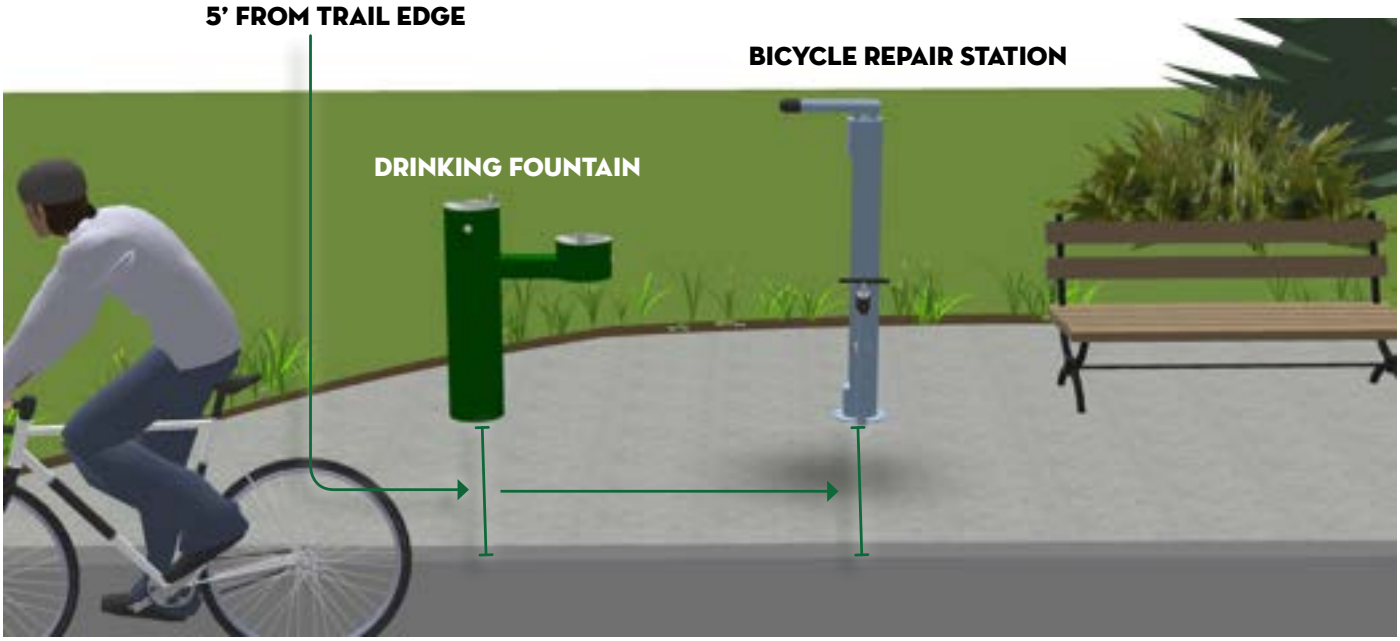
Restrooms

Public restrooms are one of the most critical building amenities because they need to be responsive to a wide range of human needs and abilities. Careful consideration should be given to a number of factors before locating restrooms, including available land, size of trailhead, existing restroom facilities within the system, utility availability, and user need.

Prior to undertaking any restroom building design, consultation with a structural and civil engineer, state building codes, health and safety codes, ADAAG and Public Rights-of-Way Accessibility Guidelines (PROWAG) standards, and local development codes (UDO) is required. The space required for each restroom building depends on the number of toilets to be provided.

Restrooms require considerable maintenance and service. Access to these resources should be a strong consideration when planning for restroom buildings.

- Local, state, and federal codes take precedence for all restroom facilities.
- Prioritize location of restrooms at trailheads within existing parks and review gaps for placement at other trailheads or locations within the system.
- Restroom structures should be located adjacent to vehicular access points for security, maintenance, and access to water and sewer (unless they are self-composting).
- Restrooms should also make use of natural light and ventilation to the extent possible.
- Place bicycle parking close to restroom structures so that bicyclists do not impede trail access. Inadequate bicycle parking encourages informal propping of bicycles at or against restroom buildings.



- Provide restroom facilities that are durable and resistant to vandalism.
- Always provide restroom facilities outside of floodprone areas.
- Where other restroom facilities are available within the park and trail system, use wayfinding signage along trails to direct users appropriately.
- Composting toilets should be considered in remote areas or where utility connections are unavailable.

Drinking Fountains

Drinking fountains provide opportunities for users to replenish fluids and potentially extend their trip. Access to City water service must be available. Review Regulatory Flood Protection Elevation prior to locating.

- Locate drinking fountains at least 5 feet from trail edge.
- Locate drinking fountains near restrooms, at trailheads, parks and other public gathering places along the trail.
- Standard and accessible fountains should be installed to accommodate all trail users.
- Consider grouping amenities together (seating, bicycle parking, drinking fountains, and bicycle repair stations) at a rest stop or comfort station. Drinking fountains should be placed on a well-drained surface (2 percent sloped concrete slab).
- Consider the use of durable and vandalism-resistant materials such as steel, or stone.
- Drinking fountains must be ADAAG compliant.

Bicycle Repair Stations

Bicycle repair stations are small kiosks designed to offer a complete set of tools necessary for routine bicycle maintenance. Popular locations for placement include major or minor trailheads and rest stops along trails.

- Bicycle repair station tools are secured by high security cables, but will still be an attractive target for theft. Proper placement of kiosks in areas of high activity is one key strategy to reduce potential vandalism.
- Consider grouping repair stations together with other amenities (seating, bicycle parking, and drinking fountains) at a rest stop.

Bicycle Parking

Bicycle parking should be as convenient as the majority of automobile parking and should be easily accessible from the associated trail. Entrances and exits should be designed to minimize conflict with trail user traffic patterns.

Bicycle parking should be located on a hardscape surface and not be located directly in front of other trail amenities. Ideal rack location should be parallel along the trail

approach. Parking should be located no more than 25 feet from ingress/egress and at least 5 feet from the edge of trail to avoid traffic conflict. Location should be highly visible.

Consideration should be given to avoid emergency ingress/egress, service access, and vehicular conflict areas.

- Locate bicycle racks at restrooms, select trailheads, points of interest, and rest stops.
- The bicycle rack should supports the bicycle in at least two places, preventing it from falling over.
- The bicycle rack should allow locking of the frame and one or both wheels with a U-lock.
- When installing racks on concrete surfaces, use 3/8 inch anchors to plate mount. Shim as necessary to ensure vertical placement.
- When installing racks on pavers or other non-stable surfaces, embed into base. Core holes no less than 3 inches in diameter and 10 inches deep.
- Ensure the rack is securely anchored to ground.
- Consider bicycle racks that resist cutting, rusting, and bending or deformation.

Seating

Seating along trails provides a place for users to rest, congregate, contemplate, or enjoy art, nature, and interpretive elements. Benches can be designed to create identity along the trail or be strictly utilitarian. Picnic tables provide places for trail users to congregate for meals or to relax.

- Locate benches and other site furniture a minimum of 3 feet from the edge of the trail.
- Locate benches along the trail where appropriate, or where there is a demand by users. Providing seating at one mile gaps is the goal. Seating within 1/2 mile of trailheads is recommended.
- Provide benches and picnic tables in areas that provide interesting views, are close to an interpretive element, and offer shade or shelter from seasonal winds.
- Drainage should slope away from the bench and the trail.
- Locate benches a minimum of 4 feet from restrooms and drinking fountains and a minimum of 2 feet from trash and recycling receptacles, lighting poles, and sign posts.
- Wheelchair access should be possible at some picnic tables and alongside benches. Provide access with a hardened surface such as concrete or asphalt.
- Seating should be securely anchored to the ground. Consider durable materials or native materials such as boulders that are vandalism-resistant.

Public Art and Sculpture

Public art engages the community through artists' work and creates a memorable experience for trail users. Art and sculpture can create an identity for the trail and strengthen the emotional connection between the Green Crescent Trail and its users. Depending on the scale and form, it can become an "event" in itself and serve as a public attraction.

Public art can be aesthetic and/or functional, and double as sitting or congregational areas. Memorable installations can act as landmarks and serve as valuable wayfinding tools. Public art can be a device for telling a compelling and memorable story about the trail and area history.

- Artists can be commissioned to provide art at one or multiple locations the Green Crescent Trail.
- When appropriate, artists could be engaged as part of the corridor planning and development process.
- Artists should be encouraged to produce artwork in a variety of materials for sites along the corridor.
- When appropriate, consider developing greenway furnishings and amenities with artistic intent. Key locations such as turns or landscape changes could be areas to highlight through the inclusion of public art. Consider how to provide continuity between elements while maintaining the unique styles of multiple artists.
- Provide art displays on trails with anticipated high use and user exposure.
- Consider community based art and temporary installations.

4.5.5 Trailheads

Trailheads provide essential access to the trail system and can include many amenities in one location: automobile parking, bicycle parking, restrooms, drinking fountains, trash and recycle receptacles, dog waste stations, bicycle repair stations, and trail wayfinding and informational signage.

There is no prescription for the frequency of trailheads. Conduct user counts, vehicle counts, and surveys across the trail network at peak hours of use to determine parking demand. Consider locating trailheads with consideration to other available public facilities or through partnerships with owners of existing parking areas. When locating trailheads in or adjacent to neighborhoods streets, work with property owners to install no parking signs if desired, and to minimize impacts during construction and daily use.

North Carolina Art Museum Park

Temporary organic art sculpture along Reedy Creek Trail in Raleigh

Major Trailheads

Major trailheads should be established near large residential developments, commercial developments, and transportation nodes, making them highly accessible to the surrounding community and to the trail system. A major trailhead could include all of the items mentioned previously plus additional facilities, such as shelters, picnic areas, and extensive parking.

- Major trailheads can provide parking for 10-40 vehicles, depending on availability of land and anticipated level of use of the trail.
- Consider 300 to 350 square feet for each parking space.
- Major trailheads will typically have a large paved parking lot that accommodate passenger vehicles and large vehicles year round. Consider locating larger lots in existing disturbed areas to minimize environmental impacts.
- Major trailheads should provide emergency and maintenance vehicle access and turnaround.
- Place ADA accessible parking spaces near the site's accessible route, at a rate of one accessible space per 25 standard spaces. Parking spaces and access aisles should not exceed 2 percent slope in any direction.
- Parking lot surfaces should never exceed 5 percent slope in any direction.
- Where major trailheads are located near neighborhoods, provide user access from local streets crossing the trail. Where trails cross neighborhood streets, "No Parking" signs may be desirable to minimize impact on the neighborhood.
- Reduce the visual intrusion of large parking areas by using vegetative screening.
- Consider one-way vehicle circulation within parking areas to minimize road width.
- Refer to current setbacks and other requirements within the UDO.

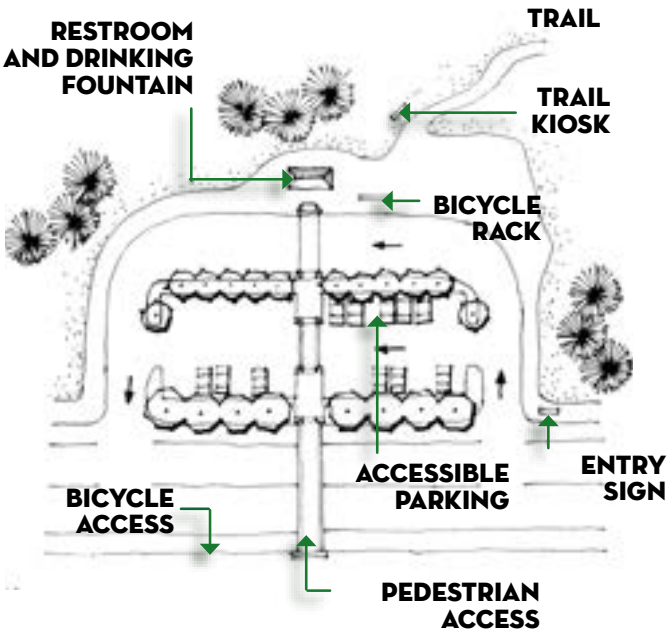


Diagram of amenities at a major trailhead.

Minor Trailheads

Minor trailheads are trail access points with very minimal infrastructure. They can occur at parks and residential developments. Some minor trailheads could include a small parking lot for five to six passenger vehicles. In addition to vehicle parking, minor trailheads may include drinking fountains, benches, trash and recycling receptacles, an information kiosk, and signage about the trail network.

- Minor trailheads can provide parking for up to ten vehicles. The parking area may be asphalt or gravel, as long as ADA requirements are met
- Minor trailheads should provide emergency and maintenance vehicle access.
- Minor trailheads should be ADA accessible and provide at least one accessible space near the accessible route.
- Provide adjacent wayfinding signage that directs trail users to minor trailheads.

4.5.6 Signage

The goal of a signage program is to provide a sense of identity and utility for the existing trail network. Signage types include informational, directional, regulatory, confidence markers, access identification, and interpretive panels. The program adheres to a consistent, selective, and strategic manner so as not to clutter or dominate the visual character of the trails.

Gateway Monuments

Municipalities often desire identification and a favorable image of their community. A Gateway Monuments are typically any freestanding structure or sign that will communicate the name of a local entity. Gateway signs provide the first welcome to visitors while reinforcing community identity, pride, and sense of place. They should be integrated into the greater wayfinding plan in order to create a unified, welcoming, and legible system.

Gateway monuments should:

- Be a maximum of one Gateway Monument, visible from

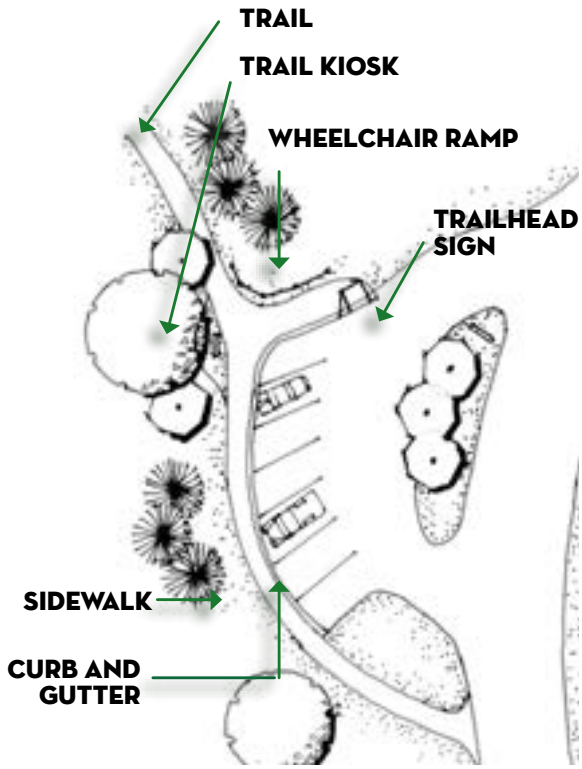


Diagram of amenities at a minor trailhead.

the traveled way, should be placed at the appropriate approach, to avoid distraction and visual clutter.

- Include the officially adopted town logo/seal, however this is not required.
- Be located well beyond the clear recovery zone or otherwise placed to minimize the likelihood of being struck by an errant vehicle (if along a roadway).
- Be kept clean, free of graffiti, and in good repair. Their care should be incorporated into City maintenance schedules prior to installation.
- Be developed and placed to require low or no maintenance to minimize exposure of workers and others to potential risks. Protective graffiti resistant coatings should be applied.
- Be composed of materials that are durable for the projected life span of the project.
- Be appropriate to the proposed setting and community context.
- Be in proper size and scale with its surroundings.

Destination/Directional Signs

The ability to navigate through a city is informed by landmarks, natural features, and other visual cues. Wayfinding signs should indicate:

- Direction of travel
- Location of destinations
- Location of access points

These signs increase users' comfort and accessibility to the trail network. Wayfinding signage can serve many purposes including:

- Helping to familiarize users with the trail system
- Helping users and emergency responders identify locations, in case of emergency on the trails.
- Helping users identify the best routes to destinations
- Helping overcome a "barrier to entry" for people who do not use the trail system
- Helps users find access points to the trail system
- Wayfinding signs also visually cue motorists that they are driving near a trail corridor and should use caution. Signs are typically placed at key locations leading to and along routes, including the intersection of multiple routes.

Regulatory Signs

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement and parking. The examples below are types of regulatory signage.

- Smaller scale signs or plaques may be used for trail applications.
- See the MUTCD 9B for a detailed list of regulatory sign application and guidance.

Etiquette Signage

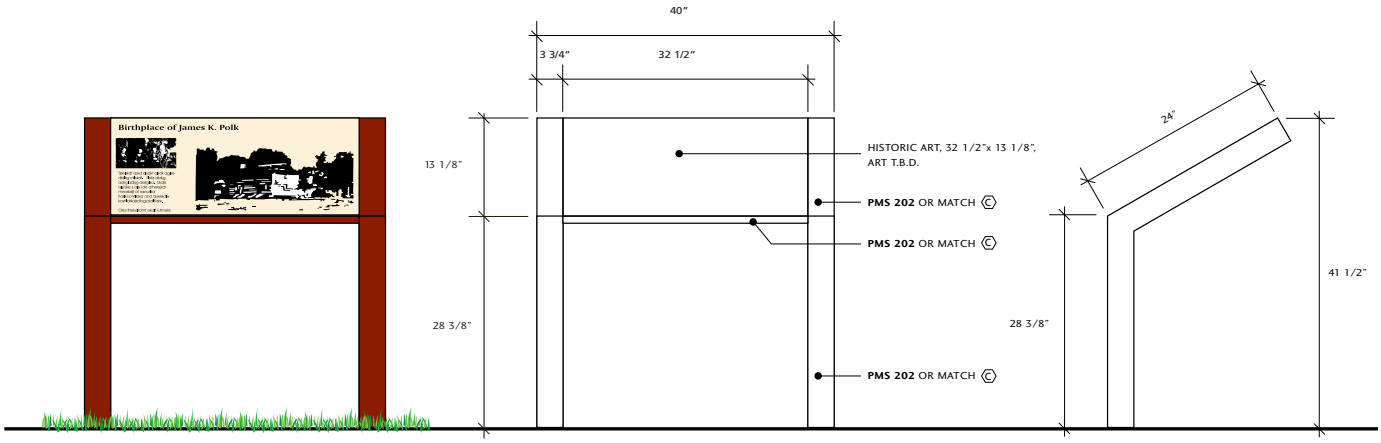
Informing trail users of acceptable etiquette is a common issue when multiple user types are anticipated. Yielding the right-of-way is a courtesy and yet a necessary part of a safe trail experience. The message must be clear and easy to understand. The most common trail etiquette systems involve yielding of bicyclists to pedestrians.

- Trail etiquette information should be posted at access points and periodically along the trail.

Interpretive Signage

Interpretive displays provide trail users with information about the surrounding environment or site, wildlife, vegetation, history and the significance of cultural elements. Interpretive displays may also be combined with public art and sculpture opportunities along the trail.

- Consider the character of the trail and surrounding elements when designing these signs.
- Work with experts specific to the information you are



Interpretive Signage

conveying on the signs such as historians, ecologists, or artists.

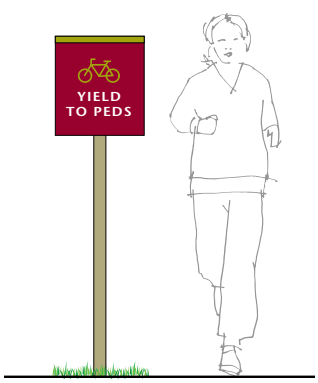
- Separate interpretive signage panels from the main trail circulation so that users can stop and not impede traffic.
- Consider including interpretive signage at rest stops or areas of congregation.
- Panels must be ADA accessible.
- Consider use of technology for interpretation.

Informational Kiosks and Message Centers

Kiosks and message centers provide trails users with information to orient themselves, learn of areas of interest, read the rules and regulations of the trail system, and find the hours of operation.

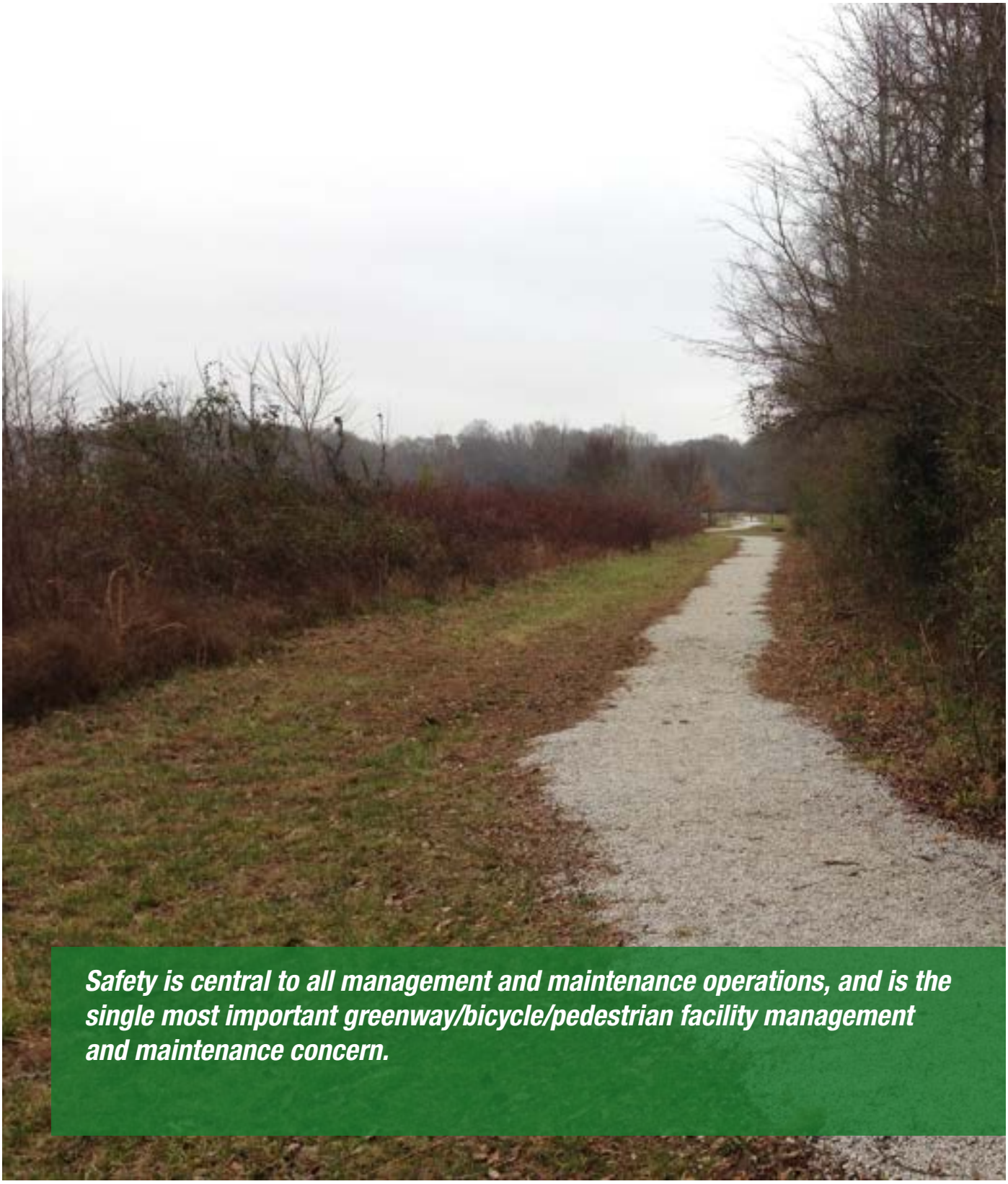
- Install kiosks at each major and minor trailhead.
- The entire Green Crescent Trail, rules and regulations, and ADAAG accessibility advisories should be included on each kiosk.
- When locating kiosks next to parking facilities, set the units back far enough from traffic and protect the support posts or structure with appropriately sized barriers.
- Provide ADA access using established guidelines for visual height, clearance, and surface type where kiosks are located.
- Evaluate the use of emerging technology options for implementation of greenway information and messages as part of the signage program.

Example Wayfinding Signage - Destinations



Etiquette Signage

Example Trail kiosk Walnut Creek Trail



Safety is central to all management and maintenance operations, and is the single most important greenway/bicycle/pedestrian facility management and maintenance concern.

5: Operations + Maintenance

5.1 OVERVIEW

The Green Crescent Trail network should be viewed and maintained as a public resource. This network will become infrastructure similar to street systems or utility networks, serving the community for generations. The following guiding principles will help ensure the preservation of a first class system:

- Good maintenance begins with sound planning and design
- Foremost, protect life, property, and the environment
- Promote and maintain a quality outdoor recreation and transportation experience
- Maintain quality control and conduct regular inspections
- Include field crews, police and fire/rescue personnel in both the design review and ongoing management process
- Maintain an effective, responsive public feedback system, and promote public participation
- Be a good neighbor to adjacent properties
- Operate a cost-effective program with sustainable funding sources

Maintenance schedules and standards help keep trail systems attractive and as safe recreational destinations and transportation facilities, and are critical to the safety and enjoyment of trail users. Managing risk, safety, and security are important components woven into the management and maintenance scheme. Creating an effective administrative/jurisdictional structure will foster the successful development and implementation of an efficient system with stable support, leading to a highly connected network of trails and pathways that will become part of everyday life and utility in Pickens and Anderson Counties. The following sections provide detail on how this will be achieved.

5.2 MANAGEMENT + MAINTENANCE PROGRAM

There are many forms of trail management and maintenance assessments, checklists, plans, standards, and guidelines currently in use by counties, towns, and park systems throughout the United States. Trail-related organizations such as American Trails, the Rails-to-Trails Conservancy, the Federal Highway Administration, and the U.S. Forest Service provide excellent examples of management and maintenance best practices from across the country. This section was developed based on our previous experience and resources from the aforementioned organizations.

5.2.1 Systematic Approach

In developing an efficient and effective management and maintenance system, the Cities of Clemson and Central should consider a detailed and systematic way of inventorying, planning, executing, and monitoring maintenance. A maintenance inventory and maintenance training for staff are first steps towards achieving this:

Maintain a Trail and Facilities Inventory

This Plan provides a baseline inventory and database of existing and proposed trail facilities and their features. Maintaining this information, whether through database software or other means, is an essential tool for efficient trail management. The inventory can be a simple Excel spreadsheet or a GIS map populated with data collected during the development of this Plan and through subsequent updates.

Consider Professional Maintenance Training

Another option in management and maintenance efficiency is training. Training opportunities should be carefully reviewed for relevance and cost-effectiveness. One example of a relevant program is the Park and Recreation

TABLE 5.1: MAINTENANCE TASKS AND SUGGESTED FREQUENCY

MAINTENANCE TASK	SUGGESTED FREQUENCY
Inspections	Seasonal - at both beginning and end of summer
Sign repair/replacement	4-6 years
Site furnishings; replace damaged components	As needed
Fencing repair	Inspect monthly for holes and damage, repair immediately
Pavement markings replacement	1-3 years
Pavement sweeping/blowing	As needed; before high use season
Pavement sealing; pothole repair	5-15 years
Lighting repair	Annually
Introduce tree and shrub planting, trimming	1-3 years
Shrub/tree irrigation for introduced planting areas	Weekly during summer months until plants are established
Shoulder plant trimming (weeds, trees, branches)	Bi-annual (Fall or Spring)
Major damage response (fallen trees, washouts, flooding)	As needed
Culvert inspection	Before rainy season; after major storms
Maintain culvert inlets	Inspect before onset of wet season
Waterbar maintenance (earthen trails)	Annually
Trash disposal	Weekly during high use, twice monthly during low use
Litter pick-up	Weekly during high use, twice monthly during low use
Graffiti removal	Weekly, as needed

Maintenance Management School sponsored by The National Recreation and Park Association (NRPA). For over 30 years the North Carolina State University Department of Parks, Recreation and Tourism Management and Continuing and Professional Education, in conjunction with NRPA, has conducted this two-year professional development program for park and recreation personnel. Another option is to hire an expert trail system manager to conduct a customized training or provide assistance on a consulting basis.

5.2.2 Maintenance Activities and Costs

The following are typical duties and activities often performed by management and maintenance staff.

- Vegetation Management: mowing, litter clean-up, manure removal, pruning, trimming, weeding, invasive species management, tree removal, planting
- Drainage Cleaning and Maintenance: flushing, raking, slough and berm removal, cleaning drain dips
- Trailhead, Amenity, and Signage Maintenance: parking, toilet facilities, informational kiosks, picnic tables, benches, maps, trail rules and regulations, traffic control for trail users, mile markers, directional signs, fencing
- Trail Inspection/Patrolling: greet users, encourage proper etiquette, make minor repairs, report vandalism[1]

General annual management and maintenance costs vary depending on the facility to be maintained, level of use, location, and standard of maintenance. Budgets should take into account routine and remedial maintenance over the life cycle of the improvements and on-going administrative costs for the program. The section below provides an overview of approximate costs for basic greenway, bicycle, pedestrian, and equestrian trail management and maintenance services. The estimates include field labor, materials, equipment, and administrative costs.

1 The frequency of the above activities will certainly vary across trail systems and even within trail systems. For a best practices model outlining specific activity frequencies and costs, please see Fairfax County, Virginia's Guide to Trail Management; Appendix A & B http://www.fairfaxcounty.gov/parks/trailmgmt.htm.

5.2.3 Routine Management and Maintenance Costs

Routine management and maintenance refers to the day-to-day regimen of litter pick-up, trash and debris removal, weed and dust control, trail sweeping, sign replacement, tree and shrub trimming, and other regularly scheduled activities. It also includes minor repairs and replacements, such as fixing cracks and potholes or repairing a broken hand railing. The following are typical annual costs for different trail types.

Greenway Trails

Many factors influence greenway trail costs, such as amount of use, maintenance crew-size needed, proximity to urban centers, and number of interfaces with geographical and man-made features. Annual routine maintenance costs range from nominal to as high as $7,000 per mile. Research conducted by the Rails-to-Trails Conservancy (RTC) indicates costs are often on the lower end for managing and maintaining rail trails at approximately $1,500 as shown in Table 2[2].

Nature Trails and Equestrian Facilities

Annual maintenance costs range from nominal to $2,000 per mile/year depending on usage and level of development. Care needs to be taken to ensure that outslope is restored after excessive trail tread compaction. Volunteers may absorb all or part of this function.

2 Poole, T. Rail-Trail Maintenance and Operation. Rails-To-Trails Conservancy Northeast Regional Office. July 2005.

On-Road Bicycle Facilities

Maintenance of the on-roadway bicycle facility system is handled by the local Public Works Departments and SCDOT Maintenance Division. Some provision should be made however for up to fifteen regular inspections per year, to include minor repair or replacement of signs, vegetation grooming and other items that an inspector could remedy in the field. Additional attention should be paid to any potholes or other pavement damage. Additional sweeping may be required where bicycle lanes and wider shoulders are provided along roads. Staff costs can be reduced by training local volunteers or bicycle advocates to conduct inspections and providing a means for citizens to report bicycle facilities needing repairs (see Implementation Strategies below).

Pedestrian Facilities (On Road Sidewalk/ Sidepath)

SCDOT maintains all sidewalks on SCDOT rights-of-way. Maintaining pedestrian facilities is an important part of maintaining the complete right-of-way for all users. When cracks, surface defects, tree root damage, and other problems are identified, SCDOT fixes the area to ensure sidewalks remain accessible to all pedestrians. Repairs are generally completed on an as-needed basis rather than through regularly scheduled evaluation of the sidewalk condition.

On locally-owned streets, local property owners are responsible for routine maintenance of sidewalks (such as clearing vegetation), and the City of Clemson and Central's Public Works Departments and/or Utilities Departments are responsible for more significant repairs. Crosswalks,

TABLE 5.2: TRAIL OVERALL MAINTENANCE AND OPERATIONS ANNUAL COSTS

ITEM	OVERALL	ASPHALT	NON-ASPHALT
Number of Trails Reporting Financial	39	18	19
Average Annual M&O Cost	$24,239	$19,584	$25,237
Average Length (miles)	23	20	24
M&O Cost per Mile		$1,458	$1,478
Average Years Open	12	15	11
Average Annual Users	136,986	139,304	129,492
Re-grade/Re-surface Frequency		17	9

pedestrian signals, curb ramps, median crossing islands, and other pedestrian facilities should be maintained by the respective Public Works departments and SCDOT, depending on right-of-way ownership.

5.2.4 Remedial Management and Maintenance Costs

Remedial Management and Maintenance refers to correcting significant defects in the network, as well as repairing, replacing, or restoring major components that have been destroyed, damaged, or significantly deteriorated from normal usage and old age. Some items ("minor repairs") may occur on a five- to ten-year cycle, such as repainting, seal coating asphalt pavement, or replacing signage. Major reconstruction items will occur over a longer period or after an event such as a flood. Examples of major reconstruction include stabilization of a severely eroded hillside, repaving a trail surface or a roadway that is part of the bicycle network, or replacing a footbridge. Remedial maintenance should be part of a long-term capital improvement plan.

The following estimates provide a general idea of potential remedial management and maintenance obligations:

Greenway Trails

A 7- to 15-year life is assumed for asphalt and crushed fine trails after which an overlay may be required. A complete resurfacing after 20 to 25 years is anticipated. Concrete is assumed to last twice as long. Bridges, tunnels, retaining walls and other heavy infrastructure are assumed to have a 100-year life or longer.

On-road Bicycle Facilities

Remedial work for on-road bicycle facilities includes asphalt repaving (five feet on either side of the street), curb and gutter, sewer-grate, and manhole repair. Pothole and crack repair are considered routine. Pavement markings, such as bicycle lane lines, bicycle stencil markings, and fog lines should be re-installed when other roadway pavement markings are improved. Since this work is done as part of the current street maintenance regime the cost is assumed to be covered.

Pedestrian Facilities

Sidewalks should be constructed with concrete, which requires replacement in 50 to 75 years. A rough cost estimate for on-linear-mile of concrete sidewalk could be provided by the Cities and/or SCDOT; this would include base material, concrete, and construction work. Costs for design and right-of-way easement purchases should also be considered.

5.3 Risk Management, Safety + Security

Safety is central to all management and maintenance operations, and is the single most important greenway/bicycle/pedestrian facility management and maintenance concern. Context-sensitive trail design, clear and implementable safety and security policies, comprehensive programs, and maintenance commitments affect the measurable, as well as the perceived, safety and security of a trail facility.

When considering risk management, it is important to keep in mind that:

- State law of South Carolina, removes much of the liability from landowners who open their property for public recreation except in cases of gross negligence. Specifically, South Carolina Code of Laws Title 27, Chapter 3. Additionally, in April 2012, the South Carolina Governor signed amendments to Code of Laws 47-9-710 and 47-9-730 to improve liability protections for landowners allowing equestrian trail riding activity on their property (see Bill H4775).
- Trails and trail users are inherently safe. In a Rails-To-Trails Conservancy survey, most reported suits were the result of one individual being reckless, then trying to shift blame onto the trail. In 150 million trail visits surveyed by the Rails-To-Trails Conservancy, only eleven resulted in lawsuits.

Sound trail management and maintenance planning combined with attention to physical safety hazards, environmental design opportunities, and appropriate insurance policies will provide a safety structure that encourages trail use and enhances the trail experiences. Building trust with the community will serve to highlight and reinforce the value added by the trail system to the community, allowing the network to grow in a way that fits the needs of the community and improves overall quality of life.

Safety programs should include the following preventative measures:

- As part of regular trail inspections, evaluate and remove any obstacles or objects that could impede facility usage such as debris, overgrown vegetation, etc. and, when needed, provide alternative routing.
- Partner with local police to ensure that any incidents, such as vandalism, are tracked, including the specific location, and, if problems develop, create a safety follow-up task force to develop preventative measures for avoiding future incidents.
- Implement an emergency response protocol working with law enforcement, EMS agencies, and the fire department that includes mapping of access points, design of trails and access roads (to accommodate up to 6.5 tons), and an "address system" such as mile markers to identify locations for all off-road greenway facilities, trails, and equestrian facilities. Greenville, SC installed numbered pavement markings every one tenth of a mile on asphalt trails as a way to provide trail users with an "address" for their trail location in the event of an emergency. On-road facilities should make use of the existing street names and adjacent property addresses. Each local emergency response office/unit should have an up-to-date map of all greenway and trail facilities within the local jurisdiction.

5.3.1 Managing Trail User Conflicts

Though most multi-use trail experiences are pleasing and enjoyable, conflicts between trail users may occur that can have serious consequences. In these cases, the challenges usually relate to a trail user's style of activity (mode of travel, level of experience, etc.), trip focus, expectations, attitudes toward and perceptions of the environment, and level of tolerance for other activities.

In order to manage multiple user groups with potential conflicts, the Cities should address user conflicts as they arise (if they arise), based on patterns of usage and recorded incidents. The Cities should also review complaints and accident reports on an on-going basis to determine if there is a pattern of user conflicts that needs to be enforced. Trail managers can take additional measures to address the challenges of shared use, such as:

- User involvement and outreach - Build understanding and good will by finding mutually agreeable solutions, and then inform the community (through signs, maps, brochures, Internet, media campaigns, sponsorship of "user swap" activity days, joint trail building days, etc.) to actively and aggressively promote responsible behavior.
- Uniformed presence on the trail - This can be in the form of police, maintenance staff, volunteer trail patrols, etc.
- Maintenance program - An efficient and appropriate maintenance program that addresses signs, sight distances, vertical and lateral clearances and surface maintenance.
- Regulations and enforcement – If user conflicts persist, for those not influenced by outreach and education, employees and volunteers must have the authority to enforce safe and courteous behavior, with regulations posted prominently at trailheads and other appropriate locations. Four broad areas of regulations include:
  - Acceptable uses and right-of-way (ROW) (who must yield to whom) (ex: Motor vehicles, other than power assisted wheelchairs, are prohibited; Stay on the trail; No loitering; no vandalism; no dumping; Keep to the right except when passing; Yield to on-coming traffic when passing; Bicycles always yield to pedestrians; Pedestrians always yield to equestrians; Give a vocal warning when passing; Pets must always be on short leashes; Travel no more than two abreast; Alcoholic beverages are not

permitted on the trail; Bicyclists and pedestrians yield to maintenance vehicles)

- Speed limits (ex: 15 mph speed limit)
- Hours of use
- Objectives of resource protection (e.g., enhance native vegetation by preventing the spread of invasive species and minimizing disturbances to vegetation)

- Monitoring progress - The ongoing effectiveness of decisions made and programs implemented – in the context of clearly understood and agreed-upon objectives – must be monitored for each trail area, with flexibility and willingness to adapt strategies for individual situations.

Managing Trail Use Through Design

The Green Crescent trail network will be available to a variety of uses and managers should expect that the public will practice proper etiquette to control speed, direction, and position. Trail design can positively affect trail user experiences and a trail users understanding of proper etiquette within various contexts.

In areas with high user volumes, physical elements to separate users by direction or mode of travel may be desirable. For instance, a center stripe painted on the trail can separate users by direction, or an adjacent trail with a different surface material may be created for runners. In other cases, signs may suffice. Following recommended best practices for multi-use trail design (see Appendix F: Design Guidelines of this Plan) is important for minimizing potential trail user conflicts.

Trail Etiquette Awareness

The Green Crescent Trail should include public awareness as an integral component to any effort to manage trail user conflicts. Ensuring that the public is aware of trail policies and etiquette is essential to addressing trail user behavior. Providing this information in a clear and conspicuous manner allows users to understand both their responsibilities and their rights. Trail signage, pavement markings, and media campaigns are effective strategies for educating the public about appropriate trail use. For example, simple signs reminding hikers and cyclists to yield the right-of-way to equestrians should be posted at trail access points where use is permitted for all three groups, as shown with the trail etiquette sign to the right.

Signs like this encourage pedestrians and slower users to stay to the right, allowing faster users to pass safely on the left. Source: www.tfhrc.gov

Signs like this can reduce trail user conflict by clarifying universal trail etiquette.

Dog Use Management

Dog handlers and their pets enjoy trails for a number of reasons – mobility assistance, personal security for handlers, and for the pleasure and fitness of animals. However, adding unleashed or unruly dogs to the mix of walkers and cyclist may create conflicts. Techniques to help manage dog use on the trail can include signage pertaining to regulations and etiquette such as: staying within the trail corridor; leash usage; greet-before-you-meet etiquette with people and other dogs; and picking up waste. With appropriate management policies in place, dogs can be a welcome addition to the Green Crescent Trail system.

5.4 ADMINISTRATIVE RESPONSIBILITIES

5.4.1 Inter-Agency Design Review

Coordination between and commitment of agencies responsible for greenway, bicycle, and pedestrian trail facilities is crucial in completing routine and remedial maintenance tasks. In addition to department managers, planners, designers, and engineers, police, fire/rescue, and field maintenance personnel should be consulted in the design and review process. Coordination should occur at a local level through carrying out the following tasks.

- Establish a coordinating committee with representatives from each of the participating agencies and stakeholders.
- Identify an entity to provide on-going oversight, coordination, and leadership for the overall network.
- Review critical public and private sector projects that might impact greenway, bicycle, and pedestrian projects as they come online.
- Pursue grants and cooperative agreements.
- Monitor management and maintenance and other advocacy functions now and over the years to come.
- Review accident and crime reports, and take the necessary upfront actions on a case-by-case basis, to ensure that greenway, bicycle, and pedestrian facilities do not deteriorate due to safety concerns, crime, or from fear of criminal activity.

5.4.2 Management Responsibilities by Department

Recreation Departments

Duties for Recreation Departments would include carrying out the recommendations from this Plan, applying for funding, maintaining trails, and conducting routine maintenance of paved trails, trail planning and design, trail construction, and overseeing the safety and operations of all trail facilities. Staff should also conduct tasks such as updating and publishing new maps, creating and updating GIS layers of all bicycle and pedestrian facilities proposing future alternative routes, working with adjacent neighborhoods to coordinate linkages, and playing a key role in education and encouragement programs.

Public Works and Engineering Departments

The Public Works and/or Engineering Directors should oversee the construction and remedial maintenance of all bicycle, pedestrian, and equestrian facilities. One member of the local staff should handle facility development and construction (including posting wayfinding signs) among his/her other responsibilities. Staff should work with SCDOT to develop a schedule for routine maintenance and a means of identifying locations for spot maintenance improvements.

Police Department

All local police officers should go through training courses so that they are up to date with the most current laws governing bicyclists and pedestrians in South Carolina. Specific laws can be found here:

- Bicycle related - http://www.bikelaw.com/blog/south-carolina-bicycle-laws/
- Pedestrian related - http://www.leekelaw.com/library/south-carolina-pedestrian-laws-sc-pedestrian-accident-attorney.cfm
- Bikelaw.com (www.bikelaw.com) provides assistance for conducting bicycle-specific legal training for police officers.

South Carolina Department of Transportation (SCDOT)

SCDOT should continue to design and build on-road facilities along with maintaining all pedestrian and bicycle facilities within the roadway rights-of-way that are owned by the state (with the exception of sidewalks on local streets). This includes paved shoulders, bicycle lanes, crosswalks, pedestrian signals, and sidewalks on main roadways. SCDOT should work with local jurisdictions to develop a schedule for routine maintenance and a means of identifying locations for spot maintenance improvements. Through coordination with the City staff, SCDOT can develop recommended on-street bikeway facilities that involve striping or restriping the existing pavement as part of the routine repaving schedule.

Volunteers

Services from volunteers or donations of material and equipment may be provided in-kind, to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as-needed with senior class projects, scout projects, interested organizations, clubs, or a neighborhood's community service to provide for the basic needs of proposed networks. Utilizing volunteers reduces planning and construction costs and enhances community pride and personal connections to the local greenway, bicycle, and pedestrian networks. In

particular, volunteer groups associated with a trail user group, such as the Southeast Off-road Bicycle Association (SORBA), a walking or hiking club, or a non-profit or school that will use the trail for nature education or other purposes are primary targets for ongoing assistance. Volunteers should be trained or supervised in the topic area in which they are working.

5.5 IMPLEMENTATION FOR MANAGEMENT/ MAINTENANCE

Trail management and maintenance can be regular, stable, and thorough with support from and partnerships with a variety of public, private, non-profit, and community organizations at the local, regional, and national levels. Through the combined resources of existing staff, new funding sources, and new community partners and volunteers, the following are implementation strategies for advancing best practices in management and maintenance within Pickens and Anderson Counties:

5.5.1 Establish a Public Comment System

As discussed previously, a common factor that often influences public support for trail funding is the visual condition of the trails. Regular trail users are often the first to notice trail deficiencies or safety issues. Therefore, it is recommended that the Friends of the Green Crescent establish a user feedback system that will give trail users an opportunity to provide comments related to trail conditions directly to the agency responsible for maintenance of that particular trail. This can be done by posting a sign or kiosk at each trailhead with the necessary contact information. Some communities, such as Greenville, SC, encourage citizens to provide bicycle, pedestrian, or trail related feedback through the City's existing "311" communication service, which allows submissions through a mobile application for smart phones, e-mail, or a phone call

5.5.2 Implement a Management and Maintenance System

Based on the staff and department resources, carry-out and monitor regular management and maintenance activities tailored to each section of trail. As the inventory of existing trail conditions and amenities is continuously updated, records of trail maintenance activities over time can be used for determining required budget adjustments on an annual basis. To achieve this, this Plan recommends that the City of Clemson and Central:

- Integrate the trail inventory into the City and County GIS system, so trail maintenance maps can easily be developed for planning purposes;
- Identify the staff member charged with maintaining the inventory of existing and proposed trail facilities and amenities;
- Identify the staff member charged with fielding public comments and complaints related to trails, monitoring incidents along trail, and working with other agencies and partners to develop a response;
- Ensure that staff members handling various aspects of management and maintenance are in regular communication with one another.

5.5.3 Further Define Agency Roles and Responsibilities

As the trail system in Pickens and Anderson continues to expand, it will become even more critical that the roles and responsibilities of each agency are clearly defined. It is recommended that a point person be identified as the individual responsible for coordination between agencies and continually updating the recommended management and maintenance system.

Proposed Green Crescent Trail

5.5.4 Conclusion

While day-to-day management and maintenance activities may seem ordinary and routine, their proper execution will add years and value to the Green Crescent Trail system. Thoughtful and thorough structure for trail management and maintenance activities should be established now. Establishing responsible team member roles and routinely working with community members will ensure the Green Crescent Trail network of bicycle, pedestrian, and trail facilities continues to grow and foster economic, social, and environmental benefits.

6: Appendix A.1: Labeled Map Exhibits

0 OVERVIEW MAP

GREEN CRESCENT TRAIL STUDY

DANIEL HIGH
RC EDWARDS MIDDLE
NORTH EXPERIMENTAL FOREST
FUTURE BLUEWAYS PARK
CENTRAL ELEMENTARY
FUTURE SWU ATHLETIC COMPLEX
SWU DRIVING RANGE
DOWNTOWN CENTRAL
HUNDRED ACRE WOODS
SOUTHERN WESLEYAN UNIVERSITY
SWU OUTDOOR CENTER
RECREATION CENTER
OLD LANDFILL
Central Disc Golf Course
WALMART
INGLES
Twelve Mile Park
WALMART MARKET
Eighteenmile Creek
COUNTRY WALK NEIGHBORHOOD
CLEMSON ELEMENTARY
Jaycee Park
Shanklin Sams Greenspace
Bowman Field
Presidents Park
Gateway Park
Clemson Park
Earl Anderson Park
CAMELOT NEIGHBORHOOD
Ashley Dearing Park
Nettles Park
Botanical Garden
SEFICK PROPERTY
133
93
76
123
28
88

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES
0 0.5

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

1 CENTRAL TO SWU

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

Central Elementary

12' SIDE PATH TO TERMINATE AT THOMAS LANE. EXTENSIONS WILL BE NECESSARY AS DEVELOPMENT CONTINUES

JESSAMINE DR

LAWTON RD

COLLINS HILL RD

THOMAS LN

MOUNTAIN VIEW DR

LUNA LN

BROCK ST

BEVERLY ST

JOHNSON RD

FERNWAY DR

ADDITIONAL NATURAL SURFACE TRAILS SHOULD BE CUT IN TO ALLOW FOR LOOP OPTIONS ON CROSS COUNTRY TRAILS

MUTCD COMPLIANT CROSSWALK AT CLAYTON STREET

SIDE PATH TO CREATE LOOP AROUND SWU ATHLETIC COMPLEX

SWU Driving Range

6' SIDEWALK IMPLEMENTATION WILL HELP CREATE LOOP SYSTEM FOR CROSS COUNTRY TRAILS

WOOD ST

JOSEPH ST

MEREDITH ST

EATON ST

GEORGIA ST

Southern Wesleyan University

CHILDS ST

SIMMS SCHOOL RD

GREEN ST

COKER CIR

12' SIDEPATH TO BRANCH OFF TO SWU ATHLETIC COMPLEX AS 12' SHARED USE PATH

Future SWU Athletic Complex

WESLEYAN DR

MUTCD COMPLIANT CROSSWALK AT PEPPER STREET

MUTCD COMPLIANT CROSSWALK AT HORTON STREET

93

TRAILHEAD OPPORTUNITY AT CLAYTON WELCOME CENTER

EXISTING PARK AND HISTORIC DISPLAYS ALLOW FOR EASY TRANSITION TO A MAJOR TRAILHEAD LOCATION

TARRANT ST

PED BRIDGE NEEDED @ STREAM

MUTCD COMPLIANT CROSSWALK AT NEW SCDOT ROUNDABOUT

MUTCD COMPLIANT CROSSWALK AT TARRANT STREET

TRAILHEAD OPPORTUNITY ALONG FUTURE SWU ATHLETIC COMPLEX

BANK ST

BROAD ST

BRYANT ST

HANE CIR

Downtown Central

GREENWAY ON ROW TO TRANSITION TO 12' SIDE PATH UPON REACHING HWY 93

PEPPER ST

EXISTING, PRIVATELY OWNED, UTILITY ROW APPEARS TO BE AN OLD RR BED, THUS ALLOWING AN EASY IMPLEMENTATION TO A PAVED TRAIL ROUTE

SWU Outdoor Center

EXISTING CROSSWALK AT CHURCH STREET TO BE IMPROVED FOR HIGH VISIBILITY MUTCD COMPLIANT CROSSING

10' ASPHALT PATH TO TRANSITION TO 12' UPON CROSSING PEPPER STREET

ELGIN LN

CLAYTON ST

COLLEGE ST

HORTON ST

PATTERSON ST

Hundred Acre Woods

EXISTING PAVED WALKING TRAIL SHOULD BE UTILIZED. WIDENING TO 10' WILL ALLOW INCREASED USE FROM SWU TO CENTRAL DOWNTOWN

10' ASPHALT PATH SHOULD BE EXTENDED BETWEEN PARK PARKING LOT AND ADJACENT CHURCH PROPERTY.

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

2 CENTRAL / SWU TO WALMART

Protected Bike Lanes | Side Path

GREEN CRESCENT TRAIL STUDY

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
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- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

3 CENTRAL TO CENTRAL ELEMENTARY

Bike Lanes | Sidewalks

GREEN CRESCENT TRAIL STUDY

BIKE LANES TERMINATE AT SCHOOL ENTRANCE UNTIL NEIGHBORHOOD CONNECTIONS NORTH ARE ANALYZED

EXISTING SIDEWALK ROUTE TERMINATES AT SCHOOL PROPERTY

EXISTING SIDEWALK SHOULD BE ASSESSED FOR EXISTING DAMAGE AND REPAIRED AS NECESSARY

MUTCD COMPLIANT CROSSING AT JOHNSON ROAD

MUTCD COMPLIANT CROSSING AT BROCK STREET

AN AT GRADE RR CROSSING SHOULD BE DEVELOPED AT END OF EXISTING SIDEWALK

JOHNSON ROAD AND GAINES STREET LANE WIDTH ALLOWS FOR BIKE LANES ON BOTH SIDES OF ROAD

NEW 6' SIDEWALK SHOULD BE IMPLEMENTED ON SOUTH SIDE OF RR TRACKS TO CONNECT TO DOWNTOWN CENTRAL SIDEWALKS

Central Elementary

Future SWU Athletic Complex

Downtown Central

POPLAR MOUNTAIN RD
MAGNOLIA TREE
CHRISTY CIR
MOUNTAIN VIEW DR
LUNA LN
LAWTON RD
COLLINS HILL RD
JOHNSON RD
BEVERLY ST
JOSEPH ST
MEREDITH ST
EATON ST
GEORGIA ST
BROCK ST
GAINES ST
GASSAWAY ST
RAMSEUR ST
COKER CIR
WOOD ST
MAW BRIDGE RD
MERCK RD
MADDEN BRIDGE RD
PEPPER ST
TARRANT ST
WESLEYAN DR
BRYANT ST
HANE CIR
FERNWAY DR
CLAYTON ST
SWU Driving Range
93

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
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- PROTECTED BIKE LANE
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POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

4 CENTRAL TO CLEMSON

Protected Bike Lanes | Side Path

GREEN CRESCENT TRAIL STUDY

12' SIDE PATH TO BRANCH ONTO NORTH SIDE OF WERNER STREET

PATH WILL TIE INTO ROUTING ALONG CHURCH STREET

SIDEWALK TO CONTINUE INTO DOWNTOWN CENTRAL

MUTCD COMPLIANT CROSSING AT WERNER STREET

SIDEWALK GAPS ON NORTH SIDE OF HWY 93 SHOULD BE FILLED TO COMPLETE PEDESTRIAN CONNECTION

MUTCD COMPLIANT CROSSING AT ISSAQUEENA TRAIL

Central Disc Golf Course

EXISTING LANE WIDTH ALONG HWY 93 HERE WILL ALLOW IMPROVMENT OF EXISTING BIKE LANES BY ADDING SOME HORIZONTAL BUFFERING

EXISTING SIDEWALK ON NORTH SIDE OF HWY 93 SHOULD BE ASSESSED FOR DAMAGE AND REPAIRED AS NECESSARY

MUTCD COMPLIANT CROSSING AT SKYVIEW ROAD

BIKE LANES TO TIE INTO EXISTING BIKE INFRASTRUCTURE TOWARD CLEMSON UNIVERSITY

SIDEWALK AND SIDEPATH TO TIE INTO EXISTING AND PROPOSED INFRASTRUCTURE AT HWY 76 INTERCHANGE

12' SIDE PATH WILL CONTINUE ADJACENT TO BUFFERED BIKE LANES

MUTCD COMPLIANT CROSSING AT BERKELEY DRIVE

PROTECTED BIKE LANES WILL TRANSITION TO BUFFERED BIKE LANES AT BERKELY DRIVE DUE TO EXISTING LANE WIDTH LIMITATIONS

12' SIDE PATH WILL BE WITHIN HWY 93 ROW WHEREVER POSSIBLE AS TO PREVENT IMPACT TO ADJACENT PROPERTIES

HWY 93 LANE WIDTH ALLOWS FOR PROTECTED BIKE LANES FOR BOTH DIRECTIONS OF TRAVEL

EXISTING PAVED PATHWAY WITHIN GATEWAY PARK WILL CONNECT TO NEW 12' PAVED SHARED USE SIDE PATH ALONG THE SOUTH SIDE OF HWY 93

MUTCD COMPLIANT CROSSING AT VINEYARD ROAD

Twelve Mile Park
Downtown Central
Recreation Center
Walmart Market
Clemson Elementary
Clemson Park
Gateway Park
Botanical Garden
Country Walk Neighborhood
Camelot Neighborhood
Eighteenmile Creek

NEW FARM RD
LIGON RD
OLD JEWELL BRIDGE RD
SANTEE TRL
CATAWBA RD
FORD RD
MOUNTAIN DALE RD
CLEMSON ST
FERN CIR
LAWRENCE RD
OLD CENTRAL RD
CREEKSIDE DR
LINDSAY RD
COCHRAN RD
ELM ST
BANKS ST
REID ST
WARBRANCH RD
WEST LN
VISTA CIR
VISTA DR
SUMMEY ST
MONACO CIR
CARDINAL DR
PRINCESS GRACE AVE
SEDGEFIELD DR
SHAFTSBURY RD
ASHLEY RD
HYDE LN
ISSAQUEENA TRL
TABOR ST
FREEDOM DR
KELLY RD
BROOKS ST
ROSLYN DR
VINEYARD RD
KITE HL
PERIMETER RD
FIFE DR
RED MAPLE WAY
BERKELEY DR
MABEL LN
MAULDIN RD
SPRING FOREST DR
JAMES CIR
HEAD ST
CHURCH ST
GAINES ST
SANDERS RD
MOSER TRL
WILLOW CT
VERY DR
OLD SHIRLEY RD
OLD PENDLETON RD
CHAPMAN HILL RD
Ingles
133
93
76
123

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

5 WALMART TO NETTLES PARK

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

MUTCD COMPLIANT CROSSING AT WALMART SHOPPING CENTER ENTRANCE

SIDE PATH ALONG CHURCH STREET SHOULD CONTINUE TO CROSS HWY 123

PEDESTRIAN BRIDGE WILL NEED TO BE DEVELOPED AS EXISTING VEHICULAR BRIDGE WIDTH IS UNSUITABLE FOR LONG TERM PEDESTRIAN USE

12' SIDE PATH WILL TRANSITION TO 12' PAVED SHARED USE PATH ONCE ACROSS HWY 123

12' PAVED SHARED USE PATH WILL FOLLOW EIGHTEEN MILE CREEK CORRIDOR, UTILIZING EXISTING UTILITY ROWS AND FOLLOWING EXISTING TOPOGRAPHY

AN EXISTING OVERHEAD POWER ROW PRESENTS AN OPPORTUNITY TO IMPLEMENT A BRIDGE TO CROSS EIGHTEEN MILE CREEK

BRIDGE SHOULD BE DEVELOPED WITH UTILITY VEHICLE ACCESS IN MIND

12' PAVED PATH CONTINUES ON NORTH SIDE OF EIGHTEEN MILE CREEK, FOLLOWING THE CREEK CORRIDOR

EXISTING GRAVEL PATH WITHIN PATRICK SQUARE NEIGHBORHOOD SHOULD BE UTILIZED, UPON AGREEMENT FROM HOA

CONNECTION TO PATRICK SQUARE SHOULD BE PROVIDED

EXISTING PEDESTRIAN BRIDGE WILL PROVIDE CONNECTION TO SOUTH SIDE OF CREEK TO CONNECT DIRECTLY WITH NETTLES PARK

FACILITIES WITHIN NETTLES PARK WILL PROVIDE A TRAILHEAD LOCATION, ALTHOUGH ADDITIONAL TRAIL AMENITIES MAY BE NEEDED

Walmart

Walmart Market

Ingles

Clemson Elementary

Country Walk Neighborhood

Camelot Neighborhood

Anderson Earl Park

Ashley Dearing Park

Nettles Park

Eighteenmile Creek

OLD CENTRAL RD

HOPE DR

WEST LN

VICTORY DR

WILLOW CT

HEATHER DR

WELLINGTON WAY

BRIAR LN

CAMBRIDGE DR

MONACO CIR

IVESCOTT DR

PRINCESS GRACE AVE

SEDGEFIELD DR

SHAFTSBURY RD

ABEL RD

TABOR ST

ISSAQUEENA TRL

ASHLEY RD

KAREN DR

HYDE LN

CHAPMAN HILL RD

TAYLOR ST

OLD SHIRLEY RD

OLD PENDLETON RD

123

M AND M RD

WILLY WONKA DR

LELAND DR

RICHARD RD

CENTRAL RD

REFUGE RD

PORTER RD

MULLIKEN RD

88

BERKELEY DR

CLARENDON DR

KNOLLWOOD DR

RED MAPLE WAY

KENDRA LN

SQUIRE CIR

CAMELOT RD

KNIGHT CIR

KINGS WAY

THURMOND LN

POE ST

KELLER BLVD

DOWNS BLVD

HICKORY WAY

ROCK CREEK RD

DOWNS LOOP

KEYSTONE LN

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

6 NETTLES PARK TO BERKELEY DRIVE

Greenway

GREEN CRESCENT TRAIL STUDY

Camelot Neighborhood

DOWNS LOOP

KEYSTONE LN

BERKELEY CT

HILL PINE CT

Ashley Dearing Park

BERKELEY DR

ISSAQUEENA TRL

NETTLES RD

THE TRAIL WILL NEED TO GO UNDER THE EXISTING BRIDGE ON CENTRAL ROAD CROSSING EIGHTEEN MILE CREEK.

A TEMPORARY, AT GRADE ROAD CROSSING COULD BE ESTABLISHED ON CENTRAL ROAD, IF FUNDING LIMITS ABILITY TO ENGINEER A TRAIL UNDERPASS UPFRONT

AN EXISTING PAVED WALKWAY WILL BRANCH OFF TO CONTINUE DOWN THE EIGHTEENMILE CREEK CORRIDOR AND TRANSITION INTO A 12' PAVED SHARED USE PATH

Nettles Park

NETTLES PARK RD

PORTER RD

CENTRAL RD

LEAH DR

MUTCD COMPLIANT CROSSING AT ISSAQUEENA TRAIL

SHARED USE PATH TO TIE INTO "TOTTIE'S PLACE" PATHWAY ACROSS ISSAQUEENA TRAIL

LARK CIR

MAPLE BLVD

MULBERRY AVE

HOLLY AVE

WREN ST

MULTIPLE PRIVATE PROPERTY OWNER AGREEMENTS WILL BE REQUIRED TO COMPLETE SECTION BETWEEN NETTLES PARK AND CLEMSON UNIVERSITY PROPERTY

12' PAVED SHARED USE PATH SHOULD FOLLOW EXISTING PATHWAYS CUT INTO PROPERTY, AVOIDING MATURE VEGETATION PATCHES

ADJACENT PROPERTIES WILL NOT BE IMPACTED

Sefick Property

TRAILHEAD OPPORTUNITY NEXT TO MACS DRIVE IN ON SEFICK PROPERTY

28

SHARED USE PATH TO TIE INTO PROPOSED SIDEPATH ALONG PENDLETON ROAD

Eighteenmile Creek

SHARED USE PATH WILL CONTINUE UNDER PENDLETON ROAD BRIDGE AND CONNECT TO CLEMSONS SOUTHERN FORESTS

PEDESTRIAN BRIDGE NEEDED TO CROSS EIGHTEEN MILE CREEK

PEDESTRIAN BRIDGE NEEDED TO CROSS CREEK

SPAKE RD

WOODLAND CIR

CRAWFORD CIR

CEDAR LN

LAKEVIEW DR

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

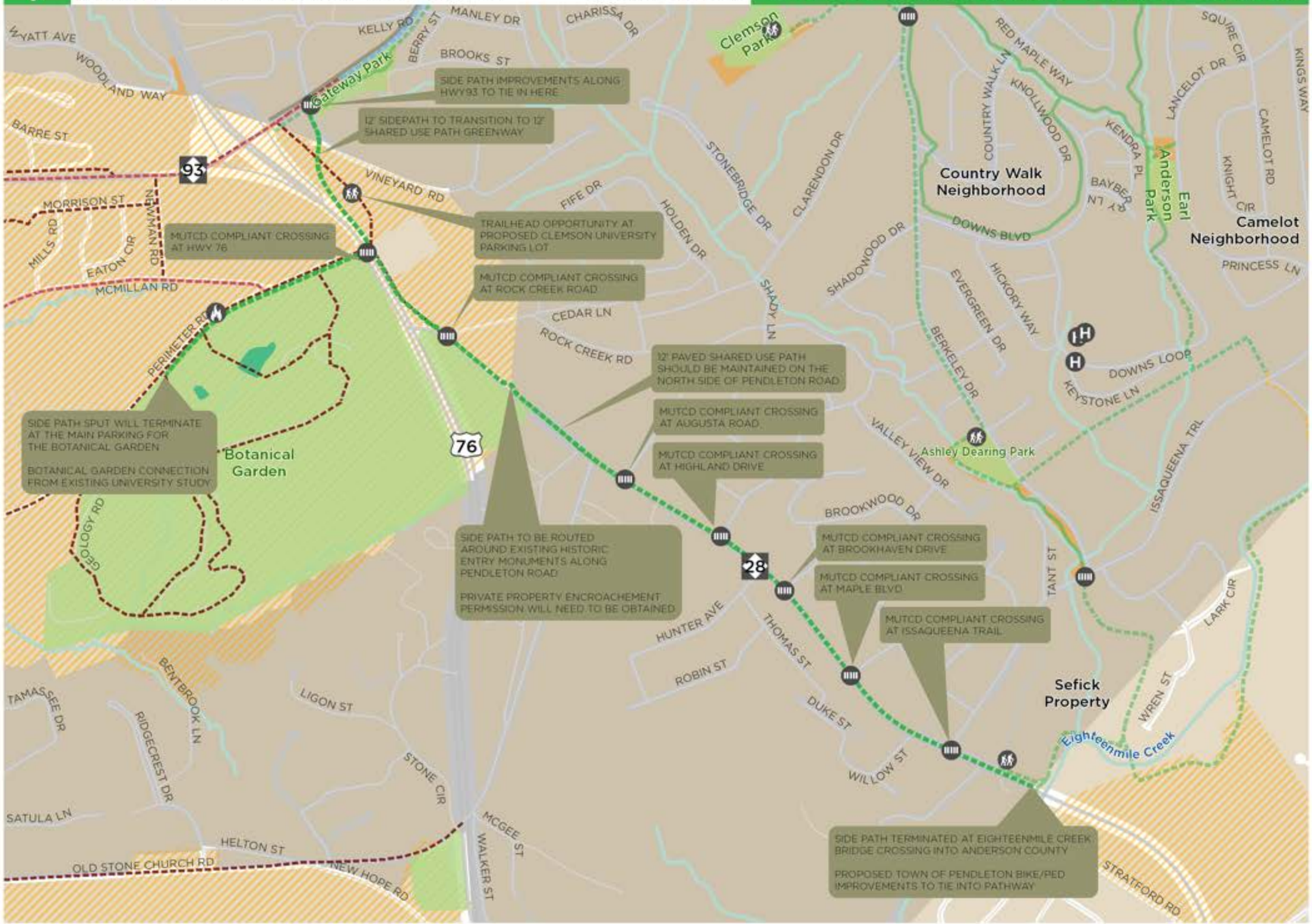
GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

7 CLEMSON TO EIGHTEEN MILE CREEK

Greenway / Side Path

GREEN CRESCENT TRAIL STUDY



BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

8 BERKELEY DRIVE

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

Botanical Garden

76

ROSLYN DR

VINEYARD RD

BROOKS ST

AZALEA DR

CHARISSA DR

LIBERTY DR

STARDUST LN

SKYVIEW DR

ARGON ST

CURTIS CIR

FRONTAGE RD

GRACE ST

93

VISTA DR

VISTA CIR

ABEL RD

BERKELEY PLACE

WEST

MT TABOR HOPE DR

SHARED USED PATH TO TIE INTO PROPOSED SIDE PATH ALONG HWY 93

10' SHARED USED SIDE PATH TO CONNECT TO CLEMSON PARK AND UNITED METHODIST CHURCH

Walmart Market

CIR

VILLAGE WALK LN

FIFE DR

CEDAR LN

BROAD ST

ALLEE ST

HOLDEN DR

STONEBRIDGE DR

ROCK CREEK RD

GOLDMAN ST

Clemson Park

DOVE CIR

MAJOR CROSSING ON BERKLEY DRIVE AT FRONTAGE ROAD

FULL MUTCD COMPLIANCE AND HIGH VISIBILITY MANDATORY

MONACO CIR

Ingles

CAMBRIDGE DR

AUGUSTA RD

28

TRAILHEAD OPPORTUNITY AT CLEMSON PARK

KAREN DR

12' PAVED SHARED USE PATH SHOULD FOLLOW EAST SIDE OF BERKLEY DRIVE NORTH OF HWY 123

GREGORY ST

12' PAVED SHARED USE PATH SHOULD FOLLOW WEST SIDE OF BERKLEY DRIVE SOUTH OF HWY 123

CLARENDON DR

BERKELEY DR

Clemson Elementary

DIRECT CONNECTION TO CLEMSON ELEMENTARY WILL PROVIDE SAFE ROUTE TO SCHOOL

PROPOSED PEDESTRIAN BRIDGE CROSSING HWY 123 WILL BE UTILIZED BY TRAIL USERS

ASHLEY RD

BRIAR LN

SIDE PATH CONSTRUCTION TO OCCUR WITHIN SCDOT ROW. SHOULD ADDITIONAL EASEMENTS BE REQUIRED, COORDINATION WILL TAKE PLACE WITH PROPERTY OWNERS

KNOLLWOOD DR

RED MAPLE WAY

RIVERBIRCH RUN

TRAILHEAD OPPORTUNITY AT EXISTING ASHLEY DEARING PARK ADDITIONAL TRAIL AMENITIES MAY BE NEEDED

EVERGREEN DR

HICKORY WAY

Country Walk Neighborhood

EXISTING PRIVATE PATHWAY SYSTEM WITHIN COUNTRY WALK NEIGHBORHOOD

CONNECTION TO ADJACENT CAMELOT NEIGHBORHOOD

EXISTING 10' PAVED PATH WITHIN "TOTTIES PLACE" TO TRANSITION TO 12' PAVED SHARED USE PATH AND FOLLOW OUTSIDE OF ASHLEY DEARING PARK

Ashley Dearing Park

BAYBERRY LN

KENDRA PL

SQUIRE CIR

Earl Anderson Park

LANCELOT DR

Camelot Neighborhood

OLD SHIRLEY RD

TABOR ST

HOLLY AVE

TANT ST

KEYSTONE LN

DOWNS LOOP

KNIGHT CIR

CAMELOT RD

123

LYNWOOD DR

FUTURE CONNECTIONS WOULD CREATE LOOP AROUND COMMUNITIES, AND PROVIDE OFF ROAD CONNECTIONS TO PARKS

CHAPMAN HILL RD

KINGS WAY

ISSAQUEENA TRL

THURMOND LN

Sefick Property

EXISTING 10' PAVED PATH WITHIN "TOTTIES PLACE" SHOULD BE UTILIZED

WREN ST

LARK CIR

Eighteenmile Creek

NETTLES RD

KELLER POE ST

SIKES AVE

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

9 CLEMSON \ CENTRAL TO FOREST

Side Path | Greenway | Bike Route

GREEN CRESCENT TRAIL STUDY

BIKE ROUTE FROM 12 MILE PARK TO NORTH EXPERIMENTAL FOREST TO UTILIZE EXISTING LANE WIDTHS AND WIDENED SHOULDERS AND HEAVY SIGNAGE

BOARDWALK SYSTEM TO TRANSITION BACK TO 12' SHARED USE PATH GREENWAY AND FOLLOW WATER LINE AROUND TWELVE MILE PARK

12' SIDE PATH TO TRANSITION TO 12' BOARDWALK SYSTEM UPON REACHING VEHICULAR BRIDGE

EXISTING TRAILHEAD FACILITIES AVAILABLE AT WATERFRONT PARK. ALTHOUGH ADDITIONAL TRAIL AMENITIES MAY BE REQUIRED

TRAILHEAD OPPORTUNITY AT EXISTING PARKING GARAGE

BIKE ROUTE SOUTH OF RR TRACKS TO TIE DIRECTLY TO EXISTING CLEMSON UNIVERSITY BIKE/PED INFRASTRUCTURE

TRAIL ROUTE TO TRANSITION TO 12' SHARED USED SIDE PATH UPON REACHING RR TRACK UNDERPASS UTILIZING EXISTING SIDEWALKS AND LANE WIDTHS

BIKE ROUTE CONTINUES TO BYPASS 12 MILE PARK

12' SHARED USE PATH TO TERMINATE UPON MEETING COLLEGE AVENUE

TRAIL TO TRANSITION BACK TO ON STREET BIKE ROUTE UTILIZING SIGNAGE AND LANE WIDTH/SHOULDER WIDENING

SIDE PATH CONSTRUCTION TO OCCUR WITHIN SCDOT ROW. SHOULD ADDITIONAL EASEMENTS BE REQUIRED, COORDINATION WILL TAKE PLACE WITH PROPERTY OWNERS

EXISTING ISSAQUEENA TRAILHEAD SHOULD BE MAINTAINED

NEIGHBORHOOD GREENWAY ALONG SEWER ROW WILL PROVIDE SAFE OFF ROAD ROUTE FROM MIDDLE SCHOOL TO HIGH SCHOOL

BIKE ROUTE FROM CENTRAL TO NORTHERN EXPERIEMENTAL FOREST TO UTILIZE EXISTING LANE WIDTHS AND WIDENED SHOULDERS WITH HEAVY SIGNAGE

North Experimental Forest

Daniel High

RC Edwards Middle

Future BlueWays Park

Downtown Clemson

Downtown Central

Walmart Market

Recreation Center

Botanical Garden

Gateway Park

Jaycee Park

Presidents Park

Twelve Mile Park

Clemson Park

Central Disc Golf Course

HUGO DR · JACOBS RD · DOYLE BOTTOM RD · LACUSTRIAN LN · OLD SIX MILE RD · BRIARCLIFF RD · R C EDWARDS SCHOOL RD · WALDROP STONE RD · MORGAN DR · CLEMSON ST · COLLEGE AVE · ELM ST · CALHOUN ST · COCHRAN RD · LINDSAY RD · LAWRENCE RD · FORD RD · WILLIAMSON DR · JERSEY LN · CHERRY RD · MCMILLAN RD · PERIMETER RD · GEOLOGY RD · KELLY RD · BROOKS ST · VINEYARD RD · FIFE DR · SUMMEY ST · FABRI ST · WARBRANCH RD · WEST LN · OLD CENTRAL RD · VISTA DR · ABEL RD · SKYVIEW DR · CURTIS CIR · GRACE ST · BERKELEY DR · PIKE RD · NEW FARM RD · MADDEN BRIDGE RD · LIGON RD · MABEL LN · MAULDIN RD · MERCK RD · MAW BRIDGE RD · GASSAWAY ST · WOOD ST · JOSEPH ST · MEREDITH ST · EATON ST · WATKINS · CARROLL DR

93 · 76 · 133 · 123 · 28

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- MAJOR X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

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6: Appendix A.2: Phasing Map Exhibits

1 CENTRAL TO SWU

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

Central Elementary

JESSAMINE DR

LAWTON RD

COLLINS HILL RD

THOMAS LN

MOUNTAIN VIEW DR

LUNA LN

BROCK ST

BEVERLY ST

JOHNSON RD

WOODS ST

JOSEPH ST

MEREDITH ST

EATON ST

GEORGIA ST

WOODSON ST

KENNEMORE ST

GAINES ST

GREEN ST

COKER CIR

FERNWAY DR

SWU Driving Range

PERIMETER RD

Southern Wesleyan University

Future SWU Athletic Complex

CHILDS ST

SIMMS SCHOOL RD

93

CLAYTON ST

NICHOLSON DR

WESLEYAN DR

BRYANT ST

HANE CIR

RICKMAN DR

BANK ST

BROAD ST

Downtown Central

WERNER ST

DUNCAN ST

CHURCH ST

FOLGER ST

TARRANT ST

MILL AVE

PEPPER ST

AIKEN ST

HORTON ST

DUNWOODY AVE

COLLEGE ST

ELGIN LN

PATTERSON ST

SWU Outdoor Center

Hundred Acre Woods

MATHINE ST

KELLY HEAD ST

FOOT ST

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

2 CENTRAL / SWU TO WALMART

Protected Bike Lanes | Side Path

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

Downtown Central
Future SWU Athletic Complex
SWU Driving Range
Southern Wesleyan University
SWU Outdoor Center
Hundred Acre Woods
Old Landfill
Recreation Center
Central Disc Golf Course
Walmart
Eighteenmile Creek
MERCK RD
MADDEN BRIDGE RD
BROAD ST
WERNER ST
FOLGER ST
WESLEYAN DR
COLLEGE ST
BERRY ST
MARTIN ST
CENTRAL LANDFILL RD
HEADS LAKE RD
SIMMS SCHOOL RD
MAULDIN RD
LIGON RD
SANDERS RD
CROSS CREEK RD
SHERIFF RD
OLD SHIRLEY RD
OLD PENDLETON RD
EIGHTEEN MILE RD
93
123

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GTC GREEN CRESCENT TRAIL

alta PLANNING + DESIGN

3 CENTRAL TO CENTRAL ELEMENTARY

Bike Lanes | Sidewalks

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

Central Elementary

Future SWU Athletic Complex

SWU Driving Range

Downtown Central

MAGNOLIA TREE

CHRISTY CIR

JESSAMINE DR

MOUNTAIN VIEW DR

LUNA LN

BROCK ST

BEVERLY ST

WOOD ST

JOSEPH ST

MEREDITH ST

EATON ST

GEORGIA ST

GAINES ST

JOHNSON RD

KENNEMORE ST

WOODSON ST

LAWTON RD

COLLINS HILL RD

FERNWAY DR

CLAYTON ST

TARRANT ST

WESLEYAN DR

BRYANT ST

HANE CIR

PEPPER ST

BROAD ST

COKER CIR

GREEN ST

RAMSEUR ST

GASSAWAY ST

MAW BRIDGE RD

MADDEN BRIDGE RD

MERCK RD

93

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GTC GREEN CRESCENT TRAIL

alta PLANNING + DESIGN

4 CENTRAL TO CLEMSON

Protected Bike Lanes | Side Path

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

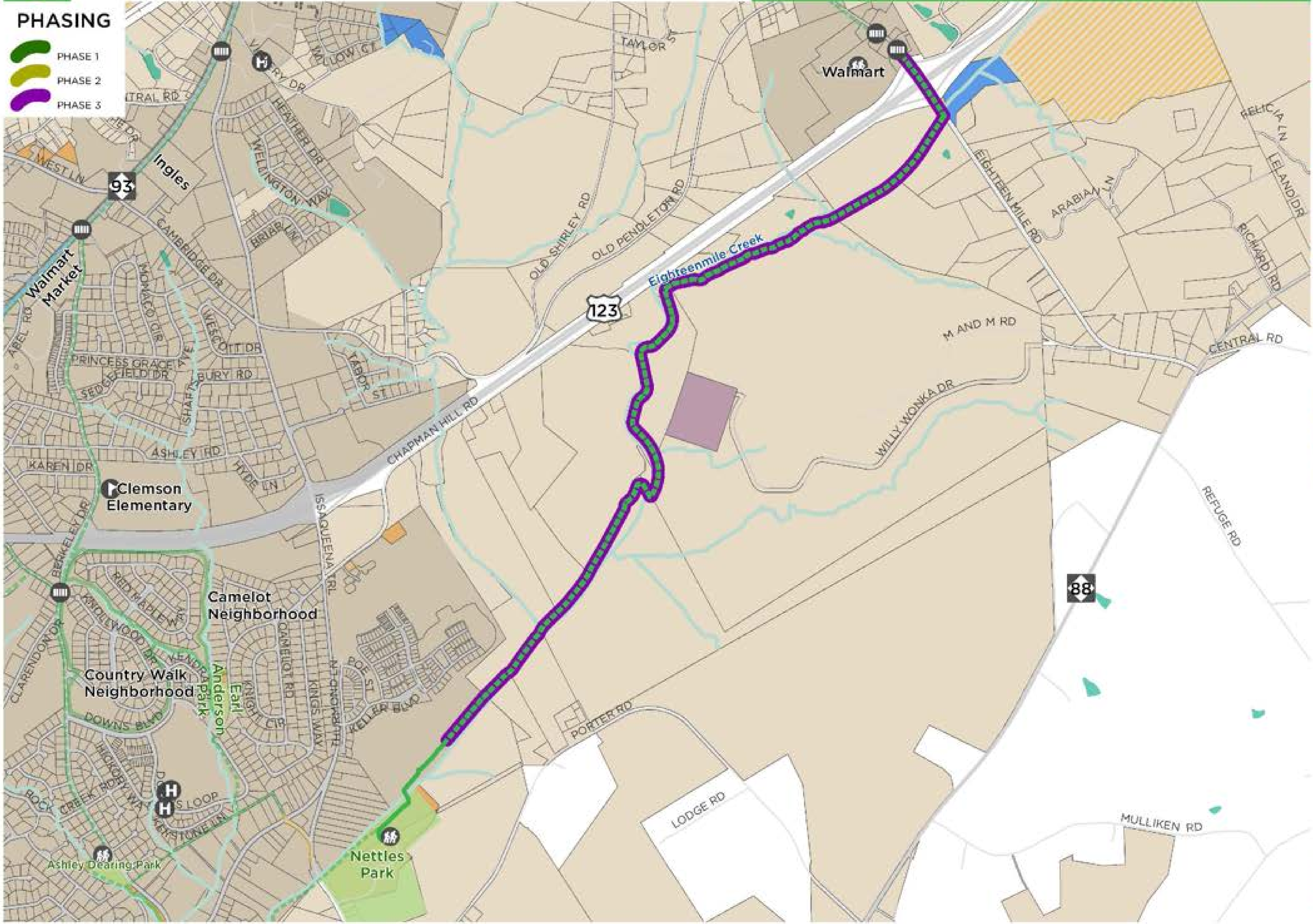
0 0.1

Downtown Central
Recreation Center
Central Disc Golf Course
Walmart Market
Clemson Elementary
Gateway Park
Clemson Park
Botanical Garden
Country Walk Neighborhood
Camelot Neighborhood
Eighteenmile Creek
NEW FARM RD
FORD RD
OLD CENTRAL RD
CLEMSON ST
MAULDIN RD
LIGON RD
MABEL LN
AIRPORT RD
BERKELEY DR
FRONTAGE RD
CHAPMAN HILL RD
OLD PENDLETON RD
OLD SHIRLEY RD
Ingles
133
93
76
123

5 WALMART TO NETTLES PARK

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY


PHASING
PHASE 1
PHASE 2
PHASE 3
Walmart
Ingles
Walmart Market
Clemson Elementary
Camelot Neighborhood
Country Walk Neighborhood
Earl Anderson Park
Ashley Dearing Park
Nettles Park
Eighteenmile Creek
93
123
88
CHAPMAN HILL RD
ISSAQUEENA TRL
OLD PENDLETON RD
OLD SHIRLEY RD
TAYLOR ST
WILLOW CT
HEATHER DR
WELLINGTON WAY
BRIAR LN
CAMBRIDGE DR
MONACO CIR
WESCOTT DR
PRINCESS GRACE AVE
SEDGEFIELD DR
SHAFTSBURY RD
ASHLEY RD
HYDE LN
KAREN DR
BERKELEY DR
ABEL RD
WEST LN
TABOR ST
CAMELOT RD
KINGS WAY
POE ST
KELLER BLVD
KNIGHT CIR
KNOLLWOOD DR
RED MAPLE WAY
DOWNS BLVD
DOWNS LOOP
HICKORY WAY
ROCK CREEK RD
KEYSTONE LN
CLARENDON DR
EIGHTEEN MILE RD
ARABIAN LN
RICHARD RD
LELAND DR
FELICIA LN
M AND M RD
WILLY WONKA DR
CENTRAL RD
REFUGE RD
PORTER RD
LODGE RD
MULLIKEN RD
NORTH
MILES
0 0.1

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

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- CENTRAL PROPERTY
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- SWU PROPERTY
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- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

6 NETTLES PARK TO BERKELEY DRIVE

Greenway

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

Camelot Neighborhood

Ashley Dearing Park

Nettles Park

Sefick Property

DOWNS LOOP
KEYSTONE LN
BERKELEY CT
HILL PINE CT
ISSAQUEENA TRL
GORDON LN
NETTLES RD
BERKELEY DR
NETTLES PARK RD
PORTER RD
CENTRAL RD
GROVE DR
TANT ST
LARK CIR
MAPLE BLVD
MULBERRY AVE
HOLLY AVE
WREN ST
LEAH DR
SPAKE RD
WOODLAND CIR
CRAWFORD CIR
CEDAR LN
LAKEVIEW DR
BOOKER SPRINGS RD
Eighteenmile Creek
CANTERBURY RD
STRATFORD RD
28

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GTC GREEN CRESCENT TRAIL

alta PLANNING + DESIGN

7 CLEMSON TO EIGHTEEN MILE CREEK

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

Gateway Park
Clemson Park
Country Walk Neighborhood
Camelot Neighborhood
Anderson Park
Earl
Botanical Garden
Ashley Dearing Park
Sefick Property
Eighteenmile Creek
93
76
28

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES
0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

8 BERKELEY DRIVE

Greenway | Side Path

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

0 0.1 MILES

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

9 CLEMSON \ CENTRAL TO FOREST

Side Path | Greenway | Bike Route

GREEN CRESCENT TRAIL STUDY

PHASING

- PHASE 1
- PHASE 2
- PHASE 3

North Experimental Forest

Daniel High

RC Edwards Middle

Twelve Mile Park

Downtown Clemson

Jaycee Park

Greenspace

Gateway Park

Botanical Garden

Walmart Market

Recreation Center

Future Blueways Park

Downtown Central

OLD SIX MILE RD

MORGAN DR

WALDROP STONE RD

DOYLE BOTTOM RD

LACUSTRIAN LN

BRIARCLIFF RD

HADDEN BRIDGE RD

DYKE RD

CAHOUN ST

VIEW LN

CLEMSON ST

LAWRENCE RD

OLD CENTRAL RD

FORD RD

PIKE RD

MOUNTAIN DALE RD

NEW FARM RD

MCJUNKIN RD

FOND DU LAC DR

CARROUSEL DR

CENTENNIAL BLVD

WILLIAMSON DR

HOUNDS

DANIEL DR

WATT AVE

JERSEY LN

CHERRY RD

MCMILLAN RD

PERIMETER RD

GEOLOGY RD

VINEYARD RD

FRONTAGE RD

PIPE DR

BERKELEY DR

ELLIS CIR

LABEL RD

SHADOWBROOK ST

SHIRLEY DR

SUMMEY ST

FABRIC ST

REID ST

BURNS ST

ELMS ST

COCHRAN RD

LINDSAY RD

WARREN LAMAR RD

WEST LN

VISTA DR

LIGON RD

MERCK RD

MAW BRIDGE RD

GASSAWAY ST

MABEL LN

MAULDIN RD

WOODISE RD

MEREDITH ST

EATON ST

WATKINS ST

CARROLL CIR

76

123

93

28

133

BIKE / PED FACILITIES

EXISTING PROPOSED

- BIKE ROUTE
- BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- NATURAL SURFACE TRAIL
- GREENWAY
- SIDEWALK
- CLEMSON UNIVERSITY BIKEWAYS

OVERLAYS

- RAILROADS
- PARKS
- CLEMSON PROPERTY
- CENTRAL PROPERTY
- PICKENS CO PROPERTY
- SWU PROPERTY
- CLEMSON UNI PROPERTY
- TOWN LIMITS

POINTS OF INTEREST

- PROPOSED TRAILHEAD
- PROPOSED X-WALK
- SCHOOLS
- EMS
- FIRE & RESCUE
- LAW ENFORCEMENT
- HEALTH FACILITY

NORTH

MILES

0 0.1

GREEN CRESCENT TRAIL GTC

alta PLANNING + DESIGN

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6: Appendix B: Funding Sources

1.1.1 Overview

When considering possible funding sources for bicycle and pedestrian networks, it is important to consider that not all construction activities will be accomplished with a single funding source. Bicycle and pedestrian funding is administered at all levels of government, federal, state, local and through private sources. The following sections identify potential matching and major funding sources, and the criteria for bicycle and pedestrian projects and programs.

1.1.2 Federal Funding Sources

Federal funding is typically directed through state agencies to local governments either in the form of grants or direct appropriations, independent from state budgets. Federal funding typically requires a local match of 20%, although there are sometimes exceptions, such as the recent American Recovery and Reinvestment Act stimulus funds, which did not require a match.

The following is a list of possible Federal funding sources that could be used to support construction of many pedestrian and bicycle improvements. Most of these are competitive, and involve the completion of extensive applications with clear documentation of the project need, costs, and benefits. It should be noted that the FHWA encourages the construction of pedestrian and bicycle facilities as an incidental element of larger ongoing projects. Examples include providing paved shoulders on new and reconstructed roads, or building sidewalks on-street bikeways, trails and marked crosswalks as part of new highways.

Moving Ahead for Progress in the Twenty-First Century (MAP-21)

The largest source of federal funding for bicyclists and pedestrians is the US DOT's Federal-Aid Highway Program, which Congress has reauthorized roughly every six years since the passage of the Federal-Aid Road Act of 1916. The latest act, Moving Ahead for Progress in the Twenty-First Century (MAP-21) was enacted in July 2012 as Public Law 112-141. The Act replaces the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), which was valid from August 2005 - June 2012.

MAP-21 authorizes funding for federal surface transportation programs including highways and transit for the 27 month period between July 2012 and September 2014. It is not possible to guarantee the continued availability of any listed MAP-21 programs, or to predict their future funding levels or policy guidance. Nevertheless, many of these programs have been included in some form since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, and thus may continue to provide capital for active transportation projects and programs.

In South Carolina, federal monies are administered through the South Carolina Department of Transportation (SCDOT) and Metropolitan Planning Organizations (MPOs). Most, but not all, of these programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system.

There are a number of programs identified within MAP-21 that are applicable to bicycle and pedestrian projects. These programs are discussed on the following pages.

More information: http://www.fhwa.dot.gov/map21/summaryinfo.cfm

Fixing America's Surface Transportation (FAST) Act

The Fixing America's Surface Transportation (FAST) Act replaced the former Transportation Alternatives Program (TAP) in December of 2015 with a set-aside of funds under the Surface Transportation Block Grant Program (STBG). For administrative purposes, FHWA refers to these funds as the TA Set-Aside. The TA Set-Aside authorizes funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity; recreational trail projects; safe routes to school projects; and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) Section 1524 requires the U.S. Department of Transportation to encourage States and regional transportation planning agencies to use qualified youth service and conservation corps to perform appropriate transportation-related projects. This section of law remains

TABLE B.1: FUNDING SOURCES

FUNDING SOURCES	PLANNING	PROGRAMMING	DESIGN/ CONSTRUCTION
FEDERAL FUNDING			
TRANSPORTATION ALTERNATIVES	X	X	X
SURFACE TRANSPORTATION PROGRAM			X
HIGHWAY SAFETY IMPROVEMENT PROGRAM		X	X
CONGESTION MITIGATION/AIR QUALITY		X	X
FTA PILOT TRANSIT-ORIENTED DEVELOPMENT PLANNING	X		
PARTNERSHIP FOR SUSTAINABLE COMMUNITIES	X	X	X
RIVERS, TRAILS, AND CONSERVATION ASSISTANCE PROGRAM	X		
COMMUNITY DEVELOPMENT BLOCK GRANTS		X	X
COMMUNITY TRANSFORMATION GRANTS	X	X	
LAND AND WATER CONSERVATION FUND	X		X
NATIONAL SCENIC BYWAYS DISCRETIONARY GRANT PROGRAM			X
FEDERAL LANDS TRANSPORTATION PROGRAM	X		X
ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANTS	X		X
STATE FUNDING			
SOUTH CAROLINA TRANSPORTATION INFRASTRUCTURE BANK			X
SC DEPARTMENT OF TRANSPORTATION - CAPITAL PROJECTS			X
SC DEPARTMENT OF TRANSPORTATION - MAINTENANCE PROGRAM			X
SOUTH CAROLINA PARKS AND RECREATION DEVELOPMENT FUND			X
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM			X
LOCAL FUNDING			
METROPOLITAN PLANNING ORGANIZATION	X	X	X
GENERAL FUND			X
LOCAL BOND MEASURES			X
STORMWATER UTILITY FEES			X
SYSTEM DEVELOPMENT CHARGES/DEVELOPER IMPACT FESS			X
STREET USER FEES			X
IN-LIEU-OF-FEES			X
UTILITY LEASE REVENUE			X
LOCAL IMPROVEMENT DISTRICT			X
BUSINESS IMPROVEMENT AREA OR DISTRICT			X
SALES TAX	X		X
PROPERTY TAX	X		X
EXCISE TAX			X
TAX INCREMENT FINANCING			X

PRIVATE/NON-PROFIT FUNDING			
BIKES BELONG GRANT PROGRAM		X	X
THE ROBERT WOOD JOHNSON FOUNDATION	X	X	
BANK OF AMERICA CHARITABLE FOUNDATION	X	X	
THE WALMART FOUNDATION	X	X	X
DUKE ENERGY FOUNDATION		X	
AMERICAN GREENWAYS EASTMAN KODAK AWARDS	X	X	X
NATIONAL TRAILS FUND		X	X
THE CONSERVATION ALLIANCE	X	X	
NATIONAL FISH AND WILDLIFE FOUNDATION	X	X	X
THE TRUST FOR PUBLIC LAND	X	X	
COMMUNITY ACTION FOR A RENEWED ENVIRONMENT (CARE)	X	X	X
LOCAL TRAIL SPONSORS			X
CORPORATE DONATIONS	X	X	X
VOLUNTEER WORK	X	X	X
PUBLIC-PRIVATE PARTNERSHIPS	X	X	X
PRIVATE INDIVIDUAL DONATIONS	X	X	X
FUNDRAISING/CAMPAIGN DRIVES	X	X	X
LAND TRUST ACQUISITION AND DONATION			X
ADOPT A TRAIL PROGRAM			X

in effect.

The FAST Act is the first long-term federal transportation funding bill since 2005. Prior to its passage, state DOTs faced a series of short-term extensions that made it difficult to plan for the future. NCDOT currently receives about $1 billion a year in federal funding, which accounts for almost a fifth of its current $4.4 billion budget.

Transportation Alternatives

Transportation Alternatives (TA) is a new funding source under MAP-21 that consolidates three formerly separate programs under SAFETEA-LU: Transportation Enhancements (TE), Safe Routes to School (SR2S), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails. TA funds may also be used for selected education and encouragement programming such as Safe Routes to School, despite the fact that TA does not provide a guaranteed set-aside for this activity as SAFETEA-LU did. South Carolina's Governor Nikki Haley did not opt–out of the Recreational Trails Program funds, ensuring that dedicated funds for recreational trails continue to be provided as a subset of TA. MAP-21 provides $85 million nationally for the RTP.

Complete eligibilities for TA include:

1. Transportation Alternatives as defined by Section 1103 (a)(29). This category includes the construction, planning, and design of a range of bicycle and pedestrian infrastructure including "on–road and off–road trail facilities for pedestrians, bicyclists, and other active forms of transportation, including sidewalks, bicycle infrastructure,

pedestrian and bicycle signals, traffic calming techniques, lighting and other safety–related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990." Infrastructure projects and systems that provide "Safe Routes for Non-Drivers" is a new eligible activity.

For the complete list of eligible activities, visit: http://www.fhwa.dot.gov/environment/transportation_enhancements/legislation/map21.cfm

2. Recreational Trails. TA funds may be used to develop and maintain recreational trails and trail-related facilities for both active and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other active and motorized uses. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails
- State administrative costs related to this program (limited to seven percent of a state's funds)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a state's funds)

Under MAP-21, dedicated funding for the RTP continues at FY 2009 levels – roughly $85 million annually. South Carolina will receive $1,211,220 in RTP funds per year through FY 2014 (http://www.fhwa.dot.gov/environment/recreational_trails/funding/apportionments_obligations/recfunds_2009.cfm).

3. Safe Routes to School. The purpose of the Safe Routes to Schools eligibility is to promote safe, healthy alternatives to riding the bus or being driven to school. All projects must be within two miles of primary or middle schools (K-8).

Eligible projects may include:

- Engineering improvements. These physical improvements are designed to reduce potential bicycle and pedestrian conflicts with motor vehicles. Physical improvements may also reduce motor vehicle traffic volumes around schools, establish safer and more accessible crossings, or construct walkways, trails or bikeways. Eligible improvements include sidewalk improvements, traffic calming/speed reduction, pedestrian and bicycle crossing improvements, on-street bicycle facilities, off-street bicycle and pedestrian facilities, and secure bicycle parking facilities.
- Education and Encouragement Efforts. These programs are designed to teach children safe bicycling and walking skills while educating them about the health benefits, and environmental impacts. Projects and programs may include creation, distribution and implementation of educational materials; safety based field trips; interactive bicycle/pedestrian safety video games; and promotional events and activities (e.g., assemblies, bicycle rodeos, walking school buses).
- Enforcement Efforts. These programs aim to ensure that traffic laws near schools are obeyed. Law enforcement activities apply to cyclists, pedestrians and motor vehicles alike. Projects may include development of a crossing guard program, enforcement equipment, photo enforcement, and pedestrian sting operations.

4. Planning, designing, or constructing roadways within the right-of-way of former Interstate routes or divided highways. At the time of writing, detailed guidance from the Federal Highway Administration on this new eligible activity was not available.

Average annual funds available through TA over the life of MAP-21 equal $814 million nationally, which is based on a 2% set-aside of total MAP-21 authorizations. Projected apportionments for South Carolina total $606,647,974 for FY 2013 and $611,847,012 for FY 2014 (http://www.fhwa.dot.gov/MAP21/funding.cfm). State DOTs may elect to transfer up to 50% of TA funds to other highway programs, so the amount listed above represents the maximum potential funding. TA funds are typically allocated through

the planning districts.

Surface Transportation Program (Guideshare)

The Surface Transportation Program (STP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of bicycle and pedestrian improvements are eligible, including on-street bicycle facilities, off-street trails, sidewalks, crosswalks, bicycle and pedestrian signals, parking, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Unlike most highway projects, STP-funded bicycle and pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System. Fifty percent of each state's STP funds are sub-allocated geographically by population. These funds are funneled through SCDOT to the MPOs in the state. The remaining 50% may be spent in any area of the state. In South Carolina, STP is known as Guideshare.

Highway Safety Improvement Program

MAP-21 doubles the amount of funding available through the Highway Safety Improvement Program (HSIP) relative to SAFETEA-LU. HSIP provides $2.4 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. MAP-21 preserves the Railway-Highway Crossings Program within HSIP but discontinues the High-Risk Rural roads set-aside unless safety statistics demonstrate that fatalities are increasing on these roads HSIP is a data-driven funding program and eligible projects must be identified through analysis of crash experience, crash potential, crash rate, or other similar metrics. . Infrastructure and non-infrastructure projects are eligible for HSIP funds. Bicycle and pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for active transportation users in school zones are examples of eligible projects. All HSIP projects must be consistent with the state's Strategic Highway Safety Plan.

Last updated in 2007, the SCDOT SHSP is located here: http://www.scdot.org/inside/pdfs/Multimodal/Road_Map.pdf

Congestion Mitigation/Air Quality Program

The Congestion Mitigation/Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality nonattainment and maintenance areas for ozone, carbon monoxide, and particulate matter which reduce transportation related emissions. States with no nonattainment areas may use their CMAQ funds for any CMAQ or STP eligible project. These federal dollars can be used to build bicycle and pedestrian facilities that reduce travel by automobile. Purely recreational facilities generally are not eligible.

New Freedom Initiative

MAP-21 continues a formula grant program that provides capital and operating costs to provide transportation services and facility improvements that exceed those required by the Americans with Disabilities Act. Examples of pedestrian/accessibility projects funded in other communities through the New Freedom Initiative include installing Accessible Pedestrian Signals (APS), enhancing transit stops to improve accessibility, and establishing a mobility coordinator position.

More information: http://www.hhs.gov/newfreedom/

Pilot Transit-Oriented Development Planning

MAP-21 establishes a new pilot program to promote planning for Transit-Oriented Development. At the time of writing the details of this program are not fully clear, although the bill text states that the Secretary of Transportation may make grants available for the planning of projects that seek to "facilitate multimodal connectivity and accessibility," and "increase access to transit hubs for pedestrian and bicycle traffic."

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities is a joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). The partnership aims to "improve access to affordable housing, more transportation options,

and lower transportation costs while protecting the environment in communities nationwide." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for bicycle and pedestrian infrastructure ("Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health").

The Partnership is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including the TIGER grants).

More information: http://www.epa.gov/smartgrowth/partnership/

Rivers, Trails, and Conservation Assistance Program

The Rivers, Trails, and Conservation Assistance Program (RTCA) is a National Parks Service (NPS) program providing technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance—there are no implementation monies available. Projects are prioritized for assistance based on criteria including conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation, and focusing on lasting accomplishments. This program may benefit trail development indirectly through technical assistance, particularly for community organizations, but should not be considered a future capital funding source.

More information: http://www.nps.gov/pwro/rtca/who-weare.htm

Community Development Block Grants

The Community Development Block Grants (CDBG) program provides money for streetscape revitalization, which may be largely comprised of pedestrian improvements. Federal CDBG grantees may "use Community Development Block Grants funds for activities that include (but are not limited to): acquiring real property; reconstructing or rehabilitating housing and other property; building public facilities and improvements, such as streets, sidewalks, community and senior citizen centers and recreational facilities; paying for planning and administrative expenses, such as costs related to developing a consolidated plan and managing

Community Development Block Grants funds; provide public services for youths, seniors, or the disabled; and initiatives such as neighborhood watch programs." Trails and greenway projects that enhance accessibility are the best fit for this funding source. CDBG funds could also be used to write an ADA Transition Plans.

More information: www.hud.gov/cdbg

Community Transformation Grants

Community Transformation Grants administered through the Center for Disease Control support community–level efforts to reduce chronic diseases such as heart disease, cancer, stroke, and diabetes. Active transportation infrastructure and programs that promote healthy lifestyles are a good fit for this program, particularly if the benefits of such improvements accrue to population groups experiencing the greatest burden of chronic disease.

More info: http://www.cdc.gov/communitytransformation/

Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. Funds can be used for right–of–way acquisition and construction. The program is administered by the South Carolina Department of Parks, Recreation & Tourism as a grant program. Any Trails and Greenways Plan projects located in future parks could benefit from planning and land acquisition funding through the LWCF. Trail corridor acquisition can be funded with LWCF grants as well.

More information: http://www.tn.gov/environment/recreation/grants.shtml

National Scenic Byways Discretionary Grant Program

The National Scenic Byways Discretionary Grants program

provides merit-based funding for byway-related projects each year, utilizing one or more of eight specific activities for roads designated as National Scenic Byways, All-American Roads, State scenic byways, or Indian tribe scenic byways. The activities are described in 23 USC 162(c). This is a discretionary program; all projects are selected by the US Secretary of Transportation.

Eligible projects include construction along a scenic byway of a facility for pedestrians and bicyclists and improvements to a scenic byway that will enhance access to an area for the purpose of recreation. Construction includes the development of the environmental documents, design, engineering, purchase of right-of-way, land, or property, as well as supervising, inspecting, and actual construction.

For more information: http://www.bywaysonline.org/grants/

Federal Lands Transportation Program (FLTP)

The FLTP funds projects that improve access within federal lands (including national forests, national parks, national wildlife refuges, national recreation areas, and other Federal public lands) on federally owned and maintained transportation facilities. $300 million per fiscal year has been allocated to the program for 2013 and 2014.

For more information: http://www.fhwa.dot.gov/map21/fltp.cfm

Energy Efficiency and Conservation Block Grants

The Department of Energy's Energy Efficiency and Conservation Block Grants (EECBG) may be used to reduce energy consumptions and fossil fuel emissions and for improvements in energy efficiency. Section 7 of the funding announcement states that these grants provide opportunities for the development and implementation of transportation programs to conserve energy used in transportation including development of infrastructure such as bike lanes and pathways and pedestrian walkways. Although the current grant period has passed, more opportunities may arise in the future.

For more information: http://www1.eere.energy.gov/wip/eecbg.html

Additional Federal Funding

The landscape of federal funding opportunities for bicycle and pedestrian programs and projects is always changing. A number of Federal agencies, including the Bureau of Land Management, the Department of Health and Human Services, the Department of Energy, and the Environmental Protection Agency have offered grant programs amenable to bicycle and pedestrian planning and implementation, and may do so again in the future.

For up-to-date information about grant programs through all federal agencies, see: http://www.grants.gov/

1.1.3 State Funding Sources

The following is a list of possible State funding sources that could be used to support construction of many pedestrian and bicycle improvements.

South Carolina Transportation Infrastructure Bank

The South Carolina Transportation Infrastructure Bank (SCTIB) is a statewide revolving loan fund designed in 1997 to assist major transportation projects in excess of $100 million in value. The SCTIB has since approved more than $4.5 billion in financial assistance and is arguably the largest and most active State Infrastructure Bank in the country. SCTIB funded development of the Palmetto Parkway in Aiken County, which included development of a roughly five mile multi-use trail within the parkway's right of way.

More information: http://www.scdot.org/inside/SIB_board.aspx

South Carolina Department of Transportation – Capital Projects

Clemson, Central, and Pendleton should work closely with SCDOT to include bicycle and pedestrian improvements as part of major projects. The two groups should cooperate on a regular basis to identify opportunities for implementation of the Green Crescent Trail.

South Carolina Department of Transportation – Maintenance Program

The South Carolina Department of Transportation carries out a number of road resurfacing maintenance projects annually. There may be opportunities for road restriping to be completed as part of regular roadway maintenance. This will require coordination with the SCDOT District Traffic Engineer and the local maintenance office to ensure that the pavement marking design is appropriate and safe for cyclists and drivers.

South Carolina Parks and Recreation Development Fund

The PARD grant program is a state funded non–competitive reimbursable grant program for eligible local governments or special purposes district entities within each county which provide recreational opportunities.

- Monthly grant cycle
- Non–competitive program available to eligible local governmental entities within each county area for development of new public recreation facilities or enhancement/renovations to existing facilities.
- Projects need endorsement of majority weighted vote factor of County Legislative Delegation Members.
- This is an 80-20 match program
- Application Deadline is the 10th of each month

More information: http://www.scprt.com/our-partners/grants/pard.aspx.

Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) is SCDOT's short-term capital improvement program, providing project funding and scheduling information for the department and South Carolina's metropolitan planning organizations. The program provides guidance for the next six years and is updated every three years. The South Carolina Department of Transportation Commission, as well as the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) approve the STIP.

In developing this funding program, SCDOT must verify that the identified projects comply with existing transportation and comprehensive plans. The STIP must fulfill federal planning requirements for a staged, multiyear, statewide, intermodal program of transportation projects. Specific transportation projects are prioritized based on Federal planning requirements and the specific State plans.

More information: http://www.scdot.org/inside/stip.aspx

1.1.4 Local Government Funding Sources

Local funding sources that would support bike facility project construction will most likely be limited but should be explored.

Metropolitan Planning Organization

Metropolitan Planning Organizations (MPOs) are federally required regional transportation planning organizations. MPOs are responsible for planning and prioritizing all federally funded transportation improvements within an urbanized area.

The Greenville-Pickens Area Transportation Study (GPATS) is the Metropolitan Planning Organization, or MPO, for the Greenville Urbanized Area. MPOs were created in the 1960s and required for any Census-defined Urbanized Area with a population of 50,000 or more. MPOs were created to ensure that transportation planning is carried out on the regional scale, in order to allocate federal and other transportation funding most efficiently.

MPOs maintain a long-range transportation plan (LRTP) and develop a transportation improvement program (TIP) to develop a fiscally constrained program based on the long-range transportation plan and designed to serve the region's goals while using spending, regulating, operating, management, and financial tools. This Plan recommends that the Green Crescent Trail partners work closely with GPATS to ensure trails and greenways projects are listed in the TIP. Typically, projects on this list require a 20% local match.

General Fund

The General Fund is often used to pay for maintenance expenses and limited capital improvement projects.

Projects identified for reconstruction or re-pavement as part of the Capital Improvements list should also implement recommendations for bicycle or pedestrian improvements in order to reduce additional costs.

Local Bond Measures

Local bond measures, or levies, are usually general obligation bonds for specific projects. Bond measures are typically limited by time based on the debt load of the local government or the project under focus. Funding from bond measures can be used for engineering, design and construction of trails, greenways, and pedestrian and bicycle facilities. A bond issued in Denver, Colorado funded $5 million for trail development and also funded the City's bike planner for several years. In 2012, voters in Austin, Texas approved a $143 million bond to fund a variety of mobility and active transportation projects

More information: http://www.scdot.org/inside/SIB_board.aspx.

Stormwater Utility Fees

Stormwater charges are typically based on an estimate of the amount of impervious surface on a user's property. Impervious surfaces (such as rooftops and paved areas) increase both the amount and rate of stormwater runoff compared to natural conditions. Such surfaces cause runoff that directly or indirectly discharges into public storm drainage facilities and creates a need for stormwater management services. Thus, users with more impervious surface are charged more for stormwater service than users with less impervious surface.

The rates, fees, and charges collected for stormwater management services may not exceed the costs incurred to provide these services. The costs that may be recovered through the stormwater rates, fees, and charges includes any costs necessary to assure that all aspects of stormwater quality and quantity are managed in accordance with federal and state laws, regulations, and rules. Open space may be purchased with stormwater fees, if the property in question is used to mitigate floodwater or filter pollutants.

System Development Charges/Developer Impact Fees

System Development Charges (SDCs), also known as Developer Impact Fees, represent another potential local funding source. SDCs are typically tied to trip generation rates and traffic impacts produced by a proposed project. A developer may reduce the number of trips (and hence impacts and cost) by paying for on- or off-site pedestrian improvements that will encourage residents to walk (or use transit, if available) rather than drive. In-lieu parking fees may be used to help construct new or improved pedestrian facilities. Establishing a clear nexus or connection between the impact fee and the project's impacts is critical in avoiding a potential lawsuit.

Street User Fees

Many cities administer street user fees through residents' monthly water or other utility bills. The revenue generated by the fee can be used for operations and maintenance of the street system, and priorities would be established by the Public Works Department. Revenue from this fund can be used to maintain on-street bicycle and pedestrian facilities, including routine sweeping of bicycle lanes and other designated bicycle routes.

In Lieu of Fees

Developers often dedicate open space or greenways in exchange for waiving fees associated with park and open space allocation requirements in respect to proposed development. These types of requirements are presented within local municipal codes and ordinances.

Utility Lease Revenue

A method to generate revenues from land leased to utilities for locating utility infrastructure on municipally owned parcels. This can improve capital budgets and support financial interest in property that would not otherwise create revenue for the government.

Local Improvement Districts (LIDs)

Local Improvement Districts (LIDs) are most often used by cities to construct localized projects such as streets, sidewalks or bikeways. Through the LID process, the costs of local improvements are generally spread out among

a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as traffic trip generation. Based on South Carolina's Municipal Improvements Act of 1999, LIDs can include a Municipal Improvement District (MID), a County Public Works Improvement District (CPWID) or a Residential Improvement District (RID).

Several cities have successfully used LID funds to make improvements on residential streets and for large scale arterial projects. LIDs formed to finance commercial street development can be "full cost," in which the property assessments are entirely borne by the property owners.

Business Improvement Area or District (BIA or BID)

Trail development and pedestrian and bicycle improvements can often be included as part of larger efforts aimed at business improvement and retail district beautification. Business Improvement Areas collect levies on businesses in order to fund area wide improvements that benefit businesses and improve access for customers. These districts may include provisions for pedestrian and bicycle improvements, including as wider sidewalks, landscaping and ADA compliance.

Sales Tax

Local governments that choose to exercise a local option sales tax use the tax revenues to provide funding for a wide variety of projects and activities. The Green Crescent trail projects can be funded by a portion of local sales tax revenue or from a voter approved sales tax increase. The City of Colorado Springs implemented a TOPS tax (Trails, Open Space and Parks) to administer the ordinance passed by voters in April of 1997. The sales tax, 1/10th of one percent, generates about $6 million annually for trails, open space and parks. Any increase in the sales tax, even if applying to a single county, must gain approval of the state legislature. In 2004, Charleston County voters approved a ½ cent sales tax for the purpose of financing transportation and greenbelt projects. Voters approved a second referendum in 2006.

More Information: http://roads.charlestoncounty.org/about.php

Property Tax

Property taxes generally support a significant portion of a local government's activities. However, the revenues from property taxes can also be used to pay debt service on general obligation bonds issued to finance open space system acquisitions. Because of limits imposed on tax rates, use of property taxes to fund open space could limit the county's or a municipality's ability to raise funds for other activities. Property taxes can provide a steady stream of financing while broadly distributing the tax burden. In other parts of the country, this mechanism has been popular with voters as long as the increase is restricted to parks and open space. Note, other public agencies compete vigorously for these funds, and taxpayers are generally concerned about high property tax rates.

Excise Taxes

Excise taxes are taxes on specific goods and services. These taxes require special legislation and the use of the funds generated through the tax are limited to specific uses. Examples include lodging, food, and beverage taxes that generate funds for promotion of tourism, and the gas tax that generates revenues for transportation-related activities.

Tax Increment Financing (TIF)

Tax Increment Financing is a tool to use future gains in taxes to finance the current improvements that will create those gains. When a public project (e.g., shared use trail) is constructed, surrounding property values generally increase and encourage surrounding development or redevelopment. The increased tax revenues are then dedicated to support the debt created by the original public improvement project.

1.1.5 Private/Nonprofit Funding Sources

Many communities have solicited greenway funding assistance from private foundations and other conservation minded benefactors. The following are several examples of private funding opportunities available.

Foothills Community Foundation

Foothills Community Foundation is an independent public charity that stewards philanthropic resources from institutional and individual donors to community based organizations.

Throughout its history, the Foundation has served as a tax efficient and cost effective means for individuals, businesses and charitable organizations to provide the financial resources critical to improving the lives of our citizens. Our mission is "To retain and nurture the charitable wealth in the South Carolina counties of Anderson, Oconee and Pickens."

The Foundation awards grants under its key initiatives: Civic, Arts and Culture, Education, Health Improvement, and Youth and Recreation. Awards are made on a competitive basis to eligible grant recipients, including individuals and non-profits. The Foundation partners with organizations and individuals to encourage greater access and participation in recreational activities, support health improvement efforts in our schools, hospitals, communities and free medical clinics.

Bikes Belong Grant Program

The Bikes Belong Coalition of bicycle suppliers and retailers has awarded $2.5 million and leveraged an additional $650 million since its inception in 1999. The program funds corridor improvements, mountain bike trails, BMX parks, trails, and park access. It is funded by the Bikes Belong Employee Pro Purchase Program.

More information: http://www.peopleforbikes.org/pages/community-grants

The Robert Wood Johnson Foundation

The Robert Wood Johnson Foundation was established as a national philanthropy in 1972 and today it is the largest U.S. foundation devoted to improving the health and health care of all Americans. Grant making is concentrated in four areas:

- To assure that all Americans have access to basic health care at a reasonable cost
- To improve care and support for people with chronic health conditions
- To promote healthy communities and lifestyles
- To reduce the personal, social and economic harm caused by substance abuse: tobacco, alcohol, and illicit drugs

More information: http://www.rwjf.org/applications/

Bank of America Charitable Foundation, Inc.

The Bank of America Charitable Foundation is one of the largest in the nation. The primary grants program is called Neighborhood Excellence, which seeks to identify critical issues in local communities. Another program that applies to greenways is the Community Development Programs, and specifically the Program Related Investments. This program targets low and moderate income communities and serves to encourage entrepreneurial business development.

More information: http://www.bankofamerica.com/foundation

The Walmart Foundation

The Walmart Foundation offers a Local, State, and National Giving Program. The Local Giving Program awards grants of $250 to $5,000 through local Walmart and Sam's Club Stores. Application opportunities are announced annually in February with a final deadline for applications in December. The State Giving Program provides grants of $25,000 to $250,000 to 501c3 nonprofits working within one of five focus areas: Hunger Relief & Nutrition, Education, Environmental Sustainability, Women's Economic Empowerment, or Workforce Development. The program has two application cycles per year: January through March and June through August. The Walmart Foundation's National Giving Program awards grants of $250,000 and more, but does not accept unsolicited applications.

More information: http://foundation.walmart.com/apply-for-grants

Duke Energy Foundation

Funded by Duke Energy shareholders, this non-profit organization makes charitable grants to selected

non-profits or governmental subdivisions. Each annual grant must have:

- An internal Duke Energy business "sponsor"
- A clear business reason for making the contribution

The grant program has three focus areas: Environment and Energy Efficiency, Economic Development, and Community Vitality. Related to this project, the Foundation would support programs that support conservation, training and research around environmental and energy efficiency initiatives.

More information: http://www.duke-energy.com/community/foundation.asp

The Kodak American Greenways Program

The Conservation Fund's American Greenways Program has teamed with the Eastman Kodak Corporation and the National Geographic Society to award small grants ($250 to $2,000) to stimulate the planning, design and development of greenways. These grants can be used for activities such as mapping, conducting ecological assessments, surveying land, holding conferences, developing brochures, producing interpretive displays, incorporating land trusts, and building trails. Grants cannot be used for academic research, institutional support, lobbying or political activities.

More information: http://www.conservationfund.org

National Trails Fund

American Hiking Society created the National Trails Fund in 1998, the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. 73 million people enjoy foot trails annually, yet many of our favorite trails need major repairs due to a $200 million backlog of badly needed maintenance. National Trails Fund grants help give local organizations the resources they need to secure access, volunteers, tools and materials to protect America's cherished public trails. To date, American Hiking has granted more than $240,000 to 56 different trail projects across the U.S. for land acquisition, constituency building campaigns, and traditional trail work projects. Awards range from $500 to $10,000 per project.

Projects the American Hiking Society will consider include:

- Securing trail lands, including acquisition of trails and trail corridors, and the costs associated with acquiring conservation easements.
- Building and maintaining trails which will result in visible and substantial ease of access, improved hiker safety, and/or avoidance of environmental damage.
- Constituency building surrounding specific trail projects - including volunteer recruitment and support.

More information: http://www.americanhiking.org/alliance/fund.html

The Conservation Alliance

The Conservation Alliance is a non-profit organization of outdoor businesses whose collective annual membership dues support grassroots citizen-action groups and their efforts to protect wild and natural areas. One hundred percent of its member companies' dues go directly to diverse, local community groups across the nation– groups like Southern Utah Wilderness Alliance, Alliance for the Wild Rockies, The Greater Yellowstone Coalition, the South Yuba River Citizens' League, RESTORE: The North Woods and the Sinkyone Wilderness Council (a Native American owned/ operated wilderness park). For these groups, who seek to protect the last great wild lands and waterways from resource extraction and commercial development, the Alliance's grants are substantial in size (about $35,000 each), and have often made the difference between success and defeat. Since its inception in 1989, The Conservation Alliance has contributed $4,775,059 to grassroots environmental groups across the nation, and its member companies are proud of the results: To date the groups funded have saved over 34 million acres of wild lands and 14 dams have been either prevented or removed-all through grassroots community efforts.

The Conservation Alliance is a unique funding source for grassroots environmental groups. It is the only environmental grant maker whose funds come from a potent yet largely untapped constituency for protection of ecosystems – the

active transportation outdoor recreation industry and its customers. This industry has great incentive to protect the places in which people use the clothing, hiking boots, tents and backpacks it sells. The industry is also uniquely positioned to educate outdoor enthusiasts about threats to wild places, and engage them to take action.

Finally, when it comes to decision–makers, especially those in the Forest Service, National Park Service, and Bureau of Land Management, this industry has clout - an important tool that small advocacy groups can wield. The Conservation Alliance Funding Criteria: The Project should be focused primarily on direct citizen action to protect and enhance our natural resources for recreation. The Alliance does not look for mainstream education or scientific research projects, but rather for active campaigns. All projects should be quantifiable, with specific goals, objectives and action plans and should include a measure for evaluating success. The project should have a good chance for closure or significant measurable results over a fairly short term (one to two years). Funding emphasis may not be on general operating expenses or staff payroll.

More information: http://www.conservationalliance.com/index.m

National Fish and Wildlife Foundation (NFWF)

The National Fish and Wildlife Foundation (NFWF) is a private, nonprofit, tax-exempt organization chartered by Congress in 1984. The National Fish and Wildlife Foundation sustains, restores, and enhances the Nation's fish, wildlife, plants and habitats. Through leadership conservation investments with public and private partners, the Foundation is dedicated to achieving maximum conservation impact by developing and applying best practices and innovative methods for measurable outcomes.

The Foundation awards matching grants under its Keystone Initiatives to achieve measurable outcomes in the conservation of fish, wildlife, plants and the habitats on which they depend. Awards are made on a competitive basis to eligible grant recipients, including federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations. Project proposals are received on a year-round, revolving basis with two decision cycles per year. Grants generally range from $50,000-$300,000 and typically require a minimum 2:1 non-federal match.

Funding priorities include bird, fish, marine/coastal, and wildlife and habitat conservation. Other projects that are considered include controlling invasive species, enhancing delivery of ecosystem services in agricultural systems, minimizing the impact on wildlife of emerging energy sources, and developing future conservation leaders and professionals.

More information: http://www.nfwf.org/AM/Template.cfm?Section=Grants

The Trust for Public Land

Land conservation is central to the mission of the Trust for Public Land (TPL). Founded in 1972, the Trust for Public Land is the only national nonprofit working exclusively to protect land for human enjoyment and wellbeing. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities. Also, TPL is the leading organization helping agencies and communities identify and create funds for conservation from federal, state, local, and philanthropic sources.

Since 1996, TPL has helped states and communities craft and pass over 382 successful ballot measures, generating $34 billion in new conservation-related funding.

More information: http://www.tpl.org/what-we-do/services/conservation-finance/

Community Action for a Renewed Environment (CARE)

CARE is a competitive grant program that offers an innovative way for a community to organize and take action to reduce toxic pollution in its local environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them. By providing financial and technical assistance, EPA helps CARE communities get on the path to a renewed environment. Transportation and "smart-growth" types of projects are eligible. Grants range between $90,000 and $275,000.

More information: http://www.epa.gov/care/

Local Trail Sponsors

A sponsorship program for trail amenities allows smaller donations to be received from both individuals and businesses. Cash donations could be placed into a trust fund to be accessed for certain construction or acquisition projects associated with the greenways and open space system. Some recognition of the donors is appropriate and can be accomplished through the placement of a plaque, the naming of a trail segment, and/or special recognition at an opening ceremony. Types of gifts other than cash could include donations of services, equipment, labor, or reduced costs for supplies.

Corporate Donations

Corporate donations are often received in the form of liquid investments (i.e. cash, stock, bonds) and in the form of land. Employers recognize that creating places to bike and walk is one way to build community and attract a quality work force. Bicycling and outdoor recreation businesses often support local projects and programs. Municipalities typically create funds to facilitate and simplify a transaction from a corporation's donation to the given municipality. Donations are mainly received when a widely supported capital improvement program is implemented. Such donations can improve capital budgets and/or projects.

1.1.6 Other Sources

Volunteer Work and Public-Private Partnerships

Individual volunteers from the community can be brought together with groups of volunteers from church groups, civic groups, scout troops and environmental groups to work on greenway development on special community workdays. Volunteers can also be used for fundraising, maintenance, and programming needs. Local schools or community groups may use the bikeway projects as a project for the year, possibly working with a local designer or engineer. Work parties may be formed to help clear the right-of-way where needed. A local construction company may donate or discount services. A challenge grant program with local businesses may be a good source of local funding, where corporations 'adopt' a bikeway and help construct and maintain the facility.

Private Individual Donations

Private individual donations can come in the form of liquid investments (i.e. cash, stock, bonds) or land. Municipalities typically create funds to facilitate and simplify a transaction from an individual's donation to the given municipality. Donations are mainly received when a widely supported capital improvement program is implemented. Such donations can improve capital budgets and/or projects.

Fundraising / Campaign Drives

Organizations and individuals can participate in a fundraiser or a campaign drive. It is essential to market the purpose of a fundraiser to rally support and financial backing. Oftentimes fundraising satisfies the need for public awareness, public education, and financial support.

Land Trust Acquisition and Donation

Land trusts are held by a third party other than the primary holder and the beneficiaries. This land is oftentimes held in a corporation for facilitating the transfer between two parties. For conservation purposes, land is often held in a land trust and received through a land trust. A land trust typically has a specific purpose such as conservation and is used so land will be preserved as the primary holder had originally intended.

Adopt a Trail Program

A challenge grant program with local businesses may be a good source of local funding, where corporations 'adopt' a trail and help maintain the facility. Foundation grants, volunteer work, and donations of in-kind services, equipment, labor or materials are other sources of support that can play a supporting role in gathering resources to design and build new bicycle and pedestrian facilities.

Residents and other community members are excellent resources for garnering support and enthusiasm for a trail, and Clemson, Central, and Pendleton should work with volunteers to substantially reduce implementation and maintenance costs. Local schools, community groups, or a group of dedicated neighbors may use the project as a

Green Crescent Trail Public Meeting

6: Appendix C: Acquisition Strategies

1.1.1 Acquisition Strategies

Several options are available for jurisdictions to acquire necessary property for the Green Crescent Trail. Options include amending local zoning and subdivision ordinances to ensure that, as developments are planned and reviewed, the trail corridors identified in this plan are protected. This would entail amending development regulations to have developers set aside land for trails whenever a development proposal overlaps with the Green Crescent Trail.

In addition, local policies can be revised so that all new sewer and utility easements allow for public access as a matter of right. Although many easements do not currently prohibit trail development, they do require the approval of landowners, increasing the complexity of trail development in these easements.

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

Partnerships

The Towns of Clemson, Central, and Pendleton 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 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 corridors throughout the study area. Trails and greenways can be built on rights-of-way that are either owned or leased by electric and natural gas companies. Electric utility companies have long recognized the value of partnering with 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 the Carolinas.

Clemson, Central and Pendleton should actively update and maintain relationships with private utility and land managers to ensure that a community wide greenway system can be accommodated within these rights-of-way. The Towns 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.

Government Regulation

Regulation is defined as the government's ability to control the use and development of land through legislative powers. Regulatory methods help shape the use of land without transferring or selling the land. The following types of development ordinances are regulatory tools that can meet the challenges of projected growth and development as well as conserve and protect greenway resources.

Growth Management Measures (Concurrency)

Concurrency-based development approaches to growth management simply limit development to areas with adequate public infrastructure. This helps regulate urban sprawl, provides for quality of life in new development, and can help protect open space. In the famous case with the Town of Ramapo (1972), the Town initiated a zoning ordinance making the issue of a development permit contingent on the presence of public facilities such as utilities and parks. This was upheld in Court and initiated a wave of slow-growth management programs nationwide. This type of growth management can take the form of an adequate public facilities ordinance.

Performance Zoning

Performance zoning is zoning based on standards that establish minimum requirements or maximum limits on the effects or characteristics of a use. This is often used for the mixing of different uses to minimize incompatibility and improve the quality of development. For example, how

a commercial use is designed and functions determines whether it could be allowed next to a residential area or connected to a greenway.

Incentive Zoning (Dedication/Density Transfers)

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 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.

Conservation Zoning

This mechanism recognizes the problem of reconciling different, potentially incompatible land uses by preserving natural areas, open spaces, waterways, and/or greenways that function as buffers or transition zones. It can also be called buffer or transition zoning. This type of zoning, for example, can protect waterways by creating buffer zones where no development can take place. Care must be taken to ensure that the use of this mechanism is reasonable and will not destroy the value of a property.

Overlay Zoning

An overlay zone and its regulations are established in addition to the zoning classification and regulations already in place. These are commonly used to protect natural or cultural features such as historic areas, unique terrain features, scenic vistas, agricultural areas, wetlands, stream corridors, and wildlife areas.

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.

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.

Planned Unit Development

A planned unit development allows a mixture of uses. It also allows for flexibility in density and dimensional requirements, making clustered housing and common open space along with addressing environmental conditions a possibility. It emphasizes more planning and can allow for open space and greenway development and connectivity.

Cluster Development

Cluster development refers to a type of development with generally smaller lots and homes close to one another. Clustering can allow for more units on smaller acreages of land, allowing for larger percentages of the property to be used for open space and greenways.

Land Management

Land 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.

Abandoned Rail

Abandoned rail lines are excellent candidates for trail development due to gentle grading and linear open space connectivity through developed and undeveloped areas. In North Carolina, once a rail line is abandoned, full ownership is transferred to the adjacent landowner unless the corridor is railbanked prior to abandonment. For more information on railbanking, visit http://www.ncrailtrails.org/legal.

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 than 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.

Installment Sale

An installment sale is a sale of property at a gain where at least one payment is to be received after the tax year in which the sale occurs. These are valuable tools to help sellers defer capital gains tax. This provides a potentially attractive option when purchasing land for open space from a possible seller.

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.

Land Banking

Land banking involves land acquisition in advance of expanding urbanization. The price of an open space parcel prior to development pressures is more affordable to a jurisdiction seeking to preserve open space. A municipality or county might use this technique to develop a greenbelt or preserve key open space or agricultural tracts. The jurisdiction should have a definite public purpose for a land banking project.

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.

Proposed Highway 93 Improvements.

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