SINGLETRACK CONNECTIONS:

INTEGRATION OF MOUNTAIN BIKE TRAILS INTO

THE OCONEE RIVERS GREENWAY

by

CHARLES MCKEAN MAFFITT

(Under the Direction of RONALD SAWHILL)

ABSTRACT

The purpose of this thesis is to propose a means of integrating mountain bike-friendly trails into the Oconee Rivers Greenway while expanding the greenway system to include new connections to the Middle Oconee River and to Ben Burton Park, in keeping with the original Athens-Clarke County (ACC) Parks & Recreation Master Plan. In addition, it will also attempt to illustrate how partnerships with mountain bike advocacy groups can help accelerate and promote the Greenway's development as a resource for the urban community. The thesis will identify ideal corridors for overland connections between the Middle and North Oconee Rivers and will illustrate how a mountain bike trail traversing this corridor would be beneficial not only to local cyclists, but to the Athens-Clarke population at large.

INDEX WORDS: Landscape Architecture, Mountain bike trails, Greenways

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GLOSSARY OF ACRONYMS

ACC: Athens-Clarke County

BLM: Bureau of Land Management

BMA: Boulder Mountain Bike Alliance

BTS: Bureau of Transportation Statistics

IMBA: International Mountain Biking Association

KMNBP: Kennesaw Mountain National Battlefield Park

LRWMA: Lake Russell Wildlife Management Area

NORBA: National Off-Road Biking Association

NPS: National Park Service

NSRE: National Survey on Recreation and the Environment

OMBA: Ocala Mountain Biking Association

RAMBO: Roswell/Alpharetta Mountain Biking Association

SORBA: Southern Off-Road Bicycling Association

USFS: U.S. Forest Service

VCCP: Velo Cross Club Parisien

Chapter 1: INTRODUCTION

The purpose of this thesis is to propose a means of integrating mountain bike-friendly trails into the Oconee Rivers Greenway (ORG) while expanding the greenway system to include new connections to the Middle Oconee River and to Ben Burton Park, in keeping with the original Athens-Clarke County (ACC) Parks & Recreation Master Plan. In addition, it will also attempt to illustrate how partnerships with mountain bike advocacy groups can help accelerate and promote the Greenway's development as a resource for the urban community at large.

The Problem

Despite being home to a large population of cyclists, the unified government of Athens-Clarke County currently offers no sanctioned facilities within its recreational program for the increasingly popular sport of mountain biking, also called off-road bicycling. This is surprising, given that the Northeast Georgia Piedmont is well-suited for the development of bike trails, and especially given the fact that a system of recreational trails already exists as part of the North Oconee River Greenway. Although a number of natural-surface trails connect to the Greenway near Sandy Creek Park and Sandy Creek Nature Center, mountain bikers are prohibited from riding these trails. Reasons given by the parks department for the exclusion of mountain bikers include lack of suitable acreage within the county for bike trails, questions about the public need for such trails, concerns about erosion and environmental impact, and the potential for user conflict on shared-use trails (SORBA, 2006).

Athens-Clarke County has a population of roughly 104,000, according to a 2005 estimate by the U.S. Census (US Census, 2000). Although an accurate estimate of the number of residents who mountain bike is difficult to obtain, Athens has long had a reputation as being a cyclist's town. Three independent specialty bike shops are located within the county, in addition to the countless bikes sold at large national chains. The Jittery Joe's professional road cycling team currently calls Athens home, as do at least four major mountain bike racing teams. The city hosts an annual cycling event, the Twilight Criterium, which provides a major boost to the local economy every April and draws more spectators to Athens than any other sporting event besides football. The high number of cyclists may be partially due to the presence of the University of Georgia. However, according to membership records maintained by SORBA, the vast majority of mountain bikers in Athens are not students but rather are professionals, homeowners, and taxpayers that fuel the government's revenue, and who have a vested interest in the city's future (SORBA, 2006).

Athens-Clarke County's lack of sanctioned trails puts it behind the curve compared to many of its neighbors; nearby Gainesville, in Hall County, boasts more than 25 miles of government-managed mountain bike trails, as does sprawling Gwinnett County. Furthermore, Barrow and Jackson counties, which share borders with Athens-Clarke, are both currently planning for the development of bike trails in county parks. For the growing population of mountain bikers in Athens-Clarke County, however, the closest places to ride are in other counties such as Oconee Heritage Park in Farmington

(Oconee County), Hawkes Creek Farm in Oglethorpe County, or at Fort Yargo State Park in Winder, all at least some 30 minutes' drive from Athens.[1]

The necessity of an automobile trip to ride mountain bikes has been a thorn in the side of Athenian cyclists for many years. Many of these riders are avid cyclists who would greatly prefer to eliminate automobiles from the equation altogether and resent the fact that the city has given them no opportunities close to home despite having a partial greenway system in place. Some, frustrated with the lack of attention they've received on an official level, have taken things into their own hands by building unauthorized trails just so they'll have a nearby place to ride. Over the years, this network of urban bike trails has weaved a pattern through the overlooked, the neglected, and the irregular patches of remaining greenspace in Clarke County.

The Proposed Solution

It is the contention of this author that the Oconee Rivers Greenway, conceived as both a conservation effort and as a recreational trailway, is the key to a successful integration of the mountain biking user group into the ACC Parks and Recreation System. The existing North Oconee Greenway provides the opportunity to create a safe and enjoyable means of cycling outward from the urban center of Athens to a proposed system of singletrack tied into the greenway. Conversely, the patchwork network of existing bike trails which link fragments of open space together with threads of singletrack illustrates the feasibility of an overland link between the Middle and the North Oconee River corridors. It also lends credibility to the idea of a city-wide circuit of

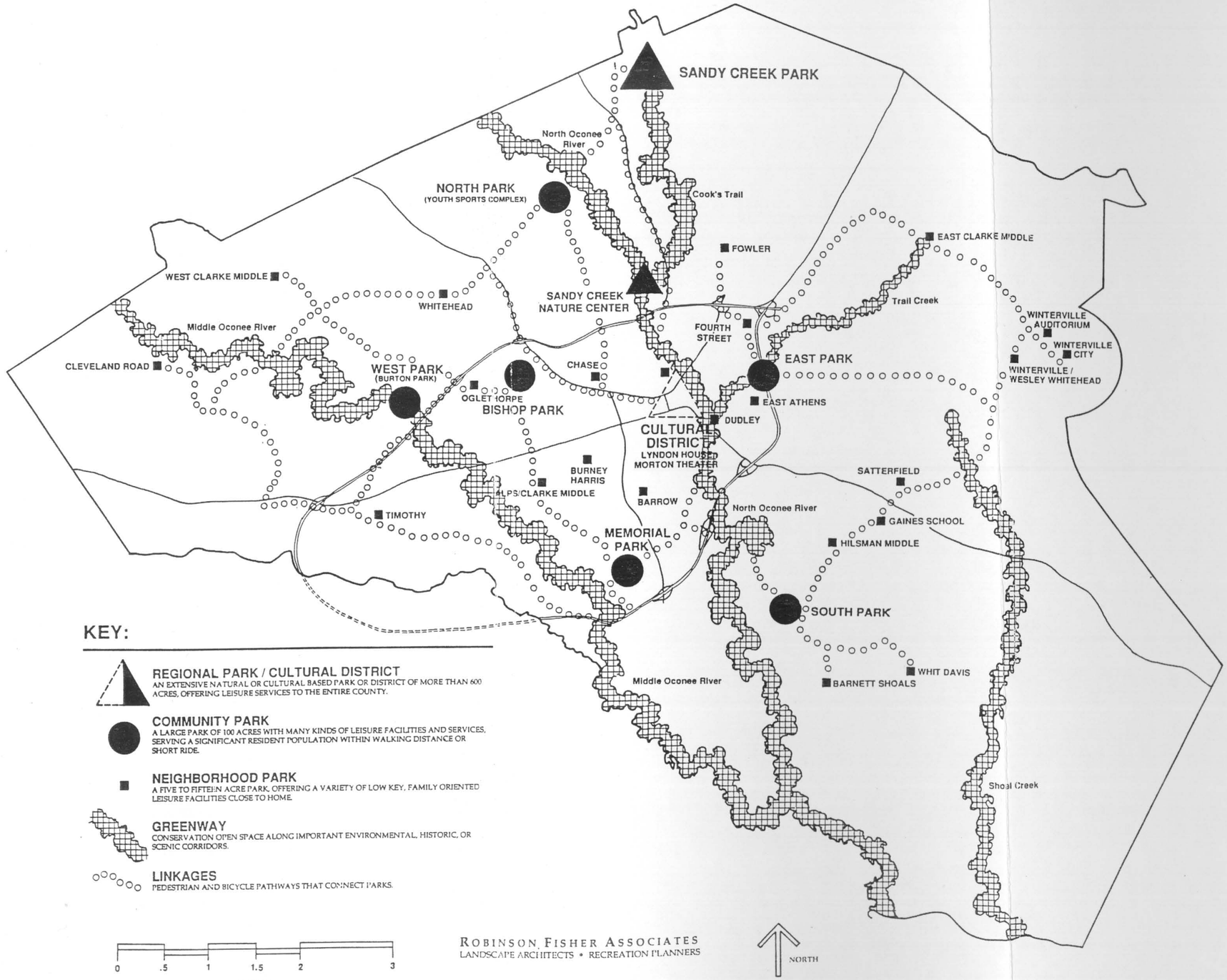
[1] Mountain biking is allowed on certain trails at the Oconee Forest Park (UGA Intramural Fields), but these total less than a mile in length, and are crowded with other user groups, illustrating a excessive high demand for such limited trail resources. They are overseen by the Warnell School of Forestry and Natural Resources, who have recently partnered with the Athens chapter of SORBA to help manage the trails within the park. A similar partnership with Athens-Clarke County is one of the main recommendations of this thesis.

trail corridors envisioned years ago by the planners of the Oconee Rivers Greenway system (See Fig. 1.1).

This thesis will attempt show that integrating this network of singletrack into the Greenway system would ultimately prove extremely beneficial to the city by adding an additional user group to the system, adding recreational mileage for bikers, runners and hikers. In addition, such a network would preserve acres of threatened greenspace, re-open corridors for wildlife, and add value to a formerly disconnected and nearly forgotten city park, providing it with a connection to the rest of the park system. The proposed trail would advance the process of building pedestrian and bike-friendly circulation networks through the city, reconnecting disconnected neighborhoods, and linking by overland trail the two rivers that originally gave the city its life. Moreover, it is hoped that once a foothold is established on the Middle Oconee, it will provide a strong incentive to begin further conservation efforts along that river's riparian corridor.

Fig. 1.1: Athens-Clarke County Parks and Recreation Master Plan Showing Greenways Linked by Overland Trails

(11 x 17 Foldout)



ATHENS-CLARKE COUNTY PARKS AND RECREATION MASTER PLAN

Chapter 2. A SHORT SUMMARY OF MOUNTAIN BIKING

In the last thirty years, the sport of mountain biking has evolved from an experimental fringe sport to a worldwide phenomenon enjoyed by millions of people. According to the National Bicycle Dealers Association, more than 33 million Americans owned a mountain bike in 2001 (NBDA, 2006), and in that year the New York Times stated that mountain bikes accounted for 36.8% of all bicycle sales, far more than any other type of bike (See Fig. 2.1). The Outdoor Industry Association reported that by 2006, mountain bikes still accounted for the largest subset of bicycle sales (OIA, 2006).

Breakdown of 2001 bicycle sales by type:

*** Mountain 36.8% - 4,048,000 units ***

Youth 26.1%
Comfort 20.8%
Hybrid 8.8%
Road 4.4%
Other 3.1%

(Source: New York Times, 6/21/02)

(Fig 2.1): 2001 Bicycle Sales by Type

The explosive growth of the sport has slowed since the 1980's and 1990's, but it remains steady, and today mountain biking is one of the most popular forms of outdoor recreation in America. Even President George W. Bush is an avid mountain biker who spends much of his free time in the saddle, and has spoken with the International Mountain Biking Association (IMBA) about building a new trail system on his Crawford,

TX ranch (USA Today, 8/13/2005). Bush began mountain biking as an alternative to jogging, which put too much stress on a bad knee, and now mountain bikes as his main form of cardiovascular exercise due to its low physical impact and high reward.

Fig 2.2: President George W. Bush Mountain Biking with Members of the Chinese Olympic Team
(USA Today, 2005)

As the popularity of the sport continues to grow, more and more demand arises for stimulating, challenging, and convenient venues for mountain biking, which has resulted in a boom of new mountain bike trail construction over the past decade or so. This demand is especially high in urban areas, where the open space necessary for mountain biking is being rapidly consumed by development and opportunities for off-road biking are limited or nonexistent (SORBA, 2006).

Some Statistics on Bicycling

The Outdoor Industry Association reported in 2006 that that 92 million Americans ride bicycles on a regular basis (OIA, 2006). A 2006 National Survey on Recreation and the Environment report estimates that the number of Americans who bicycled at least

once a year grew 62.5% between 1995 and 2004, from 1.23 billion to 1.99 billion (NSRE, 2006).

The 1987 report by the President's Commission on Outdoor Recreation concluded that 46% of Americans bicycle for pleasure (PCAO, 1987), and the National Sporting Goods Association reports that there are more bicyclists in America than skiers, golfers, and tennis players combined (NSGA, 2006). Cycling, despite these numbers, has traditionally received far less in municipal spending that tennis and golf facilities nationwide (PCAO, 1987).

According to a 2001 National Household Transportation Survey, 40% of trips in the United States are two miles or less in length. The same report states that twenty-five percent of trips in the United States are one mile or less, but 75% of these trips are made by automobile (NHTS, 2001). The Bureau of Transportation Statistics reports that half of all work commute trips are five miles or less (BTS, 2000). This suggests that bicycle commuting is a feasible alternative to driving, and the following statistics indicate that more people are beginning to feel this way.

In 1994 the Federal Highway Administration reported that "…nearly three million adults - about one in sixty - already commute by bike. This number could rise to 35 million if more bicycle friendly transportation systems existed" (FHWA, 1994). The Bureau of Transportation Statistics (BTS) October 2000 Omnibus Household Survey states that, 41.3 million Americans (20.0%) used a bicycle for transportation in the thirty days measured in the survey (BTS, 2000)**.** During the thirty day study, bicycling was the second most preferred form of transportation after the automobile, ahead of public

transportation (see Fig. 2.3). The report also noted that over 9.2 million (22.3%) of the 41.3 million people who bicycled during the study did so more on than ten of the thirty days (BTS, 2000).

Mode of transportation	Total number (millions)	Percent who used mode in last 30 days by number of times used			
		1 or 2 times	3 to 5 times	6 to 10 times	More than 10 times
Drive alone in private vehicle	182.2	2.3%	6.2%	7.2%	84.3%
Drive or ride with others	137.4	13.9%	25.8%	14.9%	45.5%
Bicycle	41.3	37.9%	26.4%	13.4%	22.3%
Local bus, subway rail	30.8	26.9%	18.1%	9.0%	46.0%
Commercial airliner	27.3	77.1%	15.6%	2.5%	4.9%
Taxi, limo or shuttle	24.6	50.5%	28.1%	4.9%	16.5%
Car pool or van pool	19.9	17.4%	21.4%	6.8%	54.4%
Recreational boat	17.5	41.2%	35.5%	10.7%	12.5%
Commercial boat	6.1	61.2%	21.4%	14.4%	3.1%
Intercity train	6.1	51.6%	37.5%	3.5%	7.5%
Intercity bus	5.3	71.5%	27.0%	-	1.6%
Private or charter airplane	2.7	81.4%	6.6%	2.1%	10.0%

Fig. 2.3 – Frequency of Transportation Methods in October, 2000

(BTS, 2000)

Cycling can also play a major role in addressing public health concerns. According to the Centers for Disease Control and Prevention, 64% of the American adult population is overweight or obese (CDC, 2002). Bicycling is a great way to increase physical activity and fitness. A 130 pound cyclist can burn 402 calories while pedaling 14 miles/hour. A 180 pound cyclist burns 450 calories while pedaling 14 miles/hour (Bikes Belong, 2006).

Changes in public health have financial implications as well: according to the Office of the Surgeon General, some $117 billion dollars a year are spent on healthcare for overweight or obese people (U.S. Dept. of Health and Human Resources, 2001). That same report estimated that $76.6 billion could be saved annually if Americans were more active.

Some Statistics on Mountain Biking

According to a 2005 study by the Outdoor Industry Association, the number of people considered “Participants” in the sport of Mountain Biking (meaning that they ride on singletrack at least once a year) has remained fairly steady since 1998, ranging from a low of 37.1 million in 1998 to a peak of 46 million in 2001 (OIA, 2005). This study broke mountain bikers into two groups: The number of mountain biking "Participants" was 39.3 million in 2004. The number of "Enthusiasts" (those in the top 15 percent of frequency) has grown 150 percent since 1998 - from 2.5 million in 1998 to 7.5 million in 2001. The number of "Enthusiasts" in 2003 declined slightly to 6.6 million. The report also stated that mountain bikes account for roughly 36% of all bikes sold in the United States, and over 20% of Americans rode a mountain bike at least once in 2004 (OIA, 2005).

The National Survey on Recreation and the Environment, a collaborative effort between multiple agencies including the University of Georgia and the U.S.D.A. Forest Service, offers recent statistics on mountain biking specific to the state of Georgia, and therefore relevant to Athens-Clarke. According to the survey, an estimated 15.8% of Georgia’s population, or just over one million people, have participated in mountain

biking in the past year (NSRE, 2006). This makes it the sixth most popular nature-based land activity in the state, ahead of hunting, backpacking, and primitive camping. Approximately sixty-three percent of participants are male, and 36.8% are female. Participation rates for residents of the metro Atlanta region are even higher than the state average, at 17.2%. The annual family income for mountain bikers is most often between $50,000 and $150,000, and participation rates are relatively similar between different race/ethnicity groups, suggesting that the sport has a broad appeal across demographic lines (see Fig. 2.4). Most mountain bikers are well-educated, with nearly 60% having some college education, a college degree or a post-graduate degree (NSRE, 2006).

Demographic	Stratum	Percent participating
All Groups	All people Age 16 & Older	15.8
Gender	Male	20.9
	Female	11.1
Race/Ethnicity	White, non-Hispanic	15.9
	Black, non-Hispanic	15.1
	American Indian, non-Hispanic	19.2
	Asian or Pacific Islander, non-Hispanic	1.3
	Hispanic	20.6
Age	16-24	24.2
	25-34	22.8
	35-44	18.1
	45-54	10.8
	55-64	10.3
	65+	3.0
Education	Less than high school	13.1
	High school graduate	11.2
	Some college	19.4
	College degree	21.5
	Post-graduate degree	18.1
Annual Family Income	<$15,000	4.0
	$15,000-$24,999	15.6
	$25,000-$49,999	13.9
	$50,000-$74,999	19.7
	$75,000-$99,999	21.6
	$100,000-$149,999	21.0
	$150,000+	20.8
Place of Residence	Non-metro resident	13.0
	Metro area resident	17.2

Fig. 2.4 -- Demographics of Georgia Residents Who Participate in Mountain Biking

(NSRE, 2006)

Assuming that the percentage of mountain biking participants in Athens-Clarke County is in line with the 15.8% average for the state of Georgia, an estimated 16,000 Athens residents have gone mountain biking at least once in the past year and would therefore likely be receptive to additional mountain biking facilities in Athens-Clarke County.

A Short History of the Mountain Bike

A mountain bike (which is also sometimes more accurately referred to as an All Terrain Bicycle, or ATB), is a bicycle which is specifically designed to be ridden on natural surface trails or in other off-road environments. This means that typically the frame of the mountain bike is thicker and stronger than those of road bikes, which are extremely difficult and dangerous to ride on anything but smooth pavement. The tires are much thicker and wider, the geometry of the bike puts the rider in a much more stable and upright position, and in recent years the introduction of technological innovations such as hydraulic suspension have given the mountain bike the ability to smoothly ride over very rough and rugged terrain which would shake a road bike to pieces.

The riding of bicycles in off-road environments can be traced all the way back to the invention of the bicycle, as smooth, hard paved surfaces were rare in the mid to late 19th century. Hence, just about every bike was an "all-terrain bike" by sheer necessity, and most early riders of bicycles probably rode primarily on the hard-packed dirt roads of the time. The invention of the automobile at the end of the 19th century and its rapid proliferation in the early 20th century led to the widespread construction of paved roads, and bicyclists welcomed the new surface as it undoubtedly made their bicycles smoother to ride, easier to control, increased their speed, and greatly expanded their effective

range. Hence, the evolution of bicycle design for most of the 20th century focused on the refinement of bikes for this paved riding environment by making them lighter and thinner in order to increase speed and reduce drag. This ultimately resulted in what most people now consider the classic "ten-speed" design, with thin, slick tires designed to minimize friction and road resistance. This emphasis of design toward the paved riding environment helped to shape the sport of bicycling and effectively limited cyclists to riding on the road along with cars, except in cases of rural isolation or poverty where paved roads were not available.

Fig. 2.5 – The Classic Ten-Speed
(Photo by Author)

The overall trend in the 20th century was to relegate the bicycle to the paved environment, but there do exist a few cases of bicycles being employed specifically for off-road use in rugged terrain. In the 1890's, during what some have described as the "golden age" of bicycles, General Nelson A. Miles of the U.S. Army recommended the

creation of an all-black infantry corps, led by white officers, to test the viability of bicycles for military use. The idea was to replace horses as the primary means for increased troop mobility and range, as the bicycle was cheaper, easier to maintain, and never had to be fed (Sorensen 2000, 22).

Thus was the U.S. Army's 25th Infantry Bicycle Corps founded, and they spent the summer of 1896 in intensive training at Fort Missoula, Montana. Jean Arthur, a Missoula historian, writes that "…upon the command, "Jump Fence!" the soldiers scaled a nine-foot obstacle by leaning their bike against the fence, standing on the bike's seat, climbing to fence top, then pulling the bicycle up and over" (Arthur, 2007).

In June of 1897, led by Lt. James Moss, the bicycle corps of the 25th Infantry left Fort Missoula and began making their way over the rough western terrain to Yellowstone Park and eventually down to St. Louis, following wagon roads, Indian trails, or any route which was passable. The bikes were heavy compared to today's standards, and were loaded down with the soldiers' rations of flour, baking powder, dry beans, baked beans, coffee, sugar, bacon, canned beef, salt, and pepper, not to mention rifles, ammunition, spare parts and tools, bedding and clothing. In all, the loaded bikes weighed over 70 pounds, which coupled with the fact that they had only one gear, meant that the soldiers usually had to push their bikes up hills and ride down the other side; the bikes were also pushed through bogs, mud, and various other obstacles as the unit slowly made its way across the grueling terrain in the summer heat. When they finally arrived in St. Louis on 16 July 1897, Lt. Moss estimated that the men had actually pushed their bikes for some 300-400 miles of the 800 mile trek; nonetheless, his report was quite positive and

indicated that the bicycle was indeed of great value for moving soldiers rapidly and cheaply across remote and mountainous terrain.

Fig. 2.6 – Soldiers of the U.S. Army's 25th Bicycle Corps en route from Missoula, MT. to St. Louis, MO. (1897)

(Sorensen, 2000)

The idea, however, never gained wide acceptance within the Army. The 25th was eventually sent to Cuba without bikes to fight as regular infantry in the Spanish-American War, and motorized vehicles with internal combustion engines became the standard for troop mobility after being deployed with great success in World War One. To this day, many still credit the "Buffalo Soldiers" of the 25th Bicycle Corps as being the first mountain bikers, though the intention certainly wasn't recreation (Sorensen 2000, 6).

The first purpose-built off-road bikes to be used for recreational purposes were built in the early 1950's by a group of 18 teenagers in the suburbs of Paris calling themselves the Velo Cross Club Parisien (VCCP) (Dodge, 1998). At the time, the sport of motocross (off-road motorcycle racing) was becoming popular among the French working class, and the teens, who were not yet old enough to have motorcycles, began modifying bicycles so that they resembled the motocross bikes, with suspension forks and knobby fat tires. The club then convinced the promoters of the motocross races to let them ride their bikes on the course during intermission, providing some extra entertainment for the spectators. The VCCP's lifespan was relatively short, as these "velo cross" events only lasted four years before the members became old enough to purchase motorcycles of their own; it is worth noting, however, that the members of the VCCP did invent a sport remarkably akin to modern mountain biking in both its equipment and its competitive nature. Around the same time, a Californian named John Finley Scott built what he called a "Woodsie" bike (a bike for riding in the woods) with balloon tires, flat handlebars, derailleur gears, and cantilever brakes (Mountain Bike Hall of Fame).

Most sources trace the beginnings of the modern mountain bike to Marin County, California in the mid 1970's. Local cycling enthusiasts took Schwinn beach cruisers from the 1930's and 40's, pushed them to the top of Mount Tamalpais, and rode them down an old rocky, twisting fire road which dropped 1300 feet over the course of the 2.1 mile run, simply for the thrill of the experience. Over the course of the run, the outdated hub coaster brakes on the bikes got so hot that the grease inside them would liquefy, forcing the riders to repack their hubs with grease every run. The road hence became known as

the “Repack Road,” and by 1976 the riders began hosting races down the mountain (Mountain Bike Hall of Fame).

Spurred on by the competitive aspect of the Repack races, the riders began modifying the heavy Schwinn “clunkers” with better brakes, stronger frames, and derailleur-controlled gears in order to gain an advantage over the other competitors. Within a year a Marin rider named Joe Breeze abandoned the beach cruiser platform and welded together his own frame specifically for use in the Repack race; the frame was much lighter than the old Schwinn clunkers while still being much more durable than a road bike, and this made the bike much easier to handle and maneuver. The “Breezer #1” was the first purpose-built mountain bike, though only ten were built by Breeze for himself and his friends (Mountain Bike Hall of Fame).

Fig. 2.7 – 1977 Breezer #1
(Mountain Bike Hall of Fame)

The first commercially available mountain bike appeared in 1979, and was built by three Repack racers; Tom Ritchey built the frame, which was fitted with parts and sold to the public by Gary Fisher and Charlie Kelley, who called their new company MountainBikes (later to become the Gary Fisher company). A MountainBike bicycle sold for about $1400 in 1979 (the relatively high cost coming as a result of the handmade nature of the bike), and for almost three years Fisher and Kelley's company was the only maker of mountain bikes in the world (Mountain Bike Hall of Fame). The comparatively low weight of the bike and the inclusion of multiple gears meant that the bike could be used for cross-country riding in addition to only downhill, and the geometry of the frame was designed with this in mind.

Fig. 2.8 – 1982 Specialized Stumpjumper:
The First Mass-Produced Mountain Bike
(Mountain Bike Hall of Fame)

In 1982, the Specialized bicycle company in San Jose, CA released the Stumpjumper, a mass-produced mountain bike available for $850, and the Univega corporation released the Alpina Pro for $650. Both based their design on the Ritchey frame, but were able to reduce cost by importing the bikes from Japan in large quantities. The low cost and widespread availability of these bikes translated into high sales for the Specialized and Univega, and over the next two years thousands of them were sold. Other major bicycle manufacturers quickly jumped on board, and most based their designs on the Stumpjumper and Alpina, resulting in a sort of standardization of mountain bike design.

Today's mountain bikes look radically different from the first mountain bikes and have benefited from advances in technologies such as front and rear wheel suspension, hydraulic disc brakes, lightweight carbon fiber, and advanced shifting systems. They all share the same basic components as the original Repack bikes, however: fat, knobby tires, reinforced frames, and an ability to go anywhere.

Fig. 2.9 – 2006 Specialized Stumpjumper FSR

The new owners of these bikes were understandably excited about taking their new "all-terrain" bikes out and getting them dirty. In some parts of the country this was easy; in Crested Butte, Colorado, for example, where the residents enjoyed miles of existing logging and fire roads in the mountains, the sport took off like a rocket, and Crested Butte became the home of the nation's first mountain biking festival, the Crested Butte Fat Tire Bike Week, which was first put on in 1982 and is still held annually.

In other parts of the country, however, proper venues for mountain biking were more difficult to come by, and as the sport gained popularity in the 1980's the enthusiastic participants of the new sport often put additional pressure on trails and parks which were not intended or appropriate for mountain bike use. In New York City this caused problems within the limited trail resources of Central Park. According to Marianne Cramer, the park's Chief of Planning at the time, the problems began as seemingly everyone in Manhattan bought a new mountain bike during the time of the nationwide mountain bike boom in 1982-83 (Cramer, pers. comm.). The park's managers suddenly found themselves dealing with a surge of people riding their bikes in the wooded areas of the park. They rode not only on existing paths, but also off-trail, creating new "desire trails" which were in conflict with the established management plan of the park, and which led to increased erosion and maintenance problems. The riders instinctively sought out the steepest parts of the park, specifically those in the Woodlands, and created new trails going straight down the slopes; this led to dramatic increases in erosion and maintenance problems, as well as the visual scarring of the landscape which was specifically managed for its picturesque qualities. Hoping to draw

attention to the problem, the Central Park Conservancy contacted some of the bike manufacturers, including Specialized, and began dialogues about the manufacturers' responsibility of promoting proper use of recreational venues and discouraging destructive actions such as riding off-trail. In addition, the overall management plan of the park was revised by 1985 to prohibit riding bikes off-path in Central Park, which decidedly limited the challenge and thrill of mountain biking within the Park. Eventually it was determined that mountain biking would be allowed and encouraged on the existing trails in Riverside Park, which was better suited to the sport. It was also agreed that the riders would be responsible for the upkeep and proper maintenance of the trails, a practice of partnership still widely followed to this day. Riding off-trail and creating new lines was still prohibited, however, and no new trails were added specifically for use by mountain bikes. It would be another twenty years before the first purpose-built mountain bike trail was opened in New York City at Highbridge Park (Vitti, 2006).

In Georgia, similar problems arose as the metropolitan Atlanta population embraced the mountain bike craze. Kennesaw Mountain National Battlefield Park (KMBBP), managed by the National Park Service (NPS), became a popular destination for riders in the Atlanta area in the early 1980's thanks to its twisty, challenging hiking trails and the steep natural topography of the site. Within a few years, however, the managers of the park had become soured on mountain bikes because of erosion and maintenance problems as well as perceived conflict between mountain bikers and other users of the trails. Kennesaw Mountain National Battlefield Park was declared off-limits to mountain bikes in 1988. This closure led directly to the formation of the Southern Off-Road Bicycling Association (SORBA), a Georgia-based advocacy organization whose

goal was to protect the land access of mountain bikers and to prevent further trail closures by educating mountain bikers on responsible riding, etiquette, and environmental impact.

Other local and regional advocacy groups sprang up across the country as more land managers found themselves questioning the legitimacy of mountain biking and the role and impacts of mountain bikes in their parks. The largest of these groups, the International Mountain Biking Association (IMBA), was formed in 1988 out of five smaller clubs in response to widespread trail closures in California, including many of the trails on Mount Tamalpais in Marin County where the sport had been born. In short, by the late 1980's, the ever-increasing number of mountain bikers and the additional stress they were placing on existing trail systems led to widespread banishment of bikes from their favorite riding areas due to user conflict and erosion fears.

The best response to this crisis, IMBA decided, was to place an emphasis on improving the public image of mountain bikers by educating riders about the impact they were having on trails and on other users. They created and publicized a document called the "Six Rules of the Trail" which prohibited riding off-trail or on trails closed to bikers and which stated that mountain bikers must yield to other trail users including hikers and equestrians. These rules were embraced by land managers and were posted at trailheads nationwide as well as abroad, as the sport was no longer limited to the United States. This helped the managers get comfortable with the idea of allowing mountain bikers on public trails knowing that there was now a framework they could use to enforce trail rules and manage impact. Again, the bicycle manufacturers took an active role in this education and advocacy initiative and partnered with IMBA to promote the new set of rules; at a major industry convention in 1989, Specialized held a "No Trails, No Sales" breakfast

highlighting the fact that if manufacturers did not promote proper trail use, their mountain bike market would eventually dry up due to lack of available venues (IMBA).

Not all trails were being closed to bikes, however. The first trail to be officially designated for mountain bike use was the Slickrock Trail outside Moab, Utah, in 1982, on lands managed by the Bureau of Land Management (BLM) (Reiter 2002, 1). The trail itself had been developed by motorcyclists in 1969, but by the 1980's the majority of the trail's users were mountain bikers. Because of its unique location (the trail is built primarily on a Navajo sandstone plateau overlooking the Colorado River and Arches National Park), and thanks in large part to the governmental sanction of the BLM, the Slickrock trail became a popular vacation destination for mountain bikers, and the number of annual visitors skyrocketed. According to BLM statistics, the number of mountain biking visitors to the Slickrock trail grew from 1,000 bikers in 1983 to over 103,000 in 1994 (Reiter 2002, 1).

Officially authorized venues for mountain biking appeared on the east coast as well, primarily on U.S. Forest Service (USFS) lands. One of the earliest trail systems to be officially opened to bikers east of the Mississippi was the Tsali Recreational Area in the mountains of North Carolina, in the Nantahala National Forest. Like Slickrock, the Tsali trail had an existing trail system originally built in the 1930's as a bridle trail which lent itself to use by mountain bikes, particularly in the steepness of its grades, the radius of its turns, and its overall mileage (a loop in excess of twenty miles). Similar to how the BLM had in Utah, the USFS managers of the Tsali system recognized that their trails were particularly suited to mountain biking, and they opened their doors to the new breed of adventure tourist looking for a destination where both they and their bikes were

welcome. Annual visitorship from all over the region climbed rapidly in the Nantahala National Forest as a result (Webber 2007, 157).

The success of trails like Slickrock and Tsali, as well as the cooperation of the new advocacy groups like IMBA, eventually convinced many land managers that there was indeed a legitimate place for mountain biking in American parks, and beginning primarily in the 1990's, plans were drawn up for purpose-built mountain bike trail systems in parks all over the country. For the first time this included local and municipal parks with enough acreage to adequately provide facilities and trails for mountain bikes. At this time, almost nothing had been codified or published in the way of proper MTB trail design or construction, and those who were tasked with the design and construction of the new trails were forced to combine and adapt lessons learned from other types of trail design, primarily hiking trails.

The primary authority on trail design and construction at the time were hiking clubs such as the Appalachian Mountain Club, and although these groups offered a great deal of knowledge in terms of proper sustainable trail design and maintenance, many of the techniques used for hiking trails were inappropriate for mountain bikes. The designers of new bike trails had to make adaptations where necessary and learned primarily from trial and error in the early and mid 1990's.

In addition, many of the designers of these early bike trails were without any design or landscape management education or experience which might qualify them for the job. Lacking anyone on staff who knew how to design trails for mountain bikes, the land managers often turned to the riders to design and build the new trails. Some of these individuals took the trouble to research and follow established sustainable trailbuilding

guidelines, but many others designed their trails only with rider enjoyment in mind, and with little, if any, concern for the long-term manageability and environmental impact of their layout. Consequently, many of the mountain biking venues opened in the 1980's and 90's had to be reworked considerably, often mere months later, in order to correct the poor decisions of these well-meaning but uneducated designers.

The bike trail at the International Horse Park in Conyers, GA, which was the host site for the mountain biking events at the 1996 Olympics, illustrates this trend well. Mountain biking's inclusion for the first time as a medal sport in the summer Olympics was a benchmark, highlighting the dramatic growth of the sport – the events were held twenty years almost to the day after the first Repack race. The Olympic committee wanted to ensure that the trail used to host the event was world-class, and hired Brian Stickel, John Bailey, and David Wiens to design the layout. Each was an accomplished racer and was well known and respected within the cycling community; however, none of the three had any significant landscape design background, and as a result the course was highly regarded from a rider's perspective, yet lacking in sustainable design principles.

Within a year of its construction, erosion had damaged the International Horse Park trail so severely that the park was considering closing it permanently. Only a significant re-design with substantial changes to the alignment of the trail eventually saved the trail and preserved its legacy as a world-class competition course.

Aware of the problem, IMBA began work codifying the principles of mountain bike trail design. In 1997, they formed the IMBA Trail Care Crew, composed of Mike and Jan Riter who had just successfully redesigned the Olympic Trail in Conyers. The Trail Care Crew toured the country in a donated Subaru station wagon, paying visits to

bike trails across the country with the mission of educating bike clubs and land managers on sustainable trail design and proper construction and maintenance techniques.

By 2003, IMBA had collected enough information to publish the first book to specifically address the design, construction, and maintenance of mountain bike trails. For the first time, *Trail Solutions: IMBA's Guide to Building Sweet Singletrack* (2003) provided an extensive compilation of detailed information on how to design and build sustainable trails, and placed valuable drawings and diagrams in the hands of both professional and amateur trailbuilders nationwide. In terms of landscape architecture, *Trail Solutions* is currently the most useful source of information pertaining to mountain bike trail design, as it provides a basic toolkit for anyone who needs to know how to properly lay out and build an environmentally sustainable mountain bike trail.

The primary challenge facing mountain bikers today is finding access to trails close to home. Bike tourism destinations like Slickrock or Tsali remain very popular, but they are also quite a distance from most riders and are primarily considered vacation destinations. The most recent trend in mountain bike trails has been the development of trail systems in urban areas, where most of the population resides. Most riders are more than willing to drive to remote spots for occasional bike tourism, but they also desire local venues which do not require a long automobile trip in order to ride their bikes on a regular basis. An estimated twenty percent of people who mountain bike do so at least three times a week, usually as part of a regular fitness routine (Bikes Belong). Local venues allow them to ride more frequently, and to ride for longer periods of time (time which would have otherwise been spent in transit).

When a large population of cyclists lacks local trails, unauthorized trails often appear as a result. These trails are by necessity built quickly without landowner permission and often (but not always) without regard to the proper sustainable practices established by IMBA. They are a symptom of a greater problem. In Clarke County there are miles of unauthorized trails winding through the overlooked places amidst the sprawl, whereas the total mileage of sanctioned trail in the county is less than a mile on the UGA campus. The solution to this problem in Athens may lie in a movement not much older than the mountain bike itself, and which shares many of the same goals and values: the Greenway.

Chapter 3. GREENWAYS AND THEIR RELEVANCE TO MOUNTAIN BIKING

Greenways Defined

Greenways are natural corridors which are linear in form. Over the past thirty years or so, the greenway concept has taken many different forms in implementation, but all share some defining characteristics. Shwarz writes in the foreword to *Greenways: A Guide to Planning, Constructing and Managing* (1993) that the term describes "natural corridors crisscrossing a landscape that has been otherwise transformed by development" (Flink 1993, xv). Little offers the following definition in *Greenways for America* (1990):

1. "Linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, scenic road, or other route.
2. Any natural or landscaped course for pedestrian or bicycle passage.
3. An open-space connector linking parks, nature reserves, cultural features, or historic sites with each other and with populated areas.
4. Locally, certain strip or linear parks designated as parkway or greenbelt. [American neologism: green + way; origin obscure.]" (Little 1990, 1)

Little suggests that the term is a combination of two ideas: the parkway and the greenbelt. This results in a "natural, green way based on protected linear corridors which will improve environmental quality and provide for outdoor recreation" (Little 1990, 4). Little also divides them into five major categories:

1. “Urban riverside greenways, usually created as part of (or instead of) a redevelopment program along neglected, often run-down city waterfronts.
2. Recreational greenways, featuring paths and trails of various kinds, often of relatively long distance, based on natural corridors as well as canals, abandoned railbeds, and other public rights-of-way.
3. Ecologically significant natural corridors, usually along rivers and streams and (less often) ridgelines, to provide for wildlife migration and ‘species interchange,’ nature study, and hiking.
4. Scenic and historic routes, usually along a road or highway (or, less often, a waterway), the most representative of them making an effort to provide pedestrian access along the route or at least places to alight from the car.
5. Comprehensive greenway systems or networks, usually based on natural landforms such as valleys or ridges but sometimes simply an opportunistic assemblage of greenways and open spaces of various kinds to create an alternative municipal or regional green infrastructure.” (Little 1990, 4).

The recent flourishing of many greenway systems may be a result of these differences in category; the ability of a greenway to meet the individual needs of a community by taking one form or another shows a flexibility and adaptability of form which manifests itself in the many different types of greenways being built today. “The strength of the greenway movement, and the attraction of the concept itself, lies in its

diversity of form and function. The greenway concept is flexible enough to adapt to many combinations of local needs, values, and conditions." (Flink 1993, xvi).

Origins of the Greenway Concept

The idea of the greenway is not a new one; the concept can be traced back to the mid-19th century when Frederick Law Olmsted began incorporating "park-way" concepts into designs for parks. The first implementation of such a plan was at what is now the University of California at Berkeley where, according to Charles Little, Olmsted proposed two design elements that would later come to be recognizable as fundamental greenway aspects. First, he recommended the creation of public parkland north of the campus with pleasure drives, walks, and views of the school, with a creek as its natural boundary. Olmsted then suggested that the campus be linked to Oakland via a series of pleasure drives (Little 1990, 9). Although the plan was only partially implemented at Berkeley, Olmsted liked the concept enough to reintroduce it again at several points in his professional career.

It was at Prospect Park in Brooklyn, which Olmsted considered one of his greatest successes, that the linked parkland idea eventually came to fruition. "The Prospect Park assignment… led Vaux and Olmsted to a full realization that no single park, no matter how large and well-designed, would provide the citizens with the beneficial influences of nature. Parks needed to be linked to one another, and to surrounding residential neighborhoods, they decided" (Little 1990, 11). The proposal that they submitted to the City of Brooklyn for Prospect Park therefore called for the creation of a "shaded pleasure drive" which would run from the southern edge of the park through the Long Island countryside, eventually ending at the Coney Island waterfront. They also proposed an

avenue leaving the park's west side that would cross the East River via bridge or ferry, ultimately making a connection to Central Park. "Although the Brooklyn city fathers were not interested in the Central Park linkage," Little writes, "they did eventually permit Olmsted to build Ocean Parkway, which connects Prospect Park to Coney Island through Flatbush, and Eastern Parkway, which angles off from the park to the northwest border of what is now the borough of Queens" (Little 1990, 11).

A few years later, in their 1868 design for the town of Riverside, Illinois, Olmsted and Vaux returned to the concept of connectivity as a design goal by including in the design a parkway linking the new suburb to Chicago. In 1887, Olmsted proposed a design for a series of interlinked parks and parkways to the city of Boston. In this design, Boston Common, the Back Bay Fens, the Muddy River, and Franklin Park were linked for the first time by a 4.5 mile linear parkway now known affectionately to Bostonians as the "Emerald Necklace."

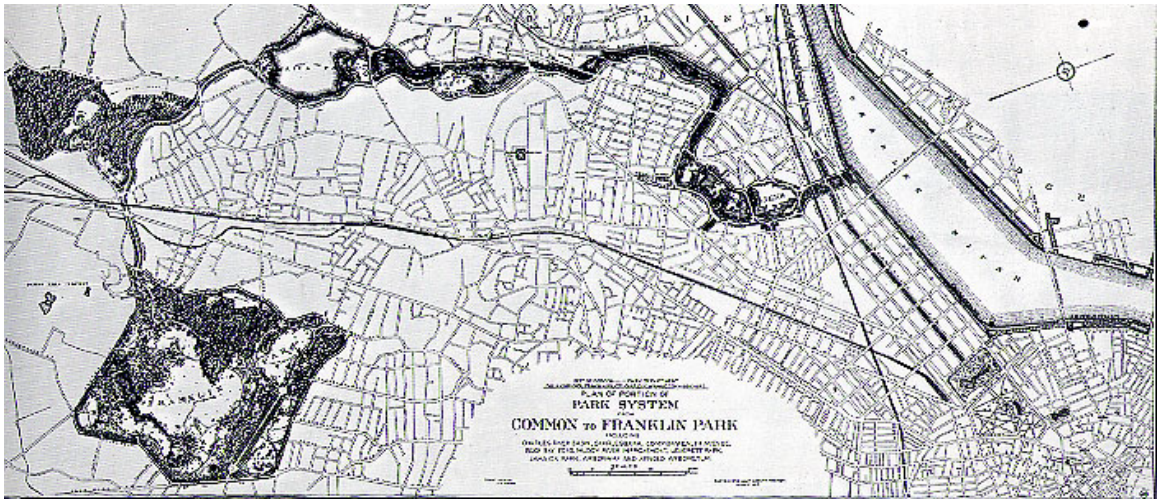


Fig 3.1 – Olmsted's Emerald Necklace in Boston
(Little, 1990)

After the successes of the Emerald Necklace and the Ocean Parkway, other designers began to take notice, and Olmsted's contemporaries began to implement the

linked park-and-parkway system in their own designs. As an example, shortly after the Emerald Necklace was designed, a competitor of Olmsted named H.W.S Cleveland designed for the city of Minneapolis-St. Paul an open-space network of parks and parkways. Completed in 1895, the Minneapolis-St, Paul metropolitan park system is now considered one of the country's "first and finest open space networks" (Little 1990, 12).

Little points out that these early parkways were not intended for automobiles, as the modern connotation of the word 'parkway' might lead us to believe. The automobile had not yet been invented when Olmsted was at the height of his parkway designs, and even the bicycle was a very new technology in the 1890's. Olmsted's *park ways* were linear parks which allowed for safe and enjoyable circulation within the city for pedestrians, horse-drawn carriages, and horseback riders. The introduction of automobiles near the turn of the 20th century would eventually give even more meaning and importance to these pedestrian networks, though not even Olmsted could have foreseen the magnitude of this impact.

In the early days of the automobile, very few people were wealthy enough to own one, and those who did tended to view them as recreational vehicles rather than as practical transportation. "Motors were for fun, and as their numbers increased, they multiplied the recreational potential of parkways" (Little 1990, 12). The first parkway designed as an avenue for recreational driving was the Bronx River Parkway, a 23-mile road connecting New York City with pastoral Westchester. Begun in 1913, the parkway was a great success when it opened, and this led to the creation of more automobile parkways, including the Blue Ridge Parkway.

As the century progressed, the parkway idea held fast, and was particularly embraced by Robert Moses, the Commissioner of Parks for New York from 1933-1959. Moses is thought to have created more parks and parkways than any other person in the world (Little 1990, 14). Moses conceived of his parkways as the circulatory system for the parks and public spaces in the New York area, specifically Long Island, providing nearby and easily accessible recreational opportunities for the general public of New York City. "Moses planned his Long Island parkways to link existing parks, although he often created new parks to have a parkway *to"* (Little 1990, 14). In the end, Moses was really more of a highway builder than a park designer, and most of the parkways he built are now congested commuter routes. His environmental concern was minimal, as evidenced by his desire to build superhighways on endangered dunes at Fire Island and across a wooded ridge on Staten Island where Olmsted himself had once proposed an idyllic linear park. Moses's social ideals were also somewhat less than democratic, as bridges over the parkways were intentionally designed too low to allow buses to pass through, thereby ensuring that only the predominantly white middle class who could afford cars could visit the beachfront destinations at the end of the parkway (Cramer, 2007). Nonetheless, Moses's practice of connecting nodes of recreational importance with transportation corridors lies at the heart of modern greenway design.

The parkway idea makes up only part of the greenway concept. The other half comes from the concept of the "greenbelt," originally developed in Britain during the 19th century (Little 1990, 16). Lewis Mumford, concerned about the possibility of cities expanding and eventually growing into each other, wrote in *The City in History* (1961) that the only way to prevent 'conurbation' was to ensure that a belt of undeveloped space

was left around each city and town (Mumford 1961, 515). These green belts would be composed of farms, woods, and 'pleasure grounds,' and would provide a buffer against the encroaching development of neighboring cities. He felt it was important that there be a clear distinction between town and country, and clear differences between the towns themselves, and the greenbelt was the ideal solution. Mumford took much of his inspiration from Ebenezer Howard, who was promoting the 'garden-city' concept, which among other things stated the need for 'country belts' of agricultural land surrounding the city to preserve both the urban integrity of the city and the rural integrity of the country (see Fig. 3.2). In the words of Mumford, Howard was concerned mainly with "a stable marriage between city and country, not a weekend liason… To achieve and express this reunion of city and country, Howard surrounded his new city with a rural greenbelt. The two-dimensional horizontal 'wall' would serve not merely to keep the rural environment near, but to keep other urban settlements from coalescing with it; not least, it would, like the ancient vertical wall [of medieval cities], heighten the sense of internal unity" (Mumford 1961, 515-516).

Examples such as Letchworth, designed by Howard in 1903, and many other "new towns" built across the U.K. during the first quarter of the 20th century, all featured an interior network of open spaces such as gardens and parks for recreation as well as an outer greenbelt. The most visible and prominent application of the greenbelt principle would come in 1938, when the City of London adopted the Green Belt Act, incorporating a number of open spaces around the city. Despite the difficulty of incorporating a green belt into the landscape of one of the largest cities in the world, the London Greenbelt was expanded in 1944 and again in 1955, with parcels added in bits and pieces afterward. The

London Greenbelt included private land, and these landowners were compensated for any loss of development value they could prove.

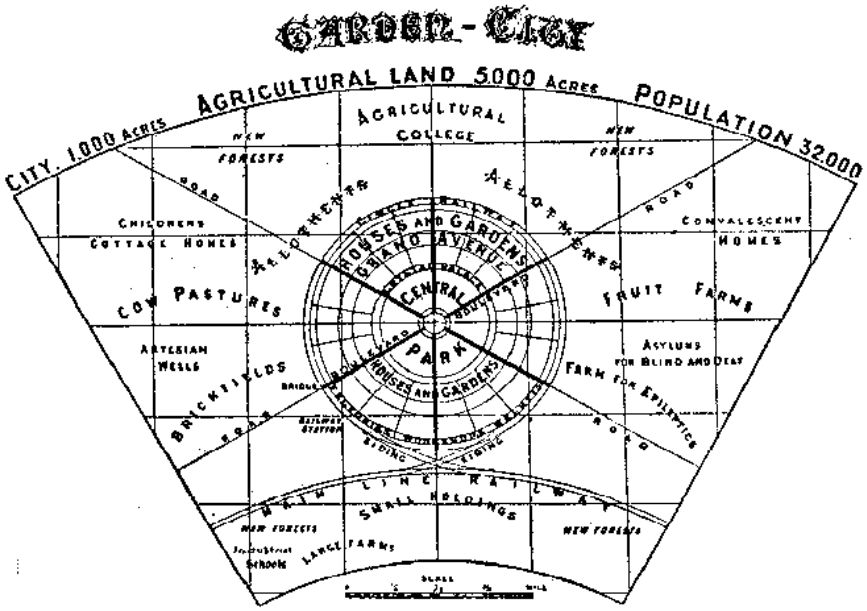


Fig 3.2 – A Diagram of Ebenezer Howard's Garden City Concept
(Mumford, 1961)

In the United States, the greenbelt idea was not as widely accepted, but it did play a role in the development of new towns such as Radburn, New Jersey and 1930's New Deal-funded projects such as the town of Greenbelt, Maryland. One of the most important applications of the concept came from the naturalist Benton MacKaye in the form of the Appalachian Trail.

Like Mumford and Howard, MacKaye was concerned that the outward expansion of metropolitan cities in the 20th century would eventually lead to a spider web of urban development leaving no open space behind. MacKaye thought of urban growth as being like a flood of water. He wrote that "if left alone, the metropolitan deluges will flow out along the main highways (and side highways)… distributing the population in a series of

continuous strings which together would make a metropolitan cobweb" (MacKaye 1928, 178). MacKaye believed that the only way to control this outward flood was to create a system of public open space which would, like the greenbelts of Mumford and Howard, stem the tide of uncontrolled urban growth. MacKaye advocated using outstanding topographical features, such as ridgelines, to create 'common public grounds' which would limit development while also providing needed recreational opportunities to the urban population. "These open ways along the crestlines mark the lines for developing the pristine environment, while the motor ways mark the lines for extending the metropolitan environment. The motor ways form the channels of the metropolitan flood, while the open ways (crossing and flanking the motor ways) form 'dams' and 'levees' for controlling the flood" (MacKaye 1928, 179). This concept of using natural and topographical features to dictate the growth of cities and the arrangement of open space would factor prominently into the greenway movement later in the century. He also envisioned "numberless walking circuits" as a result of "these open ways around and about the various cities and towns," and was thus one of the first to champion the usefulness and desirability of combining recreation with land preservation (MacKaye 1928, 181).

This idea of allowing the terrain and topography dictate the pattern of development would be reflected in the 1960's by the 'physiographic determinism' of Ian McHarg, who believed that development patterns should be decided based on the ecological and physical attributes of a region. This is considered 'ecological planning' and it emphasizes the protection of natural systems by confining development to the places where it has the least environmental impact. In addition to preserving natural

systems, the McHarg overlay system was especially suited for planning and controlling urban growth. McHarg stated, “The distribution of open space must respond to natural process… The problem lies not in absolute area but in distribution. We seek a concept that can provide an infusion of open space and population” (McHarg 1969, 65).

A similar method of determining development values was developed by a landscape architecture professor named Philip Lewis. Lewis assigned symbols to noteworthy natural and man-made features such as waterfalls, historic sites, wetlands, cultural centers, woodlands, and burial grounds, then plotted the symbols on maps. He found that most of the symbols aligned themselves in a linear form along corridors, often the same rivers and ridgelines that had been pointed out so many times before as being ideal for preservation: “Most of the features are found within the combined pattern of water, wetlands, and steep topography of 12.5 percent or greater” (Little 1990, 23). Lewis’s results were therefore quite similar to McHarg’s, and both methods seemed to add credibility to earlier ideas of using natural systems and features to determine the growth of man-made development.

The modern greenway movement traces its roots back to the 1970’s, when a landscape architecture student at the University of North Carolina named Bill Flournoy, who proposed in his masters’ thesis a system of interconnected trails along the creeks and streams of Raleigh. Though the idea of a trail system in Raleigh was not new, Flournoy was one of the first to describe his system of connected open space as a ‘greenway’, and his plan was eventually adopted by the city and implemented, serving as example and catalyst for projects to follow. “Natural environmental functions do not need to be

displaced as cities expand," Flournoy is quoted as saying (Little 1990, 39), and today Raleigh's Capital Area Greenway serves as tangible evidence of that idea.

In 1987, the President's Commission on Americans Outdoors promoted the greenway concept in their report as a means of getting people outside and into nature. Based on research and surveys, the Commission found that there was a growing desire among Americans for recreational opportunities close to home. National Parks were popular destinations, the report found, but were too far away from most people to visit regularly. The Commission recommended that natural recreational environments be provided in urban and suburban areas, where people actually lived, and could make best use of their benefits, and pointed to a network of greenways as the ideal solution. "Imagine walking out your front door, getting on a bicycle, a horse, or *trail bike* [emphasis added], or simply donning your backpack and, within minutes of your home, setting off along a continuous network of recreation corridors which could lead across the country" (President's Commission on Americans Outdoors, 1987). The Commission's report gave a great deal of publicity to the idea of the greenway, which helped spur the development of many more greenways in the 1990's.

The Oconee Rivers Greenway

The Oconee Rivers greenway traces its origins back to 1973, when a grassroots movement called the Oconee Rivers Greenway Commission was formed in Athens, Georgia to protect the natural corridors of the North and Middle Oconee Rivers, both of which run through the city. Led in large part by University of Georgia landscape architecture professor Charles Aguar, the Greenway Commission sought to establish a partnership with the local government in order to restrict land development rights along

the two rivers within Clarke County. Recreational trails were not originally part of the Oconee Greenway, as Aguar believed that "the river itself is the trail" and that the ecological preservation of wildlife and plants as well as the quality of the river itself was the overall goal. Aguar and the others on the commission called for a greenway which would "border the Middle and North Oconee Rivers from Jackson County to the point where the two rivers join at Whitehall" (Aguar 1990, 41). Such a greenway would serve to link various parks and sites of interest along the way. Along the North Oconee, Sandy Creek Park, Sandy Creek Nature Center, Riverside Park, North Oconee Park, Dudley Park, the UGA campus, and the UGA Golf Course would all be linked. Ben Burton Park, Memorial Park, and the State Botanical Garden of Georgia are all situated along the Middle Oconee.

The Oconee Rivers Greenway Commission was established in 1990 as an official department of the Athens-Clarke County Government, and this helped to accelerate the development of the greenway system. The goals of the commission were to:

1. "Protect the Oconee Rivers and ensure the long term integrity, natural beauty and life support functions of the rivers
2. Provide citizens the opportunity to enjoy healthy river-oriented activities
3. Develop an economically viable plan for a greenway system based on sound environmental principles, and
4. Assist in the implementation of the plan" (Athens-Clarke County Comprehensive Plan, 2006).

The commission also successfully lobbied for the legislation of a 100-foot development buffer along rivers and a 75-foot buffer along perennial streams in Clarke

County. This opened the door for possible greenway alignments along those streams and rivers and provided legal backing for the prevention of future development along riparian corridors.

In 1995, a plan for the greenway was officially unveiled to the public that included recreational pedestrian paths along the North Oconee from Sandy Creek Nature Center south to Dudley Park, connecting to the University's greenway section at East Campus Road (see Fig. 3.3). The 1995 plan did not call for any greenway development along the Middle Oconee due to the high number of private landholdings fronting it, focusing instead on the North Oconee, where public land was more accessible.

Public reaction to the plan was generally very positive, although there were some opponents who objected to the greenway being built. Most of these dissenters were owners of the private residential property the greenway needed to cross in order to make its connections. One property owner was so angered at the proposal of a trail being built on his land that he showed up to a commission meeting armed with a shotgun and a pistol. His objection was to the city "doing whatever they wanted" on his land, and he made headlines in the local newspaper denouncing the greenway (Deck, 1997). However, the general attitude of the public was positive, and eventually most dissent was assuaged.

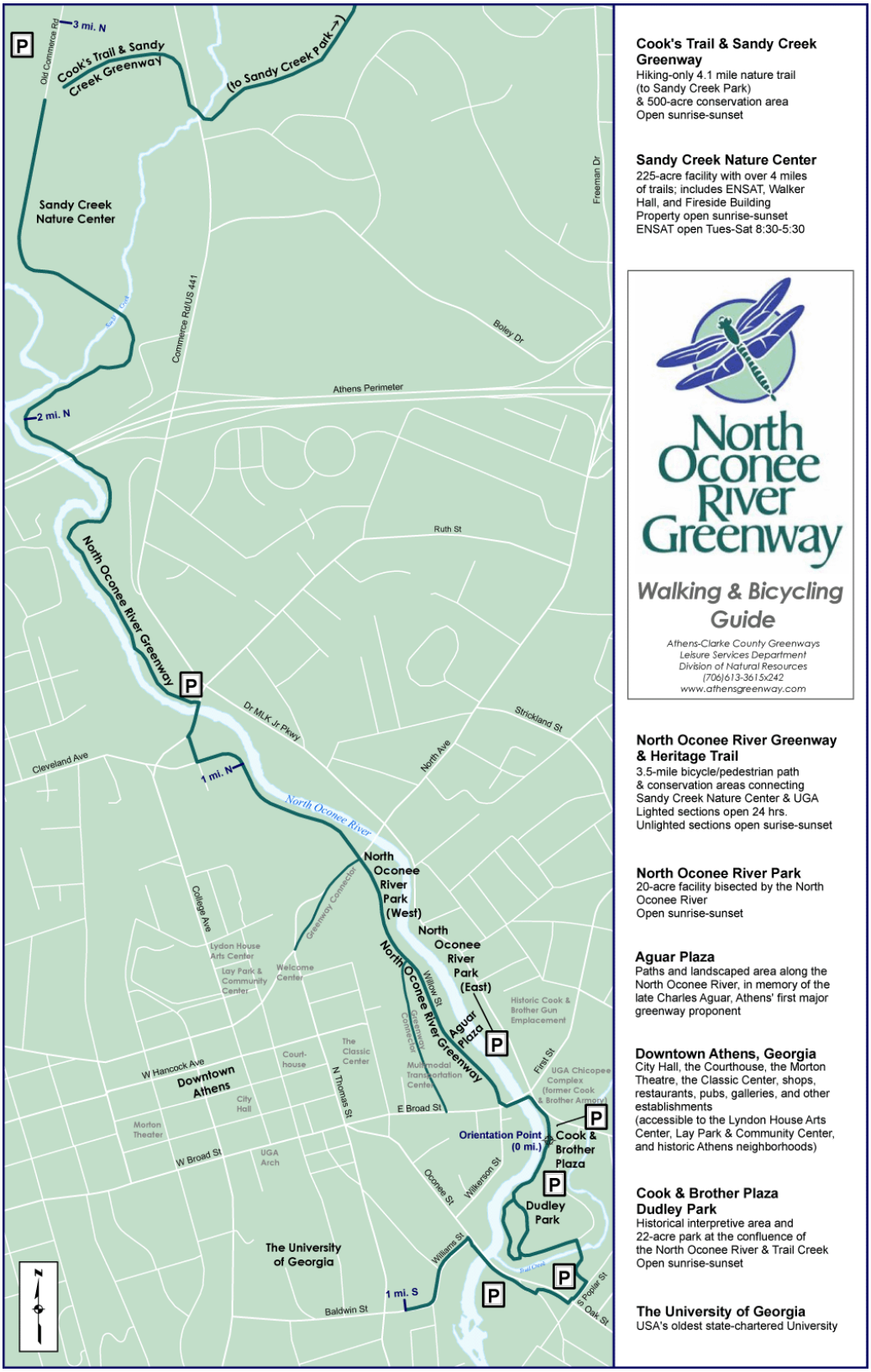


Fig. 3.3 – North Oconee River Greenway, Athens, GA

Work began on the North Oconee Greenway in the late 1990's and was completed in 2002. Today the Greenway also includes connections to Cook's Trail, a 4.1 mile natural-surface walking trail that connects Sandy Creek Nature Center to Sandy Creek Park, providing close-up interaction with wildlife and plant communities, and extending the reach of the greenway even further north than where the paved path ends. Mountain bikes, however, are not permitted on Cook's Trail.

The Importance of Connectivity

At the beginning of the 21st century, urban growth continues unabated, and plenty of evidence exists of the 'urban spiderweb' Benton MacKaye warned about. Cities seem to grow without limits until there is virtually no distinction between the center of a city and its outer edge. The impact of the automobile in 20th century planning has left an auto-centric tangle of streets and highways, carving up the land into increasingly smaller and more isolated parcels. The result is a highly fragmented layout, where residents of neighborhoods separated by a four-lane highway or a railroad might never even come into contact with the people living just meters away on the other side of the divide. "There is a surprising amount of this kind of land in our urban areas, and because of the vagaries of water, it has the fine characteristic of being intertwined throughout the built-up sections… The land is not massed in one or two big tracts; it is a series of elements, irregular, sometimes disconnected, and this dismissible as bits and pieces of only local significance", wrote William Whyte in *The Last Landscape* (Whyte 1968, 168).

These scraps are not without value of their own, however, especially when viewed as potential pieces of a linked network. One of the most positive features of greenways is that they re-establish meaning for overlooked, forgotten, and discarded strips of land.

Whyte writes of these fragments: “If some of them are big, so much the better, but in most cases what is left are the smaller spaces, the irregular ones, and the maligned bits and pieces. Weaving these together is a far tougher challenge than setting aside large chunks somewhere else, but it can be done” (Whyte 1968, 163). He goes on to say, “Our metropolitan areas are criss-crossed with connective strips. Many are no longer used, or only slightly used for their original purpose… but they are there if only we will look (163).

Greenways take advantage of these neglected bits and pieces of land by connecting them and re-infusing them with the meaning they lost when the roads, shopping centers, railroads, and factories were built up around them. “These linear commons share some interesting characteristics” (Little 1990, 34).

> “Almost invariably they follow the topographic logic of a place: streamways, ridgelines, transportation corridors. They are often unsuitable for many land uses that would give them great private economic value; being long and thin, they do not offer the dimensional chunks of land favored by those who wish to build shopping malls, residential subdivisions, distribution center warehouses, or office and industrial complexes” (Little 1990, 34).

Little notes that despite intense urban growth since 1950, many of these parcels were jumped over because they were “physiographically unsuitable for building, were regulated against development, or were in an economically unattractive location” (Little 1990, 35).

Greenways offer a chance to utilize and protect these spaces, while ultimately adding value to the destination points they connect. Many greenways seek to connect parks or other public open space by making use of these 'forgotten corridors,' and with good reason. Olmsted's sons, working on plans for a new park system, echoed their father's sentiments when they wrote that "a connected system of parks and parkways is manifestly more complete and useful than a series of isolated parks" (Little 1990, 37). In other words, connectivity is crucial, and greenways offer a ready means of city-wide connectivity. "In Portland Oregon, for example, a 140-mile greenway around the city will connect some thirty parks and reserves, substantially increasing their aggregate benefit to the community" (37). Whyte shares this sentiment, writing, "When they are laid out along the routes that people travel or walk, or poke into the places where they live, the spaces provide the maximum physical impact and the maximum physical access… It provides us a way of securing the most highly usable spaces in urban areas where land is hard to come by, and, in time, a way of linking these spaces together" (Whyte 1968, 173).

Rivers and other topographic features tend to provide the most frequent means of bridging the gaps and connecting disconnected spaces, due to the fact that the developed infrastructure had no choice but to build around them; the land dictated the pattern of development. This is why the vast majority of greenway systems align themselves along river or stream corridors. "The conservation of water resources tends to be the land that is most suitable for recreation and that is the most beautiful" (Whyte 1968, 181). To take true advantage of potential connectivity, however, it could be of great benefit to look for the linear strips of fragmented and disused space which Whyte mentions as potential corridors for connecting neighborhoods and greenspace that do not lie along the river but

rather in the thick of the sprawl. In fact, it may be in the most fragmented, most developed areas that the connections are of the greatest importance, offering the residents of those formerly isolated neighborhoods access to the natural amenities from which they have been cut off.

In the case of Athens-Clarke County, where the two river corridors run parallel to each other, overland connections offer chances to join the two rivers and to provide a circuited network of recreational potential rather than simply two parallel corridors moving outward from the center of the city, with no connectivity between the two other than at the point south of the city where they converge. If a corridor could be identified which could connect the two corridors on the north side of Athens, the greenway system would then encompass a far greater area, functioning in two dimensions rather than in just one, and would work as a circuit or a loop rather than as a linear design. “What can make the acreage so effective,” Whyte says, “is the fact of linkage, and a few relatively small spaces can make the difference” (Whyte 1968, 177).

Greenways and Mountain Bike Trails

While there does not seem to be any immediate incompatibility between greenways and mountain bike trails, there have been relatively few attempts to integrate the two. This may be due to the fact that until recently, mountain bikers did not comprise a large enough user group in most cities to be considered worthy of special consideration. In addition, many (if not most) greenways are specifically designed to be bike friendly as well as pedestrian friendly. To the local politicians and the general public, this may seem like more than a sufficient concession to cyclists, and the cyclists for their part are certainly thankful for every mile of dedicated bikeway.

Recall also that for most of the modern greenway movement, the sport of mountain biking was only just being born, and existed only as a fringe element within the greater sport of cycling. The growing pains of the 1980's (trail closures, etc) and uneasy relationship between mountain bikers and land management agencies was not lost on the designers of new greenways, and many of them chose to limit biking within the greenway to paved areas only. This policy does not exclude mountain bikes, it simply does not make any special concession to them, and for many years in many places this has been an acceptable policy.

In recent years, as mountain biking has become more mainstream, however, greater pressures have been placed on greenway managers to develop areas specifically for off-road biking use compatible with the ideals and goals of the greenway. This should be seen as a positive thing for greenway administrators since it indicates that a significant portion of the public is actively using the greenway as a park system, and that one of that system's most frequent user groups is expressing a desire for additional facilities.

As the legitimacy of mountain biking has increased, so has the importance and credibility of advocacy groups such as IMBA and SORBA. Groups such as these have typically spearheaded the integration of off-road trails into greenway systems, and some have done so with great results. Consequently, the city typically gains an official medium through which it can govern, regulate, and communicate with the mountain biking population. By giving mountain bikers a stake in the process, the city essentially gives them a privilege which can be lost and which needs to be protected. Bikers are far better at governing themselves, therefore, when they have a stake in the project and stand to

lose their hard-fought access if they act irresponsibly. When bikers have absolutely nothing to lose, illegal trails flourish.

Case Studies

In the neighboring cities of Roswell and Alpharetta, Georgia, a greenway was developed in the late 1990's along Big [also known as Vickery] Creek. Realizing an opportunity, members of the Roswell-Alpharetta Mountain Bike Chapter (RAMBO) lobbied the mayor and commission of Roswell to purchase and incorporate a large parcel of land adjacent to the creek and within the greenway corridor where mountain bikers had been riding without landowner permission for many years. "Those trails are what opened up that area to people walking and let people get in there to take a look at it," said Roswell's mayor Jere Wood. "I'm not sure they had the permission of the property owners at the time, but it was the mountain bike trails that brought people onto that property to see how pretty it was, which developed the movement to buy that property." (Hurd, 2006). Roswell, using money from a parks referendum, bought the 171-acre site in 2001 for $19 million. The city worked out a partnership with RAMBO to maintain the trails, educate riders on safety and etiquette, and to patrol the trails and enforce rules.

Today the Big Creek City Park in Roswell hosts more than six miles of natural surface bike trails, as well as some constructed stunt/skill areas. Trails for mountain biking are now located at each end of the Roswell/Alpharetta Big Creek Greenway, and the results have been very positive. Roswell's Recreation and Parks director Joe Glover believes the bike trails are a tremendous asset to the system and notes that the volunteer labor is tremendous. Glover estimates that the volunteers have added approximately

$100,000 in value to the park, owing that it would normally cost the city roughly $20,000 a mile to build trails (Hurd, 2006).

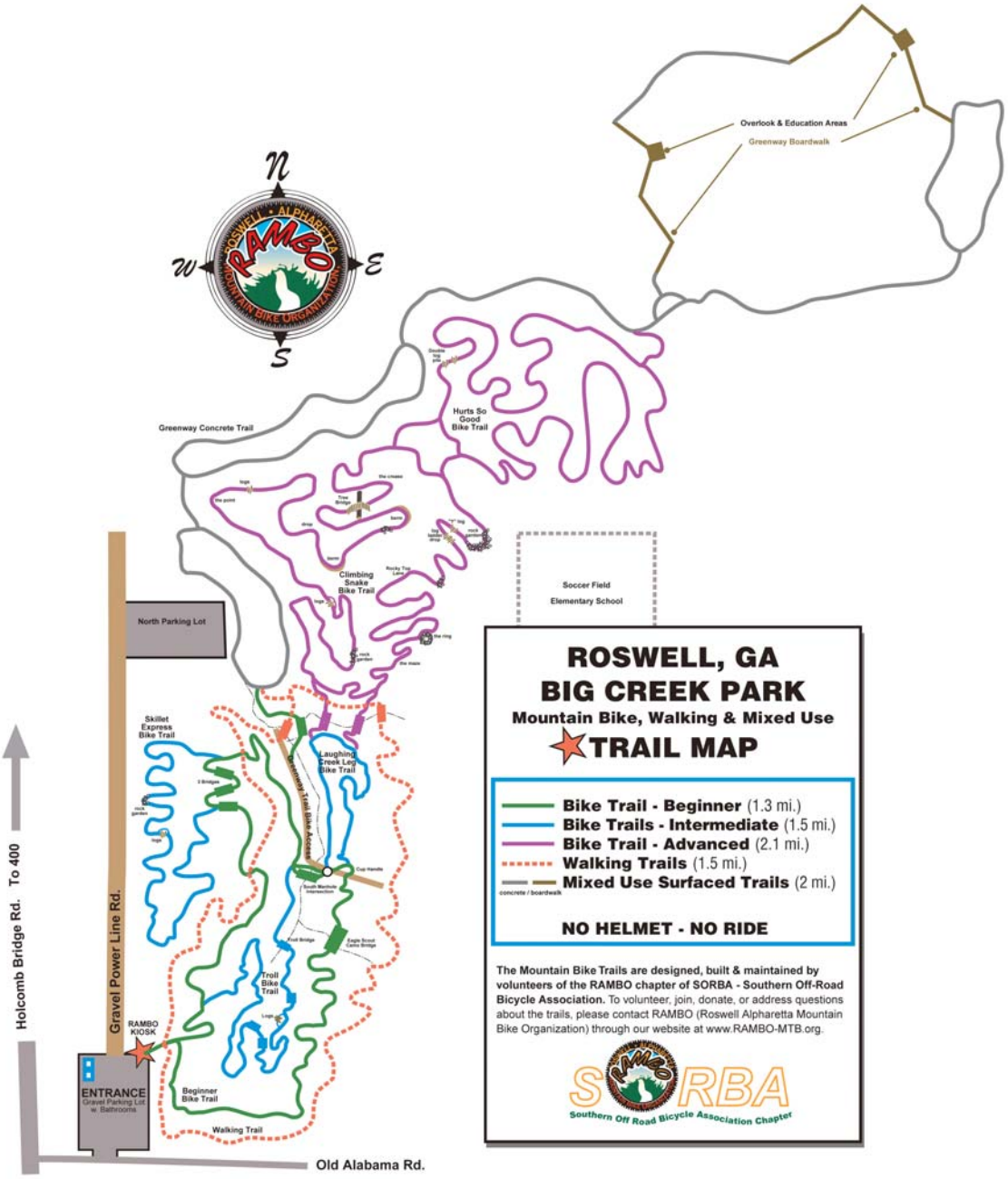


Fig. 3.4 – Mountain Bike Trails Within Roswell/Alpharetta Greenway
(SORBA, 2006)

Mayor Wood plans to tie the trails in with a greater regional network, thus using the greenway to connect Roswell to other cities within the Metro Atlanta area and to

recreational areas in North Georgia. "[The greenway] has become a major attraction. It has the only mountain bike trails in the city," Wood said. "These people [RAMBO] have given a lot to the city [of Roswell]. Without their efforts, there is a good chance that all of Big Creek Park would be apartments now" (Hurd, 2006).

The city of Ocala, Florida, has utilized a similar partnership with the Ocala Mountain Biking Association (OMBA) in order to integrate mountain bike trails into its section of the Cross Florida Greenway, a greenway system crossing the state from east to west. In addition to a large parcel of land with trails called the Santos Area, the Ocala greenway takes advantage of linear strips of undeveloped land adjacent to the main paved ten-foot wide trail in order to provide offshoots of singletrack for mountain bikers and hikers. Similarly to the Roswell case, a successful partnership with the local mountain bike advocacy group was what drove the initial push to integrate, and continues to provide a medium for communication with and regulation of mountain bikers. After receiving commendation from IMBA on the project, Jena Brooks, Director of the Florida Department of Environmental Protection's Office of Greenways and Trails, said "The Office of Greenways and Trails is proud to be recognized for our unique trail system on the state's premier greenway, the result of hard work by many" (IMBA, 2006). Brooks also noted that the driving force behind the project were volunteers who contributed almost 1,900 hours in trail maintenance and outreach in 2005. Consequently, Ocala mountain bikers need not leave their city in search of singletrack.

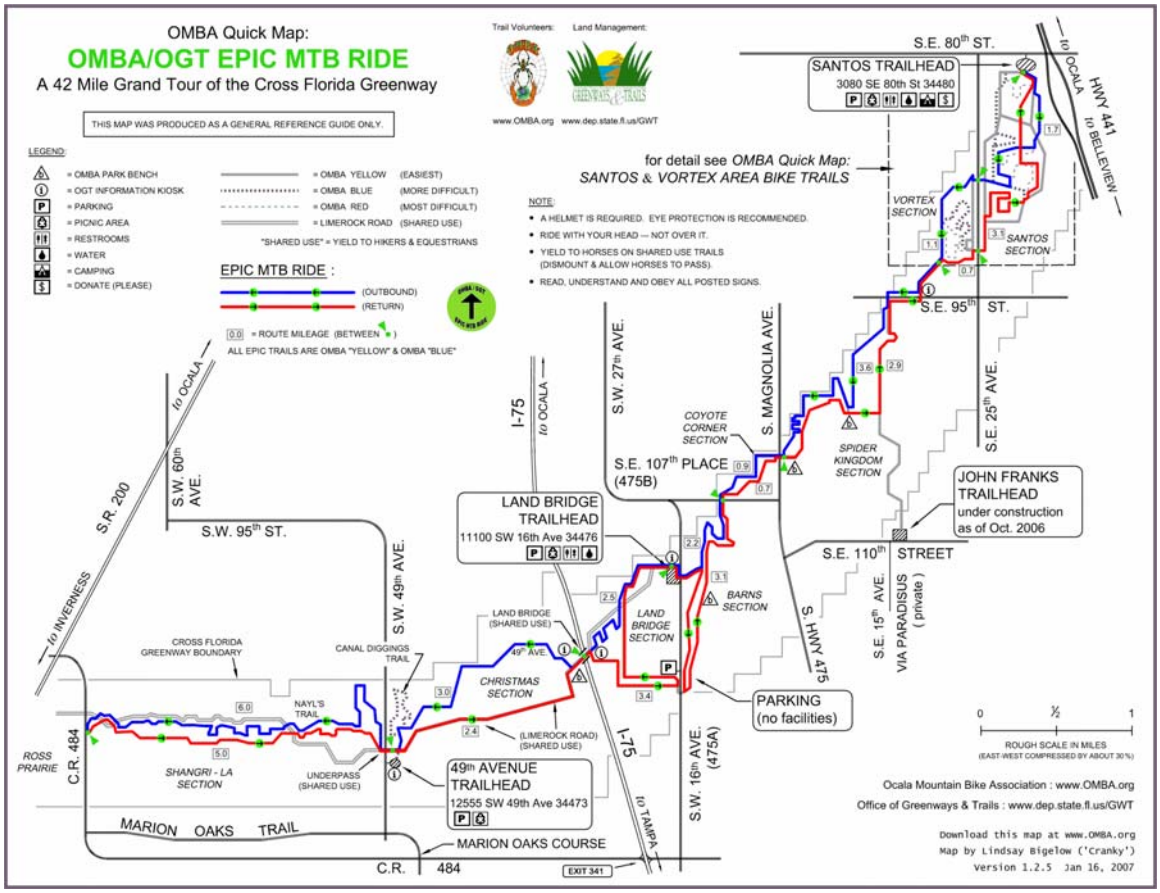


Fig. 3.5 – Ocala Greenway Mountain Bike Trails Map
(IMBA, 2006)

As a final example, the city of Boulder, Colorado, has an integrated system of paved and unpaved bike trails weaving throughout the city as part of its greenway. Some dirt trails are open to mountain bikes, while others are not. Those that are not are usually reserved for hikers, horses, or are restricted due to ecologically sensitive areas. Rangers patrol the trails on bikes and issue summons to any biker caught riding on a closed trail. The city of Boulder drew up a memorandum of understanding between its parks department and the Boulder Mountain Bike Alliance (BMA) to maintain and develop the trail in such a way that all users of the greenway could benefit.

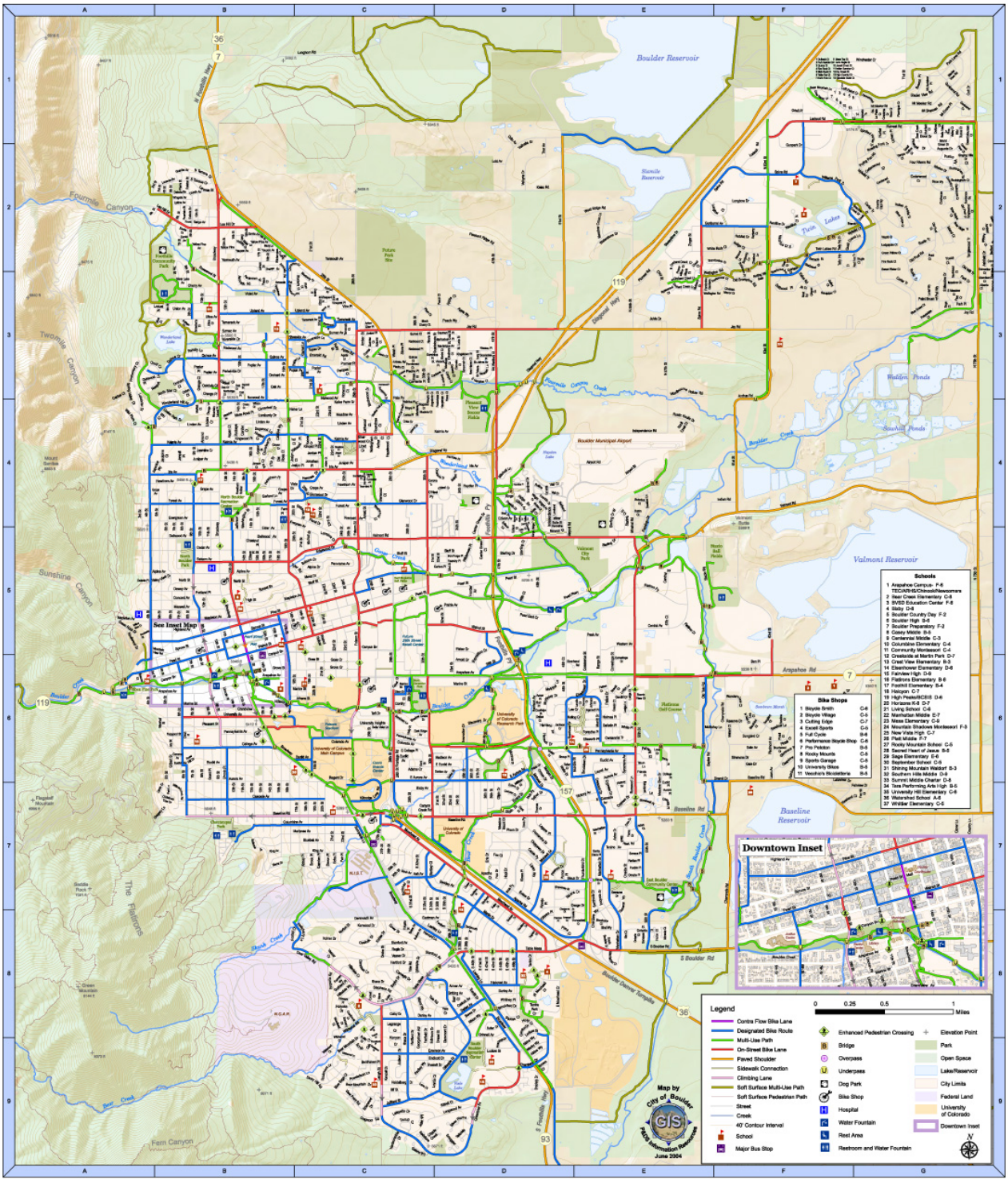


Fig. 3.6 – Master Bike and Pedestrian Plan for Boulder, CO
(BMA, 2006)

It seems, therefore, that an integration of mountain-bike friendly singletrack into a larger greenway system is possible, especially with the cooperation and volunteer-driven assistance of mountain bike advocacy groups. In the examples noted above, the typical physical model seems to be a paved spine with singletrack offshoots, or the use of singletrack to connect paved sections. It is worth noting that all of the cities mentioned are similar in size to Athens, Georgia's roughly 104,000 residents. Ocala is slightly smaller (50,000), Roswell/Alpharetta's combined population is about 130,000, and Boulder has a population of 91,000.

Chapter 4: TREADWAY DESIGN, STANDARDS, AND MANAGEMENT

What is Singletrack and Why is it Important?

According to IMBA, a singletrack trail is "one where users must generally travel in single file. The term 'hiking trail' is an improper synonym for singletrack because it defines a type of user, not the physical structure of the trail" (Felton 2004, 49). The typical tread width for a singletrack trail is eighteen to twenty-four inches wide, though it can be as narrow as six inches or as wide as thirty-six inches. The description of singletrack promoted by IMBA also states the following: "Singletrack trails tend to wind around obstacles such as trees, large rocks and bushes. As compared to roads [or to paved greenway paths] singletrack trails tend to blend into the surrounding environment, disturb much less ground, and are easier to maintain. The tread of singletrack is almost always natural surface, in contrast to the gravel or pavement of roads" (Felton 2004, 49).

The difference between singletrack and other types of trail is important not only to mountain bikers, but to all trail users. Vernon Felton writes, "Most trail users prefer narrower trails. Whether they are riding a mountain bike, running, or hiking the trail, or exploring on horseback, these users want to experience a close connection to nature… Trees and shrubs may create a tunnel of green, flowers may reach eye level, wildlife may cross the path, immersing visitors in the natural world. The experience just isn't the same on an open, wide road" (Felton 2004, 49). In addition, singletrack offers the opportunity for a higher degree of challenge for the trail user, making the trail more exciting and providing for a more diverse and invigorating experience.

The narrow nature of singletrack trails also has another benefit, namely speed control. This helps to make the trail more appropriate for multiple user types rather than for mountain bikes only. “Those who object to mountain biking on singletrack envision riders bombing along a skinny trail at supersonic speeds, launching headlong into startled hikers and equestrians. In fact, singletrack trails tend to slow mountain bikers—particularly on shared-use trails where they anticipate encountering other visitors—demanding constant vigilance and a slow to moderate speed.” In other words, the narrow nature of singletrack forces riders to keep their speed in check. “It’s almost counterintuitive, but speed and danger tend to increase on wide, unchallenging roads” (Webber 2007, 150). Felton also makes mention of this phenomenon: “Bored and unchallenged [on wide roads], bicyclists quickly attain speeds that can bring them into direct conflict with other users” (Felton 2004, 49).

The last benefit to singletrack, and the one which makes it particularly suitable as an inter-corridor connector through fragmented urban space, is the fact that it can be threaded through extremely narrow parcels with minimal disturbance and impact. Whereas a ten foot-wide paved path requires a much larger right-of-way, an eighteen-inch singletrack trail is far less obtrusive, and blends into the natural appearance of a place. This can greatly reduce landowner objection to allowing a trail easement across their property, since the trail is both physically and visually unobtrusive. Charles Little references this fact in *Greenways for America* (1990) when he writes that greenways need not always be paved: “That a trail should be continuous does not imply that it need be continuously paved, especially through private-land areas. There, trails can dwindle to simple footpaths [singletrack], which tend to be unattractive to people the landowners are

concerned about – unruly youths, nonlocals, or those with larceny (or worse) on their mind" (Little 1990, 190). Charles Flink also makes mention of the fact that singletrack is unattractive to those with criminal intent. He states that the vast majority of vandalism, theft, and other crimes which happen on greenways tend to occur within parking areas, where vehicle access is easy. Singletrack is not attractive to criminals because it is inaccessible by motorized vehicle. On the Appalachian Trail, which is singletrack, the crime rate was 0.05 crimes per 100,000, or one in two million, according to a 1990 study by the Appalachian Trail Conference. "This means you are more likely to be struck by lightning or victimized in your home than as a hiker on the Appalachian Trail" (Flink 1993, 76).

The last advantage to singletrack is overall cost. The expense of constructing a singletrack trail is a mere fraction of the cost of a traditional paved or gravel-surfaced bikeway, and in many cases the construction cost is entirely offset by the volunteer labor of local groups such as SORBA. Singletrack is also far cheaper and easier to maintain than paved or surfaced trails, making it an ideal complement to greenway systems, most of which have limited budgets and have to scrounge for sufficient funding.

For these reasons, the overland connector between the Middle and the North Oconee Rivers should be built as a singletrack trail, at least for the majority of the route. Some sections, outlined in the next chapter, would be more appropriately paved in the style of the existing North Oconee Greenway, with an eight to ten foot width. However, the use of singletrack allows for the trail to pass through some extremely narrow areas without disturbing the natural settings of those environments, and provides trail users with the most effective recreational experience. Finally, the use of singletrack for the

connector reduces the need for additional trail mileage within expensive, high-acreage parcels, spreads the trail over a larger area, and makes it more accessible to a larger portion of the city's population.

Core Elements of A Sustainable Trail

It is important that the trail be sustainable in order to prevent environmental impact as well as to reduce the amount of ongoing maintenance required to keep the trail up to its standards. The emphasis on proper trail design promoted by IMBA beginning in the 1990's stressed the importance of sustainability when designing and building trails. According to IMBA, a sustainable trail is one that protects the environment, meets the needs of its users, requires little maintenance, and minimizes conflict between user groups. "If any one of these four values is overemphasized at the expense of another, the trail could cause irreparable damage to the environment, provide an unsafe or negative experience for users, or deplete your maintenance budget" (Felton 2004, 40). All of these aspects are best controlled through initial design and construction.

Erosion and Trails

Erosion is the biggest threat to trail sustainability. Because the tread of singletrack is a natural surface, it is subject to the erosive effects of wind and water. These effects can rapidly damage or destroy trails if the trail is not designed to counteract erosion. There are three major contributing factors which can accelerate the erosion of a poorly-designed trail: Trail users, water, and gravity.

All trail users loosen soil. This includes hikers as well as mountain bikers or equestrians. Typically, user-caused erosion accounts for the least impact of the three, but is still a factor.

Water, on the other hand, is the most potentially destructive of the three erosive elements. “Focused water can do more damage to a trail than any user. It channels down trails—which often become the path of least resistance for slope runoff—and gains velocity and energy, washing away precious soil and cutting deeper into the tread each time it flows” (Webber 2007, 112).

Finally, gravity plays a part as well. On steeper slopes, erosion will be more severe due to the effect of gravity on the flow of water. “Water flows faster on steeper grades, washing away more soil” (Webber 2007, 112). The force of gravity also pulls trail users more quickly down a slope, causing them to react by digging their heels in or by braking, loosening more soil.

The primary means of combating erosion on trails is through proper design, specifically by building what are referred to as Rolling Countour Trails. A contour trail is a path that follows the contours of a slope rather than going straight up and down hills. On a topo map, a countour trail runs parallel to the topo lines rather than perpendicular to them. They are characterized by “a gentle grade, undulations called grade reversals that drain water, and a tread that usually tilts or outslopes slightly toward the downhill edge. These features minimize tread erosion by allowing water to drain in a gentle, non-erosive manner called sheet flow” (Felton 2004, 56). Sheet flow is the way in which water would drain off a hillside if the trail were not there at all. Allowing the water to flow in thin, dispersed sheets rather than as a focused flow keeps soil on the trail tread and minimizes the trail’s overall environmental impact.

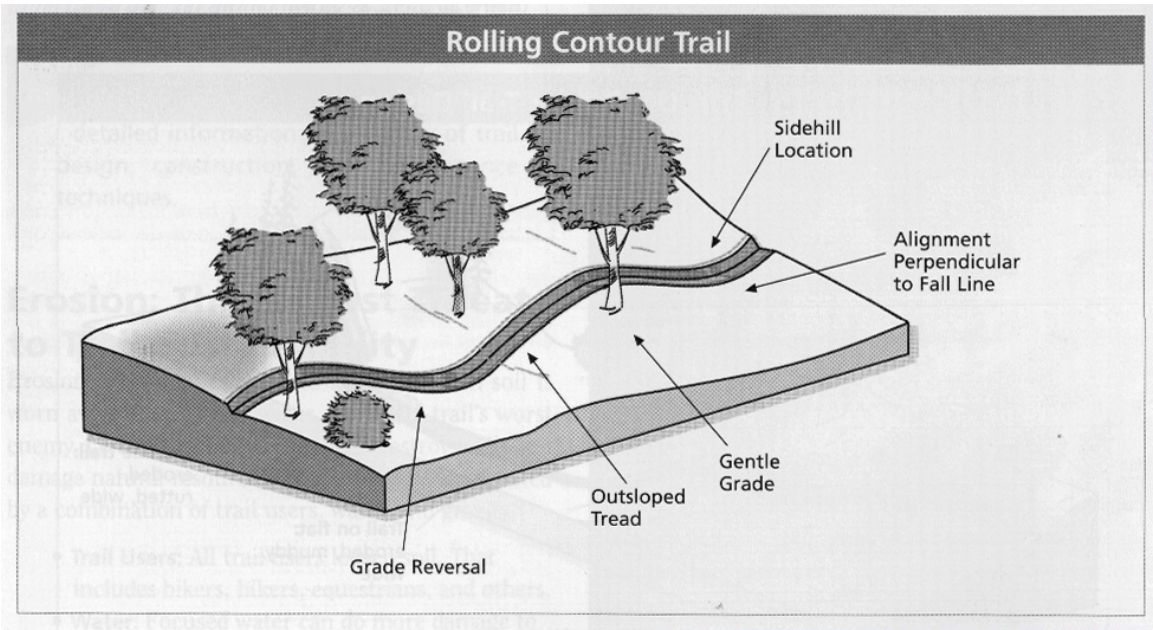


Fig. 4.1 – Rolling Contour Trail
(Webber 2007)

Principles of Sustainable Trail Design

The following standards for trail design and construction represent the most modern methods for designing and building sustainable singletrack trails. Some of these standards were developed by IMBA over the last decade, while others go back to Forest Service standards in place by 1915, but all of them are considered current Best Management Practices when designing mountain bike trails. It is recommended that the proposed Oconee Rivers Connector Trail be held to these standards so as to ensure the most sustainable, least erosive trail tread, thereby minimizing the need for ongoing maintenance and optimizing the user experience.

Sidehill Alignment

A sidehill alignment is always best for the trail. Sidehills allow for the creation of rolling contour trails as previously mentioned, and offer the best means for draining water

off the trail. Novice trail designers often mistake flat areas such as meadows, valley floors, and floodplains as ideal trail corridors. However, these areas tend to become collection basins for water, resulting in mud puddles and bogs. Trail users, seeking to avoid these muddy and wet areas, seek drier ground, leaving and thereby widening the trail. The standards published by IMBA state that "in order for water to drain off the trail properly, the tread must always be slightly higher than the surrounding terrain on at least one side. Trails that traverse a hillside will always have a high side and a low side, ensuring drainage and encouraging users to stay on the route" (Webber 2007, 116). In circumstance where a sidehill alignment is not possible, the tread must be elevated or routed across soil that drains especially well, such as sandy soils.

Avoiding the Fall Line: The Half Rule

Trails that directly ascend a hillside are called fall-line trails. They follow the shortest path up or down a slope, which is also the same path water takes. Fall-line trails therefore focus water down their length, increasing the speed and volume of water on the trail and accelerating erosion. Once ruts and gullies are formed, it is nearly impossible to divert water off the trail in sheet flow.

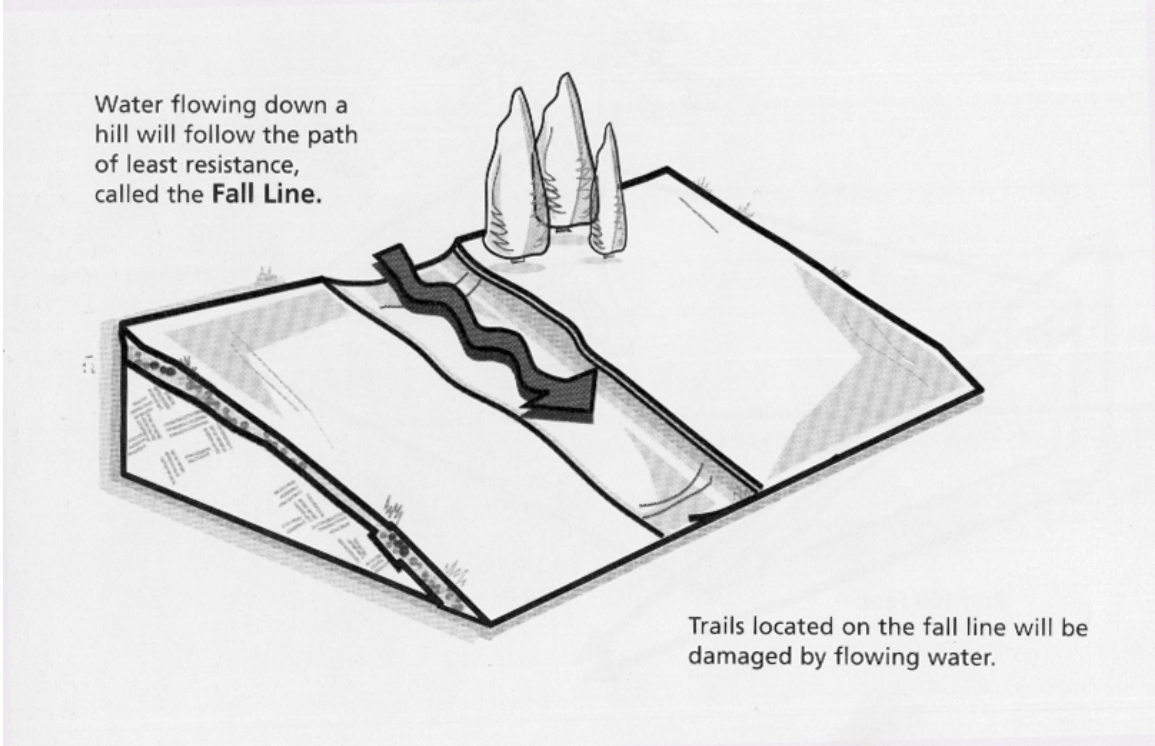


Fig 4.2 – Fall Line Trail
(Felton 2004)

The “half rule” of trail design is the best way to avoid fall-line trails. “To ensure a sustainable alignment, a trail’s grade should never exceed half the grade of the sidehill it is located on. If the grade does exceed half the sideslope, the trail is considered a fall-line trail. Water will flow down the trail rather than run across it” (Felton 2004, 63). For example, if the trail runs across a hillside with a sideslope of twenty percent, the grade of the trail should never exceed ten percent. This rule is especially important in flatter areas, where the sideslope may only be six percent. In this case, the trail grade must be kept under three percent, because even gentle slopes have a theoretical fall-line, where water will follow the trail rather than sheeting off it.

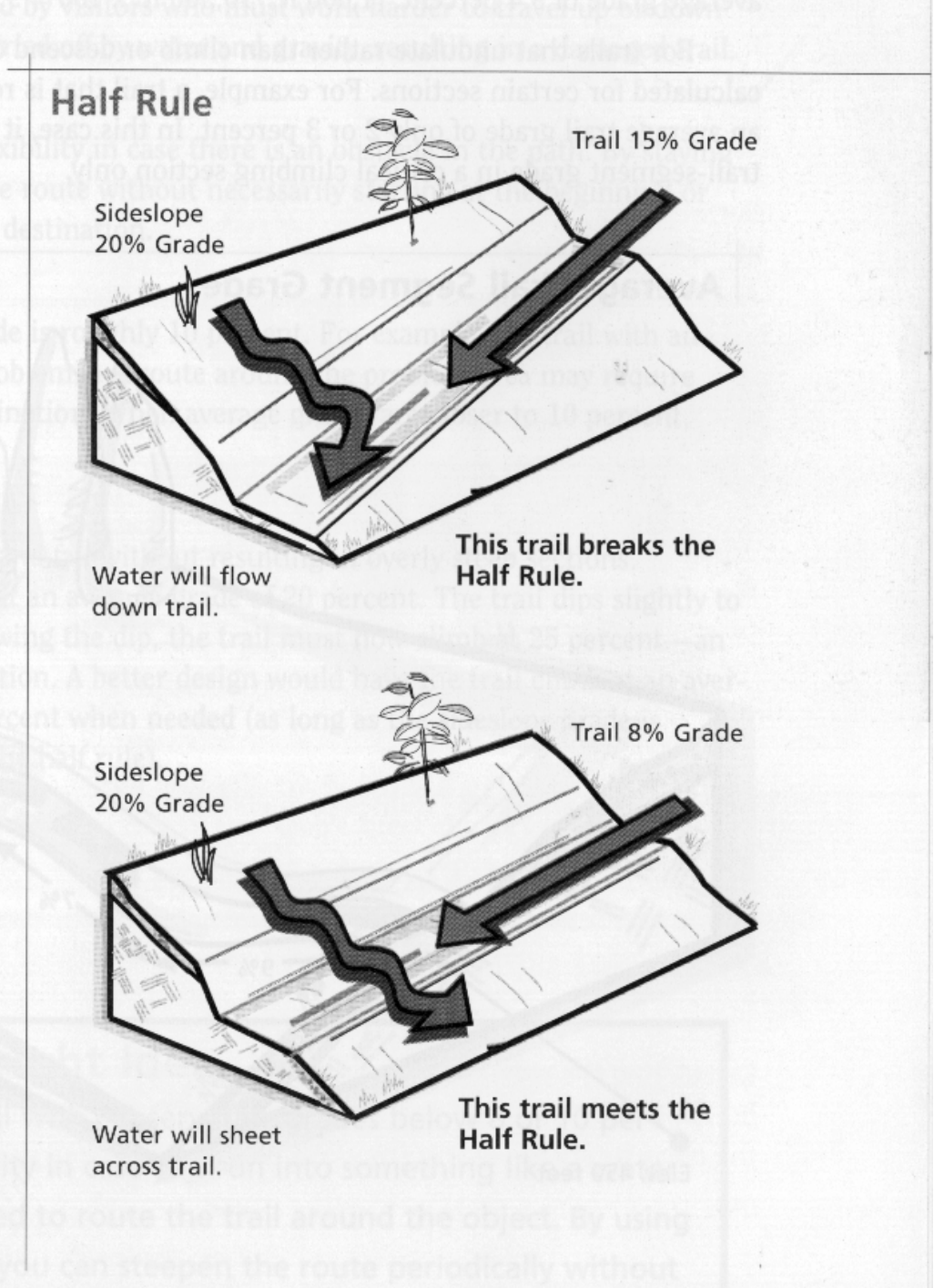


Fig 4.3 – The Half Rule
(Felton 2004)

There is one exception to the half rule. “For each trail location there is a maximum grade that will be sustainable, irrespective of the sidehill grade or half rule.

Except in rare situations, the trail should never exceed fifteen percent, even if a steeper trail would meet the half rule" (Webber 2007, 119). At grades above fifteen percent, the natural surface tread cannot be protected from erosion due to the steepness of its slope. In one of the earliest works on trailbuilding, a 1915 U.S. Forest Service document stated that "any other feature of construction may be improved from month to month or year to year, but if the grade is not properly established the trail must in time be abandoned. Thus not only may time and money be wasted, but the trail while in use will be unsatisfactory" (USFS 1915). The maximum grade is also influenced by soil type: In loamy or mixed soil, the maximum grade drops to approximately ten percent, and in sandy soils a five percent grade is the maximum sustainable alignment.

Average Grade

In addition to the maximum grade for short sections of trail, IMBA also recommends a maximum average grade of ten percent. This applies to longer sections of trail. For example, a trail in the mountains might have a climb some two miles in length. While the maximum grade for short sections of that trail might be fifteen percent, the average grade over the two miles should still be kept under ten percent. "An average trail grade of ten percent or less is a sustainable target. It applies to most soil types, minimizes user-caused erosion, allows for design flexibility, accommodates up-and-down undulations, and allows for future route adjustments" (Webber 2007, 119).

Grade Reversals

Even well-designed trails can collect water. Frequent drainage features are therefore essential to shed the water off the trail as soon as possible. Grade reversals are places where the trail changes elevation, dropping slightly before rising again. This forces

water to exit the trail at the low point of the grade reversal, before it has a chance to gain momentum, volume, and erosive power. “Grade reversals effectively divide the trail into short, individual watersheds, so the drainage characteristics of one section of trail won’t affect any other section” (Felton 2004, 67). These grade reversals ideally should be spaced every twenty to sixty feet in order to ensure that water is quickly drained from all trail sections. They also help to ensure trail longevity: “On older trails, which often have a deeply compacted, cupped trail tread that collects water, water will have only a short distance to flow before it can drain” (Webber 2007, 122).

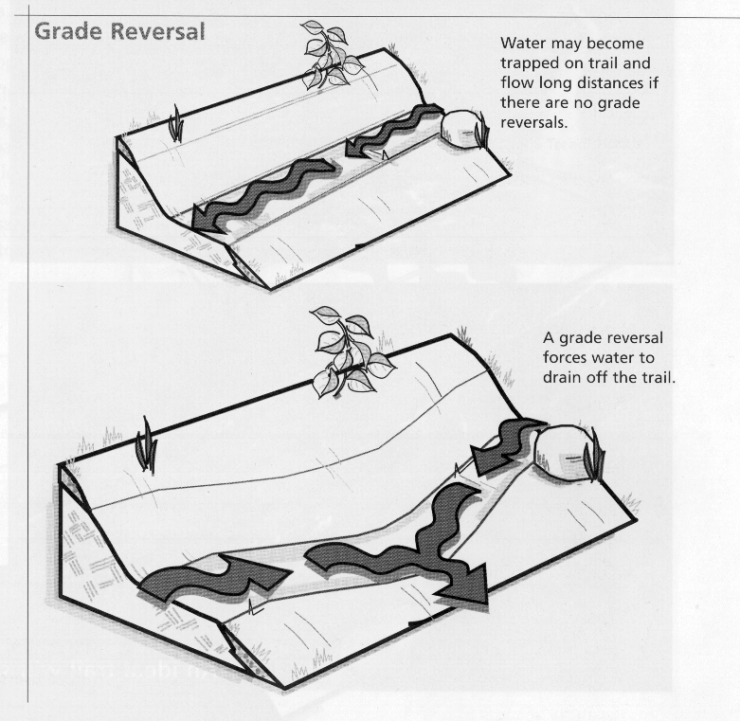


Fig 4.4 – Grade Reversal
(Felton 2004)

In addition to draining the trail, grade reversals also help to make the trail much more enjoyable. “For mountain bikers, long runs of constant grade encourage excessive speed on a downhill and they’re boring on an uphill. Short climbing interludes and uphill

whoop-de-dos on a downhill provide variety, challenge, and let cyclists get off their brakes for a bit. Brief descents mixed into long climbs help all users regain their momentum and catch their breath" (Felton 2004, 67).

Outslope

The tread of the trail itself should be constructed so as to tilt slightly to the side in order to shed water in a sheet flow rather than funneling it down the trail. This tilt is called outslope by most trailbuilders and cross-slope by landscape architects. The standards published by IMBA for sustainable trails specify a five percent outslope for every trail tread. This five percent outslope can be difficult to maintain, especially in loose soils. "Tires, feet, and hooves constantly compact the center of the trail and push loose soil to the sides, creating a concave tread. Frequent grade reversals are essential in order for water to drain in this situation" (Felton 2004, 69). In certain conditions, however, such as loose, well-drained soils, "outslope may even be undesirable because the trail may actually benefit from trapping a bit of moisture" (Webber 2007, 123). In the case of the proposed Oconee Rivers Connector Trail, which is on clayey soil, the five percent standard is recommended.

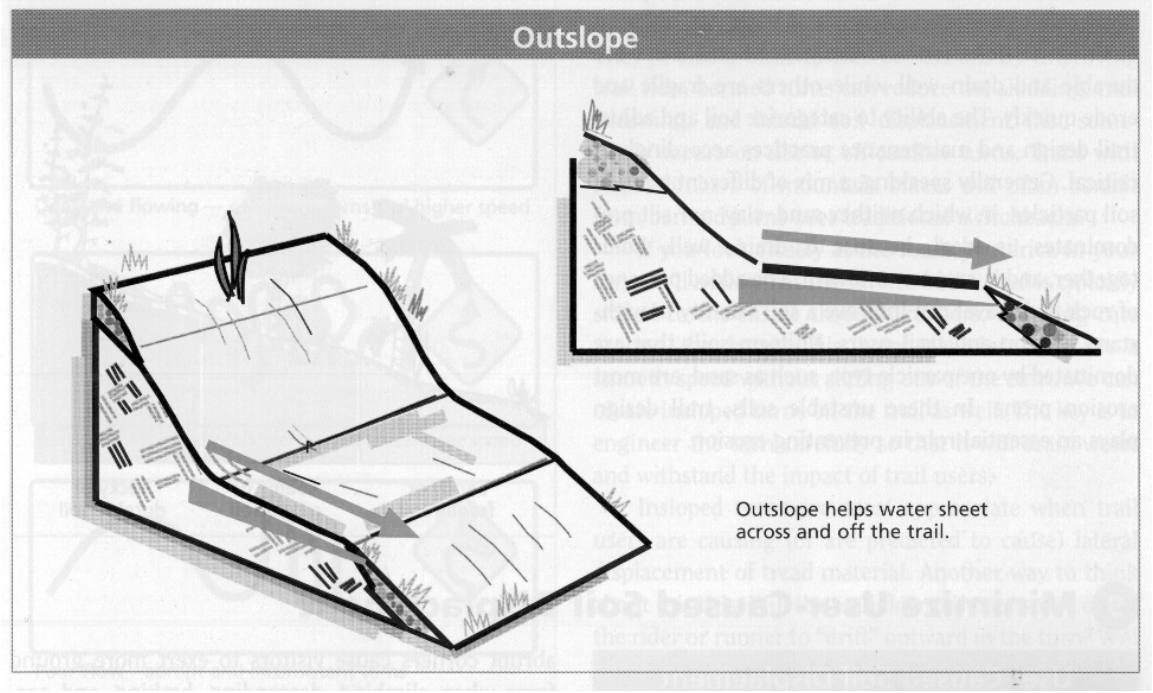


Fig 4.5 – Outslope
(Webber 2007)

Minimizing User-Caused Erosion

The preceding standards were developed to minimize the effects of water and gravity, two of the primary forces of erosion on natural surface trails. However, as mentioned before, a third erosive force acts on trails, the trail user. To a certain extent, all users impact the trail surface, but different user groups impact it differently. For example, land managers have long been concerned with the possible environmental impacts of mountain bikes on trails – Athens-Clarke County's Parks and Recreation Department has cited this as one of their primary objections to sanctioning mountain bikes on existing trails. However, recent scientific research indicates that their fears are unsubstantiated. Studies conducted by Marion and Olive (2006) and Wilson and Seney (1994) show that mountain bikes have an environmental impact which is less than or comparable to hiking

in regards to soil and sediment loss. This is due largely to the fact that a mountain bike's two contact points with the ground are only about two inches wide, and around two and a half inches long. In addition, because mountain bike tires roll along rather than being picked up and placed down, mountain bikes tend to have a smoothing, grooming effect on singletrack, which actually decelerates erosion rates on properly designed contour trails. The same studies show that both mountain biking and hiking have significantly less environmental impact than horses or motorized vehicles. Thus, "studies indicate that while mountain biking, like all forms of recreational activity, can result in measurable impacts to vegetation, soil, water resources, and wildlife, the environmental effects of well-managed mountain biking are minimal" (Webber 2007, 110).

In fact, most of the erosion perceived to have been caused by bikes is in fact due to poor trail design, such as following fall-lines rather than contours or routing trails through floodplains. This being the case, "trail design and management are much larger factors in environmental degradation than the user type or amount of use" (Webber 2007, 104).

Designing for Flow

"All trails have a rythym or tempo determined by the landscape and the sequence of turns, ups and downs, and trailside objects," Pete Webber writes (Webber 2007, 104). "Smooth and consistent flow can reduce user-caused soil movement by minimizing locations where visitors are forced to exert more ground force or sideways motion to stay on track" (104). A good design will seek to control the trail user's speed and momentum by providing consistent flow. This means avoiding abrupt transitions that are "likely to make a cyclist brake hard or skid, resulting in braking bumps, trail widening, and in

extreme cases, users being forced off trail" (Felton 2004, 97). Felton also writes, "Mountain bikers love the rhythm of a trail where one turn blends into the next, and every descent leads to another rise. A trail with good flow helps minimize erosion, user conflict, and safety concerns" (Felton 2004, 99).

According to IMBA, contour trails can have three basic types of flow:

1. "*Open and Flowing*. These trails are relatively gentle. They have long sightlines, gradual turns and few technical challenges. They appeal to less-skilled cyclists as well as people who enjoy traveling fast. Open and flowing trails need long sightlines because they invite higher speeds.
1. *Tight and Technical*. These trails have sharper turns and twists, rougher surfaces, a narrower tread, and natural obstacles. They provide challenges and thrills for mountain bikers while keeping speed down, which in turn may reduce user conflict. Tight and technical trails may frustrate destination-oriented hikers, and shortcutting may result.
2. *Hybrid*. Hybrid trails successfully blend open flowing with tight and technical. Hybrid trails are often a good choice for urban areas. Brush and other obstacles close to the trail should be kept below eye level, allowing for longer sightlines to help reduce user conflict. Transitions should occur gradually or be located atop hills, so that they are approached slowly." (Felton 2004, 97)

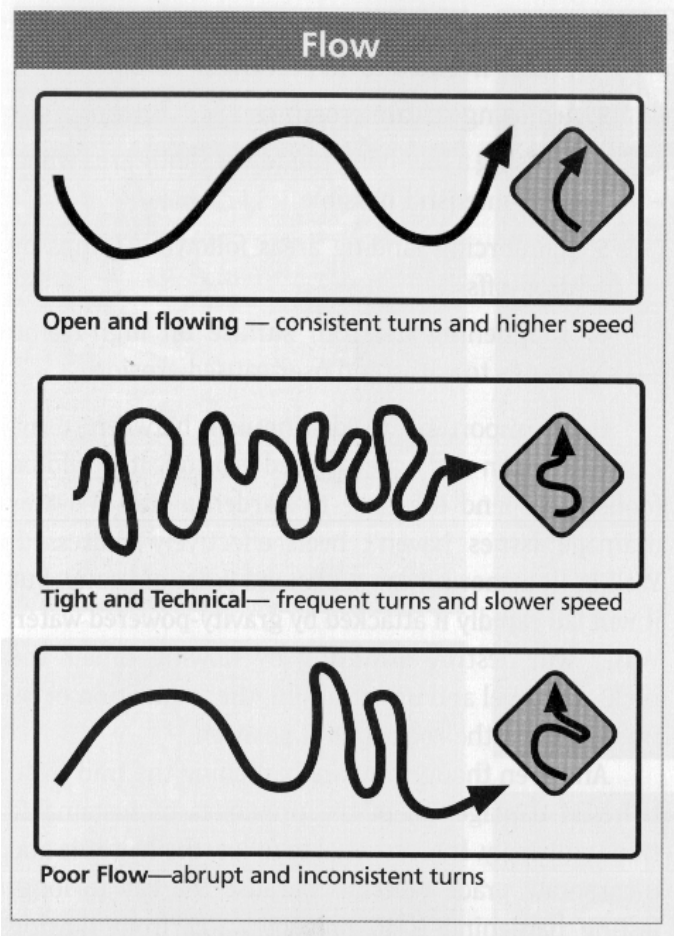


Fig 4.6 – Designing for Flow
(Webber 2007)

The Oconee Rivers Connector Trail proposed in this thesis is a hybrid trail, with some open and flowing sections, and other tight and technical sections. Some areas within the larger parcels along the way are tight and technical. However, due to its destination-oriented goal, the predominant characteristic of the trail is of an open and flowing variety. The best way to provide all types of flow within one system is to arrange them in a stacked loop system. “Loops let visitors enjoy trails of varying distances, difficulty, or ecosystems in the same outing” (Felton 2004, 95). They allow for users of varied ability to be able to use the same system while minimizing potential conflict. In a

stacked loop system, a core trail would exist which would be accessible and enjoyable to user of all abilities. These trails are closest to the access points, allowing for easy, short-distance rides. Spur loops can then be added to the system, providing varying degrees of difficulty and mileage. The difficulty of the loop is determined by its proximity to the main access points such as parking areas or trailheads. The most difficult trails are located farthest from the access points. This allows distribution of users based on ability and needs throughout the system and minimizes potential for conflict. Expert riders get their desired mileage and challenge, while beginners can still enjoy the trail. The stacked loop system works well with the greenway concept, as loops of varying distance and difficulty can spur off from the main spine.

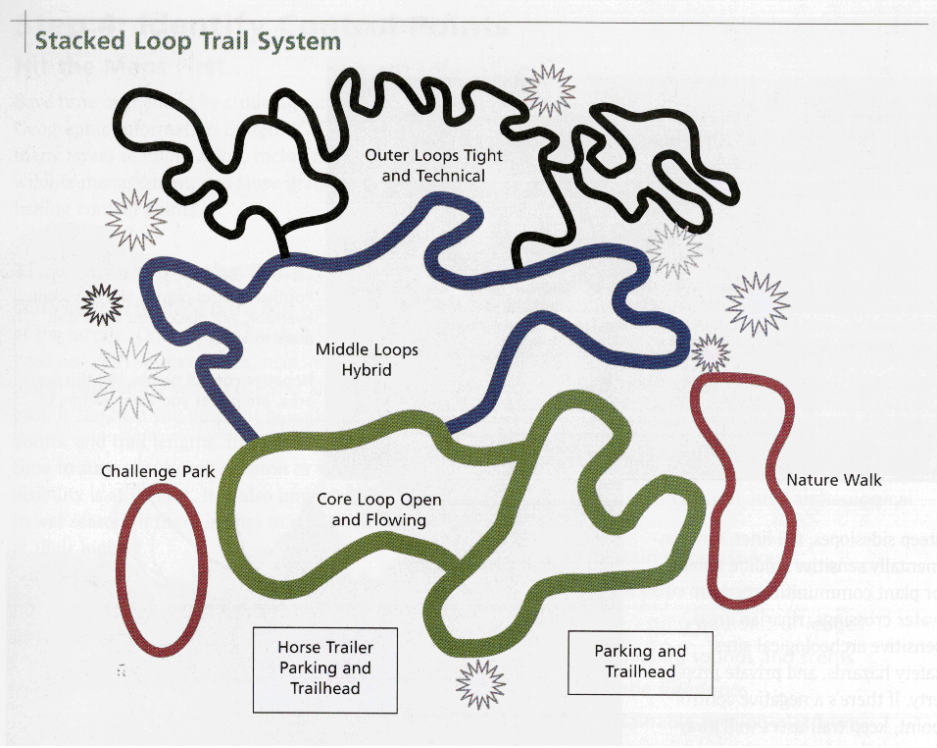


Fig 4.7 – Stacked Loop System
(Felton 2004)

The proposed Oconee Rivers Connector trail could have many such spurs. The sections of trail used to connect the fragments of greenspace are destination-oriented, and by necessity would be open and flowing, appealing to all users including hikers and joggers. Tight and technical sections, which appeal to mountain bikers but may frustrate hikers, should located at the spurs where additional acreage allows for such trails.

Safety Concern: Transitions Between Singletrack and Pavement

A potential problem area for user conflict may be found at the places where unpaved singletrack intersects with the paved portions of the greenway. Here, trail users such as mountain bikers are likely to encounter other users in greater number due to the higher accessibility of the paved sections. The best way to manage these transitions from unpaved to paved trail is to reduce the bikers' speeds as they approach the paved section of trail and to ensure long sightlines at the transition point. This can be accomplished through trail design in a number of ways, including choke points, corralling and tight turns.

Choke points are areas where the trail becomes very narrow due to the placement of rocks, logs, or vegetation in strategic areas specifically designed to slow riders down. A rider, sensing a tight squeeze ahead, instinctively reduces speed in order to pass through the narrow clearance. Strategically placed, choke points are very effective at slowing riders as they approach a hazardous area, sharp turn or trail intersection, and thus help promote smooth, safe transitions. They can also help minimize environmental impact by slowing riders down gradually before they reach sharp turns or other areas where they would otherwise brake suddenly or apply strong sideways force due to their speed.

Corralling the trail is simply placing objects beside the trail to define its sides and emphasize turns. “Also called trail anchors, these can be large rocks, logs, trees, or other obstacles staggered on either side of the trail that serve as physical and visual barriers to keep visitors on the trail and slow riders. These anchors can help tie the trail to the landscape and provide a more enjoyable experience” (Felton 2004, 80). They also serve to keep riders on the established trail tread, minimizing the potential for environmental impact caused by going off-trail.

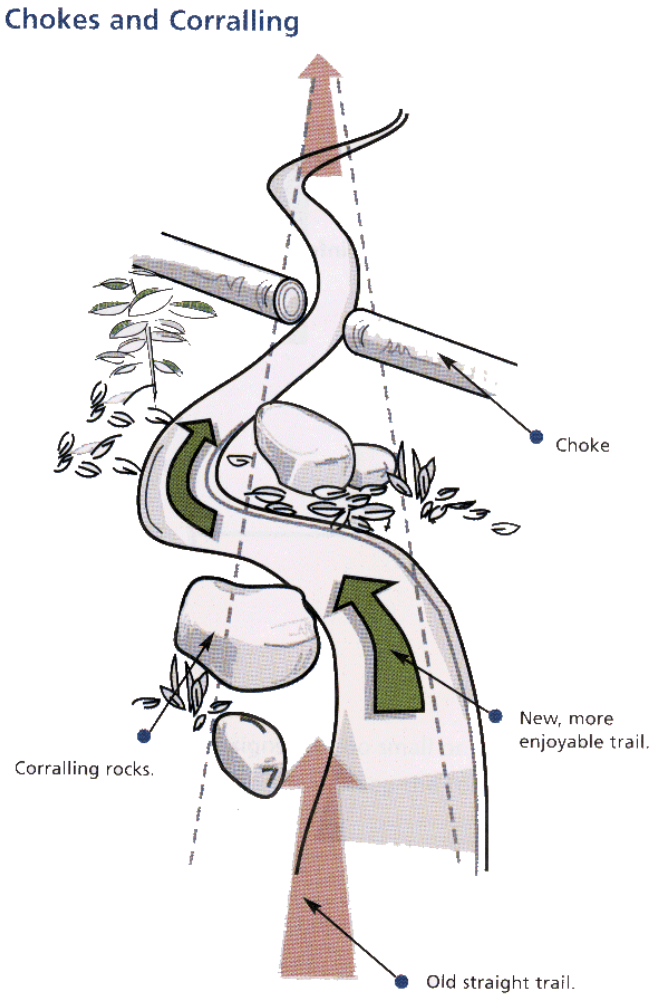


Fig 4.8 – Chokes and Corralling
(Felton 2004)

Signage

Effective, consistent signage is also necessary to minimize inter-user conflict and enhance the overall user experience. Signs before trail intersections could warn bikers of the upcoming transition to paved greenway and let them anticipate the potential for oncoming traffic. “A well implemented and maintained signage system has the potential to greatly enhance the user experience, navigating visitors through the trail network and providing information about an area. Signage also plays a critical role in managing risk and the rapid and effective deployment of emergency services” (Webber 2007, 207). Such signage is used at Fort Yargo State Park in Winder, Georgia, where signs advise hikers to yield to mountain bikers on the designated biking loop. On other trails in the park, hikers have the right of way, and signs advise of this where applicable.

Trail signs are typically divided into three categories:

1. Informational/Directional
2. Regulatory/Warning, and
3. Educational/Interpretive.

Directional signs provide navigational information such as maps, while informational signs provide details such as trail length and difficulty. These signs are usually best placed at trailheads, and allow trail users to accurately plan and manage their visit to the trail system. An informative kiosk at the primary trailhead (such as parking areas or public access points) should provide as much detailed information as possible, including emergency contacts, risk and hazard warnings, volunteer information, rules and regulations, and trail etiquette tips. Mile markers also fall into this category; these are sometimes called waymarks, and are small, simple signs that direct visitors through the

system. Secondary and tertiary trailheads are areas within the system where one trail branches off from another, such as the stacked loop or spur system advocated in this thesis. Directional and informational signs are necessary at these secondary and tertiary trailheads to advise users of varying trail difficulty and their location within the trail system.

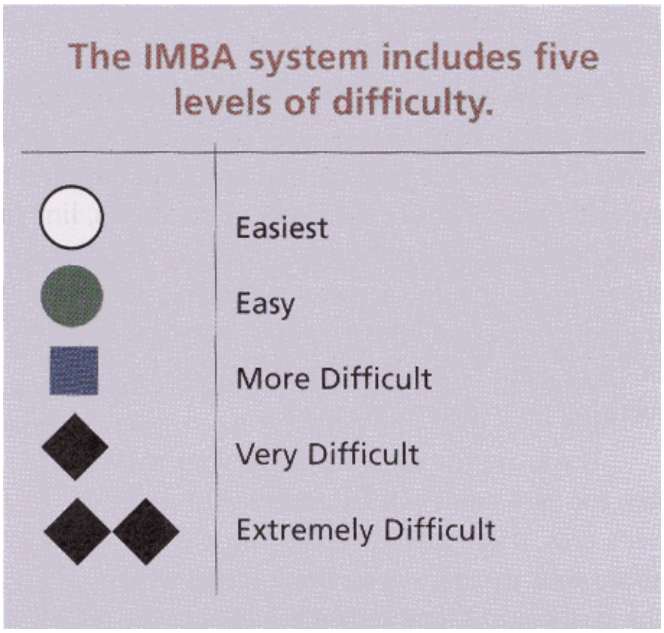


Fig 4.9 – Trail Rating Categories
(Felton 2004)

Trail difficulty signs help trail users make informed decisions about which trails to take, encouraging them to use trails that match their skill level, and can help prevent personal injury and other safety concerns. The system IMBA recommends for delineating trail difficulty is adapted from the International Trail Marking System used by ski areas worldwide. It breaks trails into five categories from easiest to most difficult. The difficulty of a trail is determined by considering the following four objective, measurable criteria: tread width, tread surface, trail grade (maximum and average), and natural obstacles and technical trail features. Each rating has a recognizable symbol associated

with it, as shown above (see Fig. 4.9). Easy trails are marked with a green circle, while very difficult trails are marked with a black diamond.

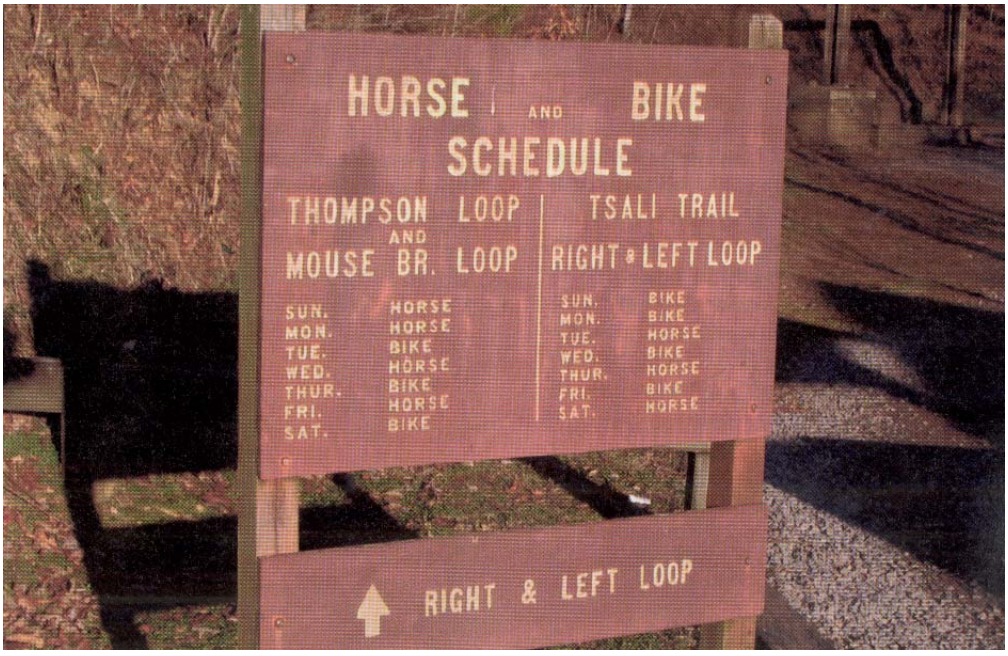


Fig. 4.10 – Regulatory Sign at Tsali Recreational Area, NC
(Webber 2007)

Regulatory signs delineate rules, such as prohibited activities, direction of travel, or other activities. Signs such as these can indicate trails where certain user groups are not allowed, or direct users to different parts of the trail where their activity is permitted. For example, at the Tsali Recreation Area in North Carolina, mountain bikes and equestrians share access to the same trails, but in order to manage user conflict, the Forest Service has implemented a rotational plan which keeps horses on one side of the trail system and bikes on the other so that they never run into each other on the trail. “The system works quite simply: Mountain bikers, the more populous user group, can ride the longer Left and Right loops on Monday, Wednesday, Friday, and Sunday, and the shorter Mouse Branch and Thompson Loops on Tuesday, Thursday, and Saturday; while equestrians follow the opposite schedule” (Webber 2007, 157). The system has turned out

to be a great success, with both user groups expressing satisfaction with the arrangement, and Tsali remains one of the most popular mountain biking destinations in the Southeast. Without effective signage, however, this system could not function.

Warning signs also play a major role in managing risk. Where they are appropriate, warning signs should be placed along the trail to warn visitors of upcoming hazards or especially technical challenges. They should be positioned well ahead of the hazard so that the rider has enough time to read the sign and react appropriately.

The final category of signage is educational and interpretive signs. Educational signs seek to inform or educate the trail user as that user passes by, often regarding things such as trail etiquette and responsible behavior. Interpretive signage provides information about points of interest along the trail and can identify important natural or cultural resources. A trail that passes near a wetland created by a beaver dam might provide a sign explaining how the wetland was created and describing the local ecology and wildlife. The mountain bike trail system at the Lake Russell Wildlife Management Area (LRWMA), a 17,000-acre site near Toccoa, Georgia, features dozens of trailside interpretive signs showcasing various historic sites, including nineteenth century homesites, graveyards, and mills. These signs tell the compelling story of a place, of the people who lived in that very spot many years ago, and instill an enhanced sense of and appreciation for that place in the trail user's mind.

In summary, signage provides a means for communication between land managers and trail users, and offers one of the best ways of controlling and guiding user behavior. "By posting clear, well-placed signage, land managers can head off many of the management issues that affect the larger health of the trail system" (Webber 2007, 219).

Signs along the Oconee Rivers connector trail should be modeled on existing signage standards established by the North Oconee Greenway in order to maintain consistency. Fig 5.31 shows a directional sign on the existing Greenway; signs on the Oconee Rivers Connector Trail should maintain the same quality, design, and functionality as this sign. Mile markers and interpretive signage are also recommended, as well as safety and geographical information at road crossings.

Fig. 4.11 – Directional Sign on the North Oconee River Greenway
(Photo by Author)

Managing User Conflict

Conflict among user groups is one of the major problems facing the managers of any trail. User conflict will always be present to some degree, but it can be effectively curtailed through management and design techniques, and is rarely the result of a true incompatibility between groups. Flink writes, “Conflict among users… is largely the result of an increased in demand for trail resources, increased use of existing limited

trails, poor management, underdesigned facilities, lack of user etiquette, and disregard for the varying abilities of trail users" (Flink 1990, 194). By employing such techniques as controlling user speed through design, maintaining adequate sightlines, providing a clear and consistent program of signage, offering trails of varying difficulty for all user types, and partnering with advocacy groups such as SORBA, Athens-Clarke could effectively govern and prevent most user conflict issues.

Mountain Bike Patrols

Another management technique gaining popularity with land managers is the formation of Mountain Bike Patrols, usually made up of volunteers from local bike advocacy groups such as SORBA. Inspired by the model set by ski patrols, volunteer bike patrols provide assistance and education on trail systems around the world and offer effective solutions to trail management problems ranging from user conflict to erosion to risk management. *Managing Mountain Biking* (2007) states that "Mountain bikers are a user group with a strong sense of community. Most riders will gladly offer directions or a spare inner tube to a fellow rider in need and expect nothing in return. Mountain bike patrols are formal expressions of this culture of assistance on the trail" (Webber 2007, 190).

Bike patrols can offer a variety of services, which vary from location to location. There are typically four main ways that mountain bike patrols can help manage a trail system. The first is by enhancing the user experience. This is accomplished by providing information about the trails, offering mechanical assistance, or providing food, water, sunscreen to those in need.

Patrols are also helpful in assisting land managers with the daily management of the trails. Because they are familiar with the trails, volunteer patrollers can keep an eye on trail conditions and spot areas where riders are creating new trails. This allows them to alert the land manager in time to close the rogue trail before it becomes established. Bike patrols can also observe visitor trends and educate users on safety and etiquette. The promotion of trail stewardship can be another job of the patrol, explaining park policies to visitors, organizing volunteer trailwork projects, and creating a sense of pride and ownership of the trails within the community.

Finally, bike patrols are excellent means for incident response, especially in areas of singletrack trail where typical emergency response is unavailable. Bike patrols can administer first aid for minor injuries and can help to coordinate and mobilize professional emergency services when necessary. Liability issues vary from location to location, and proper certification and training is necessary for the volunteers. However, when an emergency response protocol is established between the volunteer patrols and the land managers, bike patrols can be incredibly effective for incident response. Mountain bikes make ideal search and rescue vehicles due to their range and ability to cover rugged ground quickly.

It is important to emphasize that formal bike patrols are not a substitute for professional law enforcement or emergency response, but are intended to provide assistance, education and information. “A volunteer patroller may politely inform a visitor that riding without a helmet is a violation of park policy and offer a discount coupon from a local bike shop sponsor that can sell them one. They should not be asked the offender’s name, or otherwise directly confront them. The burden of enforcing rules

and regulations should never be placed on volunteers and can result in strained relations between visitors and patrollers" (Webber 2007, 191).

The first official mountain bike patrol was formed in 1994 by NORBA to address user conflicts and possible trail closures. At the time of this writing, there are more than 75 active patrol units in IMBA's Bike Patrol program, including a unit in Gainesville, GA. It is recommended that a formal mountain bike patrol be established to help manage the proposed Oconee Rivers Connector Trail. In addition, uniformed officers of the Athens-Clarke County Police could patrol the trail on mountain bikes (a unit of officers riding mountain bikes currently patrols downtown Athens).

Environmental Impact Mitigation and Beautification Opportunities

Although singletrack provides the least destructive means of building a trail, all trails have some impact on their immediate environment. "The designer should be aware that wider trails will impact the immediate environment, such as trees and drainage patterns, considerably more than the minimum width" (PATH 1993, 15). In addition to the necessary destruction of vegetation required to construct the trail tread, vegetation on either side of the trail is subject to impact by trail users. By viewing the trail as a 'corridor' to be managed and not just as a path, potential negative impacts can be reduced. It may help managers to think of a buffer zone of at least ten feet on either side of the tread as being part of the corridor, and therefore subject to management needs. Ryan makes two recommendations for management within this vegetated buffer. "Minimize the removal of native vegetation and to control any potential soil erosion," she writes, and "…promote the preservation and/or restoration of native vegetation,

especially emphasizing any plant material that will provide food or shelter for target wildlife" (Ryan 1993, 116).

Such preservation and restoration techniques are beginning to be creatively employed by IMBA-affiliated clubs worldwide. At the Makara Peak Mountain Bike Park in New Zealand, these practices are being showcased as an example of environmentally responsible bike trail management. New Zealand resource management law states that any project of significant size must "avoid, remedy or mitigate" its environmental impacts. Consequently, designers and managers of the Makara Peak Park took special care to avoid disturbing any endangered plant species, routing the trail around them where necessary. Where it was not possible to realign the trail, the plants were transplanted to other parts of the park. They also strictly followed IMBA's design standards to prevent sediment loss and erosion, and to keep users on trail via design techniques.

The most significant action they took, however, was to implement a policy of planting new seedlings along the trail in order to replace the vegetation destroyed during its construction. The policy stated that volunteers from the mountain biking club would plant one seedling for every meter of trail built. At present, the club has constructed fifteen miles of singletrack, and has consequently planted over 26,000 seedlings. They also actively remove or prevent the spread of any exotic invasive species found within the park. The health of the forest has greatly improved, and native forest species are beginning to thrive and spread, whereas before they had been in decline. "The park enjoys widespread community support, positive press, and frequent financial grants," writes Kennett. "That positive press warms attitudes towards riders throughout the

region, helping improve access to other areas" (Kennett 2006). The park's annual attendance has grown from a few hundred in the 1990's to over 60,000 per year in 2004-2005.

It is recommended that such a restoration and management program be implemented to improve the vegetative conditions along the proposed Oconee Rivers Connector Trail. Such a program would undoubtedly be of tremendous benefit to vegetation along the trail corridor, and would provide a long-term benefit to the community as a whole. Invasive species (which are present along the corridor) should be removed or controlled as best as possible, and new plantings of native species should be encouraged, ultimately resulting in a beautification of not only the trail corridor, but also of the highway's viewshed. The environmental benefits of such a policy greatly outweigh the negative impacts a singletrack trail can have on its immediate environmental surroundings.

Chapter 5: THE PROPOSED TRAIL CORRIDOR

This thesis proposes that trails for mountain bikes can be integrated into the Oconee Rivers Greenway by making use of an overland route defined by transportation corridors, utility easements, and a surprisingly evident pattern of linkable strips and pieces of greenspace. For much of the proposed route, a trail corridor is already in place, created by mountain bikers seeking to connect popular in-town riding areas. The remaining distance could be easily bridged by following stream buffer zones and utility easements, ultimately connecting to the existing greenway at Sandy Creek Nature Center.

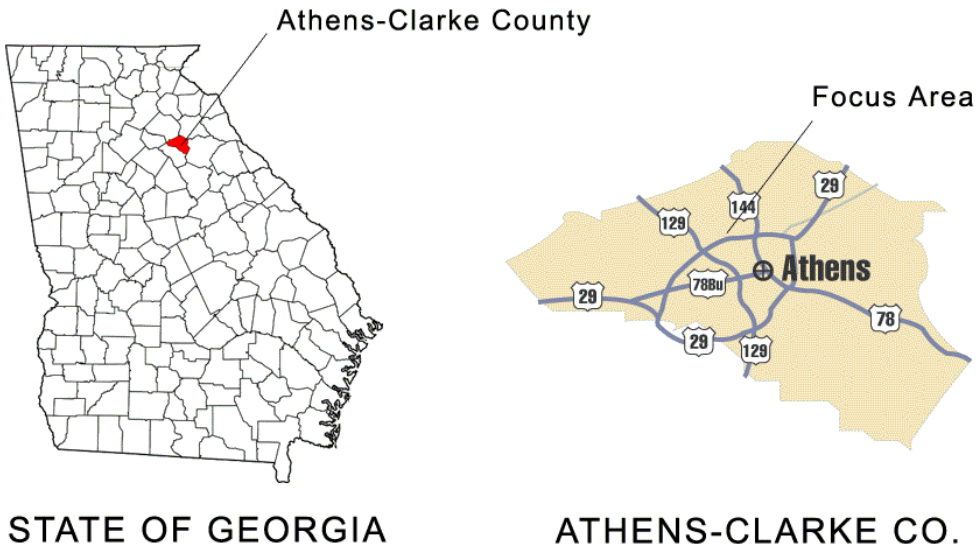


Fig. 5.1 – Location Context Maps

Fig 5.2: Master Plan for Oconee Rivers Connector Trail

(11 x 17 Foldout)

Oconee Rivers Connector Trail - Master Map

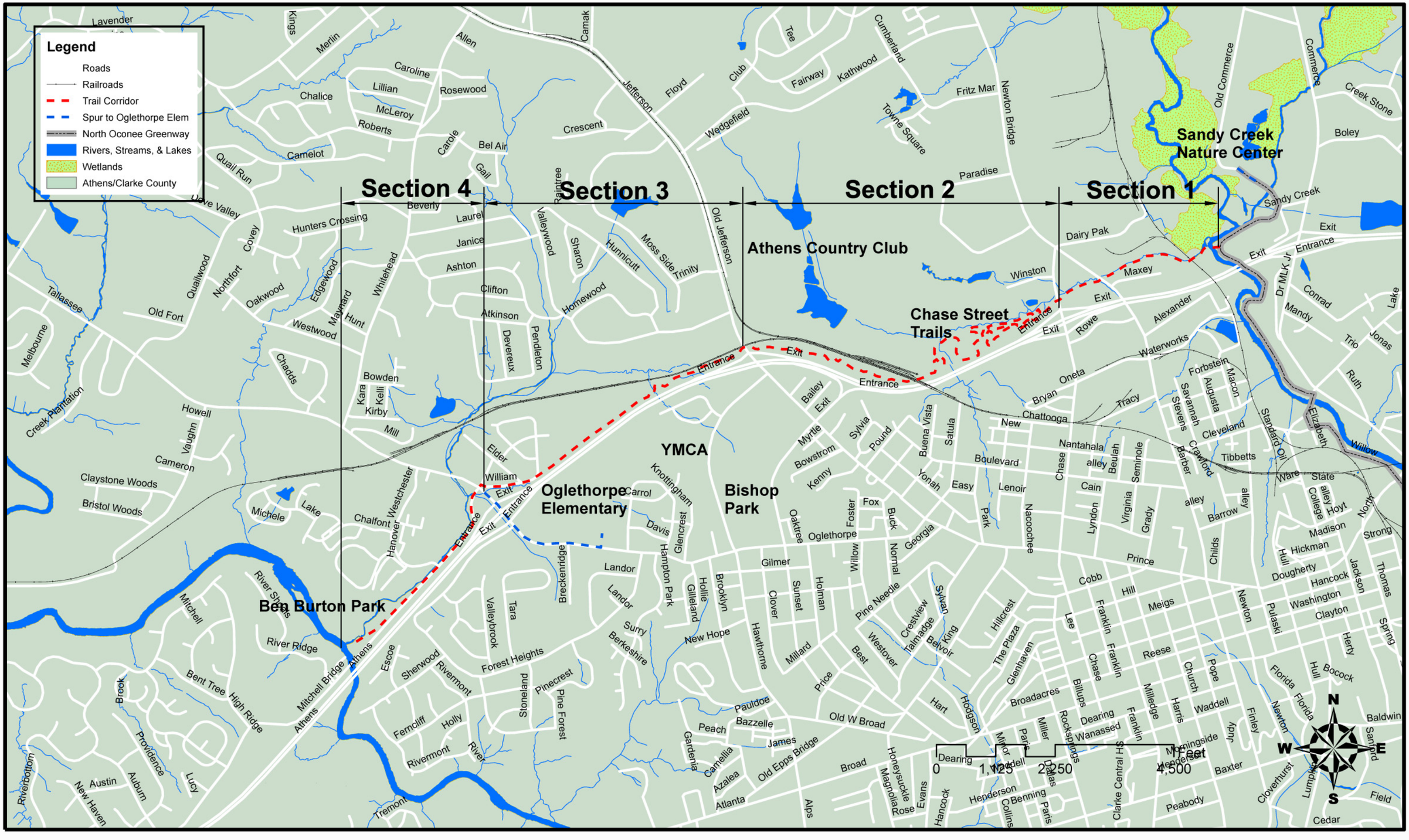


Fig 5.3 – Detail Map: Section One

(11 x 17 Foldout)

Oconee Rivers Connector Trail - Section One

Sandy Creek Nature Center to Chase Street

Fig 5.4 – Detail Map: Section Two

(11 x 17 Foldout)

Oconee Rivers Connector Trail - Section Two

Chase Street to Prince Ave/Jefferson Hwy

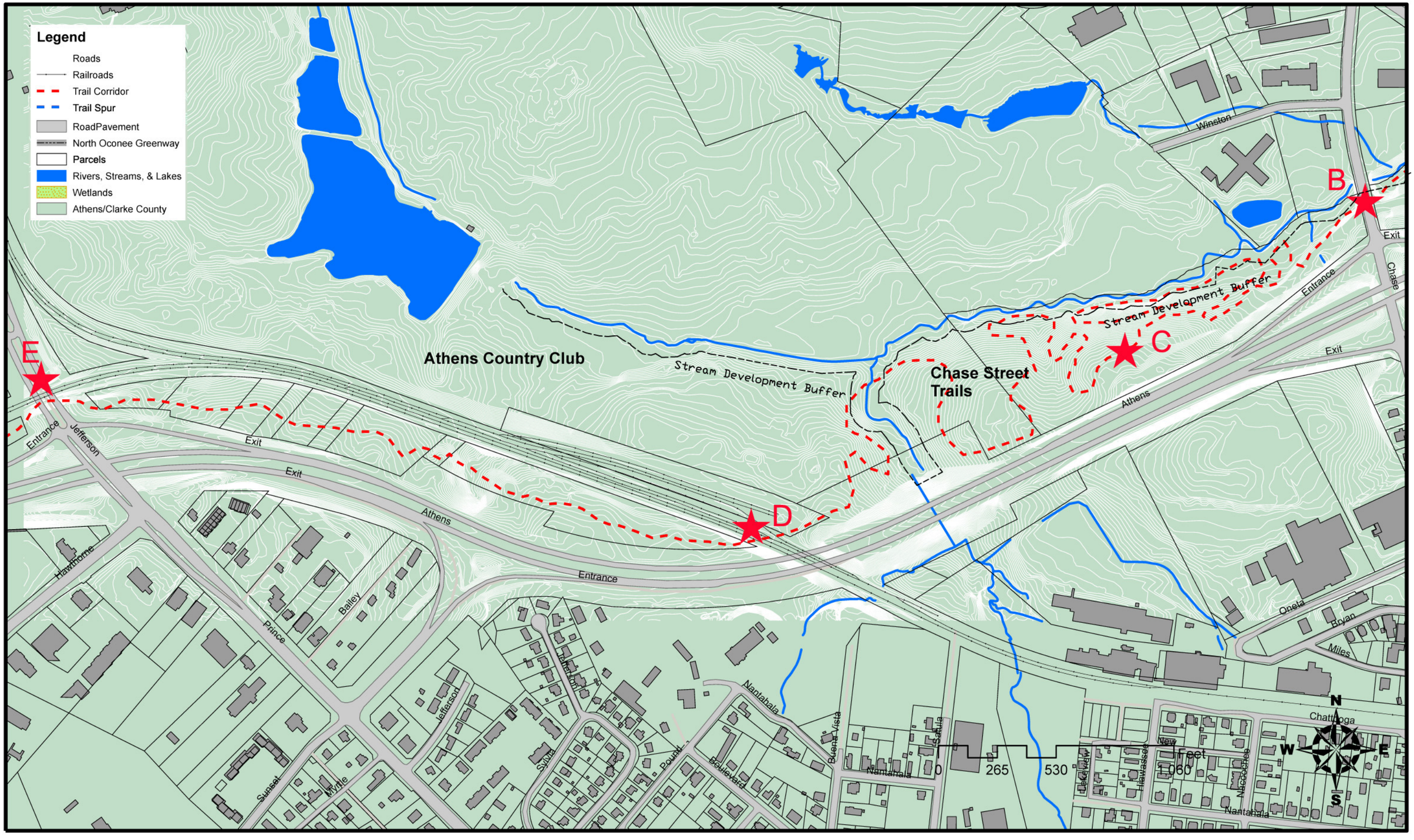


Fig 5.5 – Detail Map: Section Three

(11 x 17 Foldout)

Oconee Rivers Connector Trail - Section Three

Prince Ave/Jefferson Hwy to Tallassee Road

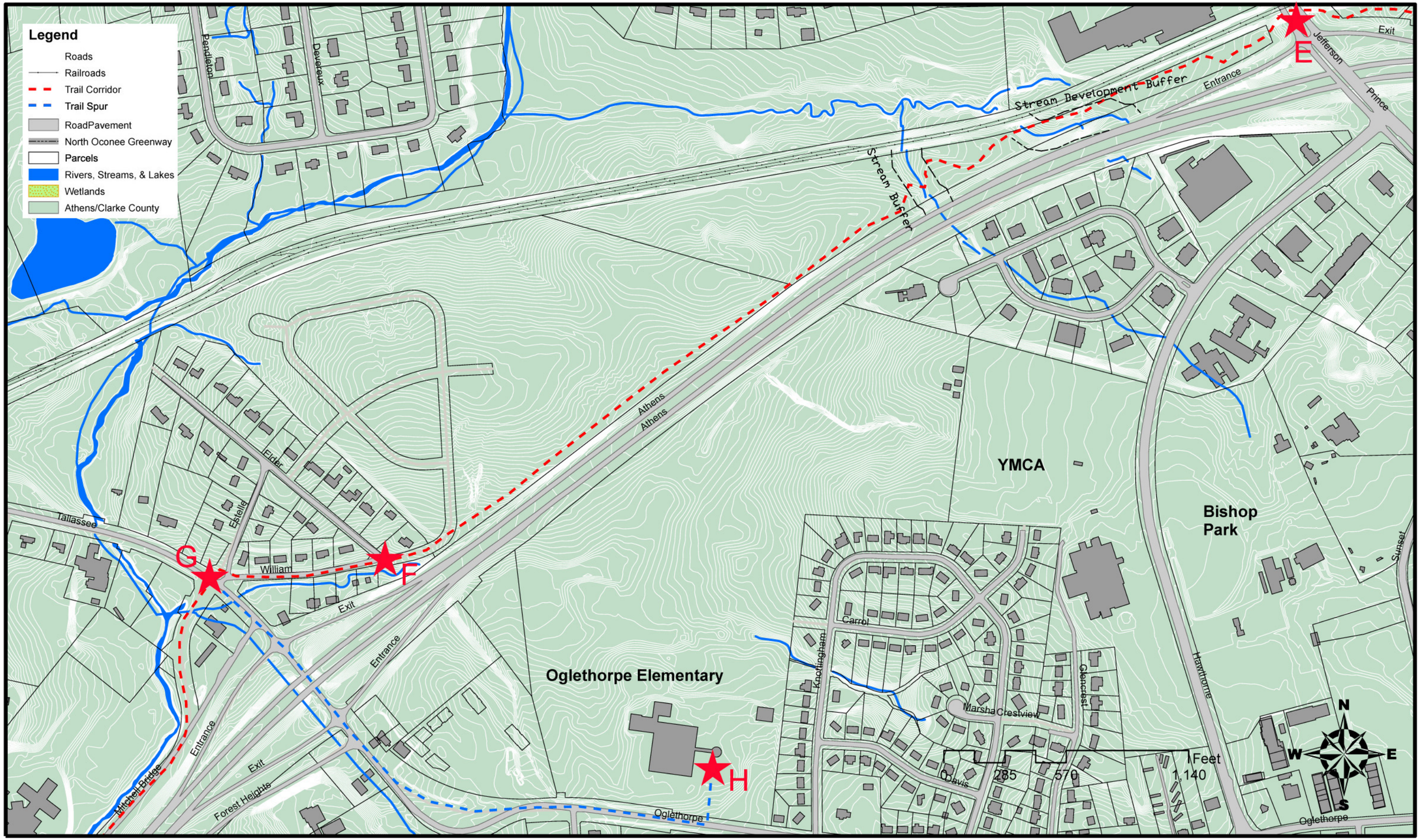


Fig 5.6 – Detail Map: Section Four

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Oconee Rivers Connector Trail - Section Four

Tallassee Road to Ben Burton Park

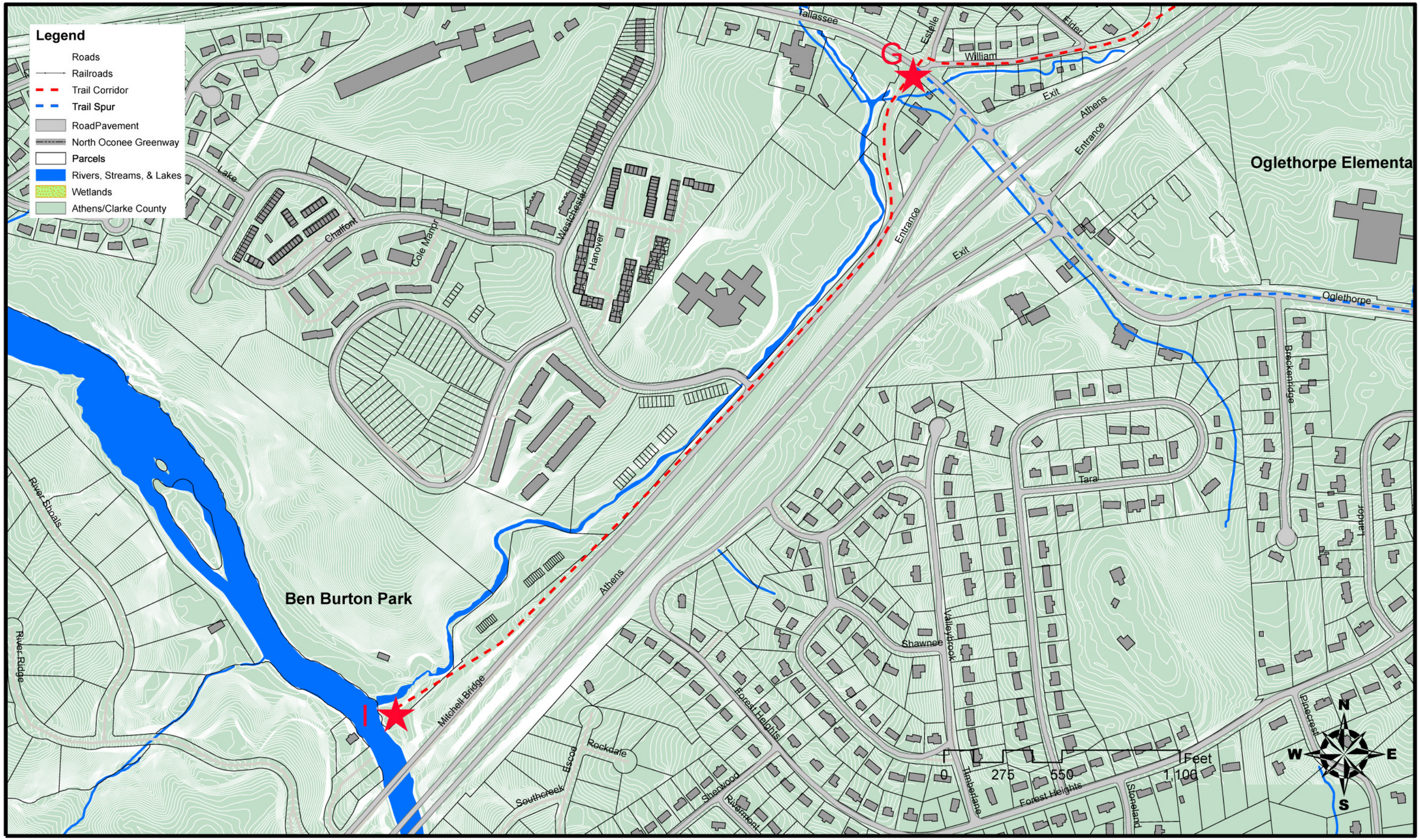


Fig 5.7 – Land Use Map: Section One

(11 x 17 Foldout)

Land Use: Oconee Rivers Connector Trail - Section One

Sandy Creek Nature Center to Chase Street

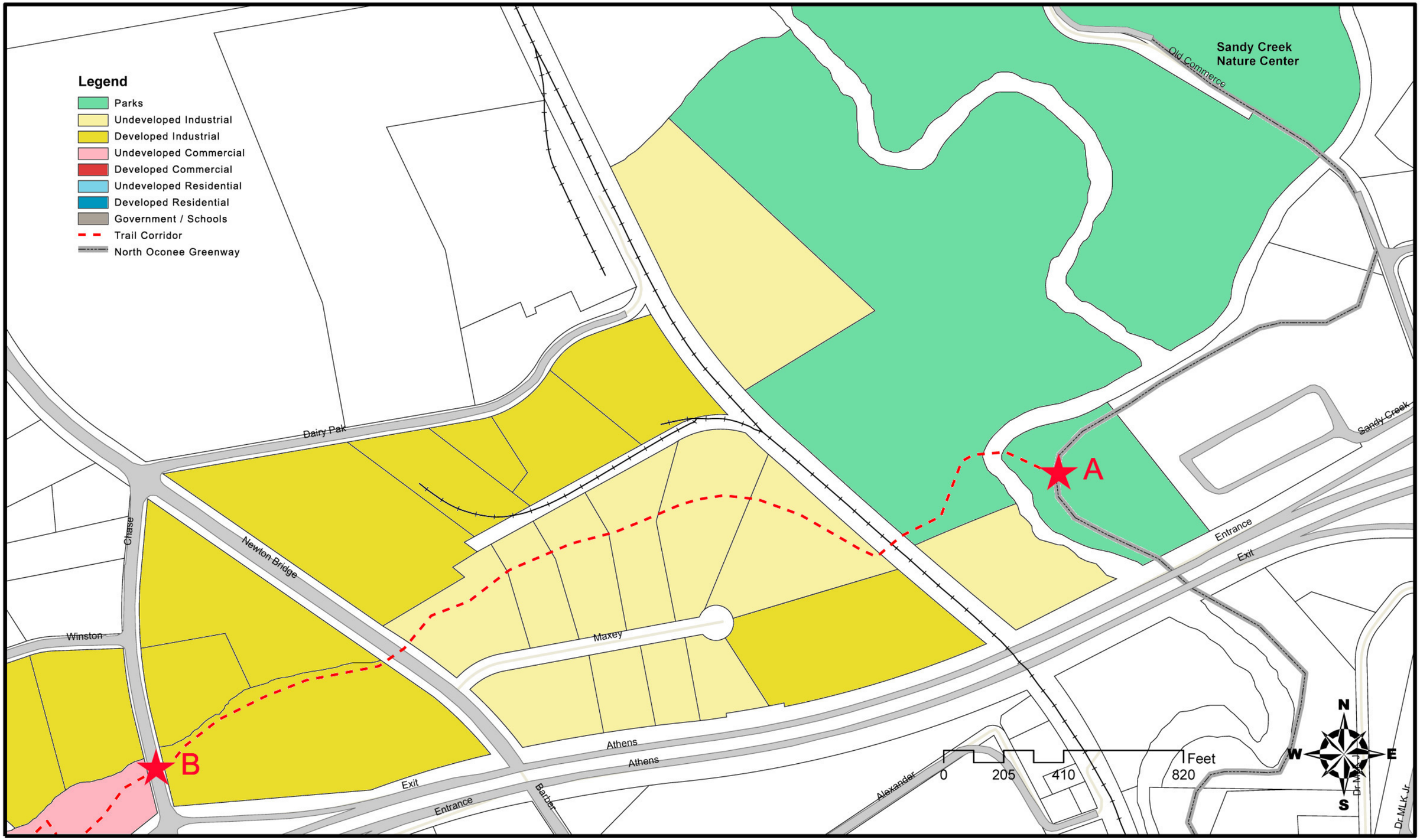


Fig 5.8 – Land Use Map: Section Two

(11 x 17 Foldout)

Land Use: Oconee Rivers Connector Trail - Section Two

Chase Street to Prince Ave/Jefferson Hwy

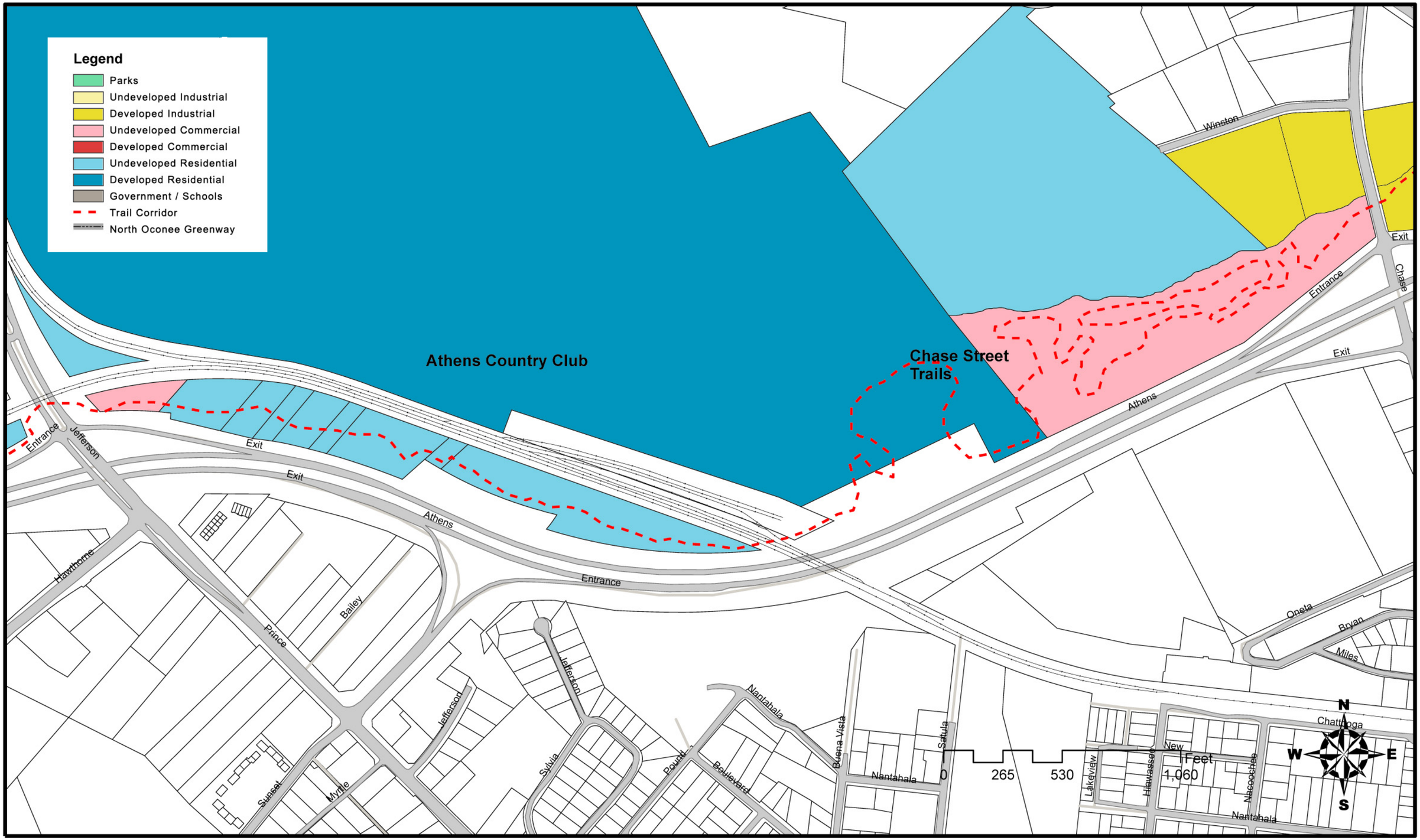


Fig 5.9 – Land Use Map: Section Three

(11 x 17 Foldout)

Land Use: Oconee Rivers Connector Trail - Section Three

Prince Ave/Jefferson Hwy to Tallassee Road

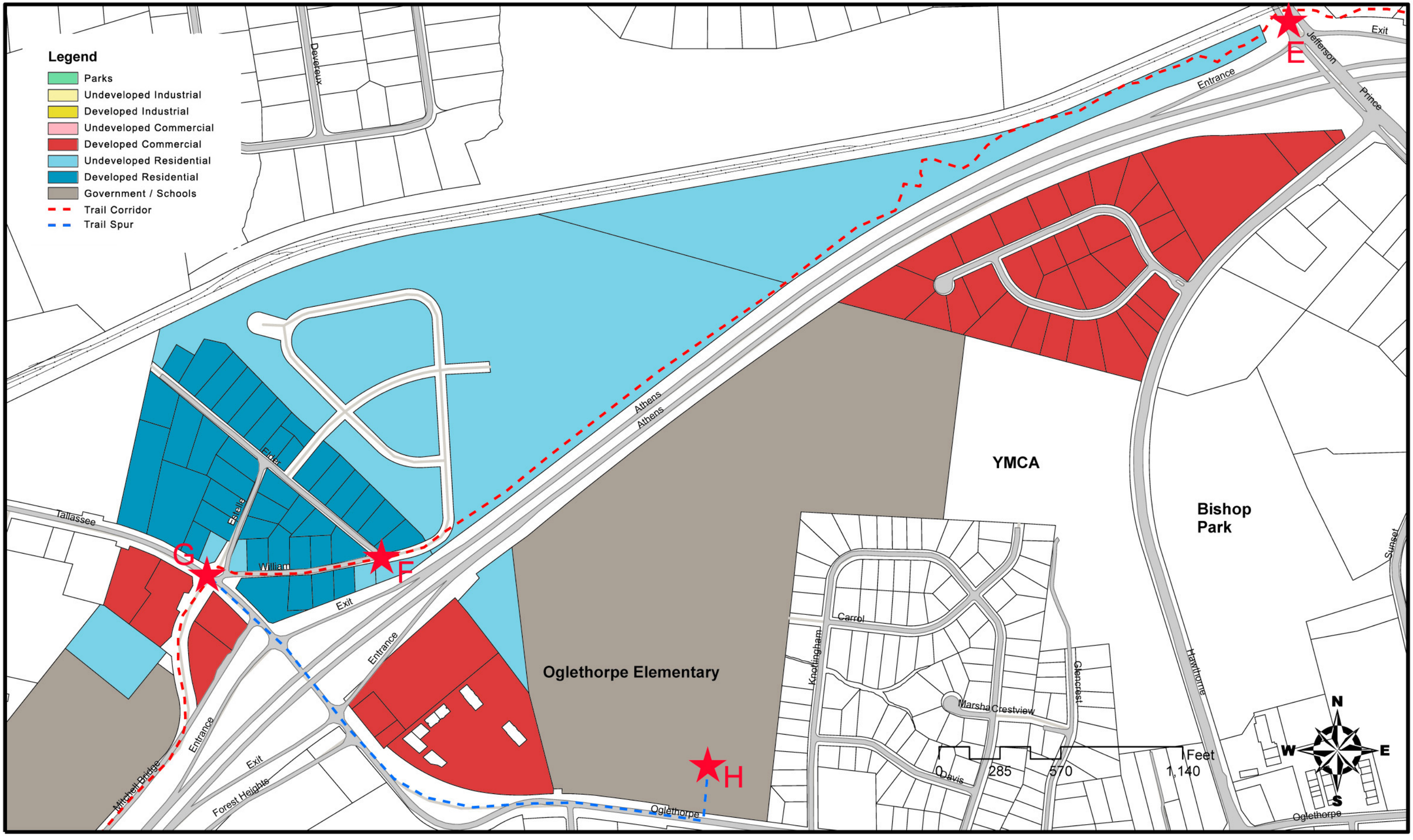


Fig 5.10 – Land Use Map: Section Four

(11 x 17 Foldout)

Land Use: Oconee Rivers Connector Trail - Section Four

Tallassee Road to Ben Burton Park

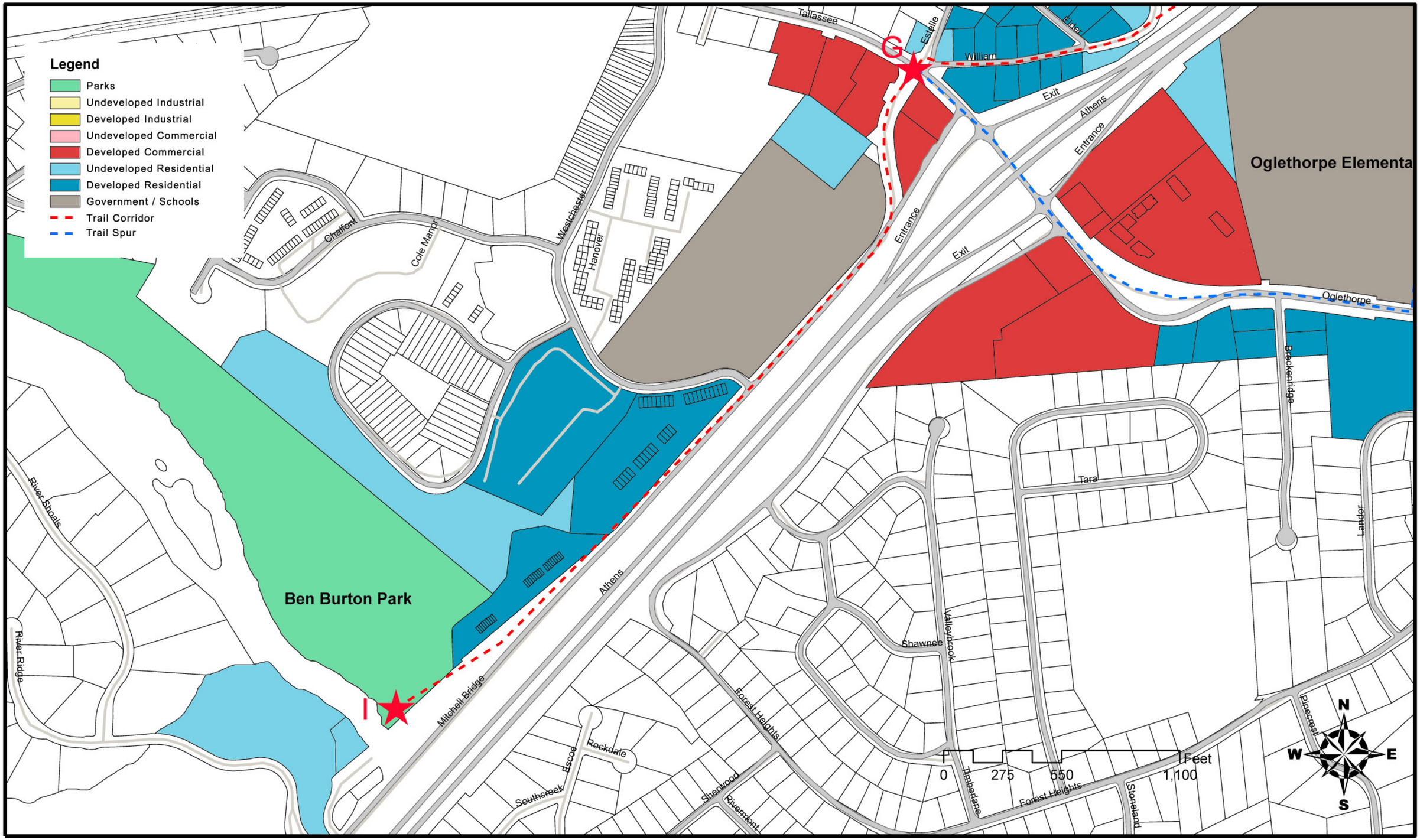


Fig 5.11 – Satellite / Aerial Map: Section One

(11 x 17 Foldout)

Aerial Imagery: Oconee Rivers Connector Trail - Section One

Sandy Creek Nature Center to Chase Street

Fig 5.12 – Satellite / Aerial Map: Section Two

(11 x 17 Foldout)

Aerial Imagery: Oconee Rivers Connector Trail - Section Two

Chase Street to Prince Ave/Jefferson Hwy

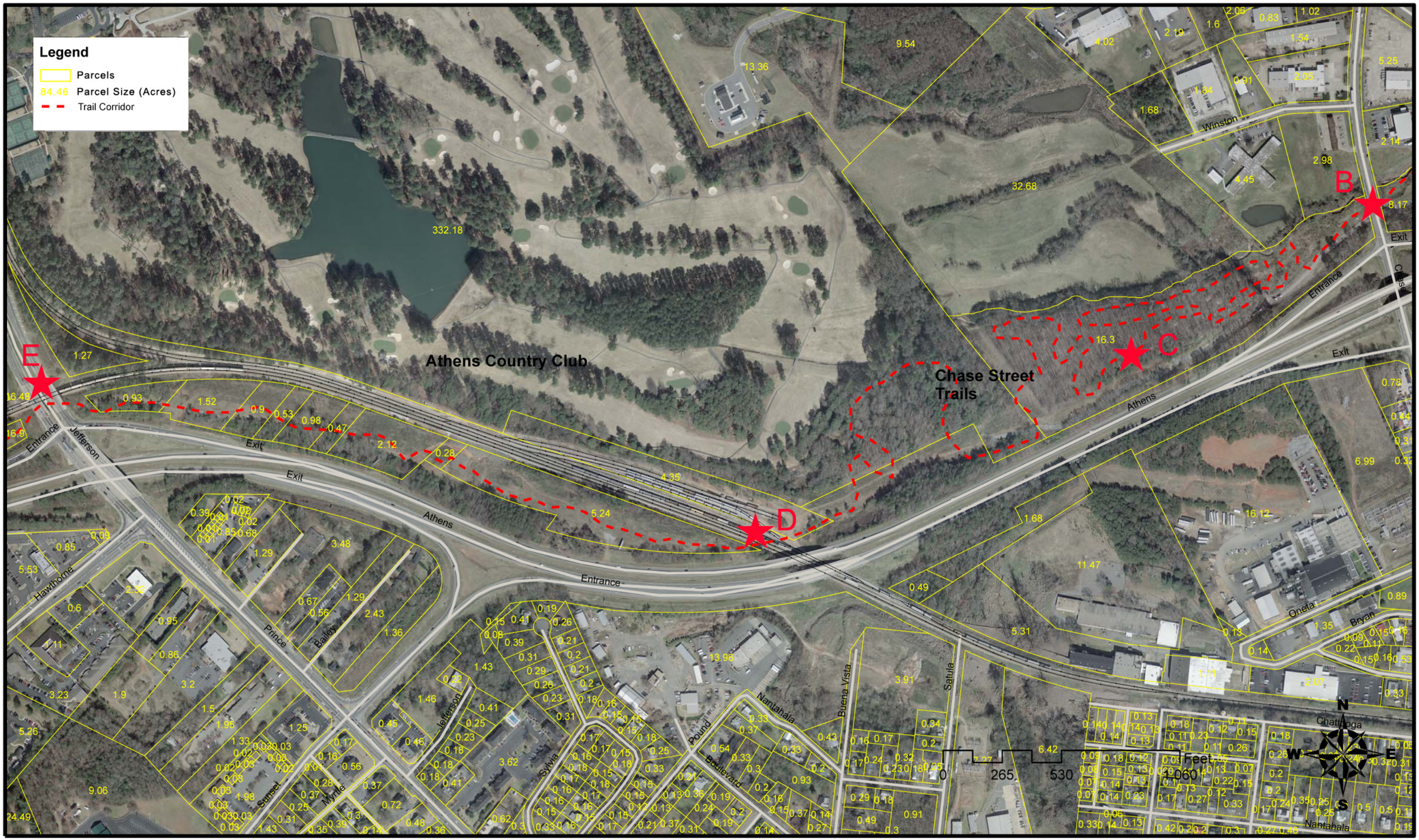


Fig 5.13 – Satellite / Aerial Map: Section Three

(11 x 17 Foldout)

Aerial Imagery: Oconee Rivers Connector Trail - Section Three

Prince Ave/Jefferson Hwy to Tallassee Road

Fig 5.14 – Satellite / Aerial Map: Section Four

(11 x 17 Foldout)

Aerial Imagery: Oconee Rivers Connector Trail - Section Four

Tallassee Road to Ben Burton Park

Fig 5.15 – Visual Inventory Key: Section One

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section One

Sandy Creek Nature Center to Chase Street

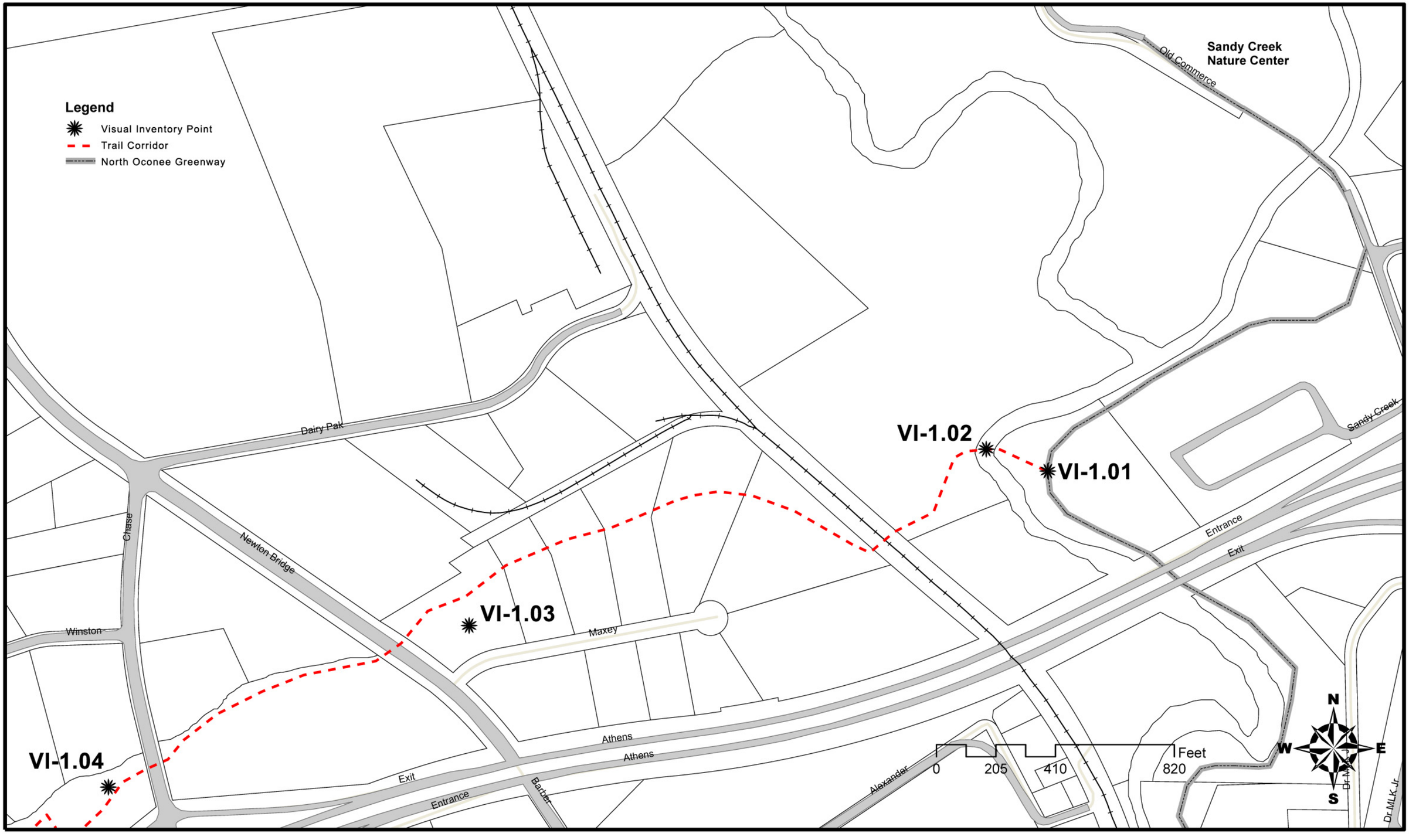


Fig 5.16 – Visual Inventory Key: Section Two

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section Two

Chase Street to Prince Ave/Jefferson Hwy

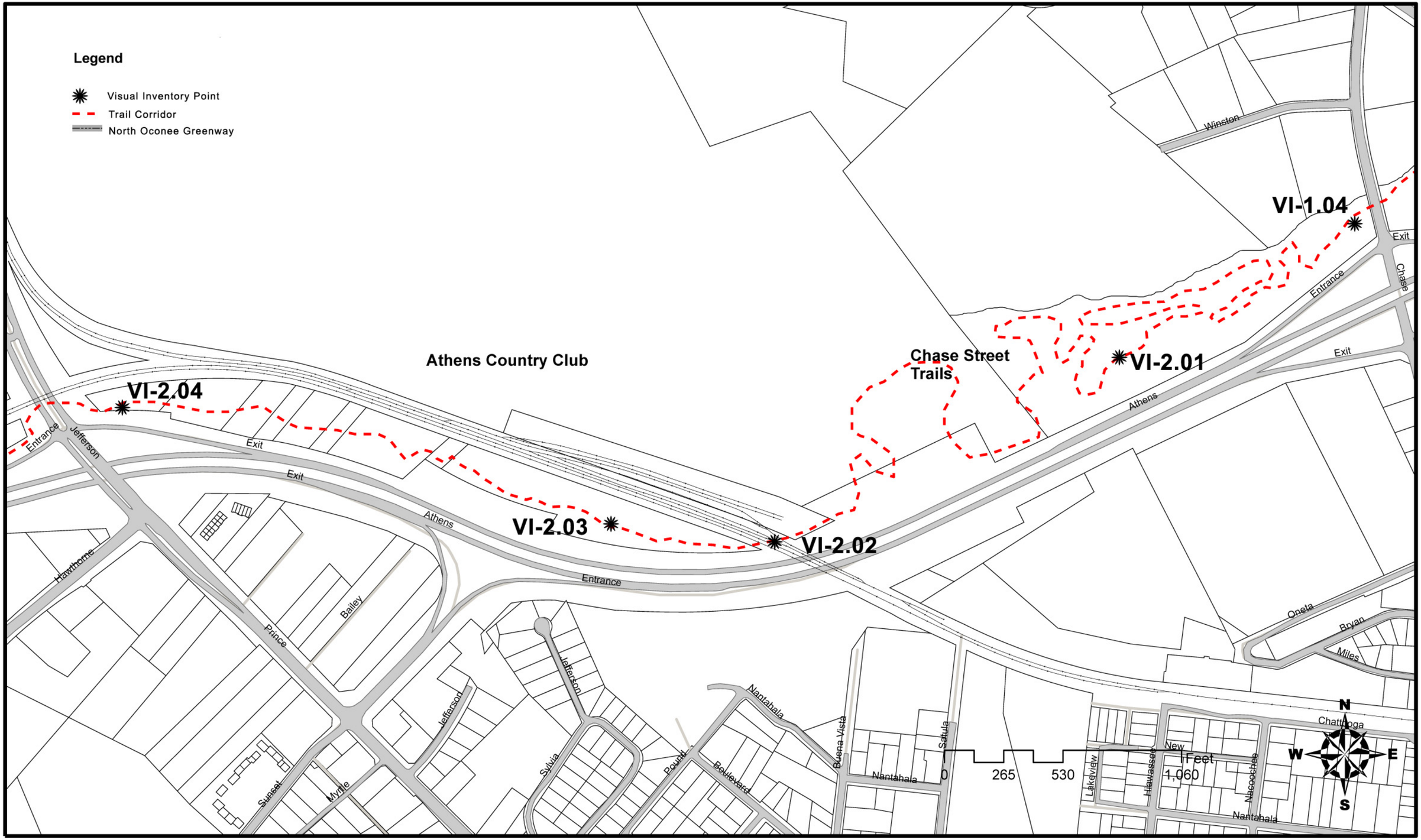


Fig 5.17 – Visual Inventory Key: Section Three

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section Three

Prince Ave/Jefferson Hwy to Tallassee Road

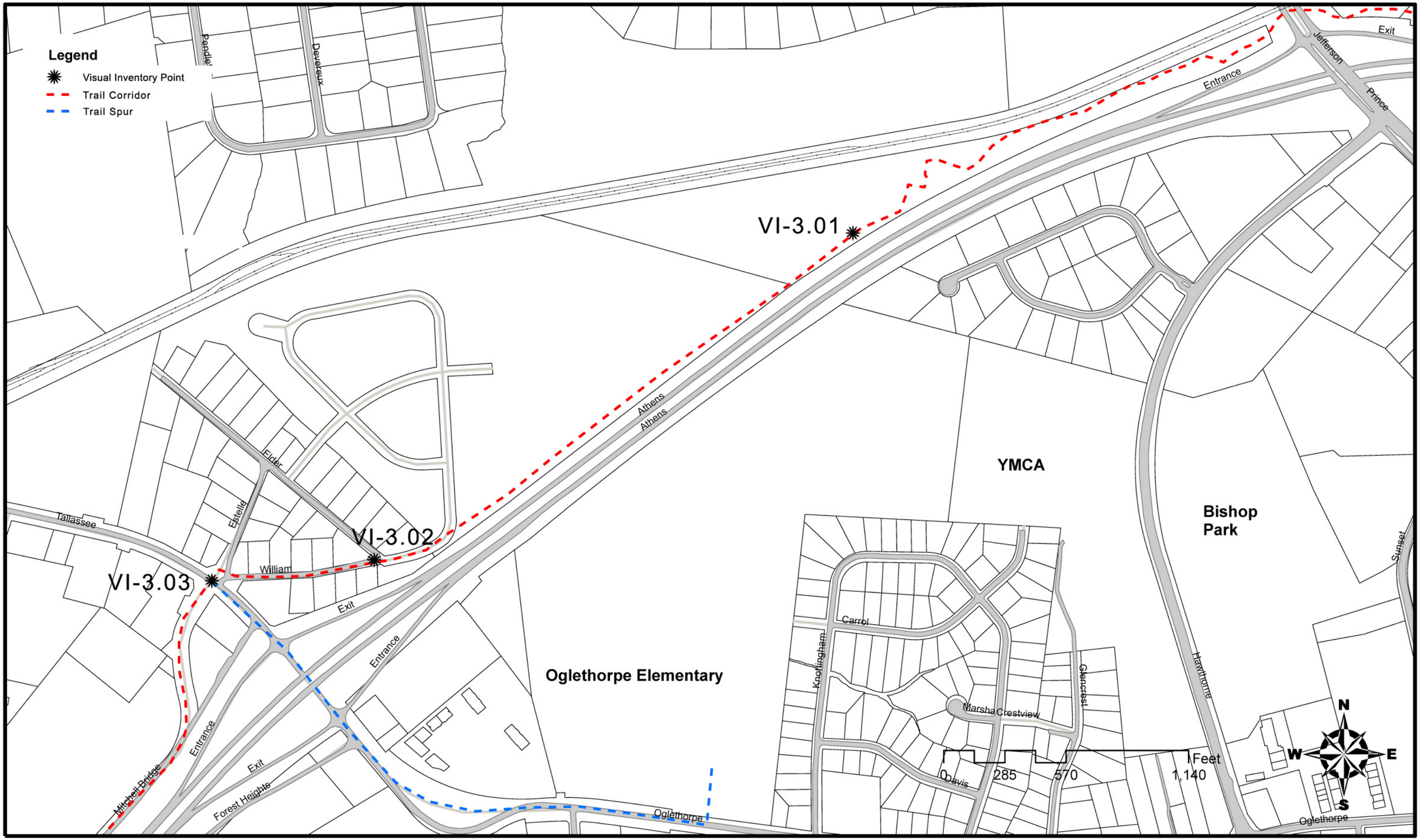


Fig 5.18 – Visual Inventory Key: Section Four

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section Four

Tallassee Road to Ben Burton Park

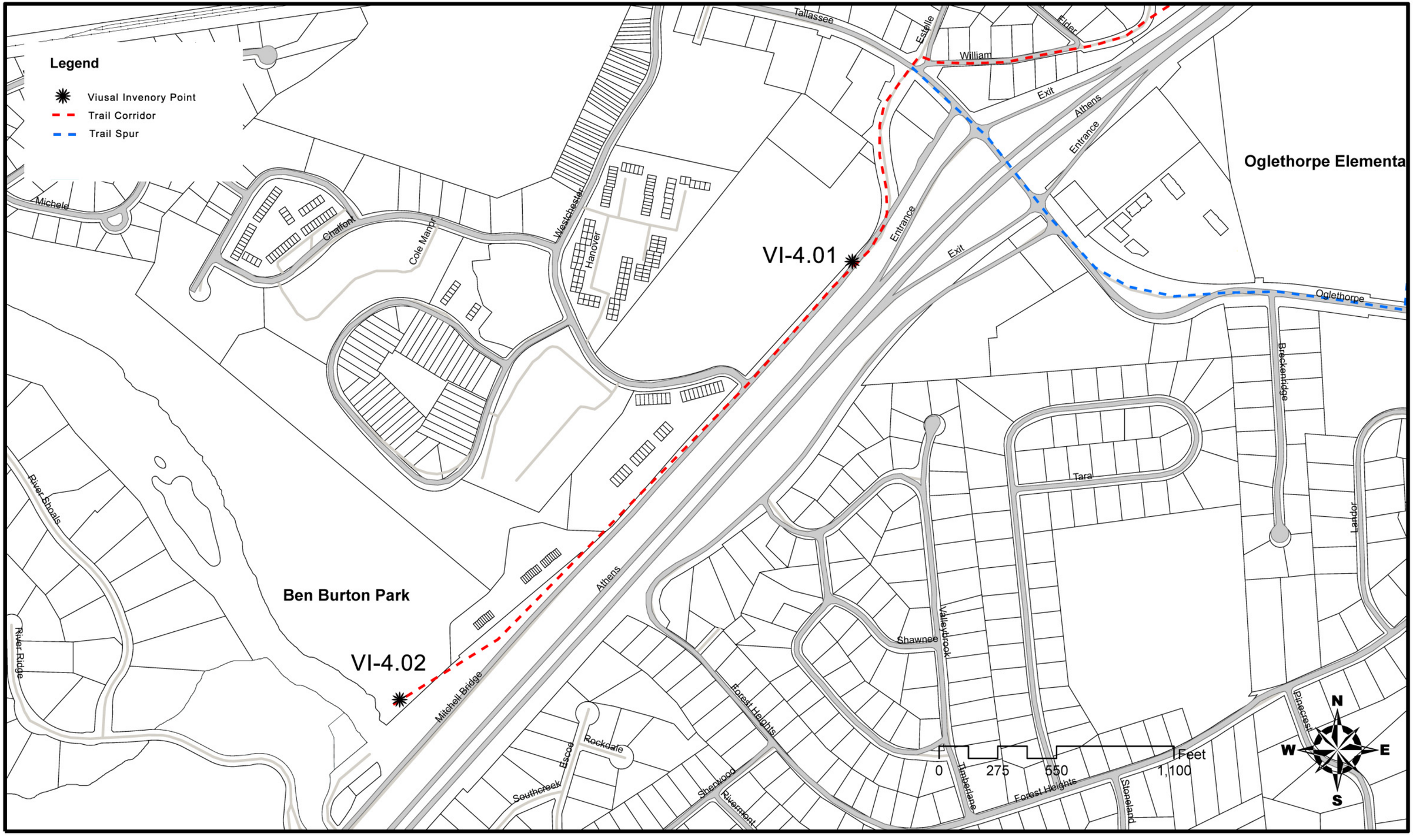
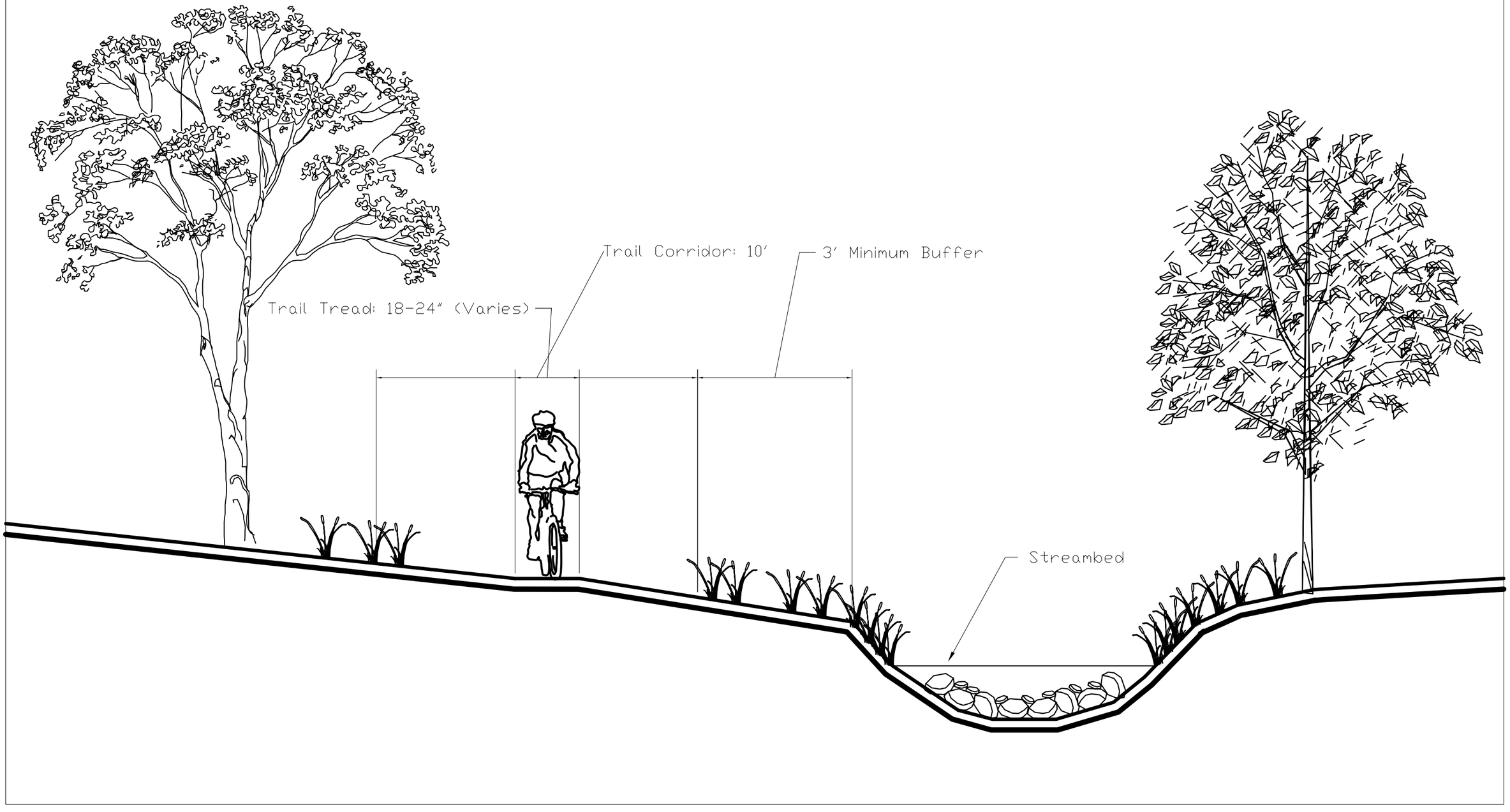


Fig 5.19 – Sample Cross-Section: Section One

(11 x 17 Foldout)



Sample Cross-Section: Trail Section 1

Scale: 3/8"=1'

Fig 5.20 – Sample Cross-Section: Section Two

(11 x 17 Foldout)

Sample Cross-Section: Trail Section 2

Scale: 1/4"=1'

Fig 5.21 – Sample Cross-Section: Section Three

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section Three

Prince Ave/Jefferson Hwy to Tallassee Road

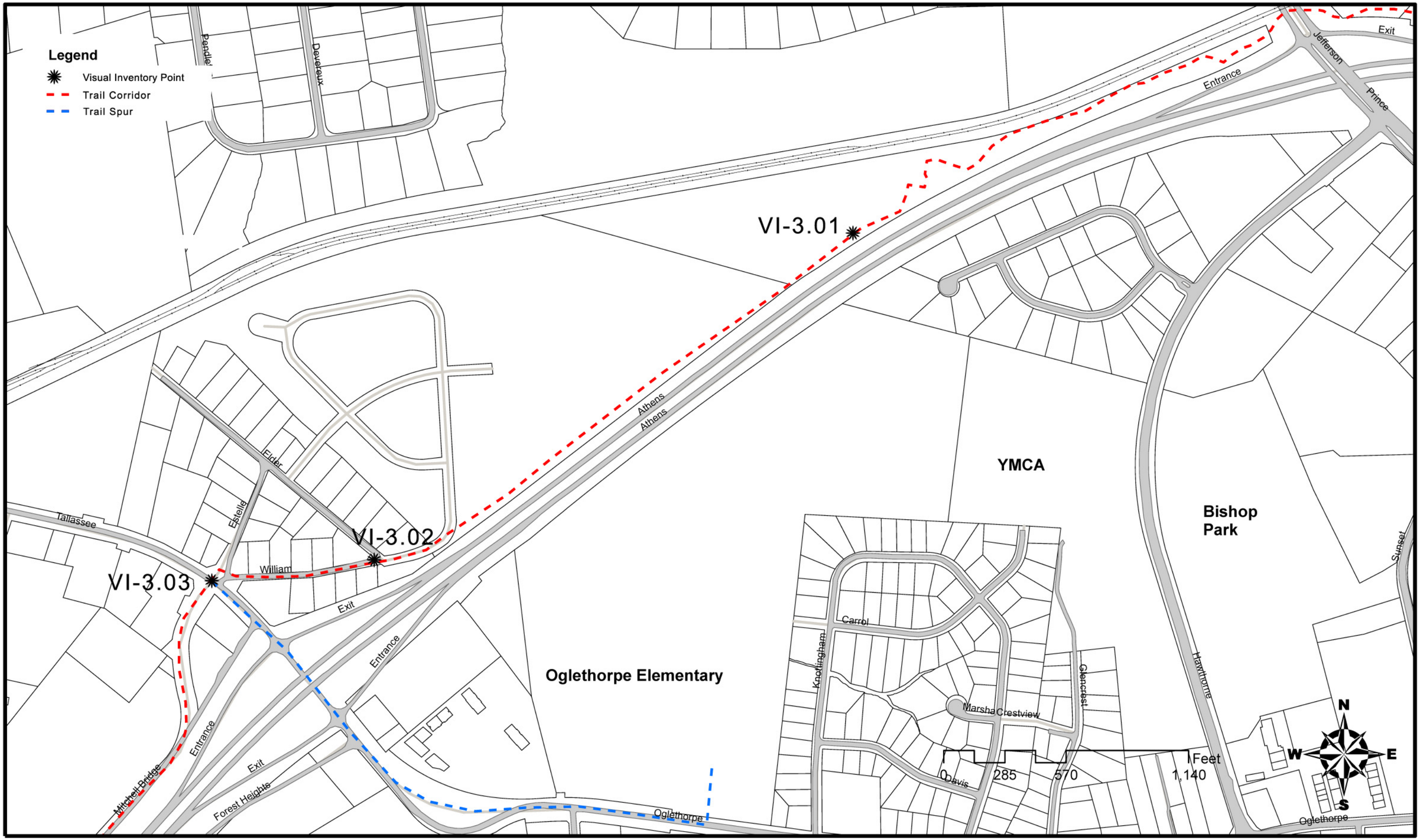
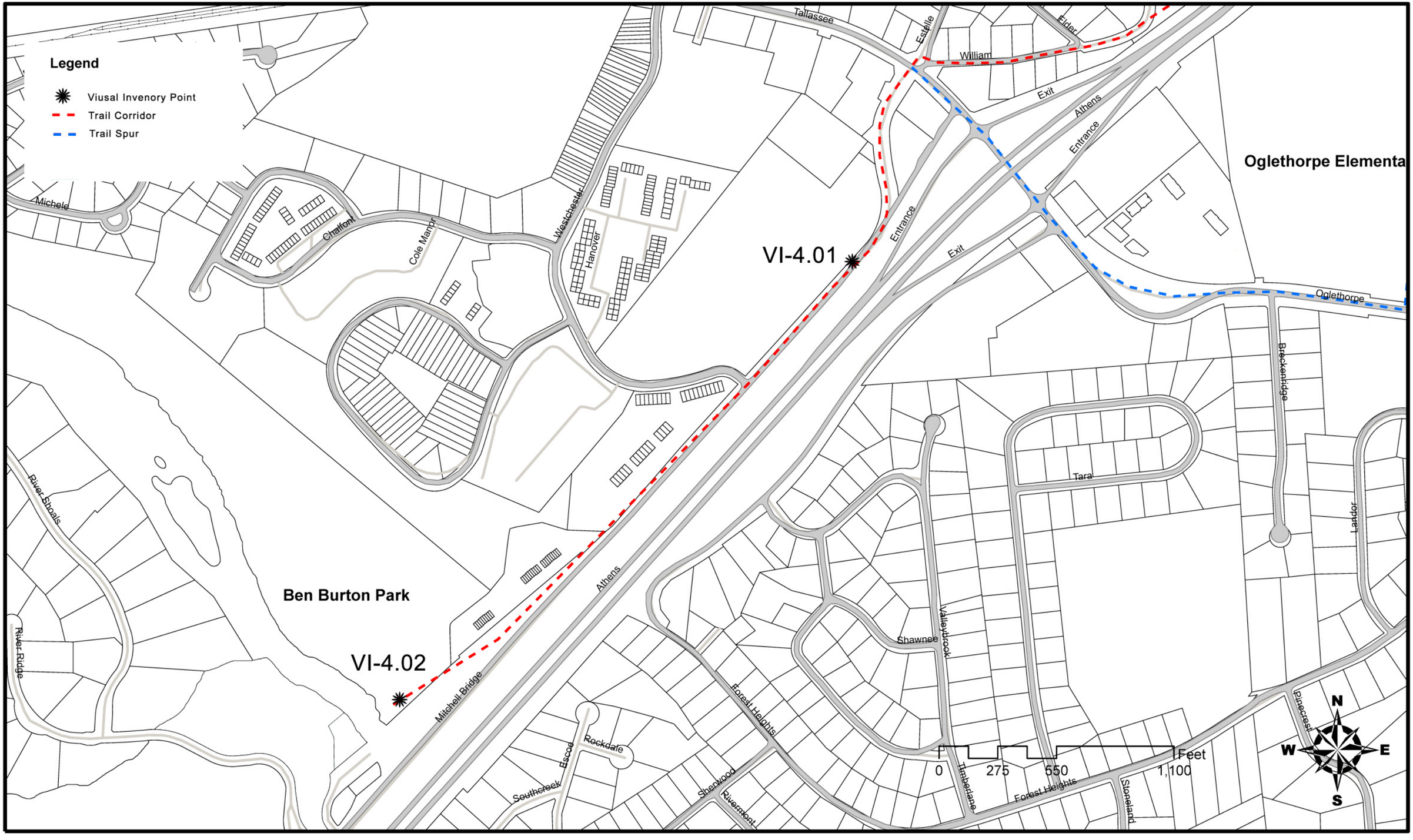


Fig 5.22 – Sample Cross-Section: Section Four

(11 x 17 Foldout)

Visual Inventory Key: Oconee Rivers Connector Trail - Section Four

Tallassee Road to Ben Burton Park



If completed, this Oconee Rivers Connector Trail would serve as a greenspace connector between Ben Burton Park on the Middle Oconee and Sandy Creek Nature Center on the North Oconee. This would allow the citizens of Athens to walk or ride from one river to the other on a dirt trail, weaving underneath and in between the highways, roads, and railroad tracks that up until now have only fragmented these pieces of remaining greenspace. It would also provide nearly five miles of sanctioned, managed mountain biking trails within Clarke County, with easy access for most of the city's population due to its proposed connection with the existing North Oconee and UGA Greenways.

Examples given in Chapter Three of Ocala and Roswell's greenway systems show that a network of singletrack can be successfully integrated into a traditional greenway system. The examples also indicate that a partnership between local government and local mountain bike advocacy groups such as SORBA produce the best results for both parties. A partnership between Athens-Clarke County and the Athens chapter of SORBA is therefore recommended as the best way to ensure that the needs of both the bikers and the general public is met, to ensure modern sustainable trail design and maintenance practices, and to effectively manage and govern the users of the trail.

Visual Inventory

Photographs of locations along the route are included throughout this chapter in order to convey ground-level information about the trail corridor. Each image is labeled with a Visual Inventory (VI) number based on which of the four sections of trail is being represented; the images appear sequentially throughout the chapter. For a geographical key to the Visual Inventory, see Figs. 5.15-5.18 at the beginning of the chapter.

The Proposed Corridor

The corridor proposed for the trail follows adjacent to and parallel with the northern segment of the limited access four-lane highway GA Loop 10, which encircles Athens. It runs generally west by southwest, beginning at the North Oconee River and ending at the Middle Oconee River. Development patterns show that the highway forms a distinct barrier or corridor bisecting the land on either side. In some ways, the highway moves through the land like a river. In much the same way that a river does, the highway forges a path which cuts a clean line through the sprawl. It does not run up against obstacles but flows unimpeded through the dense urban environment. For this reason, the land alongside it makes for an excellent trail corridor. It is buffered on either side by a thin strip of woods left by the Georgia Department of Transportation (GADOT) for noise reduction and as a visual screen and an embankment for noise mitigation. The pattern of development along this buffer is such that very few of the parcels bordering the highway have been developed: the diminished value of the land is due to the highway's presence and the lack of access it creates. What little development there is along the corridor has completely turned its back to the highway. Consequently, the thin wooded buffer along the highway's edge has become almost invisible in the public's eye. Few probably even realize it exists. This thin strip of overlooked, neglected woodland provides the bulk of the proposed corridor for the Oconee Rivers Connector Trail.

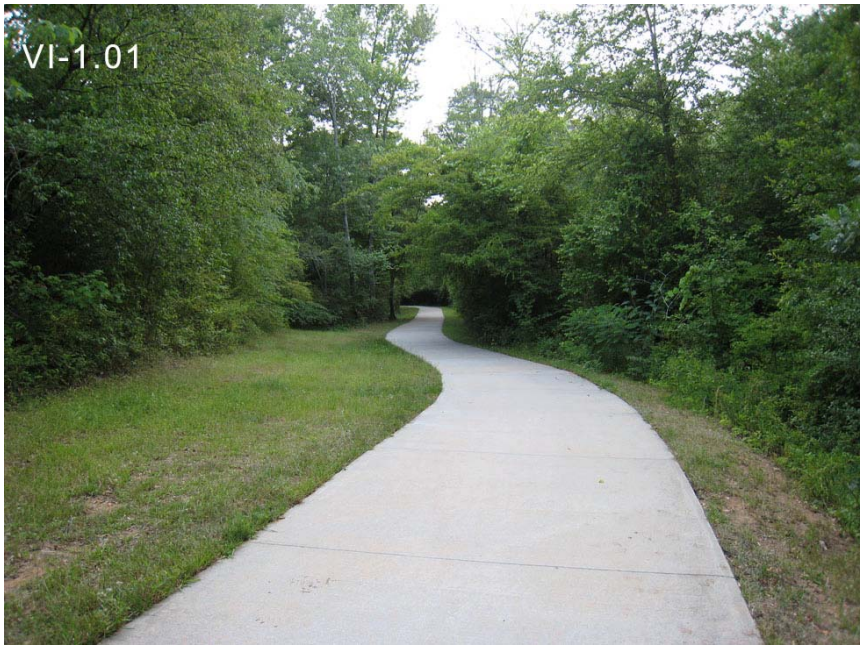


Fig. 5.23 – The North Oconee Greenway, At Origin Point "A" (VI-1.01)
(Photo by Author)

Section One

The trail begins near Sandy Creek Nature Center, on the existing North Oconee Greenway (see Fig. 5.3 or VI-1.01). A trailhead including a large kiosk and informational signage should be built at this location. From its origin point "A," it heads west, crossing the North Oconee River. A pedestrian bridge will be necessary to cross the river similar to those already constructed for the North Oconee Greenway.

Fig. 5.24 – Sandy Creek Bridge on North Oconee Greenway (VI-1.02)
(Photo by Author)

After the river, the corridor crosses under a railroad bridge and follows a power line easement along a stream through an industrial zone. There is no development along the floodplain of the stream other than the power lines, which makes an excellent path for a greenway. Little notes that "privately owned floodplains are prime candidates for greenway trails, since a trail easement can often be secured at a reasonable cost because the land it would traverse retains only marginal value as residential or commercial real estate" (Little 1990, 98). In addition, utility corridors also make good greenways: "Trail easements can be piggybacked on public utility rights-of-way such as sewer easements or power lines" (Little 1990,193).

Fig. 5.25 – Floodplain Along the Proposed Corridor (VI-1.03)
(Photo by Author)

These piggybacked easements can often be quite beneficial to both the greenway and the utility. Flink writes that "Joint ventures between utility companies and greenway groups may be attractive since trails provide easy access for maintenance activities and excellent public relations." He also gives examples of such partnerships: "For example, the W&OD trail in northern Virginia receives $500,000 per year for leasing its right-of-way to a fiber-optics company; overall the park nets $250,000 above expenses every year" (Flink 1993, 55).

Trail easements through commercial or industrial properties are often easier to obtain than those crossing land zoned for residential use. Most objections to greenway

easements come from residential landowners protective of their property. Commercial land owners, on the other hand, are typically more receptive to trail easements because the easements ultimately benefit the company's bottom line. "Easements, whether sold or donated, usually reduce the owner's property tax" (Flink 1993, 103). For the entire length of its nearly five miles, the proposed Oconee Rivers Connector Trail only passes within sight of one residential property.

Fig. 5.26 – Utility Easement / Floodplain (VI-1.04)
(Photo by Author)

Following the stream, the corridor crosses first Barber Street, then Chase Street (Point "B") in quick succession. Crossings at these streets will require crosswalks and signage but traffic on them is relatively light, visibility is good, and the streets pose a minimum of crossing danger.

Section Two

After crossing Chase Street, the corridor takes advantage of a 13.2 acre parcel of land which has been in use by mountain bikers for years (see Point "C", Fig 5.5). Known locally as the "Chase Street Trails" the parcel lies adjacent to GA Hwy 10 ("The Loop") and borders Athens Country Club's quite sizeable real estate to the north. To appropriately incorporate this trail into the greenway, it would be necessary to purchase this 13.2 acre parcel, but this is a relatively small piece of land and has diminished value due to its steep slopes, stream corridor, and position along a limited access highway. On the other hand, its recreational potential is significant. In addition to a healthy successional forest and streambed, the Chase Street trails boast beautiful views of open pastureland on the north side of the creek and a variety of plant species including Buckeye, Dogwood, Bradford Pear, and Forsythia.

Fig. 5.27 – North View From Chase Street Trail (VI-2.01)
(Photo by Author)

Wildlife is abundant, including Redtail Hawk and many other species of birds as well as deer and fox. Its wooded hillsides provide ample shade for the trail, and seem more like a remote woodland rather than an urban highway buffer. Residents of nearby homes often jog and walk their dogs on the trails at Chase Street.

Like Big Creek Park in Roswell, the Chase Street parcel offers a spectacular opportunity for community trails, despite its illegitimate beginnings. The cross-slope of the hillside provides an ideal setting for sustainable rolling contour trails as recommended by IMBA, and to a large extent the existing trails comply with these standards.

Fig. 5.28 – Obstacle: Crossing the Railroad Tracks (VI-2.02)
(Photo by Author)

At its northwest edge, the Chase Street Trail ends at a railroad switching yard (Point “D”, Fig. 5.5). One might think that this would be the end of the line for the trail, but a sharp eye will catch the beginnings of another trail on the other side of the railroad, climbing up the embankment to a ridgeline which runs between the Loop and the railroad. To connect these trails safely for the public, a pedestrian bridge could be built

over the tracks. Graded embankments for the highway bridge are present on either side, so very little additional grading would be necessary in order to build a bridge spanning the railroad. Alternatively, the trail could go under the highway bridge, proceed southward parallel to the tracks for approximately a hundred yards, cross underneath the railroad at a trestle, then come back up the other side and proceed up the embankment. This solution, while cheaper, might be more difficult due to the necessity of aligning the trail alongside the active railway for a short stretch. The railroad company might also find this solution less amenable due to concerns about liability and safety; a bridge spanning the tracks would certainly be safer. This railroad crossing is a design problem, but not one without a solution. The crossing is the greatest obstacle in the way of the proposed trail, so the value of bridging the space previously fragmented by the railroad makes finding a creative solution worthwhile.

Once across the tracks, the trail follows a thin, wooded ridgeline, primarily along the fence which marks the highway's right-of-way. The railroad on the other side leaves a thin strip some 150 to 200 feet in width, completely disconnected from any road access, and too odd a shape to develop. This is one of the "maligned bits and pieces" Whyte wrote about the importance of connected and re-instilling with meaning. The trail, originally built by mountain bikers to connect the Chase Street Property with other trails off Mitchell Bridge Road, serves as the life-giving connection, and in return, the strip offers just enough shade and trees for riders to enjoy a singletrack trail just out of sight from the cars whizzing by on the other side of the fence. The embankment at the highway's edge provides some noise reduction, ensuring that the volume of traffic sounds

does not terribly diminish the outdoor experience for users of the trail despite the trail's proximity to the road (see Figs. 5.19-5.22 for sample cross-sections).

Fig. 5.29 – The Thin Strip Between Highway and Railroad (VI-2.03).
(Photo by Author)

Though thin, the tract illustrates an edge effect described by White: "Open space… does most of its work along the edges. This is the part that people use most often for recreation. This is the part people see the most, and it is often the best part. Much as a city park seems bigger when it is enclosed on all sides by buildings, woods or meadows delight our eye most when they provide a contrast to adjoining roads or buildings" (Whyte 1968, 171). In other words, though the strip of land between the highway and the railroad has had most of its value removed by the alignment of transportation corridors, it still retains value as contrast space. Little points out that "From the edge, a wooded park that might be a mile across looks the same as one that is two hundred feet in width.

Clearly, therefore, a long thin greenway can provide a great deal more *apparent* open space per acre than a consolidated parcel of land" (Little 1990, 35).

Fig. 5.30 – Note the Proximity of the Trail to the Highway (VI-2.04)
(Photo by Author)

In addition, because the limited access highway cuts through the development patterns of the city in much the same way as a river, it has some of the same benefits to a trail that a river would. For example, the many under- and over-passes needed to thread a four-lane divided highway through a city also provide a means for trail alignments to cross the barriers of development by following the highway and dropping below or crossing above roads, railroads, or other obstacles in the trail's path. This is of great benefit to a pedestrian system, allowing safe separation of bikes and walkers from automobiles. The corridor takes advantage of one of these bypasses by going underneath the six-lane Prince Avenue/U.S. 129 at a major interchange, thereby eliminating a potentially dangerous street crossing (see Point "E", Fig. 5.5).

Section Three

After the Price Ave/Jefferson Highway underpass, the trail continues to follow the fenceline denoting the highway right-of-way. The highway begins to curve to the southwest, leaving a wider tract of wooded space along the highway and more room for the trail to move laterally rather than in a straight line. This is beneficial to promoting sustainable trail design, so that the trail can flow with the terrain at acceptable angles rather than following a fall line straight up and down hills.

Fig. 5.31 – Trail Following Gas Line Easement (VI-3.01)
(Photo by Author)

The trail continues for roughly three quarters of a mile before it feeds into a neighborhood just off Tallassee Road (see Point “F”, Fig. 5.6). This is the first and only time the proposed trail comes within sight of residential property. The trail then utilizes the crosswalk at Tallassee Road and Mitchell Bridge Road (Point “G”, Fig. 5.5) to feed into an existing six-foot wide sidewalk down Mitchell Bridge Road. At the Tallassee/Oglethorpe intersection, an opportunity for a spur exists which would lead to

wooded greenspace (complete with existing trails) on the other side of the Loop held by Oglethorpe Elementary School (see Point “H”, Fig. 5.5) and the Athens YMCA. Julius Bishop Park lies just east of these parcels. A bike lane already exists on Oglethorpe Avenue, making such an on-street connection easy. The spur would be advantageous because it would connect an elementary school, a YMCA youth sports facility, a wooded trail system, and another city park with the greenway. The spur would need to be only about an eighth of a mile long in order to make this connection, and should be eight feet wide and paved according to the standards of the North Oconee Greenway.

Fig 5.32 – The Trail Feeds into a Residential Neighborhood (VI-3.02)
(Photo by Author)

Fig 5.33 – Crossing Oglethorpe/Tallassee (VI-3.03)
(Photo by Author)

Section Four

From Tallasee Road / Oglethorpe Ave, the trail utilizes the exisiting sidewalk which leads southwest along Mithcell Bridge Road for approximately a quarter mile, feeding directly into Ben Burton Park (see Point "I", Fig. 5.6), the destination point on the Middle Oconee. This is the only section of trail which is paved; however, it is the section of trail which requires the least new construction, as the existing sidewalk meets greenway standards. The installation of signage consistent with the rest of the greenway system and a 300-foot extension of the existing sidewalk to connect to Ben Burton park are all that are necessary to complete Section Four. The installation of lighting is recommended along this section. The total distance between Ben Burton and Sandy Creek on the trail is roughly five miles, with at least three and a half of those miles already cleared and walkable.

Fig. 5.34 – Section Four Along Mitchell Bridge Road (VI-4.01)
(Photo by Author)

Fig. 5.35 – Destination Point: Ben Burton Park (VI-4.02)
(Photo by Author)

Conclusion

Dr. Walter Cook, retired UGA Forestry Professor and one of the leading proponents behind the Oconee Rivers Greenway, said the following to the Athens Observer on the occasion of the opening of the nature trail named for him: “The thing about a trail is that it allows you to be intimately involved with nature without disturbing it. Trails are important because they draw people out – people who wouldn’t normally be outdoors – and they help to spread the environmental ethic that we all should have, which is: If we understand and enjoy a thing, then we will value and protect it” (Hester 1990). Mountain bikers are as aware of this importance as anyone, and today they are at the forefront of greenspace preservation and environmental action. They seek the same intimacy with nature that Dr. Cook describes, and they want to experience it close to home.

The Oconee Rivers Connector Trail provides an opportunity to expand the Parks and Recreation Department in Athens-Clarke county while reclaiming a little bit of nature within easy access of the urban center. Mountain bike trails offer a unique, up-close look at the land, provide a medium for interaction with nature, and a forum for recreation and exercise. The incorporation of natural surface bike trails into the Greenway system allows the city of Athens to make optimal use of the land available to it for preservation and recreation; it provides the practical means to open the door to the possibility of a city-wide network of trails. Beginning with a connection between the two rivers which gave birth to the city, Athens-Clarke County has the opportunity to extend its parks into the places where people live, connecting them physically to the land in which they live and the spaces where they want to play.

By securing legal easements for an overland trail, obtaining two parcels, and connecting them with the North Oconee Greenway at Sandy Creek, Athens Clarke County could simultaneously provide nearly five miles of connected, accessible singletrack and expand both the reach and the effectiveness of the Oconee Rivers Greenway by linking fragmented neighborhoods and offering a walkable, bikeable, green corridor spanning the northern portion of Athens. In doing so, they would disprove the idea that large acreage, rural parcels are needed in order to develop mountain bike trails of adequate mileage. Rather, by taking advantage of the forgotten spaces, the "maligned bits and pieces," and maximizing their edge potential as urban greenspace corridors, the city could actually re-connect fragmented open space, provide natural corridors for human recreation and wildlife, and meet the needs of a growing urban population increasingly impatient for outdoor recreation opportunities right out their back door.

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