BIKEWAYS AND TRAILS
master plan

Hernando/Citrus MPO
Bikeways and Trails Master Plan

Adopted June 2018

Prepared by

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METROPOLITAN PLANNING ORGANIZATION
HERNANDO / CITRUS

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Executive Summary

The Hernando/Citrus Metropolitan Planning Organization (MPO) Bikeways and Trails Master Plan represents a collaborative effort involving the community, the MPO, and committees to create the vision for the future of bicycling in Hernando and Citrus counties. It is the Bikeways and Trails Master Plan Vision that:

> Hernando and Citrus counties become communities where people can safely and easily ride bicycles and walk daily. A connected network of trails and on-street facilities will benefit the economy, public health, and quality of life for all members of the community.

This vision directs the development and expansion of the bicycle and trail network for both counties. The Plan brings together the prior work done in both counties and identifies expanded opportunities to put the vision into practice.

The Goals of this plan are as follows:

- **Safety** – Increase safety for people who walk and bicycle in Hernando and Citrus counties.
- **Connectivity** – Create a network of efficient, convenient bicycle and pedestrian facilities in Hernando and Citrus counties.
- **Equity/Livability** – Increase transportation choice and community livability through the development of an integrated multimodal system.
- **Health** – Encourage health and fitness by providing a safe, convenient network of facilities for walking and biking.
- **Economic Development** – Promote tourism and economic opportunities by developing a safe, connected network of biking and walking facilities.

In addition to MPO staff, committee and Project Advisory Team input, an extensive outreach effort included interactive workshops in each county as well as an on-line survey and use of a web-based mapping tool. Feedback highlighted safety as the #1 concern and a desire to be able to bicycle on safer, more comfortable facilities throughout each county.

The Plan

This Plan was developed in two parts—short-term projects identified through feedback that are smaller and collaborative or incorporated during routing resurfacing projects and a long-term vision that sets the tone for future roadway reconstruction projects.

The identified needs include trail crossings, locations for advisory signage, bike lane gaps, and short connector trail segments. It is recommended that coordination with City and County departments

continue after plan adoption to facilitate the incorporation of the identified projects into planned maintenance efforts wherever possible.

Safety and Crash Analysis

Crash data were evaluated early in the plan development process to identify areas that might benefit from additional analysis and/or infrastructure improvement. Crashes occurred throughout each county, and areas of higher crash concentration were found along US 19 in Hernando and Citrus counties and along Mariner Boulevard in Hernando County.

Policy/Program Recommendations

In addition to infrastructure recommendations, the Plan includes policy and program recommendations designed to improved safety and enhance the bicycling environment.

Vision

The Vision for this plan is for a safe, easy-to-use, and connected network of on-road and trail facilities that builds on work already being done, as well as a general public interest in safer places to bicycle. In 2017, the MPO adopted a resolution that all State roads include a separated trail or widewalk (wide sidewalk) in their designs. Citrus County has been including trails in their roadway expansion plans and has built trails where possible. Feedback and committee discussion encouraged the consideration that a separated trail be the preferred facility type when possible.

This Master Plan is meant to be a blueprint that provides guidance about facility improvements and policy recommendations aimed at accommodating bicycle and pedestrian modes of transportation, improving safety conditions, and ensuring coordination among jurisdictions, departments, and agencies. The plan acknowledges the work done by individual communities and seeks to enhance it.

Figures ES-1 and ES-2 illustrate the existing conditions and projects to be constructed in Hernando and Citrus counties by 2023. Figures ES-3 and ES-4 illustrate the bikeway and trail visions for each county, with an emphasis on providing the safest and most comfortable bicycling experience for residents and visitors alike.

Figure ES-1: Existing and Committed Bikeways and Trails Facilities in Citrus County (2018–2023)

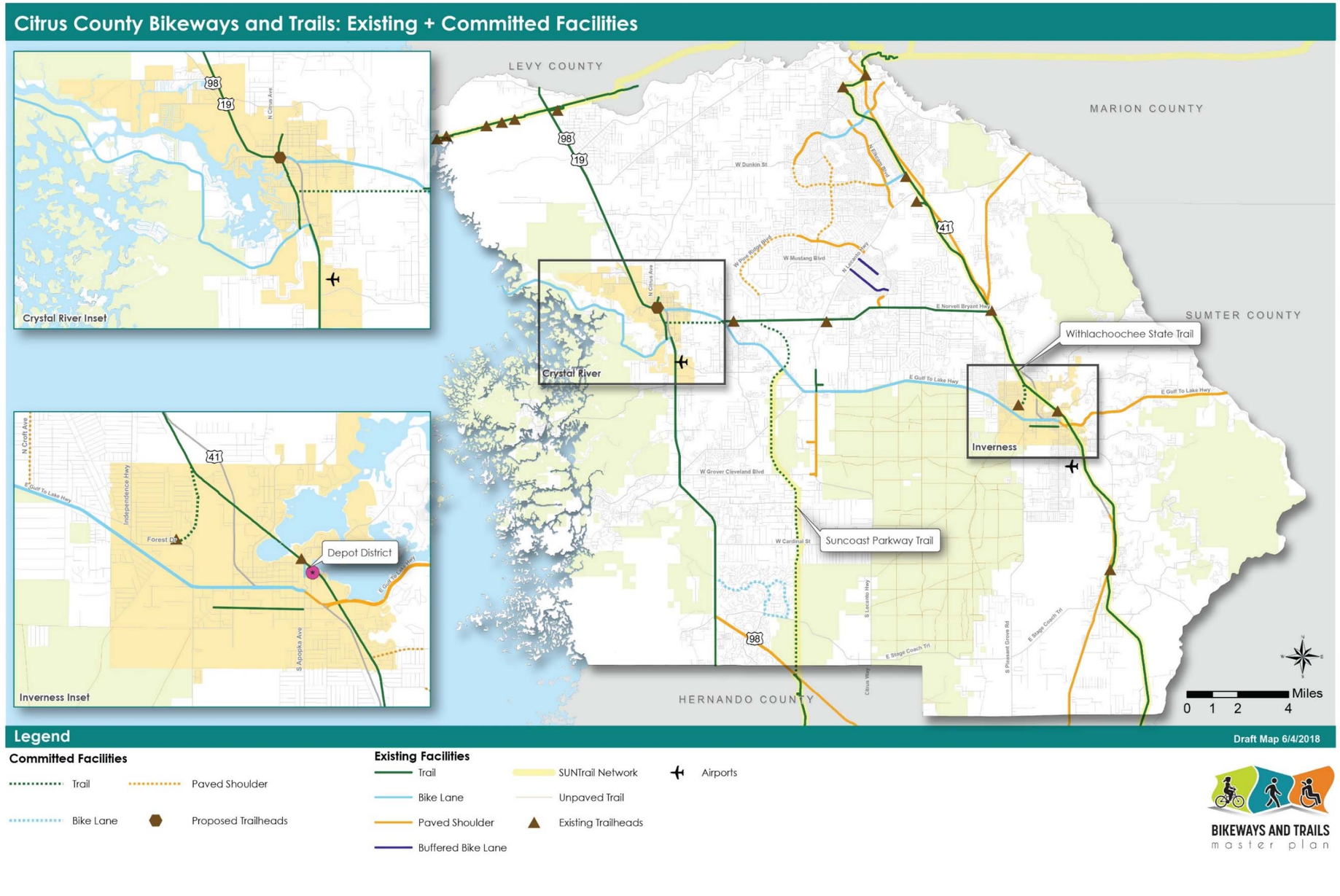

Figure ES-2: Existing and Committed Bikeways and Trails Facilities in Hernando County (2018–2023)

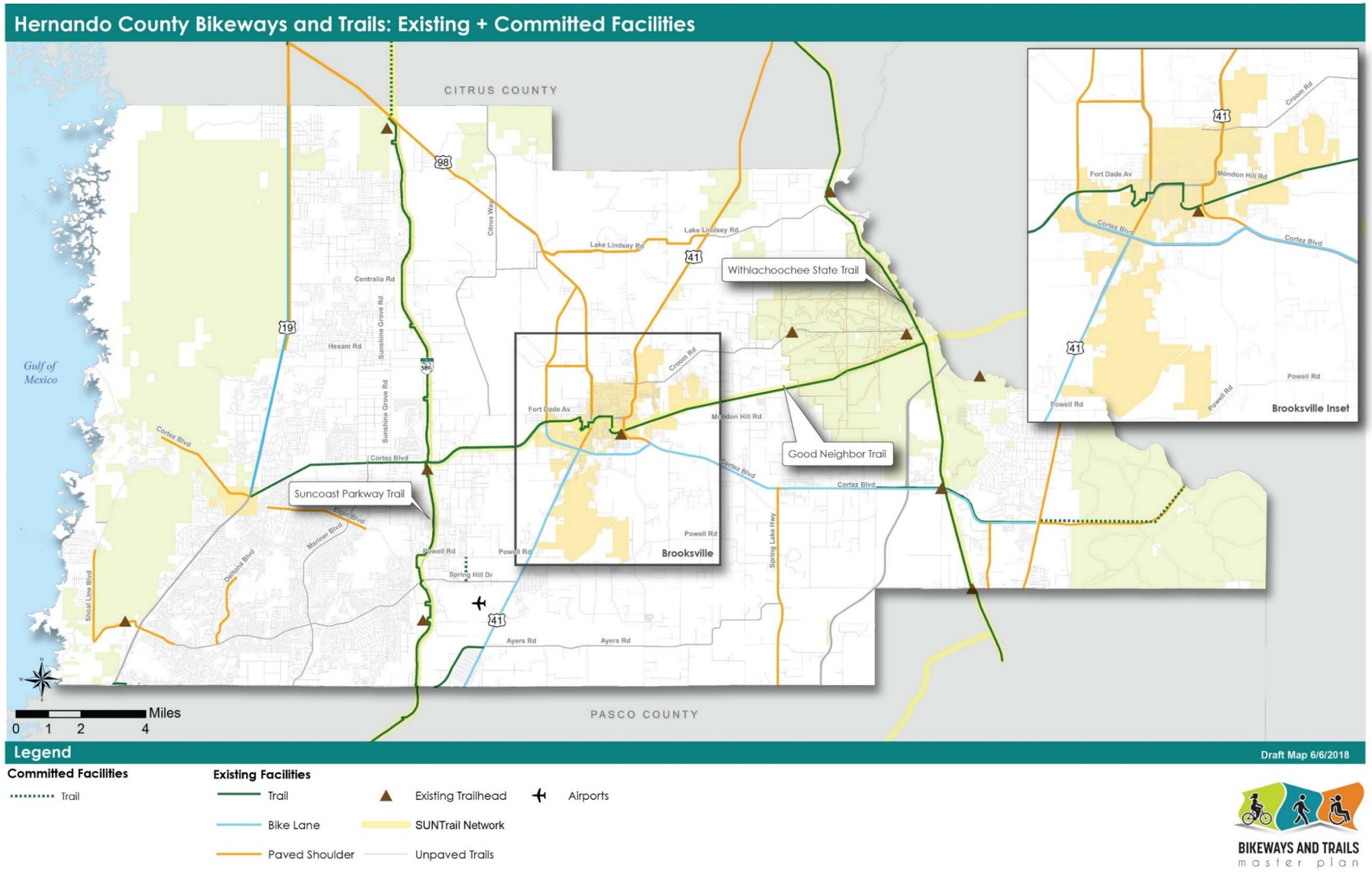

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Figure ES-3: Vision for Bikeways and Trails Facilities in Citrus County

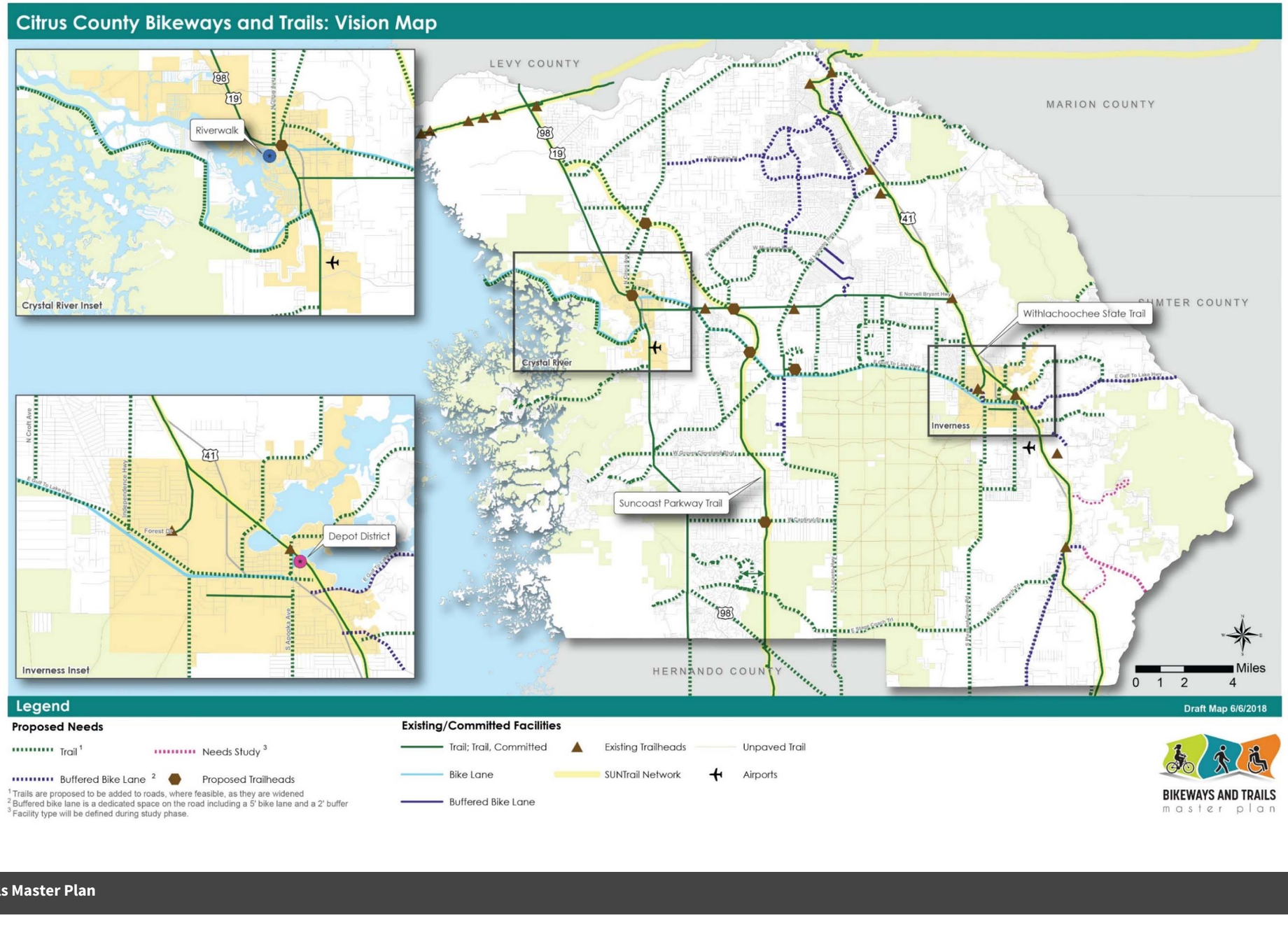
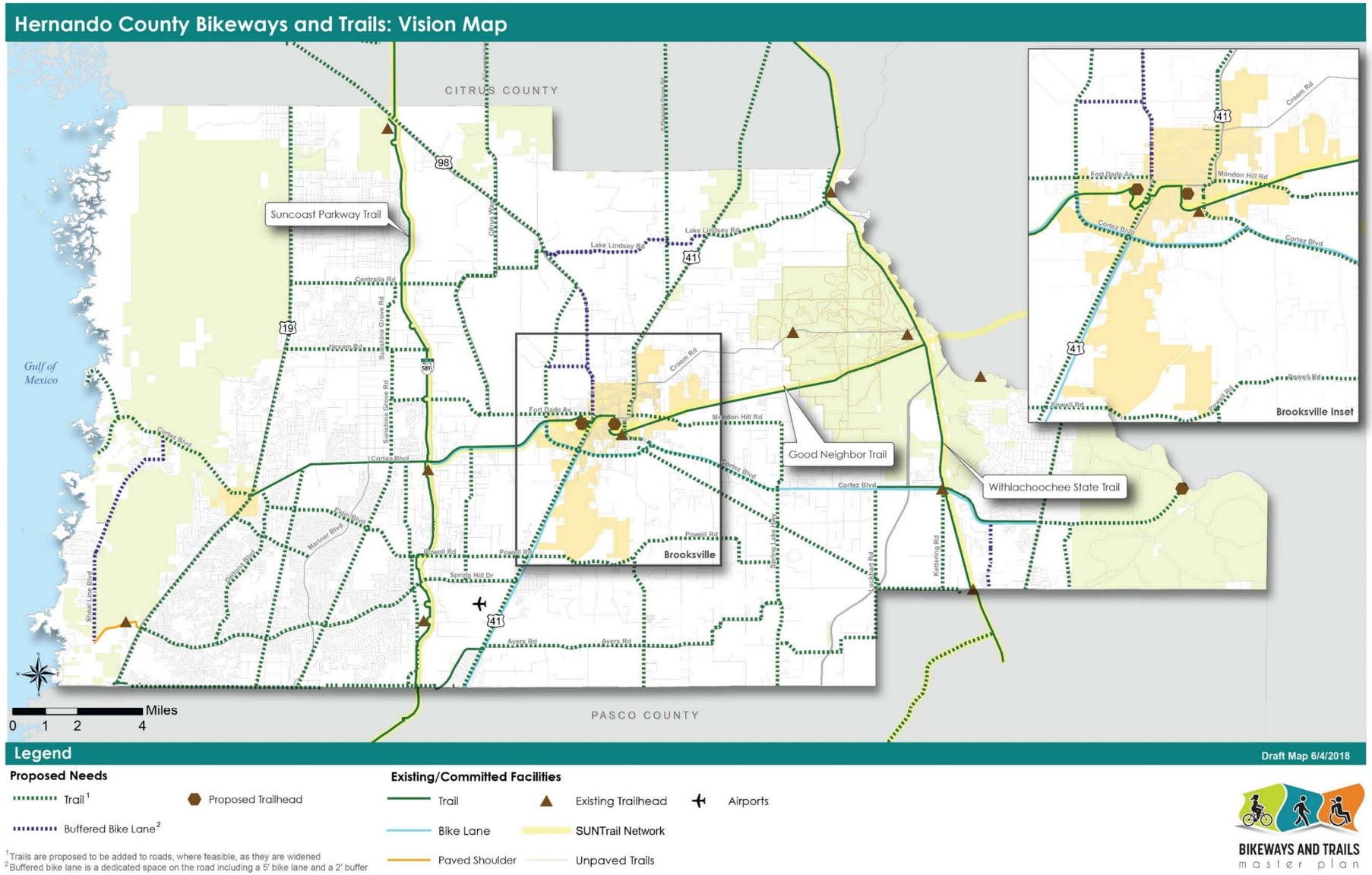


Figure ES-4: Vision for Bikeways and Trails Facilities in Citrus County



Plan Implementation Actions

Developing a plan is only the first step in the process to creating a robust and successful active transportation network. After plan adoption, collaboration and action are what make it successful. The following implementation actions have been developed to ensure the success of this Master Plan and should be reviewed on an annual basis:

- On January 30, 2018, the Hernando/Citrus MPO Board voted to support the Florida Department of Transportation's (FDOT) goal of zero serious auto-related injuries and deaths (Vision Zero). It also established a short-term target of 5% per year in reduction in traffic fatalities and serious injuries, based on a five-year rolling average. In support of the MPO Plan is reducing the number of bicycle and pedestrian injuries and fatalities by funding projects that will support this goal.
- Recognizing that it takes more than engineering solutions to resolve safety issues in Hernando and Citrus counties, the MPO will collaborate with the county governments, FDOT, and other agencies to identify and fund enforcement and education programs throughout both counties.
- Work should continue with FDOT to add bicycle and pedestrian facilities to State roads as they are resurfaced or expanded. Wherever possible, separated trails should be included in Project Development & Environment (PD&E) and design phases.
- This Master Plan is a living document and reflects the vision of the MPO and stakeholders as well as analysis done at the time of its revision. The priority projects identified according to the evaluation process will not preclude the addition or upgrade of bicycle and/or pedestrian facilities on County roads.
- The MPO will collaborate with County staff to ensure that the best possible bicycle and pedestrian facilities are incorporated into all upcoming county resurfacing and reconstruction projects.
- Coordination will continue with the Hernando and Citrus County Public Works departments to include trails and wider sidewalks on new roadways and roadway expansion plans.
- Coordination will continue with the cities of Inverness, Crystal River, and Brooksville, local agencies, and Hernando and Citrus counties on submission of projects to a list of projects to be considered for prioritization for funding.
- Coordination will continue with local governments for adoption of the Hernando/Citrus MPO Bikeways and Trail Master Plan into Local Comprehensive Plans, the Land Development Code, and City Master Plans and identification and protection of trail corridors.
- Coordination will continue with other government and non-government entities on regional planning issues related to the trail system including the Florida Department of Environmental Protection (FDEP), the Office of Greenways and Trails (OGT), the Florida Department of Affairs, and

others to pursue grant opportunities to develop the regional trail network in Hernando and Citrus counties.

- Coordination will continue with staff in adjacent counties, MPOs, OGT, and FDOT to plan for and construct trails and other bicycle infrastructure across county lines to help create a seamless and connected regional trail network.
- This Master Plan will be reviewed and revised as needed at least every five years. Interim updates to the map or Plan may be required to take advantage of opportunities with developers or local and county agencies.

Chapter 1 – Introduction

This inaugural Bikeways and Trails Master Plan is the culmination of significant coordination between Hernando/Citrus Metropolitan Planning Organization (MPO) staff and committees as well as dedicated citizens. It represents a wide range of perspectives and interests, all of which are focused on the same goal— improving bicycling conditions in Hernando and Citrus counties. This Master Plan identifies a number of ways to achieve this, both long- and short-term, including infrastructure, policy and program opportunities that will enhance the current conditions and make it possible to begin to achieve the Vision identified during plan development (see Chapter 5).

Following is a discussion of some of the concepts that led up to and were foundational in the development of the Master Plan.

Safety

The Tampa Bay area is considered the most dangerous place for walking and biking.[1,2] Although Hernando and Citrus counties are not included on Florida's top 10 list of high crash areas, every fatality and severe injury takes a toll on the community and family and friends of victims. The safety of bicyclists in every county should be paramount in any decision about bicycling infrastructure and was identified as the #1 goal by staff and the community for this Plan.

Vision Zero

Vision Zero is a multi-dimensional effort to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero is increasingly being adopted by cities across the United States. It takes a traditional approach to safety and reconsiders some of the most basic assumptions made over the past decades to reduce the number of deaths on American roadways. The following table compares the traditional and Vision Zero approaches.

Table 1: Traditional vs. Vision Zero Approach to Traffic Safety

TRADITIONAL APPROACH	VISION ZERO APPROACH
Traffic deaths are INEVITABLE	Traffic deaths are PREVENTABLE
PERFECT human behavior	Integrate HUMAN FAILING
Prevent COLLISIONS	Prevent FATAL AND SEVERE CRASHES
INDIVIDUAL responsibility	SYSTEMS approach
Saving lives is EXPENSIVE.	Saving lives is NOT EXPENSIVE

[1] *Dangerous by Design* (2016), https://smartgrowthamerica.org/dangerous-by-design/.
[2] Statewide Analysis of Bicycle Crashes, FDOT (2017), http://www.fdot.gov/research/Completed_Proj/ SummarySF/FDOT-BDV29-977-23-rpt.pdf.

A commitment to Vision Zero encompasses the entire roadway network and all users. By committing to a reduction in crashes, all modes benefit. The recently-adopted MPO commitment to a 5% reduction in crashes can be supported by the Vision Zero approach.

Equity and Choice

According to AAA, car ownership is estimated to cost $8,500 per year.[3] For any family that is already struggling, this additional expense can mean tough choices. Although bicycling may not be the perfect answer in an area that is sprawling with homes and destinations far apart, bicycle ownership is an inexpensive option.

According to the National Household Travel Survey (NHTS), 41% of trips are three miles or less.[4,5] This distance is comfortable to travel by bicycle for most riders, so with the appropriate bicycle infrastructure, drivers might choose to bike instead of drive. Whereas this mode shift is more likely in cities and towns, where destinations tend to be closer together, as the population ages and needs change, it is worth considering changes in land use patterns to aggregate land uses to either minimize trips or support the use of other modes such as bicycle.

Benefits of Walking and Biking

The benefits of physical activity are well-documented and, as the population ages, facilitating low-impact activity becomes even more important. Across the US and in Hernando and Citrus counties and the Tampa Bay region, it has been confirmed that "if you build it, they will come." Trails such as the Withlacoochee State Trail and the Pinellas Trail have hundreds of thousands of visitors every year, and good walking and biking environments are increasingly considered a quality-of-life benefit that add value to neighborhoods.

Recent studies, including one from the Harvard School of Public Health, noted that walking and biking, particularly to work, can help manage weight loss, improve cardiovascular health, and possibly prevent cancer.[6] With public health care costs rising and the burden of those costs on every American, easy and convenient opportunities to improve public health are become more and more important.

Economics of Trails and Greenways

According to a presentation on the FL Department of Environmental Protection Trail Town web site, there are an estimated 1,000 Pinellas Trail users per day riding through Dunedin on an average weekend day

[3] https://newsroom.aaa.com/auto/your-driving-costs/.
[4] https://nhts.ornl.gov/.
[5] Todd Litman, "Short and Sweet," July 2017, http://www.vtpi.org/short_sweet.pdf.
[6] "Benefits of biking appear to outweigh the risks," https://www.hsph.harvard.edu/news/hsph-in-the-news/bicycle-commuting-benefits/.

and vacancy rates are down to 1% in 2017.[7] All this represents a huge change from the 1980s when Dunedin was a town in decline and vacancy rates were at 30%. This activity can be attributed to the town's willingness to embrace the Pinellas Trail as a primary focus. Inverness has adopted the same strategy with the Withlacoochee Trail and with the upcoming construction of the Coast to Coast Trail, Brooksville has the same opportunity.

The Coast-to-Coast Trail, running from St. Petersburg to Titusville, is projected to provide an annual economic benefit of $120 million to Central Florida. A major portion of this trail runs through Brooksville and Hernando County, and communities along the trail are anticipating growth and change. According to Eydie McCall, Titusville Economic Development Director:

> In the next 10 years, you're going to see a totally changed downtown…. Look at some of the other cities that had a trail connected to an even larger trail but didn't do much publicity to promote it. It caught on anyway because people like the way it feels downtown when they see families out cycling or on a bike hike.[8]

The West Orange and Pinellas trails have provided huge boosts to the towns they run through, improving the economies, driving down vacancy rates, and supporting job growth. Inverness has experienced this with its proximity to the Withlacoochee State Trail and actively promotes the trail and being a "bicyclers' paradise" and part of its economic development plans.

Plan Vision

With all of the previously discussed concepts in mind, the vision, goals, and objectives of the Bikeways and Trails Master Plan were developed by Hernando/Citrus MPO staff with input from the Project Advisory Team and are based, in part, on:

- Advisory Committee input
- Public outreach
- Existing vision and goal statements of MPO and County planning efforts
- Nationally-recognized performance measures for pedestrian and bicycle planning

The following Vision statement serves as guidance for the overall project and helps define success. Goals, objectives, and project evaluation criteria are an extension of the Vision and will help facilitate and track implementation progress.

> The Bikeways and Trails Master Plan Vision is that Hernando and Citrus counties become communities in which people can safely and easily ride bicycles and walk daily.

[7] https://floridadep.gov/sites/default/files/Dunedin%2C%20the%20Little%20Downtown%20That%20Could.pdf.
[8] "A New Path: Florida's Coast-to-Coast Trail Promotes Eco-Tourism and More," http://www.i4biz.com/featured-posts/new-path-floridas-coast-coast-trail-promotes-eco-tourism/.

A connected network of trails and on-street facilities will benefit the economy, public health, and quality of life for all members of the community.

Plan Goals and Objectives

As an extension of the Vision, goals help guide the implementation of the Master Plan and are concepts against which success and project selection can be measured. These measures can help make the Plan more effective over time. Specific targets may be set for the goals over time.

The Moving Ahead for Progress in the 21st Century (MAP-21) Act (2012) shifted the focus of State agencies and MPOs to a more data-driven approach and developed rules for identifying targets. The Fixing America's Surface Transportation (FAST) Act (2016) mandated that statewide and metropolitan long-range plans describe the performance measures and targets that states and MPOs use in assessing system performance and progress in achieving the performance targets. Performance measures being set at the State level will lead to evaluation at the state department of transportation and MPO levels. Per MAP-21, there are seven designated performance measures; the most relevant to this planning effort measures fatalities and serious injuries for non-motorized road users.

In response to the requirement that state DOTs set performance measures, the Florida Department of Transportation (FDOT) has adopted an aspirational goal of zero fatalities for all road users (Vision Zero). The Hernando/Citrus MPO Board affirmed its commitment to this goal in 2018, further supporting safety as the Master Plan's primary goal. Attendees at the public workshops for this Plan also affirmed their support for the goals of safety and connectivity. Additional goals and objectives related to the Vision statement also were identified. The Master Plan goals and objectives are as follows:

Safety

- Increase safety for people who walk and bicycle in Hernando and Citrus counties by supporting the construction of trails, bicycle facilities and enhanced crossings.

Connectivity

- Create a network of efficient, convenient bicycle and pedestrian facilities in Hernando and Citrus counties.

Equity/livability

- Increase transportation choice and community livability through the development of an integrated multimodal system.

Health

- Encourage health and fitness by providing a safe, convenient network of facilities for walking and biking.

Economic Development

- Promote tourism and economic opportunities by developing a safe, connected network of biking and walking facilities.

In addition to the rest of the introduction that includes the plan vision, goals and objectives, the report is organized into the following chapters:

- **Chapter 2 – Existing Conditions** describes the plan Vision, goals, and objectives and the existing conditions for bicycling in Hernando and Citrus counties.
- **Chapter 3 – Programs and Policy** discusses how, although infrastructure is the most critical component of a bikeway and trails network, policies must be in place to ensure that the trails and facilities are constructed. Programs play a role in creating a safer environment as well as supporting the desire to ride, whether for transportation or recreation.
- **Chapter 4 – Bikeways and Trails Toolbox** includes a discussion about bicyclist comfort and safety and describes bikeway and trail types and supporting elements and trends such as bike-sharing and e-bikes.
- **Chapter 5 – Recommendations/Implementation Plan** discusses the long-term plan vision and shorter-term needs identified during the public outreach process and includes funding and design guidance.

Chapter 2 – Existing Conditions

Hernando and Citrus counties each have the beginnings of connected bikeway networks, the basis of which are regional trails. Each county is home to significant regional trails that also serve shorter trips between destinations. On-road facilities or bike lanes often facilitate connections to trails. Table 2 and Figures 1 and 2 show the existing bicycle infrastructure and committed mileage, typically funded for construction over the next five years and found in the current FDOT work program, by county. Bicycle lanes are found on County or State roads.

Table 2: Existing Bike Infrastructure Mileage in Hernando and Citrus Counties

	Existing Mileage		Committed	
County	***Bike Lane***	***Trail***	***Bike Lane***	***Trail***
Citrus	63	83	6	18
Hernando	51	83		6

Regional trails, or those that cover multiple counties, connect Hernando and Citrus counties and their adjacent neighbors. The 46-mile long Withlacoochee State Trail (WST) starts in Pasco County and ends just south of Dunellen in Marion County, and the 42-mile long Suncoast Trail, which runs along the Suncoast Parkway, begins in Hillsborough County and currently ends at US 98 in Hernando County. The Coast-to-Coast trail, comprising segments of trail in eight counties, will run through Brooksville as the Good Neighbor Trail and is under construction.

Local trails, those that are within county boundaries, exist in both counties. Citrus County has a trail that runs most of the way along CR 486, and a trail was constructed along SR 50 in Hernando County east of the Suncoast Parkway. A continuation of that trail is planned west of US 301 to the Sumter County line.

Paved shoulders have been constructed along the many rural roads in both counties, primary for use by vehicles in emergency situations but they can also be used by bicyclists. A field review showed that shoulders typically drop after intersections forcing bicyclists to ride in the travel lane. Because of this and the fact that shoulders provide some of the least comfortable facilities for bicyclists, especially on high speed roads, they are not included as a facility in either county.

Figures 1 and 2 show the existing and committed bikeway and trail infrastructure in Citrus and Hernando counties.

Paved shoulders along County road ends create unsafe conditions for bicyclists.

Figure 1: Existing and Committed Bikeway and Trail Infrastructure in Citrus County, 2018–2023

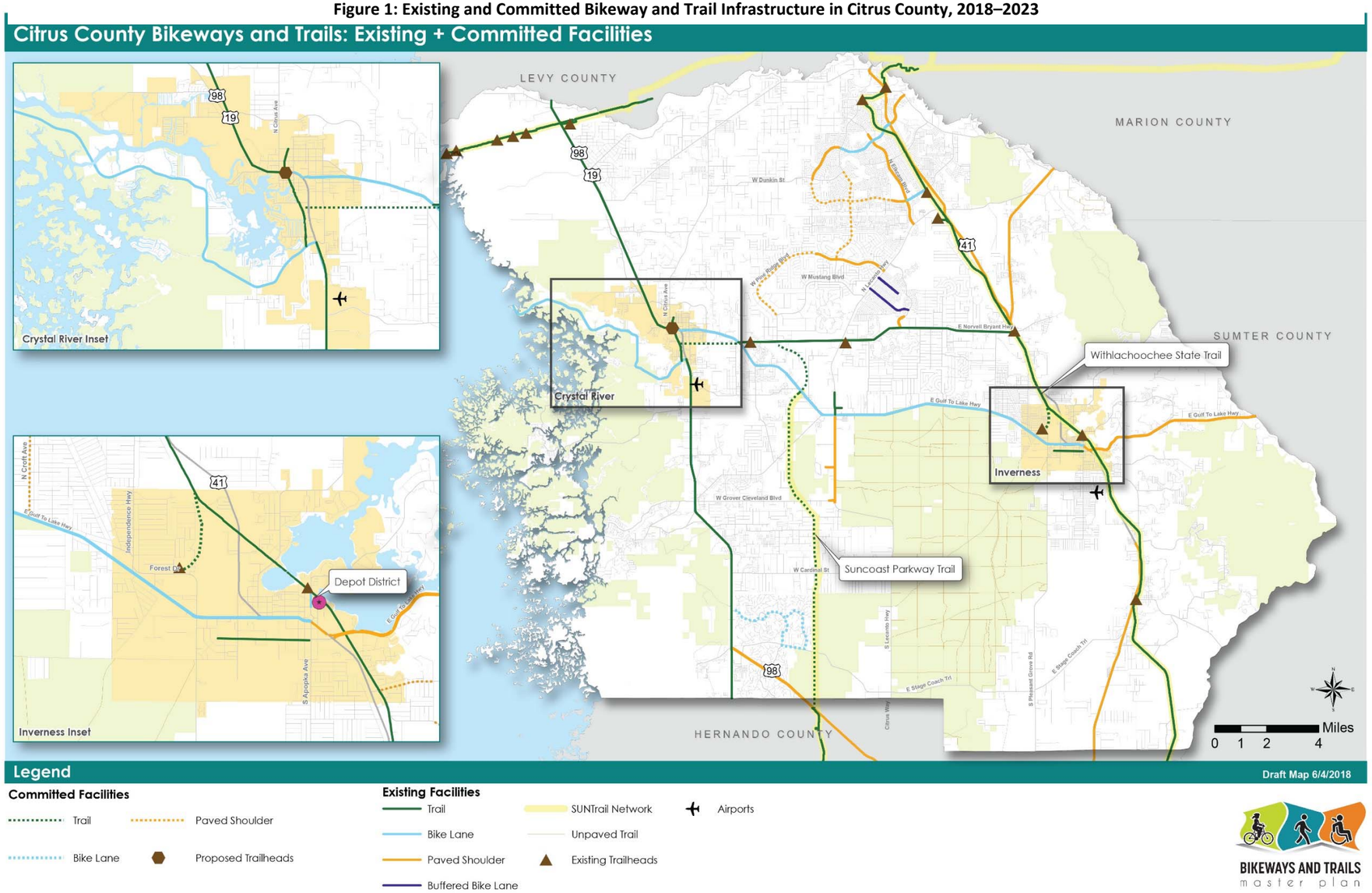
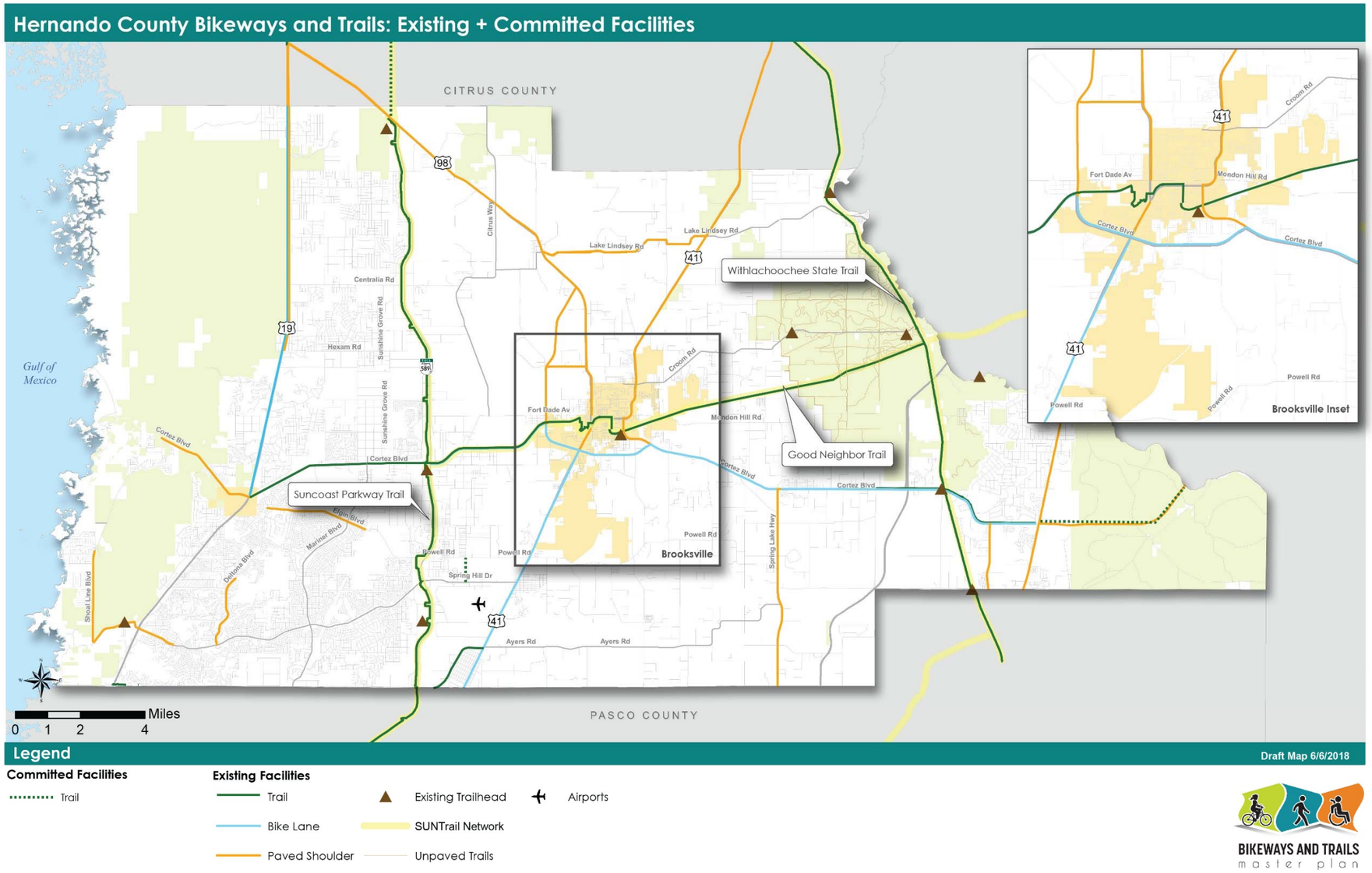


Figure 2: Existing and Committed Bikeway and Trail Infrastructure in Hernando County, 2018–2023



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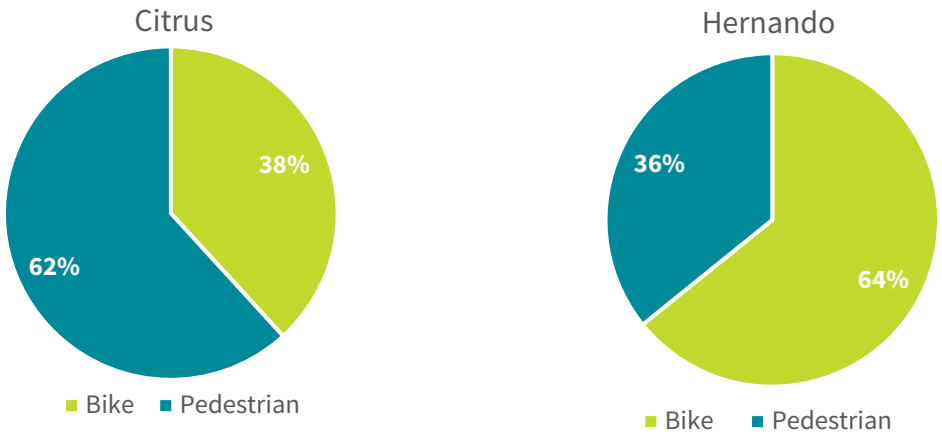
Safety

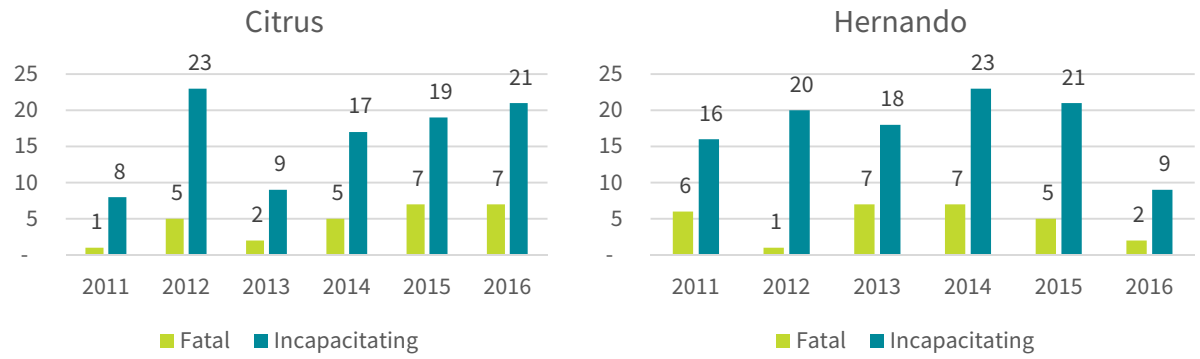
Reducing fatalities and injuries is a goal of the MPO's recently-adopted performance targets and a primary goal of this Master Plan. To help identify areas of concern for bicyclists and pedestrians, bicycle/pedestrian crash data from 2011 to 2016 were reviewed. (Individual crash reports were not reviewed as part of this project.) As shown in Figure 3, in Citrus County over the five-year period, a total of 437 crashes involved vulnerable users, with 62% involving a pedestrian and 38% involving a bicyclist. In Hernando County, bike crashes made up about 64% of all crashes and 36% involved pedestrians. Total crashes (606) were higher in Hernando County.

Figure 3: Bicycle/Pedestrian Crashes, Hernando and Citrus Counties, 2011–2016



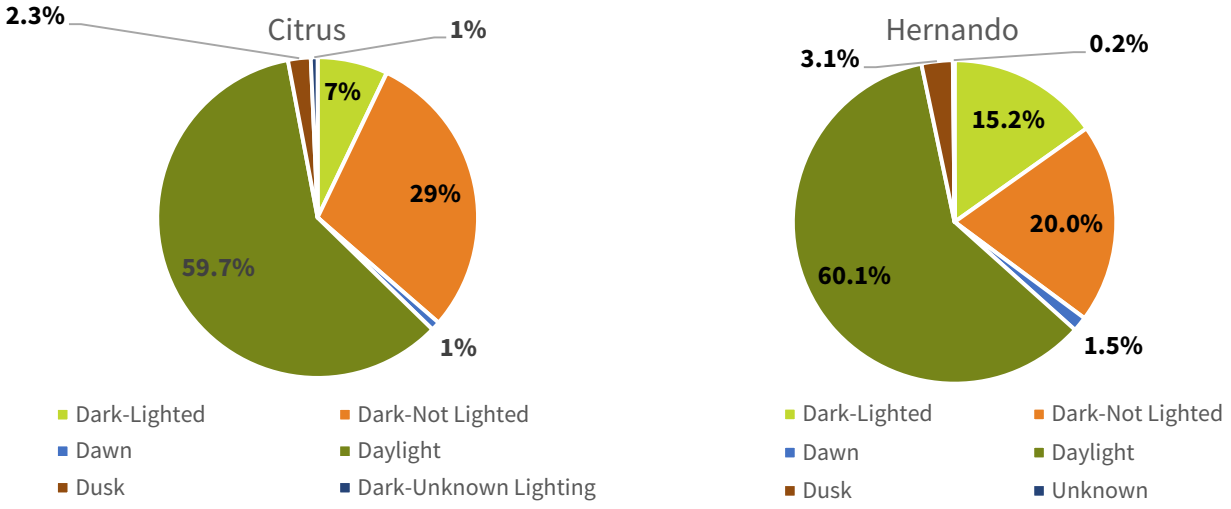
In Hernando County, fatal and incapacitating bicycle and pedestrian crashes accounted for 22% of total crashes in 2011–2016; in Citrus County, they were 28% of crashes. As shown in Figure 4, generally, in Citrus County, there has been an upward trend in incapacitating crash types, whereas fatalities have been fairly stable. In Hernando County, both incapacitating and fatal crashes experienced a decline in 2016, but generally stayed stable in previous years.

Figure 4: Fatal and Incapacitating Bicycle/Pedestrian Crashes, Hernando and Citrus Counties, 2011–2016



In both counties, as seen in Figure 5, the majority of bicycle and pedestrian crashes occurred in during daylight hours, suggesting that street lighting has not typically been a factor. Dark–not lighted conditions made up a larger majority of the crashes in Citrus County, accounting for 29% and 20% in Hernando County. Review of individual crash reports is recommended to better understand crash circumstances.

Figure 5: Bicycle/Pedestrian Crash-related Lighting Conditions, Hernando and Citrus Counties, 2011–2016



Crashes in both counties were analyzed for clustering to identify locations that most frequently have crashes. Figures 7 and 8 illustrate the high-crash locations in Citrus and Hernando counties, respectively. Areas of highest crash occurrence are recommended for further study to identify specific infrastructure changes that could be made. Proximity to crash cluster areas is also used as an evaluation criterion for project prioritization.

Figure 6: Crash Clusters, Citrus County, 2011–2016

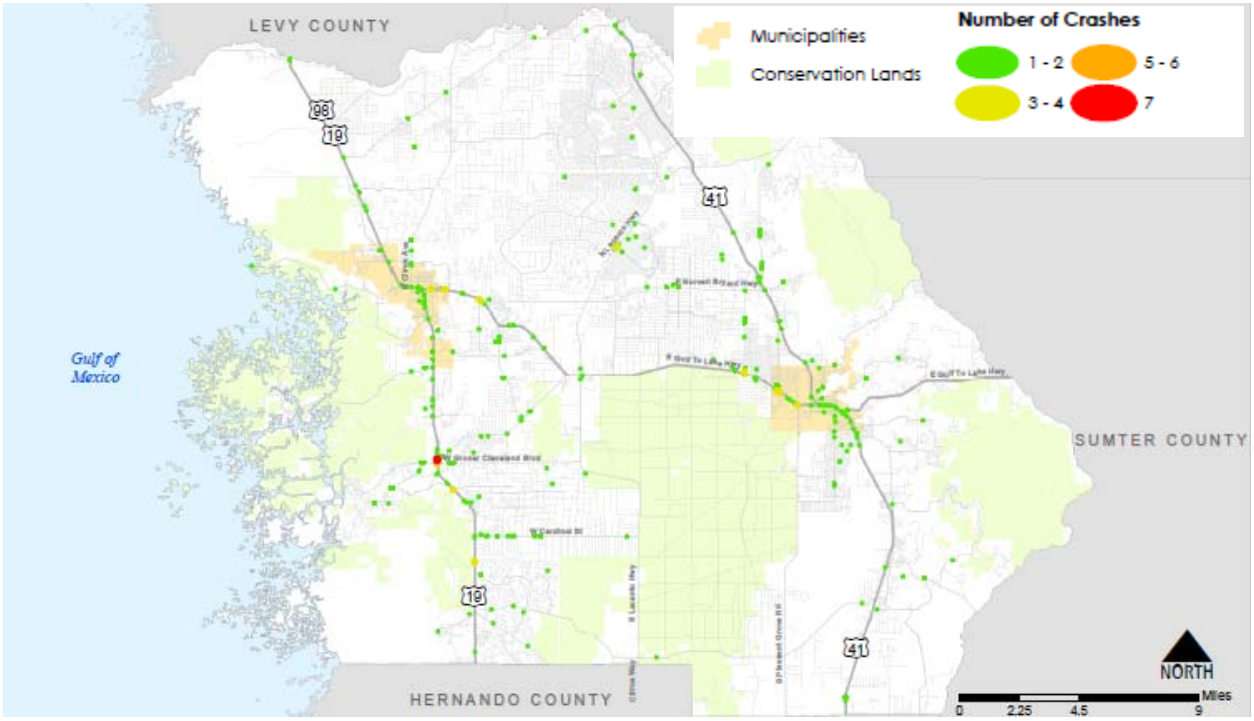
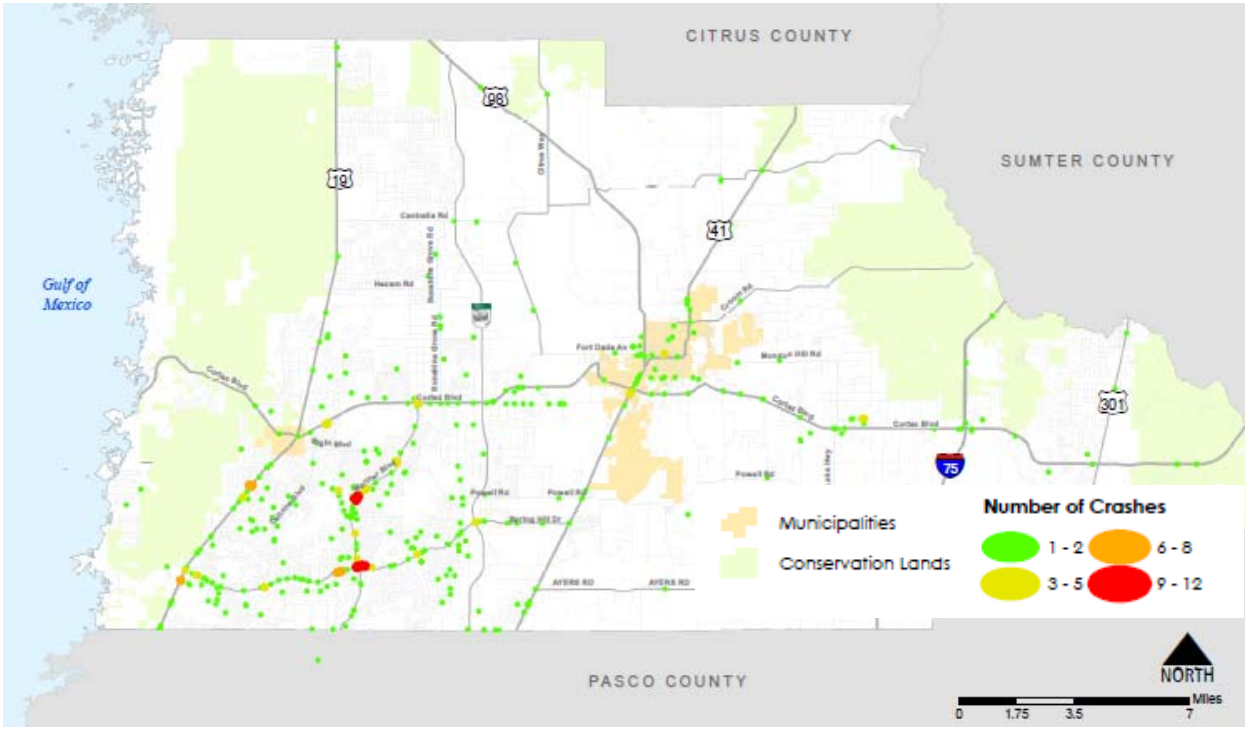


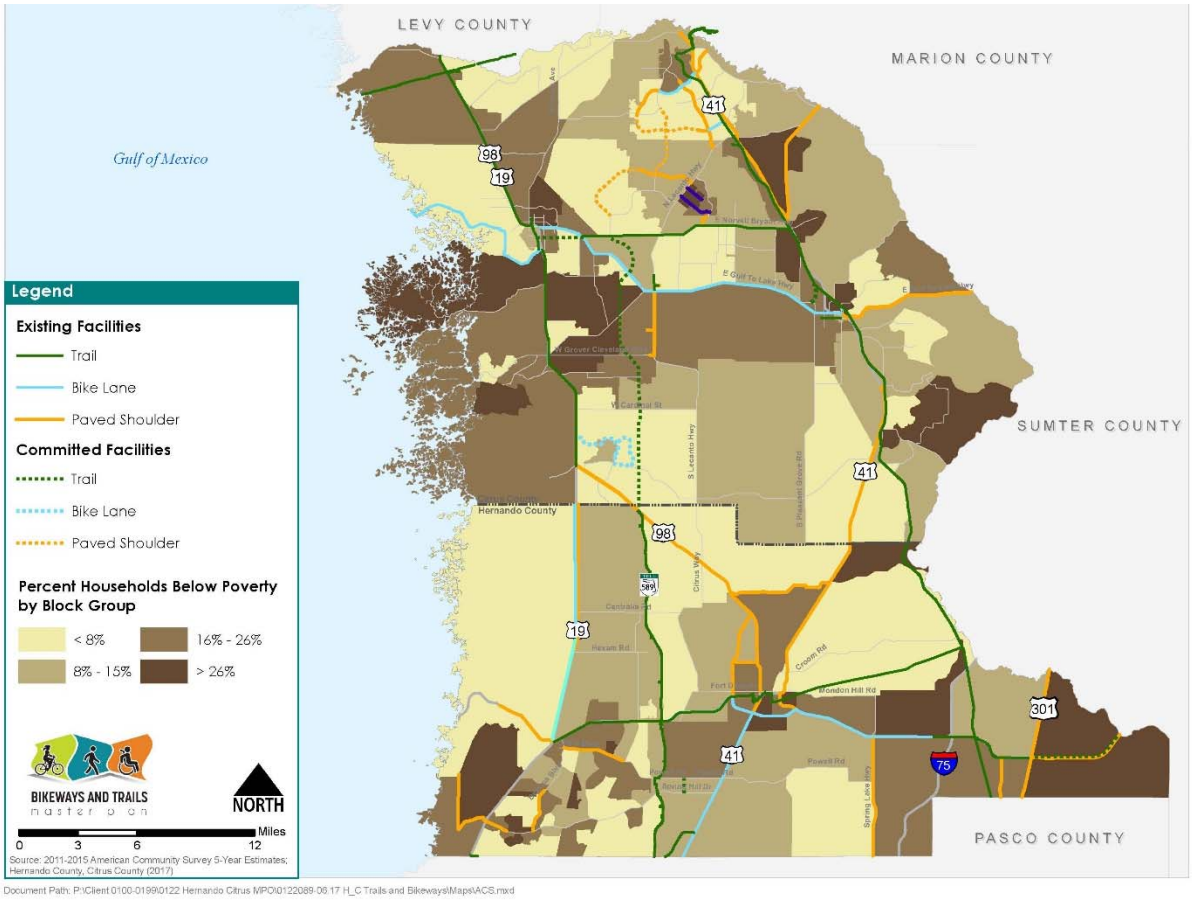
Figure 7: Crash Clusters, Hernando County, 2011–2016



Equity

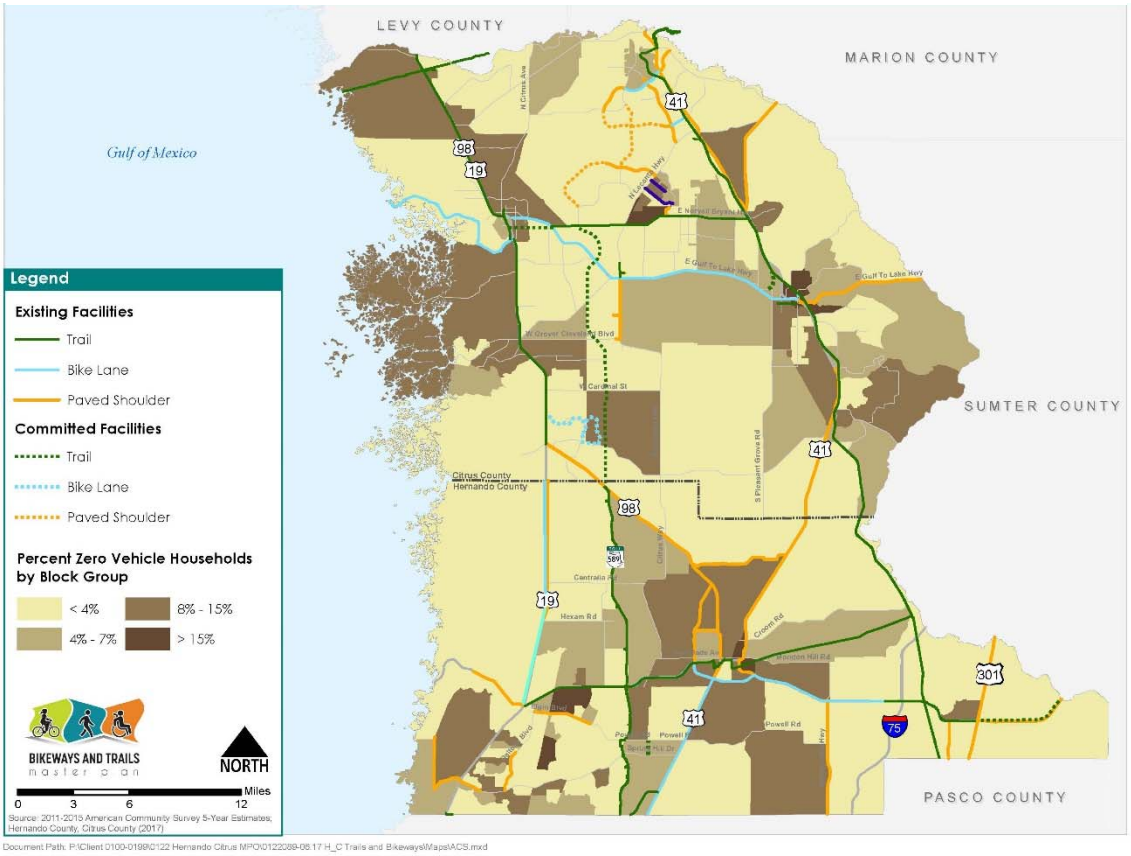
Figure 8 illustrates areas of poverty in Hernando and Citrus counties. Poverty is defined by the US Census as a family of four earning $22,000 or less. Owning a car is often an expense that is out of reach for many, it is important to acknowledge, especially in areas of poverty, that safe, convenient access to transit may be critical. Without a car, the mode of travel may be bus or bicycle.

Figure 8: Poverty Areas, Citrus and Hernando Counties, 2010–2015



The provision of sidewalk and bike lanes or other bicycle facilities creates opportunities for safe travel and may also extend the availability of the current transit system to users who are within a few miles of a stop or route rather than along the route. Figure 9 illustrates the areas of Hernando and Citrus counties in which car ownership is the lowest. The darkest areas indicate that 15% or more of households do not own a vehicle. For many in these areas, riding a bicycle is a necessity and is transportation, not recreation.

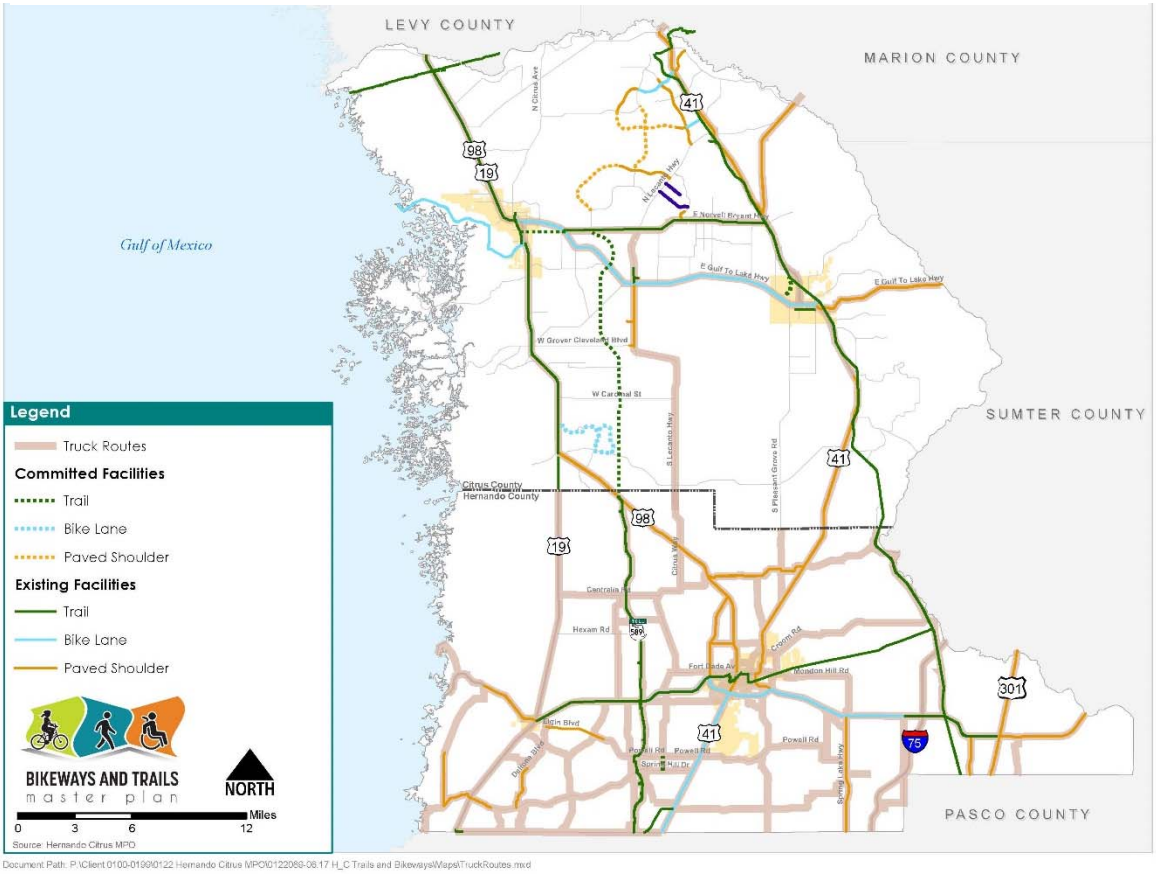
Figure 9: Households in Hernando and Citrus Counties with Zero Cars, 2010–2015



Truck Routes

All State roads and a majority of County roads are identified a truck routes. Although freight is important to the economies of both counties, it is important to remember that high volumes of trucks, especially those traveling at high speeds, have a negative impact on bicycle travel. Because County and State roads often are the only option for longer-distance travel by bicycle and car, consideration should be given to all modes. Especially outside of municipalities, the posted speed limit is often 45 miles per hour (mph) or higher. Generally 35 mph is the guidance for consideration of a separated facility (see Chapter 5). Figure 10 illustrates the locations of bike facilities or where they are proposed and where they overlap the truck routes.

Figure 10: Bike Facility Overlap with Truck Routes, Hernando and Citrus Counties



Regional Connections

The Hernando and Citrus bikeway and trail systems are developing at the local and regional levels. Within each county, primary trails such as the Suncoast Trail, the Coast-to-Coast Trail, and the Withlacoochee State Trail make up the backbones of the system, with local trails, County trails, and the roadway network acting as connections. It is also important to understand how Hernando and Citrus counties fit into an even larger context.

Tampa Bay Regional Transportation Authority (TBARTA) Regional Trail Priorities

In addition to hosting trails that are on the TBARTA regional trails maps, Hernando and Citrus counties have trails on the TBARTA Regional Multi-Use Trail Priority Project list. TBARTA is the regional planning agency covering Hernando, Citrus, Hillsborough, Pinellas, Pasco, and Manatee counties. This list covers trails in these counties and is an indicator of priority used to request and justify funding. The trails in Table 3 are on TBARTA's 2018 adopted list. A complete list of trails and the map can be found in the Appendix.

Table 3: TBARTA 2018 Priority Trails, Hernando and Citrus Counties

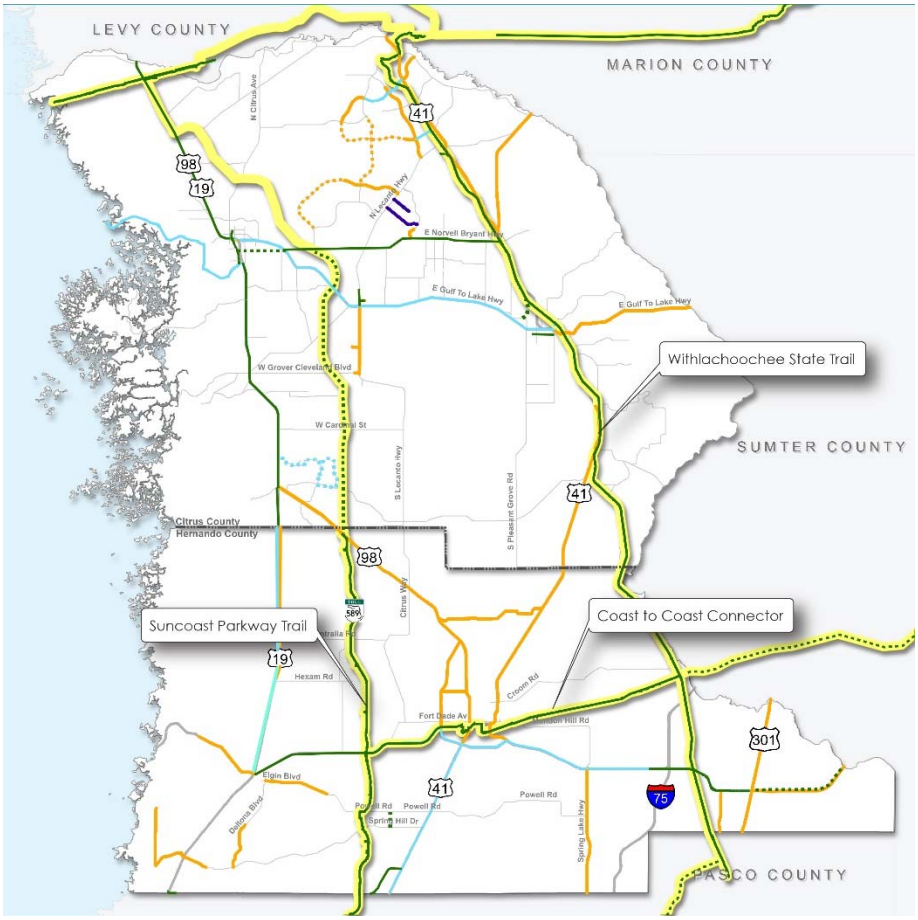
Rank	Name	County
2b	Suncoast Trail/Good Neighbor Trail Connector (Coast-to-Coast Connector – Good Neighbor Gap)	Hernando
7	Suncoast II	Citrus
10	Withlacoochee State Trail - Dunnellon Trail Connector	Citrus

Florida Greenways and Trails System

Both Hernando and Citrus counties include a number of land trail opportunities and priorities, as shown on the Florida Greenways and Trails System (FGTS) Plan and maps. The FGTS plan and maps are managed by the Florida Department of Environmental Protection, Office of Greenways and Trails.[9] The FGTS Plan establishes the vision for implementing a connected statewide system of greenways and trails for recreation, conservation, alternative transportation, healthy lifestyles, a vibrant economy, and a high quality of life. A map of the trail opportunities in the West Central region is included in the Appendix. Opportunities to connect to existing trails that are not yet funded for construction include the Orange Belt Trail in Pasco County and the extension of the Suncoast Trail north of CR 44. Figure 11 illustrates the regional trails that define the bicycle network in Hernando and Citrus Counties and the opportunities to connect within and to adjacent counties.

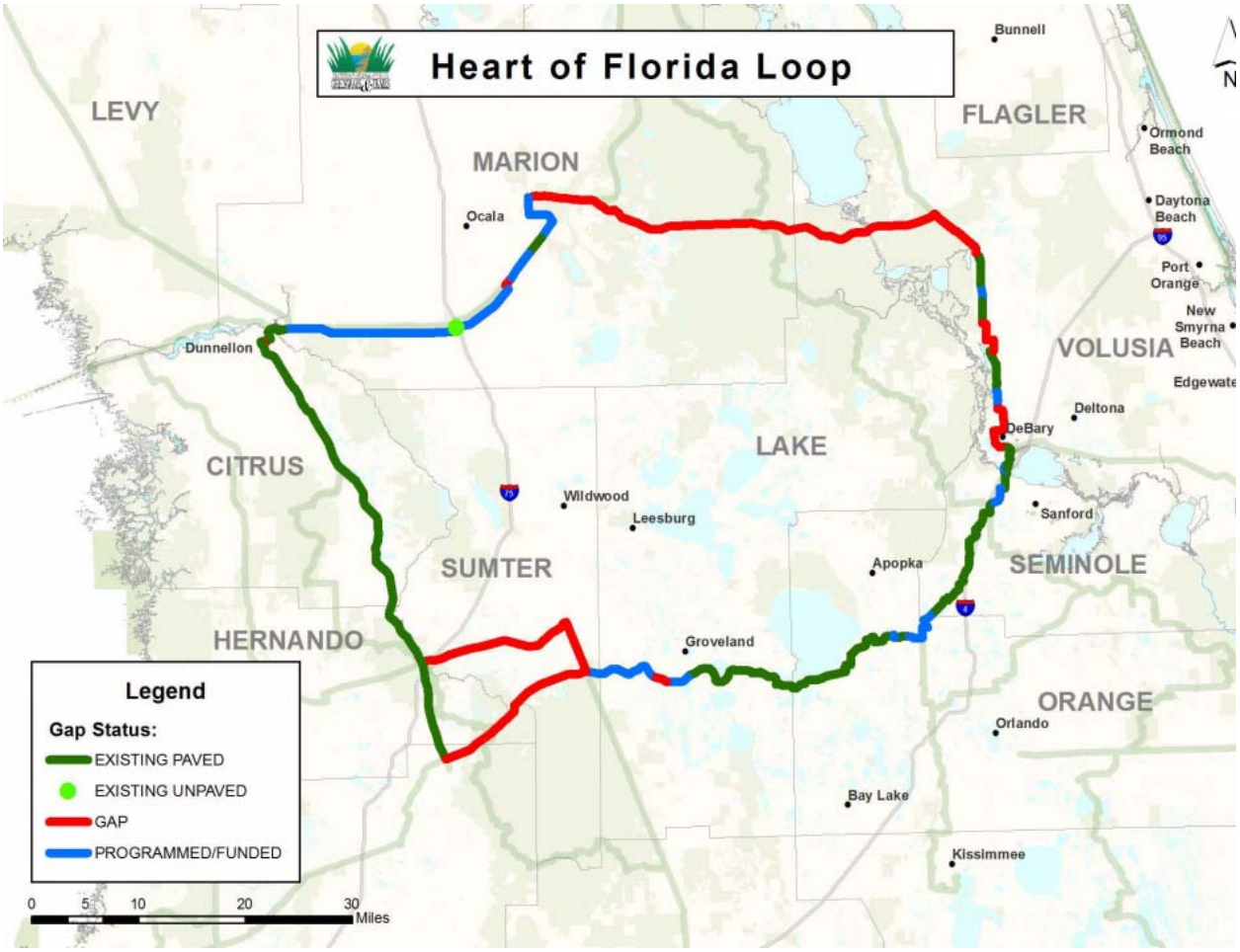
[9] https://floridadep.gov/parks/ogt/content/florida-greenways-and-trails-system-plan-and-maps.

Figure 11: Regional Trail System in Hernando and Citrus Counties



A map of the Heart of Florida Trail, shown in Figure 12, illustrates the connections with trails in Marion and Sumter counties and the larger loop trail connecting to Lake, Volusia, and Seminole counties. The Suncoast Trail, the Good Neighbor Trail, and the Withlacoochee State Trail in Hernando County are also part of the 250-mile long Coast-to-Coast Connector Trail running from St. Petersburg to Titusville.

Figure 12: Heart of Florida Loop Trail Running through Hernando and Citrus Counties



Local Plans

The Bikeways and Trails Master Plan works in concert with local planning efforts taking place in Crystal River, Inverness, and Brooksville. Although the plan focuses primarily on County and State roads, connections to and within communities in both counties are critical to the development of complete networks, making it possible for users to access destinations by bicycle and, for shorter distances, by foot. Continued coordination with local agencies to identify projects for placement on the MPO Priority List will support the goals of each community.

Chapter 3 – Programs and Policy

Creating a comfortable bicycling environment is a complex challenge that benefits from a multi-faceted approach. The "5 E's" (Engineering, Education, Enforcement, Encouragement, and Evaluation & Planning; 6 if Emergency Services included) offer a framework on which to build the program. Because each of these aspects works together and satisfies a different need, in addition to infrastructure, the Bikeways and Trails Master Plan includes recommendations about programs and policies. The emphasis on improving the infrastructure and designing roadways that encourage safe driving needs to stay at the forefront of the efforts to reduce crashes for all modes and the following programs ranging from education initiatives to policy changes can help achieve the goals identified above.

Programs

Safety programs are an important component of the Master Plan and part of the overall strategy to create an environment in which people can safely and easily ride bicycles and walk daily. Many programs are being implemented by MPOs and agencies throughout the US; those listed in Table 4 were selected because they can be implemented fairly rapidly by the MPO and its partners.

Table 4: Examples of Easily-Implementable Safety Programs

Type	Program
Education	• Walking and Biking Education (K–12) • Walk/Bike Smart • Bicycle Rodeos • Motorist Education/Outreach
Encouragement	• Bike Suitability Map • Walk/Bike to School Day • Florida Trail Town Program
Enforcement	• Bicycle Enforcement • Law Enforcement Officer Training
Evaluation/Planning	• Bike Counts • Miles Planned/Constructed

- **Walking and Biking Education (K–12)** – *The Bicycle and Pedestrian Curricula Guide,* published by the Safe Routes to School National Partnership, lists a number of different options for integrating bicycle and pedestrian education into the classroom. Bike/Walk Tampa Bay offers pedestrian, bicyclist, and driver safety presentations (WalkWise or BikeSmart Tampa Bay) to interested groups around Tampa Bay that target adults with brief interactive sessions covering the basics of walking and bicycling.

- **Bicycle Rodeos** – Bicycle rodeos are skill-based events that allow children to practice safe bicycling in a controlled environment. Usually for kids under age 12, they often are held along with bike safety inspections or helmet giveaways.
- **Motorist Education/Outreach** – Motorist education that encourages awareness of pedestrians and bicyclists and responsibilities on the road can be helpful in discouraging crashes. Current trends related to distracted driving and crashes suggest that motorists need to be reminded about the dangers of driving and texting.
- **Bike Suitability Map** – A bike suitability map helps to communicate the relative "comfort" of a facility to potential bicyclists. This can be an invaluable tool for riders who are both familiar and unfamiliar with local roads. It is recommended to be available in print and online.
- **Walk/Bike to School Day** – An international annual event, Walk/Bike to School Day is an opportunity to partner with local schools in support of safe walking and biking.
- **Florida Trail Town Program** – The Florida Office of Greenways and Trails (OGT) recently launched a new program to recognize and support trail towns in Florida. The program will highlight towns across Florida that cater to trail users. "A Florida Trail Town is a vibrant destination where people come together," said Doug Alderson, Assistant Bureau Chief of OGT. Communities can submit a questionnaire and self-assessment found on the Trail Town Program website.[10] Designated towns receive free metal trail town signs, stickers, and publicity.

The Florida Office of Greenways & Trails recently launched the Trail Town program to highlight the benefits of trails.

- **Law Enforcement Officer Training**[11] – Self-paced training on pedestrian safety and bicycle safety are available from the National Law Enforcement Academy Resource Network (NLEARN) and can be valuable tools. Alert Today Alive Tomorrow, FDOT's pedestrian- and bicycle-focused initiative, has developed several roll-call training videos for use by law enforcement officers.[12]
- **Usage Counts** – Communities across the US have begun counting users of their facilities, which often can lead to a better understanding of demand and can help with planning. The City of St. Petersburg conducts manual counts several times per year and will be installing trail counters at a number of locations in 2018. Counters could be placed along the Suncoast, Coast-to-Coast and Withlacoochee State trails.

[10] https://floridadep.gov/parks/ogt/content/florida-trail-town-program.
[11] https://www.iadlest.org/.
[12] https://www.alerttodayflorida.com/RollCall/.

Policy Review and Recommendations

In 2017, the Hernando/Citrus MPO adopted a resolution to request that FDOT include separated multi-use paths or widewalks in the design cross-section of State roads. Resolution 2017-01 reflects the MPO's support of developing bicycle/pedestrian-friendly infrastructure (see Appendix for reference). The following policies have been established to create the framework for implementation of this Master Plan.

Plan Policies

Funding

- Establish prioritization for funding projects based on safety, equity, and connectivity.
- Include bikeways in planned road construction projects, maximizing available construction funding and long-range planning efforts.
- Collaborate with counties and schools to identify Safe Routes to School funding candidates.

Opportunities

- Consult the Vision plan, which shows corridors where bicycle and pedestrian improvements should be considered when other improvement projects are planned.
- Work to increase bicycle and pedestrian facilities on all roads to make walking and biking more convenient.
- Encourage end-of-trip facilities, including secure bicycle parking and shower/changing facilities to make walking and biking more convenient.
- Establish preferred roadway cross-sections to assist in future roadway design.
- Make separated bikeways the preferred bikeway facility on County roadways with four or more lanes, traffic speeds of 45 mph, and/or more than 6,000 Average Daily Traffic (ADT). Separated facilities on roads with curbs may be separated bike lanes and shared-use paths or buffered shoulders on roads with no curbs.
- Increase opportunities for the Bicycle Pedestrian Advisory Committee (BPAC) and the Citizens Advisory Committee (CAC) to collaborate with County Engineering and Public Works departments to comment on Plan review and approve to ensure that what gets built is consistent with policies and vision.
- Work with schools to promote Walk/Bike to School Day.

Connectivity

- Coordinate with developers to connect project bicycle and pedestrian infrastructure to existing or planned trails within 100 ft. of development entrance.

- Enforce requirements that interconnections between developments are shown on project submittals. If there is no current adjacent development, opportunities to connect to the future development must be included in the project submittal.

Education and Enforcement

- Promote current rules and regulations for motorists, bicyclists, and pedestrians in a variety of formats to reinforce the need to comply with all appropriate laws.
- Identify locations in both counties with the highest number of crashes involving bicycles and pedestrians; provide educational outreach to residents and local police as part of an overall effort to reduce crashes in these locations.
- Work with local law enforcement as part of districtwide Community Traffic Safety Team (CTST) programs.
- Work with FDOT to develop educational and enforcement campaigns targeting Hernando and Citrus counties.
- Work with FDOT to identify resources to support additional enforcement campaigns, as needed.

Maintenance

- Support coordination among the MPO and City and County Maintenance offices for multi-use trails and facilities along and within State, County, and local rights-of-way.

Policy Review

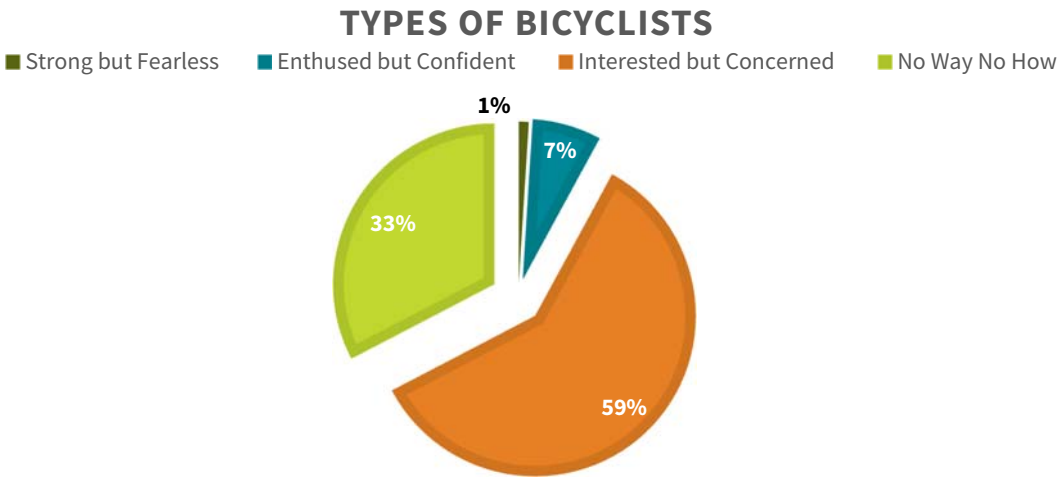
To ensure the integration of bicycle and pedestrian infrastructure into the County and local roadway systems in both counties, Land Development Codes, Facility Design guidelines, and Comprehensive Plans were reviewed to identify opportunities to update the plans and guidelines. Whereas this Master Plan is consistent with and builds upon the plans and guidelines, suggestions for edits have been included in the Appendix. It is recommended that plans and guidelines be reviewed periodically to ensure they are helping to create the environment envisioned.

Chapter 4 – Bikeways and Trails Toolbox

Bicycle and pedestrian facility design is evolving and, for many departments, including FDOT and Public Works, bicycle lanes have been included in the design of roadways for more than two decades. In the last 10 years, however, an increasing number of people have begun riding, and research indicates that most people need more than standard 4-ft bike lanes to feel comfortable riding.

In 2004, a paper by Roger Geller of the Portland Office (now Bureau) of Transportation suggested general categories and percentages of the types of bicycle users, as shown in Figure 13. The "no way no how" contingent of potential users is strong at 33%, but the "interested but concerned" group (59%) has shown that, with the construction of more protected, safer-feeling facilities, they are willing to ride a bicycle. In an increasing number of cities in which investments have been made in separated facilities such as side paths and in-road separated bike lanes, the percentages of bicyclists has increased.[13]

Figure 13: Bicyclist Rider Types



Source: Geller, Portland Office of Transportation, 2004

Level of Comfort and Facility Type

Because of the strong correlation between comfort and facility type, communities around the U.S. are developing bicycle networks that support more casual cyclists who may be interested in riding but are intimidated by sharing the road with vehicles. The City of Vancouver, for example, has developed an "All Ages and Abilities" (AAA) approach to some of its bicycling facilities to develop a network that targets the "interested but concerned" user group and begins to target the "no way no how" group. This approach is

[13] https://nacto.org/2016/07/20/high-quality-bike-facilities-increase-ridership-make-biking-safer/.

being applied to cities across North America. Figure 14 illustrates facility types and places them on the level-of-comfort spectrum. Whether or not an "all ages and abilities" approach is adopted, building facilities that are less protected (and, therefore, less comfortable) will limit users to those who are more comfortable on less-protected bicycle facilities.

Figure 14: All Ages and Abilities Facility Types by Comfort Level

Sources: City of Vancouver, Transportation Design Guidelines, All Ages and Abilities Cycling Routes

Much like the general trend seen around the country, the online survey developed to capture input for this Master Plan found that although many people ride and walk, the impediment for those who do not ride often is feeling unsafe; in total, 83% of survey respondents said there are places they want to ride in Hernando and Citrus counties but do not because they feel unsafe. As noted, comfort and safety are the primary motivators for people who ride by choice. Although those who are bicycle-dependent rarely attend meetings or sit on committees related to bicycle safety, it is important to remember that the routes they take should also be the safest and most comfortable available.

> **83%**
>
> *of survey respondents said there are places they want to ride in Hernando and Citrus Counties but do not because they feel unsafe.*

There are a variety of facility types and features that can be implemented to create bicycle networks. The following sections discuss potential on-road and separated facilities as well as supporting elements that should be considered, as appropriate, for both. Additional resources such as the American Association of State Highway and Transportation Officials (AASHTO) *Guide*

for the Development of Bicycle Facilities (2012), the National Association of City Transportation Officials *(NACTO) Urban Bikeway Design Guide,* and the Federal Highway Administration (FHWA) *Small Town and Rural Multimodal Networks Guide* (2016) should be consulted for the latest design guidance.

On-Road Facilities

Several different on-road bicycle facility types make use of the current roadway network by working between existing curbs; they can enhance the trail network by connecting parks and trails and creating transportation opportunities and accommodating different categories of users. They also tend to be less expensive to build and may be able to be implemented with a resurfacing project. Increasingly, as noted, research is showing that the more protection bicyclists have from vehicles, the more comfortable they feel and the more people ride. Following are facility types, from least to most protected, and a discussion of where they should be considered for construction.

Paved Shoulders

Shoulders are commonly used on rural roads that provide a separated space for bicyclists but are not marked as a bicycle facility. The minimum shoulder width is 4 ft., but on high-speed roadways or roadways with many bicycle users, wider shoulders are recommended (Figure 15).

Figure 15: Paved Shoulder

Rumble-Buffer Bike Lane[14]

This is an enhanced paved shoulder, primarily used along rural roads. Many cyclists report feeling unsafe on a standard paved shoulder, especially when adjacent to high-speed traffic or high volumes of trucks. Maryland DOT has been working to develop a rumble-buffer option for high-speed rural roads; by adding rumble strips and additional paint, the rumble-buffer bike lane adds additional separation between

[14] Safe Accommodation of Bicyclists on High Speed Roadways in Maryland, http://www.roads.maryland.gov/OPR_Research/ MD-16-SHA-UM-4-06_Bicycles-on-High-Speed-Roadways_report.pdf.

vehicles, continues to function as an emergency travel or stopping space, actively discourages either mode from entering the travel lane, and requires only a modest increase in shoulder width (Figure 16).

Bike Lanes

Bike lanes are spaces dedicated to bicycle travel on roadways. Typically, they are a minimum of 4-ft-wide if no curb and gutter, and 5-ft wide if included. Users are those who are comfortable riding with traffic; they represent a fairly small segment of the bicycle-riding community. This facility type should be considered during roadway resurfacing projects and can be used to make connections between trails. Bike lanes are not considered a preferred facility type for developing a community-friendly trail system (Figure 17).

Figure 16: Rumble-Buffer Bike Lane

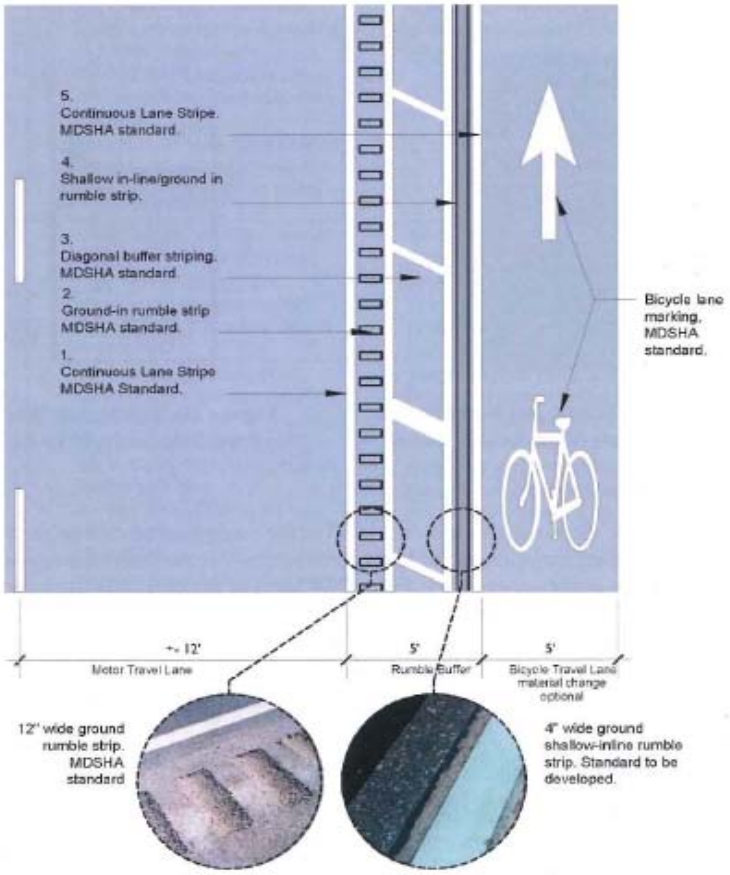


Figure 17: Marked Bike Lane

Buffered Bike Lanes

Buffered bike lanes are areas dedicated to bicycle travel on roadways that are 7-ft wide and include a painted buffer to provide extra space between bicyclists and adjacent vehicles. These facilities provide an additional degree of comfort for bicyclists and if bike lanes are being provided, should be considered for all new roads where higher volumes of bicycle traffic are anticipated (Figure 18). FDOT's policy is to install buffered bike lanes unless there isn't room to do so.

Figure 18: Buffered Bicycle Lane

Separated Bicycle Lanes

Separated bicycle lanes are on-road facilities that include a traffic separator and dedicated space for bicyclists. They can be one- or two-way depending on the need or the roadway condition and often can be constructed between existing curbs if the roadway has excess capacity. In urban areas, this type of facility can provide a high level of comfort for bicyclists, similar to that of a shared-use path. Design care must be taken at intersections and driveways. Adding this type of facility has been associated with an increase in bicycle usage (Figure 19).

Figure 19: Separated Bicycle Lane

Green Bike Lanes

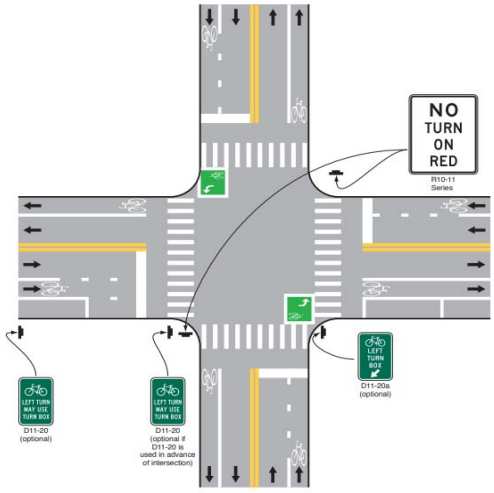
Green paint can be applied to bike lanes in areas of potential conflict where motorists must cross the bike lane to turn or to exit a parking area. Green paint is considered a traffic control device and is subject to guidance in the *Manual on Uniform Traffic Control Devices* (MUTCD), subject to Interim Approval 14 (Figure 20).

Figure 20: Green Bike Lane

Two-Stage Queue Box

A two-stage queue box allows bicyclists to more easily make a left turn. Rather than having to move into a turn lane to make a left turn, the turn box allows bicyclists to proceed across the intersection and position themselves to cross the intersection with the signal. It received FHWA Interim Approval IA-20 in 2017 (Figure 21).

Figure 21: Two-stage Queue Box



Advisory Bike Lane

An advisory bike lane is used on low-speed roadways where there is not enough room for both bike lanes and travel lanes. These markings communicate to both bicyclists and motorists where to ride while also communicating to motorists that they can pass when there is room (Figure 22).

Figure 22: Advisory Bike Lane

Advisory Shoulder

Advisory shoulders may be used on roads where it is not possible to construct a traditional shoulder. Using paint, space is designated for pedestrians within the travel lane; a dashed line is used to delineate the space may be crossed by motorists if the way is clear. Considered an innovative facility type by FHWA, an approved Request to Experiment is required to implement this facility on federally-funded projects. Additional information can be found it the FHWA's *Small Town and Rural Multimodal Networks.*

Bicycle Boulevard

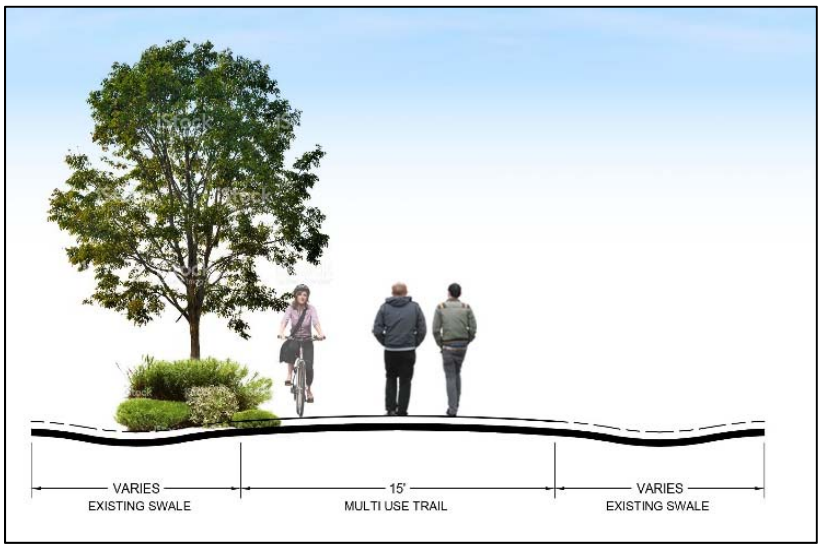
A bicycle boulevard is a low-volume, low-speed street designed to give bicycles priority, typically achieved by a combination of signage and infrastructure. Also called neighborhood greenways, bicycle boulevards generally provide convenient access to local destinations and often connect or go through neighborhoods (Figure 23).

Figure 23: Bike Boulevard

Multi-use Trails

AASHTO defines a multi-use trail as a bikeway that is typically in an independent right-of-way and separated from motorized traffic by open space or a buffer. It may be used for recreation or transportation purposes and falls under the accessibility requirements of the Americans with Disabilities Act (ADA) (Figure 24).

Figure 22: Multi-use Trail Section



Trailheads and Rest Areas

Rest areas and trailheads can take many forms, from the most basic parking lot with trail access to a major trailhead that includes parking, restrooms, water fountains, trail signage, and bike racks (Figure 25). Although the elements of each trailhead may be unique to its location and subject to available space and projected demand, generally, they can be separated into three categories. The provision of areas and elements, even if they do not fully conform to the category, is encouraged.

Figure 23: Shelter on Suncoast Trail

- **Major trailheads** include parking, restrooms, water fountains, bike racks, and a bike repair station. Parking at a major trailhead should be designed to accommodate trailers for recumbent bikes (for example, Suncoast Trail at SR 50)
- **Minor trailheads** include parking, seating, and bike racks.
- **Rest areas** may be a shelter adjacent to the trail; there may or may not be trail information and a trash can.

911 Emergency Response System Markers (ERSM)

Feeling safe on a trail is critical to its use. Installing location decals on trails such as that shown in Figure 26 is an increasingly common practice to both enhance the feeling of safety and allow emergency responders to locate trail users. Exercise distance monitors could also be considered so users can track distance according to the markers. In Hernando County, a process has been developed between the Parks & Recreation Trails Division and fire, EMS, and law enforcement agencies in which 911 operators use GPS to mark coordinates. It is increasingly common to install and maintain these markers for the life of a trail. Maintenance must include replacement of decals.

Figure 24: Embedded Pavement Decal

Trail Counters

Understanding trail usage is critical to properly staff and maintain trails. Information on usage can help make the case to expand the system or improve facilities. Cities across the US such as Boulder, San Francisco, and Seattle are installing trail counters (Figure 27). According to the Portland Bureau of Transportation, "… counting bicycles informs [us] about progress toward making bicycling a fundamental part of life in Portland and gives feedback about the usefulness of investments in bicycle infrastructure and city streets" (Brooks, 2014). It is recommended that trail counters be installed at major trailheads and at County lines, with a focus on the Coast-to-Coast Trail and the Suncoast Trail. Other possible locations along the Withlacoochee Trail should be considered.

Figure 25: Bicycle Barometer in Boulder, CO
(Source: PeopleForBikes)

Crossings

Trail/roadway intersections are essential components of a trails system because they are the most prone to conflict and crashes. Designing intersections that give bicyclists and vehicle operators enough time to react to each other is crucial to minimizing the opportunities for crashes. Several design tools are available to help all users navigate intersections, as described below.

Because each crossing is unique, the specific geometry and location will factor into the design of each intersection. It is important to note that circumstances of use may change over time; this should trigger a review and modification as needed of certain intersections. If, for example, a trail has a higher volume of users than might have been anticipated, it is recommended that the trail crossings be reviewed. It is also important to consider changes to surrounding land use. A crash trend or higher- than-projected volumes for either vehicles or bicyclists may require the need to redesign the crossing to address the challenges.

Stopping Sight Distance

Safety at trail intersections (trail and roadway, trail and driveway, etc.) relies on enough time for users of all modes to see any oncoming conflict. This "stopping sight distance" will vary depending on trail conditions, including slope and design speed. Additional information on calculating these distances can be found in the *AASHTO Guide for the Development of Bicycle Facilities* (2012).

Intersection Design

Trail crossings typically take one of three forms—mid-block, intersection, or grade-separated (over/underpass). Each has its own design and usage challenges. These crossing types are discussed below; refer to the AASHTO *Bike Guide*, section 5.3, and AASHTO's *Guide for Planning, Design and Operation of Pedestrian Facilities* for more details. Determining assignment of right-of-way at an intersection is of critical importance and, typically, the approach taken should be to apply the least traffic control that will be effective.

Unsignalized Crossings

Unsignalized crossings occur where a trail intersects with a roadway. Assignment of right-of-way is key to identifying the appropriate traffic control devices for the circumstance. Factors such as traffic and trail volume, sight distance, and grade should be taken into account. High-visibility crosswalks with appropriate signage and markings for both modes should be the minimum. Per AASHTO, the amount of restriction placed at an intersection should be appropriate for the intersection. Unnecessary risk and disregard of signage can result if more restriction than necessary is included at intersections.

Enhanced At-Grade Crossing or Signalized Crossing

A Pedestrian Hybrid Beacon is a pedestrian-activated traffic control device that is dark to motorists until activated by a pedestrian, at which time a flashing yellow light followed by a solid red light is provided to motorists to direct them to stop (Figure 28). The solid red advances to a flashing red that allows motorists to proceed with caution once the pedestrian has cleared the crossing).

Figure 26: Pedestrian Hybrid Beacon

A Rectangular Rapid Flashing Beacon (RRFB) (Figure 29) is a traffic control device consisting of two rapidly and alternately flashing rectangular yellow indications with an LED array that functions as a warning beacon. This device has Interim Approval through FHWA for use at unmarked crosswalks.

Figure 27: RRFB, St. Petersburg, FL

Trail/Subdivision Intersections

Trail/subdivision entrances often are challenging because of design and volume of users. It is important to treat these like an unsignalized intersection, with adequate sight distance and assignment of priority. “Yield” signs should be considered unless residential volume is high. High-visibility crosswalks or a variation that uses green paint should be considered to bring attention to the crossing.

Overpasses and Underpasses

Overpasses and underpasses could be considered in locations where traffic volumes are too high to manage with an at-grade crossing, such as multi-lane highway crossings. In some instances, based on usage volume, it may be appropriate to consider the construction of an overpass as part of a long-term plan for the trail.

Crosswalks

Crosswalks provide critical clarification at intersections, identifying a safe space for bicyclists and pedestrians to cross and heightening the visibility of users of the crossing. The design of a crosswalk should depend on the facility type, adjacent street function, surrounding land use, and level of potential conflict.

The Small Town and Rural Design Guide has identified several factors that can be included to make a crossing safer, including median islands, raised crossings, and crosswalk markings (see Figure 30). NACTO's *Bikeway Design Guide* has also identified a number of crosswalk designs that can be implemented depending on context. Features highlighted in the guide include green paint in the intersection and "elephant tracks" or wider white striping along the outside of the intersection.

It is recommended that each intersection or crossing be designed for the context, including the features that would provide the most clarity for all users of the crossing.

Figure 28: Shared-use Path Crossing

(Source: FHWA Small Town and Rural Design Guide)

Geometric Trail Design Criteria

Basic trail design criteria are provided below. More detail can be found in the *AASHTO Guide for the Development of Bicycle Facilities* and the *AASHTO Guide for the Development of Bicycle Facilities*.

- **Lateral Clearance** – The minimum lateral clearance distance is 2 ft. MUTCD requires 3 ft. clearance between trail and signage.
- **Overhead Clearance** – The recommended overhead clearance for structures is 1 ft., with a minimum of 8 ft. Trees should be limbed up 13 ft. above the trail surface.

- **Striping** – Striping may be installed where passing is inadvisable, including at the approach and departure of intersections. Striping may also be advisable where trail user volume is high, sight distance is restricted, or design speed is low.
- **Cross Slope –** Shared-use paths adjacent to roadways function as sidewalks according to Public Rights-of-Way (PROWAG) and, therefore, cannot have a cross slope greater than 2%. A 1% cross-slope is recommended for ease of use by people with disabilities.
- **Grade** – The maximum grade of a shared-use path adjacent to a roadway is 5%. Grades for paths in an independent right-of-way should not exceed 5%. Switchbacks and pull-outs can be provided to mitigate excessive grade changes. Signage also should be provided to warn users of grade changes.

Wayfinding

Wayfinding is an important component of a bicycle network and can be defined as:

> … a system [that consists] of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes. (*NACTO Urban Bikeway Design Guide*)

Both Hernando and Citrus counties have areas that would benefit from signage that informs bicycle riders in the same way roadway signage informs motorists. Although cell phones have put maps and information at rider fingertips, signage creates confidence in the route being traveled and can quickly and conveniently convey directions and distance. Locally, Inverness and Brooksville have established signage plans, and signage also exists along US 41 to guide users to the Withlacoochee State Trail. A signage plan also is being developed for the Coast-to-Coast Trail and will facilitate co-branding with Brooksville. Beyond big projects such as regional trails, there is the need to provide information about the best routes to travel through neighborhoods or to make connections to destinations. It is recommended that a wayfinding plan be developed for the Citrus Hills and Citrus Springs neighborhoods in Citrus County.

National Guidance

Signage used on roadways is regulated by MUTCD, and NACTO has developed a reference guide that can be used to help develop a wayfinding signage plan.

MUTCD

MUTCD addresses aspects of bicycle signage and placement. Section 9B.20, Bicycle Guide Signs, identifies standard sign color, but there is no specification for bike boulevard or bikeway signage. Chicago, Berkeley, and Tucson have developed their own bicycle wayfinding signage designs.

MUTCD Section 2D.50, Community Wayfinding Signs, outlines guidance for this type of signage and allows for color variation, as long as the colors used are not those used in regulatory or warning signage (i.e., Stop, Yield, Work Zone).

NACTO

NACTO's *Urban Bikeway Design Guide* has been endorsed by FHWA for reference in designing urban bicycle infrastructure. The goal of the guide is to provide cities with state-of-the-art-practice solutions that can help create complete streets that are safe and enjoyable for cyclists. The guide's chapter on "Bike Route Wayfinding Signage and Markings System" describes a wayfinding system as comprehensive signing and/or pavement markings and identifies three types of signs that should be used when developing a bicycle wayfinding signage system:

- **Confirmation signs** help bicyclists know they are on a bike route and also let motorists know they are on a road that may have higher bicycle traffic. Placement should be every 2–3 blocks and used in conjunction with turn or decision signs. Pavement markings also can be used as confirmation.
- **Turn signs** indicate when the bikeway/bike boulevard is shifting to another street. It is recommended that destination and distance be listed on the sign. Pavement signage can be used.
- **Decision signs** mark the intersection of routes and access to destinations and typically include arrows, named destinations, and distances. Pavement signage can be used.

Figure 29: Wayfinding Signage Example, Gresham, OR

While the details might not be known until a signage program was developed, the approach to laying out signage is to post signs at decision points and providing information about destinations. It is increasingly common for communities to develop wayfinding signage strategies that market their brand. Figure 31 is an example of a wayfinding sign from Gresham, OR that identifies destinations and distances and also includes local marketing information.

Trends

When planning for the future of the bikeways and trails system in Hernando and Citrus counties, it is important to understand how current trends might impact future needs and to allow enough flexibility to respond as things change. Currently, in addition to the trend in increasing ridership, one of the most important trends in bicycling is bike-sharing. Bicycle sharing systems allow users to check-out a bike for a small rental fee. They can use fixed docking stations or be "dockless", allowing bike to be locked to anything. Each system has its own challenges that need to be planned for. Fixed docking stations need a permanent location and dockless bikes may need appropriate locations for locking up bikes. Bike-sharing has expanded to include e-bikes which have expanded the reach of bike share letting users comfortably ride longer distances. Both innovations have had a tremendous influence on a relatively new phenomenon; bike-sharing was already changing commute patterns in high-density areas and offering an answer to the first/last mile challenge presented by transit. E-bikes—bicycles with a battery-powered pedal assist or throttle—with their longer range and ease-of-use make them an option for an even broader group of users.[15] Sales of e-bikes have grown (by 25% from 2016 to 2107[16]), and cities are grappling with how to incorporate them into their transportation systems. Issues range from parking, often seen with dockless bike share, to their place on the road and how these bikes interact with motorists and other bicyclists.

The CV Link is a mixed motorized trail designed to cover an 80-mile portion of a larger multimodal pathway connecting nine cities to accommodate low-speed electric vehicles in addition to bicycles and pedestrians.

E-bikes typically have a maximum speed of 20–28 mph, which, although low speed, conflicts with the cruising speed of an average bicyclist. Additionally, use of other low-speed vehicles such as cargo bikes, scooters, and driverless shuttles are on the rise and may require the reallocation of roadway space and the re-imagining of trails and roadways to encompass a wider range of vehicles and speeds.

The advent of different kinds of bicycles also means different demands for bicycle parking. Docks for bike share systems take up space, often on sidewalks and dockless bike parking needs to be convenient yet out of the way of pedestrians. Trailheads have always needed to accommodate recumbent bicycle parking and the trailers that are used to haul them, and bicycle parking is considered key to getting people to use bicycles for short trips, so it needs to be incorporated into destinations such as shopping areas and downtowns. Convenient parking in shopping areas and destinations that are also within close

[15] https://www.bicycling.com/skills-tips/a20044021/13-things-about-e-bikes/.
[16] https://cyclingindustry.news/u-s-electric-bike-market-up-at-least-50-says-market-analysts-ecycleelectric/.

proximity to residential areas can increase the likelihood that people will choose to ride instead of drive. The increasing use of Uber and Lyft means that bike parking should be considered in tandem with loading zones.

A related concept, one that brings multiple modes together, is the mobility hub, the aggregation of various modes to increase efficiency. An example of this is a bike-share dock or parking at a bus stop to help users move seamlessly between bike and bus. Access to these hubs should be supported by the best possible versions of infrastructure such as separated bike lanes and enhanced intersection and would make sense at high use transit stops or destinations.

Because the sidewalk tends to be the nexus for all of this activity, this increased pressure highlights the increasing need for sidewalk demand management. Although walkable places are a focus of any downtown, with bustling sidewalks and amenities, consideration will need to be given to the special needs for bicycles.

Chapter 5 – Recommendations and Implementation Plan

This Master Plan was developed in two parts to reflect short-term needs and a long-term vision. Achieving the Vision will require collaboration and a commitment to creating a bicycle-friendly community and is assumed to be achieved primarily as roadways are expanded.

As described in Chapter 3, there are a variety of facilities appropriate for bicyclists ranging from buffered bike and marked bike lanes to completely separate trails. Sidewalks are not included in this list and are not recommended as appropriate for bicyclist travel. While bicyclists often ride on sidewalks if they are uncomfortable or feel unsafe on the roadway, riding on sidewalks has been shown to be dangerous and in some communities in Florida is illegal.[17]

Public Engagement

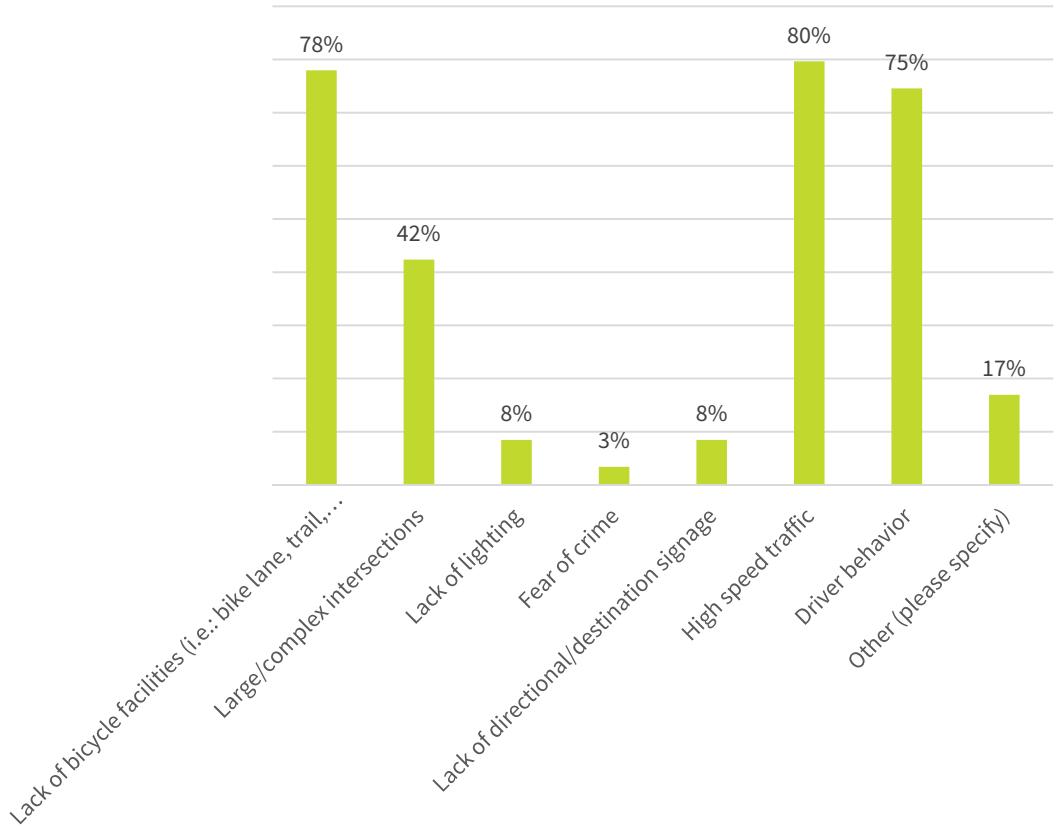
The public engagement effort for this project was multi-faceted. In addition to staff and committee feedback, on-line survey and mapping tools were used to compliment workshops held in each County. A Project Advisory Team, made up of committee members, was also convened several times during plan development to review workshop and on-line feedback. Input from the different groups influenced the development of the goals as well as the prioritization criteria and the final spot project or needs list.

The Public Engagement Memo as well as the raw feedback received from the survey and the web-mapping tool can be found in the Appendix. In the on-line survey, respondents were given a series of questions about bicycling conditions to gauge their concerns as well as what they considered important. The responses to the question about safety and desired facility types are included below. These responses helped form the basis of the policy to include separated facilities in roadway widening projects.

Respondents were asked **If biking, what makes you feel unsafe?** They could note more than one. As shown in the chart below, 80% identified high speed traffic as the factor that makes them feel unsafe. This was closely followed by the lack of bicycle infrastructure (78%), and driver behavior (75%). Things noted in the "Other" category included high volume traffic, narrowness of certain roads, the lack of a bike lane or shoulder and debris in the bike lanes.

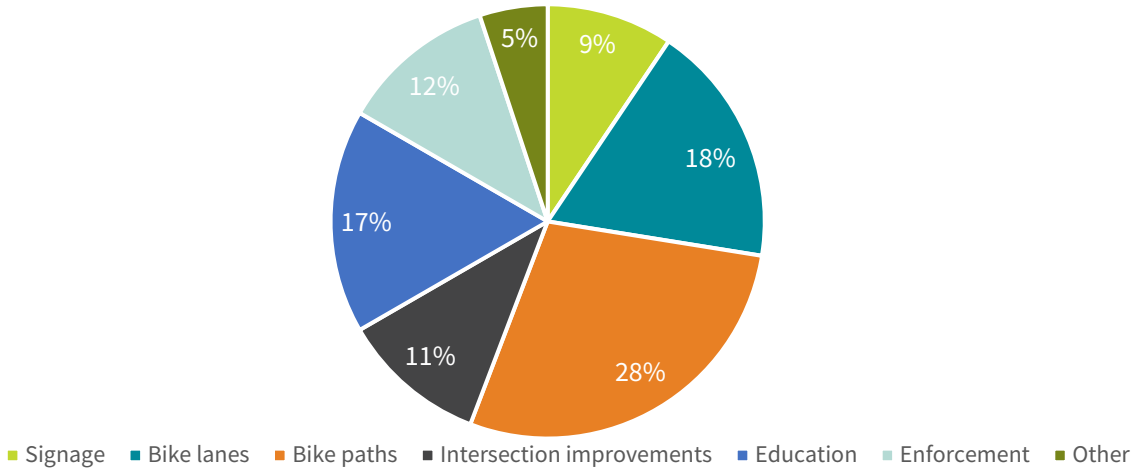
[17] Alan Wachtel, Diana Lewiston, "Risk Factors for Bicycle-Motor Vehicle Collisions at Intersections," http://www.bicyclinglife.com/Library/Accident-Study.pdf

Figure 30: What Makes You Feel Unsafe When You Ride?



Respondents were also asked **What bike support would you like to see more of in Hernando/Citrus counties? (i.e., signage, bike lanes, bike paths, intersection priority, bicyclist and driver education, enforcement).** As seen in Figure 33, Bike lanes, paths (trails) and education were the top three items selected. Other items listed include lighting, restrooms, and resurfacing. Things noted in the "Other" category included maintenance, lighting and weather protection.

Figure 31: Facilities Respondents Would Like to Have



Vision Maps

Vision Maps were developed to illustrate an ultimate bicycle and pedestrian network for each county. These maps offer the possibility of more comfortable bicycle facilities on a variety of roads, acknowledging the trends in facility design and the impact on ridership. The Vision acknowledges individual city plans and incorporates them. Many who attended the Master Plan workshops expressed interest in being able to travel between cities and towns, and it is most often the State and County roads that make this possible.

Noteworthy on the maps is the addition of multi-use trails adjacent to County and State roads. This aligns with the Citrus County commitment to add trails adjacent to roadways whenever they are widened and also aligns with the 2017 MPO resolution to request that FDOT include separated multi-use paths or widewalks in the design of their collectors and arterials. The feasibility of separated facilities was not analyzed other than by spot review, so the actual implementation of such facilities would need to be determined during design, subject to drainage and right-of-way constraints. The approach should be to attempt to include separated facilities; if these are determined to not be feasible or to be feasible only in sections, then plans should include the next-safest facility, which on rural roads would be wider, buffered shoulders. In more-developed areas, a buffered bike lane or a separated bike lane may be more appropriate. The Vision Maps for each county are provided in Figures 34 and 35.

Figure 32: Bikeways and Trails Vision Map for Citrus County

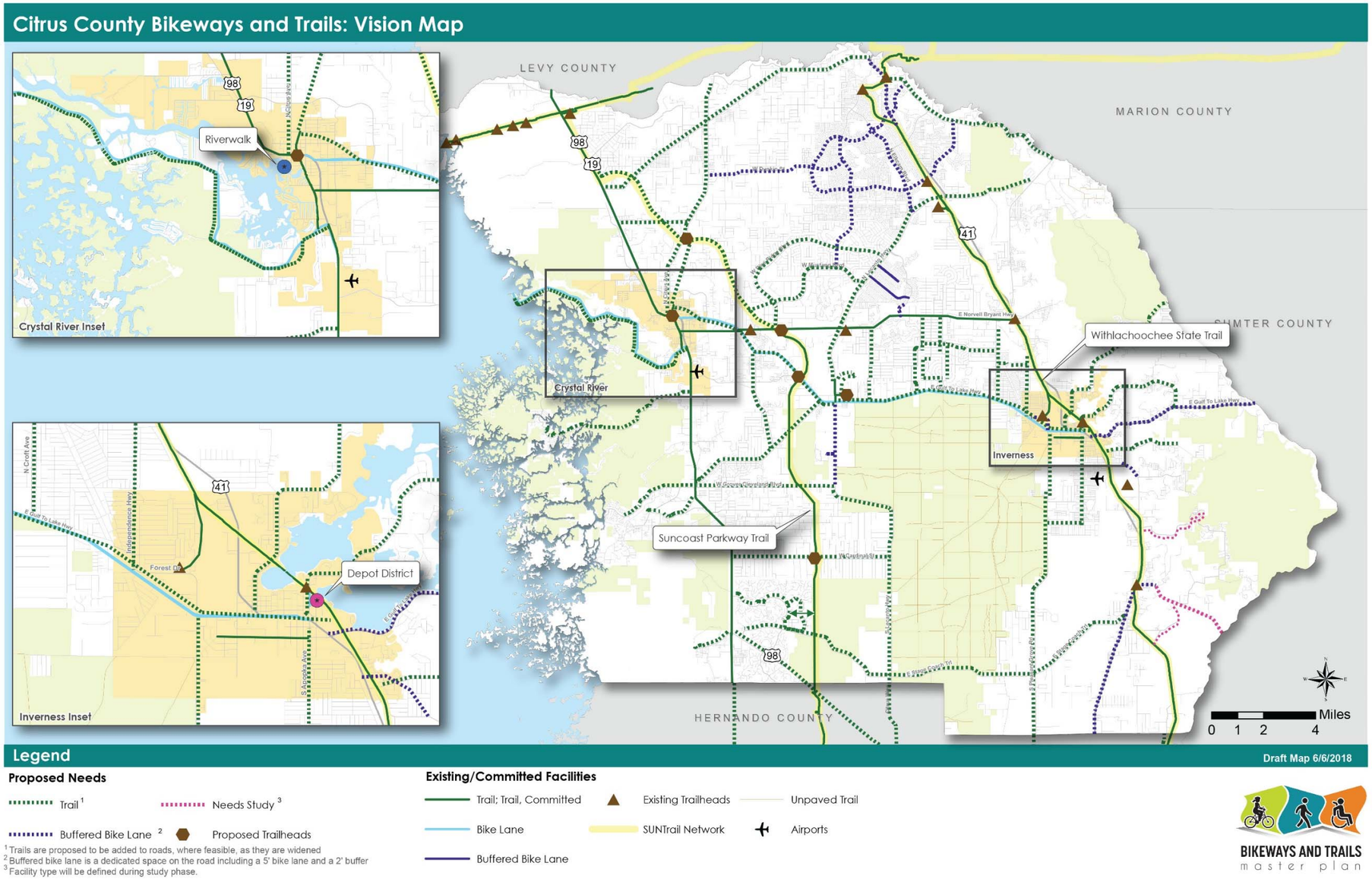
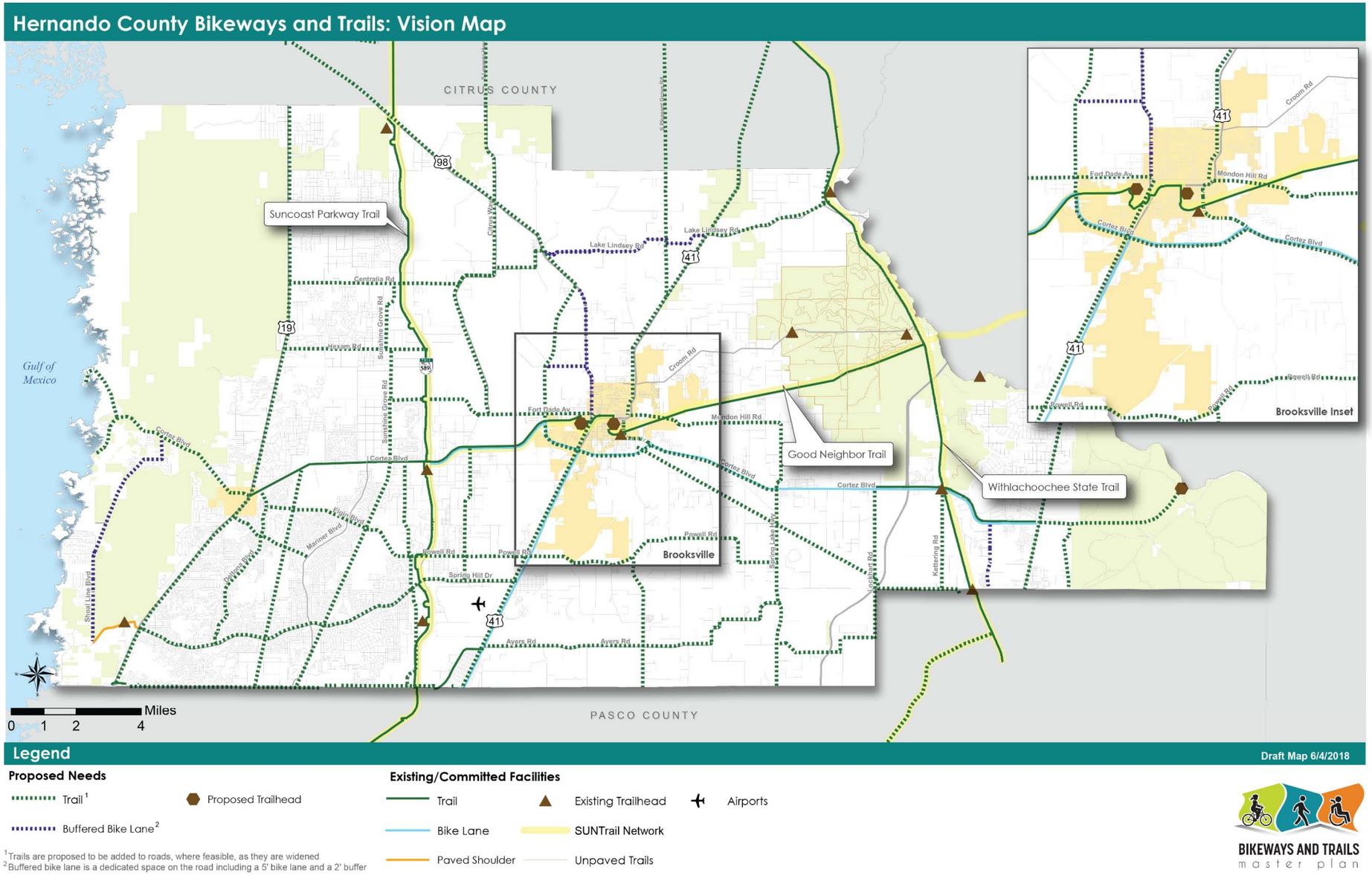


Figure 33: Bikeways and Trails Vision Map for Hernando County



Needs

Throughout the planning process, it became apparent that there are myriad perspectives on what makes a good bicycle network. Early discussions covered everything from fixing the existing trails to planning for new trails. To capture this input, several strategies were used—an online mapping tool was used to capture location-specific input, an online survey tool was used to obtain facility and needs input and opinions, and two workshops were held for in-person discussions. All feedback was compiled, categorized, and reviewed with MPO staff. More detail about these efforts can be found in the Public Engagement Memo in the Appendix.

Many comments received dealt with existing facilities, which were assigned to an "Existing Facility Issues" category and routed accordingly. Comments related to the Withlacoochee State Trail will be addressed in future studies that address it specifically. Another group of comments was related to concerns about existing trail construction and were provided to the responsible County agency. All feedback was reviewed by the Project Advisory Team (PAT).

Other comments addressed the desire to add amenities such as camping and other trip support. Because of the economic development possibility offered by the trails system, OGT was identified as a valuable partner in this process and was engaged as a stakeholder to partner in future opportunities for plan development. Finally, a number of comments will be addressed by the upcoming construction of the Brooksville segment of the Coast-to-Coast Trail, scheduled for completion in 2022 or by the Citrus County policy to add multi-use paths and bike lanes as part of capacity projects.[18] Projects included in the Long Range Transportation Plan (LRTP) also are candidates for bicycle facilities as envisioned in the Master Plan. The breadth of these comments illustrates the needs and opportunities important to many in each community.

In addition to trail connections, specific locations and destinations within areas were identified as part the mapping and workshop exercises. Being able to ride to a variety of destinations is in line with the Master Plan Vision of creating a comfortable bicycling environment. Some of those will be addressed by trail plans that are under construction, including the multi-use trail along US 19 being constructed as part of an FDOT widening project. Other destinations, such as riding around Crystal River, will benefit from a scheduled resurfacing project that will add buffered bicycle lanes and several mid-block crossings.

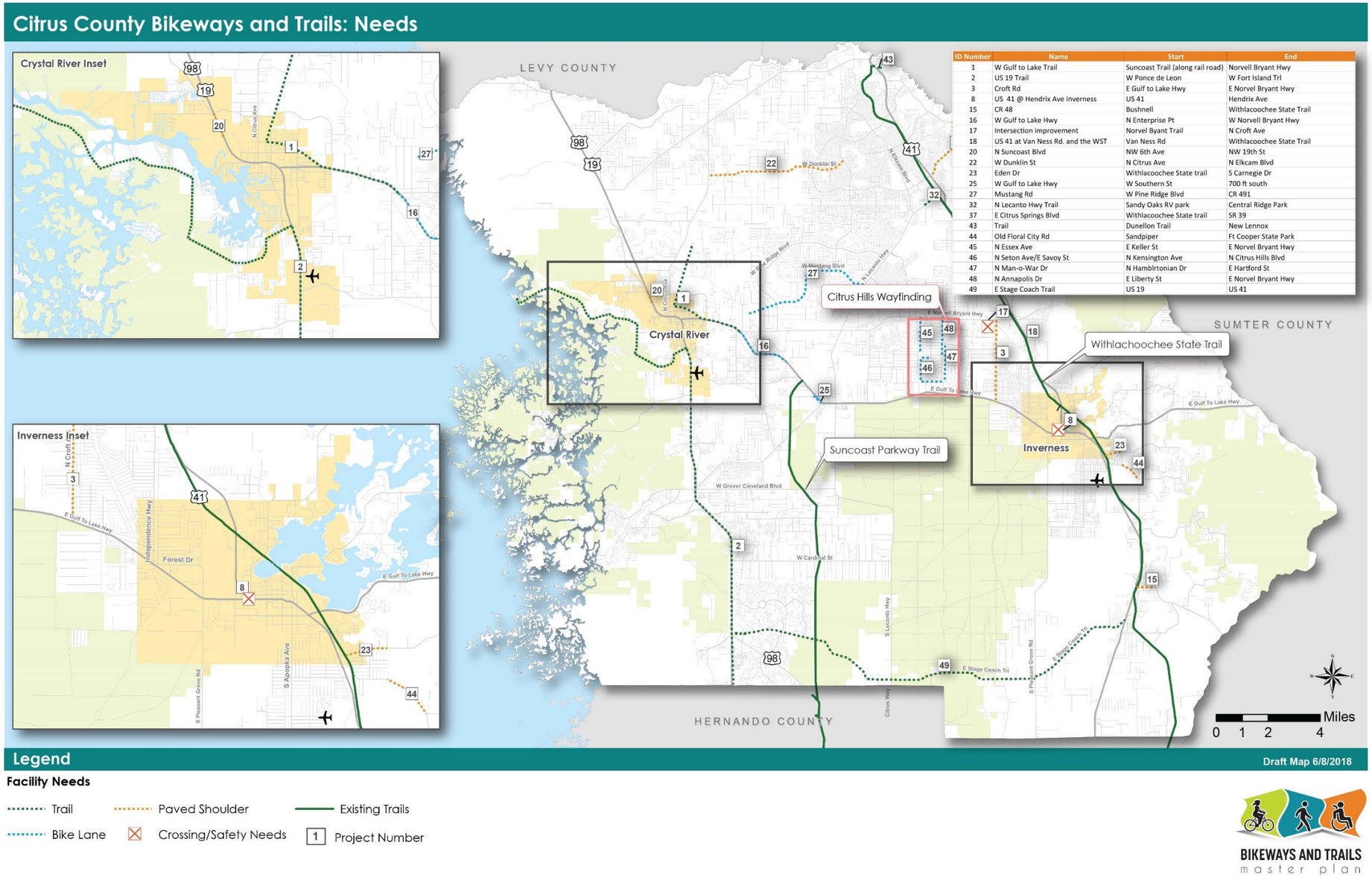
The draft list of needs was analyzed according to the evaluation criteria and ordered by points, with the most points indicating the highest-priority projects. A map of the project needs for each county was developed, and the list was evaluated by MPO staff and reviewed at the second PAT meeting. The PAT discussed the list and the needs maps, and the needs were further refined.

[18] Citrus County facility width criteria are included in the Appendix.

Limited funds necessitate that projects must be prioritized, but this does not preclude incorporating projects that may be lower on the list into planned infrastructure improvements to take advantage of funding sources or infrastructure projects. Based on feedback from the MPO committees, projects from this process will be reviewed for feasibility and added to the Hernando and Citrus County Complete Streets Lists for submission to FDOT for discussion and funding options, including Surface Transportation Block Grant Program and Highway Safety Improvement Program (HSIP) Funds.

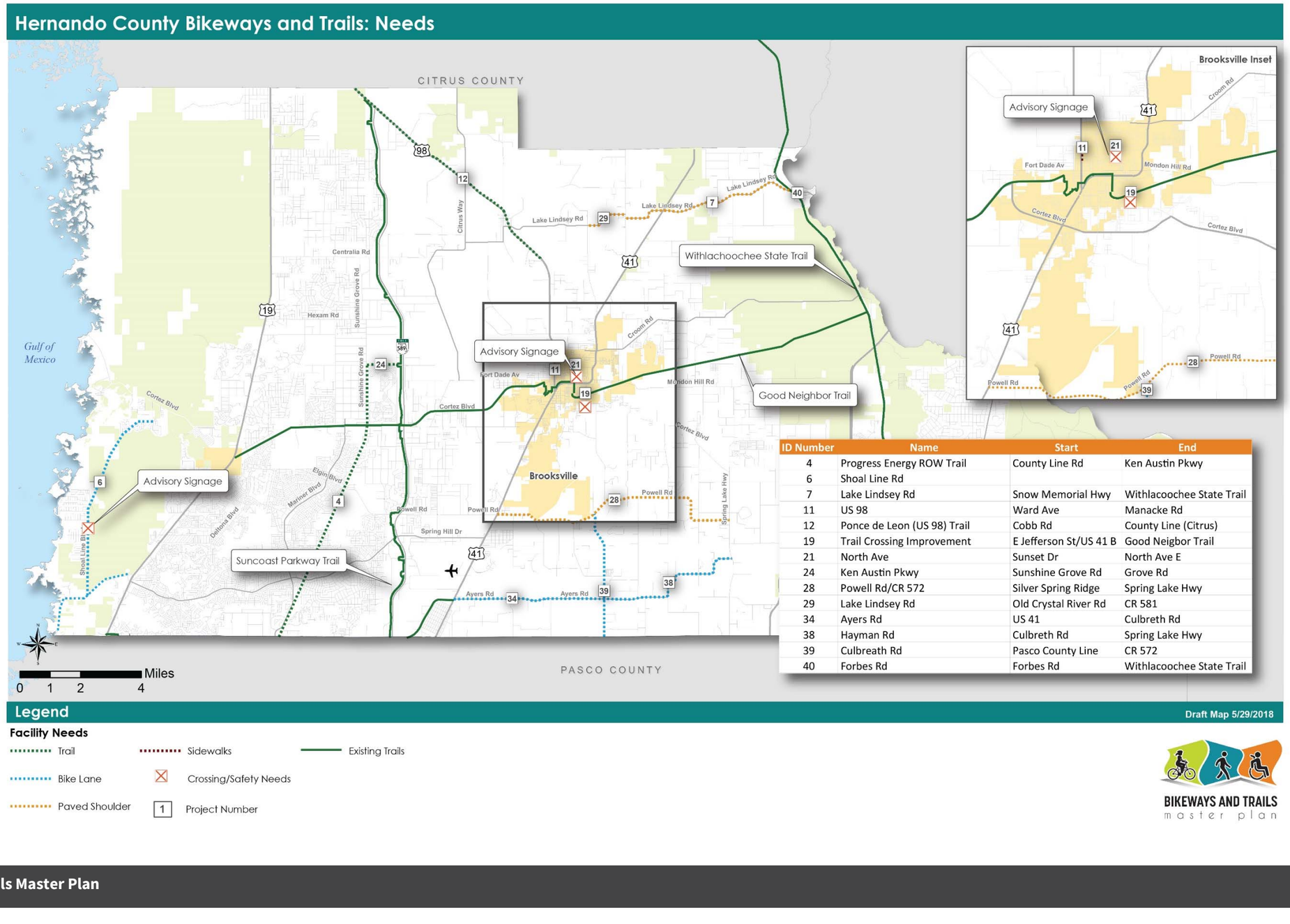
Maps of the needs projects for each county are provided in Figures 36 and 37.

Figure 34: Bicycle Needs, Citrus County



ID Number	Name	Start	End
1	W Gulf to Lake Trail	Suncoast Trail (along rail road)	Norvell Bryant Hwy
2	US 19 Trail	W Ponce de Leon	W Fort Island Trl
3	Croft Rd	E Gulf to Lake Hwy	E Norvel Bryant Hwy
8	US 41 @ Hendrix Ave Inverness	US 41	Hendrix Ave
15	CR 48	Bushnell	Withlacoochee State Trail
16	W Gulf to Lake Hwy	N Enterprise Pt	W Norvell Bryant Hwy
17	Intersection improvement	Norvel Byant Trail	N Croft Ave
18	US 41 at Van Ness Rd. and the WST	Van Ness Rd	Withlacoochee State Trail
20	N Suncoast Blvd	NW 6th Ave	NW 19th St
22	W Dunklin St	N Citrus Ave	N Elkcam Blvd
23	Eden Dr	Withlacoochee State trail	S Carnegie Dr
25	W Gulf to Lake Hwy	W Southern St	700 ft south
27	Mustang Rd	W Pine Ridge Blvd	CR 491
32	N Lecanto Hwy Trail	Sandy Oaks RV park	Central Ridge Park
37	E Citrus Springs Blvd	Withlacoochee State trail	SR 39
43	Trail	Dunellon Trail	New Lennox
44	Old Floral City Rd	Sandpiper	Ft Cooper State Park
45	N Essex Ave	E Keller St	E Norvel Bryant Hwy
46	N Seton Ave/E Savoy St	N Kensington Ave	N Citrus Hills Blvd
47	N Man-o-War Dr	N Hamblrtonian Dr	E Hartford St
48	N Annapolis Dr	E Liberty St	E Norvel Bryant Hwy
49	E Stage Coach Trail	US 19	US 41

Figure 35: Bicycle Needs, Hernando County



ID Number	Name	Start	End
4	Progress Energy ROW Trail	County Line Rd	Ken Austin Pkwy
6	Shoal Line Rd		
7	Lake Lindsey Rd	Snow Memorial Hwy	Withlacoochee State Trail
11	US 98	Ward Ave	Manacke Rd
12	Ponce de Leon (US 98) Trail	Cobb Rd	County Line (Citrus)
19	Trail Crossing Improvement	E Jefferson St/US 41 B	Good Neigbor Trail
21	North Ave	Sunset Dr	North Ave E
24	Ken Austin Pkwy	Sunshine Grove Rd	Grove Rd
28	Powell Rd/CR 572	Silver Spring Ridge	Spring Lake Hwy
29	Lake Lindsey Rd	Old Crystal River Rd	CR 581
34	Ayers Rd	US 41	Culbreth Rd
38	Hayman Rd	Culbreth Rd	Spring Lake Hwy
39	Culbreath Rd	Pasco County Line	CR 572
40	Forbes Rd	Forbes Rd	Withlacoochee State Trail

BIKEWAYS AND TRAILS
master plan

Evaluation and Prioritization

Project Evaluation Criteria

There are no dedicated funding sources for bicycle facility construction projects in either county, so projects are generally either submitted for Surface Transportation Block Grant Program (formally TA funds) funding through FDOT or are funded as part of roadway reconstruction or resurfacing projects. Given this constraint, projects that were identified during Plan development were evaluated by prioritization criteria to identify relative need and may be considered for inclusion on future versions of the MPO Compete Streets project lists or as part of local projects. As in previous funding cycles, MPO staff and committee input were used in conjunction with the evaluation and prioritization to determine ranking and are subject to review and modification annually, as has been the MPO process.

To better reflect the project goals, the criteria used for prior evaluation were modified to reflect the emphasis on safety, connectivity, and equity. The ranked project list developed for the Master Plan, including criteria and scoring, is provided in the Appendix. These projects may be considered by the MPO committees for addition to the Priority Lists for future funding. Any future projects will be evaluated according to the criteria and reviewed by the committees before adding them to the annually-adopted list.

Whereas an initial identification of needs and opportunities illustrates the scope of the Master Plan, the review and prioritization of the lists according to goals of the counties and the overall Plan helps create direction and focus. Adding separated trails to satisfy the Vision is considered a separate endeavor that would not compete with the short term or gap projects.

Table 5 shows needs or project opportunities by county and by type. The feasibility of the improvements identified below will be determined during design.

Table 5: Needs Identified During the Public Engagement Process

County	Roadway/Project	To	From	Type
Citrus	N Essex Ave.	E Keller St.	E Norvell Bryant Hwy	Bike Lane
Citrus	N Seton Ave/E Savoy St.	N Kensington Ave.	N Citrus Hills Blvd	Bike Lane
Citrus	N Man-o-War Dr.	N Hambletonian Dr.	E Hartford St.	Bike Lane
Citrus	N Annapolis Dr.	E Liberty St	E Norvell Bryant Hwy	Bike Lane
Citrus	Mustang Rd.	W Pine Ridge Blvd	CR 491	Bike Lane
Citrus	W Gulf to Lake Hwy	N Enterprise Pt	W Norvell Bryant Hwy	Bike Lane
Citrus	W Gulf to Lake Hwy	W Southern St.	700 ft. south	Bike Lane
Citrus	US 41 @ Hendrix Ave Inverness	US 41	Hendrix Ave	Crossing
Citrus	Intersection improvement	Norvell Bryant Trail	N Croft Ave	Crossing
Citrus	Croft Rd.	E Gulf to Lake Hwy	E Norvell Bryant Hwy	Paved shoulder
Citrus	E. Citrus Springs Blvd	Withlacoochee State trail	SR 39	Paved shoulder
Citrus	CR 48	Bushnell	Withlacoochee State Trail	Paved shoulder
Citrus	N Suncoast Blvd	NW 6th Ave.	NW 19th St.	Paved shoulder
Citrus	W Dunklin St.	N Citrus Ave.	N Elkcam Blvd	Paved shoulder
Citrus	Old Floral City Rd.	Sandpiper	Ft Cooper State Park	Paved shoulder
Citrus	Eden Dr.	Withlacoochee State trail	S Carnegie Dr.	Shared Lane Marking
Citrus	Trail	Whispering Pines Park	Withlacoochee State Trail	Trail
Citrus	Trail	Sandy Oaks RV park	Central Ridge Park	Trail
Citrus	US 41 at Van Ness Rd and the WST	Van Ness Rd	Withlacoochee State Trail	Trail
Citrus	Trail	Dunellon Trail	New Lennox	Trail
Citrus	Trail	Suncoast Trail (along rail road)	Norvell Bryant Hwy via W Gulf to Lake	Trail
Citrus	Trail	W Ponce de Leon	W Fort Island Trl.	Trail
Hernando	North Ave.	Sunset Dr.	North Ave E	Advisory sidewalk
Hernando	Shoal Line Blvd.	Osowaw Rd.	Cortez Blvd	Advisory signage
Hernando	Ayers Rd.	US 41	Culbreth Rd.	Bike Lane
Hernando	Hayman Rd	Culbreth Rd	Spring Lake Hwy	Bike Lane
Hernando	Culbreath Rd.	Pasco County Line	CR 572	Bike Lane
Hernando	E Jefferson @ GNT	E Jefferson St/US 41 B	Good Neighbor Trail	Crossing
Hernando	Powell Rd/CR 572	Silver Spring Ridge	Spring Lake Hwy	Paved shoulder
Hernando	CR 476	Old Crystal River Rd	CR 581	Paved shoulder
Hernando	CR 476	Snow Memorial Hwy	Withlacoochee State Trail	Paved shoulder
Hernando	US 98	Ward Ave.	Manacke Rd.	Sidewalk
Hernando	Progress Energy ROW	County Line Rd	Ken Austin Pkwy	Trail
Hernando	Ken Austin Pkwy	Sunshine Grove Rd	Grove Rd.	Trail
Hernando	Ponce de Leon (US 98)	Cobb Rd.	County Line (Citrus)	Trail
Hernando	Forbes Rd to WST	Forbes Rd.	Withlacoochee State Trail	Trail

Multi-use Trail Typical Sections

Multi-use trail or separated facility design is critical to user enjoyment and safe operation. Chapter 3 described different elements of a bikeway and trail network, and the Figures 38-41 present general illustrations of trail and sidewalk facilities. Location needs and community feedback may identify other options that might better serve the needs of the area. These context-specific needs, as well as any drainage or right-of-way issues that might have an impact, would be determined at the time of design.

Figure 36: Local Road with Sidewalk

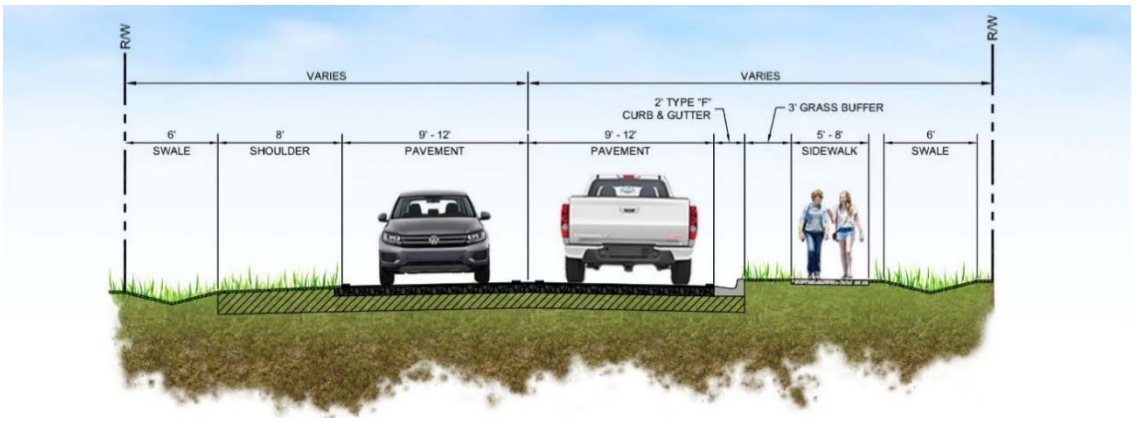


Figure 37: Two Lane Collector with Multi-use Trail

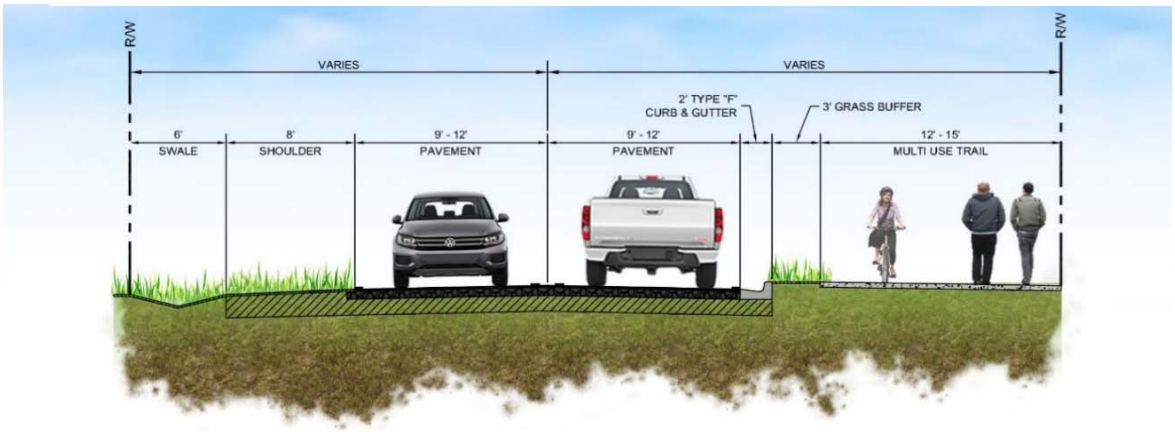


Figure 39: Four-lane Collector or Arterial Road with Trail and Sidewalk

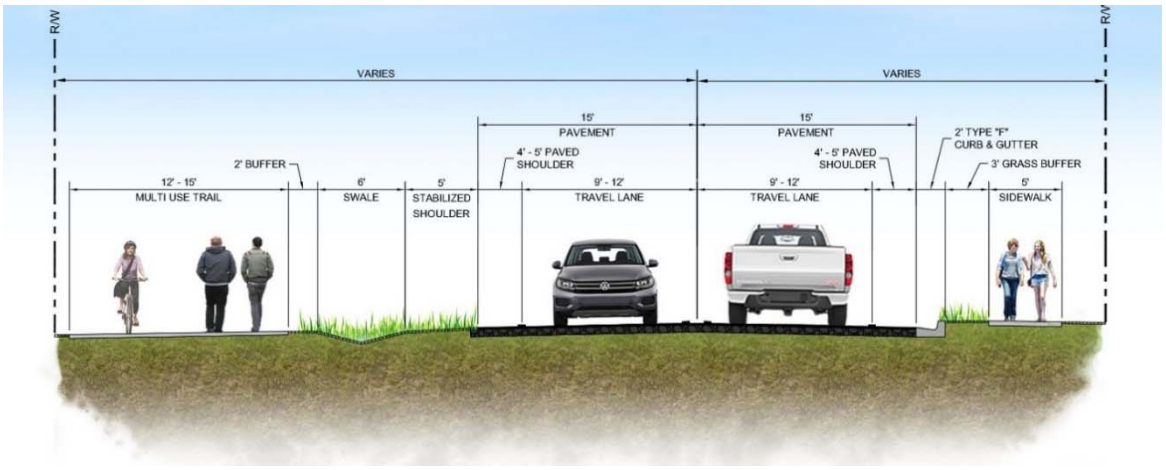
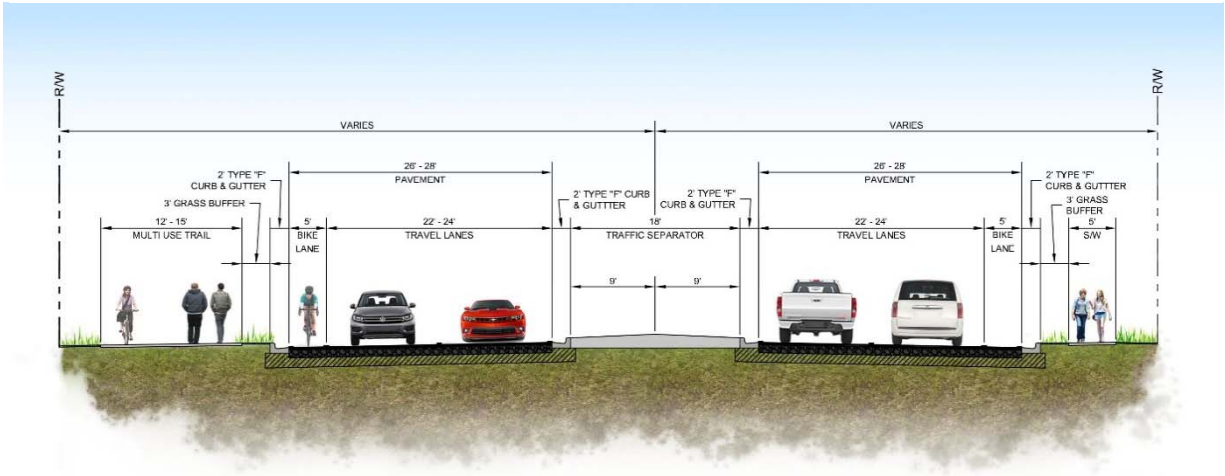


Figure 38: Four Lane Collector with Multi-use Trail and Sidewalk



Bicycle Facilities for Comfort and Safety

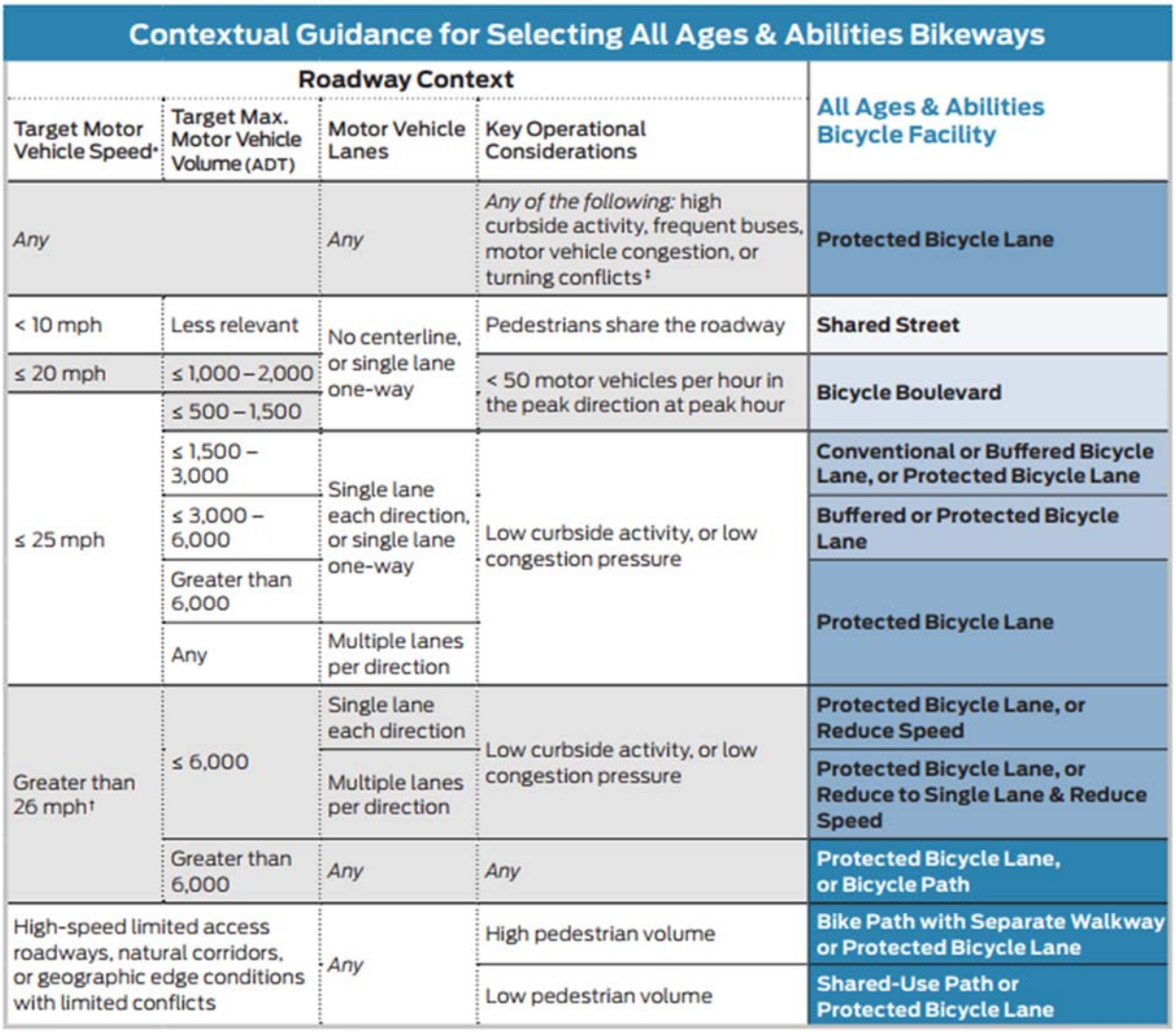
Generally, the preferred roadway combination is a trail on one side and a sidewalk on the other. In urban locations, low-speed, low-volume roadways with signage may be appropriate bicycle facilities, or a separated bike lane may be considered. In rural areas, if a separated multi-use trail cannot be achieved, a rumble shoulder or buffered shoulder may be an appropriate facility.

Cost is often the primary determinant in the selection of bicycle facility type. This can lead to the construction of a facility that does not truly meet the needs of bicycle riders. An example of this is a bike lane on a high-speed, high-volume road; a primary reason for this is cost, as building within the curbs is much less expensive than reconstructing a curb. Another reason for adding a bicycle lane might be to

help manage speed on the roadway, but this approach, although providing a facility, does not provide one that is comfortable for a majority of bicycle riders.

This Master Plan proposes that during all roadway reconstruction projects, a separated trail facility be included during design. This resolves the discomfort and danger people feel when sharing the roadway with trucks or fast-moving cars and also helps to build a bicycle network that serves everyone. Excess pavement should still be set aside for bicycle lanes for riders who prefer them. The table shown in Figure 42 was developed by NACTO to provide guidance on the circumstances for including particular facility types; importantly, it offers options that allow designers to include the facility that fits the space based on cost and engineering judgment.

Figure 40: NACTO Guidance for Selecting Appropriate Bicycle Facilities



Contextual Guidance for Selecting All Ages & Abilities Bikeways

Roadway Context				All Ages & Abilities Bicycle Facility
Target Motor Vehicle Speed*	Target Max. Motor Vehicle Volume (ADT)	Motor Vehicle Lanes	Key Operational Considerations	
Any		*Any*	*Any of the following:* high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts‡	**Protected Bicycle Lane**
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	**Shared Street**
≤ 20 mph	≤ 1,000 – 2,000		< 50 motor vehicles per hour in the peak direction at peak hour	**Bicycle Boulevard**
≤ 25 mph	≤ 500 – 1,500			
	≤ 1,500 – 3,000	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	**Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane**
	≤ 3,000 – 6,000			**Buffered or Protected Bicycle Lane**
	Greater than 6,000			**Protected Bicycle Lane**
	Any	Multiple lanes per direction		
Greater than 26 mph†	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	**Protected Bicycle Lane, or Reduce Speed**
		Multiple lanes per direction		**Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed**
	Greater than 6,000	*Any*	*Any*	**Protected Bicycle Lane, or Bicycle Path**
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		*Any*	High pedestrian volume	**Bike Path with Separate Walkway or Protected Bicycle Lane**
			Low pedestrian volume	**Shared-Use Path or Protected Bicycle Lane**

* While posted or 85th percentile motor vehicle speed are commonly used design speed targets, 95th percentile speed captures high-end speeding, which causes greater stress to bicyclists and more frequent passing events. Setting target speed based on this threshold results in a higher level of bicycling comfort for the full range of riders.

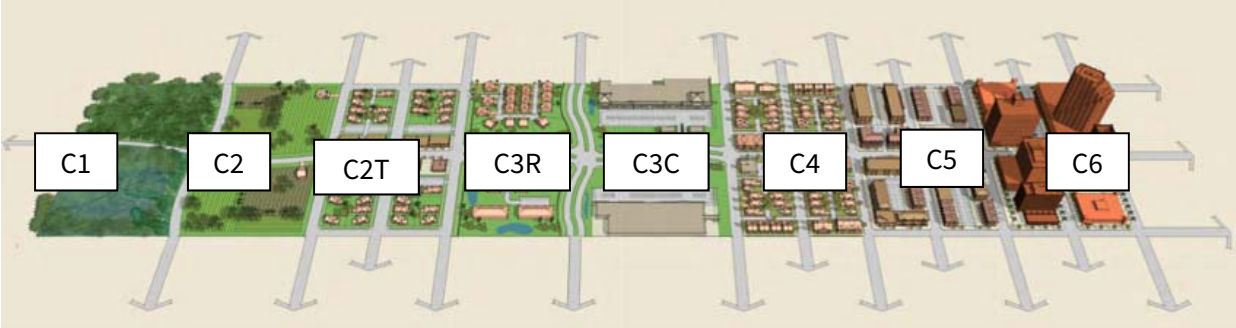
† Setting 25 mph as a motor vehicle speed threshold for providing protected bikeways is consistent with many cities' traffic safety and Vision Zero policies. However, some cities use a 30 mph posted speed as a threshold for protected bikeways, consistent with providing Level of Traffic Stress level 2 (LTS 2) that can effectively reduce stress and accommodate more types of riders.[18]

‡ Operational factors that lead to bikeway conflicts are reasons to provide protected bike lanes regardless of motor vehicle speed and volume.

Facilities on State Roads[19]

FDOT adopted a Complete Streets Policy in 2014 that accommodates all users along the State roadway system. Although counties typically follow the *Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways* or the "Florida Green Book," State roads are designed according to the *Florida Design Manual*. The two resources, while separate are coordinated in their approach to developing a transportation system that serves all users. To better serve the different users of the system, FDOT developed a Context Classification methodology that, according to infrastructure and land use, assigns a context that reflects where the road way is in the land development continuum, as shown in Figure 43.

Figure 41: Illustration of FDOT Context Classification System



This continuum ranges from undeveloped conservation land to the most urban downtowns. By analyzing land use, FDOT determined the facilities that are most appropriate for where they are located. It is FDOT policy that roadways in all counties be classified before or when work is anticipated to assist in the determination of what facilities to include. Table 6 identifies sidewalk facilities by FDOT Context Classification. The highlighted rows and contexts are most relevant to Hernando and Citrus counties.

Table 6: FDOT Context Classification Guidance for Sidewalks

Context	Allowable Range (mph)	SIS Minimum (mph)	Sidewalk
C1 Natural	55-70	65	5' Sidewalk if demand warrants
C2 Rural	55-70	65	5' Sidewalk if demand warrants
C2T Rural Town	25-45	40 (35 with design elements)	6' Sidewalk
C3R Suburban Residential	35-55	50 (45 with curb)	6' Sidewalk
C3C Suburban Commercial			6' Sidewalk if demand warrants
C4 Urban General	30-45	45	6' Sidewalk
C5 Urban Center	25-35	35	10' Sidewalk
C6 Urban Core	25-30	30	12' Sidewalk

[19] Additional information may be found at http://flcompletestreets.com or at http://fdot.gov/roadway/fdm/.

Notes: 1) C2T, C3, C4 sidewalk may be increased to 8' with demand; 2) C5 and C6 should be maximum width possible, not less than 6'; 3) For RRR projects, 4' sidewalk may be retained.

Table 7 identifies bicycle facilities by FDOT Context classification. Shared use paths are typically considered in contexts C1-C3 where there may be more right-of-way availability. If trails are included in local plans, coordination with FDOT may facilitate construction.

Table 7: FDOT Context Classification Design Guidance for Bicycle Facilities

Context	Allowable Range (mph)	SIS Minimum (mph)	Bicycle Facility
C1 Natural	55-70	65	Unmarked paved shoulder or shared use path
C2 Rural	55-70	65	Unmarked paved shoulder or shared use path
C2T Rural Town	25-45	40 (35 with design elements)	Marked bicycle lane
C3R Suburban Residential	35-55	50 (45 with curb)	Marked bicycle lane when speed is ≤ 45pmh and shared use path is not present or shared use path
C3C Suburban Commercial	35-55	50 (45 with curb)	Marked bicycle lane hen speed is ≤ 45pmh and shared use path is not present or shared use path
C4 Urban General	30-45	45	When speed is ≤ 45pmh and shared use path is not present
C5 Urban Center	25-35	35	When speed is ≤ 45pmh and shared use path is not present
C6 Urban Core	25-30	30	When speed is ≤ 45pmh and shared use path is not present

Cost Estimates

Cost estimates for bicycle and pedestrian projects are most often used when making requests for funding and like most things, the level of detail available impacts the specificity of the estimate. Applications for funding for projects typically need an estimate that involves a higher level of specificity than is done at this planning level. Right-of-way and additional costs due to project complexity are not accounted for and will be identified during development of the long range estimate and refined during design. Table 8 shows the current FDOT District 7 cost per mile or generic cost per mile for the construction of shared-use paths, sidewalks, and mid-block crossings. Additional information can be found in the Appendix.

Table 8: FDOT Cost per Mile

Type	Notes	Cost ($)
Shared Use Path	12', two-directional	$337,726
Sidewalk	5'-6', 4" depth	$198,086-237,704
Mid-block crossing		$120,052

The costs of facilities vary widely and are impacted by location, existing conditions, right-of-way availability, cost of materials, and whether they are standalone or incorporated into a construction project. When estimating, separating the costs of bicycle facilities from overall roadway construction

costs has been identified as one of the challenges to estimating costs but a number of organizations have reviewed projects nationwide to develop cost ranges; the costs included in Table 9 are from a number of sources including the Pedestrian and Bicycle Information Center and the Institute for Bicycle and Pedestrian Innovation at Portland State University and should be used to understand the base construction costs for projects.[20, 21]

Table 9: Additional Costs Related to Plan Improvements

Type		Cost ($)
Buffered bike lane (conversion of bike lane)	Add striping	$10,560 – $49,262
Protected bike lane	Add striping and traffic separation	$500,000 – $2,000,000/mi
Bike lane with roadway widening	Widen 4-lane road, curb and gutter, add bike lane	$2, 607,630/mile
Bike lane	Add striping – add asphalt	$133,170 – $536-680
Signed bike route	Signage	$25,070 – $64,330

Tables 10 and 11 show the system-wide mileage of proposed project needs and the Vision. In most cases the cost of developing an independent alignment or facility will be higher if constructed independently of a roadway construction project. For that reason, it is the assumption of this plan that adjacent trails envisioned in this Plan will typically be constructed with road expansion projects, thus reducing the construction costs.

Table 10: Needs Plan, Spot Improvement Mileage

	Citrus County	Hernando County
Facility	***Proposed Mileage or Number***	***Proposed Mileage or Number***
Multi-use trail	18	19
Advisory Signage ($250/sign)		7.5
Trail crossings	2	1
Bike lanes	14	13
Paved Shoulders	13	16

Table 11: Vision Plan Mileage

	Citrus County	Hernando County
Facility	***Proposed Mileage***	***Proposed Mileage***
Multi-use trail	220	254
Buffered Bicycle Lane	50	35

[20] https://activelivingresearch.org/sites/default/files/Dill_Bicycle_Facility_Cost_June2013.pdf.
[21] http://www.pedbikeinfo.org/data/library/details.cfm?id=4876.

Funding

The following describes a variety of funding sources available for the construction of trails and trail-related amenities. Additional information about possible funding sources is included in the Appendix.

Local and County Projects

Local community plans are a critical component of county networks, providing the nodes or hubs to which County and State projects can connect and support. Although local and county projects may be implemented by the jurisdiction in which they are located, coordination with the MPO for federal funds may result in significant cost savings by the municipality.

New Development

Review and coordination with plans for new development in both counties is an important way to make connections to the planned networks. In every case, plans are subject to review by County staff, and every effort should be made to require connections be made and facilities built to standards identified in this plan.

Shared-Use Nonmotorized (SUN) Trail Network

Managed by FDOT, the SUN Trail program funds non-motorized, paved shared-use trails that are part of the Florida Greenways and Trails System Priority Trail Map coordinated by the OGT.

Doppelt Family Trail Development Fund[22]

The Rails to Trails Conservancy awards about $85,000 per year to support organizations and local governments that implement projects to build and improve multi-use trails. Applications for funding typically open in December.

Non-Profit Grants

- **Robert Wood Johnson Foundation, Built Environment and Health** – At the national and local levels, the Robert Wood Johnson Foundation is working with a wide array of partners to help ensure that investments in housing, transportation, parks and open space, and other critical aspects of the built environment in communities foster equity and create healthy opportunities for everyone

RWJ Foundation Grant Funds Plainsboro Preserve Trail Improvements

The Robert Wood Johnson Foundation awarded a $94,000 grant to pay for the improvement of nature trails at the Plainsboro Preserve in Plainsboro Township, NJ. Additional funds by the town will allow the Preserve to be more pedestrian-friendly, provide ample seating, and give better access to individuals with disabilities.

[22] https://www.railstotrails.org/our-work/doppelt-family-trail-development-fund/.

(https://www.rwjf.org/en/how-we-work/grants-explorer/featured-programs/build-healthy-places-network.html).

- **Kodak American Greenways Program** – A partnership project of the Eastman Kodak Company, the Conservation Fund, and the National Geographic Society, this program provides small grants to stimulate the planning and design of greenways in communities throughout America (http://www.rlch.org/funding/kodak-american-greenways-grants).

National Highway Performance Program (NHPP)

NHPP funds may be obligated only for a project on an "eligible facility"—a project, part of a program of projects, or an eligible activity supporting progress toward the achievement of national performance goals for improving infrastructure condition, safety, congestion reduction, system reliability, or freight movement on the National Highway System (NHS). Projects must be identified in the Statewide Transportation Improvement Program (STIP)/Transportation Improvement Program (TIP) and be consistent with the Long-Range Statewide Transportation Plan and Metropolitan Transportation Plan(s). Bicycle transportation and pedestrian walkways associated with an NHS facility such as improvements to facilities or new design features at overpasses and onramps are eligible. Shared-use paths along interstate corridors, but outside the main travel way, are eligible for the use of NHPP funds, as are bicycle lanes, shoulder and sidewalk improvements on major arterial roads that are part of the NHS, and bicycle and/or pedestrian bridges and tunnels that cross NHS facilities.

Surface Transportation Block Grant Program (STBG)

The FAST Act replaced the TA Program with set-aside funds under the Surface Transportation Block Grant Program. Eligible activities include on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities such as historic preservation and vegetation management, environmental mitigation related to storm water and habitat connectivity, recreational trail projects, and Safe Routes to School projects. A 20% local match is required. Typically, right-of-way issues and environmental concerns must have been addressed prior to the submission of the application.

Highway Safety Improvement Pram (HSIP)

HSIP funds can be used for pedestrian and bicycle safety improvements. States may obligate funds under HSIP to carry out any highway safety improvement project on any public road or publicly-owned bicycle or pedestrian pathway or trail, or as provided under Flexible Funding for States with a Strategic Highway Safety Plan, and other safety projects.

Recreational Trails Program (RTP)[23]

The RTP is a federally-funded competitive grant program that provides financial assistance to agencies of city, county, state, or federal governments and organizations approved by the State, or State- and federally-recognized Indian tribal governments, for the development of recreational trails, trailheads, and trailside facilities. For more information on Florida's RTP, see Chapter 62S-2, F.A.C., the rule governing the program in Florida.

FTA Funds

A variety of FTA funding is available that may be used to fund the design, construction, and maintenance of pedestrian and bicycle projects that enhance or are related to public transportation facilities. Improvements made expressly eligible by statute include capital projects such as pedestrian and bicycle access to a public transportation facility and transit enhancements such as pedestrian access, walkways, and bicycle access, including bicycle storage facilities and equipment for transporting bicycles on public transportation vehicles.

Evaluation

Performance measures are used to evaluate progress and level of success. The following performance measures are recommended for current and proposed planned projects and are meant to track baseline progress toward developing a network. The following should be assessed bi-annually, and the measures themselves should be assessed for appropriateness each time the Plan is updated. Additional measures can be found in the *FHWA Guidebook for Developing Pedestrian & Bicycle Performance Measures* and should be considered as the needs of the counties evolve:

- Miles of trail built
- Miles of sidewalk built
- Miles of trails built in equity areas

Plan Evaluation Criteria

In addition to evaluation criteria applied to each project to be added to the MPO Complete Streets Project list, Master Plan performance measures were identified to evaluate the efficacy of the Plan. These measures are not meant to be onerous or bureaucratic; rather, they have been included to allow the plan to be reviewed from the standpoint of "Is what was meant to be done with this Plan getting done?"

The recommended plan evaluation criteria are as follows:

- Crash reduction in high-crash areas if projects have been constructed.
- Number of sidewalk and path miles planned for construction.

[23] https://floridadep.gov/ooo/land-and-recreation-grants/content/recreational-trails-program.

- Number of sidewalk and path miles planned for construction in underserved areas.
- Number of community/agency partnerships (events, programs) related to bicycling and walking.

Maintenance and Operations

Maintenance of trails and on-road bike facilities is critical to their safe use. Much like roadways, asphalt trails need repair and eventually need resurfacing, and bike lanes and shoulders need monitoring and sweeping to function as designed. Throughout Plan development, it was noted that bike lanes and shoulders often were full of debris that create unsafe conditions. Whereas roadways may be cleared by storm events, the debris is often left in the bike lanes. It is recommended that bike lanes be swept on at least a quarterly basis and monitored for debris pick-up as needed. A mobile phone-based app such as SeeClickFix[24] can be used to let citizens notify agencies of specific needs.

The following section is a discussion of the specific county approaches to maintenance and recommendations for supporting the growing bikeway and trails network.

Hernando County

Trails in Hernando County are managed by Hernando County Public Works, the local agency, or FDOT. A three-person crew is dedicated to routine trail maintenance such as mowing, litter collection, and edging, covering the 35 miles of existing trail once a month. Maintenance of the soon-to-be constructed Coast-to-Coast Trail to Brooksville will be included in the schedule. Generally, it is assumed that maintenance of one mile of trail costs $333 per month or $4,000 per year. Additional trail maintenance needs will be reviewed as needed. The City of Brooksville is currently responsible for the care and maintenance of the Good Neighbor Trail in the City limits. Staffing plans account for care of the trails as they exist today and are anticipated to be able to handle the extra mile. It is recommended that staffing levels be reviewed and adjusted as needed in response to the additional miles of trail that will be added over time.

Citrus County

Trails along County roads in Citrus County are managed and maintained by the Road Maintenance Division under the Department of Public Works. The Citrus County Road Maintenance Division will be responsible for trail maintenance for new trails constructed along County roads.

The Withlacoochee State Trail is supported by Rails to Trails of the Withlacoochee, Inc. RTW is a friends group under the Florida DEP Division of Recreation and Parks that helps to develop, maintain, and promote the Withlacoochee State Trail. Members volunteer their time and labor on projects such as trail maintenance, fundraising, public education about trail-related issues, and building trail amenities.[25]

[24] https://seeclickfix.com/.
[25] https://www.rttwst.org/about-rails-to-trails.php.

Local jurisdictions typically are responsible for trails within their boundaries.

Maintenance and Frequency

Table 12 lists the activities and maintenance needed to keep the trail operating safely. There may be additional activities that Hernando or Citrus or the municipalities will need to undertake as the trails become cross-jurisdictional. Maintenance frequencies may change according to funding and staffing availabilities, but they need to be consistent to keep up with demand and the expected increased trail usage.

Table 12: Trail Maintenance Activities and Frequency

Activity	Frequency
Mowing	Weekly
Tree pruning/removal	Annually
Weed control	Monthly
Vegetation irrigation	Daily/weekly
Drain cleaning	Monthly
Pavement sealing/repave	2–7 years, depending on sealant
Trash pickup/disposal	Twice weekly
Graffiti cleanup	As needed
Lighting repair/replacement	Yearly/as needed
Furniture repair/replacement	Yearly/as needed
Signage repair/replacement	Yearly/as needed
Fence repair/replacement	Yearly/as needed

Rules and Regulations

Prior to the completion of the Hernando County portions of the Coast-to-Coast Trail, it is recommended that rules and regulations such as hours of operation be reviewed and, if needed, revised to best suit trail users and the agencies responsible for the safety and security of trail users. Currently, the trails are open dawn to dusk, but as usage changes and demand grows, hours of operation might need to change to accommodate longer- haul riders or visitors using the trail as their primary way to travel.

Bicycle / Pedestrian Coordination

Given the increasing importance of safe bicycling in both counties, the establishment of a responsible position or addition onto a previous position within the MPO that coordinates between jurisdictions and is the point of contact for citizens and government departments should be considered. The coordinator would be responsible for overseeing the implementation of this plan and ensuring its success.

Responsibilities could include:

- Coordination between governmental jurisdictions
- Serve as the point of contact for governments and citizens
- Implement plan and seek additional funding
- Coordinate long term maintenance
- Works to ensure safety and security of the trails in both counties

Safety

As much as possible, and in compliance with the *Florida Design Manual* and the "Florida Greenbook," trails are designed with adequate right-of-way to buffer the trail from the roadway and create connectivity between open spaces. Trails also should be designed such that crime, fire, flooding, and other hazards are reduced. In some cases, using fencing and other barriers can be used to reduce traffic in unwarranted areas.

Personal safety is always a concern along trails, especially in areas that are secluded or not heavily traveled. To address this and ensure that the user experience is safe, trail communities have created or facilitate patrols on trails by either law enforcement agents or volunteers. For example, the Rails to Trails of the Withlacoochee Trail citizen support organization patrols the trail, providing information and light maintenance services and an extra level of safety and security. A similar group in Hernando County is recommended and could also play an ambassador role.

Safety is also a concern along on-road facilities and at crossings, as noted during the development of this Plan; therefore, it is imperative that design decisions be made with as wide a range of users in mind and that areas of concern be reviewed as needed.

Lighting

Although lighting is not a standard trail provision, it should be considered in areas of concern or high use or around amenities such as shelters, restrooms, and trailheads. As noted earlier, hours of trail operation are generally dawn to dusk, but providing adequate lighting will allow users peace of mind when using the trail during hours of limited daylight. It can be assumed that as the trails grow in popularity and used for more long-haul trips, trail lighting will become a concern.

Cost Savings

Jurisdictional Sharing

Generally, trails and facilities within jurisdictional boundaries are maintained by that jurisdiction. Collaboration among groups or other cost-sharing mechanisms could be considered as facility mileage grows.

Volunteer Opportunities

Volunteers are key to a successful trail maintenance strategy. Many trails in the region have long-standing volunteer programs that supplement Parks & Recreation support. For example, Pinellas Trails, Inc. "exists to support and enhance the Pinellas Trail now and for future generations." Providing such opportunities for volunteer groups to patrol, maintain, and repair segments of the trail helps build community and also helps share the cost of supporting the trails. Patrol benefits include:

- Security
- Conflict resolution
- Trail inspection
- Emergency aid
- Debris cleanup

Adopt-a-Trail Initiative

Many communities have created programs in which individuals or groups "adopt" segments of a trail and provide maintenance services along the adopted segment of trail. This program exists in Brooksville, and it is recommended that the program be expanded as trail segments are added.

Community Partners

Opportunities to foster community partnerships abound and ways to engage the community as the trail grows should be considered, Other options including create and fostering partnerships with community groups such as Boy and Girl Scouts, Rotary International, and local schools.

Liability

Liability issues for trails are covered under section 375.251. F.S., as adopted by the Florida Legislature. This statute limits the liability of owners or lessees who make their land available to the public for recreational use.

Plan Implementation Actions

Developing a plan is only the first step in the process to creating a robust and successful active transportation network. After plan adoption, collaboration and action are what make it successful. The following implementation actions have been developed to ensure the success of this Master Plan and should be reviewed on an annual basis:

- On January 30, 2018, the Hernando/Citrus MPO Board voted to support the Florida Department of Transportation's (FDOT) goal of zero serious auto-related injuries and deaths (Vision Zero). It also established a short-term target of 5% per year in reduction in traffic fatalities and serious injuries, based on a five-year rolling average. In support of the MPO Plan is reducing the number of bicycle and pedestrian injuries and fatalities by funding projects that will support this goal.
- Recognizing that it takes more than engineering solutions to resolve safety issues in Hernando and Citrus counties, the MPO will collaborate with the county governments, FDOT, and other agencies to identify and fund enforcement and education programs throughout both counties.
- Work should continue with FDOT to add bicycle and pedestrian facilities to State roads as they are resurfaced or expanded. Wherever possible, separated trails should be included in Project Development & Environment (PD&E) and design phases.
- This Master Plan is a living document and reflects the vision of the MPO and stakeholders as well as analysis done at the time of its revision. The priority projects identified according to the evaluation process will not preclude the addition or upgrade of bicycle and/or pedestrian facilities on County roads.
- The MPO will collaborate with County staff to ensure that the best possible bicycle and pedestrian facilities are incorporated into all upcoming county resurfacing and reconstruction projects.
- Coordination will continue with the Hernando and Citrus County Public Works departments to include trails and wider sidewalks on new roadways and roadway expansion plans.
- Coordination will continue with the cities of Inverness, Crystal River, and Brooksville, local agencies, and Hernando and Citrus counties on submission of projects to a list of projects to be considered for prioritization for funding.
- Coordination will continue with local governments for adoption of the Hernando/Citrus MPO Bikeways and Trail Master Plan into Local Comprehensive Plans, the Land Development Code, and City Master Plans and identification and protection of trail corridors.
- Coordination will continue with other government and non-government entities on regional planning issues related to the trail system including the Florida Department of Environmental Protection (FDEP), the Office of Greenways and Trails (OGT), the Florida Department of Affairs, and

others to pursue grant opportunities to develop the regional trail network in Hernando and Citrus counties.

- Coordination will continue with staff in adjacent counties, MPOs, OGT, and FDOT to plan for and construct trails and other bicycle infrastructure across county lines to help create a seamless and connected regional trail network.
- This Master Plan will be reviewed and revised as needed at least every five years. Interim updates to the map or Plan may be required to take advantage of opportunities with developers or local and county agencies.

Resources

AASHTO Guide for the Development of Bicycle Facilities, 2002.

FDOT, *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways* ("Florida Greenbook"), 2016.

FHWA*, Small Town and Rural Multimodal Networks*, December 2016.

NACTO, *Urban Bikeways Design Guide,* 2nd Edition (2016)