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City of Ormond Beach

2016-2026 Bicycle master plan

Planning Department

Adopted by Resolution 2016-155

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I. EXECUTIVE SUMMARY

As recently as early 1990, biking was basically for the young. Riding a bicycle over the age of 55 was rare. Vehicle miles traveled are decreasing at a rapid rate among young adults which leads some to believe that millennials are driving the nationwide boom in bike trips. The latter is somewhat true, but trends indicate that young adults are relocating closer to work in favor of walking and biking as primary transportation modes while retirees are more active and are riding bicycles for recreation and physical fitness. Ormond Beach will not escape this phenomenon of active retirees biking for recreation and fitness. If anything, it will be more pronounced.

In 2010 the City adopted a Multimodal Strategy that presented a balance between all roadway capacity improvements and all vehicle reduction strategies. A mobility fee was adopted to implement the Multimodal Strategy. The mobile fee contained three components: a road, transit and non-motorized fee component. The purposes for the non-motorized fee component are to be used to construct gaps in sidewalks between residential areas and transit stops, convert existing sidewalks by widening sidewalks from 5 feet to 8 feet for multi-use; and provide bike facilities. The proposed Bike Plan concentrates on the bicycle purposes of the non-motorized fee.

In 2015 the City Commission conducted a strategic planning exercise and from that effort a Strategic Planning Report was prepared. Seven goals along with a number of objectives were identified. One objective which is complimentary to the City Commission's priority objective of updating the Parks/Recreation Master Plan is the development of a city-wide bicycle pedestrian plan.

In addition, the City of Ormond Beach Comprehensive Plan outlines the goals, objectives, and policies for a number of elements related to the topic of bicycle facilities. These elements include land use, transportation, parks and recreation, and capital improvements. In addition, within the Transportation Element the City's Multimodal Strategy approved pursuant to SB 360ER contains Strategies to implement the Bicycle Vision Plan.

The bike plan identifies three levels of bike users that need to be considered in the design of bike facilities.

1. Advanced or experienced riders generally use bicycles as a convenience and speed and want direct access to destinations with minimum of detour or delay. The Ormond Loop, SR 40 or US1 could be considered routes for experienced riders due to the limited pavement width and/or vehicle volume.
2. Basic or less confident adult riders prefer comfortable riding on lower vehicle volume collector streets with designated bike lanes or wider shoulder lanes on busier streets.

3. Families and children who ride for fun and access to destinations like parks gravitate to neighborhood streets, where the speed limit is 25 mph, which are then linked to multi-use or shared use paths.

Currently, the City has about 10.65 miles of paved shoulders in the city which are 4 foot wide and two designated bike lanes totaling 17.42 miles in the city (SR 40 and US 1). In addition, there are about 2.5 miles of shared use paths (8 foot wide sidewalk not part of the road rights of way) and 9.15 miles of multiuse paths in the City (part of the road right of way). In addition, there is a 33.98 mile Ormond Scenic Loop and Trail but this trail is considered a "shared use" with motorists. Four cross jurisdictional trails are planned that traverse Ormond Beach (Greenway Trail, SR40, Kings Highway Heritage Trail and the Tomoka State Park Trail). Finally, the City Land Development Code requires bike parking facilities for all new public and private development.

A crash analysis was conducted of all bike accidents from 2010-14. There were 90 bicycle crashes involving 1 fatality and 85 injuries. 26 injuries occurred on city roads. Most crashes occurred during the weekday between 4-6pm at major and minor intersections and driveways. Surprisingly, Ormond Beach has a higher per capita bike crash rate than Volusia County or the State of Florida (per 10,000 populations). This statistic should not be confused with the fatality rate. The most common crash is a right angle crash. The right angle crash is indicative of bicyclists or motorists not yielding the right of way when required. Consequently, Engineering of infrastructure for bicycles alone will not increase bike safety. Behavior change by people using the road is also needed. This change can be through education and enforcement of laws pertaining to bicyclist, motorists and pedestrians. The bike plan also addresses education and enforcement.

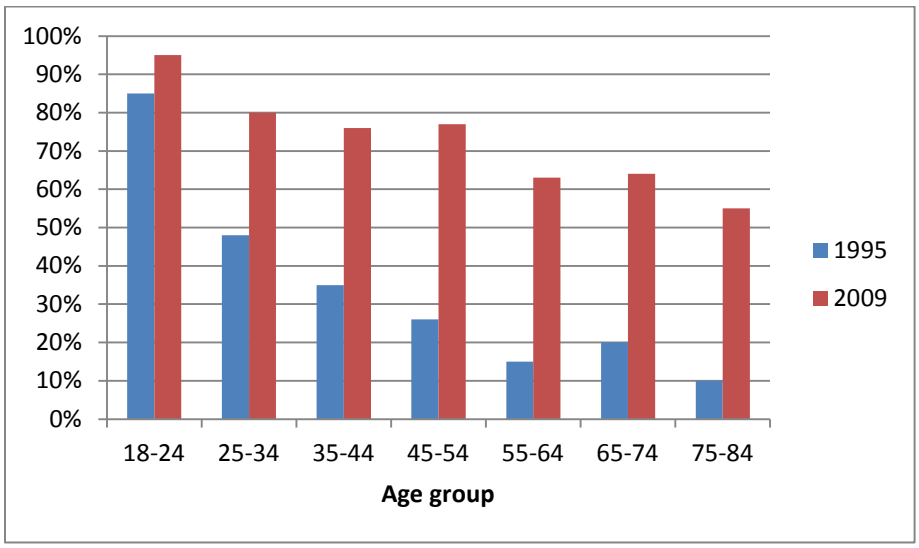
The Plan proposes 15.5 miles of multi-use path that connect multiple destinations. These are not paths or trails contained only in a park. One small fixed span bridge is proposed. The total cost of the plan is estimated to be between $4.3 million and $5.7 million depending on routes chosen and designed. FDOT"s Long Range Estimates (LRE) for bike paths was used to determine this number. These numbers will be better refined as the paths move from a planning state to a design stage. Finally, a cost benefit analysis was used. It is estimated that $14 million in reduced injury costs and health benefit costs over the 10 year horizon of the Plan.

Making it safer to walk and bike contributes to the community health, quality of life and future independence of residents as they progress in age. What has been proposed in this plan is doable. The implementation of this plan relies on the cooperation and participation of city residents, the county, the TPO and the State. There is no better time than now to begin this effort.

II. INTRODUCTION

As recently as early 1990, biking was basically for the young. Riding a bicycle over the age of 55 was rare. Vehicle miles traveled are decreasing at a rapid rate among young adults which leads some to believe that millennials are driving the nationwide boom in bike trips. The latter is somewhat true, but trends indicate that young adults are relocating closer to work in favor of walking and biking as primary transportation modes while retirees are more active and are riding bicycles for recreation and physical fitness.[1] Table 1 below identifies the growing influence of older America on bicycling.

Table 1: Biking rates by age group, 1995-2009



Source: National Household Travel Survey

Why is this important to the City of Ormond Beach? Ormond Beach for the most part has 27% of its residents whom are 65 years of age or older; 54% are between 18-64 years of age; and a decreasing younger population of people from 5 to 17 years old (15%). Median age is 50.6 years.[2] The older population groups are much more active than past generations.

In 2010 the City adopted a Multimodal Strategy that presented a balance between all roadway capacity improvements and all vehicle reduction strategies. A mobility fee was adopted to implement the Multimodal Strategy. The mobile fee contained three components: a road, transit and non-motorized fee component. The purposes for the non-motorized fee component are to be used to construct gaps in sidewalks between residential areas and transit stops, convert existing sidewalks by widening sidewalks from 5 feet to 8 feet for multi-use; and provide bike facilities. This plan concentrates on the bicycle purposes of the non-motorized fee.

[1] (Anderson, 2014)
[2] (Census, 2010)

The City has been very supportive of providing transportation alternatives to all types of users. The term "Complete Streets" is relatively new to Ormond Beach but some of these principles have been implemented for decades. Complete streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.[3] In addition to the bike lanes on arterial and collector roads, many of the local streets have either sidewalks on both sides of the roadway; an 8 foot sidewalk on one side of the roadway; or paved shoulders sufficient for bicycle use. In addition, the City has an extensive network of sidewalks that are between 8-10 feet wide in the Central Park area, Tomoka State Park and Inglesa Avenue; Ormond Beach Middle School area and West Grenada Boulevard from Tymber Creek Road to Airport Road Extension.

As Ormond Beach continues to attract new households, a growing demand by a health conscious population to walk and/or ride a bicycle to and from destinations is occurring. In 2001 the City prepared the Greenways and Trails Plan for approval by the City Commission but it was not acted upon. The City needs a formal bicycle master plan developed for prioritizing and recommending bicycle facilities and programs in order to better compete for funds from the Transportation Planning Organization or State. This plan is designed to be consistent with and further the State, Regional and County-wide bike plans to ensure connectivity as well as to provide support for requesting funds from the River-to-Sea TPO, state, and federal governments.

III. GOALS AND OBJECTIVES OF BIKE PLAN

SAFETY - Provide complete, safe, and attractive accessibility for bicyclists using sound planning and engineering, intergovernmental coordination, and public involvement.

Objectives:

- Ensure bike facilities are an integral part of street design so that lanes and pathways form an integrated network.
- Implement the Bicycle and Pedestrian School Safety Review studies for all middle and elementary schools where such studies have been completed.
- The City shall follow the American Association of State Highway and Transportation Officials publication entitled, "A Guide for the Development of Bicycle Facilities," when selecting and designing a bike facility route.
- Provide safe and appropriate routes based upon user ability

[3] (Coalition)

- Create comfortable riding environments through the use of shared and multi-use paths; and paved shoulders and sharrow lanes on low volume (<2.5K), low speed (<25 mph) local streets.

CONNECTIVITY - Identify and implement an interconnected network of bike facilities that serve all bicyclists, regardless of experience, for travel to important destinations.

Objectives

- Develop a feasible bikeway network that is continuous, closes gaps in the existing system, and serves employment centers, schools, downtown, the beach, and parks.
- Where the planned city route system interfaces with adjacent cities, the routes should be coordinated with those cities to facilitate the ability to take longer rips by bicycle.
- Implement a cohesive wayfinding system directing users to and from the bicycle network while connecting community destinations.
- Provide bike facilities through the site plan review process for all public and private development.

DEMAND - Increase bicycle commuting to employment and recreational trip purposes.

Objectives

- Increase ridership by providing for a network of bike facilities which are convenient but yet comfortable to the advanced, intermediate and family user.
- Develop bike facilities which create a demand for bicycling in population and employment concentrations with a focus on high trip generation areas.

HEALTH - Improve community health thru increased biking and walking opportunities.

Objectives:

- Integrate bike and pedestrian facilities into land development planning.
- Provide a comprehensive program of education and enforcement strategies to improve the safety of cyclists, pedestrians, and motorists.
- Provide facilities that will increase bicycling across a broad range of age and ability levels.

COMMUNITY SUPPORT - Engage citizens in the planning and development of the bicycle and pedestrian system to build consensus and create advocates.

Goal Icon	
Safety	S
Demand	D
Health	H
Connecting Destinations	CD
Community Support	CS

Objective:

- Develop and post on the City's web page an interactive crowd sourcing wikimap to allow all levels of bicyclists or pedestrians to provide comments about walking and bicycling routes and post photos of barrier concerns.

IV. CONSISTENCY WITH COUNTY, REGIONAL AND STATE PLANS

In addition to the bike lane and path policies contained in the City's Comprehensive Plan and Multimodal Plan, the 2040 Long Range Transportation Plan prepared for the River-to-Sea TPO (R2CTPO) is also supportive of bicycling. A major emphasis of the 2040 LRTP is the use of multimodal forms of transportation. A major emphasis of this LRTP is SunRail and transit.

In the City of Ormond Beach, there are five fixed bus routes. Table 2 provides those routes in terms of revenue miles and the percentage in Ormond Beach.

Table 2: Bus Routes in City

Route#	Total Miles	Ormond Miles	Ormond %	Location
Route 1 weekday	423.2	113.2	26.8%	A1A
Route 1 night	61.8	28.4	45.9%	A1A
Route 1 Sunday	123.6	56.8	45.9%	A1A
Route 3 weekday	276.8	168.7	60.9%	US 1
Route 3 night	86.0	31.6	36.7%	US 1
Route 3 Sunday	205.8	75.8	36.8%	US1
Route 6 weekday	364.8	146.3	40.1%	SR5A/SR40/Hand
Route 18 weekday	329.1	84.3	25.6%	A1A/SR40/Williamson
Route 19 weekday	335.6	92.0	27.4%	

Due to rising demand in transit usage, it is important that the city's pedestrian and bicycle network is highly integrated with transit routes along SR 40, A1A, SR5A and Hand Avenue.

Table 3 identifies cross jurisdictional trails that traverse Ormond Beach which are recognized by county, regional and state plans.

Table 3: Consistency with Plans			
Trail Name	**2005 MPO County Bicycle/Pedestrian Plan**	**Shared-Use Nonmotorized Trails (SUNTrail)***	**Tomoka State Park Land Management Plan**
Kings Highway Heritage Trail	x		x
SR40 Trail Corridor	x		
St. Johns River to Sea Loop	x	x	
Tomoka State Park Trail			x
*** East Coast Greenway trail is the same route as the St. Johns River to Sea Loop through Ormond Beach**			

V. EXISTING CONDITIONS

A. On Street Facilities

All existing bicycle related facilities within Ormond Beach were inventoried as part of this plan. The facilities inventoried include road name, segment, and classification; existence of sidewalk, linear feet and width of sidewalk; existence of bike lanes and lane width; and existence of transit stops. The inventory indicates sidewalks are sometimes discontinuous, and when they are continuous, they sometimes shift from one side of the road to another causing the pedestrian to cross the street in order to remain on a sidewalk. Transit stops are sometimes located in areas without sidewalks, which necessitates that some riders wait in unimproved rights-of-way and walk to and from bus stops across unimproved rights-of-way or in the street. Most bicycling now occurs and probably will continue to occur on the network of local, county and state roads used by motorists. This should not be surprising since these routes are direct to desired destinations. What's missing is the complimentary system of off road routes for bicyclists and pedestrians that serve as an extension to the roadway network.

Bike lanes, by definition, are exclusive lanes for bicyclists that are designated through the use of pavement markings and signage. Typically, designated bike lanes are four to six feet in width. The City has two designated bike lane facilities. SR 40 from A1A to Tymber Creek Road and US 1 are designated by FDOT as Bicycle Routes. See picture to the right. Bike lanes are most appropriate on roads that have an Annual Average Daily Traffic (AADT) volume of 10,000+ vehicles and where speeds are posted at 35 mph or higher

Shared lane designations on roadways provide no separate area for bicycle traffic and require the bicyclist to travel within a standard width travel lane. Often in these types of designated roads, motorists change lanes when overtaking a bicyclist. Roads may or may not be posted as "Share the Road." Shared lanes should have at least 14 feet in width on the outside lane. SR 40 between Beach and US 1 is an example of a signed shared lane but the lane is not 14 feet in width. The picture to the right depicts bicycle signage indicating to bicyclists this segment of Granada is a shared lane with motorists due to on-street parking and limited rights-of-way.

Many of Ormond Beach roads are local neighborhood streets with posted speed limits of 25 mph. These local streets have AADT traffic volumes of less than 2500 vehicles and shared lane designation would function well. Should on-street bike lanes be warranted, it is possible that the width for the bike lane may be found by narrowing the lane width without widening the street.

Paved shoulders, by definition, is the portion of the roadway to the right of the solid white line on the edge of a road. Shoulder widths are typically between 4 and 5 feet and are considered suitable for bicycle travel. Paved shoulders are similar to bicycle lanes except there are no designated pavement markings or signage for the shoulder. Paved shoulders include SR 40 from Tymber Creek Road to the eastern city line and A1A and Clyde Morris Boulevard which is depicted in the picture to the right. The real difference between bike lanes and paved shoulders can be found in the Mandatory Bike Lane Law of 2010. Legally, cyclists are required to use designed bike lanes if one exists on a road. Where designated bike lanes do not exist, cyclists may use the travel lane even if paved shoulders exist.

There is approximately 28 miles of roadways in Ormond Beach which currently have either dedicated bicycle lanes or paved shoulders. The roads and respective lane widths are included in Table 4 and depicted in Map 1 attached at the end of this plan.

State Roads

- A1A South Atlantic to city line – Paved shoulder
- Ocean Shore Boulevard from SR40 to northern city limits – Paved shoulder
- SR 40 from A1A to Airport Road Extension minus downtown (Beach to US 1) – Designated bike lane
- US 1 North from SR40 to northern city limits – Designated bike lane
- US 1 South from SR40 to southern city limits – Designated bike lane

County Roads

- Clyde Morris Boulevard from SR40 to southern property line of Aberdeen development – Paved shoulder
- Airport Road from FEC Rail Crossing to Tymber Creek Road – Paved shoulder
- Hand Avenue from Shangri Lane to Williamson – Paved shoulder
- Tymber Creek Road from SR40 to Peruvian Lane – Paved shoulder

City Roads

- North Halifax Drive from Banyan Drive to SR40 – Paved shoulder
- Tomoka Avenue eastbound alternative route to SR 40 downtown – Designated bike route
- Lincoln Avenue westbound alternative route to SR40 downtown – Designated bike route.

Table 4: Designated Bike Lane or Paved Shoulder

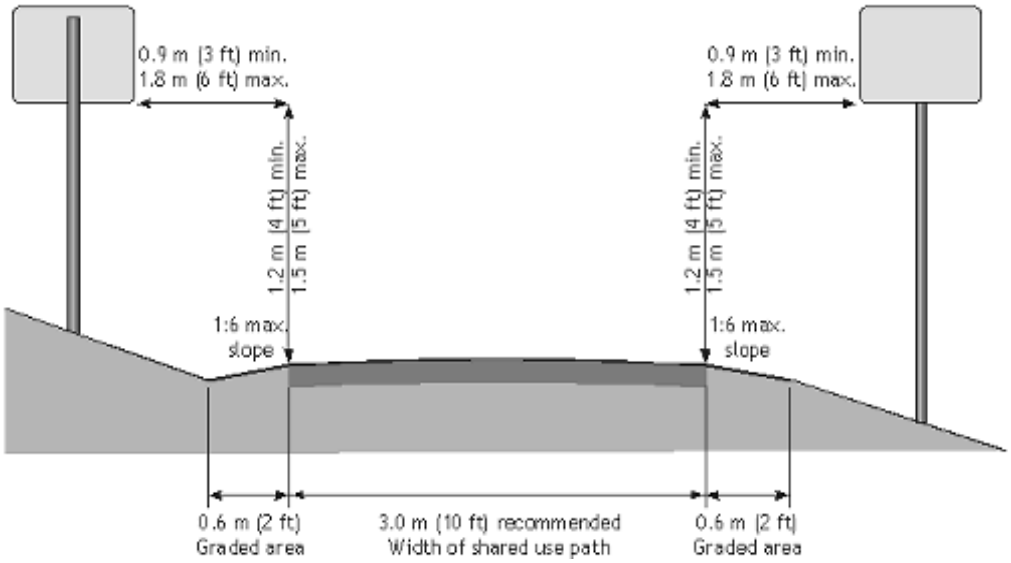
Road	From	To	Distance (mi)	Lane/Shoulder (ft)
Airport Road	FEC RR X	Ocean Pines BLVD	1.75	4
Clyde Morris	SR40	Aberdeen	1.18	4
North Halifax	SR 40	Banyan Drive	2.04	4
Hand Avenue	Shangri La	Williamson	2.03	4
Ocean Shore	Neptune	Northern City line	1.21	4
SR 40	A1A	Beach	1.02	4
SR 40	US 1	Williamson	3.70	4
SR 40	Williamson	Airport Road Ext	3.80	4
US1	NCL	SCL	8.90	4
A1A to City line	SR 40	Southern City line	1.73	4
Tymber Creek RD	SR40	Peruvian Lane	.71	4
			28.07	

B. Off Street Facilities

In general, multi-use paths may include concrete, pavement or decks or a combination of materials. The multi-use path is typically 8 to 10 feet wide and completely separated from vehicular traffic. It may run parallel to a road facility. The larger width is what distinguishes the multi-use path from the standard 5 foot

sidewalk. Shared use paths are like multi-use paths but they function differently. Shared use paths should serve corridors where roads and highways do not generally exist. Shared use paths are typically recreational in nature and are great at connecting parks or city facilities. Typically, shared use paths have common applications along rivers, oceans, drainage canals, or under overhead utility rights-of-way.

The American Association of State Highway and Transportation Officials (AASHTO) allows for a minimum multi-use path of 8 feet provided there is a low volume of bicyclists and pedestrians. Otherwise AASHTO recommends a minimum of 10 feet as depicted.



Ormond Beach has about 9.15 miles of multi-use paths located along streets. They include:

- Hand Avenue from US 1 to Nova (1.38 miles)
- Granada Boulevard from Nova Road to I95 (2.54 miles)
- N. Ridgewood from Sanchez to Domicillio (2,500 lf)
- Domicillio from N. Beach Street to Northbrook Dr (1,635 lf)
- Sanchez Avenue from N. Ridgewood to Andrews Street (2,085 lf)
- Wilmette Avenue from Nova to Andrews Street (5,182 lf)

- N. Center Street from Sterthaus to Wilmette (2,334 lf)
- Division Avenue (1.37 miles)
- SR 40 west of I95 (3.03 miles)
- N. Beach from Inglesa Avenue to Burr Oak Court (2,100 lf)

Additionally, shared-use paths are provided by the city within several designated parks to include:

- Woodham Woods Trail (1.10 miles)
- GF Althouse Trail (1.0 miles)
- Nova Park (.5 miles)

The GF Althouse Trail is a 1.0 mile multi-use path that traverses natural scenic uplands and wetlands from Fleming to Hammock Lane. In 2016 the Environmental Discovery Center on Division Avenue was dedicated. This will be a popular destination for families and children. The need to connect this destination spot within the Park to other areas in the city will become most important.

In addition to the multi-use paths, the city has an excellent sidewalk network consisting of 4, 5 and 6 foot wide sidewalks. Sidewalks are typically provided on one side of the roadway. In addition, sidewalks are a critical component of the Safe Route to Schools Program. The city has made extensive improvements as a result of the studies completed for each elementary school and the sole middle school within city limits. Unfortunately, the existing intermediate and family bicycle network consists primarily of paved paths either in parks (Central, Nova or Tomoka State Park) or on low volume local streets which have signal-controlled crossings of collector and arterial streets. This system lacks connectivity. The existing local street system is made up of partial grid and cul-de-sac type development and offset intersections limit the functionality of the bike network

Privately, there is one large subdivision that provides a shared use path for the community which is open to the public. This shared use path runs throughout the Trails community and is separate from the road system.

The multi-use path/sidewalk network adjacent to the arterial and collector road system is depicted in Map 2 at the end of the plan.

C. Ormond Scenic Loop and Trail

The Ormond Scenic Loop and Trail is located in the City of Ormond Beach and unincorporated Volusia County. The 33.98 mile double loop of roadways traverses some of the most beautiful and diverse natural scenery remaining in all of northeast Florida. There is ready access to the Atlantic Ocean, North Peninsula, Tomoka and Bulow Creek State Parks as well as numerous city and county parks. The roadway view includes unobstructed vistas of two rivers, creeks and marshes, barrier island dunes and beach, and historic dwellings. Visitors seeking a cultural and/or historic experience will find museums and historic public buildings and private homes along the corridor, in Tomoka State Park and in locations a few blocks off the designated roadways.[4] Currently, the Loop is a "Share the Road" type of bicycle facility. There is no paved shoulder and no separated bike path. Consequently, users of this loop are considered experienced cyclists.

D. Bicycle Parking and Repair Facilities

Bike racks are currently provided at all appropriate city facilities. The City's Land Development Code requires multifamily and nonresidential uses to set aside a certain percentage of bicycle parking spaces based upon the number of parking spaces required. These bicycle percentages based upon specific land uses are depicted in Table 5. Bike racks at city facilities and private development should either be of the inverted U or spiral design. Both designs meet the Bicycle Guidelines of the Association of Pedestrian and Bicycle Professionals.[5]

[4] (Entity)
[5] (Professionals, 2002)

Table 5: Bicycle Parking Schedule	
Residential	**Percent of Required Automobile Parking**
Multifamily apartment complexes	10
Timeshares	10
Nonresidential uses	
Bowling alleys	10
Child Care	5
Libraries	15
Hotels/motels	2.5
Uses located adjacent to SR A1A	5
Municipal and community office buildings	15
Office buildings > 30 required parking spaces	2.5
Outdoor Recreation	20
Skating centers	15
Restaurants, fast food	10
Commercial retail uses adjacent to SR A1A	10
Commercial uses not appearing above & not exempt	5
Institutional uses not listed above & not exempt	5

The Guidelines recommend the following for bike racks:

- Support the bicycle upright by its frame in two places.
- Prevent the wheel of the bicycle from tipping over.
- Support bicycles without a diamond-shaped frame with a horizontal top tube.
- Allow front-in and back-in parking where the front or rear wheel and the down tube or seat tube respectively can be locked using a u-lock

In keeping with the City's support of bicycle usage, two bicycle repair stations donated by the Daytona Beach Bike Club have been constructed – one each at Fortunato Park and Cassen Park. Additional stations will be required as the bike network is expanded. These stations provide all the tools necessary to perform basic repairs and maintenance, from changing a flat to adjusting brakes. Each bike repair station contains a spiral a support rack that is double-sided; a heavy duty bike pump with a waterproof gauge; and a service station that can handle a flat to adjusting brakes and derailleurs. Tools are attached to the stand with stainless

steel cables. Hanger arms are provided to place the bike in a position where the pedals and wheels may spin freely while making adjustments.

The repair stations depicted to the right are located in Fortunato and Cassen Park. These bike repair stations provide a valued amenity and recognition of the importance of cycling to the Ormond Beach community. The easy installation and positive feedback from bikers using bike stations demonstrates both the scalability of these stations in Ormond Beach as well as the high demand for a bike resource like the repair station.

E. Existing Bike and Pedestrian Level of Service

1. Road Corridors

There are a number of approaches to determining improvement needs to bicycle and pedestrian facilities. For the purposes of this plan, the approach chosen to determine the exiting level of service for pedestrian and bicycle travel modes is FDOT's Bike and Pedestrian LOS Model. FDOT concluded that these two models were the best analytical methodologies available.[6] The Level of Service for each of the road corridors is provided in Table 6.

Table 6: Existing Bike & Pedestrian LOS

Road Corridor	Travel Mode	
	Pedestrian	Bicycle
SR 40	D	C
A1A	D	C
Airport Road	D	B
Clyde Morris	C	B
Hand Avenue	E	D
SR 5A	C	D
Tymber Creek	C	D
US 1	D	B
Williamson	C	E

2. Signalized Intersections

There are 45 signalized intersections that the City contracts with Volusia County to operate and maintain. All the signalized intersections within the city operate in a semi-actuated mode which allows the signal timing to adjust based on vehicle demand. Video detection exists at three SR40 intersections.

[6] (Transportation, Level of Service Handbook, 2009),

Table 7 provides the analysis of levels of service for bike and pedestrians at signalized intersections in the city.

Table 7: Existing Bicycle LOS by Corridor and Intersection		
Road	**Intersection**	**Bike LOS**
A1A	@ Neptune	C
	@ SR40	B
	@ Harvard	B
Airport Road	@ Tymber Creek Road	A
	@ US1	A
Clyde Morris Boulevard	@ Hand	A
Hand Avenue	@ Nova	B
	@ Clyde Morris	D
	@ Williamson	B
Nova Road	@ Hand	C
	@ SR 40	C
	@ US 1	C
SR 40	@ Tymber Creek Road	B
	@ I95	B
	@ Williamson	B
	@ Clyde Morris	C
	@ Nova	B
	@ US1	B
	@ Halifax	B
	@ A1A	C
Tymber Creek Road	@ Airport Road	C
	@ Riverchase	D
	@ SR 40	B
US 1	@ SR 40	B
	@ Nova	A
	@ Airport	B
	@ I95 SB Ramp	B
Williamson	@ Hand	E

F. Bike Facilities in Ormond Beach

1. Types of Bike Facilities

Bike facilities that are commonly found in the State of Florida and in Ormond Beach include:

- Shared Travel Lane – Except for the Interstate highway system and the Florida Turnpike, every FDOT lane is also a bikeway.

  Comment: Standard travel lanes are 12 foot wide and too narrow to share, so the cyclist when using a travel lane must control the lane.

- Wide Outside Lanes – Some lanes are designed to be 14 feet wide and can be shared by the bicyclist and a vehicle.

Comment: Recently FDOT reduced the lane widths on SR 40 to create designated bike lanes in each direction.

- Shared Lanes – This is sometimes called a “sharrow” lane which is often marked as two chevrons over it.

  Comment: This is commonly used for lower speed streets and roads (<35 mph) where bike lanes either cannot be accommodated or are not encouraged such as in the City’s downtown where on-street parking and bike lanes conflict.

- Bike lanes - Designated lanes on the right side of the road separated by a solid strip. The lane width is typically between 4 and 6 feet wide.

  Comment The City has two designated bike lane corridors and they are SR 40 from John Anderson Drive to Tymber Creek Road and US 1 from I95 to the southern city line.

- Paved Shoulders – Lanes on the right side of the road separated by a solid strip but not designated as bike lanes. These types of lanes are found on rural road sections where curb and gutter do not exist although some urban road sections have paved shoulders.

  Comment: Clyde Morris Boulevard, Hand Avenue and North Halifax are good examples of this type of facility.

- Multi Use Paths – These are paths that are off-road facilities specifically designed to accommodate a low volume of cyclists and pedestrians. They also can be parallel to road facilities. Typically the multi-use path is between 8-10 feet wide.

  Comment: The Tomoka State Park multi-use path between Inglesa and the state park is an example of an off-road facility. SR 40 multi-use path from Tymber Creek Road to Airport Road Extension is also an example of parallel facility to a road.

- Shared Use Paths – These are paths that are off-road facilities also and they are designed to accommodate a higher volume of cyclists and pedestrians. They also can be parallel to road facilities. Shared use paths that are two-directional should have a minimum width of 12 feet and the pedestrian area should be marked separately by a 4” stripe from the bikeway portion of the path.

  Comment: The city currently has no shared use paths although as part of the Project Development & Environment (PD&E) of SR 40 from Williamson to

Breakaway Trails, a shared use path was designed as part of the facility improvement.

VI. DESIGNING BIKE FACILITIES – FOR WHOM?

A. Users

A 1994 report by the Federal Highway Administration identified three types of bicycle users that should be considered in the design of facility types.[7] Advanced or experienced riders generally use bicycles as a convenience and speed and want direct access to destinations with minimum of detour or delay. The Ormond Loop and SR 40 could be considered routes for experienced riders due to the limited pavement width and/or vehicle volume. Basic or less confident adult riders prefer comfortable riding on neighborhood streets and multi-use paths and prefer designated bike lanes or wider shoulder lanes on busier streets. SR 40 multi-use path would be akin to the basic rider. Families and children who ride for fun and access to destinations like parks gravitate to neighborhood streets, where the speed limit is 25 mph, which are then linked to multi-use or shared use paths. The Tomoka State Park or Central Park multi-use paths are good examples of a facility for family and children use. Based upon the different users, the City's bike facility network must be designed to have interconnectivity and provide consistency and continuity between the users.

B. Selecting the Right Bicycle Facility for the User

The American Association of State Highway and Transportation Officials provide guidance on facility selection in their publication entitled a, "guide for the development of bicycle facilities." This publication, while dated, is still the authorative source when designing bike facilities. The Guide indicates there are a number of factors to consider when determining the bicycle facility type, location and priority for implementation.[8]

These factors should be considered when locating a bike facility:

- Skill level of users – Consideration should be given to the skills and preferences of advanced, basic or children bicyclists.
- On street parking – Bicycling and on-street parking are not compatible and should be designed separately if right-of-way widths permit it.
- Barriers – Physical barriers due to topographical features or even manmade features can provide interesting bicycling opportunities.

[7] (Administration, 1994)
[8] (Officials, 1999)

- Crash reduction – Reducing or preventing bicycle crashes is important enough that all new or refurbishments of bike facilities must be assessed to resolve safety issues.

- Directness – Connect traffic generators along direct lines of travel that is convenient for the user.

- Accessibility – When locating a facility, consider the ease of access.

- Aesthetics – Placing bike facilities along the Halifax River, the beach, state park lands and city parks is an important consideration.

- Personal safety/security – Consider crime and design facility accordingly.

- Number of potential stops – Try to minimize the number of stops along the way to ensure the bicyclist does not make frequent stops.

- Conflicts between users of different facility types – Consider the number of road crossings required when planning a bike facility.

- Maintenance – Facility design should facilitate and simplify maintenance which in turn will improve safety and use of the facility.

- Pavement quality – Pavement must not have bumps, holes, utility covers or unfriendly drainage grates.

- Presence of bus or truck traffic – Large vehicles and bicycles cause special issues particularly in turning movements.

- Traffic volumes and speed – Volume, speed and existing roadway width should be assessed for a facility.

- Bridges – Bridges are a great way to cross barriers but they can also present unfavorable conditions for bicyclists.

- Intersection conditions – A high percentage of bike/vehicle crashes occur at intersections and driveways. Facilities should be selected so as to minimize the number of crossings, or intersections should be improved to reduce crossing conflicts.
- Cost/funding – Cost, while important, should be one component balanced with all the other factors when designing a facility. Perform a Cost Path analysis and assess the costs with the goals of the bike facility to be constructed.

- State and city laws – Bike facility design and how it operates should not conflict with city or state laws

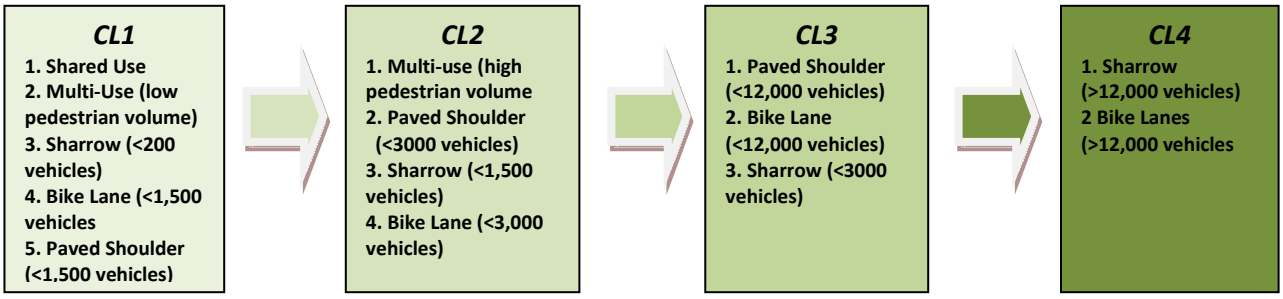
C. Design Elements

Once all of the applicable factors in section D have been evaluated, the selected facility should adhere to the design standard contained in Table 8 that is most

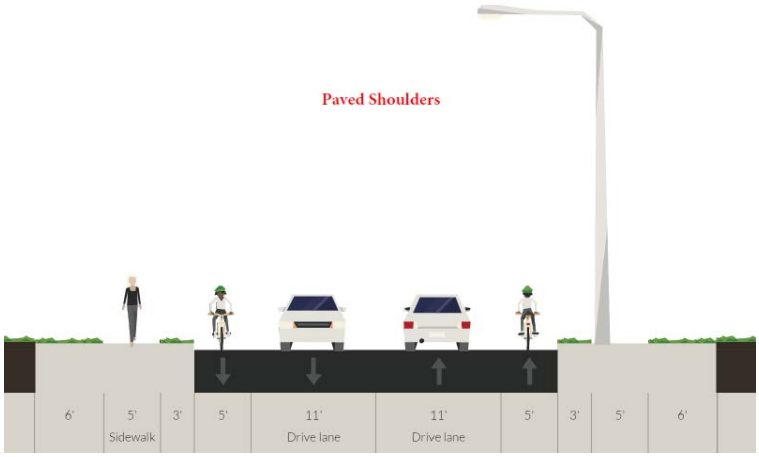
Table 8: Facility Design Standards

Type of Facility	Width	Road Classification	Type of User	Location Examples	Comments
Sharrow	12' Lane	Rural/Urban	Advanced	Ormond Loop Nova Road Beach Street	
Paved Shoulder	Minimum 4'	Rural road section	Advanced	Airport Road east of Ocean Pints Drive	Ditch and recovery
	Minimum 5'	Urban road section	Advanced	Clyde Morris	Curb and gutter
Bike Lane	5 – 7'	Rural or Urban	Advanced Intermediate	SR40 US 1	FDOT is going from 5 foot lane to 2' buffer + 5' bike lane on divided roads with a speed limit of <45 MPH
Multi-Use Paths	Minimum: 8' Preferred: 10' Vertical Clearance: 8' Horizontal Clearance: 2'	N/A	Intermediate Family	Wilmette SR 40 west of Tymber Creek Road	Two directional – bicycle and pedestrian traffic is anticipated to be low; good horizontal/vertical alignment
Shared Use Paths	Minimum 12' Vertical Clearance: 8' Horizontal Clearance: 2'	N/A	Intermediate Family	Tomoka State Park from Inglesa Av. to state park entrance	Two directional – bicycle and pedestrian traffic is anticipated to be high; bicycle and pedestrian separated by 4" stripe.

The comfort level of a bicyclist varies based upon the stress experienced while biking. The more comfortable (less stress) a bicyclist feels on a facility, the more willing a bicyclist will use the facility. Bicyclists comfort levels (CL) are depicted below by type of bicycle facility. These levels range from 1 (most comfortable), 2 (moderately), 3 (less) to 4 (least comfortable).



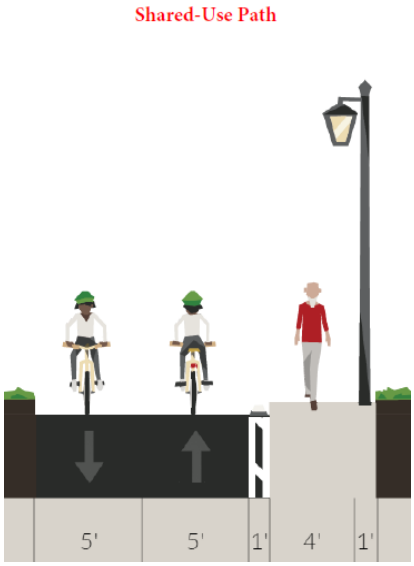
Diagrams depicting these facility design standards were developed using Streetmixology, an interactive street section builder browser used to engage neighbors in the decision making process about Complete Street design.



Paved shoulders cater principally to advanced bicyclist. Intermediate bicyclist may feel comfortable depending on vehicle volumes and speed.

Bike lanes principally cater to advanced bicyclist. Intermediate bicyclist comfort levels depend on vehicle volumes and speed.

Multi-use paths cater to intermediate and family bicyclists. Pedestrians may feel comfortable depending on volume of bicyclists.



Shared-use paths cater to intermediate and family bicyclists and pedestrians.

Sharrows cater principally to advanced bicyclists on arterial and collector roads. Intermediate and family bicyclists may use sharrows on local residential streets where vehicle volume and speed is low.

D. Design Philosophy

In designing new multi-use paths or retrofitting local roads as part of a reconstruction or repaving, a design philosophy is advocated that moves the City towards Complete Streets. This philosophy should include the following:

Routinely accommodate bicyclists as part of roadway improvement projects

- Be bike friendly by replacing older unfriendly drainage grates, removing vertical and horizontal hazards and maintaining a smooth riding surface on local roads;
- Provide as much space for bike lanes and paved shoulders as possible given the rights-of-way but strive for a 5.0 foot width;
- For local streets that may be used as part of recognized bike routes, use signs for way-finding and pavement markings for channelization;
- Be consistent in signs and markings for all bike related facilities;
- Recognized that biking is for all users. Experienced cyclists will use arterial and collector roads while the casual or less experienced cyclist will probably navigate to multi-use paths or low volume collectors or local streets.

In Ormond Beach, the city has several collector roads and mostly local streets. There is little new road construction anticipated except for Ormond Crossing. A key consideration for city engineers when planning a repaving or reconstruction of existing roads is the possibility of retrofitting said roads with designated bike lanes or paved shoulders. It is recommended that the City examine the existing lanes to determine if the lanes can be narrowed. This was done recently by FDOT when East-West Granada was repaved. If the lanes are of the required width, can the existing pavement be widened or can the curbs be relocated? Of course, these considerations should be assessed against the effects of changes in the existing cross section of a road.

VII. BICYCLE AND PEDESTRIAN SCHOOL SAFETY REVIEW STUDIES

Consultants were retained by the River-to-Sea Transportation Planning Organization to prepare an Implementation Report for the Bicycle and Pedestrian School Safety Review Study for 17 Volusia County schools. Conditions within the walk zone of elementary schools and middle schools were assessed based upon the following factors:

- Safety severity
    - Distance from the school
    - crashes

    - Traffic flow (how it affected walkers and bicyclists)
- Benefits associated with improvement
    - Walker and bicyclist traffic
    - Walking and bicycling network/connectivity
- Constructability
- Cost

Studies completed were for the following schools:

- Ormond Beach Middle School
- Ormond Beach Elementary School
- Osceola Elementary School
- Pathways Elementary School
- Pine Trail Elementary School
- Tomoka Elementary School

Projects, where denoted as a priority, are incorporated into the Proposed Bicycle Network.

VIII. EVALUATION

A number of evaluation measures are available to the City to determine how well its bicycle program is performing. Some of these include bicycle accident data and bicycle Levels of Service. This chapter establishes the baseline from which the City can measure progress and identify areas for potential improvement in the future.

A. Bicycle Crash Analysis

A bicycle crash analysis looks at all aspects of bicycle crashes in the city. With this analysis, an attempt was made to identify all of the factors that contribute to bicycle crashes in Ormond Beach, and then seek improvement. The period of study 2010 to 2014 provides a clear picture of what is needed to achieve the goals of City's 2016 Bike Plan. Using the University of Florida's Signal Four Analytics, it was determined that the city had 95 bicycle crashes between January 1, 2010 and December 31, 2014.[9] Of the bicycle crashes, two fatalities and 90 injuries were reported. Twenty-six crashes occurred on city roads of which three were property damages only. The crash data is presented in Tables 9 through 12 and Figure 1. The data is broken down by year; day of the week; time of day; month; and crashes per capita for Ormond Beach, Volusia County and Florida for comparison purposes.

[9] (Florida U. o.)

Table 9: Bicycle Crashes by Year

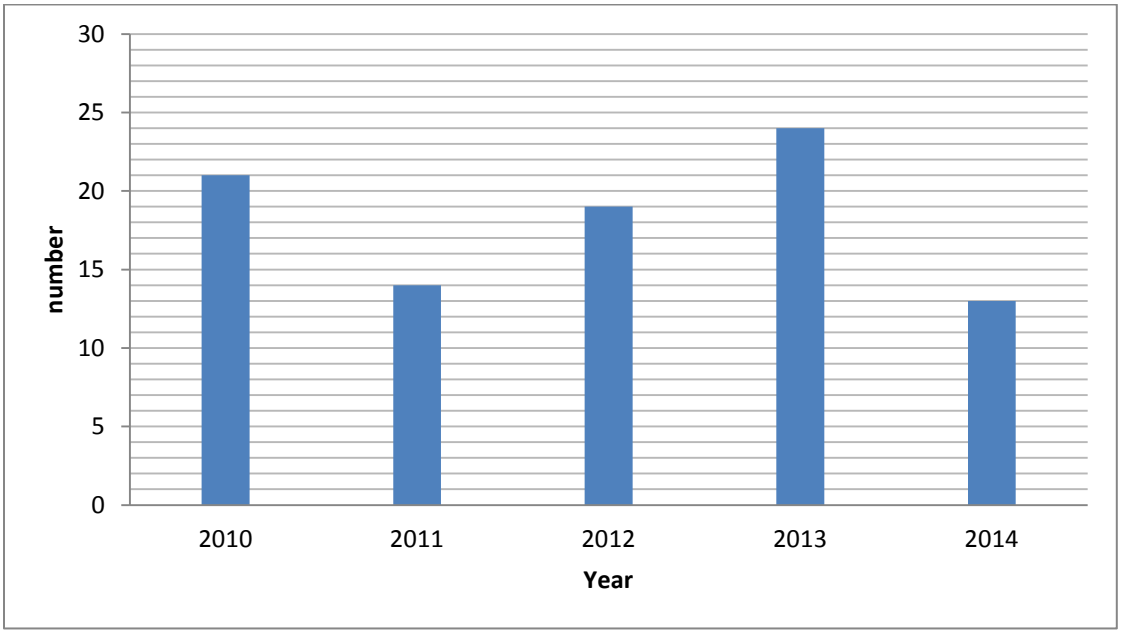


Table 10: Bicycle Crashes by day of week

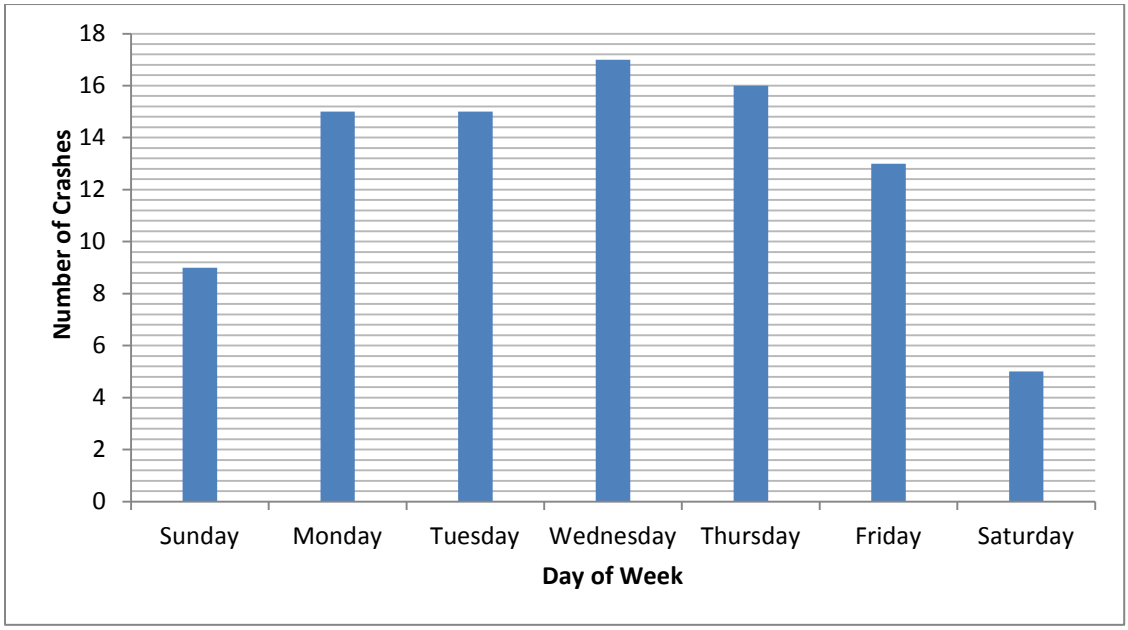


Figure 1: 2010-14 Crashes by time of day

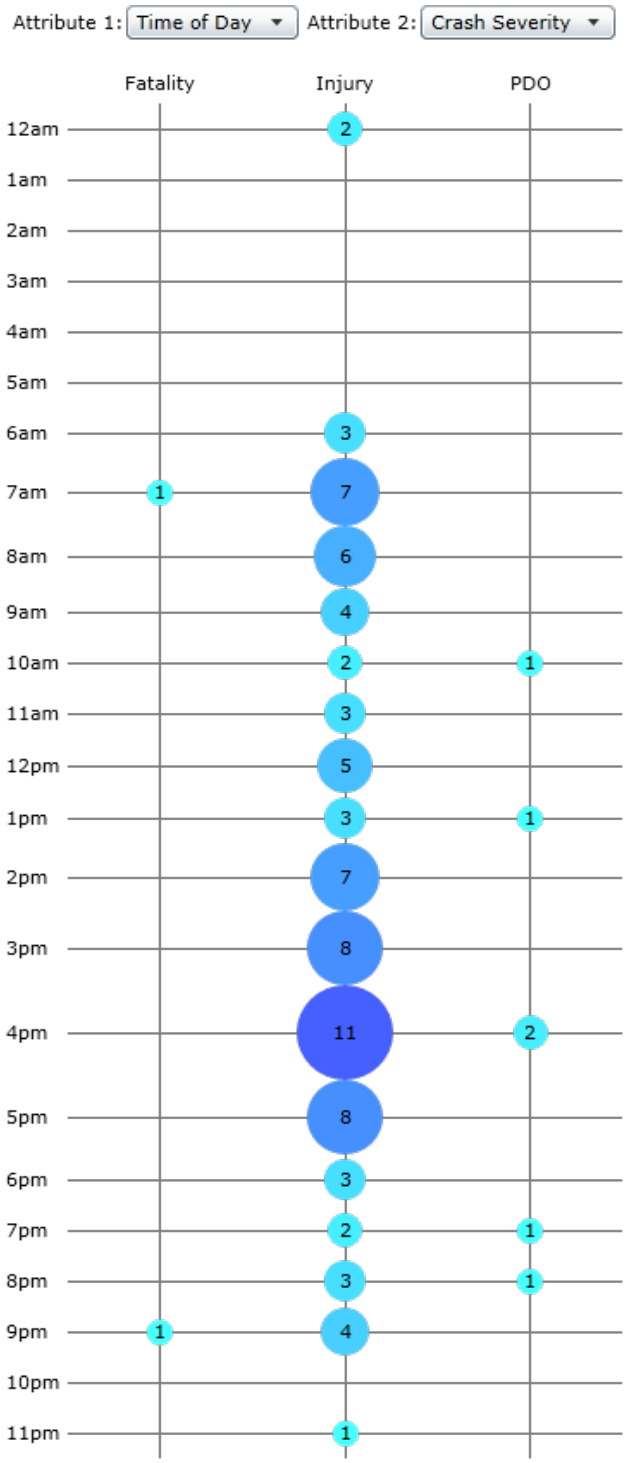


Table 11: 2010-14 Bicycle Crashes by Month

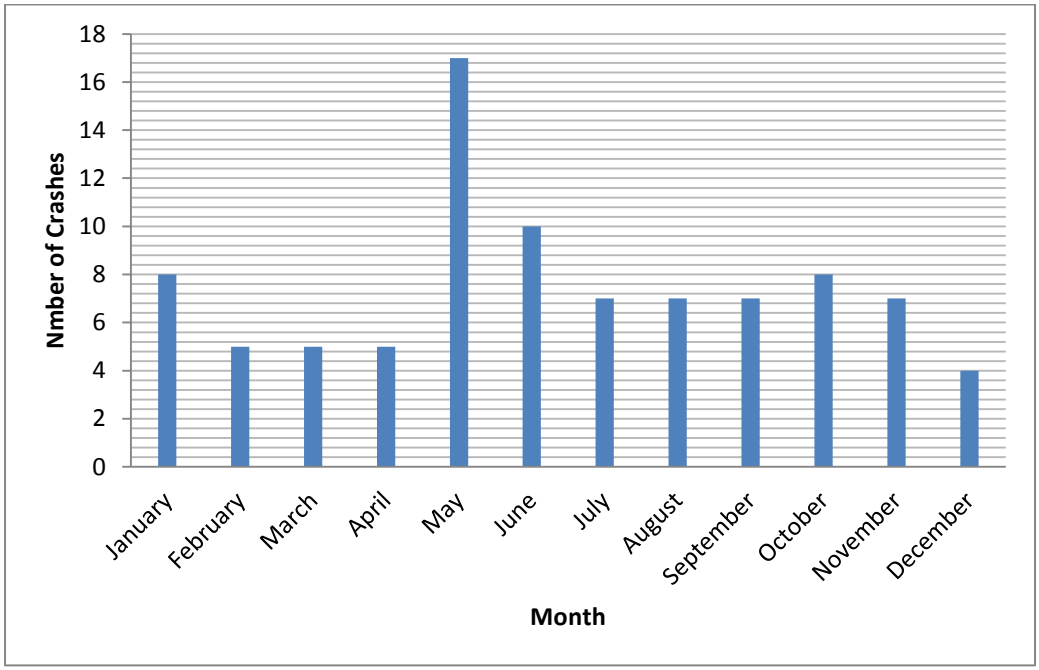
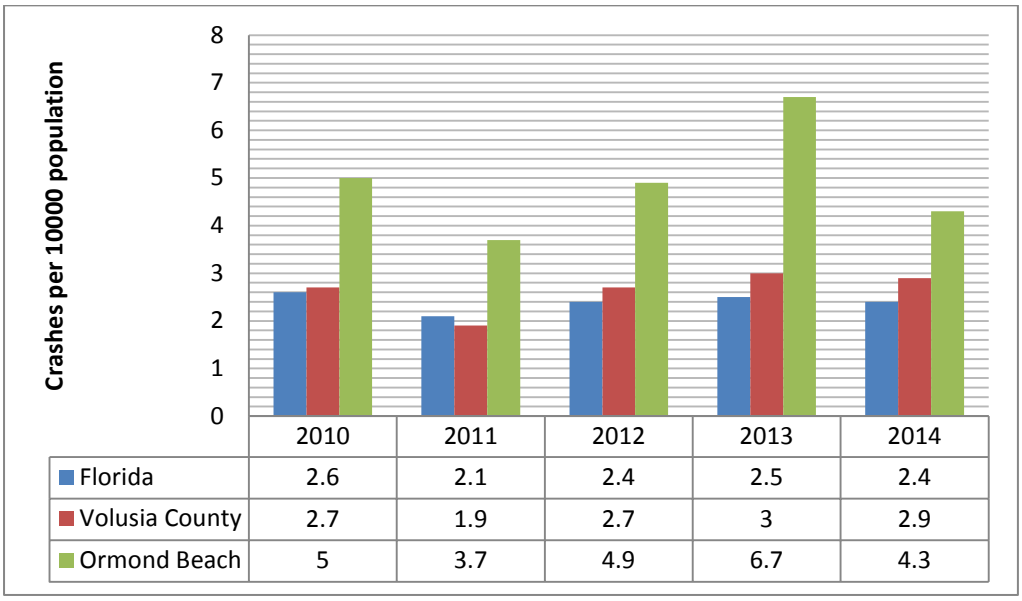


Table 12: 2010-14 Bicycle Crashes per capita



	2010	2011	2012	2013	2014
Florida	2.6	2.1	2.4	2.5	2.4
Volusia County	2.7	1.9	2.7	3	2.9
Ormond Beach	5	3.7	4.9	6.7	4.3

The bike crashes from 2010-2014 were compared to the number of bicycle crashes in Volusia County and Florida. The bicycle crashes reported in Table 12 are based upon the number of crashes per 10,000 residents.

B. Types of Bike Crashes

An analysis of the bike crashes was performed on the data provided from Signal Four Analytics. The predominant type of crash was right angle crashes where either the cyclist or the motorist failed to yield. These type of crashes include one of the following: 1) motorists pulling out or driving into intersections and into the path of bicyclists on initial crossing path; and 2) motorists and bicyclists failing to stop for a red signal indication or a stop sign, or pulling into the path of each other at a stop-controlled location after initially stopping, including to make right turns on red or to make right or left turns at stop signs. Accident reports indicate wrong-way and sidewalk riding were two major contributing factors that placed cyclists in positions not expected by motorists at intersections and driveways.

Table 13: Common Bicycle Collisions

Collision Type	Number	Percent	Crash Group
Rear End	5	.05	Parallel path
Bicycle side/car front	18	.20	Crossing path
Right Hook	1	.01	Crossing path
Driver failed to yield - intersection	10	.11	Crossing path
Other (alcohol related)	3	.03	
Sideswipe	7	.08	Parallel path
bicyclist failure to yield - intersection	17	.18	Crossing path
Left Cross	1	.01	Crossing path
Right Angle	26	.27	Parallel path
Left Angle	3	.03	Parallel path
Operating without proper equipment	4	.04	
Total	95	100%	

C. Findings

The key findings of this analysis are these:

BIKE CRASH SAFETY TRENDS, 2010-14

Bike crash trend is sporadic but increased generally and reached its peak in 2013 before decreasing in 2014.

Ormond Beach had a higher per capita crash rate than Volusia County or the State of Florida during the period studied.

WHERE DID THE CRASHES OCCUR

The bike crash data is scattered throughout the city but many of the bike crashes are generally located along two major corridors and at major and minor intersections and driveways. The two main corridors are SR 40 (Granada Boulevard) and SR5A (Nova Road). Twenty-six crashes occurred on city roads.

WHEN DID CRASHES OCCUR

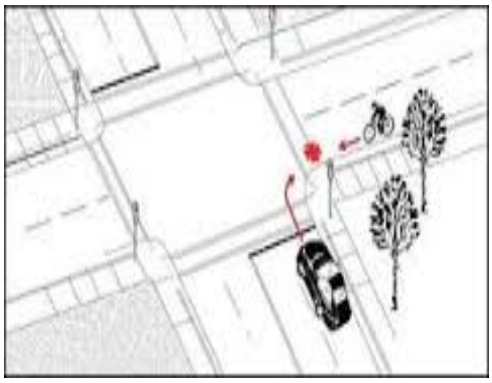
The majority of bike crashes occurred during daylight hours and the weather was clear.

May was the month that had the largest number of bike crashes.

Bike crashes increased into the weekday and reached its peak on Wednesday before decreasing into the weekend.

The largest number of crashes occurred on the weekday between 4:00-6:00 pm.

ADDITIONAL COMMENTS



The most common type of crash was a right angle crash where the bicyclist was either riding with or against traffic on street or with or against traffic on the sidewalk/crosswalk. The second and third most common is the cyclist and motorists not yielding the right of way. All three are considered a crossing path crash group issue.

IX. ENFORCEMENT AND EDUCATION

Engineering of infrastructure for bicycles alone will not increase bike safety. Behavior change by people using the road is also needed. This change can be through education and enforcement of laws pertaining to bicyclist, motorists and pedestrians. The City's Police Department is highly trained in knowing, understanding, and applying local and state bicycle laws. The Department has an active Bicycle Patrol unit of six (6) police officers. The City's Police Department has roll call videos for bicycle training which is provided to all officers. In addition, the Police use Radar Speed trailers as part of a community education program. While these types of actions have limited long-term effectiveness in changing the problem, they can be useful in educating motorists and residents thereby boosting support for longer term solutions.

Enforcement actions such as Progressive Ticketing (education, warning and ticketing) and the use of Pedestrian Enforcement Operations using pedestrian decoys crossing marked crosswalks are all enforcement techniques that have been used in the State. FDOT has funding available for law enforcement agencies to conduct High Visibility Enforcement operations for pedestrian and

bicyclist safety. High visibility enforcement funds are intended as a crash mitigation tool. These enforcement activities are designed to target unsafe behaviors of all road users, including motorists, pedestrians, and bicyclists. Behavior can change! Vehicle speeds on Division and Hand between Orchard and Nova rarely exceed the posted 25 mph. Nor do motorists fail to stop for pedestrians at or in the marked crosswalks along the streets that divide Central Park. This is due to a constant police presence and enforcement along these roads. In addition, the Police should actively enforce the helmet law for age groups that are under 16.

A. State Laws (Chapter 316, Section 316.2065)[10][11]

- Bicycles are vehicles. Drivers of vehicles must follow all traffic laws common to drivers. As a bicyclist, special laws adopted for bicycles also apply.
- Bicycles cannot carry more persons than designed or equipped.
- Bicycle riders under 16 must wear a helmet.
- Bicycles may not be attached to other vehicles other than trailers designed for such attachment.
- Bicycles travelling at less than the normal speed shall ride in the lane marked for bicycle use or as far right as practicable except when:
  - overtaking a vehicle travelling in the same direction,
  - preparing for a left turn;
  - when reasonably necessary to avoid any condition or potential conflict;
  - lane is substandard in width (less than 14 feet) which makes it unsafe to continue along the right-hand curb or edge or within a bicycle lane.
- Bicycles may not be ridden more than 2 abreast and do so only within a single lane and travelling at less than normal traffic speed and it does not impede traffic.
- Bicycles on a sidewalk or crosswalk must observe the duties applicable to a pedestrian.
- Bicycles on a sidewalk or crosswalk shall yield to pedestrians and give an audible signal before overtaking.
- Bicyclists may not wear headsets, headphones or other listening devices unless sound is provided through only one ear.

X. COST ESTIMATES

Unit costs for the types of pedestrian/bike projects proposed in this plan are based upon FDOT's Long Range Estimates (LRE) System as of June 2014.[12] LRE is FDOT's Long Range Estimates web-based computer system that is used to develop construction cost estimates for projects. It is a parametric estimating

[10] (Bicycle-traffic law)

[11] (Statute)

[12] (FDOT, 2014)

tool used for conceptual estimating prior to the development of design quantities. The LRE is used in estimating bicycle and pedestrian facility related cost items and is based on the total Project Costs for such facilities. Table 14 cost items includes Construction, PE Design and CEI.

Yearly maintenance is based upon the Rails-to-Trails Maintenance & Operation Manual which surveyed 100+ trails on primary management and design topics, including liability, surfaces, drainage, amenities, signs, bridges and budgets. The report was used to estimate maintenance of trails.

Table 14: Cost Estimates

Item	Costs	Comments
Sidewalks	$33 LF	5' Wide – 1 Side. Includes
Multi-Use Paths	$48 LF	10 foot wide; 6" thick.
Boardwalk	$250.00 LF	Includes handrails
Paved Shoulder	$28 per LF	4' Wide – 2 sides (rural) 85% of the bike lane cost per mile.
Bike Lane	$33 per LF	5' Wide – 2 sides (urban)
Bridging	$1,600 per LF	14' wide; Prefabricated steel structure Steadfast type pedestrian bridge. The cost of abutments, foots, crane and other mobilization costs not included.
Shared Use Path	$63 per LF	12' wide; 1 side. Concrete only
Lane Marking	$15,000 per mile	Both sides of road
	$2.47 per LF of thermoplastic for line striping	
	$350 for each set of performed thermoplastic bike symbols with arrows	
Lighting	Varies widely depending on type of light and location. Forest Hill lighting was $5,000/light	System controller included
Route Marking	$2,000 per mile	
Signs	$250 - $350 each	
Maintenance	$2,077 per mile for city owned facilities	

XI. BICYCLE NETWORK

In addition to advocating design improvements at high crash locations at State and County intersections and expanding the network of protected bike lanes for state, county and city roads when resurfacing or reconstruction is planned, additional multi-lane and shared lane improvements are needed. The City

should advocate for the state and county to build multi-use and shared use paths adjacent to major road widening improvements. In addition, the City should identify a local network of bike paths interconnecting destinations for residents to bicycle for utilitarian and recreational purposes. With this latter statement in mind, the following multi-use and shared use paths have been identified:

A. Forest Hills Connector

In 2008 a School Bicycle and Pedestrian Review Study was prepared for the Tomoka Elementary School located south of SR 40 and west of Nova Road on Old Tomoka Road. At the time of the study, 840 students attended this school with 351 living within the designated walk zone area. During the 2007/2008 school year approximately 70 of these students walked or rode bicycles to school. Children walking or riding bicycles to and from school currently travel along Nova Road and S.R. 40 to reach Old Tomoka Road and the school. These roads are busy and the distance exceeds one mile.[13] This Study recommended that the City of Ormond Beach pursue funding for a trail connection with a pedestrian bridge between this subdivision and Mayfield Terrace. The proposed 5600 linear foot pathway would begin at the western end of Scottsdale Drive and proceed south to north along Misner's Creek in Haas Park to Old Tomoka Road. At each end wood decking would be used to bridge the differences in topography or the channel itself. This project was submitted to the TPO for funding in 2015/16 and therefore is considered a number 1 priority.

Project	Map #	Description	Length	Est. Cost
Forest Hills Shared Use Path	3	Scottsdale/Military to Old Tomoka Avenue via Misner Creek Channel	5600 LF of concrete and boardwalk decking with lighting.	$500,000
			Annual Maintenance Cost	$ 2,200

B. Tomoka State Park Multi-Use Path - Phase 2

In 2012 the City constructed an 8 foot multi-use path from Inglesa Avenue to the Tomoka State Park entrance, a distance of 1.09 miles. Phase 2 of this multi-use path would connect Inglesa with Sanchez Park. This pathway would parallel the King Heritage Highway and run in a north-south direction. The proposed pathway could take two directions. The first alternative would require cooperation and planning from key stakeholders such as the city, the State of Florida Park System, Volusia County, residents, and the R2CTPO. This trail alignment (alignment 1) would be consistent with the State of Florida's Tomoka Basin State Park land management plan which was approved in 2012.[14] Multi-use pathways will be examined to determine the exact alignment of the trail. It is possible that the trail will connect with portions of existing fire trails. The trail will

[13] (Transportation, Tomoka Elementary School Bicycle and Pedestrians School Safety Review Study, Phase 3B, 2008)
[14] (Protection, 2012)

consist primarily of paved (concrete) surface, with alternative materials employed where necessary in environmentally sensitive areas. Location of trail will be aligned in a way to ensure the residents' concerns regarding security and privacy are addressed. This pathway is currently in the City's proposed 2016-20 Capital Improvement Plan. The project was submitted to the TPO in 2014, and it is

Project	Map #	Description	Length	Est. Cost
Tomoka State Park Shared Use Path – Phase 2	4	1. Sanchez Park to Tomoka State Park multi-use path at Inglesa via Tomoka State Park	12,667 LF of 10 foot sidewalk & 700 LF of boardwalk	$900,000 - $1,000,000
		2. 8 Foot sidewalk from Beach to Domicillio and from Sanchez to Andrew Street	6,650 LF± 8 foot sidewalk	$400,000 to $500,000
			Annual Maintenance Cost:	$ 5,000

currently in Tier B – ready for funding. This pathway would be car-free and connect Sanchez Park directly to Tomoka State Park. Sanchez Park could be the trail head for this portion of the multi-use path.

Alternative 2 to placing the path in the State Park property is to make use of the 8 foot wide sidewalk on N. Beach Street to Burr Oak Court and then widen 5,500± linear feet of existing 5 foot sidewalk on N. Beach Street from Burr Oak Court to Domicilio Avenue to 8 foot. Make use of the 8 foot wide sidewalk on Domicillio to the intersection of North Ridgewood and Sanchez. Once at Sanchez, there are 8 foot sidewalks on Sanchez Avenue on the north side to the beginning of Sanchez Park property. An existing 8 foot sidewalk is on the south side of Sanchez across from the park but the path should be on the same side. Construct about 1,150± linear feet of sidewalk from N. Yonge to Andrew Street.

C. Thompson Creek Multi-Use Path

This is a 6550± linear foot multi-use path that parallels Thompson Creek on city owned land from Wilmette to Division Street. This corridor will have more urban type trail characteristics near Sanchez Park and near Division Street. However, in the middle of the corridor, construction of the trail would follow more rural trail type characteristics. Alignment traverses the Downtown and SR 40 - a City designated multimodal corridor. Pathways devoted to bicycling and pedestrians that link the downtown with residential neighborhoods contribute to the smart growth initiatives that are articulated in the City's mobility plan, downtown plan and form based code. Non-motorized connectivity is needed between the downtown and the residential areas along this corridor. Ultimately, this trail has the potential to connect the Central Park area's population to destination shopping areas, transit stops, civic buildings, and other parks.

In 2001, this corridor was assessed as part of the FDOT sponsored East Coast Greenway Alliance Trail Designation Review Study. The corridor was evaluated based upon:

- Location of the corridor in relation to roadways;
- Aesthetics of the corridor;
- Proximity to Attractors;
- Relative cost to construct;
- Right of way availability;
- Safety Issues; and
- Connectivity

Of the four corridors evaluated, this western corridor was tied for the best route but was not recommended due to the complexity involved in crossing Granada. However, the right-of-way is publically owned and is considered one of the most beautiful canopied corridors in the city. In 2011 this was approved by the City for submittal to the TPO for a feasibility study to determine the most appropriate alignment. Due to a number of obstacles, two alignments are possible. The first and preferred alignment would be south to north and that portion of the southern leg would be within FPL's easement. This would require FPL's approval but bike facilities within power easements are being done throughout Florida so this would not be precedent setting. Crossing SR40 would be the first obstacle. From SR40, the trail would proceed north along the city owned Thompson Creek channel to Wilmette. Due to wetlands, trees and water, part of this trail would be concrete and part wood decking. Clearing of trees and the width of the channel are obstacles.

An alternative could be the use of Tomoka Street to Orchard and from Orchard to Wilmette. Crossing of SR 40 would be at a signalized intersection but the existing right-of-way on Orchard north of SR40 is narrow. Funding of a feasibility study for this segment has remained at the bottom of the TPO's priority list since each year new projects from other cities are added. Staff intends to retool the application and resubmit for 2016.

Project	Map #	Description	Length	Est. Cost
Thompson Creek multi-use path	5	Division to SR 40 via FPL easement and north along canal to Wilmette. Alternative Route: Tomoka Avenue to Orchard to Wilmette	4252 LF of 10 foot sidewalk & 1750 LF of Boardwalk Median Refuge **OR** 8 foot of 3151 LF sidewalk from Tomoka at Orchard to Wilmette	$400,000 to $700,000
			Annual Maintenance Cost:	$ 2,400

D. Sanchez Multi-Use Path

The pathway from Sanchez Park to the Thompson Creek pathway at Wilmette has only one possible alternative. Initially, a pedestrian bridge was examined at the canal crossing of Andrews Street. Silting and tidal flow puts an at grade span bridge in conflict with boats that are moored in the dead end portion of the canal. The most logical route would be to build an 8 foot path on Sanchez to connect to Yonge's 8 foot sidewalk. Yonge's sidewalk would then connect to Wilmette's 8 foot sidewalk. An upgrade of the signal and crossing at US 1 would be required but then the 8 foot multi-use path picks up again in an east-west fashion.

Project	Map #	Description	Length	Est. Cost
Sanchez multi-use path	6	Sanchez Park to Yonge to Wilmette.	.Approximate distance: 600 lf of 8 foot path; Stone driveway aprons in ROW require replacement with concrete; upgrade of signal/crossing; and construct missing link from Sanchez Park to Yonge.	$75,000 to $100,000
			Annual Maintenance Cost	$1000

E. US 1 Shared Use Path

In December 2013, FDOT partnered with the TPO and had prepared the US 1 Corridor Improvement Program (CIP). This study concentrated on the entire corridor from Brevard County to Flagler County. There were two phases to the US 1 CIP. Phase 1 of the study compiled all previous studies and developed a database of current and proposed projects associated with US1. Additionally, goals and objectives for the corridor were developed through a county-wide working group. One of the conclusions of Phase 1 was the need to improve multi-modal travel along US 1. Phase 2 was undertaken to determine the most appropriate approaches for US 1 to better serve bicyclists, pedestrians and transit while still maintaining the primary focus of US 1 – move vehicles. Figure 29 of the study identifies a potential network of facilities that would establish a fully contiguous system of facilities for cyclists and pedestrians based upon the existing bike/pedestrian infrastructure and gaps on US 1 in Ormond Beach. This project was submitted to the TPO for funding in 2015. One of those illustrative projects was a shared use path from Wilmette to Pine Tree.[15]

Project	Map #	Description	Length	Cost
US 1 Trail	7	Wilmette to Pine Tree Drive via US 1	27139 LF of 12 foot concrete pathway	$1,600,000 to $1,800,000
			Annual Maintenance Cost	$ 11,000

[15] (Transportation, US 1 Corridor Improvement Program, Phase II Summary Report, 2013)

F. East Coast Greenway (ECG) Trail

In 2001 FDOT prepared for the City of Ormond a feasibility report whose purpose was to assist the city in completing an analysis of alternative alignments for multi-use trail that would have been designated as part of the ECG Alliance Trail System.[16] There were four alignments studied:

- Alignment A was South Beach Street to Granada to A1A to Roberta Road;
- Alignment B was South Beach Street to Granada to John Anderson to Neptune to A1A to Roberta Road;
- Alignment C was South Beach Street to Granada to North Beach Street to Sanchez Avenue to Sanchez Park; and
- Alternative D was South Beach Street to Division to Thompson Creek to Wilmette to US 1 to West Street over the canal to Putnam to Andrews to Sanchez Park.

Alignment B was recommended as a Class A – East Coast Greenway Trail while Alignment C was recommended as an alternative.

Since then, a number of changes have occurred to affect these recommendations. FDOT provided designated bike lanes on East Granada from west side of the bridge approach to the intersection of A1A and the City as part of the resurfacing and drainage work on North Halifax provides 4 foot marked shoulders where none existed previously.

Consequently, Alignment A could be the preferred route provided the sidewalks along A1A are expanded from 5 feet to 8-10 feet wide. Alignment B could be the alternative route but rather than using John Anderson, N. Halifax should be used as the connector between Granada and Neptune.

Project	Map #	Description	Length	Cost
East Coast Greenway Trail	8	North Beach to E. Granada to A1A to Roberta – Preferred alternative	6388 LF of 10 foot sidewalk from Neptune to Plaza Drive on A1A	$300,000 to $400,000
		Ocean Shore from NCL to Neptune; Neptune to Halifax to Granada Bridge to S. Beach Street - Alternative	Annual Maintenance Cost	$ 2,500

[16] (Transportation, Ormond Beach East Coast Greenway Alliance Trail Designation Review, 2001)

G. Hand Avenue Multi-Use Path

The Hand Avenue multi-use path would begin at Central Park and extend westward to Williamson Boulevard. The path will connect along the north-south bike shoulders and sidewalk on Clyde Morris Boulevard. Central Park would be a good trail head because of parking and recreational facilities. An 8 foot sidewalk already exists from Central Park to Nova Road. Two intersections would require crossing but there is sufficient rights-of-way between these intersections to provide an 8 foot wide multi-use path. Since Hand Avenue is a Volusia County jurisdictional road, cooperation and a partnership would be required.

Project	Map #	Description	Length	Cost
Hand Avenue Multi-Use Path	9	Hand Avenue from Central Park to Williamson	Central Park to Nova 8 foot wide exists. 12830 LF of 10' wide from Nova to Williamson	$600,000 to $700,000
			Annual Maintenance Cost:	$ 5,000

H. Kings Highway Heritage Shared Use Path

The Kings Highway Heritage shared use path would continue where the Tomoka State Park multi-use path ended (entrance to park) and proceed up Old Dixie Highway, Walter Boardman Lane, Highbridge Road and State Road A1A using state lands. Expanded shoulders on Old Dixie Highway outside of the Park seems like a good alternative approach to providing bike facilities however Old Dixie rights-of-way is prescriptive and therefore limited to the width of the pavement.

In 2001 the State Park System expressed concerns about this trail due to security and vandalism concerns however in the latest Management Plan for the park DRP "*supports a partnership with Volusia and Flagler Counties and the City of Ormond Beach to implement part of this vision that would connect Sanchez City Park, Tomoka State Park, Bulow Creek State Park, Bulow Plantation Ruins Historic State Park, Ormond Tomb County Park, North Peninsula State Park and adjacent communities.*" DRP sees Kings Highway Heritage Shared Use Path as complimenting the existing Ormond Scenic Loop and Trail, increasing bicycle and pedestrian safety, and providing an important contribution to Volusia County's proposed trails network. Because of private lands, wetlands, and limited rights-of-way along the proposed route, a mix of trail types may be required. As stated in the Management Plan, site constraints may limit the trail to paved bike lanes along road shoulders within the park and will require creative engineering solutions, such as elevated boardwalks in other sections. The two most challenging sections are located between the Tomoka River Bridge and Dummett Sugar Mill Ruins along Old Dixie Highway and east of the Bulow Creek Bridge on Walter Boardman Lane and Highbridge Road.

The Management's Plan recognizes that the completion of this trail will require significant intergovernmental coordination and support from the local community, particularly since the proposed route is not entirely within park boundaries. An important first step in this process is the completion of a feasibility study that would propose options for constructing the trail through areas of private ownership, across bridges and through tidal marshes.

A variety of funding sources beyond DRP will have to be considered and may include Volusia County's ECHO Program, SUNTrail funding and/or federal transportation enhancement dollars. DRP will also encourage local governments to establish safe bicycle/pedestrian passage north along Old Kings Highway that would provide a link to Bulow Plantation Ruins Historic State Park.[17]

Project	Map #	Description	Length	Cost
Kings Highway Heritage Shared Use Path	10	From Tomoka State Park Entrance to Old Dixie Highway, Walter Boardman Lane, Highbridge Road and State Road A1A	The presence of private lands, extensive wetlands and limited right-of-way along the proposed route will require a mix of trail types	Feasibility Study required

I. Broadway Multi-Use Path

Broadway, between US 1 and Old Dixie Highway, is a relatively new road that has not been opened to the public. The Plantation Oaks development will soon begin to start up and the link between US 1 to Old Dixie Highway would provide connectivity.

Project	Map #	Description	Length	Cost
Broadway Multi-use path	11	From US 1 to Old Dixie Highway	10349 LF	$450,000 to $525,000
			Annual Maintenance Costs	$ 4,000

J. Bike Plan Costs

This bike plan proposes 15.5 new miles of multi-use or shared use paths. These paths range in width from 8 feet to 10 feet. Some are separate from the road while others follow a road. The estimated planning costs are $5.35 million with annual maintenance costs projected at $32,604. These costs do not necessarily mean that the City would assume the full funding of these improvements. For example, three of the projects have been submitted to the R2CTPO for funding with the city providing a 10% match using the mobility fees collected for non-motorized improvements.

[17] (Protection, 2012)

There are a number of projects that could involve multiple partners such as the Kings Highway Heritage Trail. This trail due to its location and potential positive impact on the State Park and the ability to connect historic resources could involve the Recreational Trails Program of Florida (State/Fed); County (ECHO); and the City.

Table 15: Estimated Bike Plan Costs

Project Name	Distance in Linear Feet (LF)	Estimated Construction Cost	Estimated Annual Maintenance Cost
Forest Hills Connector	5,600 LF	$500,000	$2 200
Tomoka State Park Phase 2	6,650 LF	$400,000 - $1,000,000	$5,000
Thompson Creek	6,000 LF	$400,000- $700,000	$2,400
Sanchez	60 LF	$75,000-$100,000	$1,000
US 1	27,139 LF	$1,600,000 to $1,800,000	$11,000
East Coast Greenway	6,388 LF	$300,00 to $400,000	$2,500
Hand Avenue	12,830 LF	$600,000 to $700,000	$5,000
Kings Highway Heritage		Feasibility Study	
Broadway	10,349 LF	$450,000 to $525,000	$4,000
Total	75,016 LF	$4,325,000 to $5,725,000	$33,100

Finally, this plan is an extension of the current Comprehensive Plan policy to accommodate bicyclists as part of roadway improvement projects. Consequently, for experienced riders, this means making every street bicycle friendly, while for casual and intermediate riders, this means including paved shoulders, bicycle lanes and providing trails where possible. Ormond has a wide variety of streets, from congested urban road corridors to quiet residential streets. This policy of routine accommodation will require creativity and flexibility when designing bike facilities.

XII. Prioritizing Bike Paths

A. Criterion and Weight

The criteria used to rank the bicycle and pedestrian projects are discussed below. The criteria are linked to the goals articulated in the Bike Plan. Many of the criteria address multiple goals and therefore have been identified using the Goal Icons as identifiers.

🚲 Connectivity H S CD

Facilities that fill gaps among existing facilities (especially gaps that discourage walking/biking because they limit route continuity) qualify for this priority criterion. Areas of activity such as the beach, shopping centers, transit stops, commercial and industrial centers, recreation areas, schools, libraries, hospitals and government buildings are the major trip-driving destinations within Ormond Beach. By increasing bicycle and pedestrian accessibility to these areas, the City of Ormond Beach Bicycle & Pedestrian

Master Plan can reduce traffic congestion and support residents and visitors who choose to bicycle or walk for transportation. Does the proposed bike facility increase recreational potential by providing greater uninterrupted distances and increased transportation usefulness by connecting people to desired locations? Projects located within the most popular activity areas qualify for this prioritization criterion.

🚲 Demand **H** **D**

Population density is used to gauge the potential volume of bicyclists and pedestrians. Projects located within the most dense activity areas fit this priority criterion. Service Level (SL) identifies the potential number of people who could reasonably be expected to use a bike facility. SL is determined by the number of people who live within the walking distance of a path or proposed path. Walking distance is 1250 linear feet. How well does the proposed bike facility provide geographic and demographic equity by either removing barriers and closing system gaps or serve populations with lower than average rates of bicycling?

🚲 Safety **S** **H** **CD**

Type of bike facilities available and the aesthetics of the area are likely to encourage and attract or discourage or detract people from walking or bicycling. Does the proposed bike facility provide a safer and more appealing alternative to what currently exists currently. Proposed facilities that can reduce the frequency of bicycle/pedestrian and vehicle collisions by serving areas with high volumes of such occurrences fit this priority criterion.

🚲 Community Support **CS**

Proposed bike facility that have a citizen and/or user group constituency are best positioned to succeed?

Each of the four criteria contains elements of a project's value to the bicycle and pedestrian network. Ranking the criteria establishes which factors have greater influence over prioritization. Each criterion was ranked and then given a weight according to the rank. Table 16 describes the rank, points, and weight assigned to each criterion. One hundred raw points have been allocated with 25 points allocated to each criterion. Weights were given unequally to each criterion to reflect the goals of the bike plan.

An example of how weight is used to determine a score from allocated points is provided for the Goal entitled, "Connectivity."

Connectivity has been assigned a 0.30 (weight) and 25 points resulting in a 7.5 maximum score.

(.30) x 25 = 7.5.

Table 16 Rank and Weight of Criteria				
Rank	Criteria	Weight		Points
1	Connectivity	30.0%	• Does the proposed project connect to an existing bicycle system by removing barriers and closing system gaps? • Does the project connect Ormond Beach to surrounding communities or to planned regional bike facilities that facilitate the ability to take longer trips by bicycle? • Does the project provide directness by providing a convenient bicycle path to popular destinations such as schools, library, parks, downtown, and other public spaces?	25
2	Safety	30.0%	• Does the project provide a safer, more comfortable and therefore a more appealing alternative to what currently exists in a given corridor?	25
3	Demand	20.0%	• Does the project either supplement the existing bicycle system by removing physical barriers and/or closing system gaps? • Are neighborhoods conveniently and comfortably connected within a ¼ miles of the proposed bike facility? • Does the project serve diverse populations equally? • Is the bike facility appealing to a broad range of age and ability levels and is consideration given to user amenities.	25
4	Community Support	20.0%	• Did the bike facility project have support from a neighborhood or a user constituency group?	25
		100%		100

B. Prioritization:

This prioritization does not include shared lane markings such as sharrows nor does it include shared roads. The intent is to determine the priority and phasing of expenditure on constructing multi-use or shared use paths. Pavement markings and signage is a low cost, and can be best implemented annually, either independently or in conjunction with adjacent road repaving projects. Since the Plan has a 10 year horizon and 9 projects, it is highly unlikely that all of them will be constructed in the 10 year horizon. Each project will need to go through the funding, design and engineering and then construction. This cycle can take anywhere between 3 to 5 year for each project. It is important therefore to prioritize the projects as to which one best implements the goals and objectives of the Plan. Table 17 identifies the bike path's name, type of project and the points in the upper left hand corner of the cell multiplied by the weighted percentage given to each criterion. The results are the points in the lower left hand corner of the cell. The last cell identifies the total number of points

given out of 100 and the weighted score based upon a total of 25. The projects are ranked in priority based upon the score.

Table 17 Prioritization of Bike Paths

Bike Path Name	Project Type*	Connectivity 30%	Safety 30%	Demand 20%	Community Support 20%	Points / Score
Thompson Creek	SU	20 / 6	10 / 3	20 / 4	25 / 5	75 / 18
Hand Avenue	MU	15 / 4.5	15 / 4.5	20 / 4	25 / 5	75 / 18
Forest Hills Connector	SU	15 / 4.5	25 / 7.5	25 / 5	0 / 0	65 / 17
Tomoka State Park Phase 2	SU	20 / 6	25 / 7.5	15 / 3	0 / 0	60 / 16.5
Sanchez	MU	20 / 6	20 / 6	15 / 3	0 / 0	55 / 15
Kings Highway Heritage	MX	20 / 6	15 / 4.5	20 / 4	0 / 0	55 / 14.5
US 1	SU	15 / 4.5	25 / 7.5	10 / 2	0 / 0	50 / 14
Broadway	SU	15 / 4.5	15 / 4.5	15 / 3	0 / 0	45 / 12
East Coast Greenway	PS	20 / 6	5 / 1.5	15 / 3	0 / 0	40 / 10.5

*SU = Shared Use; MU = Multi-Use; MX = Mixed

XIII. RECOMMENDED WAYFINDING SIGNAGE

It is recommended that as local bike routes are marked or constructed, that a consistent sign package and pavement marking be developed for application throughout the bicycling network. Signs should be posted on local roadways that are considered shared paths that lead to city multi-use paths or designated

routes and paved shoulders on state and county road facilities. Pavement markings should also be used and be consistent in color and application with wayfinding signs. The following basic standards are recommended when locating signs as part of a bike route:

- Follow the Manual on Uniform Traffic Control Devices for sign installation.
- Keep city, state, and regional route bike signs separate on all segments although local, state and regional signs on one channel iron would be acceptable.
- City bike signs should include the city seal, logo, directional arrow, destination, time and distance.
- When there are multiple destinations that can be reached by a bike route, the sign listing the closest destination should be on top and the furthest at the bottom. In order not to create sign chaos, keep the number of sign panels to no more than three. As intermediate destinations are reached along the route, additional intermediate destinations can be added with the furthest destination still at the bottom.
- Destinations on signs should reflect the commonly understood name i.e., Central Park, Tomoka State Park, City Hall, Library, etc.
- Feeder streets are typical local residential streets the road is shared between bicyclist and motorist due to low volumes and speed limit. Install signs on feeder streets leading to bike routes. Indicate the distance and direction to the bike route as well as to the destinations the bike route serves.
- On city streets, ensure bike route signs are at each turn or decision point along the route.
- Place signage for bicyclists traversing residential areas that have complicated street patterns making it difficult to traverse.
- To connect through existing gaps in bike routes, use pavement markings in conjunction with signs to provide direction.
- For multi-use paths, post bicycle signs at all major road intersections, feeder streets, and other decision points.
- For multi-use paths, provide bicycle route confirmation signs after all local, collector and arterial roadway crossings if applicable. Depending on length of route, consider placing additional confirmation signs.
- For multi-use paths that cross roads, include the road name along with the trail name on separate panels.

XIV. FINANCING OF SHARED USE AND MULTI-USE PATHS

Funding for bikeway facilities include federal, state and locally supported initiatives. The following programs are potential funding sources but the list should not be considered all-inclusive:

A. River-to-Sea Transportation Planning Organization's Bike-Pedestrian Program

Each year the TPO issues a Call for Projects which is typically in March or April. Projects must be within one of three Priority Project Lists. They include:

- Traffic Operations/ITS/Safety and Local Initiatives
- Bicycle/Pedestrian and B/P Local Initiatives Project
- Transportation Planning Studies

These applications are ranked by the TPO based upon criteria established for each program. The project applications **require a 10% local match**. Frequently, a feasibility study is required before funding an actual construction project. The TPO will pay for the study to determine a project's feasibility and cost, but the project sponsor must secure funding for the local match. The local match can be cash or in-kind services such as providing design and construction inspection.

B. Volusia ECHO Program

Volusia ECHO provides grant funds to finance acquisition, restoration, construction or improvement of facilities to be used for environmental, cultural, historical and outdoor recreational purposes. Resolution 2000-156 states: It is the intent of the County Council that the funds be allocated throughout the County to provide broad geographical distribution and apportioned appropriately among the environmental, cultural, historic and outdoor recreation projects. The Volusia ECHO Program seeks to enhance the quality of life of Volusia County's residents by working to achieve the following goals over a broad geographic base:

- Provide environmental/ecological, cultural, historical/heritage, and outdoor recreational facilities.
- Preserve significant archaeological or historic resources; and develop, enhance, and promote heritage tourism opportunities, experiences, and resources.
- Foster public memory and community identity by promoting and providing access to destinations and experiences associated with past events, peoples, and places within the County of Volusia.
- Provide high quality, user oriented outdoor recreational opportunities including, but not limited to, access to the Atlantic Ocean through the establishment of oceanfront parks and off-beach parking.
- Improve the quality of life for Volusia citizens by providing access to the cultural arts, increase cultural based tourism, and encourage redevelopment and revitalization of downtown and urban areas through the provision of cultural arts facilities.

C. City Mobility Fees

The City approved Ordinance 2013-02 establishing a mobility fee that was mode neutral and it contained a road, transit and non-motorized (sidewalks, bike trails) component. This mobility fee is collected on all development located on SR 40,

US 1 and A1A. The fee is based upon person trips rather than vehicle trips. The cost for one person trip is $16.00 of which 39% is allocated to bike/pedestrian improvements. This fund can be used to provide the match to those grant programs where a match is required.

Table 18: Mobility Fee

Modal Component	Cost Per PT	Mode allocation %
Roads	$1.76	11%
Transit	$8.00	50%
Bike/Pedestrian	$6.24	39%
Total	$16.00	100%

During fiscal years 2013/14 and 2014/15, the City collected $42,913.19 in mobility fees of which $4,700 were for roads, $21,500 was for transit, and $16,700 was for bike and pedestrian improvements. Staff is expecting an increase in mobility fee collection based upon an improvement in the economy.

D. Tax Increment Financing

Dollars from the Downtown CRA can be used based upon the proportionate share of the total bike facility located in the CRA. It has been demonstrated that bike facilities that pass through downtowns are great economic development drivers. The Pinellas Trail and its impact on downtowns such as Dunedin, Largo and Clearwater have been well documented.

E. Florida Communities Trust

Florida Communities Trust assists communities in protecting important natural resources, providing recreational opportunities and preserving Florida's traditional working waterfronts through the competitive criteria in the Parks and Open Space *Florida Forever* Grant Program and the Stan Mayfield Working Waterfronts *Florida Forever* Grant Program. These local land acquisition grant programs provide funding to local governments and eligible non-profit organizations to acquire land for parks, open space, and greenways. The source of funding for Florida Communities Trust comes from *Florida Forever* proceeds.

F. Land and Water Conservation Fund (LWCF)

The LWCF is a federal competitive program which provides grants for acquisition or development of land for public outdoor recreation use. The matching ratio is one applicant dollar to one federal dollar for all grant awards (50%/50%). The maximum grant request is $200,000.

G. The Recreational Trails Program in Florida (RTP)

The Recreational Trails Program (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.

H. SUNTrail Funding

In early 2016 the Florida Greenways & Trails Council evaluated several regional trails systems selected for evaluation. The St. Johns River to Sea Loop Trail was ranked as the #1 regional trail. This positions the St. Johns River to Sea Loop Trail second only to Coast to Coast Trail as the priority for SUNTrail funding, which is $50 million in FY 2016/17 and $25 million annually thereafter. The incomplete segments of the St. Johns River to Sea Loop Trail will be eligible for SUNTrail funding if they will be paved, separated from the roadway and at least 10 feet wide. In Volusia County, this includes the Spring to Spring Trail, East Coast Greenway, East Central Regional Rail Trail, and the remainder of the loop trail.

XV. CIVIC ENGAGEMENT

Shared-use paths attract a variety of user groups who often have conflicting needs. Additional public meetings beyond this plan will be required to engage the affected neighborhoods and multiple user groups when a recommended bike path enters design phase.

It should become apparent to the designers as to the users based upon neighborhood meeting results and input from user groups. Consequently, surface materials will vary according to the type of user. However, sometimes a mix of surface materials may be used for a multiuse or shared use path based upon existing environmental conditions and not a specific user.

Bike paths are generally paved with asphalt or concrete, but may also use prepared surfaces such as crushed stone or soil stabilizing agents mixed with native soils or aggregates. High use trails passing through developed areas or fragile environments are commonly surfaced with asphalt or concrete to maximize the longevity of the shared-use path surface and promote bicycle and inline skating use. The surfacing material on a multiuse or shared-use path significantly affects which user groups will be capable of negotiating the terrain. For most shared-use paths, bicyclists are the primary user group and concrete is the best surface but runners prefer asphalt to concrete because asphalt allows the ground to absorb more of the shock instead of passing it along to a runner's legs. Shared-use paths that have been built using crushed aggregate generally are unusable by inline skaters and slow down the speed of bicyclists. Finally, any design should take into consideration those users who have mobility

impairments. Ease of movement accessing a path as well as on the path should be considered in the design.

The Index below presents the pros and cons of different type of surface materials which should be considered at time of design.

Index of Pros and Cons on surface materials[18]		
Surface Type	Pros	Cons
Asphalt	Best initial surface (smooth, no cracks)	Edges crack with vegetation
	Slightly cheaper than concrete in initial cost	Constant maintenance of cracks
	Softer on joints of runners	Requires overlay every 10 years
		Little structural strength
		Requires greater initial excavation to provide rock base depth
		Impervious
Concrete	Best ADA surface long term	More expensive initially
	Best longevity. Last 20+ years	Harder on joints of runners
	Best consistency of surface	Less natural looking than gravel
	Does not wash in natural drainage areas	Impervious surface
	Steel in concrete keeps it from deflecting	
	Cleaner surface during/after storms	
	Does not require gravel base rock – less impact on tree roots	
Unsealed Paths	More natural looking	High ongoing maintenance costs
	Good for flat areas out of drainage areas	Difficult to maintain consistent surface quality
	Softer on joints of runners	Environmental damage from erosion
	Cheapest of alternatives initially	Not usable after big storms
		Not friendly to bikes/inline skaters
		Difficult to remove silt deposits
		Difficult to meet ADA
		Less stability for running

[18] (Snyder)

Bicyclists can be found in two general user groups when identifying and planning new bike facilities. The first user group is the bicycling community who is experienced and has an interest in promoting bicycling for transportation or sport. The Daytona Beach Bicycle Club has Wednesday morning rides where they start at the Fifth Third Bank ride to Halifax Plantation entrance and then to Flagler Beach and return to West Granada. The Bike Shop in the downtown sponsors Thursday Night rides during the daylight hours. Classifications for bike rides are based upon route length, rest stop intervals, average riding speeds and the use of paceline cycling. These bicyclists either share the road, or use designated bike lanes and paved shoulders along arterial or collector roads.

The second user group is more family oriented that use local streets, multi-use paths or shared-use paths for leisure recreational activities. The location of these paths typically requires more effort to inform and engage the affected residential neighborhood. Across the country when residents believe bicycle or pedestrian paths are not properly designed and integrated into their area, the specter of decreased property values and/or increase crime that would adversely affect the quality of life become the rallying cry.

In order to ensure an open line of communication to multiple user groups, an interactive crowd-sourcing wikimap should be developed and posted on the city's webpage which would allow all user groups to provide input to the City from walkers, bicyclist, runners, and skaters. Existing routes and desired routes but for barrier concerns can be added through comments, points, line and photos. Results of this mapping tool could be used to develop future project recommendations.

A biking alliance consisting of biking enthusiasts from bike clubs, bike shops, and residential neighborhoods could be developed to work directly with the City when local roads are repaved or bike-pedestrian paths are being developed and funded. This alliance could also assist the city in conducting neighborhood meetings in prioritizing trail routes, identifying walking and bicycling routes not listed in this plan, select specific routes where alternatives exist, inform and educate the public about bicycling laws, and even volunteer in policing trails for light maintenance and monitoring, and reporting safety issues.

XVI. COST/BENEFIT OF IMPLEMENTING THE PLAN

A. Cost Profile

The expected costs resulting from this plan include construction and maintenance costs once construction occurs aggregated over a 10 year plan horizon. Future cash flows were deemed not applicable consequently calculating net present value was not done. There is a value to the benefits, but these benefit values accrue more to the community than to the city making the investment. Table 16 provides the cost profile of the cost/benefit analysis. The

high range of estimated costs or $5,750,000 over the plan's 10 year horizon is used because it represents the worst case with respect to costs.

Table 19: Cost Profile (in hundreds of thousands)											
Cost Category	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Construction	.500	1.0	.700	.125	1.800	.400	.700	.525	0	0	5,750
Maintenance	.22	.05	.24	.01	.11	.25	.5	.4	0	0	.33
Projected Costs	.522	1.5	.724	.126	1.811	.425	.705	.529	0	0	5,783
Net Present Value											N/A
Net Cumulative Costs	.522	1.5	.724	.126	1.811	.425	.705	.529	.0	0	5,783

B. Benefit Profile

FDOT frequently issues Roadway Design Bulletins (RDB) to the seven FDOT Districts regarding changes to the Plans Preparation Manual (PPM), Volume 1. Chapter 23 of the PPM provides for accident severity level costs.[19] These costs are used in the cost/benefit analysis FDOT is required to do when doing improvements at sites with a crash history. There are methods that are acceptable for performance of a benefit/cost analysis. The Historical Crash Method (HCM) uses the Highway Safety Improvement Program Guideline (HSIPG) cost per crash by facility type to estimate benefit to society, while the cost to society is estimated by the expected cost of right of way, construction, and maintenance. This method aggregates all crashes regardless of severity by facility type. The Predictive methods (Roadside Safety Analysis Program and Highway Safety Manual) allocates costs to an individual crash severity which is much more useful in the performance of a benefit/cost analysis based upon the crash analysis that was performed earlier in this plan. When using the predictive methods for analysis, the accident severity level costs are as follows:

Table 20: Crash Severity and Costs	
Crash Severity	**Comprehensive Cost**
Fatal (K)	$10,120,000
Severe Injury (A)	$574,080
Moderate Injury (B)	$155,480
Minor Injury ©	$96,600
Property Damage Only (O)	$7,600

The city does not collect data regarding crash severity costs on local roads under the city's jurisdiction. Consequently, the best source of information is FDOT's information regarding severity crash data which includes pedestrian, bicyclists and motorists. The City had 23 bike crashes involving some type of injury and 3

[19] (Transportation, Plans Preparation Manual, January 1, 2015 Revised)

crashes involving property damage only (see page 23) from 2010-14. Assuming all injuries were minor, the approximate injury costs were $2,244,600 (($96,600x23=$2,221,800 + (7,600x3 = $22,800))

The benefits to city's residents can be analyzed in two measurable areas. First, providing bicycle facilities reduces the incidences of injuries. The city's existing bicycle network consists of a few miles of shared use paths and approximately 5.91 miles of multi-use paths. Regarding the latter, these multi-use paths are scattered throughout the city but are concentrated generally in and around walking routes to schools and a few parks. There is no interconnectivity of these shared use paths and multi-use paths that lead to multi-destination points. In the 2005 City's Parks and Recreation Master Plan, the bench mark average for comparable sized cities indicated .40 miles of trails per 1000 population while the City's rate was .18 miles per 1000 population.[20] Consequently, it is not surprising that a review of 23 studies on bicycling injuries found that bike facilities (e.g. off-road paths, on-road marked bike lanes and on-road bike routes) are where bicyclists are the safest.[21] The estimated cost to build 15.5 miles of shared and multi-use paths ranging in width from 8 feet to 10 feet, is about $5.36 million (see Table 15, page 37) over the projected 10 years of the plan. The off-street bicycle paths and bike lanes will decrease interactions between vehicles and bicycles by providing dedicated space for bicyclists, especially on the off-street facilities.

According to FHWA literature, it is standard practice to use Crash Reduction Factors (CRF) to estimate the reduction in future bicycle collisions and Crash Reduction Factors (CRF) to estimate the number of future bicycle collisions. However the Crash Modification Factors (CMF) Clearinghouse website was not able to provide a CMF for off road bike paths nor could FDOT's Final Report on Florida Crash Reduction Factors.[22] However, a compendium of state DOT's CRF's featured in FDOT's report indicates pedestrian sidewalks have a 65% CRF. Since many of the multi-use paths and shared use paths are for pedestrians and bicyclists, a .65 CRF was used in determining the injury benefits.

Second, the next greatest benefit is the health benefits that biking provides. G. Wang estimated, in his Cost Benefit Analysis of Physical Activity Using a Bike/Pedestrian Trail, that per capita annual cost of using bike trails was $209.28 ($59.28 construction and maintenance, $150 of equipment and travel). Per capita annual direct medical benefit of using the trails was $564.41. The cost-benefit ratio was 2.94, which means that every $1 investment in bike paths for physical activity led to $2.94 in direct medical benefit. The sensitivity analyses indicated the ratios ranged from 1.65 to 13.40. Therefore, Mr. Wang arrived at the conclusion that building trails was cost beneficial from a public health perspective. The most sensitive parameter affecting the cost-benefit ratios were equipment and travel costs; however, even for the highest cost, every $1

[20] (Inc, 2005)
[21] (Reynolds, 2009)
[22] (Albert Gan, 2005)

investment in trails resulted in a greater return in direct medical benefit.[23] Based on this study, the expenditure of $5.36 million (federal, state or local dollars) would lead to $15.7 million in direct medical benefit over the 10 year horizon.

Table 21: Benefit Profile (in thousands)											
Benefits Category	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Injury (CRF: .65)	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.753
Health	1.50	2.78	1.96	.28	5.03	.90	1.81	1.46	0	0	**Total**
Projected Benefits	1.56	2.84	2.02	.35	5.09	.96	1.87	1.52	.06	.06	16.50
NPV of Benefits											N/A
Net Cumulative Benefits	1.56	2.84	2.02	.35	5.09	.69	1.87	1.52	.06	.06	16.48

Total injury and health benefit is estimated at $16.5 million over 10 years. There was no attempt to determine environmental benefits such as CO2 reductions.

C. Cost/Benefit of Plan

Table 18 summarizes the cost-benefit analysis in thousands over a ten year horizon. The purpose of this table is simply to state that the soft benefit costs exceed the hard costs which include construction, design, inspection and maintenance. The benefit costs include the savings in economic costs resulting in reduced injuries and increased health savings for pedestrians and bicyclists. No attempt was made to assess the environmental benefit, the quality of life benefit or perform a present value calculation of costs or benefits. Overall, after construction is completed and all costs have been paid, the net cumulative health benefits to the public are estimated at $14.02 million. This number continues beyond the horizon year and increases as more bike projects are implemented beyond the horizon end year.

Table 22: Cost-Benefit Profile (CBP) (in hundreds of thousands)											
Cost Profile	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Projected Costs	.52	1.0	.70	.12	1.80	.40	.70	.52	.03	.03	5.75
Benefits Profile	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Projected Benefits	1.56	2.84	2.02	.35	5.09	.96	1.87	1.52	.06	.06	16.48
Cumulative CBP	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Net Cumulative Benefits	1.04	1.84	1.33	.23	3.29	.56	1.17	1.0	.06	.06	14.02

XVII. KEY PERFORMANCE OUTCOMES

The net benefit savings resulting in reduced injuries and increased health savings for pedestrians and bicyclists is demonstrated in Section XVI. These net savings should be sufficient motivation for the City of Ormond Beach to make investments in walking and biking to improve quality of life, public health, aesthetics and even economic

[23] (G. Wang, 2004)

development. Measuring these outcomes of bicycle goals, objectives and investments directly, rather than measuring assumed outputs associated with them, should yield data that is more clearly linked to bike plan goals.

Table 23: Key Performance Outcomes

Goal Icons	Proposed Key Performance Indicators.
CD	1. % of bikeways that cater to each type of bicyclist (i.e. Advanced, Basic, Family). 2. Number of existing road segments and intersections improved to Bike LOS B. 3. Number of miles of multi-use and shared uses paths.
S H	1. Number of crash hotspots improved. 2. Reduction in bicyclist and pedestrian crash rate. 3. # of reductions in injuries and death.
D	1. Miles of networked bicycle routes with wayfinding signs indicating destinations and distances. 2. % of households within ¼ mile of a bicycle facility.
CS	1. Establishment of Bike Advisory Committee. 2. Development of an online crowd sourcing tool to ascertain user comments on existing and future bike path improvements. 3. % of residents satisfied with the safety and comfort of existing bicycle and/or pedestrian facilities.

XVIII. SUMMARY

Walking and bicycling is a growing physical activity across all age groups. The fastest age group is those at or above 50 years of age. The median age of Ormond Beach residents is 50.6. Making it safer to walk and bike contributes to the community health, quality of life and future independence of residents as they progress in age. What has been proposed in this plan is doable. The implementation of this plan relies on the cooperation and participation of city residents, the county, the TPO and the State. It will take time to develop a bike friendly system of roadways and paths for greater connectivity to multiple destination points in the city. There is a need for greater mobility, access, and connectivity on and off the street system that accommodates walkers, bicyclist and transit users. There is no better time than now to begin this effort.

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LOCATION MAP

Map 1 - Designated Bike Lanes & Paved Shoulders

RPG 081015

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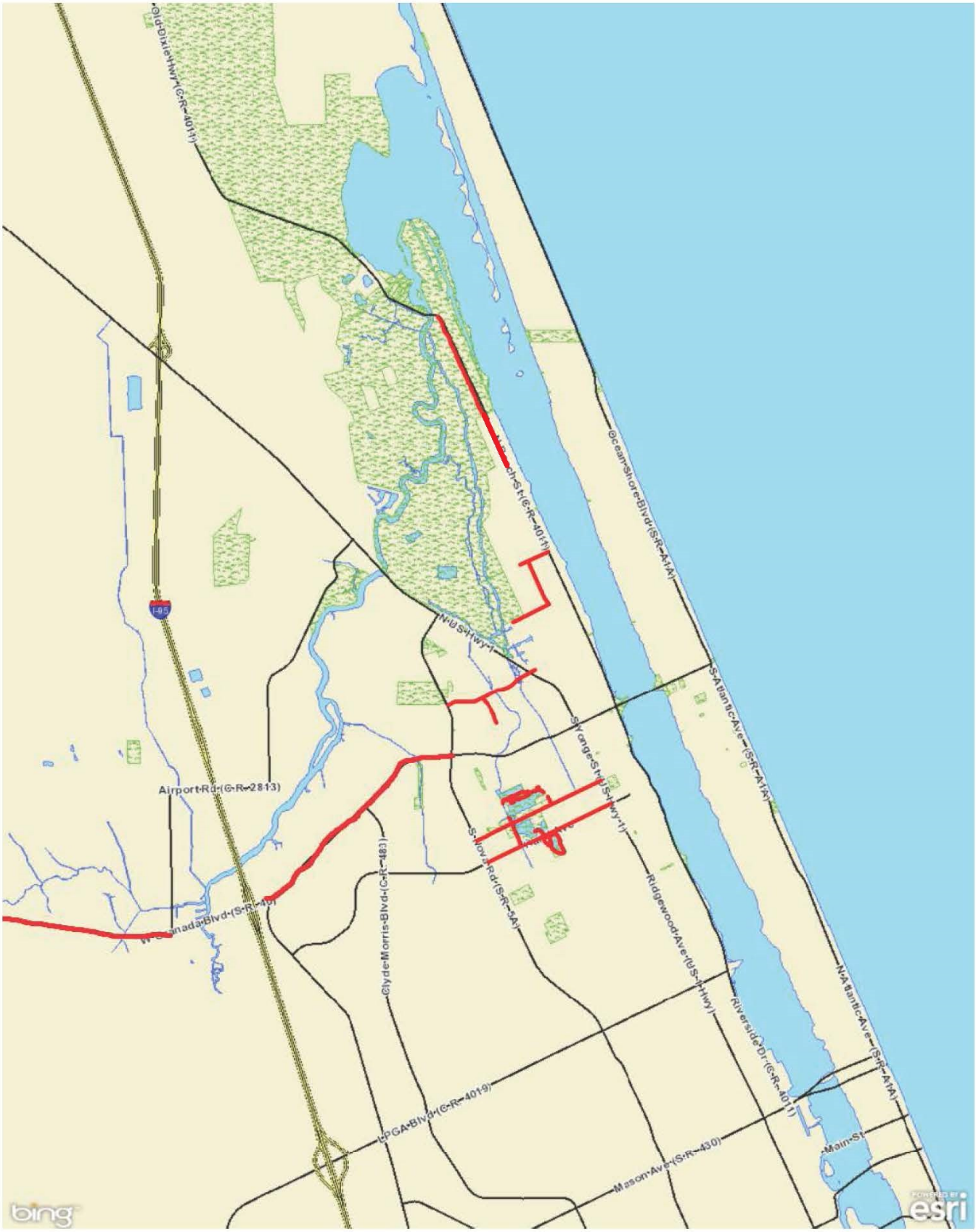

LOCATION MAP

Map 2 - Multi-Use Paths

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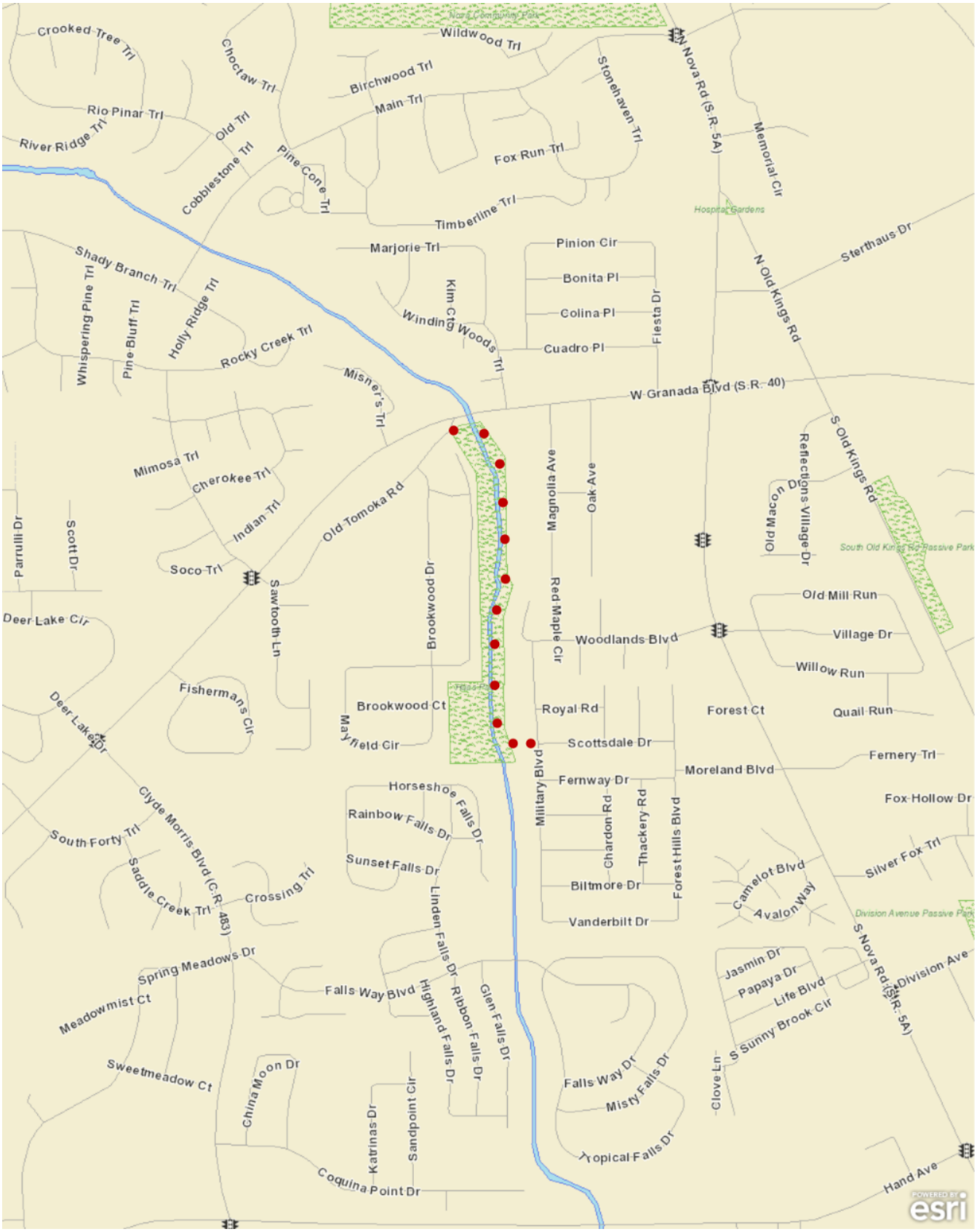

LOCATION MAP

Map 3 - Forest Hills Connector

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LOCATION MAP

Map 4 - Tomoka State Park Shared Use Path Phase 2

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LOCATION MAP

Map 5 - Thompson Creek Multi-Use Path

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LOCATION MAP

Map 6 - Sanchez Multi-Use Path

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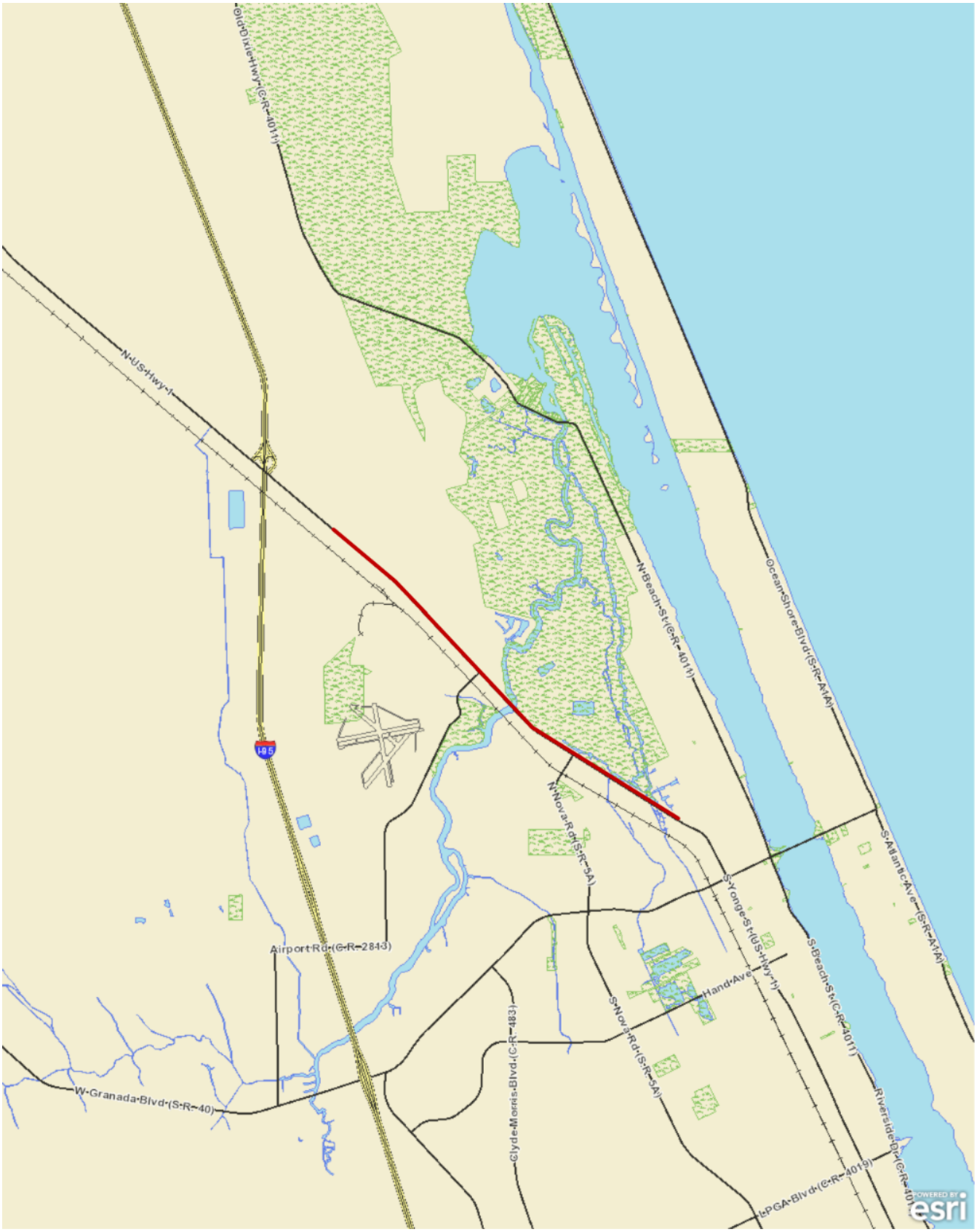

LOCATION MAP

Map 7 - US 1 Shared Use Path

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LOCATION MAP

Map 8 - East Coast Greenway Trail

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LOCATION MAP

Map 9 - Hand Avenue Multi-Use Path

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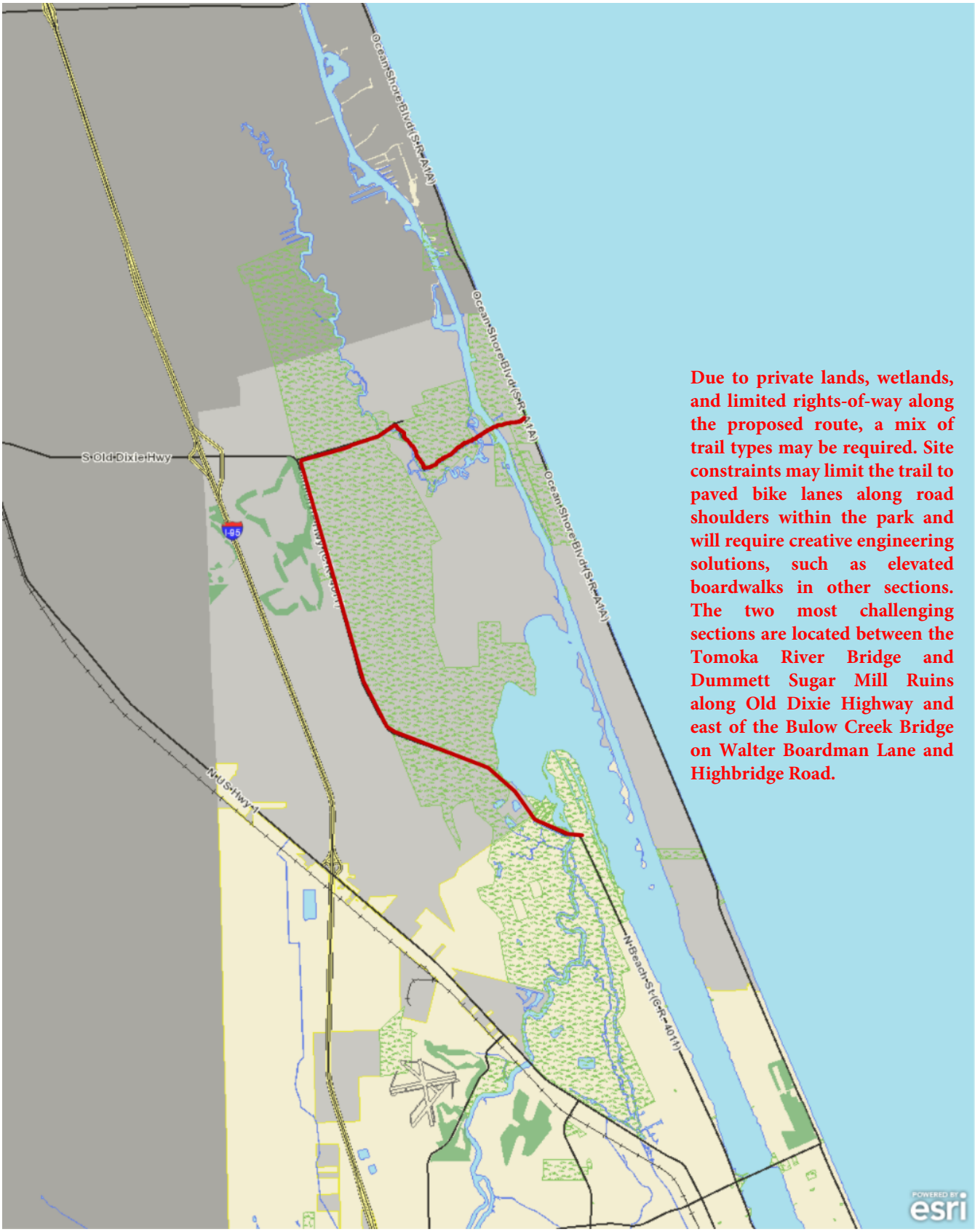

Due to private lands, wetlands, and limited rights-of-way along the proposed route, a mix of trail types may be required. Site constraints may limit the trail to paved bike lanes along road shoulders within the park and will require creative engineering solutions, such as elevated boardwalks in other sections. The two most challenging sections are located between the Tomoka River Bridge and Dummett Sugar Mill Ruins along Old Dixie Highway and east of the Bulow Creek Bridge on Walter Boardman Lane and Highbridge Road.

LOCATION MAP

Map 10 - Kings Highway Heritage Multi-Use Path

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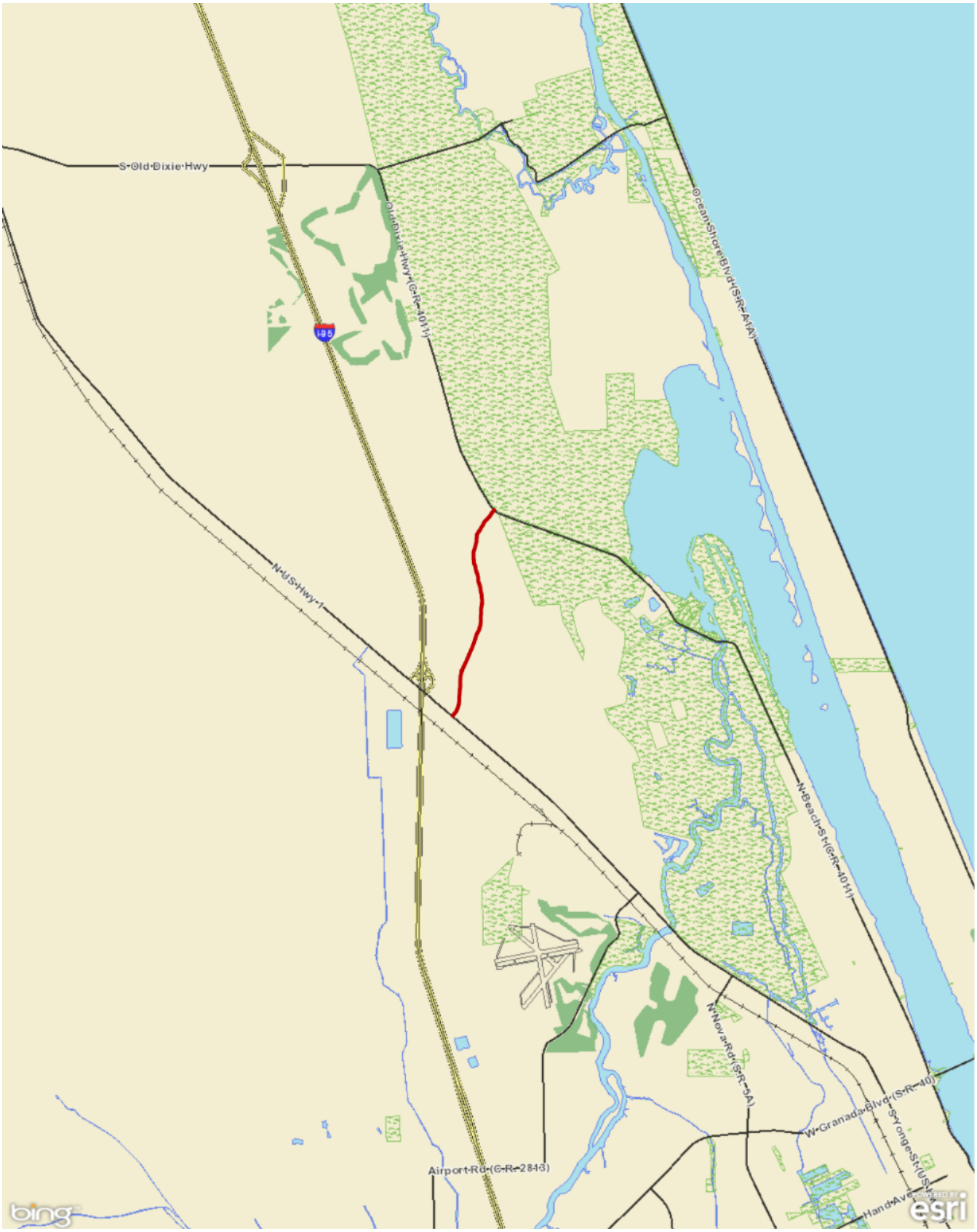

LOCATION MAP

Map 11 - Broadway Multi-Use Path

RPG 080315

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