St. Lucie
Transportation Planning Organization

Micro-Mobility Study

June 2022

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Introduction

The St. Lucie TPO Micro Mobility Study reviews the needs and characteristics of various low-speed transportation options, compares them to existing conditions in the transportation network, land development patterns and demographics for three distinctly different study areas and develops considerations that the St. Lucie TPO can implement or coordinate to promote more widespread and greater density of micro-mobility options throughout St. Lucie County.

The study progresses through four tasks to develop the final considerations:

Task 1. Review existing plans that affect micro-mobility and affirm the 3 study areas.

Task 2. Identify micro-mobility provider needs with a focus on the requirements and perspectives for sustainable micro-mobility systems from the supply side.

Task 3. Assess existing conditions and analysis of the mobility network, land use and demographic characteristics providing perspectives for sustainable micro-mobility systems from the demand side.

Task 4. Considerations that focus on actionable strategies for the TPO, including infrastructure planning, support for regulatory changes and funding opportunities.

Each micro-mobility mode has its own characteristics of suitability that are context sensitive. Whether owned or operated by governmental entities or not, each mode has specific needs for infrastructure, regulatory support, funding, and integration with primary fixed-route transit. Each is affected by level-of-acceptance from end-users and continued innovation in technology and business models. From traditional to the cutting-edge, the range of micro-mobility technologies and delivery models include many options and are organized into modal groups:

Bicycle, Board & Skate Modal Group:

- Personal Bicycles and E-Bikes
- Bike Sharing: dock-based or dockless
- Skateboards and E-Skateboards
- Shared E-Scooters

Vehicular Modal Group:

- Low Speed Electric Vehicles (LSEV)
- Neighborhood Electric Vehicles (NEV)
- Golf Carts

Transit Modal Group:

- Micro-Transit with conventional small transit vehicles
- Micro-Transit with Low Speed Electric Vehicles
- Micro-Transit with Autonomous Vehicles (AV)
- Private Providers and Public-Private Partnerships

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Task 1 Review of Existing Plans

1.1 Introduction

Task 1 consists of identification and review of past micro-mobility plans, related efforts, and transit plans that are pertinent to the three identified study areas that include: 1) Downtown Fort Pierce, 2) the Torino Parkway Area, and 3) the Gatlin/Tradition Area. The geography and potential connections of the study areas to regional and local fixed-route transit are important toward identifying potential plans of interest to the micro-mobility plan.

To identify past and current plans, the following documents were reviewed

- Smart Moves 2045, St. Lucie TPO Long Range Transportation Plan
- St. Lucie County 10-Year Transit Development Plan and Annual Progress Report
- St. Lucie TPO Bike Facilities Map
- St. Lucie County Area Regional Transit (ART)
- Zagster Bike Share Review
- St. Lucie TPO Bike Rack Plan
- St. Lucie TPO Jobs Express Terminal Connectivity Study
- Port St. Lucie Multimodal Plan

The reviews are included in Appendix A that is included in the Micro-Mobility Study Technical Memorandum which is a separate volume from this study. The reviews have been organized as a tabular format to summarize the importance of each study component and the relevance for each study area.

As part of the Task 1 effort, site visits were made on February 16, 2022 to assess the details of land use and relevant infrastructure conditions. The findings are provided in the following subsection.

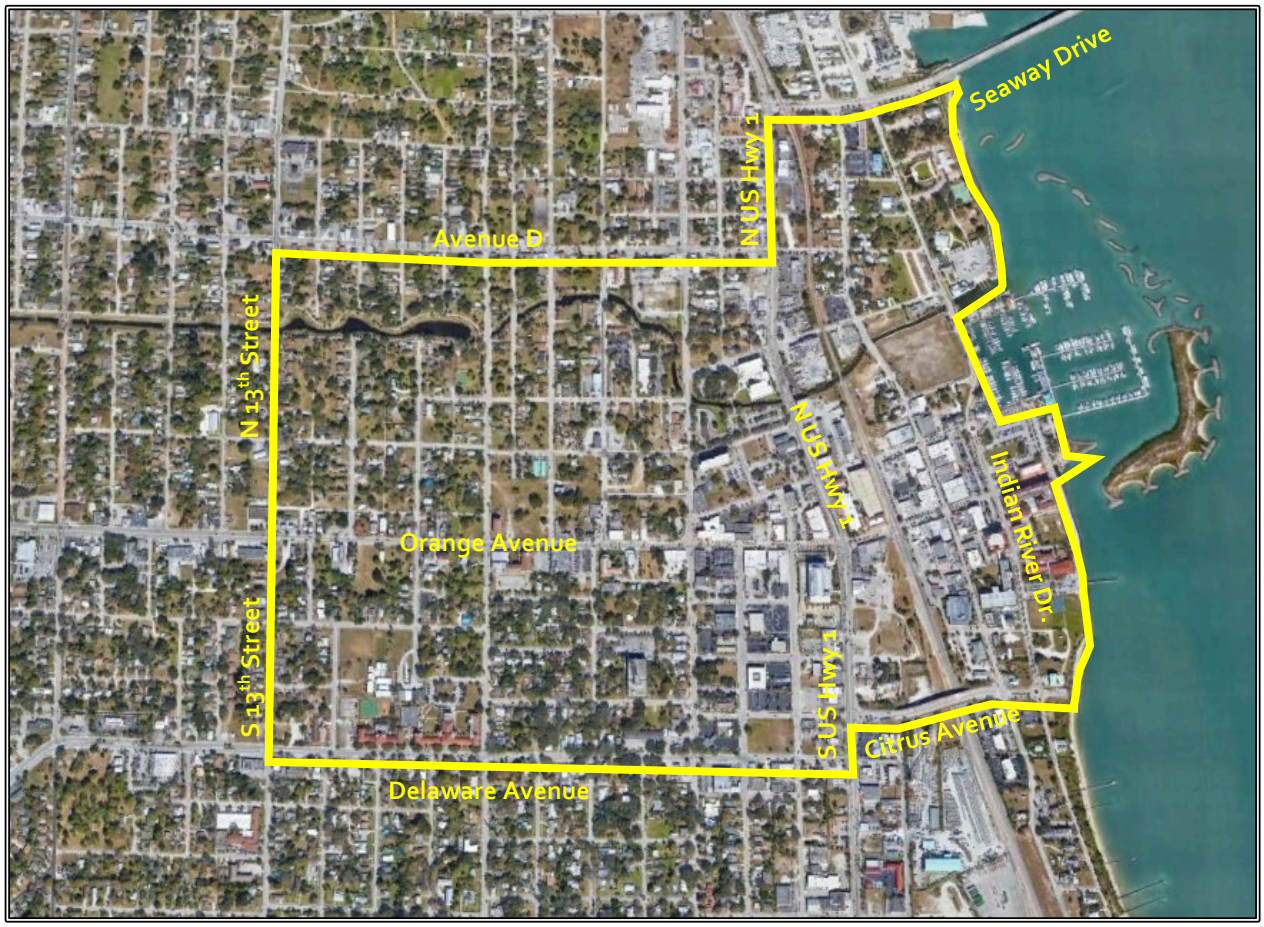
1.2 Study Area Descriptions

As part of Task 1, the study area boundaries were confirmed. The maps in Sub-Section 1.2 describe the three study areas.

Fort Pierce Downtown

The Fort Pierce downtown area is a mixed-use civic, commercial and entertainment core, that is bounded by residential areas to its north and west. West of the commercial and civic core, from 7th Street to 13th Street is the historic Peacock Arts District (PAD) which is also a community redevelopment area. Downtown Fort Pierce is well served by transit and already served by micro-mobility modes, including the Fort Pierce Trolley and Spin shared-scooters. West of 7th Street, the PAD is centered around the Creative Arts Academy along Delaware Avenue. The west area also includes the Beth Ryder Intermodal Center at Avenue D and N 8th Street. For the Micro-Mobility Study, the boundaries as depicted below with a yellow border are:

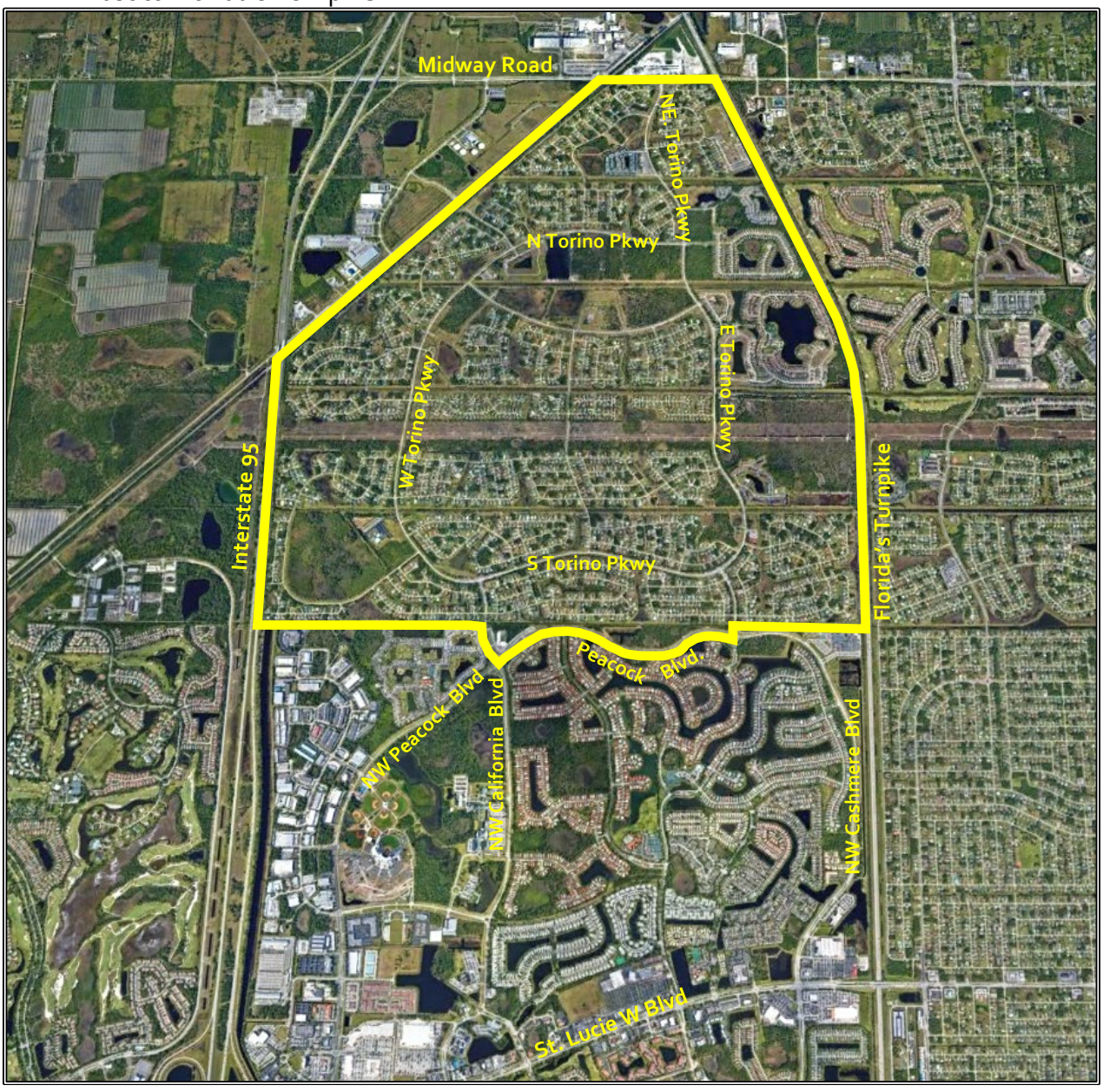
- North to Seaway Drive and Avenue D west of US-1;
- West to S 13th Street;
- South to Citrus Avenue, and Delaware Avenue west of US-1;
- East to the shoreline.



Torino

Torino is an entirely suburban residential neighborhood within the City of Port St. Lucie, that is defined by Torino Parkway which is a ring road that serves as a collector street for the individual communities. The population is approximately 9,000 . For the purposes of the Micro-Mobility Study, the boundaries of the Torino study area are defined as the entire area served by Torino Parkway. For the Micro-Mobility Study, the boundaries as depicted below with a yellow border are:

- North to Midway Road;
- West to I-95;
- South to the canal that is north of Peacock Boulevard;
- East to Florida's Turnpike



Tradition / Gatlin

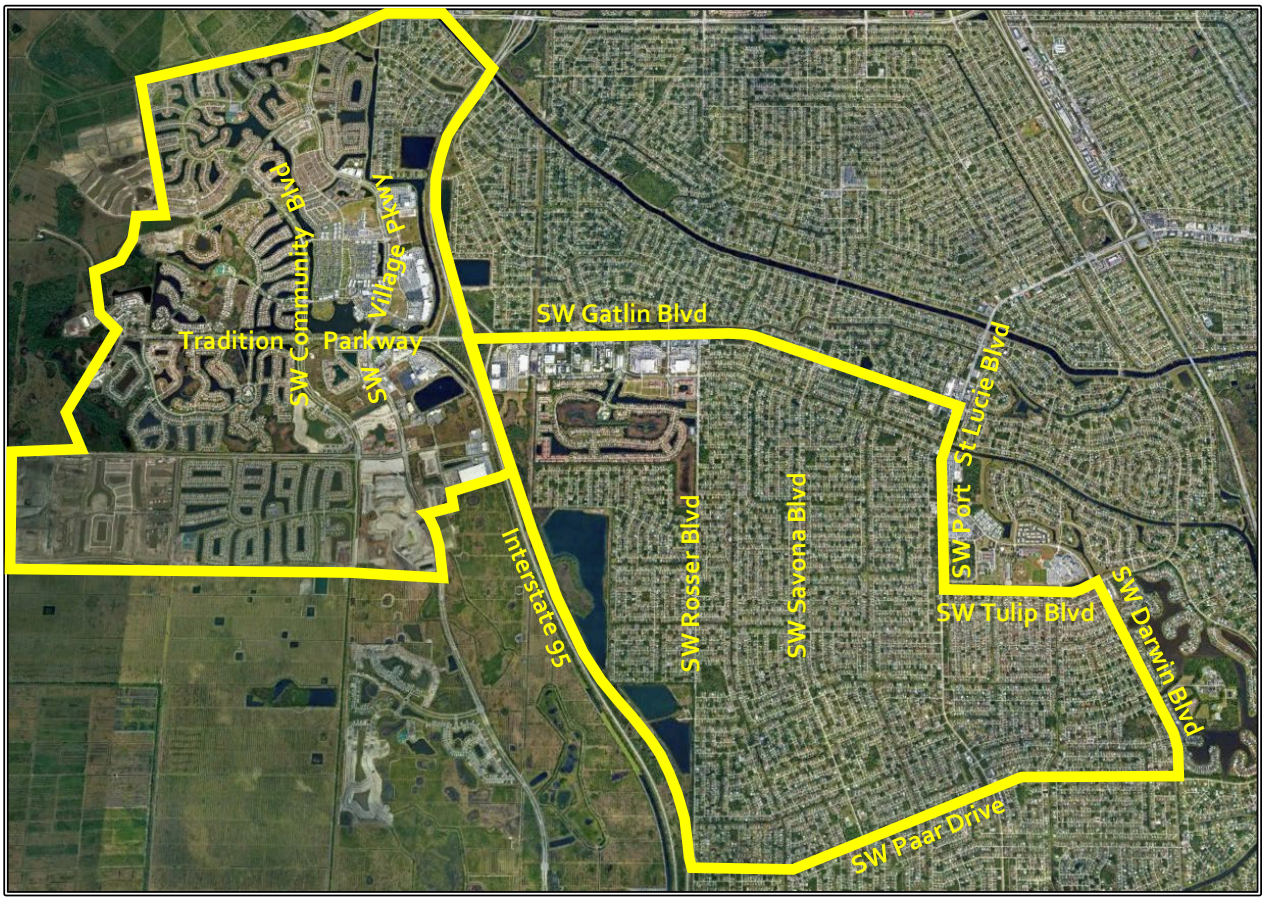
Tradition is a master-planned, mixed-use community within Port St. Lucie. The community consists of several neighborhoods with pedestrian-friendly environments and a town center that includes shops, restaurants, parks and schools. The population is approximately 6,000. Gatlin Pines is a primarily suburban residential neighborhood within Port St. Lucie with commercial uses along major corridors including Gatlin Boulevard. The population is approximately 8,000. For the purposes of the Micro-Mobility Study, the boundaries as depicted below with a yellow border are:

Tradition:

- North to the line of a westward extension of Crosstown Parkway;
- West to the limits of development and ultimately Range Line Road;
- South to the limits of development including the Center for Innovation, Cleveland Clinic Tradition Hospital, Keiser University
- East to I-95.

Gatlin:

- South of Gatlin Boulevard and SW Tulip Boulevard, west of Port St. Lucie Boulevard;
- West to I-95;
- South to Paar Drive;
- East to Darwin Boulevard



Task 2 Opportunities for Success and Micro-Mobility Provider Needs

2.1 Introduction

The objective for Task 2 is to understand the key benchmarks for micro-mobility to enter and sustain viable service in an area, and if it exits a market area, to understand if there are causes that government can ameliorate or otherwise provide support for sustaining such operations. Understanding that government organizations can provide for infrastructure needs; change regulations that are barriers; support necessary market area geography with planning and zoning efforts; and public agencies can provide assistance to integrate micro-mobility with fixed-route transit systems.

Task 2 focuses on the requirements and perspectives for sustainable micro-mobility systems from the supply side, while Task 3 focuses on the requirements for micro-mobility as part of the complete transit network from the demand side.

The scope of this effort sought to contact and interview three micro-mobility program managers that have operated in St Lucie County to determine these factors by modal type for sustainable micro-mobility systems. The companies from which information was sought included:

1. Beep, that operates the Tradition-In-Motion micro-transit system for the Tradition community
2. Spin, that provides a shared-use electric scooter program in downtown Fort Pierce, and
3. Zagster, that provided a shared-use bicycle program throughout St. Lucie County..

Initially the companies were approached by cold calls, and then survey-type questionnaires were sent to company representatives followed up by telephone calls. At the time of writing, we have not received all desired from these sources; however, while performing research for the calls and for Task 3, published interviews with program executives were found and have been used to provide much of the information sought. For each micro-mobility program, a summary sheet of referenced findings follows. The sample questionnaire is also provided in an exhibit. The summary sheets and the questionnaire are included in Appendix B that is included in the Micro-Mobility Study Technical Memorandum which is a separate volume from this study.

2.2 Key Findings

Location: Transportation Network, Land Use Patterns,

- Certain demographics and land use characteristics are important for private companies in the micro-mobility space; they are looking for a density of users, whether at employment campuses, college campuses, downtowns, or planned medium-density and greater residential campuses. One manner in which these concepts have been described is as a "geo-

fenced area," being a planned community with a horizontal mix of uses, employment or education campus, downtown area, or even military bases.

- Most important is that micro-mobility is a business, and half of the importance of the "geo-fenced area" is a single-entity customer for the geographic place. The micro-mobility users are not the customer for a micro-mobility company, the manager of the area or place is the customer, whether it is a government entity, or private property manager.
- Often for public sector customers, the emphasis is on first-last-mile connectivity to the public transit systems to create greater utilization without having to go deep into the community, thereby increasing ridership density while maintaining or decreasing direct service area. with larger vehicles.
- Among demographics, age is important. User-members must be at least 18 to sign up. Depending on the need for physical fitness to use the mode, concentrations of older age groups are negatively correlated to usage and growth.
- Younger riders are more likely to patronize bike or scooter modes (especially scooters); however, for micro-transit modes higher age groups also have a higher probability for usage.
- For any micro-mobility mode, scooter, bike or transit a destination location is important. Micro-mobility has a high proportion of recreational use, so in addition to employment centers, tourist destinations are positively correlated with higher usage.
- Regarding the use of shared mobility, a study performed for shared car location analysis, provides useful demographic information, that although not directly applicable to all shared mobility modes, provides useful demographic and land use indications of where shared micro-mobility has a higher probability of sustained service. Tables summarizing these findings are excerpted as exhibits 2.2 and 2.3 and are included in Appendix B. The inference from this data that are useful for shared micro-mobility considerations are:
  - 1-person households are positively correlated with shared mobility use.
  - Households with children are negatively correlated with shared mobility use.
  - Rental households are positively correlated with shared mobility use.
  - People that drive alone or carpool to work are negatively correlated with shared mobility use.
  - People that take transit to work are positively but weakly correlated with shared mobility use.
  - People that walk to work are positively correlated with shared mobility use.
  - Household auto ownership is negatively correlated to shared mobility use: with more cars generally decreasing the likelihood of shared mobility use.
  - Residential density is strongly and positively correlated to shared mobility use.

Cost:

- In smaller cities and suburban areas, micro-mobility companies partner with governments and property managers to share the cost of providing services. Costs to the micro mobility provider are: the smart-phone application itself, vehicles (scooter, bike, transit), fixed infrastructure, operators for transit systems, repair services, rebalancing and charging services, company back-of-house operations for data and analysis, sales, and management.

- These provider costs are fixed or inelastic compared to actual usage; therefore, to reduce risk, micro-mobility companies partner with local property managers or governments. Costs for downtown areas and suburban areas, depending on deployment levels can range from $50,000 to $300,000, and for transit range around $100 per vehicle service hour.
- Vehicle service life ranges from 4 months for scooters, 18 months to 2 years for bicycles, x for e-bikes. While the average life for a full size bus in public service is 12 years, most micro-transit vehicles average around 7 years, not including other specialty transit vehicles.
- Contracts range from 3 to 5 years, but are not tied to vehicle life depletion in the case of scooters and bikes which have shorter service lives than the contracts. These short-lived vehicles are either donated or sold through local channels at the end of their service lives. In shared-use, the service life of bikes and scooters are about ¼ of their service life for personal use.

Management:

- Micro-mobility companies typically provide turn-key services that include all of the operational, maintenance, management and data services. Some aggregate data may be shared with the customer (government or private property manager) but much is considered proprietary and private.
- Micro-mobility providers rely on governments and private property management for fixed infrastructure placement such as docks and bus stops, for vehicle placement for dockless systems, and for infrastructure network for non-road vehicles. Infrastructure placement is the major consideration for first-and -last-mile use to transit, in which docks, bike racks or scooter corrals are located within or adjacent to transit facilities.
- Micro-mobility providers benefit by infrastructure improvements that create more complete, safer, low stress mobility networks that are appropriate for different modes. This is especially important for bicycles, e-bikes, and scooters. It is not as critical to plan for extensive and wide networks of bike and scooter facilities (lanes, buffered lanes or multi-use paths), but more important to concentrate efforts to create complete networks in smaller areas that are planned as micro-mobility deployment service areas. Where network roadway or path facilities are unsafe, providers can use on-board GPS equipment to shut off electronically controlled equipment, especially for scooters.

Regulations:

- Micro-transit sales pipelines and service contracts are relatively short time horizons compared to land use planning and development regulations. The use of land development regulations, whether by land use policy or general zoning amendments may be inappropriate because the deployment, business models, modes and technologies of shared micro-mobility are in a rapid expansion cycle and as such are volatile regarding specifics. Micro-mobility businesses and models are more adaptable than land development controls.

- Although considering land development controls at this period is not generally recommended, some specific building requirements for safe and secure storage for bikes, scooters or low-speed electric vehicles (LSEV) ("golf carts") are useful.
- Regulations to address sharing or dedicating roadway or path space for safe and comfortable scooter, bicycle, e-bike use and LSEV are becoming critically important as micro-mobility expands. In Florida, electric scooters without a seat are not street-legal and cannot be operated either on the road or on sidewalks. Electric scooters do not require registration, and riders over the age of 16 need not wear helmets while riding. However, riders still need to be licensed to ride a motorized scooter in Florida, though any driver's license is accepted.

Task 3. Existing Conditions & Analysis

3.1 Introduction

The objective for Task 3 is to identify the need for micro-mobility to create a complete transportation system for the County that is sustainable, low impact, equitable to all people and carbon free to the greatest possible extent. In parallel with Task 2, the existing conditions are defined with relevance to the role of government organizations to provide for infrastructure needs; change regulations; support market area geography with planning and zoning efforts; and provide assistance to integrate micro-mobility with fixed-route transit systems.

Task 2 focused on the requirements and perspectives for sustainable micro-mobility systems from the supplier's side, while Task 3 focuses on the requirements for micro-mobility as part of the complete transit network from the County's demand side.

Following Tasks 1 and 2, insights were gained regarding the transportation network characteristics, land use characteristics, and demographic characteristics for each micro-mobility mode. Using available data from the St Lucie County transportation planning model and geographic information system (GIS), the study areas are analyzed for patterns to determine where micro-mobility will serve: 1) local trips, not requiring first-last-mile connections; 2) non-local trips that do not require transit connections, such as recreational trips; and, 3) non-local trips that do require first-last-mile transit connections, such as work, shopping, medical trips, and other necessary travel. The analysis for each area includes indicators with which to recommend different micro-mobility mode combinations that are pertinent to the projected mobility needs of each area.

These characteristics, as defined by prior research for car sharing and transit are verified in part by the outcomes of Task 2. It is important to understand the background that the shared bike and scooter space is in an extremely competitive growth phase, and the marketing and business models for these companies is in part driven by horizontal (across geographic markets) and vertical (across different modes) market dominance for the brand and application software. To some extent, this creates an environment in which the marketing strategies of these companies are less sensitive than expected to traditional criterial for identifying market potentials for mobility alternatives to private cars. To some extent, micro-mobility for a particular area is somewhat trial-and-error initially, with ongoing feedback to refine the models for greater success. This is especially applicable to more suburban environments.

Micro-mobility market segments create the boundaries for potential geofencing for shared modes, and service areas for transit modes. The market segments can be usefully divided into two broad categories: 1) the physical geography of an area, including the jurisdictional or management boundaries; and 2) demographics and the characteristics of people, households and their expected activity.

To provide guidance for shared micro-mobility based on research for carsharing, neighborhood and transportation characteristics are more important indicators for micro mobility success than the individual and household demographics. Results indicate that densities and intensities and

the presence of mixed use in a potential geo-fenced area are more important than household and individual demographics.

High Residential or Employment Density: High population density brings a large customer base within walking distance of each micro-mobility placement location. Doubling density doubles the potential customers for a given location. these potential users also will have a higher propensity to join, because dense neighborhoods typically have lower rates of vehicle ownership and vehicle travel. For example, again referring to car sharing, Zipcar used a minimum density threshold of 10,000 people per square mile and car sharing research revealed successful locations in areas of 7 to 25 units per acre in residential density. The primacy of density as a variable used to evaluate micro-mobility modes is also based on the relationship of density to transit viability and reduced car ownership. Micro-mobility is also viable in other types of market settings, such as university campuses, apartment buildings, and small towns with a strongly identified geographic and functional center.

Mixed Land Use: Business uses during the workday can be paired with residential uses in the evenings and on weekends to increase usage. Although there is a relatively strong consensus regarding these supportive characteristics, little qualitative research exists on how to apply this information to evaluate the potential of micro-mobility locations; however, transportation planning methods and shared mobility operators do look to census data to inform site selection and boundaries for new geo-fencing or service areas.

Although less important, certain demographic information is still a useful predictor, based on earlier research on the success of shared car placement and supported by the findings of Task 2.

Vehicle Ownership: Results indicate that low vehicle ownership has a strong and consistent correlation for adaptation to alternative modes, whether it is micro-mobility as an unchained destination mode or as a first-last-mile mode. Vehicle ownership is also intercorrelated with demographic factors, such as household income, but it is just as importantly correlated to geographic factors such as the scarcity of parking, cost of parking, availability of high level-of-service transit options, and the location of even a dense mixed-use district within a larger suburban setting, in which the effect of the mixed use area is diminished as efficient trip-making within the region will still require a private car. In its effect for the ability to live without a car: micro-mobility is not designed to meet a household's entire set of mobility needs but to work in concert with other modes, such as transit, and to provide an alternative for certain household trip purposes that may be: shorter in length; able to be made within a potentially geofenced area; be safe, secure and low stress on a micro-mobility mode; and have less sensitivity to time.

Household Size: From the car-sharing research, one-person households were far more common in carsharing neighborhoods. Similarly, micro-mobility placements have focused on larger urban areas, compact mixed-use downtowns and college campuses, where one-person households are prevalent. The presence of children is noticeably less likely as well. With the exception of family recreation trips, there is a logic that goes with current attitudes of parents toward safety and security for their children. For younger children, it's easier, safer and more secure for school and afternoon trips to be made with a family member in a personal car. There is also a correlation with 1-person households and rental tenure.

Mode to Work, Transit and Walk: Based on the car-sharing research and again supported by micro-mobility locational choices, mobility-sharing neighborhoods have a composition of residents that are more likely than their regional counterparts to take transit and walk, rather than drive, to work. The high mode share for walking is indicative of mixed-use development and a good pedestrian environment. For bike-to-work persons, the correlation is not strong which is intuitive: if a person already owns their own bicycle and uses it for work trips, the likelihood of using micro-mobility is low. Although not supportive of micro-mobility use, the end goal of reducing vehicular trips and reducing the area's mobility carbon footprint is achieved.

Non-Work Trips, Transit and Walk Modes: Micro-mobility is not designed to meet a household's entire set of mobility needs. Whether bikes, e-bikes, scooters, or micro-transit, micro-mobility often serves non-work-based trip purposes, such as shopping, recreation, and shopping linked to recreation. In either case, the user's insensitivity to time, and high sensitivity to the intangibles of low stress, enjoyable infrastructure and modal characteristics is important. The concept of linked recreation and shopping (or other errands) is facilitated in mixed-use development and a good pedestrian environment. Transferring concepts from home-work-based mode choice, a person that is willing to use alternative modes for a work trip is just as likely to use the same mods for non-work trips. In addition, when time sensitivity is lower, some that use a car for work trips are still willing to use micro-mobility for other trips.

Household Income: Surprisingly, household income, is not a noticeable factor in the profiles of carsharing or micro-mobility placements. Both appear fairly insensitive to income, again reminding that micro-mobility is not designed to meet a household's entire set of mobility needs but to work in concert with other modes. This is an important distinction from transit in which household income as a composition of an area is well correlated to transit use. The importance to having some predictive capability on new placements, micro-mobility placed with intent to serve first-and-last-mile purposes may be less effective than intended to induce new ridership by lowering the walk time barrier only. It may have less effect on other perceived barriers to transit.

Walkable Distance to Placements: Walkability to a micro-mobility stop, placement or dock is critical in addition to all other factors. The distance to or spacing of micro-mobility placements is dependent on the mode, and the relative speed and distance covered by the micro-mobility mode. Generally, for micro-transit, walk to stops should be less than 0.25 miles, even while regional transit spacings are in the range of ¼ to ½-mile. For bicycle dock placements, street grid spacing, block length, distance to crosswalks, sidewalk networks, in addition to density/intensity of land use are all important to supporting the density of micro-mobility bike or scooter placement. For example, the current deployment of 200 scooters in the downtown Fort Pierce and Hutchinson Island area (Fort Pierce Downtown west to 25th Street = 5.2 sq. mi. and Hutchinson Island south to Coconut Drive= 1.1 sq. mi.) is about 32 scooters per square mile. At the maximum allowed by contract of 500 scooters it would be 79. As a point of reference, when planning for the New York City Bike Share program the placement density goal was a bike dock per 1,000-foot (on each side) grid with an average of 16.67 bikes per dock, working out to a bike density of 465 per square mile. The National Association of City Transportation Officials (NACTO) similarly recommends a spacing for bike-sharing docks of 1,000 feet; however, the actual bike density will be lower in smaller cities.

Transportation Network: The existing transportation network is critical to the suitability of an area to micro-mobility deployment and sustainability.

Criteria that are reviewed include: the roadway network, including arterials, collectors and local roads, but not private roadways. The type of facility, including direction, number of travel lanes, on-street parking, and edge conditions are considered as required.

Roadway Traffic Volumes: Traffic volumes as annual average daily traffic in two directions (AADT) on arterial and collector streets has been collected from St. Lucie County. For road vehicle micro-mobility including micro-transit and low speed electric vehicles or neighborhood electric vehicles, the traffic volumes, level-of-service, speed limits and average vehicle speeds provide an indication of the suitability for a roadway to absorb friction caused by frequent on-street transit stops, as well as a relative indication of the suitability of an area for use of LSEV or NEV whether in mixed traffic or by dedicated lanes. The suitability of a roadway for bicycle use and scooter use are also very dependent on a combination of the type of bicycle facility available and traffic volumes. The Level of Transportation Stress (LTS) is the current approach to evaluating the suitability of roadways for bicycle or scooter travel. The LTS approach quantifies the amount of discomfort that people feel when they bicycle or scooter close to traffic. While fully evaluating LTS, transit friction or integrating NEV/LSEV's onto roadways requires further operational analysis, facility type and traffic volumes are collected as the first screen-line for this analysis.

Grid Spacing: The ability to move in different directions to improve accessibility between origins and destinations is a key concept for short-distance travel and micro-mobility. Fine street grids with block sizes in the range of 300 to 400 feet perform better than suburban blocks where block lengths of 500 to 1,000 feet cause greater distances to be traveled and inhibit walking, scooter travel, bike travel and reduce the efficiency of transit service.

Pedestrian Network: An efficient, safe, secure and enjoyable pedestrian network is an important infrastructure component for micro-mobility. For bike and scooter micro-mobility, sidewalk areas are necessary for placement locations, whether in a free-float, dockless implementation or for a dock model. For micro-transit, sidewalks are critical pathways between transit stops and the rider's origin or final destination. All travel is by a multi-modal chain, and walking is the first and last mode.

Bicycle Network: Bicycle and scooter micro-mobility depend on a complete, safe bicycle network. In shared use, both modes are not to be ridden on sidewalks. For local streets where traffic volumes and speeds are low, both modes can be used in mixed traffic safely, with high satisfaction and a correspondingly better LTS score. On multilane, high traffic and higher speed roadways, dedicated and buffered facilities are a must-have to maintain high levels of safety and satisfaction; and therefore, support greater use of bicycles and scooters for micro-mobility.

Transit Network: Where micro-mobility is purposed as a first-and-last-mile mode, the existing transit service must have density of stops and good choices regarding potential transit destinations from the linked trip. Without regional origin-destination information at a reliable micro level, and an assessment of satisfaction of potential users with total trip travel and wait time, it is difficult to fully assess the impact of micro-mobility in a first-last-mile role. To assess

this at a screen-line level, mapped data is collected to indicate the number or routes in different directions and the number of stops available in the study area. More routes are important to creating productive micro-mobility implementations. More stops (or high stop density / frequent stop spacing) are somewhat counterproductive toward productive micro-mobility, because micro-mobility is purposed to replace walking to the bus stop with a faster and more enjoyable first-last-mile mode. Fewer bus stops, with bus routes that are more streamlined to remain on major thoroughfares (where micro-mobility performs less well) provides a more efficient bus system with potentially shorter travel times that are more attractive to new users.

Organization of this Section:

This study focuses on the analysis and considerations on three distinct study areas within St. Lucie County, each with distinctly different geographic location and built environments. For each study area, a summary table is provided to comment on the important geographic and demographic indicators. Each map is included for each area on the pages following the summary table.

The entire series of infrastructure, land use, demographic and travel pattern maps have been provided in Appendix C that is included in the Micro-Mobility Study Technical Memorandum which is a separate volume from this study.

3.2 DOWNTOWN FORT PIERCE

Characteristic	Finding	Scooters (docked or dockless)	E-Bikes (docked)	Low Speed Electric Vehicles	Micro-Transit
BASE TRANSPORTATION NETWORK					
Roadway Network	Network is predominantly low speed local streets with the exceptions of Orange Avenue, US-1 and North 13th Street.	↑	↑	↑	↑
Grid Spacing	Average of 300 to 400 feet.	↑	↑	●	↑
Sidewalk Network	Mostly complete sidewalks on both sides No bike lanes on major streets.	↑	↑	●	↑
Bike Network	No bike lanes on major streets.	↓	↓	●	●
Fixed-Route Transit	ART bus routes 1, ,2, 3, 7 and 8 with seven stops total and the Fort Pierce Trolley.	↑	↑	●	↑
LAND USE					
Land Use	Mixed Use: destination commercial, civic, some employment, some residential.	↑	↑	●	↑
Residential Density	Residential area west of 7th Street ranges from 1 to 3 dwelling units /acre. There are many vacant parcels in the redevelopment area.	↑	↑	●	↓
Employment Total	Total employment in the Downtown Area is approximately 3,000.	↑	↑	↑	↑
Parking	There is on street parking throughout, off-street parking for visitors, on-site parking for residential uses.	↑	↑	↑	●
DEMOGRAPHICS					
1-Person Households	1-person households are generally a high composition east of 7th Street and west of 7th Street ranges from 20% to 47% .	↑	↑	●	↑
Students Enrolled in Study Area Schools	South of Orange Avenue and west of 7th Street has approximately 400 students.	↑	↑	●	↑
Average Vehicles per Household	Among the residential areas, vehicles per household range from 0.8 to 1.8.	↑	↑	●	↑
Households with No Vehicle	Among the residential area, the percent of households that have no vehicles ranges from 7% to 44%.	↑	↑	●	↑
TRAVEL MODE					
Take Transit for All Trips	Three of residential Transportation Analysis Zones (TAZ) in the Downtown study area show 2% of all trips by residents of this area are by transit.	↓	↓	●	↓
Walk to All Trips	Among the residential areas of the Downtown study area, the percent of people that walk for their trips for any purpose range from 20% to 57%.	↑	↑	↓	↑

Key: ↑ supportive of micro-mobility ↑ minimally supportive ↓ not supportive ● no effect

3.3 TORINO

Characteristic	Finding	Scooters (docked or dockless)	E-Bikes (docked)	Low Speed Electric Vehicles	Micro-Transit
BASE TRANSPORTATION NETWORK					
Roadway Network	Predominantly low-speed local cul-de-sac streets connecting to collectors and arterials in a suburban hierarchy.	↓	↓	↑	↓
Grid Spacing	Network is cul-de-sac streets connecting to collectors and arterials in a suburban hierarchy. There is no continuous grid.	↓	↓	●	↓
Sidewalk Network	The sidewalk network is incomplete along Torino Parkway and in some subdivisions.	↓	↓	●	↓
Bike Network	There is a multi-purpose trail along parts of Torino Parkway in the south and northwest. Areas of Torino Parkway without facilities are not suitable for riding in mixed traffic.	↓	↓	●	●
Fixed-Route Transit	There is no transit service within or at the boundaries of Torino.	↓	↓	●	↑
LAND USE					
Land Use	Entirely single-family residential at suburban densities.	↓	↓	●	↓
Residential Density	Single-family residential densities are built out in the range of 0.6 to 3.3 dwelling units per acre.	↓	↓	●	↓
Employment Total	Total employment in Torino between I-95 and the Turnpike is approximately 200. External employment areas are southwest and northwest of Torino with heavy industrial uses to the north.	↓	↓	●	↓
Parking	There is no on street parking throughout, with on-site parking for all uses	●	●	↑	●
DEMOGRAPHICS					
1-Person Households	1-person households are between 10% and 25% throughout Torino.	↑	↑	●	●
Students Enrolled in Study Area Schools	There are no students enrolled in schools in the Torino study area	↓	↓	●	↓
Average Vehicles per Household	There is an average of 2 vehicles per household throughout Torino.	↓	↓	●	↓
Households with No Vehicle	The percent of households that have no vehicles in Torino is generally from 2 to 4% with two subdivisions around 15%.	↑	↑	●	↓
TRAVEL MODE					
Take Transit for All Trips	None of the population of the entire Torino area uses fixed-route transit for any trips.	↓	↓	●	↓
Walk to All Trips	The percent of households that walk for any trips in Torino is generally from 1% to 5% with one subdivision at 10%.	↑	↑	↓	↑

Key: ↑ supportive of micro-mobility ↑ minimally supportive ↓ not supportive ● no effect

3.4 TRADITION

Characteristic	Finding	Scooters (docked or dockless)	E-Bikes (docked)	Low Speed Electric Vehicles	Micro-Transit
BASE TRANSPORTATION NETWORK					
Roadway Network	Low-speed local cul-de-sac streets connecting to collectors and arterials in a suburban hierarchy.	↓	↓	↑	↓
Grid Spacing	Network is cul-de-sac streets connecting to collectors and arterials in a suburban hierarchy. There is no continuous grid.	↓	↓	●	↓
Sidewalk Network	The sidewalk network is complete throughout built-out subdivisions, Town Center, other commercial areas and the Tradition Center for Innovation.	↑	↑	●	↑
Bike Network	There are multi-purpose trails and bike lanes along collector streets throughout the residential portions of Tradition, as well as the Town Center.	↑	↑	●	●
Fixed-Route Transit	St. Lucie ART Route 5 terminates at Tradition Parkway and stops on Tradition Parkway just west of the Wawa gas station. Tradition In Motion micro transit service connects the Town Center, major shopping and apartments in Tradition, but does not connect to the Route 5 stop.	↑	↑	●	↑
LAND USE					
Land Use	Planned development with a mix of low density residential uses, geographically related to a Town Center, larger scale commercial uses and an employment center.	↑	↑	●	↑
Residential Density	Residential densities are built out in the range of 0.3 to 2 dwelling units per acre on average by TAZ; however, higher densities are arranged closer to the Town Center and other commercial areas.	↑	↑	●	↑
Employment Total	Total employment in Tradition is approximately 3,000. Concentrations of employment to the east at the Center for Innovation and the Town Center.	↑	↑	●	↑
Parking	There is no on street parking throughout, with on-site parking for all uses.	●	●	↑	●
DEMOGRAPHICS					
1-Person Households	1-person households are between 11% and 60% and generally average around 30%.	↑	↑	●	●
Students Enrolled in Study Area Schools	There are a significant number of students (1,400) enrolled in school in Tradition.	↑	↑	●	↑
Average Vehicles per Household	There is an average of approximately 2 vehicles per household throughout Tradition.	↓	↓	●	↓
Households with No Vehicle	The percent of households that have no vehicles in Tradition is generally from 2% to 6% with the only the eastern area at 20%.	↑	↑	●	↓
TRAVEL MODE					
Take Transit for All Trips	A relatively small proportion of Tradition residents use transit for any trips.	↓	↓	●	↓
Walk to All Trips	The percent of households that walk for any trips in Tradition is from 0% to 18% with the higher proportions closer to the Town Center.	↑	↑	↓	↑

Key: ↑ supportive of micro-mobility ↑ minimally supportive ↓ not supportive ● no effect

3.5 GATLIN

Characteristic	Finding	Scooters (docked or dockless)	E-Bikes (docked)	Low Speed Electric Vehicles	Micro-Transit
BASE TRANSPORTATION NETWORK					
Roadway Network	The network is predominantly low speed local streets connecting to collectors and arterials in a modified grid form.	↑	↑	↑	↑
Grid Spacing	The grid spacing ranges around 300 feet for one dimension of blocks and 1,000 to 1,500 feet for the other dimension.	↑	↑	●	↑
Sidewalk Network	Except for Gatlin Boulevard, Tulip Blvd., Paar Drive and two other subdivisions, there are limited sidewalks in the area.	↓	↓	●	↓
Bike Network	There are no dedicated bicycle facilities in the Gatlin area.	↓	↓	●	●
Fixed-Route Transit	The St. Lucie County ART Route 5 provides service along Gatlin Boulevard.	↑	↑	●	↑
LAND USE					
Land Use	Predominantly single-family residential at suburban densities; with retail along Gatlin Blvd., the corner of Paar Drive & Port St. Lucie Blvd, civic uses in neighborhoods and some light industry to the northwest..	↑	↑	●	↓
Residential Density	Single-family residential densities at approximately 1.5 to 2.0 DU/acre.	↓	↓	●	↓
Employment Total	Total employment in Gatlin is approximately 3,000. It is generally concentrated along Gatlin Boulevard.	↑	↑	●	↑
Parking	There is no on street parking throughout, with on-site parking for all uses	●	●	↑	●
DEMOGRAPHICS					
1-Person Households	1-person households are between 10% and 20% throughout Gatlin.	↑	↑	●	●
Students Enrolled in Study Area Schools	There are no students enrolled in schools in the Gatlin study area.	↓	↓	●	↓
Average Vehicles per Household	There is an average of 2 vehicles per household throughout Gatlin.	↓	↓	●	↓
Households with No Vehicle	The percent of households that have no vehicles in Gatlin is generally from 4% to 10%.	↑	↑	●	↑
TRAVEL MODE					
Take Transit for All Trips	A low percentage of the population of the Gatlin area uses transit for any trips.	↓	↓	●	↓
Walk to All Trips	The percent of households that walk for any trips in Gatlin is generally from 1% to 11% with an approximate average of 5%.	↑	↑	↓	↑

Key: ↑ supportive of micro-mobility ↑ minimally supportive ↓ not supportive ● no effect

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Task 4 Considerations

4.1 Introduction

The considerations provided in this section are based on the findings of Tasks 1, 2 and 3 and address the four questions that were proposed at the beginning of the study:

1) What micro-mobility mode, or combination of modes can best address the needs of each of the study areas?
2) Should the micro-mobility choices be managed and operated by private providers, or should they be publicly-owned/operated, or are Public-Private Partnership models better suited?
3) What infrastructure investments; policy and regulatory changes; school bus stop location changes; and transit operations/ equipment modifications could be programmed to match the needs for each area and assure long-term viability and growth of the micro-mobility services?
4) For first-and-last-mile connections, where are the locations for potential transit hubs, and what are the specifications for the hubs?

The responses to these questions will be organized by study area, with a strong emphasis on Task 3 findings to recommend modal preferences and infrastructure changes for each study area for both unchained micro-mobility trips and infrastructure for first-last-mile trips. Policy and regulatory considerations will be addressed in a separate subsection since these considerations apply equally to each of the study areas.

Each of the three study areas represent very different circumstances for existing development, infrastructure and existing multi-modal options:

1. Downtown Fort Pierce is the study area that has the best opportunities for micro-mobility and also has existing micro-mobility in place;
2. Torino is a mono-use suburban residential area with minimal commercial uses or employment destinations;
3. Tradition is an expanding planned community with a variety of residential types, a town center destination of primarily smaller employment locations and small-scale shopping and eateries, large-scale commercial areas, and a large scale employment center south of Tradition Parkway. Gatlin, to the north and south of Gatlin Boulevard and west of the Florida's Turnpike is combined with this study area, and is comprised of an older suburban form of low-density single-family residential areas and a commercial corridor along Gatlin Boulevard. The two sub-areas were analyzed independently in Task 3 due to their difference, and are recombined in Task 4 Considerations as originally scoped.

The following subsections include a brief pictorial and bullet-point summary of the overall consideration for each study area, followed by tables that provide consideration details. Within the tables, each of the rows are topics for considerations, including:

- Overall Consideration
- Land Use Support

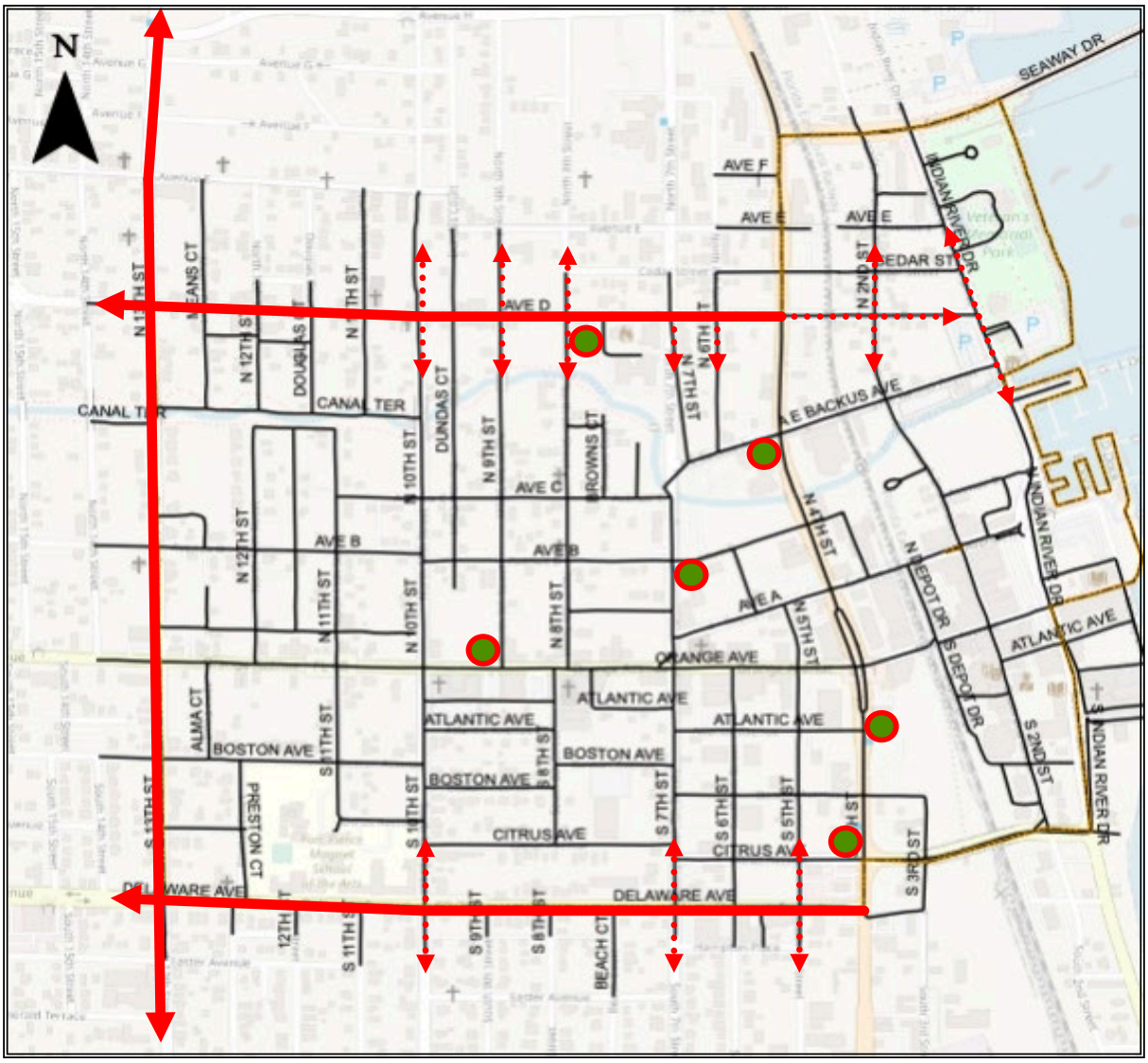
- Roadway Infrastructure
- Bicycle Infrastructure
- Roadway Operations
- Bicycle Racks
- Pedestrian Infrastructure
- Transit Service
- Transit Equipment
- Transit Stops
- School Trips

For each topic, there is a detailed description of improvements for the study area in the next column, then followed by columns for each micro-mobility mode considered and a symbol identifying that the consideration provides support for an intended mode as well as for other modes. For example: buffered bike lane improvements improve the use, comfort and safety of bike travel but also improve the use of scooter modes, and also support greater transit utilization via first-last-mile impacts.

The regulatory and policy considerations are not particular to the study areas, and apply County-wide. These considerations are in a separate subsection following the study area considerations.

4.2 Downtown Fort Pierce Study Area Considerations

Overall:	Support expanded shared scooters
Land Use:	Zoning to require bike and scooter racks in new construction
Roadways:	Coordinate with Spin to obtain data on resurfacing needs and program
Buffered Bike Lanes:	1) N/S 13th Street from canal to Virginia Avenue to Avenue Q 2) Avenue D from N 13th Street to US-1 3) Delaware Avenue from S 13th Street to US-1
Racks:	Bike racks and suitable scooter racks per TPO Bike Rack Plan, at schools, and transit stops
Transit:	Public information for transit policies for scooter and bike



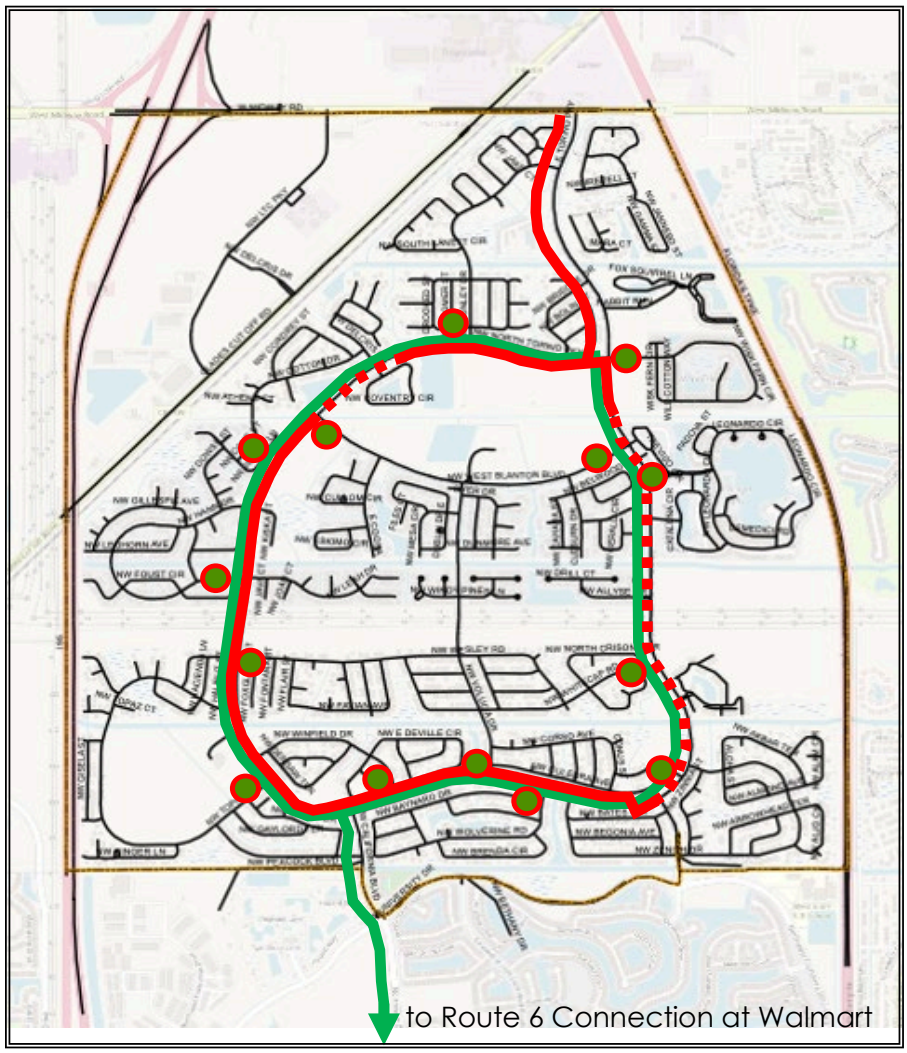
DOWNTOWN FORT PIERCE STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Overall Consideration	The overall consideration is to support expanded shared scooters. The Downtown area has significant coverage by regional transit and a local transit circulator as well as a nearly complete network of pedestrian sidewalks east of N 7th Street. Improving utilization of these investments is partly accomplished by supporting to the City and Spin's (current shared scooter operator) contractual maximum deployment of 500 scooters in the Fort Pierce geo-fenced area from the canal to Virginia Avenue, and from N/S 25th Avenue to the shoreline. While the number of scooters is a private sector action, the City and County can provide support through the considerations below that include right-of-way infrastructure, land use policy and contractual actions on the part of the City of Fort Pierce.	Directly Supportive of Scooter Mobility	Indirectly Supportive of Bicycle Mobility	No Effect	No Effect	Indirectly Supportive of Regional Transit by First-Last-Mile Improvements
Land Use Support	Determine zoning categories, development thresholds and criteria to require provision of on-site bicycle racks and scooter racks for personal equipment security, and provision of plug-in NEV space requirements for on-site parking in new developments.	Directly Supportive	Directly Supportive	Directly Supportive	No Effect	No Effect
Roadway Infrastructure	Coordinate with Spin to obtain data on scooter usage by street segment and resurfacing needs for local streets with speed limits below 30 mph, where surface conditions are not supportive of scooter use. Prioritize needs in the Capital Improvement Program.	Directly Supportive	Directly Supportive	Directly Supportive	No Effect	No Effect
Roadway Operations	There are no considerations regarding traffic operations at the level of detail for this effort; however, as bicycle infrastructure is further developed in detail, traffic operations, including signage and traffic signal modifications may become necessary for safety.	No Effect	No Effect	No Effect	No Effect	No Effect

DOWNTOWN FORT PIERCE STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Bicycle Infrastructure	Plan and program buffered bike lanes that support scooter use along higher volume, higher speed roadway segments in downtown: ▪ N/S 13th Street from canal to Virginia Avenue to Avenue Q and Frances K Sweet Elementary School. ▪ Avenue D from N 13th Street to US-1 ▪ Delaware Avenue from S 13th Street to US-1 Of note, Orange Avenue is not recommended because Delaware Avenue and Avenue D provide nearby alternative paths on roadways with less traffic volume than Orange Avenue. Delaware Avenue is also the location of the Creative Arts Academy, and Avenue D is the location of the Bus Terminal.	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Indirectly Supportive
Bicycle Racks	Use the St. Lucie TPO Bike Rack Plan to further develop location criteria for secure bike racks in coordination with scooter corrals or docks. Currently the Plan shows the location at the Avenue D Bus Terminal; however, activity center, parking lot, and transit location criteria should be further refined in coordination with the shared scooter operator to assure walkable micro-mobility with maximum spacings of 1,000 feet.	Directly Supportive	Directly Supportive	No Effect	No Effect	Indirectly Supportive
Pedestrian Infrastructure	Coordinate with shared scooter operator to obtain data on scooter usage by street segment and inventory sidewalk condition, width and continuity to prioritize sidewalk improvements and support micro-mobility corral space and pedestrian facilities to access final destination. (Many sidewalks in area west of N 7th Street are in poor condition.) Prioritize needs in the Capital Improvement Program.	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Directly Supportive

DOWNTOWN FORT PIERCE STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Transit Service	Downtown Fort Pierce is well served by fixed transit routes as well as the Fort Pierce Trolley, providing nearly complete coverage. Ridership on the bus network is low. As a first-last-mile effort, the focus is to increase usage of micro-mobility before focusing on increasing fixed-route bus service.	No Effect	No Effect	No Effect	No Effect	Indirectly Supportive
Transit Equipment	Assure that all buses include signage to make clear policies regarding prohibition of shared scooter, bike or other shared micro-mobility on public buses.	Directly Supportive	Directly Supportive	No Effect	No Effect	Directly Supportive
Transit Stops	Downtown Fort Pierce is well served by fixed-route transit routes as well as the Fort Pierce Trolley. There are 10 bus stops including the Avenue D Bus Terminal. Most of the stops have only signage. Stops should be planned and programmed to have co-located micro-mobility facilities at the stop, including a shelter, information, a public bike rack and a shared scooter corral or dock. Prioritization should be in accord with bus boarding and alighting data and data for scooter usage. Bike rack design is to follow principles described in the TPO Bike Rack Plan. Prioritize needs in the Capital Improvement Program.	Directly Supportive	Directly Supportive	No Effect	No Effect	Directly Supportive
School Trips	Work with shared mobility provider, which for Downtown Fort Pierce is Spin, to assure that high schools as well as transit stops in the study area have corrals or docks for shared scooters and/or shared bike. Also, at high schools and middle schools, define and install secure racks designed for personal bicycles and secure racks designed for personal scooters. These facilities should have a design and signage to clearly differentiate them from commercial shared mobility facilities.	Supportive	Supportive	No Effect	No Effect	Indirectly Supportive

4.3 Torino Study Area Considerations

Overall:	First-last-mile concepts, micro-mobility transit circulator – hybrid fixed route with route deviation (in the LRTP 10-Year Implementation Plan, Option 2, "Opportunity Plus") with bike and scooter facilities at bus stops
Land Use:	Zoning to require bike and scooter racks in new construction Zoning to require plug-in EV spaces
Roadways:	Reduce speed limit along Torino Parkway
Multi-Use Path:	complete the existing segments (shown by dotted red line) with new segment (illustrated by solid red line) 1) all of Torino Parkway 2) California Boulevard, Torino Parkway to Somerset Prep School 3) California Boulevard, Peacock Boulevard to Indian River College 4) Cashmere Boulevard, Torino Parkway to Westgate K-8
Racks:	Bike racks per TPO Bike Rack Plan, at schools and transit stops
Micro-Transit:	Micro-transit hybrid fixed route with on-demand route deviation illustrated by green line)



TORINO STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Overall Consideration	The overall consideration is two-fold: Torino is not currently within the service area of any transit and for persons without access to a personal car, it is isolated from nearby and regional activities and employment for which distances are long for active mobility modes. The considerations for the Torino Study Area are developed around a first-last-mile concept. A micro-mobility transit circulator with a hybrid route-deviation service could connect residential development along Torino Parkway and NW Cashmere Boulevard to connect to commercial and employment destinations along NW Peacock Boulevard, California Boulevard and St. Lucie West Boulevard. The existing bus stop at Walmart, a major activity center for a community, is to be the location for the transfer between the micro-mobility service and the regional bus network via the Route 6. To minimize on-demand route deviations for the micro-transit, scooter and bicycle infrastructure and facilities are to be fully developed along Torino Parkway, toward the goal of providing sufficient infrastructure to encourage a shared mobility (bike or scooter) provider to the area.	Directly Supportive of Scooter Mobility	Indirectly Supportive of Bicycle Mobility	No Effect	Directly Supportive of Micro-Transit	Indirectly Supportive of Regional Transit by First-Last-Mile Improvements
Land Use Support	Determine zoning categories, development thresholds and criteria to require provision of on-site bicycle racks and scooter racks for personal equipment security, and provision of plug-in NEV space requirements for on-site parking in new developments. The plug-in NEV spaces are to include a dedicated space for micro-transit vehicles where applicable.	Directly Supportive	Directly Supportive	Directly Supportive	Directly Supportive	No Effect

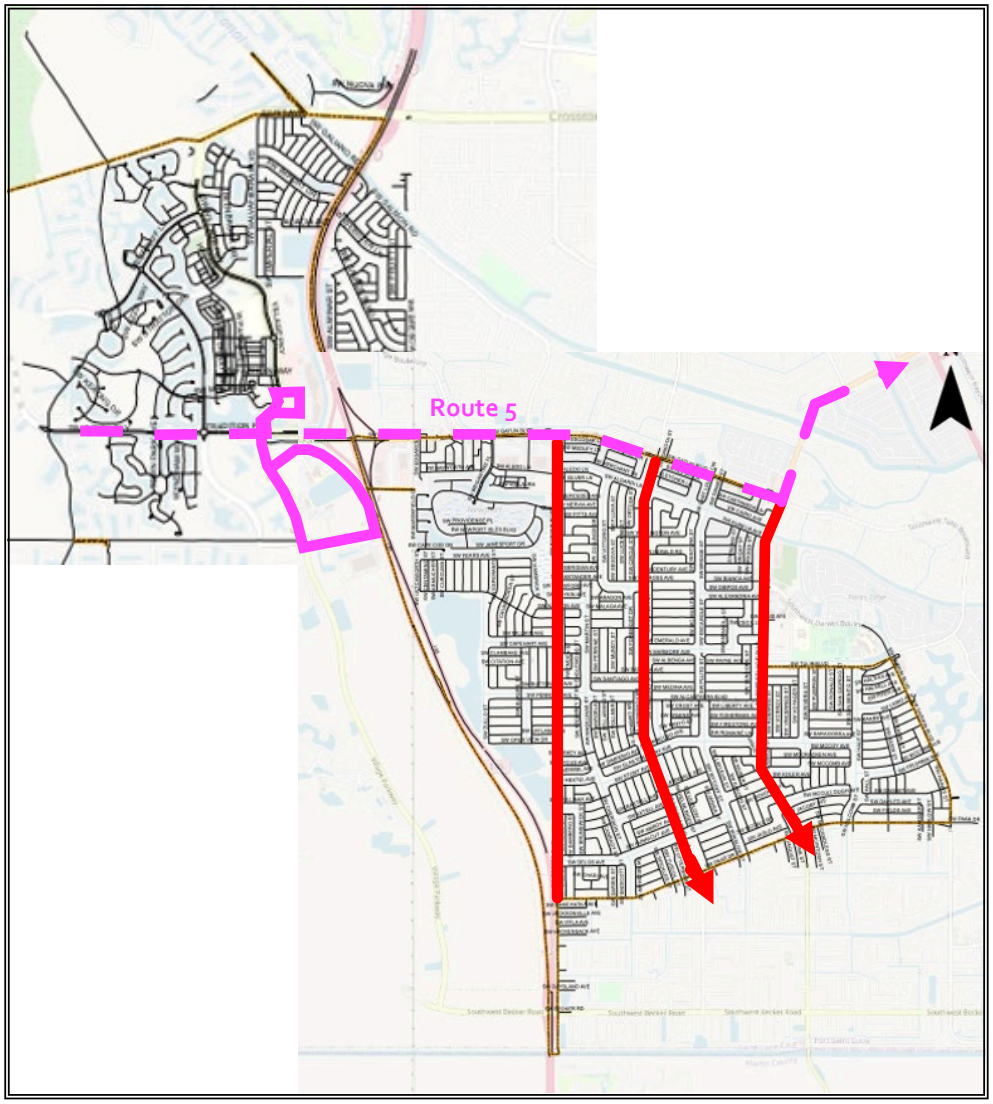
TORINO STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Roadway Infrastructure	None at this time	Directly Supportive	No Effect	No Effect	No Effect	No Effect
Roadway Operations	Reduce speed along Torino Parkway to 30 mph to increase safety for NEV use and for micro-mobility stops. As the multi-use path along Torino Parkway is further developed in detail, traffic operations, including signage and traffic signal modifications may become necessary for safety.	Indirectly Supportive	Indirectly Supportive	Directly Supportive	Directly Supportive	No Effect
Bicycle Infrastructure	Plan and program completion and widening of the sidewalk segment along Torino Parkway to complete a continuous multi-use path that includes: ▪ All of Torino Parkway ▪ The segment of California Blvd. from Torino Parkway to Somerset College Prep Academy (with reduced width at the canal bridge) ▪ The segment pf California Boulevard from NW Peacock Boulevard to Indian River State College, Pruitt Campus ▪ The segment of NW Cashmere Boulevard from East Torino Parkway to West Gate K-8 School. The consideration is consistent with the Multimodal Project Considerations (Appendix A) of the Port St. Lucie Multimodal Plan. The multi-purpose path design is to include: ▪ Minimum cross-section width of 10 feet ▪ Separation from the vehicular travel lanes ▪ Clearance to roadway signs, 4-foot minimum ▪ Sloped swale area (2% minimum) between roadway pavement and path to assure drainage ▪ Minimum width from edge of path to top of slope of 2 feet ▪ Bicycle racks and corrals as described below	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Indirectly Supportive

TORINO STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Bicycle Racks	Bike racks are to be collocated with transit infrastructure and located along Torino Parkway at the entrances of residential communities, and to include: ▪ Canopy shelter from weather that provides shelter for both bicycles, scooters and people waiting for a micro-mobility vehicle. ▪ Illumination for secure and safe night-time use ▪ Bike racks as described in the TPO bike Rack Plan ▪ Scooter corral area ▪ Wayfinding signage, maps and details about micro-mobility and County transit service	Directly Supportive	Directly Supportive	No Effect	Directly Supportive	Indirectly Supportive
Pedestrian Infrastructure	Plan and program completion and widening of the sidewalk segment along Torino Parkway to complete a continuous multi-use path as described in the bicycle infrastructure consideration, as described under bicycle infrastructure. The recommendation is consistent with the Multimodal Project Considerations (Appendix A) of the Port St. Lucie Multimodal Plan.	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Directly Supportive
Transit Service	The Torino study area is not currently served by transit service. The Considerations for the Torino Study Area are developed around a first-last-mile concept. A micro-mobility transit circulator with a hybrid route-deviation service could connect residential development along Torino Parkway and NW Cashmere Boulevard to connect to commercial and employment destinations along NW Peacock Boulevard, California Boulevard and St. Lucie West Boulevard.	No Effect	No Effect	No Effect	Directly Supportive	Indirectly Supportive
Transit Equipment	Assure that all buses include signage to make clear policies regarding prohibition of shared scooter, bike or other shared micro-mobility on public buses.	Directly Supportive	Directly Supportive	No Effect	Directly Supportive	Directly Supportive

TORINO STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Transit Stops	A micro-mobility transit circulator with a hybrid route-deviation service could connect residential development along Torino Parkway and NW Cashmere Boulevard to connect to commercial and employment destinations along NW Peacock Boulevard, California Boulevard and St. Lucie West Boulevard. The existing bus stop at Walmart, a major activity center for a community, is to be the location for the transfer between the micro-mobility service and the regional bus network via Route 6. Transit stops along Torino Parkway are as described in the Bike Racks consideration.	Directly Supportive	Directly Supportive	No Effect	Directly Supportive	Directly Supportive
School Trips	At high schools and middle schools, install secure racks designed for personal bicycles and secure racks designed for personal scooters. These facilities should have a design and signage to clearly differentiate them from commercial shared mobility facilities. Just outside the Torino study area is West Gate K-8 along NW Cashmere Boulevard, Somerset College Preparatory Academy and Indian River State College, Pruitt Campus, both along California Boulevard. Although outside of the Study area, the considerations should be applied to these schools. In addition, the bicycle facility consideration includes accommodation to have continuous paths to these schools.	Supportive	Supportive	No Effect	No Effect	Indirectly Supportive

4.4 Tradition / Gatlin Study Area Considerations

Overall:	Tradition: coordinate with TIM and extend Route 5 to Tradition Innovation Center and employment south of Tradition Parkway (illustrated by solid magenta line, with existing alignment in dashed line) Gatlin: first-last-mile concepts, bike and scooter facilities at bus stops supporting connectivity and extended service area to the Route 5, with multi-use paths extending south into the residential community (illustrated by red lines)
Land Use:	Zoning to require bike and scooter racks and plug-in EV spaces in new construction
Multi-Use Paths:	1) SW Rosser Boulevard, Paar Drive to Nervia Av & library 2) SW Savona Boulevard, Paar Drive to Gatlin Boulevard
Racks:	Bike racks and suitable scooter racks per TPO Bike Rack Plan, at schools and transit stops



TRADITION / GATLIN STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Overall Consideration	The overall consideration is comprised of two parts for the two distinct sub-areas of Tradition and Gatlin. Tradition: Tradition operates and manages its own automatic guided vehicle (AGV) micro-mobility service, Tradition-In-Motion operated by Beep. The completely planned and phased development of Tradition also includes extensive multi-use trails for pedestrians, bicycles and scooters. As Tradition develops and expands through phases of its development, it will expand these networks to serve the entire community. There are inadequate connections to the Tradition Innovation Center, the Cleveland Clinic, Keiser University and other major employment destinations south of Tradition Parkway. Gatlin is within or adjacent to the service area of St. Lucie County Route 5 going east to Tradition and west to the Port St. Lucie Intermodal Facility. Most of the areas south of Abingdon Avenue are farther than the comfortable walking distance of ¼ mile. The area is comprised mainly of single-family homes located on a broken grid street network; however, three collector streets provide a good opportunity for micro-mobility using shared bikes or scooters. The consideration for the Gatlin sub-area is to provide a complete, safe street network that provides for scooter or bicycle connections from residential development to Gatlin Boulevard destinations and transit transfers.	No Effect	No Effect	No Effect	Directly Supportive of Micro-Transit	Directly Supportive of Regional Transit
Land Use Support	Determine zoning categories, development thresholds and criteria to require provision of on-site bicycle racks and scooter racks for personal equipment security, and provision of plug-in NEV space requirements for on-site parking in new and existing commercial developments.	No Effect	No Effect	No Effect	No Effect	No Effect

TRADITION / GATLIN STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Roadway Infrastructure	None at this time	No Effect	No Effect	No Effect	No Effect	No Effect
Roadway Operations	None at this time	No Effect	No Effect	No Effect	No Effect	No Effect
Bicycle Infrastructure	Plan and program separated multi-use paths of minimum 8 to 10 foot width, and separated by a minimum of 4 feet from the edge of travel lane pavement. ▪ SW Rosser Boulevard from Paar Drive to Nervia Avenue (and library) ▪ SW Savona Boulevard from Paar Drive to Gatlin Boulevard ▪ SW Port St. Lucie Boulevard from Paar Drive to Gatlin Boulevard (narrower section from SW Aurelia Avenue to SW Cairo Avenue The recommendation is consistent with the Multimodal Project Considerations (Appendix A) of the Port St. Lucie Multimodal Plan. Buffered bike lanes on both sides of the street with a minimum 4-foot cross-section and 2-foot painted buffer for safe and comfortable private bicycle and scooter travel in support of transit service: ▪ SW Rosser Boulevard from Nervia Avenue to Gatlin Boulevard	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Indirectly Supportive
Bicycle Racks	Plan and program bike racks as described in the TPO Bike Rack Plan for shopping areas, parks, and institutions, particularly along Gatlin Boulevard and SW Port St. Lucie Boulevard. At minimum bike racks are to be collocated with Route 5 bus stops along Gatlin Boulevard.	Directly Supportive	Directly Supportive	No Effect	No Effect	Indirectly Supportive

TRADITION / GATLIN STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
Pedestrian Infrastructure	Plan and program separated multi-use paths of minimum 8 to 10 foot width, and separated by a minimum of 4 feet from the edge of travel lane pavement. ▪ SW Rosser Boulevard from Paar Drive to Nervia Avenue (and library) ▪ SW Savona Boulevard from Paar Drive to Gatlin Boulevard ▪ SW Port St. Lucie Boulevard from Paar Drive to Gatlin Boulevard (narrower section from SW Aurelia Avenue to SW Cairo Avenue The recommendation is consistent with the Multimodal Project considerations (Appendix A) of the Port St. Lucie Multimodal Plan.	Directly Supportive	Directly Supportive	No Effect	Indirectly Supportive	Directly Supportive
Transit Service	For the Tradition Area, plan for extension of the Route 5 south along Village Parkway to provide direct transit service between the Port St. Lucie Intermodal Facility and the large employment centers of the Tradition Innovation Center. If the TIM micro-mobility is extended here as anticipated, the County should coordinate but still provide direct transit service to these employment centers.	No Effect	No Effect	No Effect	Directly Supportive	Directly Supportive
Transit Equipment	Assure that all regional buses include signage to make clear policies regarding prohibition of shared scooter, bike or other shared micro-mobility on public buses.	Directly Supportive	Directly Supportive	No Effect	No Effect	Directly Supportive
Transit Stops	Plan and program bike racks as described in the TPO Bike Rack Plan to be collocated with Route 5 bus stops along Gatlin Boulevard, Tradition Parkway, Village Parkway and The Landing at Tradition stop.	Directly Supportive	Directly Supportive	No Effect	No Effect	Indirectly Supportive

TRADITION / GATLIN STUDY AREA MICRO-MOBILITY CONSIDERATIONS		Scooter & Shared Scooter	Bicycle & Shared Bicycle	Neighborhood Electric Vehicles	Micro-Transit	Area Transit and First-Last-Mile
School Trips	At high schools and middle schools, install secure racks designed for personal bicycles and secure racks designed for personal scooters. These facilities should have a design and signage to clearly differentiate them from commercial shared mobility facilities. For the Gatlin study subarea, this includes Treasure Coast High School and Windmill Point Elementary School, both along SW Darwin Boulevard. There is an existing multi-use path along Darwin Boulevard from SW Port St. Lucie Boulevard to Tulip Boulevard *(and along Tulip Boulevard that provides safe connectivity to nearby schools.)	Supportive	Supportive	No Effect	No Effect	Indirectly Supportive

4.5 Regulatory and Policy Framework Considerations

The regulatory and policy framework for micro-mobility is primarily focused on shared scooters, shared bicycles and neighborhood electric vehicles, and autonomous guided vehicles (AGV) operating as micro-transit. Each of these technologies are relatively new and through rapid adoption and use have compelled federal, state and local jurisdictions to address, licensing, roadworthiness and safety issues for each, as well as defining the limits of home rule versus state pre-emptive legislation in Florida. A short synopsis of State of Florida regulations that affect each of these technologies as of April 2022 is provided below.

Autonomous Guided Vehicles (AGV), are defined by Section 316.003 Florida Statutes as vehicles equipped with an Automated Driving System which is hardware and software that are collectively capable of performing the entire dynamic driving task of an autonomous vehicle on a sustained basis, regardless of whether it is limited to a specific operational design domain.

AGVs must be federally certified as AGV in compliance with national traffic safety requirements. Operation on public roadways is permitted if they are capable of being operated in accordance with all applicable traffic and motor vehicle laws of Florida. Operation of Autonomous vehicles is regulated by §319.145 F.S.

Where AGVs do have an onboard attendant or operator, it is generally for the comfort and confidence of passengers to use the new technology.

Neighborhood Electric Vehicles (NEV), alternatively referred to as Low Speed Electric Vehicles (LSEV) or Low Speed Vehicles (LSV) are regulated by §319.145 F.S. As defined by §320.01 F.S, "low-speed vehicle" means any four-wheeled vehicle that has a top speed greater than 20 mph but not greater than 25 mph, including, but not limited to, neighborhood electric vehicles. Low-speed vehicles must comply with the federal safety standards in 49 C.F.R. s. 571.500 and §316.2122.Municipalities are authorized to regulate the use of LSEV, LSEV or NEV upon any state, county or municipal roads within the jurisdiction subject to the following conditions:

- may be operated only on streets where the posted speed limit is 35 miles per hour or less. This does not prohibit an LSV from crossing a road or street at an intersection where the road or street has a posted speed limit of more than 35 miles per hour (§316.2122(1));
- must be equipped with headlamps, stop lamps, turn signal lamps, taillamps, reflex reflectors, parking brakes, rearview mirrors, windshields, seat belts, and vehicle identification numbers (§316.2122(2));
- must be registered and insured in accordance with s. 320.02 and titled pursuant to chapter 319 (§316.2122(3));
- any person operating a low-speed vehicle or mini truck must have in his or her possession a valid driver license (§316.2122(4));
- a county or municipality may prohibit the operation of LSV on any road under its jurisdiction if the governing body of the county or municipality determines that such prohibition is necessary in the interest of safety (§316.2122(5));

- the Department of Transportation may prohibit the operation of LSV on any road under its jurisdiction if it determines that such prohibition is necessary in the interest of safety (§316.2122(6));
- government use of NEV and utility vehicles is permitted in sidewalks adjacent to state highways only if the vehicles yield to pedestrians and the sidewalk is at least 5 feet wide.

Regulations for LSEV and NEV do not provide for the use golf carts on roadways or any part of the public right-of-way.

Golf Carts , Golf carts are specifically for operation on private land, such as a golf course or for sporting or recreational purposes. Golf carts are not to be capable of exceeding a speed of 20 miles per hour. Golf carts may be operated under other limited circumstances, as summarized below:

- a golf cart, equipped and operated as provided in §316.212 (5), (6), and (7), may be operated within any self-contained retirement community unless otherwise prohibited (§316.2125(1));
- municipalities are authorized to use golf carts and utility vehicles upon any state, county, or municipal roads located within the corporate limits of such municipalities, subject to certain conditions (§316.2126);
- a law enforcement agency may operate all-terrain vehicles, golf carts, LSVs as defined in §320.01, or utility vehicles on any street, road, or highway in this state while carrying out its official duties. Such vehicles must be clearly marked as vehicles of a law enforcement agency and may be equipped with special warning lights, signaling devices, or other equipment approved or authorized for use on law enforcement vehicles. The vehicle operator and passengers must wear safety gear, such as helmets, which is ordinarily required for use by operators or passengers on such vehicles. (§316.21265).

A county or municipality may prohibit the operation of golf carts on any street or highway under its jurisdiction if the governing body of the county or municipality determines that such prohibition is necessary in the interest of safety, and the Department of Transportation may prohibit the operation of golf carts on any street or highway under its jurisdiction if it determines that such prohibition is necessary in the interest of safety. (§316.2125)

A local governmental entity may enact an ordinance regarding golf cart operation and equipment which is more restrictive than those enumerated by State law. Upon enactment of any such ordinance, the local governmental entity shall post appropriate signs or otherwise inform the residents that such an ordinance exists and that it shall be enforced within the local government's jurisdictional territory. An ordinance referred to in this section must apply only to an unlicensed driver.

Micro-Mobility Devices, Motorized Scooters and Miniature Motorcycles:

The operator of a motorized scooter or micro-mobility device has all of the rights and duties applicable to the rider of a bicycle under §316.2065 F.S. A local government, may adopt an

ordinance governing the operation of micro-mobility devices and motorized scooters on streets, highways, sidewalks, and sidewalk areas under the local government's jurisdiction.

A motorized scooter or micro-mobility device is not required to satisfy registration and insurance requirements. A person is not required to have a driver license to operate a motorized scooter or micro-mobility device. Such vehicles are not legal to operate on public roads, may not be registered as motor vehicles, and may not be operated on sidewalks unless authorized by a local jurisdiction ordinance enacted pursuant to s. 316.008(7)(a) or s. 316.212(8).

A person who offers motorized scooters or micro-mobility devices for hire is responsible for securing all such devices located in any area of the state where an active tropical storm or hurricane warning has been issued.

Electric Bicycles, as defined by §316.003 F.S. as a bicycle or tricycle equipped with fully operable pedals, a seat or saddle for the use of the rider, and an electric motor of less than 750 watts which meets the requirements of one of the following three classifications:

(a) "Class 1 electric bicycle" means an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling and that ceases to provide assistance when the electric bicycle reaches the speed of 20 miles per hour.

(b) "Class 2 electric bicycle" means an electric bicycle equipped with a motor that may be used exclusively to propel the electric bicycle and that ceases to provide assistance when the electric bicycle reaches the speed of 20 miles per hour.

(c) "Class 3 electric bicycle" means an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling and that ceases to provide assistance when the electric bicycle reaches the speed of 28 miles per hour.

Motorized Scooter, as defined by § 316.003 F.S. as any vehicle or micro-mobility device that is powered by a motor with or without a seat or saddle for the use of the rider, which is designed to travel on not more than three wheels, and which is not capable of propelling the vehicle at a speed greater than 20 miles per hour on level ground. The term does not include an electric bicycle. In addition, Micro-Mobility Device is defined as any motorized transportation device made available for private use by reservation through an online application, website, or software for point-to-point trips and which is not capable of traveling at a speed greater than 20 miles per hour on level ground. This term includes motorized scooters and bicycles as defined in this chapter.

Electric Personal Assistive Mobility Device, as defined by § 316.003 F.S. as any self-balancing, two-nontandem-wheeled device, designed to transport only one person, with an electric propulsion system with average power of 750 watts (1 horsepower), the maximum speed of which, on a paved level surface when powered solely by such a propulsion system while being

ridden by an operator who weighs 170 pounds, is less than 20 miles per hour. They are not defined as road vehicles.

Electric Personal Assistive Mobility Devices are regulated by §316.2068 F.S. may be operated on a road or street where the posted speed limit is 25 miles per hour or less; on a marked bicycle path; on any street or road where bicycles are permitted; at an intersection, to cross a road or street even if the road or street has a posted speed limit of more than 25 miles per hour; on a sidewalk, if the person operating the device yields the right-of-way to pedestrians and gives an audible signal before overtaking and passing a pedestrian. A valid driver license is not a prerequisite to operating an electric personal assistive mobility device. Electric personal assistive mobility devices do not need to be registered and insured. A person who is under the age of 16 years may not operate or ride without an approved helmet. A county or municipality may regulate the operation of electric personal assistive mobility devices on any road, street, sidewalk, or bicycle path under its jurisdiction in the interest of safety. The Florida Department of Transportation may prohibit the operation of electric personal assistive mobility devices on any road under its jurisdiction in the interest of safety.

Considerations

Roadway Network Considerations: The infrastructure considerations summarized for each study area considered the regulatory framework, particularly in terms of where to plan for bicycle facilities and where to allow for local, low speed streets to provide for micro-mobility movement. Sidewalk infrastructure has generally not been recommended for improvements in this study because micro-mobility devices are unsuitable to be operated on sidewalks in general, and such operation is unsafe and a detractor to pedestrian use. Where streets are unsuitable for micro-mobility devices, wide and buffered multi-use paths are recommended that can satisfy regulations and provide for safe interaction between micro-mobility users and pedestrians.

We note that in late 2021, the City of Port St. Lucie engaged in an effort to reduce the speed limit on all neighborhood roads within the city's jurisdiction (over 1,100 miles of streets). The effort, to be fully implemented by summer of 2022, was in response to the well-established safety consideration that vehicular / pedestrian accidents at 25 mph incur lower probability of injury and fatalities than at 30 mph. A local speed limit reduction implemented to foster greater use of micro-mobility use would expand the network of streets that are safe, suitable and legal for widespread micro-mobility use. The local street network would then provide for all micro-mobility devices, including electric scooters and other electric personal assistive mobility devices.

User safety and comfort would be improved by better aligning the maximum speed of micro-mobility devices with the maximum vehicular travel speed. If vehicles and micro-mobility travel at the same speed, there is less passing, better spacing, and lower incidence of collisions.

The study recommends that the TPO coordinate to monitor the results of Port St. Lucie's speed reduction, and promote wider adoption of the speed reduction in other jurisdictions for safety reasons and to improve public acceptance of micro-mobility by expanding the network of roads suitable for micro-mobility use.

The Port St. Lucie Multimodal Plan also recommends roadway speed management as a policy and regulatory strategy. It provides a menu of speed management techniques that include:

- road & lane diets;
- enhanced / raised crosswalks;
- median and pedestrian crossing islands;
- horizontal deflections (chicanes, roundabouts);
- vertical deflections (speed humps, raised intersections); and
- traffic control elements (Rectangular Rapid Flash Beacons (RRFB)).

To increase adaptation to micro-mobility modes, most of these strategies are also effective for context-sensitive adoption County-wide; however, for the purposes of improving infrastructure for bicycles and especially small-wheeled scooters, the following considerations are important to adopt as design policies:

- Road and lane width diets on residential streets for mixed traffic should be considered for lower peak-hour volume streets first to provide lower probabilities of automobile and bicycle or scooter passing instances.
- Require minimum lane width and/or pavement width, albeit reduced, that provides a minimum of 4-feet of separation between a car or truck and a bicycle or scooter in a passing situation.
- Where vertical deflections are warranted, provide a gap to each side of the speed bump, speed hump, or speed table to allow for unperturbed passage by bicycles and especially scooters.
- Municipalities can regulate on their own jurisdictional streets such that they are not in conflict with State regulations that are generally pre-emptive.
- Reduce speeds on certain collector roads that are probable for micro-mobility use.
- Promote micro-mobility by increasing safety for all users.
- TPO to monitor the results of Port St. Lucie's speed reduction on local streets and promote implementation County-wide.

Land Use Regulation Considerations: Although considering land development controls at this period is not generally recommended, some specific building requirements for safe and secure storage for bikes, scooters or low-speed electric vehicles (LSEV) are useful. These are included in the specific considerations for each study area and include:

- Determine zoning categories, development thresholds and criteria to require provision of on-site bicycle racks and scooter racks for personal equipment security. Scooter racks would be intended for use by individuals with privately-owned scooters. Shared scooter providers will have their own docking areas.
- Determine zoning categories, development thresholds and criteria to require provision of plug-in LSEV / NEV space requirements for on-site parking in new and existing major commercial developments. The spaces should include charging equipment specific to use by NEV and LSEV.