North Florida TPO
Bicycle and Pedestrian Plan
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Prepared for:

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PLAN • FUND • MOBILIZE

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I. INTRODUCTION

This Bicycle and Pedestrian Plan serves as a guide to plan improved bicycle and pedestrian accommodation throughout the North Florida Transportation Planning Organization (TPO) region. While certain projects and programs within the region have led to a degree of progress in recent years, portions of the region continue to rank very poorly at a national level in terms of bicycle and pedestrian safety and accommodation. This Plan and its recommendations are designed to improve the region’s poor standing and to make it a better place for citizens to walk and ride.

The Plan, while produced as a stand-alone document, coincides with the North Florida TPO’s 2040 Long Range Transportation Plan update. It builds on the recommendations of the TPO’s 2006 Greenways & Trails Master Plan, which identified and prioritized nearly 300 on-road and off-road corridors that would benefit from new bicycle and/or pedestrian facilities. This Bicycle and Pedestrian Plan is comprised of several distinct topics related to non-motorized transportation in the region. Its development is based on a series of goals and objectives which were defined early in the planning process and extensive public input. In addition to outlining the goals and objectives and describing the public feedback related to bicycling and walking in the region, this Plan includes the following elements:

- Goals and objectives for the region;
- A summary of public involvement and input;
- A summary of related planning initiatives;
- A projected non-motorized demand analysis;
- Recommendations for detailed future study at both the subarea and corridor level;
- A review of jurisdictions’ land development codes and recommendations related to bicycle parking and end-of-trip facilities; and
- Guidelines for the installation of mid-block crossings in the region.
II. GOALS & OBJECTIVES

Goals and objectives are an integral part of any transportation plan because they provide direction, or focus, to the community’s vision. The Plan’s goals and objectives are a direct result of Steering Committee and community input. The goals, long-term ends toward which activities are directed, are broadly intended to improve bicycling and walking accommodation in the region and thereby promote increased non-motorized travel activity. Such increased activity can in turn provide both individuals and the community with many benefits related to quality of life, household economy, congestion mitigation and air quality. Public health benefits are particularly important given the Centers for Disease Control and Prevention’s finding that 30 minutes of moderate exercise, five days a week, can significantly reduce risks for many illnesses including heart disease, high blood pressure, arthritis, depression and obesity. Bicycling and walking can provide this recommended physical activity, and improved bicycling and walking conditions in the Region can make such activity more likely while also providing valuable transportation benefits.

Goal 1: Provide an extensive, connected and convenient on-road network of bicycle and pedestrian facilities throughout the North Florida TPO region.

Objective 1.1: By 2015, all agencies responsible for constructing and maintaining roadways within the region should review and potentially revise their roadway design standards to ensure that new and retrofitted roadways will provide accommodating bicycling and walking conditions.

Objective 1.2: Create a unified inventory and associated map of bicycle and pedestrian facilities within the region by 2015.

Objective 1.3: Conduct at least one detailed “priority zone” subarea study identified in this Plan per year to identify bicycle and pedestrian needs in those locations, funding permitting.

Objective 1.4: Conduct at least two regional connection studies for “holes” outlined in this Plan per year to identify appropriate bicycle and pedestrian facility improvements along those corridors, funding permitting.
Objective 1.5: Design of all new and modified limited access facilities should be done with the utmost care to maintain non-motorized transportation connectivity throughout the region.

Objective 1.6: Improve on-road bicycle and pedestrian access to the region’s key bridge connections.

Objective 1.7: Provide explicit support for any statewide initiatives to support bicycling on certain limited access facilities.

Objective 1.8: Consider connectivity to the region’s greenways and trails network whenever evaluating and prioritizing candidate on-road bicycle and pedestrian facilities.

Objective 1.9: Address regional non-motorized transportation needs early in the design phase of roadway projects.

Goal 2: Expand the region’s greenways and trails system to create a connected network of greenways and trails within the North Florida TPO region.

Objective 2.1: Double the mileage of existing greenways and trails by 2040, including trail head facilities as appropriate.

Objective 2.2: Acquire 50 miles of potential greenway corridor lands owned by TPO jurisdictions by 2040.

Objective 2.3: Acquire 100 miles of potential greenway corridor quasi-public lands, including power-line corridors and other easements.

Objective 2.4: Provide at least ten new trail-to-trail connections (intersections or extensions) by 2040.

Objective 2.5: Provide greenway/trail access to at least 25 percent of identified parkland by 2040.

Objective 2.6: Ensure that each greenway/trail has at least one connection with the on-road bicycle and pedestrian facility network and that proper design is used for these connections.

Goal 3: Improve the safety of bicyclists and pedestrians in the North Florida TPO region.
**Objective 3.1:** Continue to analyze crash data for the region yearly to identify trends in crash occurrence (locations and types).

**Objective 3.2:** At a corridor and subarea level (including all subarea studies conducted in conjunction with Objective 1.4), continue to review crash trends to identify and implement appropriate awareness, enforcement and engineering crash countermeasures.

**Objective 3.3:** By 2015, funding permitting, conduct a feasibility study for an annual regional bicycle and pedestrian count program. Such a program would enable the TPO to analyze bicycle and pedestrian crash rates in addition to the total number of crashes.

**Objective 3.4:** Once crash rates have been established, reduce bicycle and pedestrian crash rates by a statistically significant degree by 2040, based on the projected trend of crash rates.

**Goal 4: Improve multi-modal transportation efficiency in the North Florida TPO region.**

**Objective 4.1:** Increase, through encouragement, the number of local employers that provide incentives, such as bicycle parking, shower/locker facilities, financial incentives, and flexible schedules to employees who commute to work via bicycle or pedestrian travel.

**Objective 4.2:** Use bicycle and pedestrian facilities as part of an overall Congestion Management strategy to maintain or improve motor vehicle levels of service in congested corridors that do not meet adopted LOS standards.

**Objective 4.3:** At a subarea level, continue to develop wayfinding signage and maps to assist the traveling public in completing bicycle and pedestrian trips.

**Objective 4.4:** By 2015, all county/municipal jurisdictions within the region should review and potentially revise their land development and other applicable codes to include recommended bicycle parking provisions.

**Objective 4.5:** Continue to explore opportunities within the region to implement a bike share program.

**Objective 4.6:** Facilitate regular interaction and coordination between TPO staff and the region’s local bicycle and pedestrian advocacy groups.
Objective 4.7: Work with JTA, other public transportation providers, FDOT, and local jurisdictions to ensure that all transit stops have sidewalk access.

Objective 4.8: Work with JTA and other public transportation providers to ensure that all existing and future transit shelters and other high-volume stop locations have bicycle racks and other basic amenities.

III. PUBLIC INVOLVEMENT AND INPUT

Public involvement for this Plan was achieved through two primary channels: an online public survey and several of open house workshops held regionally. The public was also represented through the Plan’s Steering Committee. The following sections describe the public workshops and survey.

Public Workshops

Several public workshops were conducted in February and March 2013 to increase awareness of the Plan and gather feedback. The workshops were held in five geographically dispersed locations: Downtown Jacksonville, Jacksonville Beach, Orange Park, St. Augustine and Yulee. Collectively, more than 100 citizens visited the numerous workshop stations and participated in the following activities:

- viewed the Plan’s goals and objectives;
- provided input on posters outlining varied individual-level and community-level benefits associated with bicycling and walking activity;
- reviewed the draft results of the demand analysis (described later in the Plan);
- completed the public survey; and
- offered TPO staff and the consultant team other comments on their bicycling and walking needs and experiences within the region.
Public Survey

An online survey was designed and conducted to gather information reflecting overall user characteristics such as levels of cycling and walking activities, attitudes and perceptions toward cycling and walking, and insights into existing barriers that may serve to preclude greater participation in such activities. More than 2,000 individuals responded to the survey, an impressive response which likely reveals both a level of concern and enthusiasm surrounding cycling and walking in Northeast Florida.

The following analysis summarizes the results of the survey questions and is organized around general demographic and user characteristics of the respondents, barriers and opportunities. In addition, potential improvement areas are identified based on open ended comments and concerns by participants.

Demographic Profile

Out of the 2,000 survey respondents, approximately 85 percent were between the ages of 30-69 and approximately half of the respondents were between 50 and 69. There is an almost even split among males (56 percent) and females (44 percent). The majority of respondents (62 percent) indicated that their primary residence is in Duval County. This was followed by St. Johns County (23 percent), with the remaining 15 percent of respondents residing in Nassau (5 percent), Clay (8 percent) and other areas (2 percent). Within the region as a whole, the greatest representation of respondents resides in zip codes 32207, located on the east bank of the St Johns River in the San Marco area. Figure 1 shows the coverage of survey responses by zip code for the

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1 Several dozen open house workshop participants also completed “pencil and paper” versions of the survey.
region. On average, most respondents (67 percent) indicated that they have lived in the region over 10 years. Among respondents, the average household consists of approximately 3.6 persons. On average each household has approximately two cars and almost 3.5 bicycles.

**Cycling and Walking Behaviors**

To get a sense of the general cycling experience levels of respondents, the survey grouped potential choices into three categories: “Novice,” indicating that one cannot or is still learning to ride a bicycle; “Basic,” indicating that one prefers not to ride on roads or facilities with busy and fast motor vehicle traffic and; “Advanced,” indicating that one would use a bicycle in the same way that one would drive a motor vehicle. As shown in Figure 2, the majority (55 percent) of the respondents considered their bicycle experience to be at a “Basic” level, while 44 percent of the remaining respondents considered their bicycling abilities to be “Advanced.” Less than 1 percent of all respondents indicated that they do not know how or are still learning to ride a bike.

Most respondents indicated that they do not use their bicycle for commuting to school, work or shopping regularly, while approximately 50 percent ride at least three days per week for leisure or physical exercise (see Figure 3). Most trip purposes, for work, school or shopping, average typically five –nine miles round trip. On the other hand, the respondents indicated that they ride an average of 40 miles at least three days per week for leisure or exercise. Given the overall warm climate in Florida and the enthusiasm around cycling, most respondents (86 percent) indicated that their bicycling activities vary little or somewhat by the season.
The general patterns for reported walking behavior are similar to what they are for bicycling. By far the most common reported walking activity is for leisure or physical exercise, with 89 percent of respondents reporting some walking for this purpose, and 10 percent doing so daily. Walking is less commonly reported than bicycling for utilitarian purposes (work, school, and shopping), with only eight percent of respondents walking to work even occasionally. Walking activity also has little seasonal variation, with over 90 percent responding that walking activity varies by season somewhat or none. Walking activity by trip purpose is shown in Figure 4.
Most respondents choose to ride a bicycle or walk for exercise or personal health reasons. The next set of reasons given were for environmental and convenience factors. However, just as statistics have shown that the Northeast Florida region has a poor record for bicycle and pedestrian safety, most respondents indicated safety as the primary barrier to walking and cycling (see Figure 5 for the bicycling results). Although respondents also agreed with other barriers to cycling, when asked to rank the barriers (81 percent) indicated that safety is the most significant barrier. Other barriers include the lack of “end of the trip” amenities, such as showers and lockers, a safe and weather protected area to park the bike, personal security, travel time and travel flexibility. Travel flexibility in this case is defined by the ability to arrive and depart (typically at workplaces) at various times. In addition to being at a designated workplace during the week, a substantial number of workers must also attend meetings or be at other off-site destinations as part of their job. This scenario would likely require a personal vehicle and/or extensive travel distance which would make it very difficult to rely exclusively on
walking or cycling. While travel flexibility and travel time are perpetual trade-offs for walking and cycling, improvements can be made for safer enjoyable and friendly environment for the pedestrian and cyclist. The respondents were asked which facility types or amenities would be most likely to increase their current level of bicycling and/or walking. The highest rated response was for bicycle boulevards or low-volume, low-speed streets that have been optimized for bicycle travel. Other highly rated amenities include designated bike lanes, shared use paths and signed bicycle routes.

**Figure 5. Barriers to Bicycling Activity**

**Opportunities & Targeted Areas for Improvement**

Respondents were asked several questions in an open-ended format to list areas where enhancements should be made to bicycle and pedestrian facilities. The results were analyzed using GIS mapping software to find the areas within the region with the highest response. First, they were asked to list up to five (5) specific roadway segments and locations that would benefit most from implementing cycling or pedestrian enhancements. The roadways with the highest number of responses (over 100) considering all responses region-wide are as follows:

- Atlantic Blvd from San Marco to Atlantic Beach
- Beach Blvd from Atlantic Blvd to San Pablo Road
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- San Jose Blvd from San Marco to Mandarin
- SR A1A from SR 210 to St Augustine

Each county was also analyzed individually to find specific roadway segments that would benefit from pedestrian and cycling improvements. The highest results for each county are listed below and shown in Figure 6.

Clay:
- US 17 from I-295 to Green Cove Springs and across the Shands Bridge
- SR 21 / Blanding Blvd from I-295 to SR 16
- SR 16 from CR 218 to Green Cove Springs

Duval:
- Atlantic Blvd from San Marco to Atlantic Beach
- Beach Blvd from Atlantic Blvd to San Pablo Road
- San Jose Blvd from San Marco to Mandarin

Nassau:
- SR A1A from Peter’s Point Beach Front Park to Atlantic Avenue
- SR 200/A1A from I-95 to Atlantic Avenue
- US 17 from I-95 to Radio Avenue

St Johns:
- SR A1A from SR 210 to St Augustine
- US 1 throughout the county
- SR A1A from Anastasia Island to Fort Matanzas
Figure 6. Roadway Segment Hot Spots by County
Next, respondents were asked to list up to five specific locations where a spot-specific improvement is needed to improve bicycling and/or walking conditions. These could include intersection improvements, mid-block crossings, and maintenance issues. Although the respondents were asked to specify the needed improvement type, the responses primarily cited intersections and/or roadway segments. The responses were again analyzed geographically to find the highest number of responses for the region as a whole, as well as the highest number of responses for each county. The results are listed below and shown in Figure 7.

Locations with highest number of all responses:
- San Jose Blvd and Beauclerc Road
- Five Points Riverside – Park St and Margaret St
- Downtown Atlantic Beach – Atlantic Blvd and 3rd St

Clay:
- Fleming Island – US 17 and CR 220 / Bald Eagle Road
- Orange Park – US 17 and Kingsley Ave
- Orange Park – US 17 and Wells Road

Duval:
- San Jose Blvd and Beauclerc Road
- Five Points Riverside – Park St and Margaret St
- Downtown Atlantic Beach – Atlantic Blvd and 3rd St

Nassau:
- Fernandina Beach – SR 200 / S 8th St and Sadler Road
- Buccaneer Trail Bridge – SR 200 over Kingsley Creek
- Fernandina Municipal Airport – Amelia Island Pkwy and Amelia Road

St Johns:
- US 1 and SR 312
- Downtown St. Augustine – SR A1A and King St / Bridge of Lions
- West St. Augustine – US 1 and King St
Figure 7. Spot Specific Improvement Hot Spots by County
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The final open ended question asked the respondents to list up to five key destinations within the region that would benefit from improved bicycle and/or pedestrian access. The destinations could include schools, parks, shopping areas, transit stations, etc. The highest number of responses are listed below and shown in Figure 8.

Destinations with the highest number of all responses:

- Five Points in Riverside, Jacksonville
- The Shops of Avondale, Jacksonville
- The Jacksonville Landing, downtown Jacksonville

Clay:

- Keystone Heights – Farmers Market and High School
- Orange Park Mall
- Orange Park High School

Duval:

- Five Points in Riverside, Jacksonville
- The Shops of Avondale, Jacksonville
- The Jacksonville Landing, downtown Jacksonville

Nassau:

- Fernandina Middle School and High School
- Shopping Center on SR 200 and Chester Road
- Shopping Center on Sadler Road

St Johns:

- Downtown / Historic St. Augustine
- Mickler’s Landing
- San Marco Avenue and Castillo Drive
Figure 8. Destination Hot Spots by County
IV. RELATED PLANNING INITIATIVES

Developing this regional Bicycle and Pedestrian Master Plan incorporates and builds from many related planning and mapping initiatives undertaken by the TPO and its implementing jurisdictions in recent years. Collectively, these documents provide a solid foundation for this Master Plan and for non-motorized transportation planning as a whole. The TPO should use the guidance and requirements in these sources as a reference and leverage in promoting bicycling and walking accommodation. Many relevant plans and maps are highlighted below.

- North Florida TPO (formerly known as First Coast MPO) Regional Greenways & Trails Plan, 2006 – This plan identifies nearly 300 greenway corridors for bicycle, pedestrian, and/or equestrian activity. The corridors are prioritized using numerous criteria, and the highest priority corridors are the subject of detailed corridor needs evaluations.

- Bicycle Plan for St. Augustine (sponsored by the North Florida TPO), 2011 - This Bicycle Plan for the City of St. Augustine recommends a series of steps to improve the viability and practicality of bicycling in St. Augustine. These steps include developing a network of bicycle routes, improving bicycle parking, and developing countermeasures to observed bicycle safety issues in the City.

- North Florida TPO Regional Strategic Safety Plan, 2012\(^2\) – As part of a broad transportation safety analysis, this plan identifies priority locations (corridors and intersections) that were determined to be the most significant safety concern for safety for “vulnerable road users” (including bicyclists and pedestrians).

- City of Jacksonville 2030 Mobility Plan, 2011 – The Mobility Plan develops a mobility fee system to be applied to new development and creates land use and transportation strategies to implement this mobility fee system. The City’s related 2030 Multimodal Transportation Study includes existing conditions analyses for the bicycle and pedestrian modes, associated facility inventories, and future needs. In 2013, City Council passed an ordinance related to fee

\(^2\) Given the timeliness of the Strategic Safety Plan, this Bicycle and Pedestrian Plan does not contain a separate, region-level safety/crash analysis component. Future subarea-level studies, as identified in a later section of this plan, are anticipated to include detailed safety components.
waivers that may impact the funding of identified bicycle and pedestrian projects.

- City of Jacksonville 2030 Comprehensive Plan (Transportation Element), 2011 – The City’s Comprehensive Plan implements the Mobility Plan. A key plan goal is to establish multi-modal level of service evaluation as a key measure of mobility. Another of the Comprehensive Plan’s objectives is to reduce Vehicle Miles Traveled (VMT); several bicycle-and pedestrian-friendly policies related to facility provision, connectivity and data collection are established to help achieve this objective.

- Downtown Jacksonville Master Plan (Transportation Element), 1999 – The Transportation Element of this plan includes detailed pedestrian circulation observations for the downtown area and recommends design standards to improve pedestrian conditions within the study area.

- St. Johns County 2025 Comprehensive Plan, 2010 – The Transportation Element of the Comprehensive Plan contains an objective on the subject of Bicycle and Pedestrian Facilities, with language related to design standards, land development requirements, bicycle safety and route mapping, and inter-agency coordination. The Comprehensive Plan also includes components on the topics of trails, bicycle and pedestrian access to schools and public transit, and bicycle and pedestrian facility provision in designated land use areas.

- Clay County 2025 Comprehensive Plan, 2009 – The Transportation Element of the Comprehensive Plan establishes the bicycle and pedestrian facilities maps, supports an interconnected non-motorized transportation system, specifies bicycle lane requirements, and promotes non-motorized access to destinations. Two of the Comprehensive Plan Exhibits are master plans for the Branan Field and Lake Asbury sectors, each of which contains numerous policies about shared use paths and promoting bicycle and pedestrian travel.

- Nassau County 2025 Comprehensive Plan (Transportation Element), 2012 – The Transportation Element of the Comprehensive Plan includes an objective to encourage and promote the safe integration and use of bicycle and pedestrian travel. This objective is supported by policies that specify
coordination with the North Florida TPO and require the provision of bicycle and pedestrian facilities, including development-based construction of the Amelia Island Trail.

- Jacksonville Transportation Authority On-Board Origin-Destination Survey, 2012 – This JTA study has statistics on survey respondents’ mode of access to transit, including bicycling and walking. The survey maps illustrate key transit-based origins and destinations in the region; improved bicycling and walking accommodation and access in such locations have significant potential to improve multi-modal efficiency in the region.

- Bicycle, Pedestrian, and Trail Facility Maps, various – Many of the TPO’s implementing jurisdictional partners, including all four counties and the City of Atlantic Beach, have developed and maintain maps showing the locations of various bicycle and pedestrian facility types. The TPO has used these and other sources to create a Regional Bicycle Facilities Map. Other non-governmental organizations, such as the East Coast Greenway Alliance and the Friends of Amelia Trails, also maintain maps of proposed facilities.

V. DEMAND ANALYSIS

In addition to the extensive input received from the public regarding facility needs in the Region, an objective measure is needed to examine the “demand” of bicycle and walking facilities and thereby evaluate the relative amount of potential bicycle and pedestrian travel along a roadway corridor. Such a measure estimates the relative amount of bicycle and pedestrian activity that would occur along a corridor if facilities were constructed and conditions were excellent. While the results of the public survey are representative of a largely self-selecting group of individuals that may not be fully representative of the region’s general population, a demand analysis such as the one described herein provides an objective indicator of where people are most likely to walk and ride.

The process to identify and quantify potential bicycle and pedestrian trip activity is known as a travel demand analysis. To perform a travel demand analysis for the
bicycle and pedestrian modes, a methodology must be employed that recognizes the unique impediments to that mode. Unlike automobile travel, bicycle and pedestrian travel often does not occur because of impediments, one that is the frequently poor accommodation of bicyclists and pedestrians within the existing transportation network. Consequently, existing bicycle and pedestrian counts generally do not indicate the level of potential bicycle trip activity within a roadway network. Therefore, alternative or surrogate measures of assessing bicycle and pedestrian trip activity are needed.

The specific demand analysis technique for this plan is a variation on the widely used Latent Demand Score method. The concept of latent demand analysis is to evaluate demand based on the proximity of the Region’s arterial and collector roadways to key trip attractors and generators. For this study, the potential for trip activity was evaluated based on the characteristics within the surrounding area (at the Traffic Analysis Zone, or TAZ, geographic level) of each segment for three trip attraction/generation variables: projected future population, projected future employment, and projected future school enrollment. The specific methodology steps, carried out using GIS software for each study network segment are listed below:

- create a 0.75-mile buffer around the segment to represent the bicycle and pedestrian travel shed (the propensity of non-motorized trips typically begins to decline dramatically as distances increase beyond this distance);
- intersect the segment travel shed buffer with the TAZs from the TPO’s 2035 Long Range Transportation Plan;
- calculate the proportion of the travel shed buffer that intersects the various TAZs;
- multiply the intersect area proportions for each TAZ by the projected population, employment, and school enrollment for those TAZs (this effectively calculates the TAZ data for the portion of the TAZ that coincides with the travel shed); and

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3 Demand for other (mostly local) streets can be interpolated from the results for nearby arterials and collectors.
4 For the purpose of this analysis these characteristics are assumed to be uniform within TAZs.
sum the data for each TAZ that intersects any portion of the travel shed buffer to estimate the total population, employment and school enrollment for the segment.

Those segments with the highest level of projected population, employment, and school enrollment within 0.75 miles represent those with the highest relative latent demand for bicycle and pedestrian activity. The results, which are shown in Figure 9, are used in combination with the needs identification component of the public workshops and online survey to identify regional needs and recommended subareas for future detailed study, as discussed in the following section.
Figure 9. Demand Analysis Map
VI. RECOMMENDATIONS FOR FUTURE DETAILED STUDY

Several municipalities and other entities within the TPO’s planning area have undertaken initiatives to identify subarea-level bicycle and/or pedestrian needs and potential routes. These include the City of Jacksonville (Mobility Plan facility inventory and needs assessment), Amelia Island, downtown Jacksonville, and St. Augustine. Other trail corridors, such as the East Coast Greenway⁵ and the St. Johns River-to-Sea Loop, have also been identified. These two corridors have been identified by the Florida Greenways and Trails Foundation (FGTF), which has embarked on a “Close the Gaps” initiative in the region. The TPO’s 2006 Greenways & Trails Master Plan identified an extensive network of desired routes at a regional level, with corridor plans developed for some of the highest priority routes. Figure 10 represents a regional proposed facilities map that encompasses the recommendations from many of these various sources. While the individual facility types and the level of analysis detail vary significantly among the corridors shown on this map, the map nonetheless shows the breadth of the bicycle and pedestrian needs identification that has occurred in the region in different years and the relative absence of gaps in the proposed network.

⁵ Note that the St. Johns River Ferry has been identified as a vital connection for users of the East Coast Greenways system. 70 miles round trip are added to the east coast route without this connection.
Figure 10. Regional Proposed Facilities Map
Priority Zones

As described previously, the public survey and the plan’s public workshop included opportunities for respondents and participants to identify key destinations for bicycle and pedestrian travel. The results of the associated heat mapping (see Appendix), combined with the latent demand analysis and a review of data from the TPO’s Regional Strategic Safety Plan, indicate subareas within the TPO planning area that would most warrant more detailed subarea studies. Such subarea studies would provide a level of analysis not feasible in the context of a regional-level planning initiative: crash review and analysis, bicycle route identification, bicycle parking studies, detailed review of local ordinances, intersection and mid-block crossing needs, “family friendly route” opportunities, etc. The identified zones, shown in Figure 9, have been grouped into priority tiers based on the degree of public-identified need and projected latent demand. The TPO intends to implement these subarea studies as funding allows, with a goal to complete at least one study annually. Specific subarea study elements are expected to vary significantly because of the disparate characteristics of the priority zones.

Priority 1 Subareas

- Downtown Jacksonville, including Springfield and Riverside/Avondale (some related planning initiatives are underway)
- Orange Park
- Fernandina Beach & Amelia Island (some related planning initiatives are underway)

Priority 2 Subareas

- Duval Beaches (Atlantic Beach, Neptune Beach, & Jacksonville Beach)
- University of North Florida/St. Johns Town Center
- Ponte Vedra Beach
- Yulee

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A TPO-initiated detailed subarea plan was completed for the City of St. Augustine, another high priority zone, in 2011.
Priority 3 Subareas

- Middleburg
- Naval Station Mayport
- Naval Air Station Jacksonville

Regional Route Needs

The demand analysis and public-identified segment needs also present key opportunities to enhance regional bicycle and pedestrian accommodation through improved regional-level travel corridors. The recommended subarea studies identified above focus on needs within a certain area; performing regional corridor studies can complement the subarea analyses by improving key connections that enable longer non-motorized trips to be made, both recreational and utilitarian. The TPO intends to implement these regional route corridor studies as funding allows, with a goal to complete at least two such studies annually. The identified key regional routes are shown in Figure 11 and listed below. The majority of these regional routes are high-speed, high-volume roads that provide relatively poor bicycling and walking conditions (i.e., level of service), and many of them were identified as high priority corridors in the TPO’s Regional Strategic Safety Plan. The purpose of the recommended studies would be to determine the feasibility of new facilities to better accommodate all modes.

Clay County

- SR 21
- U.S. 17
- SR 16

Duval County

- Butler Boulevard
- Beach Boulevard
- Atlantic Boulevard

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7 Primarily bicycle accommodation because of the inherent longer trip lengths associated with regional-level travel.
• Southside Boulevard
• SR A1A
• U.S. 1 (north and south of downtown Jacksonville)
• SR 13
• U.S. 17 (north and south of downtown Jacksonville)

Nassau County
• SR A1A/SR 200
• U.S. 17
• U.S. 1
• SR 115

St. Johns County
• SR A1A
• U.S. 1 (with a planned emphasis on the intersection with Race Track Road)\(^8\)
• SR 13
• SR 16
• CR 210/Race Track Road

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\(^8\) This location has been specifically cited by cyclists and elected officials as a significant conflict point for bicyclists.
Figure 11. Recommended Priority Subarea and Regional Route Study Locations
VII. LAND DEVELOPMENT CODE OBSERVATIONS AND RECOMMENDATIONS

Private site developments have significant impacts on the transportation system. They change traffic flows, providing origins and destinations of North Florida residents. When site modifications are planned, developers must comply with local land development codes. These codes create site requirements and roadway standards that must be adhered to by developers. Consequently, these codes provide an excellent opportunity to enhance new or substantially altered developments and the surrounding roadways for bicycle and pedestrian travel.

For this Plan, the land development codes for the following jurisdictions were reviewed:

- Clay County
- City of Fernandina Beach
- City of Jacksonville
- City of Jacksonville Beach
- St. Johns County

Bicycle parking was not consistently addressed across the Region. A composite recommended bike parking requirement was prepared based upon those jurisdictions that had bike parking requirements. This recommended text is provided at the end of this section.

Clay County

Article VIII - Design and Improvement Standards
Sec. 8-5. Circulation Design
(3) Interconnectivity of Developments
Recommendation – Consider adding maximum distance between pedestrian and bicycle thorough connections.
(4) Access to All Developments
Recommendation – Consider adding a requirement that where the county or state of Florida paved route has sidewalks, the provided connection includes a pedestrian access route.

Sec. 8-10. Access Management
(4) Driveway Design
(b) Approaches

Recommendation – Required clear sight triangles should include requirements to meet sight triangles for bicycles where shared use paths are located within the roadway right-of-way. This section states, “Clear sight triangles must conform with the requirements in Article 1.” The only reference to a sight triangle in Article 1 is a definition, “Sight Triangle - A triangular-shaped portion of land established at street intersections in which nothing is erected, placed, planted or allowed to grow in such a manner as to limit or obstruct the sight distance of motorists entering or leaving the intersection.”

(d) Width, Flare or Radius

Recommendation – Consider revising first sentence to read, “Driveway width, flare and radius shall be adequate to serve the appropriate design vehicle to entering and exiting the roadway, but shall not be so excessive as to pose safety hazards for pedestrians, bicycles, or other vehicles.”

(d) 3. All return radii shall be a minimum of thirty-five feet and shall not exceed seventy-five feet for all roadway types.

Recommendation – Consider revising this section to be sensitive to the context of the driveway. AASHTO allows for smaller radii depending upon the design vehicle and the traffic control on conflicting movements.

(d) 4. All divisional driveway islands shall be a minimum of four feet in width.

Recommendation – Revise to require six feet. Six feet is the minimum width of a separator island that can be considered a pedestrian refuge island (Association of State Highway and Transportation Officials (AASHTO) and Draft Americans with Disabilities ADA Public Rights-of-Way Accessibility Guidelines (PROWAG)).

Sec. 8-12. Parking Requirements

Recommendation – Some requirement for bicycle parking should be included. See general parking recommendations at the end of this LDC review.
Sec. 8-14. Non-motorized Access Paths
Recommendation – pedestrian/bicycle paths should be referred to as shared use paths.

(2) Sidewalks
(c) Size
Recommendation – Increase absolute minimum allowable width to 48 inches.
AASHTO’s A Policy on the Geometric Design of Highways and Streets (Green Book) provides for a minimum 48 inch sidewalk. The notice of proposed rulemaking for PROWAG requires a minimum 48 inch pedestrian access route.

(3) Pedestrian/Bicycle Paths
Recommendation - A pathway intended for use by bicycles should be designed as a shared use path per and comply with the Florida Greenbook (FGB).

(b) Location
Recommendation – Change “In no instance will a pedestrian/bicycle path be any closer than two and one-half feet from the back of a curb and five feet from the nearest edge of a rural section of roadway” to require a separation of five feet to the face of curb or five feet from the edge of pavement where there is no curb (AASHTO Guide for the Development of Bicycle Facilities, 2012 [Bike Guide]).

(c) Size
Recommendation – Increase the minimum width to 10 feet, potentially allowing for eight feet in constrained situations (FGB, Bike Guide).

CITY OF FERNANDINA BEACH
7.01.00 Transportation and Parking Facilities
Recommendations – Update the parking requirements to include additional design requirements as described in the GENERAL PARKING REQUIREMENTS RECOMMENDATIONS section.

7.01.03 Sidewalks and Bicycle Facilities
Recommendation – Bike paths should be referred to as shared use paths and designed accordingly.
Recommendation – Change section D to require compliance with the Florida Greenbook.
Recommendation – In Section D.2, expand the minimum width of a combined sidewalk and bike path to 10 feet, potentially allowing for 8 feet in constrained situations (FGB, Bike Guide).

Recommendation – Include a requirement for bike facilities (bike lanes) along arterial and possibly collector roadways.

7.01.08 Visibility at Intersections

Recommendation – Required clear sight triangles should include requirements to meet sight triangles for bicycles where shared use paths are located within the roadway right-of-way.

CITY OF JACKSONVILLE

Land Development Procedures Manual

1.3.1 Pre-Application Preliminary Site Plan

Recommendation – In point 4 of the data summary include “number of bicycle parking spaces per Section 656.608.” “Areas for securing bicycles” is currently included in number 13 along with compactors and dumpsters. Moving the requirement for bike parking information and providing the citation makes the requirement parallel with motor vehicular parking.

2.2.1 Single Family Residential Sidewalk Options

Recommendation – Note number 4 reads

Sidewalks may not be required within proposed subdivision right-of-way that directly abuts preserved wetlands and retention ponds unless a pedestrian connection is deemed necessary and if pedestrian movements are accommodated on the other side of the street.

First, the phrase “may be required” is used in other locations (section 2.2.2, paragraphs 4 and 5) to apparently suggest that you have the power to require an action under a certain set of conditions. Thus it seems that “may not be required” suggests that you do not have the power to require sidewalks. The “may not be required” phrase is used in numerous places.
Second, if "may not be required" means "might not be required" in the above context, it appears this note actually means a sidewalk might not be required within a right-of-way (which includes both sides of the roadway) if it

a- Abuts a wetland
b- Is deemed necessary, and
c- If pedestrians are accommodated already on the opposite side of the street.

If this is intended to mean that if you put it on one side of the street you put it on both, then this makes sense. But consider modifying to read as follows:

The requirement for sidewalks on both sides of a roadway may be waived if the right-of-way abuts a wetland. However, if sidewalks are deemed necessary pedestrians shall be accommodated on at least one side of the street.

2.2.2 Off-Site Residential Sidewalk Requirements
Recommendation – In item 1, add “unless required to serve transit stops.”

2.2.4 Pedestrian Crossings
Recommendation – Change “handicap ramps” to “ADA compliant curb ramps or blended transitions.” Blended transitions are locations where sidewalks enter roadways without ramps. These usually occur on roads without curb and gutter.

3.2.5.2 Minimum Right-of-Way and Paving Widths
Recommendation – Require adequate pavement to include bike lanes on collector roads. It appears that the note beneath the table only provides room for wide curb lanes.

3.2.5.3 Return Radii Requirements
Recommendation – Consider revising this section to be sensitive to the context of the driveway. AASHTO allows for smaller radii depending upon the design vehicle and the traffic control on conflicting movements.

3.5.4 Concrete Curb, Gutter, Wheelchair Ramps, and Sidewalks
Recommendation – Include reference to “blended transitions.”
CITY OF JACKSONVILLE BEACH

Article VI. Development Review Procedures

Division 5. Development Plan Review

34-256 Contents of Application

(12) Development Plan

Recommendation – Include a requirement to show accessible pedestrian facilities between buildings and to the roadway sidewalks.

Recommendation – Include a requirement to show location of bike parking.

Division 7. Building Permit and Certificate of Occupancy

34-301. Building Permit

Recommendation – Include a requirement to show location and number of bike parking spaces.

Article VIII. Site Development Standards

Division 1. Parking and Loading Standards

Recommendation – Some requirement for bicycle parking should be included. See general parking requirements recommendations at the end of this LDC review.

Article IX. Subdivision Standards

Division 2. Procedures

Sec. 34-505. Final plat

(l) design standards

c. Sidewalks

Recommendation – Require sidewalks on both sides of all arterial and collector streets.

Recommendation – The maximum cross slope must be not more than 2 percent. One-quarter inch per foot is slightly more and thus does not comply with the Americans with Disabilities Act requirements. Consider stating that sidewalks must comply with appropriate state and federal accessibility guidelines.

i. Streets

Recommendation – Require bike lanes on arterial and collector streets.
ST. JOHNS COUNTY

Article VI Design Standards and Improvement Requirements

Part 6.02.00 Subdivision Design Standards and Guidelines

6.02.05 Roadway Layout

Recommendation – Restate and expand from section 6.02.1, D., 1. that direct access shall be provided for non-motorized traffic where feasible to include an efficient system of internal circulation and roadway stub-outs to connect into adjacent cul-de-sacs [added], and developments to link neighborhoods together.

Part 6.04.00 Roadways, Drainage & Utilities Standards

6.04.07 Roadway Design

H. Sidewalks

Recommendation – In paragraph 4., change “handicapped ramps” to “curb ramps” and add a requirement for transitions “blended transitions” where there is no curb and gutter.

N. Bridges and Box Culverts

4. Bridges and Box Culverts – Vehicular

e. Pedestrian accommodation of vehicular bridges -

Recommendation – Recommend requiring sidewalks on all bridges unless justification for not providing sidewalks is provided. Justification should include consideration of potential land uses on the approaches to the bridge for the life of the bridge (stated in Sec. 3 as 75 years) and any adopted St. Johns County pedestrian or pathways plan.

GENERAL PARKING REQUIREMENTS RECOMMENDATIONS

The City of Fernandina Beach, City of Jacksonville, and St. Johns County development codes all require bicycle parking. All jurisdictions should adopt some requirement for bicycle parking. Such a requirement, as adapted from the City of Fernandina Beach, the City of Jacksonville, and St. Johns codes, is provided below. The City of Jacksonville has seven tables for determining how many bicycle parking spaces should be provided; Fernandina Beach’s more limited table is provided in the below example.
Model Bicycle Parking Ordinance

Bicycle parking shall be provided at multi-family developments on two (2) or more acres, parks and recreation facilities, and commercial establishments according to the following standards:

1. All bicycle parking facilities shall be located on the same building site as the use for which such facilities serve and as close to the building entrance as possible without interfering with the pedestrian or motor vehicle traffic flow. Bicycle parking areas shall be separated from auto parking areas by a physical barrier which shall be at a minimum a two (2) foot high wall, fence or berm; a ten (10) foot wide buffer; or a six (6) inch curb with four foot buffer to protect parked bicycles from damage by cars.

2. All bicycle parking facilities shall be clearly identified as bicycle parking. Where bicycle parking areas are not clearly visible to approaching cyclists, signs shall clearly indicate the location of the facilities. When possible, this facility should protect the bike from inclement weather including wind-driven rain. Bike parking shall be consistent with the surroundings in color and design and be incorporated whenever possible into buildings or street furniture design.

3. The number of bicycle spaces required is as follows:

<table>
<thead>
<tr>
<th>Type of Use</th>
<th>Minimum Number of Bicycle Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parks and recreation facilities</td>
<td>1 space per 10 required vehicle parking spaces</td>
</tr>
<tr>
<td>Commercial uses</td>
<td>1 space per 25 required vehicle parking spaces</td>
</tr>
<tr>
<td>Multi-family development</td>
<td>1 space per 20 required vehicle parking spaces</td>
</tr>
</tbody>
</table>

4. Bicycle parking spaces may be provided as either bicycle racks or other storage facilities, provided that the following standards are met:

   a. Facilities shall be designed to allow each bicycle to be secured against theft;
   b. Facilities shall support the bike in a stable position without damage to wheels, frames or components;
   c. Facilities shall be installed to resist removal;
   d. Facilities shall be installed to resist damage by rust, corrosion or vandalism;
e. Facilities shall accommodate a range of bicycle shapes and sizes and allow easy locking without interfering with adjacent bicycles;
f. Facilities shall be located in convenient, highly-visible, active, well-lighted areas;
g. Facilities shall include an aisle or space for bicycles to enter and leave parking racks. This aisle shall have a width of at least four (4) feet to the front or rear of a standard six (6) foot bicycle parked in the facility;
h. Facilities shall provide safe access from the parking spaces to the right-of-way or bicycle lane;
i. Facilities shall be located not to interfere with pedestrian or vehicular movement;
j. Bicycle parking spaces shall have a minimum width of two (2) feet and minimum length of six (6) feet, and
k. The Administrator shall be authorized to modify these standards where the facilities will be used predominately by bicycles having different space needs such as adult tricycles, or when another design (such as the provision of bike lockers) could serve the needs to an equal or greater degree.

VIII. MID-BLOCK CROSSING GUIDELINES

One key pedestrian-related issue being faced by many of the region’s jurisdictions is creating safe and effective mid-block crossings of arterial and collector roadways. Based on roadways’ geometric and traffic characteristics, this report outlines a protocol for determining the need for certain types of crossings and for identifying appropriate combinations of treatments. Midblock crossings, as referred to in this section, include crossings of uncontrolled approaches of intersections along major roadways.

Background

The citizens of the North Florida TPO region have access to a growing network of pedestrian facilities. These facilities provide both recreational and transportation opportunities for the North Florida TPO area’s workers, students and families. While many of these facilities cross roadways at intersections, it may be desirable to provide
midblock crossings at some locations. These crossings, if not safe and convenient, create significant barriers to the usefulness of the pedestrian transportation network.

Where pedestrian facilities cross roadways at grade at a midblock location, a designated crossing may be appropriate. (At midblock locations, a crosswalk must be striped if it is to be a legal crosswalk - Section 316.130 (10), Florida Statutes.) Appropriate traffic control devices for the pedestrians and the traffic on the arterial are critical if the safety and mobility of all users is to be maintained. However, simply marking a crosswalk will not ensure a safe crossing, especially of multilane roadways.9 While no traffic control can prevent crashes if drivers and pedestrians are not paying attention, a consistent approach to signing, marking, signalizing and grade separating these crossing locations is important to ensure the expectations, and hence the safety, of drivers, pedestrians and bicyclists.

**Midblock Pedestrian Crossing Decision Guidelines**

The crossing guidelines answer four basic questions:

1. Should a grade-separated crossing be provided?
2. Is a traffic signal warranted?
3. Is a designated midblock pedestrian crossing appropriate?
4. What specific measures should be installed?

The crossing guidelines are discussed in the following sections.

**Grade-Separated Crossings**

In some instances overpasses and underpasses create vital connections in the pedestrian network. Most commonly, they allow pedestrians to cross over or under freeways and railroads. However, grade separated crossings can be quite expensive, may pose aesthetic or social problems, and even decrease safety if not properly located.

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and designed. Pedestrians will be less likely to use an overpass or underpass if it is perceived as dangerous or the proposed route is too inconvenient. Requiring changes in elevation, and the associated ramps to meet accessibility requirements, can make grade-separated structures inconvenient to use. Where the roadway is depressed or raised, overpasses and underpasses can be designed to be more convenient.

The following graphic, Figure 12, is adapted from a 1965 study by R.L. Moore and S.J. Older.\textsuperscript{10} It shows the expected usage rate at pedestrian bridges and underpasses ("subway journey" on chart), relative to the time needed to cross at street level. As shown in this chart, about 95 percent of pedestrians will use an underpass if the walking time to use the underpass is the same as crossing at street level (X=1). However, if using the underpass takes 50 percent longer than crossing at street level (X=1.5), almost no one will use the underpass.

\textbf{Figure 12. Grade Separation Usage}

Nonetheless, underpasses and overpasses can be quite beneficial. They tend to be most beneficial under the following circumstances:

- A moderate-to-high pedestrian demand to cross a freeway or expressway.
- Large number of people cross a high speed, high volume roadway

The decision to install a grade-separated crossing will often be subjective – based upon the user types and consideration of the roadway characteristics. However, in the case where a separate underpass or overpass is being considered, a quantitative method can be used to justify a grade-separated crossing. In 1984, FHWA developed warrants for grade-separated crossings. This warrant is not often used, and is provided here for informational purposes. It does not consider crash history as a factor. According to these warrants, a grade-separated crossing is justified if

- Hourly pedestrian volume >300 in four highest continuous hour periods (speed >40 mph) and inside urban area;
- Vehicle volume >10,000 during same period or ADT >35,000 (speed >40 mph) and inside an urban area; and,
- The crossing site is at least 183 m (600 ft.) from nearest alternative safe crossing.

This warrant is graphically illustrated in Figure 13. If this warrant is met, a grade-separated roadway crossing should be considered to accommodate the pedestrians.
Figure 13. Axler Warrant for Grade Separation

Signalized Crossings
The MUTCD provides warrants to install traffic signals. For midblock pedestrian crossings, “Warrant 4 Pedestrian Volume” \(^{11}\) is the warrant most likely to be used.\(^{12}\)

If warrants for a signal can be met at a midblock crossing location, signals should be strongly considered for installation.

Unsignalized Crossings
At most potential midblock crossing locations the pedestrian volumes will not be high enough to satisfy the MUTCD Pedestrian Volume warrant for a traffic signal. There are other midblock crossing locations where the roadway traffic is so low speed, low volume, and the crossings such short distances that no treatments are necessary. At

\(^{11}\) Manual of Uniform Traffic Control Devices, Chapter 4C.05, FHWA, 2009.
\(^{12}\)Any warrants described in the MUTCD can be used for shared use path / roadway intersections. When using the vehicular warrants, however, only bicyclists should be considered as volume on the path. Alternatively, bicyclists can be counted as pedestrians to apply the Pedestrian Volumes warrant.
still other locations, there may be environmental conditions that make the provision of a potential midblock crossing impractical. How to determine if it is appropriate to designate a midblock crossing is the subject of this and the following two sections. Specific traffic control device recommendations will be provided thereafter.

Two primary criteria should be used to determine if providing a designated midblock pedestrian crossing is appropriate at a given location: roadway geometrics and pedestrian volumes.

Roadway Geometrics

Roadway geometrics are an important factor because they dictate if the midblock crossing can be designed safely. Two primary factors need to be considered: sight distance and proximity to intersections.

The sight distances available to motorists and pedestrians must be adequate to allow for a safe crossing. Sight distance provided for motorists should be at least equal to the stopping sight distance for the design speed of the roadway. For these values refer to A Policy on the Geometric Design of Streets and Highways.\(^\text{13}\) While motorists are required to yield the right of way to pedestrians, pedestrians are more comfortable crossing the street when they have adequate sight distance for them to see far enough up the approach roadway to identify an adequate gap in traffic. Required gap lengths for pedestrians to complete street crossings are discussed below. Vehicles can either be assumed as traveling at the roadway’s design speed or a speed study can be performed.

The proximity to intersections is an important consideration because of the complexity of motor vehicle movements on the approach to intersections. Essentially, midblock crossings should not be placed within the functional area of an intersection. The

functional area of an intersection includes both the approaches to and departures from the intersection and the longitudinal limits of the auxiliary lanes (see Figure 14).\textsuperscript{14}

Other geometric conditions, such as available sight distance, blind access points, or limited right-of-way may make providing a midblock crossing impractical. These should also be considered in the evaluation of crossing locations.

\textit{Pedestrian Volumes}

Pedestrian user volumes are the next major determining factor in determining where crossing treatments should be provided for midblock locations. Combined with the distance to the nearest intersection crossing, pedestrian volume can be used to determine an overall geometric pedestrian delay resulting from the additional distance.

the pedestrian is required to walk to use the intersection crossing. The proposed criteria for a midblock pedestrian crossing are as follows:

The total geometric pedestrian user delay at a potential crossing location during an average day is -

- 15 minutes or more for each of any 4 hours; or
- more than 60 minutes during any one hour.

Figure 15 shows the calculated pedestrian-minutes of delay as a function of the volume of pedestrians and the offset distance to the nearest intersection. The delay was based only upon the offset to the intersection and does not include any control delay associated with traffic signals. The assumed walking speed of a pedestrian was assumed to be 4 ft./sec. Consequently the delay associated with the offset to the nearest intersection is calculated as follows:

\[
\text{Geometric Pedestrian Delay} = \text{Number of peds} \times (2 \times \text{offset to the nearest intersection in feet}) \\
4 \text{ ft./sec} \times 60 \text{ sec/minute}
\]

Figure 15. Geometric Delay to Pedestrians
If the delay criteria are met, a crossing could be considered at the midblock location. Slower pedestrian speeds could be used for this calculation if appropriate to represent a particular pedestrian cohort.

**Guidance for Traffic Control Selection at Non-signalized Midblock Crossings**

The majority of locations considered for midblock crossings will not warrant either a grade separated crossing or a traffic signal. This section presents a set of guidelines to determine what type or group of traffic control devices should be implemented at midblock crossings for pedestrians. This report also provides background into how the guidelines were developed. This document is not intended to promote the proliferation of midblock crossings. Rather it recognizes they are sometimes created by the geographic restrictions associated with roadway surrounding conditions. These guidelines provide consistent crossing treatments to increase the safety and convenience of sidewalk users throughout the North Florida TPO region. However, there are potentially many site specific issues, ranging from sight distance restrictions to special user groups, which could make the strict adherence to these guidelines impractical. Thus, herein, these are *guidelines*; they do not supersede any adopted standards and are not a substitute for the application of engineering judgment.

For these guidelines, roadways were stratified into low-, medium-, and high-volume using the values shown in Table 1. For each volume stratification, a table of potential traffic control devices is provided (Tables 2, 3 and 4 at the end of this section). The threshold volume for low- to medium-volume is determined using the amount of time a pedestrian can expect to wait for an adequate gap in traffic to cross the street. The medium-volume to high-volume threshold is based upon a midblock crossing safety study prepared by the University of North Carolina’s Highway Safety Research Center.\(^\text{16}\)

Depending on whether the street being crossed is low, medium or high volume, the

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corresponding value listed in Table 1 would be referenced to determine the recommended traffic control devices for the crossing.

Table 1. Traffic Volume Reference Table for Midblock Crossing Treatments

<table>
<thead>
<tr>
<th>Traffic Volume</th>
<th>Table for Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6,700 vpd</td>
<td>2</td>
</tr>
<tr>
<td>6,700 – 12,000 vpd</td>
<td>3</td>
</tr>
<tr>
<td>&gt;12,000 vpd</td>
<td>4</td>
</tr>
</tbody>
</table>

vpd = vehicles per day

The following general notes should be considered when using Tables 2, 3, and 4.

Each column in the table represents a package of traffic control devices recommended for the specific crossing condition.

Designating “YES” for the median assumes there is potential for installing a raised median at the crossing location and that one will be installed. Raised medians that can be used as pedestrian refuges (six feet wide or wider in the direction of the roadway cross-section) will allow for less restrictive motor vehicle traffic controls to be used in conjunction with the midblock crossings. Wider refuge islands, 10 feet or more, should be considered to accommodate bicycles with trailers and recumbent bicycles.

1. On multi-lane roadways with medians on the approach, crossing signage for motorists should be placed in the medians and on the side of the roadway.

2. Using angled cuts through the median should be considered at all crossings with raised medians for two reasons. First, the offset through the median directs the pedestrians’ attention toward the traffic about to be crossed. Secondly, of particular importance when using these tables for shared use path intersections, by providing an angled cut through the median, longer users (tandems, bicycles with trailers) may be better accommodated than in a narrower median. An example of an angled median cut is shown in Figure 16.
3. When advance yield lines are used on the approach roadways they should be used in conjunction with solid lane lines. The lane lines should extend a distance equal to the stopping sight distance back from the yield lines. This is to enable law enforcement officers to determine when a motorist fails to yield when he could have done so.

4. On six-lane, undivided roadways, strong consideration should be given to providing a signalized roadway crossing for pedestrians. Until such time as this can be achieved, aggressive channelization should be used to divert pedestrians to the nearest safe crossing.

5. This guidance assumes that lighting will be provided for crossings to be used at night.
Table 2. Low-Volume Roadway - Volume less than 650 Vehicles per hour (vph) or 6,700 vehicles per day, vpd

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Median Speed (mph)</th>
<th>4 - lanes</th>
<th>2 - lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 30</td>
<td>35-40</td>
<td>≥ 45</td>
</tr>
<tr>
<td></td>
<td>≥ 45</td>
<td>≥ 45</td>
<td>≥ 45</td>
</tr>
</tbody>
</table>

- Marked Crosswalks
  - Pedestrian Crossing Sign (W1-2) with Arrow (W16-7b)
  - Advance Pedestrian Signs (W1-2)
- Rapid Rectangular Flashing Beacon

1. Assumes a k factor of 0.097
2. The Combined Bicycle/ Pedestrian Crossing warning sign may be used at shared use path crossings of roadways.
3. MUTCD 2B.11. Strong Yellow Green may be used for this sign.
4. Placed 20-50 feet in advance of the crosswalk (Section 3B.16)
Table 3. Medium Volume Roadway - Volume greater than 650 vph (6,700 vpd) and less than 1,150 vph (12,000 vpd)

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Median Speed</th>
<th>6-lanes</th>
<th>4-lanes</th>
<th>2-lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No or Yes</td>
<td>All</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>2.45 40 mph</td>
<td>35-40 mph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2.45 40 mph</td>
<td>35-40 mph</td>
</tr>
</tbody>
</table>

1. Assumes a k factor of 0.007
2. The Crosswalk/Bicycle/Pedestrian Crossing Warning sign may be used at shared use path crossings of roadways.
3. MUTCD 2B.11
4. MUTCD Chapter 4F
5. MUTCD Chapter 4F

- Marked Crosswalks
- Pedestrian Crossing Sign
- Ped Xing Sign (advance)
- Yield Here to Ped Signs (R1.5)
- Advance Yield Lines
- Stop Lines
- Pedestrian Hybrid Beacon

Note: The table indicates the presence (✓) or absence (✗) of each condition based on the given criteria.
<table>
<thead>
<tr>
<th>Lanes</th>
<th>2 - lanes</th>
<th>Yes</th>
<th>4 - lanes</th>
<th>Yes</th>
<th>6 - lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>35-40 mph</td>
<td>≥ 45 mph</td>
<td>≤ 30 mph</td>
<td>35-40 mph</td>
<td>≥ 45 mph</td>
</tr>
<tr>
<td>Median</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Marked Crosswalks</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ped Xing Sign (advance)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Yield Here to Ped Signs (R1-5)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Advance yield Lines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Stop Lines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Rapid Rectangular Flashing Beacon</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pedestrian Hybrid Beacon</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

1 Assumes a K factor of 0.097
2 This COMBINED BICYCLE/PEDESTRIAN CROSSING WARNING sign may be used at shared use path crossings of roadways.
3 Strong Yellow Green may be used for this sign.
4 MUTCD 2B.11
5 MUTCD - Chapter 4.F
APPENDIX – DETAILED SURVEY MAPPING

The purpose of this appendix is to explain the GIS Hot Spot analysis performed for the survey questions regarding geographic areas that would benefit from bicycle and pedestrian facility improvements. The survey contained three questions that were asked in an open-ended format to list 1) roadway segments that would benefit from cycling and pedestrian enhancements, 2) locations where a spot-specific improvement is needed, and 3) key destinations that would benefit from improved bicycle and pedestrian access. The responses to each of the questions that stated specific roadways, intersections, or location names, were placed on a map with a point or a line representing each survey response. The responses were then analyzed using GIS software.

Regional Analysis

The total number of mapped responses were analyzed comprehensively in order to find the locations with the highest rate of response.

County Analysis

The responses were separated by county and each county was analyzed individually to find the county specific locations with the highest rate of response. This analysis was to find hot spots for each county, even though the majority of the survey respondents reside in Duval County.

Analysis Methods

For each survey question, by region and by county, the following analysis methods were performed.

Heat Analysis

The kernel density tool within ArcGIS was used to create a heat map of the responses. This tool creates an image in which pixels receive a higher value based on proximity to a higher number of responses. The image is then symbolized based on the pixel value.
Grid Analysis

A grid network of ¼ mile grid squares was overlaid on the study area and the number of responses intersecting each grid was totaled. Therefore, each grid was given a value of the number of responses within ¼ mile.

Dot Density Analysis

At times, the grid analysis can be hard to visualize the higher values because each grid square is quite small. Therefore, the grid squares were displayed as points with larger points representing higher number of responses per ¼ mile.
List of Maps

Roadway Segments
1. Heat Analysis by Region
2. Grid Analysis by Region
3. Dot Density Analysis by Region
4. Hot Spots by Region
5. Heat Analysis by County
6. Grid Analysis by County
7. Dot Density Analysis by County
8. Hot Spots by County

Spot Specific
1. Heat Analysis by Region
2. Grid Analysis by Region
3. Dot Density Analysis by Region
4. Hot Spots by Region
5. Heat Analysis by County
6. Grid Analysis by County
7. Dot Density Analysis by County
8. Hot Spots by County

Destinations
1. Heat Analysis by Region
2. Grid Analysis by Region
3. Dot Density Analysis by Region
4. Hot Spots by Region
5. Heat Analysis by County
6. Grid Analysis by County
7. Dot Density Analysis by County
8. Hot Spots by County
Roadway Segments Grid Analysis - Regional

Number of Responses within 1/4 mile
- 1 - 16
- 17 - 40
- 41 - 70
- 71 - 102
- 103 - 147
Roadway Segments Grid Analysis - By County

Number of Responses within 1/4 mile

Clay County
- 1 - 7
- 8 - 17
- 18 - 28
- 29 - 41
- 42 - 75

Duval County
- 1 - 16
- 17 - 40
- 41 - 70
- 71 - 102
- 103 - 147

Nassau County
- 1 - 4
- 5 - 14
- 15 - 26
- 27 - 40
- 41 - 58

St. Johns County
- 1 - 9
- 10 - 26
- 27 - 47
- 48 - 83
- 84 - 118
Spot Specific Improvement Grid Analysis - Regional

Number of Responses within 1/4 mile

- 1 - 6
- 7 - 10
- 11 - 15
- 16 - 19
- 20 - 24

0 5 10 Miles
Spot Specific Dot Density Analysis - By County

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Responses within 1/4 mile</th>
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<td>St. Johns County</td>
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