PALM BEACH Transportation Planning Agency

SPEED MANAGEMENT STUDY

Technical Report

Prepared for: Palm Beach TPA
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April 2025 FINAL

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Introduction

In 2018, the Palm Beach Transportation Planning Agency (TPA) adopted a Vision Zero goal to eliminate traffic-related fatalities and serious injuries. High vehicle speeds are often a root cause for fatal and life altering crashes, particularly for those at greater risk on the road such as pedestrians and bicyclists. Reducing speeds, even by a few miles per hour, is proven to save lives and reduce the severity of injuries.

Target Speed is defined as the highest speed at which vehicles should operate on a roadway in a specific context, consistent with the level of multi-modal activity generated by adjacent land uses, to provide both mobility for motor vehicles and a supportive environment for pedestrians, bicyclists, and transit users. **Figure 1** defines Target, Design, Posted, and Operating Speed. Ideally, all these speeds are equal to provide a supportive, safe environment for all roadway users. If the Target Speed is lower than the existing design, posted, and/or operating speed, speed management countermeasures should be considered to design and operate the roadway at the Target Speed.

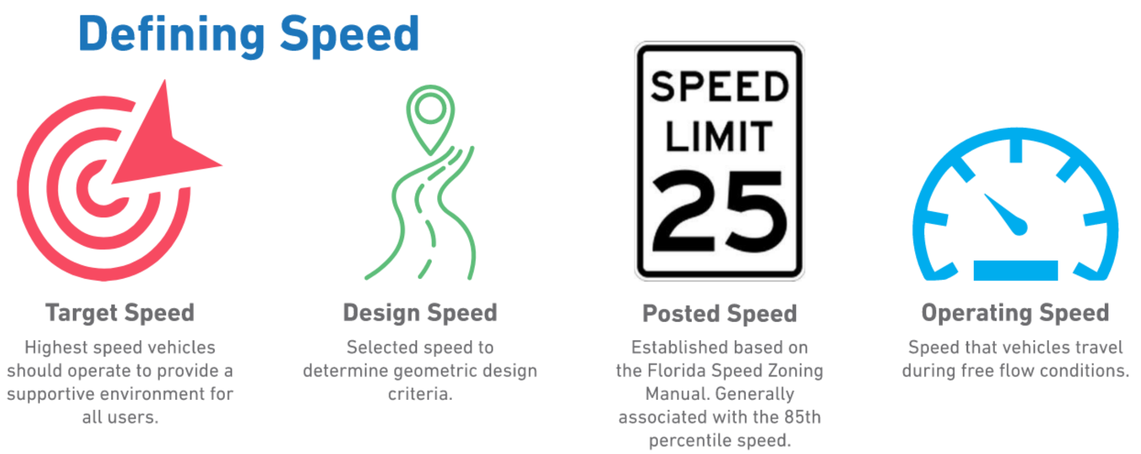


Figure 1. Speed Definitions

This study combines data including the TPA's High Injury Network (HIN), roadway characteristics, transit, and bicycle and pedestrian activity to identify a preliminary Target Speed for roadway segments. The preliminary Target Speed serves as a starting point for conversations regarding segment specific speed management and safety countermeasures. The preliminary Target Speed identified through this methodology may take multiple projects to implement, and coordination with partner agencies is required to prioritize and implement countermeasures to eliminate fatal and severe injury crashes.

Target Speed Methodology and Application

Using a data driven methodology and approach outlined in **Appendix A**, a preliminary Target Speed was identified for all Federal-Aid Highway Program (FAHP) eligible roadways not on the State Highway System (SHS), and only included SHS roadways that were identified on the TPA's HIN.

The Target Speed was determined by starting with appropriate speed ranges for each roadway type and context classification, and refining the range to a specific target speed by examining the HIN, roadway characteristics, transit usage, and bicycle and pedestrian activity. The ranges are provided in **Table 1**.

Through the initial application of the methodology using guidance from the FDOT Context Classification Guide, feedback was received from partner agencies regarding the preliminary Target Speed and specific challenges for implementation in 6+ lane facilities.

For segments where the initial preliminary Target Speed assignment differed from the posted speed by greater than 10 mph, those specific segments were flagged as needing additional detailed evaluation that cannot be applied systemwide. Generally, these segments have 6+ lanes and a C3 or C4 context classification, where the preliminary Target Speed assignment was 25 or 35 mph, while the posted or operating speed is 45 mph or greater. **Figure 2** depicts the TPA's preliminary Target Speed assignments.

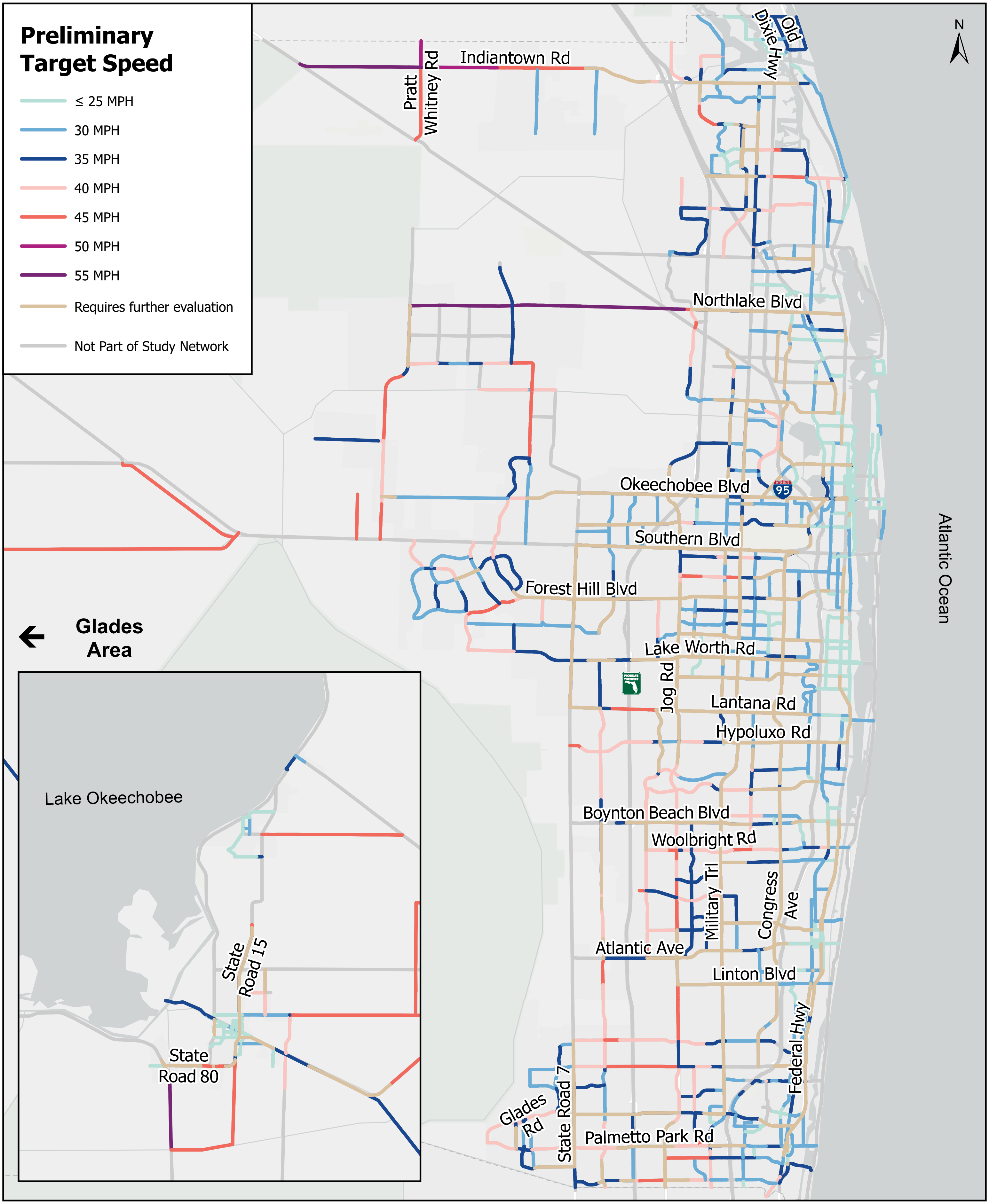
Identifying safety countermeasures for segments that need further evaluation, the FDOT Context Classification Guide states that "if the posted speed is 40 mph or above or there are six or more travel lanes, achieving the low end of the target speed range may require a full reconstruction," and emphasis should be placed on separating vehicles and non-motorists and providing additional crossing opportunities, especially where transit is present.

Table 1. Palm Beach TPA Target Speed Ranges

	Roadway Type	C1 - Natural / C2 - Rural	C3R – Suburban Residential / C3C – Suburban Commercial	C4 – Urban General	C2T – Rural Town / C5 – Urban Center	C6 – Urban Core
SHS Target Speed Ranges*	**All SHS Roads**	55 – 70	35 – 55	25 – 45	25 – 45 (C2T) 25 – 35 (C5)	25 – 30
Non-SHS Target Speed Ranges	**Arterial**	35 – 55	30 – 45	25 – 45	25 – 30	20 – 25
	Collector	35 – 45	30 – 45	25 – 45	25 – 30	20 – 25
	Local	25 – 35	25 – 35	20 – 25	20 – 25	20 – 25

![Palm Beach Transportation Planning Agency]

Preliminary Target Speed Assignments



Date: 4/7/2025

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Operating Speed Data

For the TPA's HIN, operating speed data was downloaded from RITIS HERE from January 1, 2023, to December 31, 2023, with speed data downloaded in 15-minute intervals. The 85th Percentile, 50th Percentile, and Average Speed data was calculated for the following periods:

- Weekday (Monday through Friday)
- Weekend (Saturday and Sunday)
- Overnight (10:00 PM to 5:00 AM)

Figure 3 depicts the Weekday 85th percentile speed, and **Appendix B** includes additional speed maps and detailed description on the segmentation of RITIS HERE data to the TPA roadway network.

Speed Comparative Analysis

A comparative speed analysis was conducted which compared the posted speeds to the operating speed data for the TPA HIN, and the preliminary Target Speed and posted speed. The posted speed comparison to operating speed identifies locations which may have an existing speeding issue, relative to the posted speed, or identifies locations which the operating speed is lower than the posted speed already, so implementing a lower Target Speed may be less of a challenge. **Figure 4** depicts the comparison between posted speed and 85th percentile speed, with additional maps available in **Appendix C**.

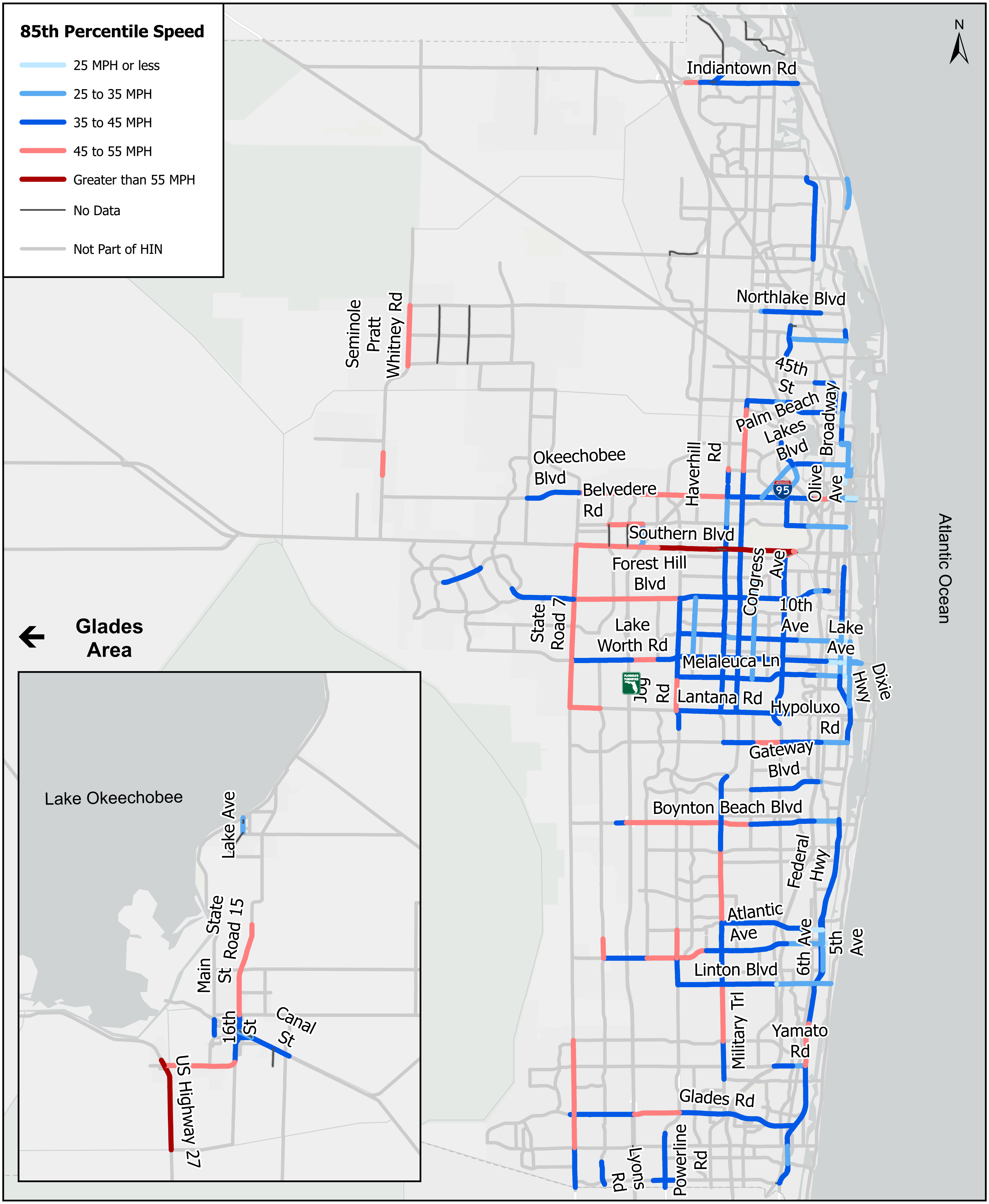
Priority Speed Management Corridors

Ten (10) priority speed management corridors were identified from the HIN using the preliminary Target Speed points, comparative speed analysis, and the TPA's Historically Disadvantaged Communities. Logical start and endpoints for the priority speed management corridors were identified in coordination with TPA staff. **Figure 5** depicts the priority speed management corridors, and **Figure 6** provides an overview of the corridors.

The priority speed management corridors reflect multiple contexts (C3C, C3R, and C4) and geometric conditions (2-lane undivided to 6-lane divided) throughout Palm Beach County.

PALM BEACH Transportation Planning Agency

Weekday 85th Percentile Speed



Date: 1/30/2025

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 2

0 1 2 4 6 8 Miles

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Weekday 85th Percentile Speed Minus Posted Speed

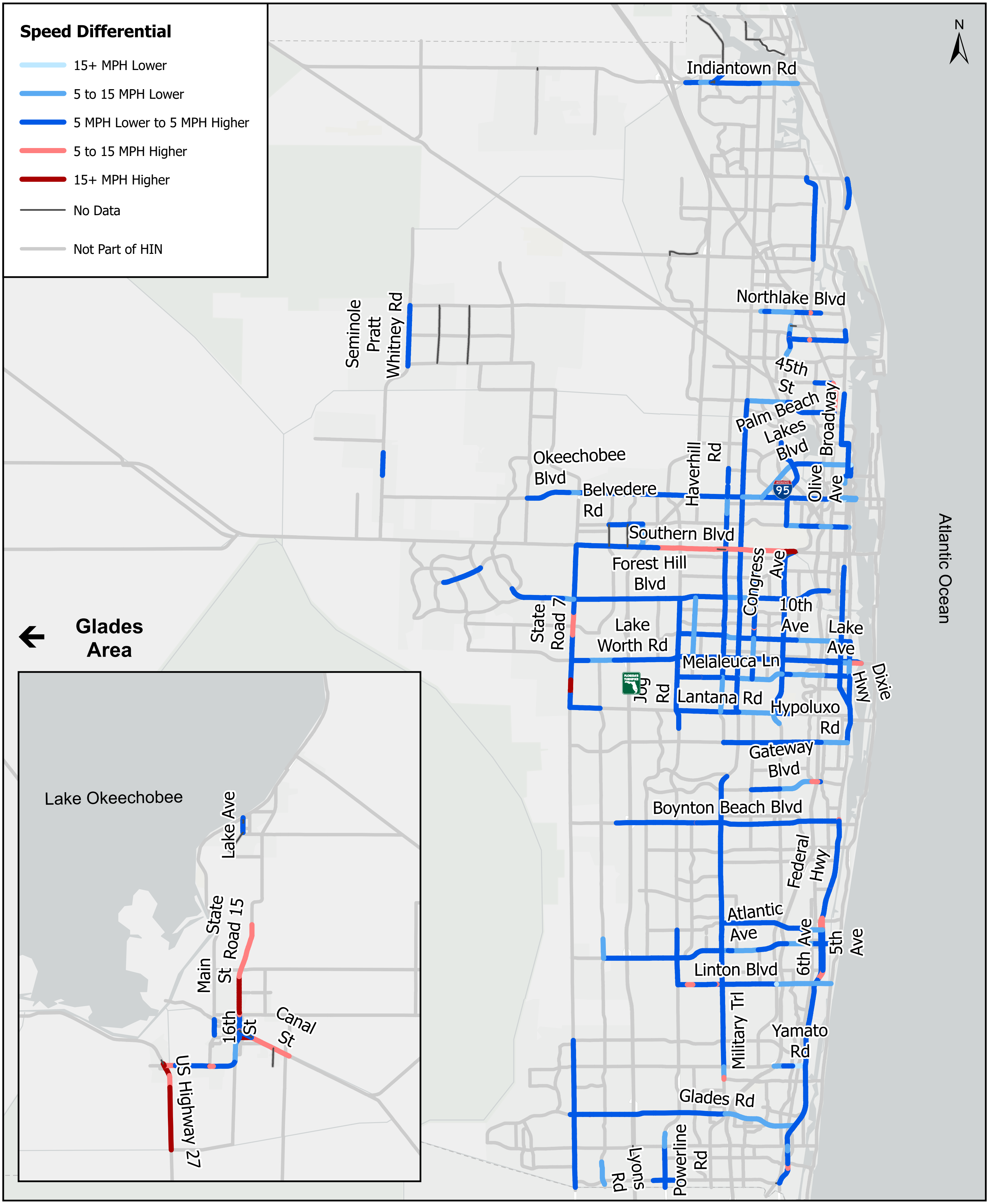
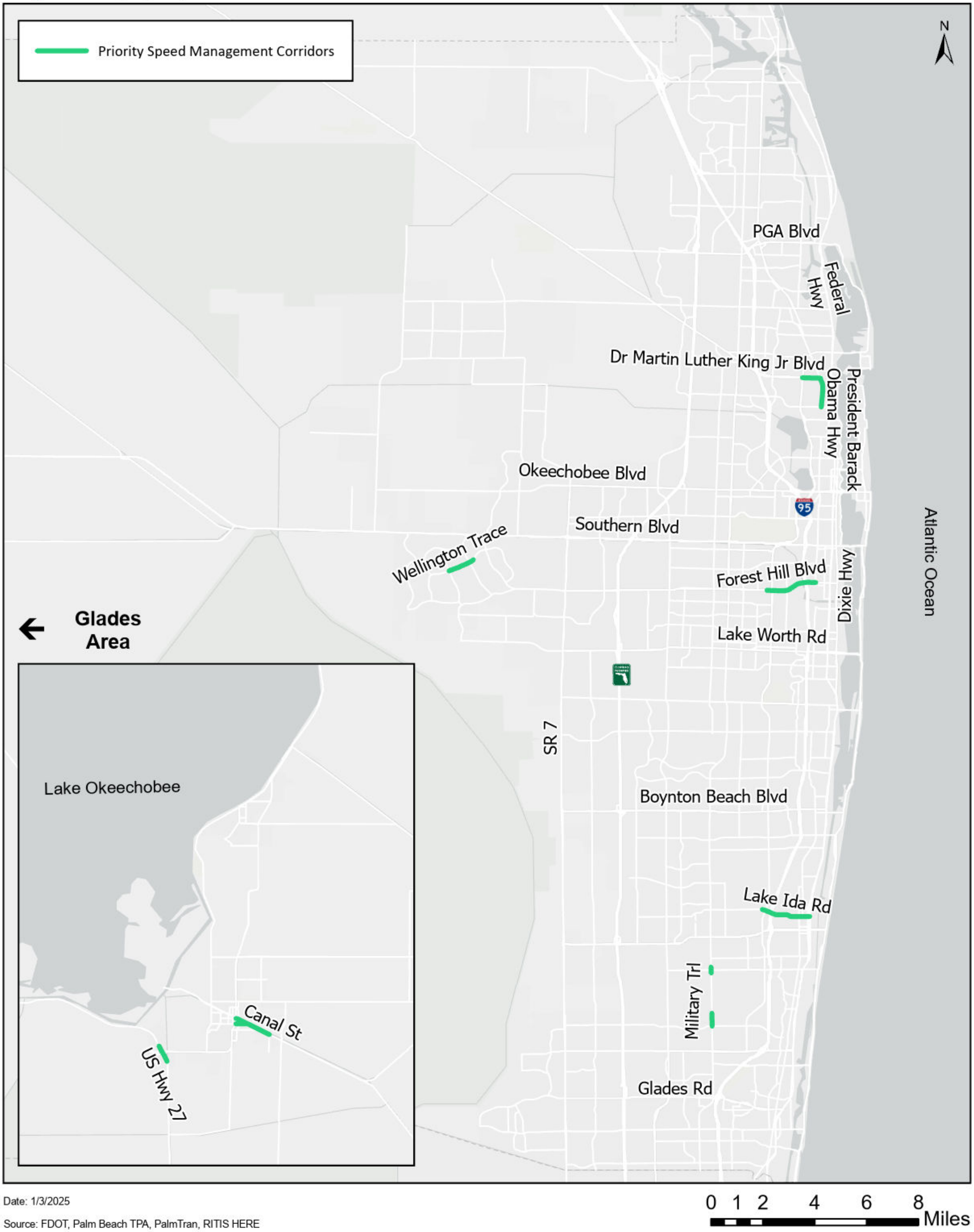


Figure 3

Date: 1/30/2025

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Priority Speed Management Corridors



Date: 1/3/2025

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Table 2. Priority Speed Management Corridors

Roadway	From	To	Owner	Municipality	Typical Section	Context Classification	85th Percentile Speed >= Posted Speed	Separation Flag* (40+ posted / 6+ Lanes)	Target Speed Points	FY25 - FY29 TIP	Historically Disadvantaged Community	TPA Lane Repurposing Candidate	Length
E Canal Street	Main S	Wedgeworth Road	County	Belle Glade	2U	C4	Yes	No	7.5	Yes (Roadway)	Yes	No	1.5
Lake Ida Road / NE 4 Street	Rainberry Lake Drive	US 1 / 6th Avenue	County / Municipal	Delray Beach	4D, 5U, 3U	C4	Yes	No	5-10	Partial (Roadway)	No	No	1.7
Forest Hill Blvd	Angel Drive	Parker Avenue	FDOT	Palm Springs / Unincorporated / Lake Clarke Shores / West Palm Beach	4D, 6D	C4	Partial	Partial	5-12	Partial (Roadway and Intersection Lighting Retrofit)	Partial	No	1.78
Pres Barack Obama Hwy	45 Street	Dr. Martin Luther King Jr. Blvd	County	Riviera Beach / West Palm Beach	5U	C4	Yes	No	6-10	Partial (Palm Tran)	Partial	Yes	1.13
Dr Martin Luther King Jr. Blvd E	Main Street	E Canal St	County	Belle Glade	4U	C4	Yes	No	7	No	Yes	Yes	0.47
Military Trail	at Linton Blvd		County	Delray Beach	6D	C4	Yes	Yes	11	No	No	Partial	0.20
Dr. Martin Luther King Jr. Blvd	Australian Avenue	Pres Barack Obama Hwy	FDOT	Riviera Beach	4D and 2U Frontage Road	C4	Yes	No	8	Partial (Intersection lighting retrofit)	Yes	Yes	0.61
Wellington Trace	Greenview Shores Blvd	Emerald Forest Drive	Municipal	Wellington	4D	C4	Yes	Yes	5-7	No	No (VRU Yes)	No	0.97
US 27	SW 3 Street	NW 2 Street	FDOT	South Bay	4D	C3C, C3R	Yes	No	7-13	Yes (EV Charging)	Yes	No	0.83
Military Trail	Clint Moore Road	Pheasant Way	County	Boca Raton / Unincorporated	6D	C3R, C4	Yes	Yes	7-12	No	No	Partial	0.50

*Separation Flag: Suggested to separated non-motorist users from vehicle traffic consistent with the FDOT Context Classification Guide.

Segment Specific Countermeasures

The wide range of geometric conditions can create challenges when selecting and applying short-term, mid-term, and long-term countermeasures. A Countermeasure Toolkit, available in **Appendix D**, was developed to provide a framework for countermeasure selection.

Certain countermeasures alone may not result in speed reduction, however, a combination of countermeasures and application consistent with the Safe System Approach can reduce fatal and serious injuries.

For five (5) priority speed management corridors, potential countermeasures were selected to facilitate further discussion with partner agencies, and evaluation to move the countermeasures further towards implementation. The countermeasure selection provides a snapshot of each segment and reflects a planning level evaluation based on the existing geometric conditions and typical section. The countermeasures will need further vetting and study for implementation.

President Barack Obama Highway Potential Countermeasures

Figure 6 depicts potential countermeasures for President Barack Obama Highway. These countermeasures are likely feasible to incorporate into a resurfacing project. If existing pedestrian demand exists, a potential short-term project could be to install a midblock crosswalk crossing President Barack Obama Highway.

Figure 7 depicts the potential modifications to the typical section to accommodate the countermeasures, which includes narrowing lanes and replacing the TWLT with a concrete median.

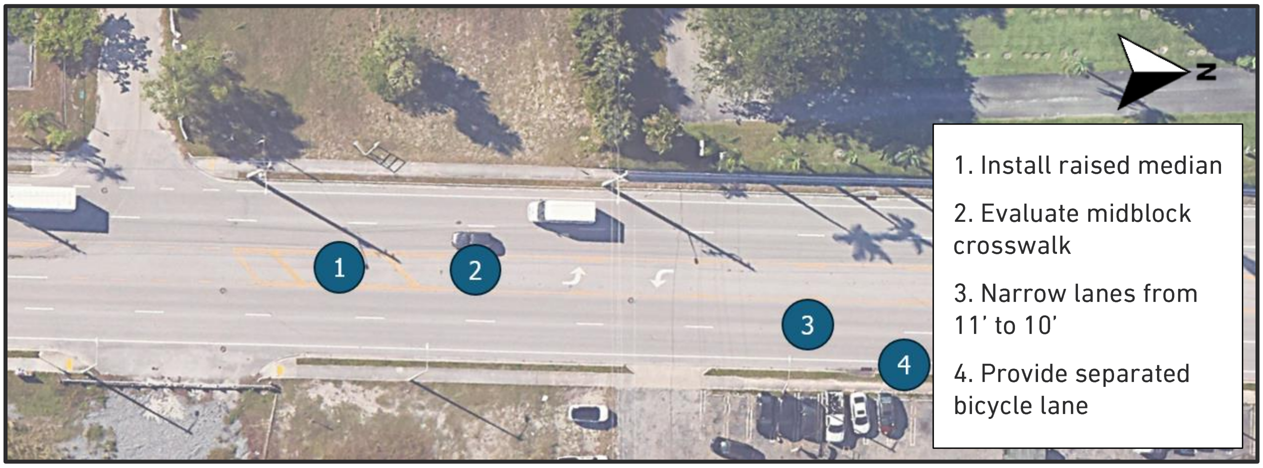


Figure 6. President Barack Obama Highway Potential Countermeasure Overview

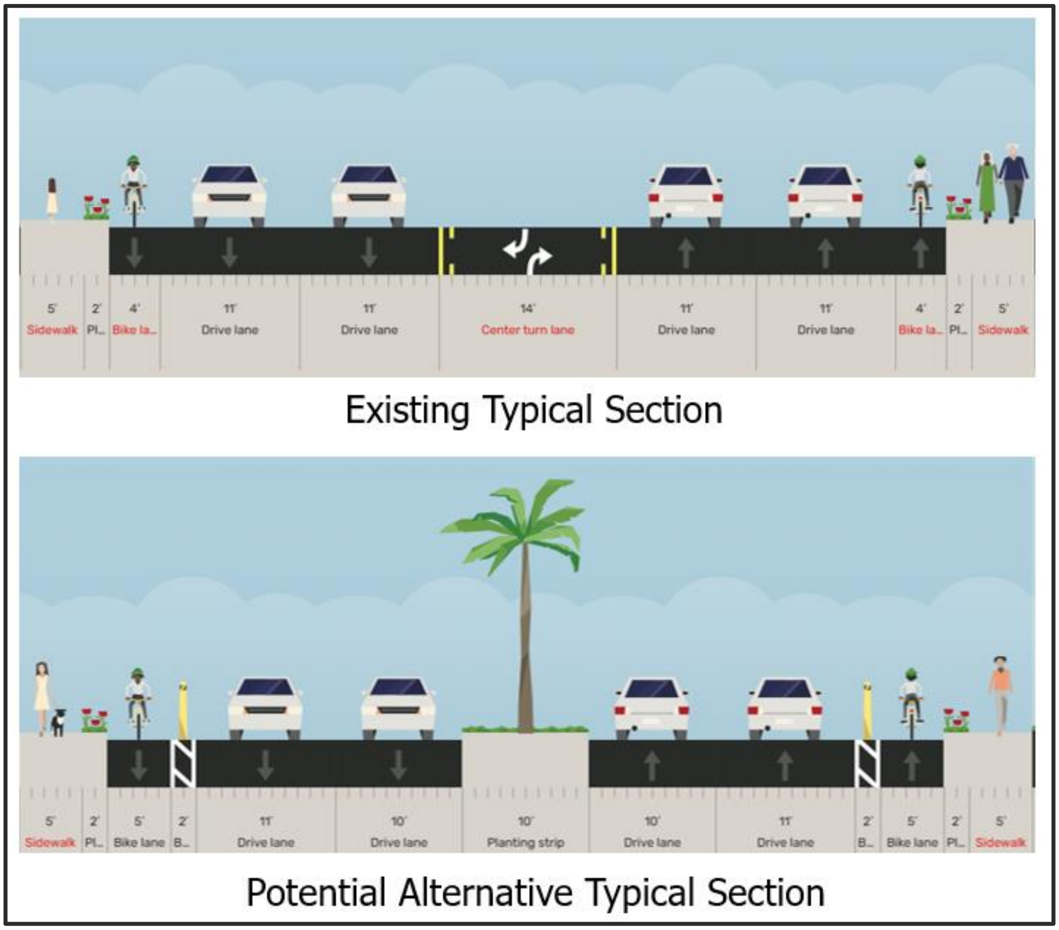


Figure 7. President Barack Obama Highway Existing and Potential Alternative Typical Section

Lake Ida Road / NE 4 Street Potential Countermeasures

Figure 8 depicts potential countermeasures for Lake Ida Road / NE 4 Street which includes both geometric countermeasures along with potentially automated speed enforcement. Given the need to narrow the median width to provide a bicycle facility, the countermeasures would likely require implementation in a reconstruction project. Additionally, a raised intersection may require drainage evaluations and re-grading the roadway surface. Automated Speed Enforcement in school zones will require policy changes within Palm Beach County; however, it could be implemented prior to a reconstruction project.

Figure 9 depicts the potential modification to the typical section to accommodate the bicycle lane. To accommodate a wider bicycle facility, additional width could potentially be re-allocated from the median.

Figure 8. Lake Ida Road / NE 4 Street Potential Countermeasure Overview

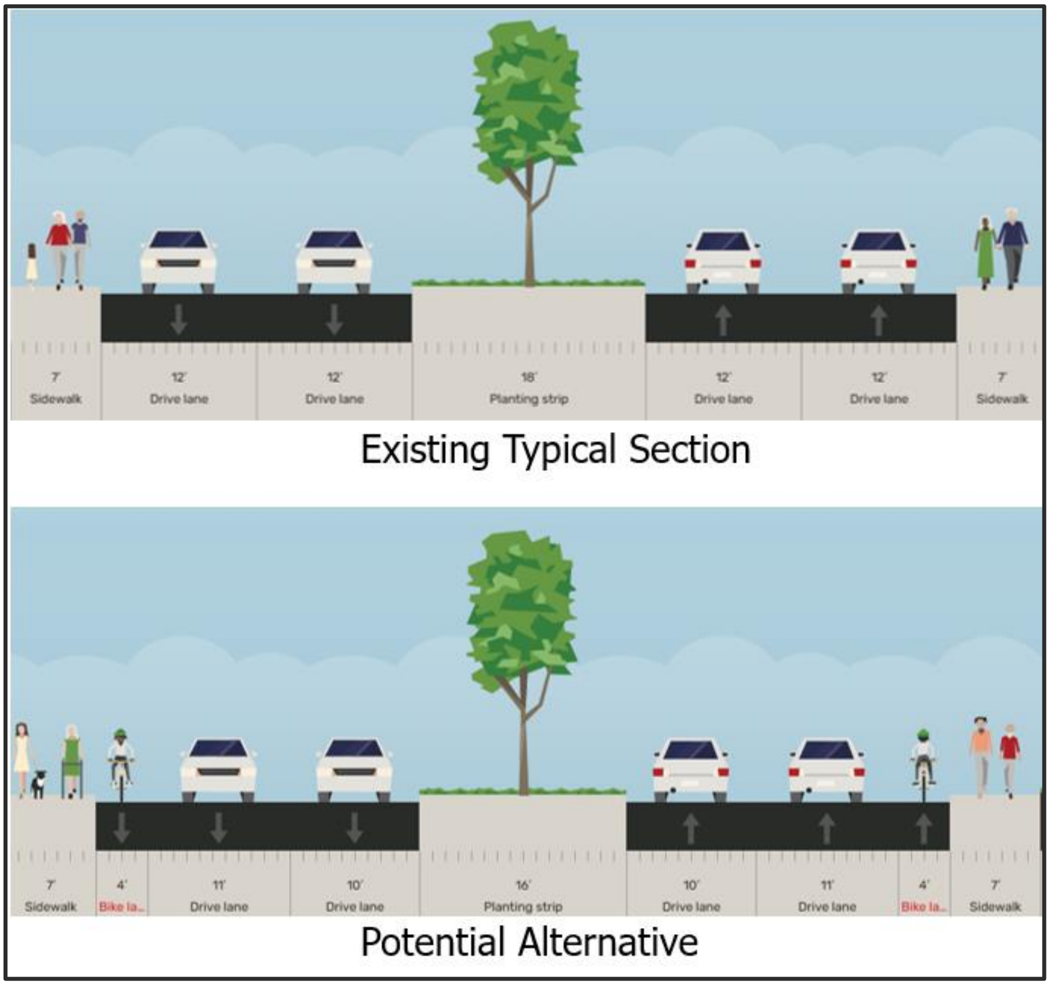


Figure 9. Lake Ida Road / NE 4 Street Existing and Potential Alternative Typical Section

Forest Hill Boulevard Potential Countermeasures

Figure 10 depicts potential countermeasures for Forest Hill Boulevard, which include both Speed Management countermeasures, and countermeasures to reduce the number of conflict points, such as a directional median. Since the proposed improvements are within the existing cross-section width, the countermeasures could be accommodated in a re-surfacing project, should funding be available. Operational countermeasures, such as a leading pedestrian interval (LPI) and reduced cycle lengths could be implemented in the short-term, with coordination with the maintaining agencies.

Figure 11 depicts the potential modification to the typical section to accommodate the separated bicycle lane, which includes narrowing the existing travel and turn lanes to 11'.

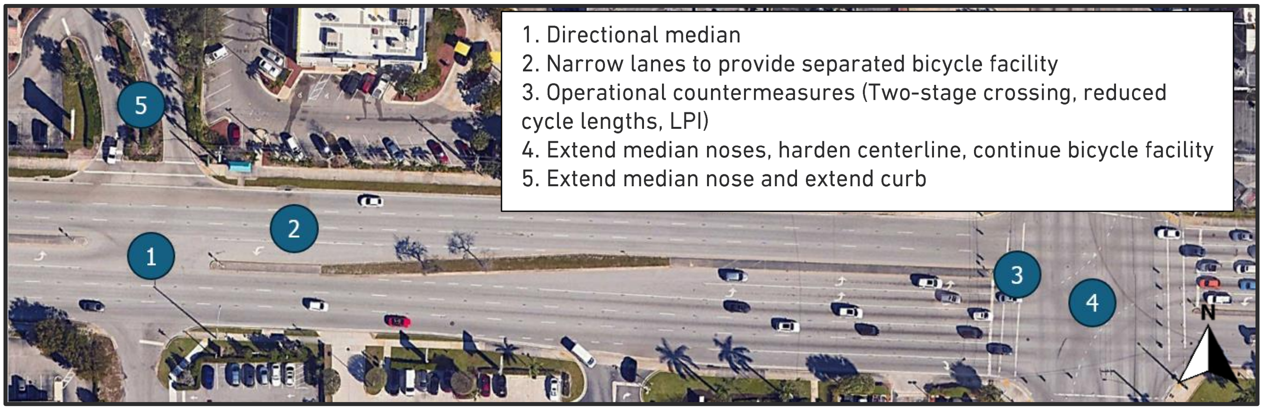


Figure 10. Forest Hill Boulevard Countermeasure Overview

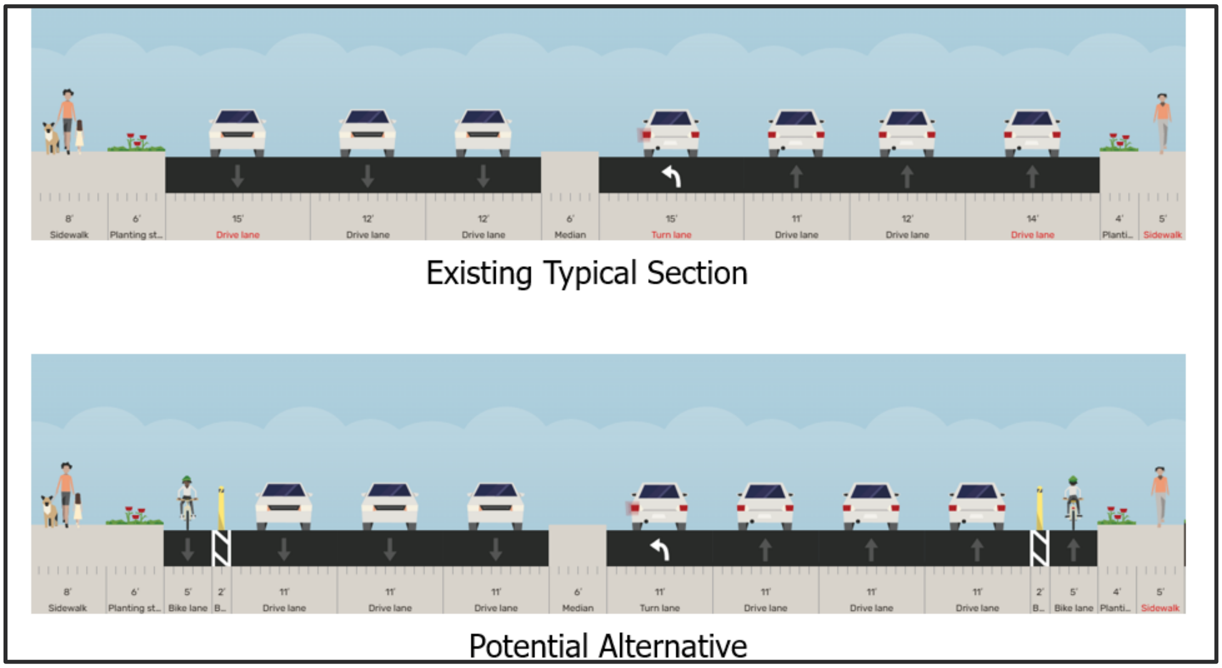


Figure 11. Forest Hill Boulevard Existing and Potential Alternative Typical Section

E Canal Street Potential Countermeasures

Figure 12 depicts potential countermeasures for E Canal Street which includes vertical deflection, centerline rumble strips, and new pedestrian/bicycle facilities. Countermeasures one (1) through four (4) would be applicable in a resurfacing project. Depending on the drainage impacts and utility placement, a shared use path could potentially be included in a resurfacing project; however, a reconstruction project may be more likely to implement.

Figure 13 depicts the potential modification to the typical section to accommodate a 10' shared use path and in-street sharrows. Further design considerations are required to determine whether adding curb and gutter to this portion of E Canal Street is feasible or if only a sidewalk could be accommodated on this section.

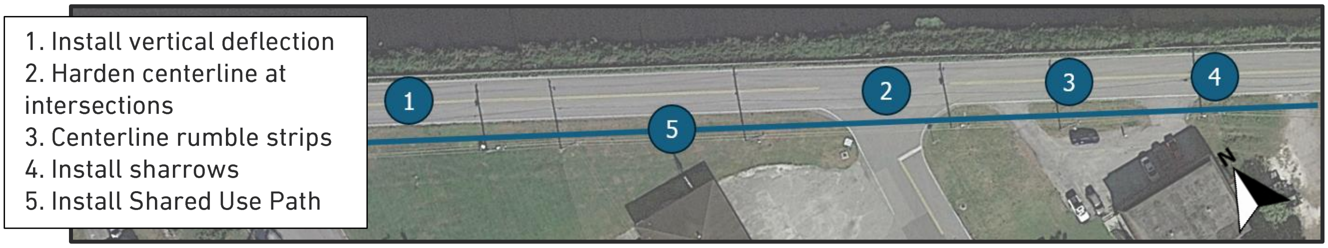


Figure 12. E Canal Street Potential Countermeasure Overview

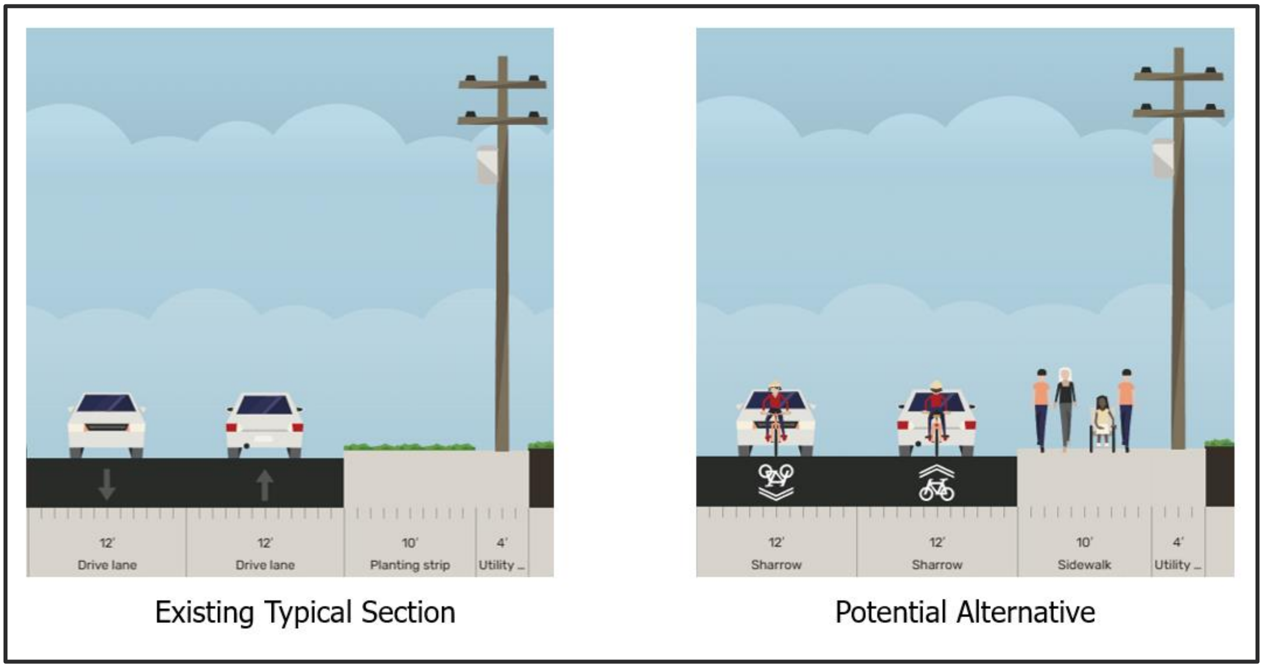


Figure 13. E Canal Street Existing and Potential Alternative Typical Section

Dr. Martin Luther King Boulevard E Potential Countermeasures

Figure 14 depicts potential countermeasures for Dr. Martin Luther King Boulevard E which includes a potential lane repurposing and separated bicycle facilities. Given that the curb-line is not proposed to move, these countermeasures could be accommodated in a resurfacing project, should funding be available.

Figure 15 depicts the potential modification to the typical section to accommodate separated bicycle facilities and a dedicated parking lane on one-side of the street. The existing typical section is four-lanes undivided, and the proposed alternative is a three-lane typical section with a TWLTL. Further evaluation is needed to justify the lane repurposing, and the segment is on the TPA Lane Repurposing candidate list. In addition to potential speed management benefits, safety benefits could occur from the lane repurposing.

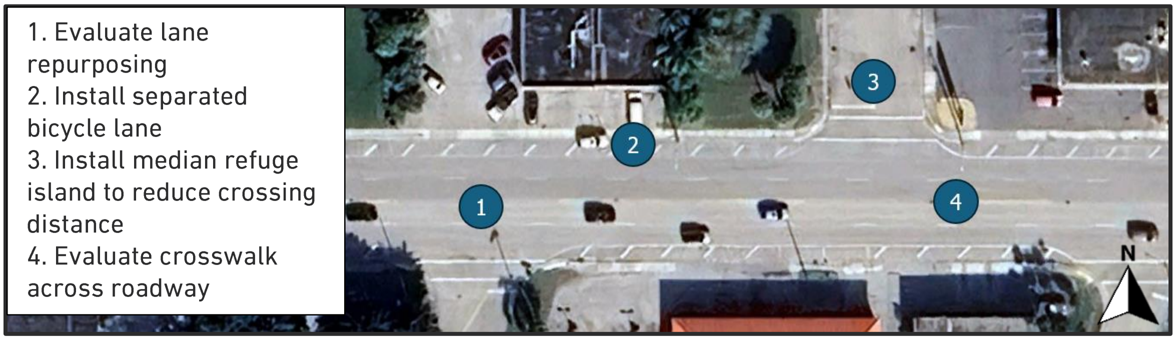


Figure 14. Dr. Martin Luther King Boulevard E Potential Countermeasure Overview

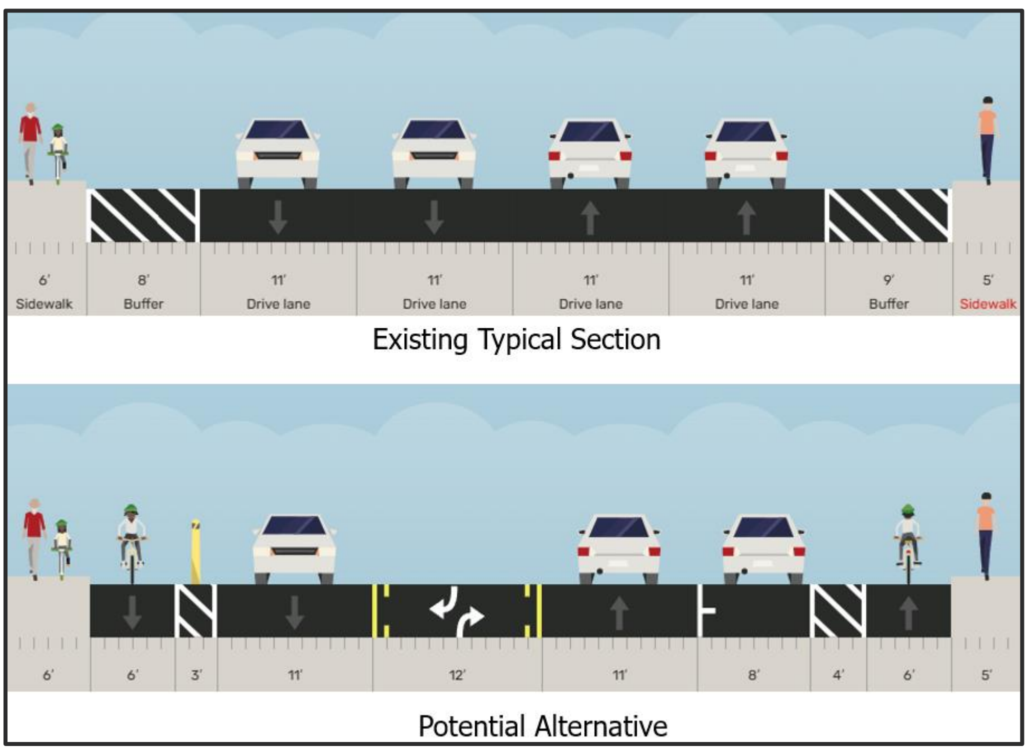


Figure 15. Dr. Martin Luther King Boulevard Existing and Potential Alternative Typical Section

Conclusion

The TPA Speed Management Study was developed consistent with the TPA's Vision Zero Goal. A data driven methodology was developed to identify preliminary Target Speeds for all federal aid eligible roads. In some cases, the preliminary Target Speed may not be achievable due to constraints or large differences between the existing posted speed, roadway geometry, and Target Speed. If a Target Speed is not achievable, emphasis should be given to separating pedestrians and bicyclists from vehicle traffic. The preliminary Target Speed is meant to serve as an identification tool and starting point for conversations with partner agencies to achieve the TPA's Vision Zero goal. For the TPA High Injury Network (HIN), operating speed data was collected from RITIS HERE and compared to the existing posted speeds.

Through the application of the Target Speed methodology, comparative speed analysis, and coordination with the TPA, ten (10) priority speed management corridors were identified. A Countermeasure Toolkit was developed to further discussion on speed management and safety countermeasures. For five (5) of the top ten (10) priority speed management corridors, potential segment specific countermeasures were identified.

Next steps include coordinating with partner agencies for discussion on countermeasures for the priority speed management corridors, providing cost estimates, and identifying potential funding mechanisms.

Appendix A – Target Speed Methodology Technical Memorandum

SPEED MANAGEMENT STUDY

Target Speed Methodology Technical Memorandum

Prepared for: Palm Beach TPA
Prepared by: Kittelson & Associates, Inc.
August 2024 FINAL

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Introduction

In 2018, the Palm Beach Transportation Planning Agency (TPA) adopted a Vision Zero goal to eliminate traffic-related fatalities and serious injuries, followed by adopting a Vision Zero Action Plan (VZAP) in 2019. Recognizing that high vehicle speeds are often a root cause for fatal and life-altering crashes, particularly for those at greater risk on the road such as pedestrians and bicyclists, the TPA's 2021 VZAP update was promotes safe speeds as a crucial measure to ultimately reduce such incidents to zero.

The TPA's 2021 VZAP provides three key strategies which includes effective policy change with a data-driven approach, TPA-administered funding to implement action items, and embedding Vision Zero principles into collaborative efforts to improve safety conditions. These strategies aim to enhance data collection and reporting of high crash corridors to provide safety to vulnerable road users.

One approach being used to evaluate and better design for and control speeds is "Target Speed". In general, "Target Speed" is defined as the highest speed at which vehicles should operate on a roadway in a specific context, consistent with the level of multi-modal activity generated by adjacent land uses, to provide both mobility for motor vehicles and a supportive environment for pedestrians, bicyclists, and public transit users. It is an important concept in traffic engineering and road safety, aiming to balance the needs of different road users and reduce the risk of crashes and eliminate crashes resulting in death or serious injury.

The Palm Beach TPA determined crash severity scores for intersections and corridors to identify the High Injury Network (HIN). The higher the crash severity score, the more fatal and severe injury crashes occur at that location. In the TPA's 2021 VZAP update, Policy Action Item 1.3 is the identification of Target Speeds for high crash corridors based on context classification and safety - a fundamental principle of Vision Zero that serves as a goal to continue the progress of speed management.

This technical memorandum summarizes the TPA's proposed Target Speed methodology that may be applied to all federal aid eligible roadways throughout Palm Beach County. The preliminary Target Speed's intended application is to identify corridors where the current posted or operating speed is not consistent with the multimodal context. The preliminary Target Speeds are not intended to replace existing posted speed limits throughout Palm Beach County, but instead by comparing the Target Speed to the posted and operating speed, priority corridors can be identified as candidates for projects and countermeasures that allow for safe operation for all roadway users.

In some cases, the preliminary Target Speed may not be achievable due to constraints or large differences between the existing posted speed, roadway geometry, and Target Speed. If a Target Speed is not achievable, emphasis should be given to separate pedestrians and bicyclists from vehicle traffic. Ultimately, the preliminary Target Speed is meant to serve as an identification tool and starting point for conversations with partner agencies to achieve the TPA's Vision Zero goal.

Target Speed Research

As a first step in the methodology development phase, Target Speed and speed management best practices were reviewed nationally, statewide, and locally to inform the TPA's approach. Studies with outcomes that included critical guidelines and context-based design standards on speed setting across the nation were reviewed. The following documents were identified as resources that contributed to the development of the proposed Target Speed methodology.

National Documents

FHWA Safe System Approach for Speed Management

The Safe System Approach for Speed Management is a five-stage framework that defines the impacts of speed on traffic safety, informing practitioners on proactive practices for speed management. This comprehensive approach includes guidelines that are intended to reduce speed with infrastructure and non-infrastructure countermeasures that implement safer conditions on roadways of critical speeding concern. Incorporating strategies from this framework into the data collection, analysis, and potential countermeasures of the proposed methodology is essential for categorizing specific portions of the roadway based on locations with the most reported severe crashes.

Figure 1. FHWA Safe System Approach

Source: FHWA.

NACTO City Limits Guide

The National Association of City Transportation Officials (NACTO) City Limits document is intended to provide city practitioners with guidance on how to strategically set speed limits on urban streets. This document introduces their Safe System Approach that can be used to reduce traffic fatalities and injuries.

- Setting Default Speed Limits on many streets at once.
- Designating Slow Zones in sensitive areas.
- Setting Corridor Speed Limits on high priority major streets using a Safe Speed Study.

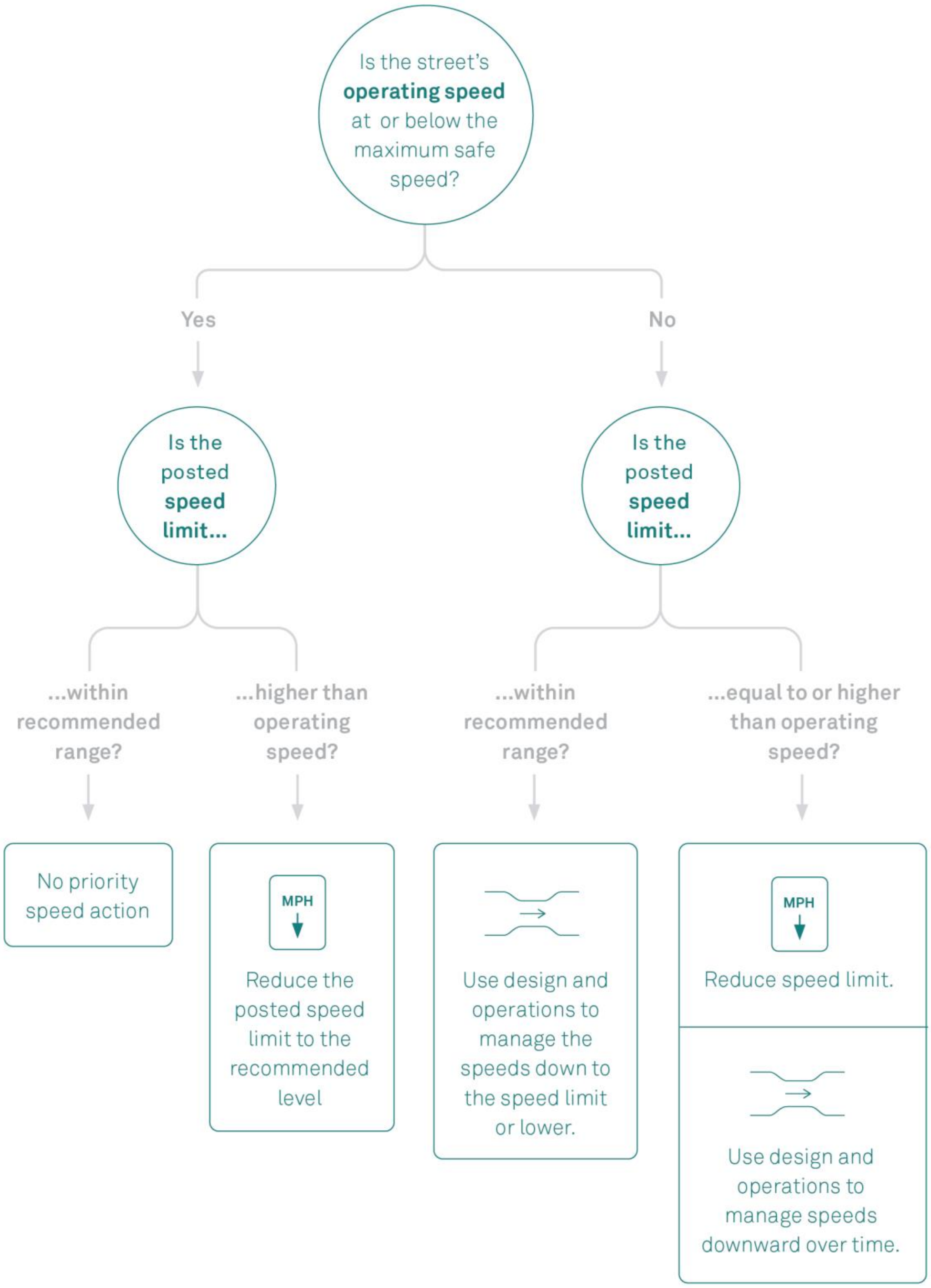
NACTO's Safe Speed Study methodology analyzes conflict density and activity level, among other contextual factors, to determine the speed limit that will best minimize the risk of a person being killed or seriously injured. Activity levels are measured directly where potential conflicts occur, and it ranges from low density industrial streets with minimal expected pedestrian volumes to active high density public spaces. For the Palm Beach TPA's Target Speed Methodology, transit ridership, the TPA's Pedestrian and Bicycle Level of Traffic Stress (LTS), and pedestrian and bicycle activity were used as measures for activity levels on the transportation network. NACTO's Safe Speed Study process is outlined below.

1. Collect Before Data
   Begin by collecting data about corridor conditions such as conflict counts, speeding opportunities, existing speeds, and crash history.
2. Analyze Existing Conditions
   Analyze the corridor, focusing on the frequency of conflict and the amount of activity, and use the risk matrix below in **Figure 2** to determine the appropriate posted speed.
3. Determine Best Option for Speed Management
   Decide on the best option to manage speeds along the corridor using the decision tree depicted in **Figure 3**.
4. Conduct an Evaluation
   Evaluate speed management efforts through pre- and post-implementation data evaluation.

Figure 2. NACTO City Limits Risk Matrix

ACTIVITY LEVEL: / CONFLICT DENSITY:	HIGH CONFLICT DENSITY	MODERATE CONFLICT DENSITY	LOW CONFLICT DENSITY
HIGH ACTIVITY	20 MPH	20 MPH	25 MPH
MODERATE ACTIVITY	20 MPH	25 MPH	30 MPH
LOW ACTIVITY	25 MPH	25 MPH	35 MPH

Figure 3. NACTO City Limits Decision Tree



In the guide, there are key metrics for determining the effectiveness of a speed limit change or safety project that include the difference in the number of:

- High-end or top-end speeders/operating speed
- People killed or severely injured
- Speeding opportunities
- vehicle conflicts

As stated in the City Limits Guide, in the US, fatal crashes are disproportionately clustered on a small group of high speed, auto-oriented streets, known as urban arterials. In the TPA's 2021 VZAP update, the TPA HIN has approximately 50 corridors accounting for 34% of the county's fatal crashes and 37% of severe injury crashes, and only 5% of the total roadway mileage in the county. Within these corridors, some arterial streets with the highest number of pedestrian and cyclist fatalities include Glades Road, Boynton Beach Boulevard, and Okeechobee Boulevard. These stretches of roads are generally wider streets with higher speeds. Countywide, over a 5-year period from 2016 to 2020, fatal pedestrian crashes contributed to nearly 25% of Palm Beach County's total fatal and severe injury crashes.

The NACTO City Limits Guide is being used as a standard in this guide as opposed to other methodologies due to its comprehensive structure and strategic approach to urban street design that prioritizes safety, pedestrians, transit users, and cyclists. It provides a set of strategies and key metrics that are essential for performing a thorough analysis of the posted speed, operating speed, conflict density, and activity levels along the corridors and HIN. Additionally, the proposed methodology includes roadway characteristics such as pedestrian/bike activity data that serve as proxy measures for activity levels on the transportation network and essential details on their influence on speed and future operations. While the NACTO City Limits Guide provides a robust framework, the TPA's proposed target speed study methodology outline compliments it by addressing areas that may not be fully covered or recognized by NACTO. This ensures that the study has a well-rounded and thorough approach to speed management that is effective on high-speed, auto-oriented streets known as urban arterials, where a significant number of fatal crashes and severe injuries are clustered in Palm Beach County.

State Documents

FDOT Context Classification Guide

The Florida Department of Transportation (FDOT) Context Classification Guide (Chapter 3) provides a methodology to assign Target Speeds along the State Highway System (SHS). Ideally at 45 mph and below, the Target Speed, design speed, and posted speed are all the same. When these speeds differ, it can result in inconsistent driver expectation about the intended operating speed. Target Speed's purpose is to identify a desired operating speed and to develop design strategies and elements that reinforce a safe operating speed based on the context of the roadway.

The guide includes a decision matrix based on Context Classification, fronting uses, population density, vulnerable users, cross section components (on-street parking, bike facilities), access classification, transit presence, vehicle trip type, trip length, and safety conditions. The following decision matrix is detailed below with questions to determine the appropriate Target Speed:

1. Determine FDM consistency:
    a. Identify Context Classification, current design and posted speed, SIS designation, and FDM design speed range. **Table 1** depicts the allowable design speed ranges for SHS roadways.

Table 1. FDM Table 201.5.1 Design Speed Ranges

Context Classification	Allowable Design Speed Range (MPH)	SIS Minimum (MPH)[1]
C1 – Natural	55 – 70	65
C2 – Rural	55 – 70	65
C2T – Rural Town	25 – 45	40
C3 – Suburban	35 – 55	50
C4 – Urban General	25 – 45	45
C5 – Urban Center	25 – 35	-
C6 – Urban Core	25 – 30	-

[1]Note the FDM provides exceptions for the SIS Minimum depending on certain criteria (Context Classification, On Street Parking, Curb, Transit presence)

2. Identify starting point for Target Speed:

Figure 4. Target Speed starting point by Context Classification

3. Identify project needs: Refine the Target Speed using the following questions:
    a. Who are the intended users? Are pedestrians, bicyclists, and transit riders traveling along or across the roadway?
    b. What are potential safety challenges? Are safety needs identified on the Safety Needs Dashboard? Does crash data identify bicycle or pedestrian crashes? What is the frequency, severity, and key crash patterns of auto crashes?
    c. Are there special population groups using the corridor (lower income, 0-car households, aging population, school age children)?

   d. What is the level of community support? Has the community requested lower speeds?
   e. What is the transportation role of the roadway in the network? Is it used to access destinations? What is the density of driveways, side streets, and signals?
4. Review potential countermeasures
5. Document Target Speed:

Additionally, if the Target Speed is not achievable or not met, the FDOT Context Classification Guide puts an emphasis on safe operations at a high operating speed. **Figure 5** outlines examples to achieve safe travel at higher operating speeds.

Figure 5. FDOT Context Classification Guide Safe Travel at High Operating Speed Examples

If the target speed is not met, increased emphasis should be placed on providing facilities that can achieve safe travel at the higher operating speed. Examples include:

1. More frequent controlled crossings for pedestrians and bicyclists.
2. Enhanced parallel facilities for pedestrians and bicyclists
3. Greater separation between vehicle traffic and bicycle and pedestrian facilities.

Target Speed is informed by Context Classification and included in the TPA's Target Speed methodology to help provide for both the safety and mobility needs of all anticipated users.

FDOT District 4 High Growth Corridor Report

FDOT District 4 (D4) completed an assessment of Non-Strategic Intermodal System (SIS) roadways on the SHS that focused on high growth corridors and safety. High growth corridors were identified using socioeconomic model data and future traffic projections. FDOT's assessment for a 5-year work program with projects being planned on most high growth corridors with priority to those that possess the potential to meet future mobility (turn lanes, ATMS), safety (lighting), and resilience (drainage, studies) needs.

In total, there are 33 identified high growth corridors with no major planned or programmed roadway capacity improvements, with 11 located within Palm Beach County. The work programmed included: resurfacing, traffic signal updates, lighting, bridge replacement/refurbishment, drainage, bike lane/sidewalk, landscaping, ITS, transit shelters, reconstruction of alignment and turn lanes, ATMS, resilience studies, PD&E studies, and interchange modifications.

The focused recommendations for the corridors in Palm Beach County are summarized below:

- SR-7 / U.S. 441 corridors include:
  - From Clint Moore Road to Atlantic Avenue
  - From Atlantic Avenue to Boynton Beach Blvd
  - From Boynton Beach Blvd to Hypoluxo Road
  - From Latana Blvd to Lake Worth Road
- SR 786 / PGA Blvd corridors include:
  - From SR-811 / A1A to The Gardens Mall
  - From the FL-Turnpike Interchange to Central Blvd
- Okeechobee Blvd / SR-704 corridors include:
  - From Benoist Farms Road to Jog Road
  - From the FL-Turnpike Interchange to Palm Beach Lakes Blvd
- Boynton Beach Blvd from NW 8th St / Old Boynton Beach Road to Seacrest Blvd
- SR 811 / A1A from PGA Blvd to Hood Road

The assessment used demographic and roadway data to develop their selection methodology by including high population, employment zones relative to SHS roadway segments and their traffic growth projections/levels of service. These improvements are significant to consider in the proposed methodology as the corridor-level evaluations provide specific and future needs for developing speed management countermeasures for the high growth corridors along the TPA HIN.

Local Documents

MetroPlan Orlando Speed Management Network Screening

The Speed Management Network Screening is a planning level analysis that was performed by MetroPlan Orlando to identify the roadways of critical speeding concern in their metropolitan planning area. MetroPlan Orlando applied a Target Speed methodology that used the Context Classification and federal functional classification of each roadway segment to determine appropriate Target Speed ranges. **Table 2** depicts the MetroPlan Orlando Target Speed ranges. To determine where an individual segment would fall within the Target Speed range, MetroPlan Orlando analyzed transit and crash data. If transit was present for a segment, the segment's Target Speed would be at the low end of the range. If transit was not present, the Target Speed would depend on crash rates, or equivalent property damage only (EPDO) scores. A segment with a high crash rate or high EPDO score would have a Target Speed on the low end of the range.

Table 2. MetroPlan Orlando Proposed Target Speed Ranges

	Roadway Type	C1 / C2	C3R / C3C	C4	C2T / C5	C6
FDOT Ranges	**All Functional Classifications**	55 – 70	35 – 55	30* – 45	25 – 45 (C2T) 25 – 35 (C5)	25 – 30
Proposed MetroPlan Orlando Ranges	**Arterial / Collector**	35 – 55**	30 – 40	25 – 35	25 – 30	20 – 25
	Local	25 – 35	25 – 35	20 – 25	20 – 25	20 – 25

*At the time of the MetroPlan Orlando study, 30 mph was the low end of the design speed range for C4 – Urban General. The 2024 FDM low end of the C4 – Urban General design speed range is 25 mph.

**Maximum Target Speed for C1/C2 collector is 45 mph.

The TPA's proposed target speed methodology similarly begins by identifying a target speed range based on the context classification and federal functional classification of a roadway, categorizing the speed ranges according to their presence on the SHS and their roadway type. To create preliminary target speed ranges suitable for various roadways' existing conditions, their method influenced our approach to assess factors like transit activity and crash rate/EPDO. Beyond target speed, MetroPlan's approach also influenced how the TPA determines which roadway design characteristics, such as the number of lanes and the Level of Traffic Stress (LTS), are vital for making feasible recommendations.

Hillsborough TPO Speed Management Plan

The Hillsborough TPO Speed Management Plan provides visual assessment on the Context Classifications categories and speed ranges for each corridor. These assessments were distinguished by their respective context based on land use patterns, density and various other factors. Design parameters that are greatly affected by a roadways speed limit/design speed include: lane width, acceleration/deceleration lanes, left turn lanes, sight distance, sign placement, traffic signal operations, and provision of bicycle facilities.

The Hillsborough TPO Speed Management Plan emphasizes that speed increases the risk of severe and fatal injuries. A pedestrian has a 5% likelihood of being killed if struck by a vehicle traveling at 20 mph, and an 80% likelihood of being killed if struck at 40 mph.

The plan measures 'exposure' as a means of identifying the most significant predictors in crash frequency. Exposure is commonly measured by how many pedestrians, bicyclists, and motorists pass through a given intersection. The plan assesses the study area to identify the Top 20 HIN corridors including prioritization factors such as:

- Crash Severity per Mile
- Pedestrian / Bicycles Crash Rate per Mile
- Number of Schools per Mile

- Equity – COC Coverage
- Posted Speed-Context Class Conflict
- Transit Route Exposure
- High Traffic Volumes

Each of the factors were aggregated and then a total weighted average score was developed for each corridor. Each of the corridors were also ranked in order of priority. The higher the weighted average score, the higher the corridor's priority. This score was used to establish a high, medium, and low priority ranking for each of the corridors.

The TPO's *significant predictors in crash frequency* informed the TPA's methodology to identify local unique predictors and determine necessary actions for improving safety based on the preliminary target speeds. This approach is valuable for identifying appropriate safety countermeasures specific to corridors experiencing speeding issues.

City of Bellevue Speed Management Plan

The City of Bellevue, Washington is committed to a Vision Zero goal of zero traffic fatalities or serious injuries by 2030, and safe speeds are a critical component of their Vision Zero Safe System Approach. To work towards their 2030 goal and to improve compliance with speed limits in Bellevue, the city developed a Speed Management Plan (SMP) that analyzes speed-related safety concerns along Bellevue's 30+ mph arterials. The SMP outlines potential safety countermeasures and follows the five-step framework identified by the FHWA's Safe System Approach to Speed Management.

The city's arterial segments were evaluated using the Speed Management Corridor Sorting Tool, which scores each 30+ mph arterial corridor with a range of factors such as speeding and crash data, equity, and infrastructure context. The city has an informed decision-making approach, beginning with organizing the corridors into eight distinct categories to assess varying differences and offering a local contextual understanding that may be contributing to speeding conditions for further review.

The Speed Management Corridor Sorting Tool requires several data inputs from various sources, including the following:

- Bellevue's latest HIN
- Speed Related Crash Data
- Speed Data
- Equity Composite Index (ECI) Score
- Bicycle Network Data
- Sidewalk Coverage
- Crosswalk Presence

In addition to the Speed Management Corridor Sorting Tool, a Countermeasure Toolbox was developed, which includes engineering and enforcement strategies for speed management on 30+ mph arterials. Alongside the land use, speed limit, and traffic considerations for each countermeasure, additional factors considered for the city's speed management may include, but are not limited to:

- Is the arterial a priority truck or emergency response route?
- Does the Fire Department have feedback or preferred speed management countermeasures?
- Are there horizontal or vertical curves?
- Where are driveways and intersections located?
- Are large vehicle turning movements affected?

In summary, the outputs from the Speed Management Corridor Sorting Tool assist city staff with selecting corridors for further evaluation and those that require speed management countermeasures. To track progress towards the 2030 Vision Zero goal, the SMP includes key performance indicators (KPIs) at both the citywide and corridor-specific scales that include:

- Speed-related fatal and serious injury crashes per year
- Percent of drivers exceeding speed limit 6+ mph
- Percent of drivers exceeding speed limit of 10+ mph
- Gap in Level of Traffic Stress goal in their Mobility Implementation Plan (MIP)

The citywide KPIs are tracked on an annual basis and corridor specific KPIs are measured in one-year post-implementation of the speed management countermeasures. These serve as interim checkpoints to ensure that the ultimate target of zero fatal or serious injury crashes on Bellevue's roads is met by 2030.

The TPA's proposed target speed methodology considered the SMP elements that assisted in fostering a widespread understanding of factors contributing to speeding conditions and the effectiveness of applied countermeasures.

Summary of Research

The Palm Beach TPA's Target Speed Methodology integrates leading industry strategies from national, state, and local documents including: FHWA's Safe System Approach, NACTO's City Limits Guide, FDOT's Context Classification Guide, MetroPlan Orlando's Speed Management Network Screening, Hillsborough TPO's Speed Management Plan, and the City of Bellevue's Speed Management Plan. These documents provide the essential guiding framework that informs fundamental speed management decisions.

Target Speed Methodology

The TPA's Speed Management study's intent is to identify appropriate Target Speeds and recommend speed management strategies to help reduce speeding and speed-related crashes on the Palm Beach TPA HIN roads.

Study Network

The Target Speed methodology assigns Target Speeds to Federal-Aid Highway Program (FAHP) not on the SHS in Palm Beach County, except for SHS roadways on the TPA HIN. FAHP are those that are either on the National Highway System (NHS) or have a functional classification of Urban Collector / Rural Major Collector, or higher.

For the SHS network overall, whether on the TPA HIN or not, FDOT District 4 (D4) has ownership and jurisdiction on SHS roads in Palm Beach County. The intent of this systemwide methodology is not to supersede any previous Target Speed recommendations made for SHS roads. Coordination and collaboration will be required with FDOT D4 for Target Speed assignments on SHS roads.

Segmentation

The study network includes data from multiple sources that were all joined to a single GIS line layer. To preserve as much data as possible, each network was first aggregated based on common values like number of lanes, functional class, posted speed, and Level of Traffic Stress (LTS).

Systemwide Preliminary Context Classification

FDOT D4 has developed a systemwide preliminary Context Classification (SPCC) for all FAHP in D4. The FDOT D4 "snapshot map" includes assigned project-level Context Classifications as well as future conditions SPCC for all other FAHP.

The FDOT D4 "snapshot map" Context Classification assignments were assumed for all FAHPs as part of the Palm Beach TPA Target Speed process, and no adjustments were made.

Proposed Target Speed Ranges and Approach

The Palm Beach TPA Target Speed ranges, shown in **Table 3**, were developed using a combination of the FDM Table 201.5.1 Design Speed ranges and the MetroPlan Orlando Speed Management Study. If the assigned Target Speed for a road was higher than the existing posted speed, then the Target Speed was set to equal the posted speed. This is also consistent with the MetroPlan Orlando Speed Management Study.

A difference from the MetroPlan Orlando ranges and the proposed Palm Beach TPA ranges is an increase to the upper range in C3R/C3C and C4 contexts to 45 mph. Based on Palm Beach County's existing land use patterns, roadway network, and infrastructure, this upper limit was selected to provide a smooth transition between existing posted speed and proposed Target Speeds.

Table 3. Proposed Palm Beach TPA Target Speed Ranges

	Roadway Type	C1 - Natural / C2 - Rural	C3R – Suburban Residential / C3C – Suburban Commercial	C4 – Urban General	C2T – Rural Town / C5 – Urban Center	C6 – Urban Core
SHS Target Speed Ranges*	All SHS Roads	55 – 70	35 – 55	25 – 45	25 – 45 (C2T) 25 – 35 (C5)	25 – 30
Non-SHS Target Speed Ranges	Arterial	35 – 55	30 – 45	25 – 45	25 – 30	20 – 25
	Collector	35 – 45	30 – 45	25 – 45	25 – 30	20 – 25
	Local	25 – 35	25 – 35	20 – 25	20 – 25	20 – 25

*Source: FDM Table 201.5.1 Design Speed Ranges; Note SIS minimums were not applied, see discussion below.

The FDM provides exceptions for Strategic Intermodal System (SIS) Design Speed minimums depending on Context Classification and additional criteria, as depicted in FDM Table 201.5.1 and in **Figure 6**. A Design Speed variation can also be processed for SIS roadways. Given these FDM exceptions and the intended application to identify roadways that have differences with the Target Speed and current posted or operating speed, the SIS minimums were not applied to the Target Speed ranges.

Figure 6. SIS Minimum Design Speed Notes (FDM Table 201.5.1)

Notes:

(1) SIS Minimum Design Speed may be reduced to 35 mph for C2T Context Classification when appropriate design elements are included to support the 35-mph speed, such as on-street parking.

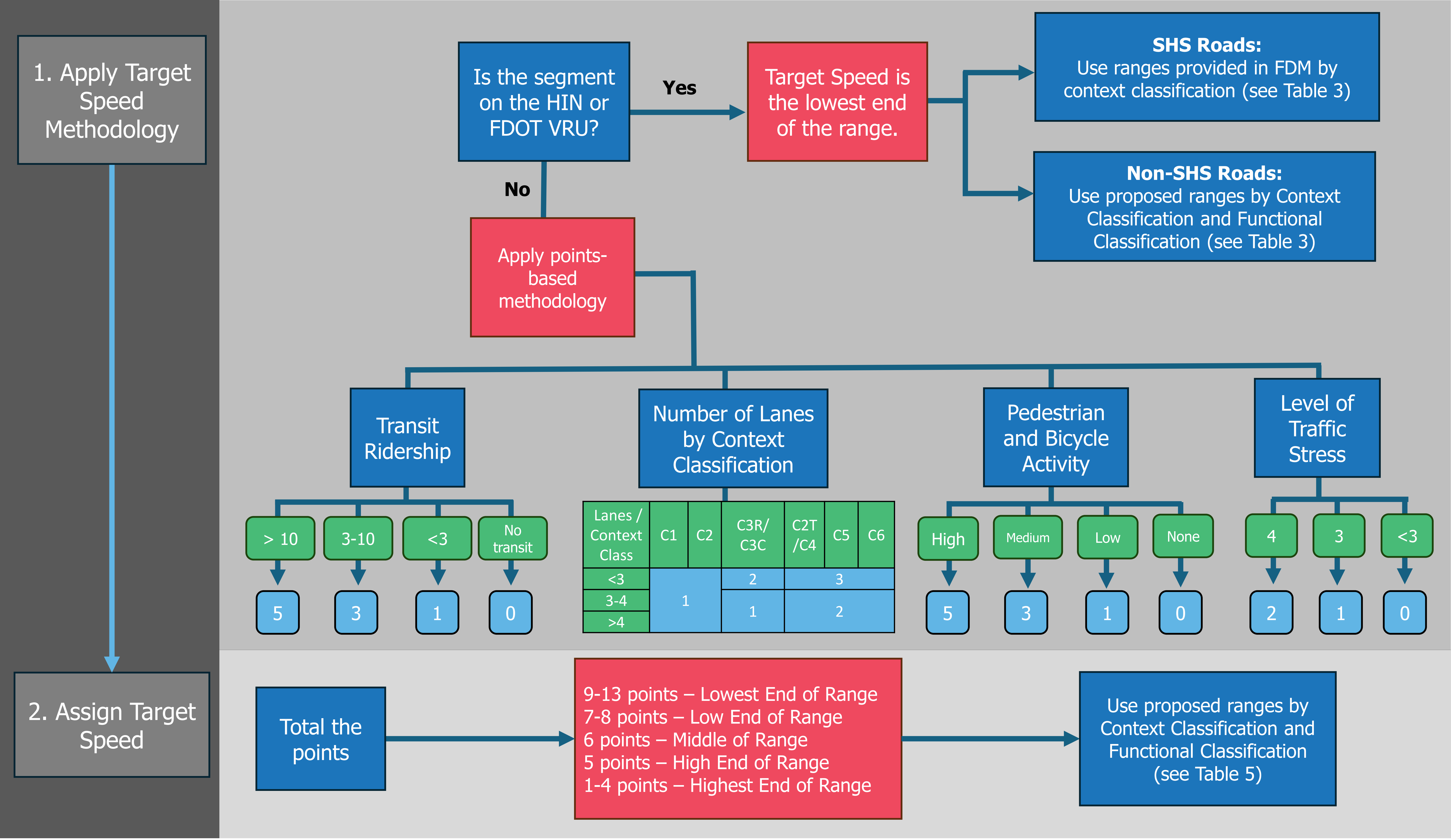
(2) SIS Minimum Design Speed may be reduced to 45 mph for curbed roadways within C3 Context Classification.

(3) For SIS facilities on the State Highway System, a selected Design Speed less than the SIS Minimum Design Speed requires a Design Variation as outlined in ***SIS Procedure (Topic No. 525-030-260)***.

(4) For SIS facilities not on the State Highway System, a selected Design Speed less than the SIS Minimum Design Speed may be approved by the District Design Engineer following a review by the District Planning (Intermodal Systems Development) Manager.

(5) SIS minimum Design Speed may be reduced to 30 mph for C2T, C3, and C4 for facilities with a transit route.

Figure 7 displays the applied methodology, that includes a point-based approach, and the remainder of this technical memorandum walks through the process. The FDOT Context Classification Guide provides the following Target Speed guidance by Context Classification: "In C1 and C2, start at the high end of the Target Speed range and justify a decrease, and in C2T through C6 contexts, start at the low end of the Target Speed range and justify an increase." Being on the Palm Beach TPA HIN and FDOT VRU provides justification for setting a Target Speed to the lowest end of the range for all Context Classifications.



Abbreviations:

HIN: High Injury Network

SHS: State Highway System

FDM: Florida Design Manual

VRU: Vulnerable Roadway Users

Target Speed Analysis

Using the proposed Target Speed ranges, a data driven approach to determining a preliminary Target Speed was developed using the following data sources along with FDOT Context Classification Guidance:

- Assigned Target Speed Range
  - Roadway Centerlines
  - Functional Classification
  - Roadway Ownership (On SHS versus Off-System)
  - FDOT D4 Context Classification Snapshot Map
- Safety Data
  - Palm Beach TPA HIN
  - FDOT Vulnerable Roadway Users (VRU)
- Transit Data
  - Palm Tran Stop Level Transit Ridership
- Geometric Data
  - Number of Lanes
- Pedestrian and Bicycle Considerations
  - Palm Beach TPA Level of Traffic Stress (LTS)
  - Replica Origin-Destination data

Data Sources and Processing

Data was obtained from different sources which required additional geoprocessing to create the input network used for assigning target speeds.

Palm Beach County Centerlines

The base roadway network that was used for the Target Speed analysis was a roadway centerlines layer obtained from the TPA. This layer contained basic roadway information including roadway name, functional classification, responsible authority, number of lanes, and speed limit. Flags were added to this layer indicating segments that were FAHP eligible.

Palm Beach TPA High Injury Network (HIN)

The Palm Beach TPA HIN layer was obtained from the TPA and was attached to the same centerline geometry as the Palm Beach County Centerlines layer. This made it easy to select the segments of the centerlines layer on the TPA HIN and add a flag.

Palm Beach TPA Level of Traffic Stress (LTS)

The Palm Beach TPA LTS layer was obtained from the TPA and was attached to the same centerline geometry as the Palm Beach County Centerlines layer. The bicycle LTS was joined to the centerlines layer by segment ID.

Palm Tran Stop-level Ridership

Transit ridership data, both boardings and alightings, were provided by Palm Tran at the stop level. This data was joined to the Palm Beach County centerlines layer by creating a 150-foot buffer around the centerlines layer and performing a spatial join. Ridership at the segment level was determined by totaling the boardings and alightings by stop and assigning the maximum total to the entire segment.

FDOT District 4 Context Classification Snapshot

Context classification data was obtained from District 4's Context Classification Snapshot, which includes the most up to date project level context classifications. This data came attached to a different roadway network layer than the Palm Beach County centerlines layer, so the context classifications had to be joined to the centerlines. This was done by creating a 50-foot buffer around the context classification snapshot layer and joining that to the centerlines layer with a spatial join. Since the two layers had different segmentations, the context classification for each segment was manually checked and split where necessary to ensure accuracy.

FDOT Vulnerable Road Users (VRU) Network

The FDOT Vulnerable Road Users Network was provided by the TPA and considered alongside the TPA's HIN when determining target speed assignments. Like how the context classification data was joined to the Palm Beach County centerlines layer, a 50-foot buffer around the VRU layer was created and spatially joined to the centerlines layer. Manual inspection and splits were made where necessary to ensure accuracy.

Replica Bicycle and Pedestrian Trip Origin and Destination Totals

The total number of bicycle and pedestrian trips was obtained from Replica, an online tool and data source containing trip origin and destination data. These totals were used to determine bicycle and pedestrian activity levels. Replica origin-destination data is provided at the block group level and was joined to the centerlines layer by a spatial join (intersect). The total number of trips per segment was calculated by taking the average of the spatially joined origin-destination totals by segment ID.

Assigned Target Speed Range

The Palm Beach TPA roadway centerlines served as the base network for this analysis. The data in the roadway centerlines included posted speed limit, roadway ownership, number of lanes, and functional classification. As a first step, the file was filtered to exclude roadways that were not part of the FAHP or TPA HIN. The process of filtering included selecting the FAHP from the base network using its functional classification and where roads on the FAHP and TPA HIN overlapped, the segments were marked to indicate that they were part of the TPA HIN.

The FDOT D4 Context Classification layer was joined to the Palm Beach TPA roadway centerlines. The combination of functional classification and Context Classification allowed for the appropriate Target Speed range to be assigned to the network.

Safety Data

The Palm Beach TPA HIN and FDOT VRU were used to provide a basis for safety conditions on the surrounding roadway network. These networks highlight corridors with fatal and serious injury crashes and/or roadways that have risk characteristics for vulnerable roadway users.

With the Palm Beach TPA's Vision Zero commitment, it is proposed that roadways that are on the TPA HIN or VRU have the ***lowest*** Target Speed in the applicable range.

The FDOT Context Classification Guide provides support for the application of safety data, and when refining the Target Speed considers potential safety challenges along with crash frequency and severity.

While setting the lowest speed for some TPA HIN or FDOT VRU roadways may result in large differences between Target Speed and existing posted speed for some corridors, this approach emphasizes the need for speed management countermeasures to improve safety outcomes.

Points Based Approach

For roadway segments that were not included on the TPA HIN or FDOT VRU, a points-based methodology was developed to determine whether a segment's preliminary Target Speed falls in the lower, middle, or upper end of the segment's Target Speed range.

Transit Data

Using the Palm Tran stop level ridership data, transit ridership was calculated by taking the maximum total ridership for a segment and assigning that total to the entire segment. Since high transit ridership suggests high levels of pedestrian and bicycle activity in addition to those users needing to cross the street, roadways with high transit activity have lower Target Speed assignments. Both the NACTO City Limits Guide and FDOT Context Classification Guide emphasize non-motorist activity when recommending Target Speeds.

From the network boarding and alighting data, roadway segments were assigned the following points:

Transit Ridership	Assigned Points
Greater than 10 riders	5 points
Between 3 and 10 riders	3 points
Less than or equal to 3 riders	1 point
No Transit	0 points

Bicycle and Pedestrian Activity Data

The NACTO City Limits Guide uses activity levels as part of its methodology for determining speed limit. One of the main factors for activity levels is bicycle and pedestrian traffic. Using Replica data, the total traffic was calculated and divided into three categories based on percentile: high, moderate, and low. The percentiles were assigned the following points:

Activity Level	Assigned Points
High (Above 66th Percentile)	3 points
Moderate (Between 33rd and 66th Percentiles)	2 points
Low (Below 33rd Percentile)	1 point
No Activity (No Recorded Trips)	0 points

Geometric Data

Roadway number of lanes was used as another metric in determining Target Speeds. Points were assigned based on the assumption that larger facilities (i.e., more lanes) are inherently designed to carry more traffic and provide mobility/throughput which often corresponds with higher speeds. Roadway segments were assigned the following points:

<table>
<tr><th></th><th>C1</th><th>C2</th><th>C3R/C3C</th><th>C2T/C4</th><th>C5</th><th>C6</th></tr>
<tr><td><3 lanes</td><td colspan="2" rowspan="3">1 point</td><td>2 points</td><td colspan="3">3 points</td></tr>
<tr><td>3-4 lanes</td><td rowspan="2">1 point</td><td colspan="3" rowspan="2">2 points</td></tr>
<tr><td>>4 lanes</td></tr>
</table>

Level of Traffic Stress (LTS) Adjustment

Level of Traffic Stress is a metric in determining Target Speed given pedestrians and bicyclists are more likely to suffer severe crash outcomes (fatal and severe injury) related to speeding vehicles. From the TPA's 2045 Long Range Transportation Plan, LTS is an analysis that considers the supply of roadways and pedestrian infrastructure and generates a score that then represents a user's estimated level of comfort, or "traffic stress" on the street. The LTS scores can be used to understand who may be willing to use the facilities based on its conditions. A lower LTS score corresponds to a more comfortable street to walk or bike on regardless of ability. The higher a road's LTS, the more stressful that road is to walk or bike on. This LTS scale goes from 1 to 4, with 1 being the least stressful and 4 being the most stressful. Vehicle speed is included as a factor for determining both pedestrian and bicycle LTS. Surrounding higher vehicle speeds correspond to more stressful walking and biking environments. Slower vehicle speeds create a more comfortable walking and bicycling experience for people of all ages and abilities. LTS was assigned the following points:

LTS Designation	Assigned Points
LTS 4	2 points
LTS 3	1 point
LTS 2 or 1	0 points

Target Speed Points Breakdown

The Target Speed Ranges were broken into three different buckets: Low, Medium, and High. Some of the proposed Target Speed ranges, like the C6 Arterial Target Speed Range of 20 – 25 mph, cannot be separated into Low, Medium, and High buckets since there are only two possible Target Speed outcomes. To address this issue, a further breakdown of the point totals for each context classification is provided in **Table 4**. The *italicized* Target Speeds correspond to point totals without a matching Target Speed. In these cases, the next lowest possible Target Speed was assigned.

Segment Smoothing

Once all segments were assigned a Target Speed, a segment smoothing process was applied to the network to handle potential conflicts in context classification and the associated Target Speed (e.g. a C2 segment with a Target Speed of 55 mph adjacent to a C4 segment with a Target Speed of 40 mph). This smoothing was applied at the corridor level and will ensure Target Speed consistency within the broader context. A detailed list of steps is provided below:

- Assign target speeds to all segments to create a Target Speed Assigned network.
- **Dissolve** the Target Speed Assigned network into one line feature.
- **Generate Points Along Lines** on the Dissolved Target Speed Assigned network every half mile.
- **Split** the Dissolved Target Speed Assigned network by the points to create approximately half mile line segments.
- **Feature to Point** to convert the original Target Speed Assigned network line segments to centroids.
  - **Inside** box is checked before running the tool.
- **Spatial Join** the original Target Speed Assigned network centroids to the Split Dissolved Target Speed Assigned network.
  - Set the **Merge Rule** for Target Speed Assignment field to **Median.**
- **Select by Attribute** and **Calculate Field** to round target speeds down to the nearest 5 mph.
- **Intersect** the Spatially Joined network with the original Target Speed Assigned network.

Table 4. Detailed Target Speed Range Breakdown

Roadway Type	Points	C1 / C2	C3R / C3C	C4	C2T / C5	C6
SHS Roads	Lowest (9-13)	55	35	25	25	25
	Low (7-8)	*55*	40	30	30	*25*
	Middle (6)	60	45	35	35	*25*
	High (5)	65	50	40	40 (C2T)	*25*
	Highest (<=4)	70	55	45	45 (C2T)	30
Arterial	Lowest (9-13)	35	30	25	25	20
	Low (7-8)	40	*30*	30	*25*	*20*
	Middle (6)	45	35	35	*25*	*20*
	High (5)	50	40	40	*25*	*20*
	Highest (<=4)	55	45	45	30	25
Collector	Lowest (9-13)	35	30	25	25	20
	Low (7-8)	*35*	*30*	30	*25*	*20*
	Middle (6)	40	35	35	*25*	*20*
	High (5)	*40*	40	40	*25*	*20*
	Highest (<=4)	45	45	45	30	25
Local	Low (7-12)	25	25	20	20	20
	Middle (5-6)	30	30	*20*	*20*	*20*
	High (<=4)	35	35	25	25	25

Appendix B – Operating Speed Data Methodology and Results

Operating Speed Data Methodology

The road network was segmented based on the direction of travel, with TMC codes categorized into positive (northbound/eastbound) and negative (southbound/westbound) directions. In certain cases, additional segmentation of TMC codes was necessary to ensure the GIS linework accurately reflected the RITIS data. The original GIS linework was slightly longer than the segmentation provided by RITIS, so the "Split" function was used to adjust the linework, ensuring correct TMC representation within the network.

After completing the segmentation, the TMC data was joined with the TMC codes on the HIN to facilitate a Speed Comparative Analysis. The process of joining the data in GIS involved several steps:

1. The positive dissolved network was intersected with the target speed assignment layer.
2. The output from this intersection was then intersected with the negative dissolved network.
3. The positive and negative TMC networks were dissolved by TMC code.
4. The "regular_csv" speed data was joined to the dissolved TMC networks using the TMC code.
5. The Target Speed Assignment network was combined with the dissolved Positive TMC network using ArcGIS Pro's Intersect function.
6. The Intersected Target Speed Assignment and Positive TMC network was then combined with the Negative TMC network using the Intersect function in ArcGIS Pro.
7. This process resulted in a combined shapefile that included both the Positive and Negative TMC Codes, along with their associated attributes for the following fields:
    a. Weekday
        i. 85th Percentile Speed
        ii. 50th Percentile Speed
        iii. Average Speed
    b. Weekend
        i. 85th Percentile Speed
        ii. 50th Percentile Speed
        iii. Average Speed
    c. Overnight
        i. 85th Percentile Speed
        ii. 50th Percentile Speed
        iii. Average Speed

Operating Speed Data Results

Figure 16 through **Figure 23** depicts operating speed data.

Palm Beach Transportation Planning Agency

Weekday 50th Percentile Speed

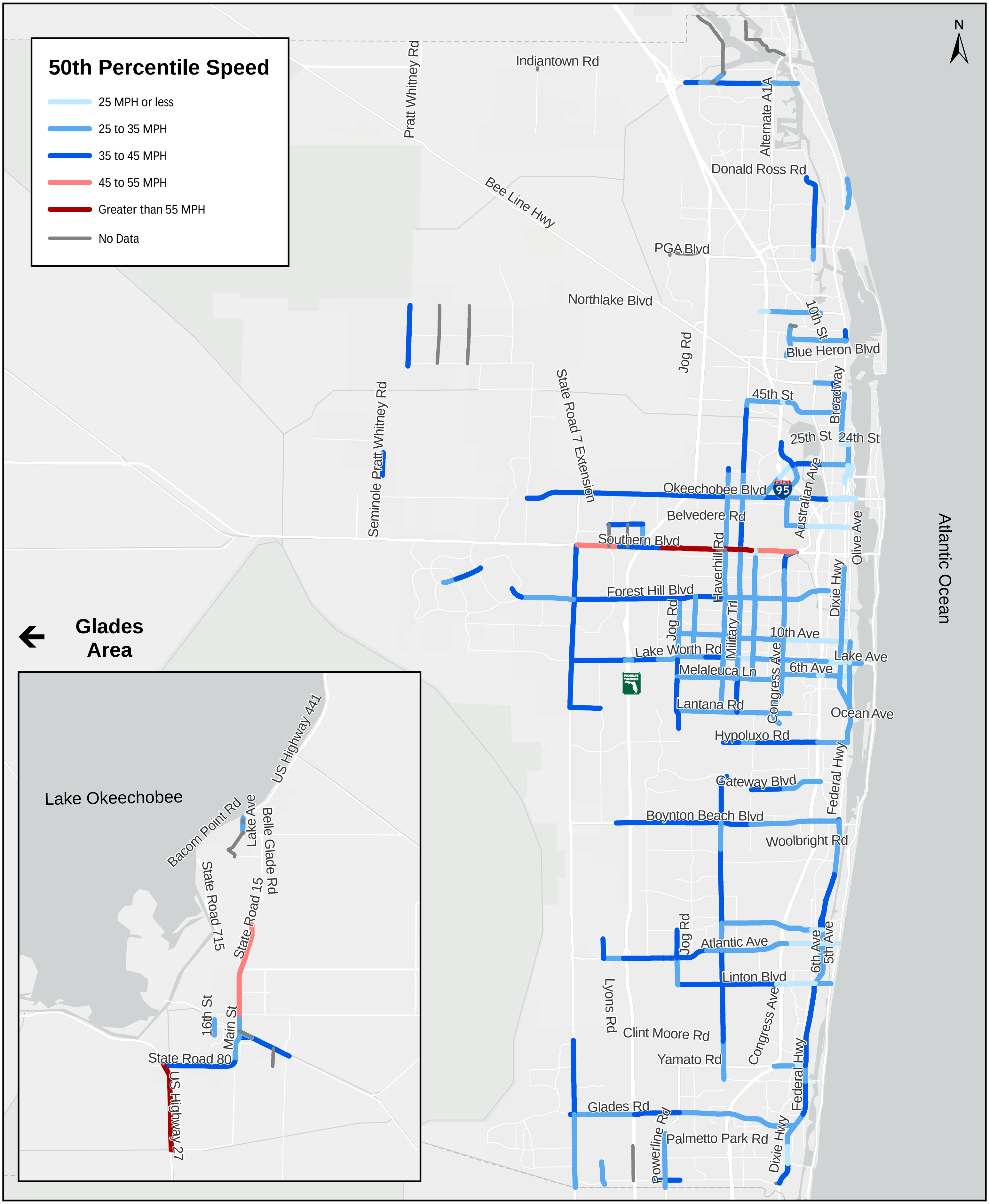


Figure 15

Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Weekday Mean Speed

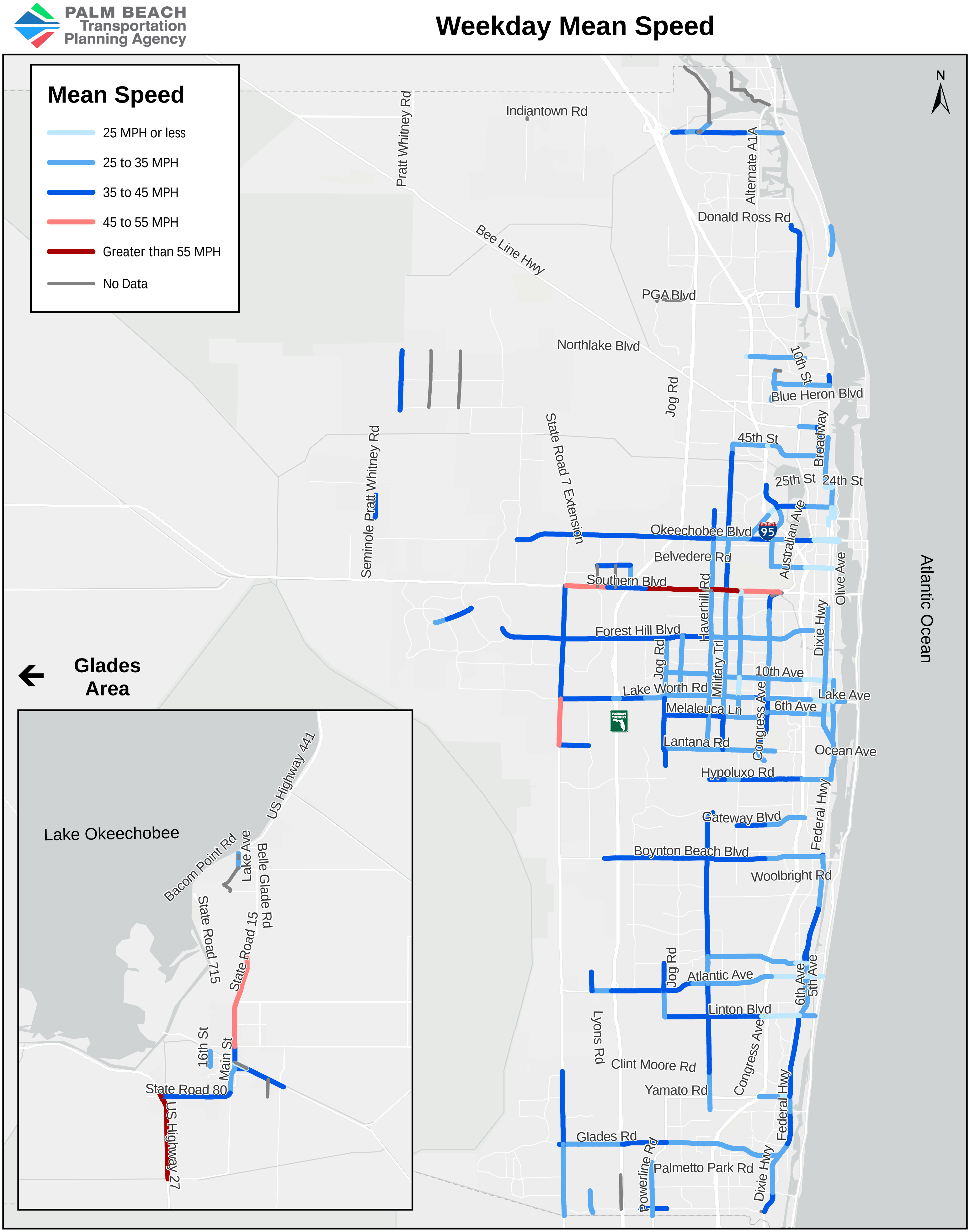


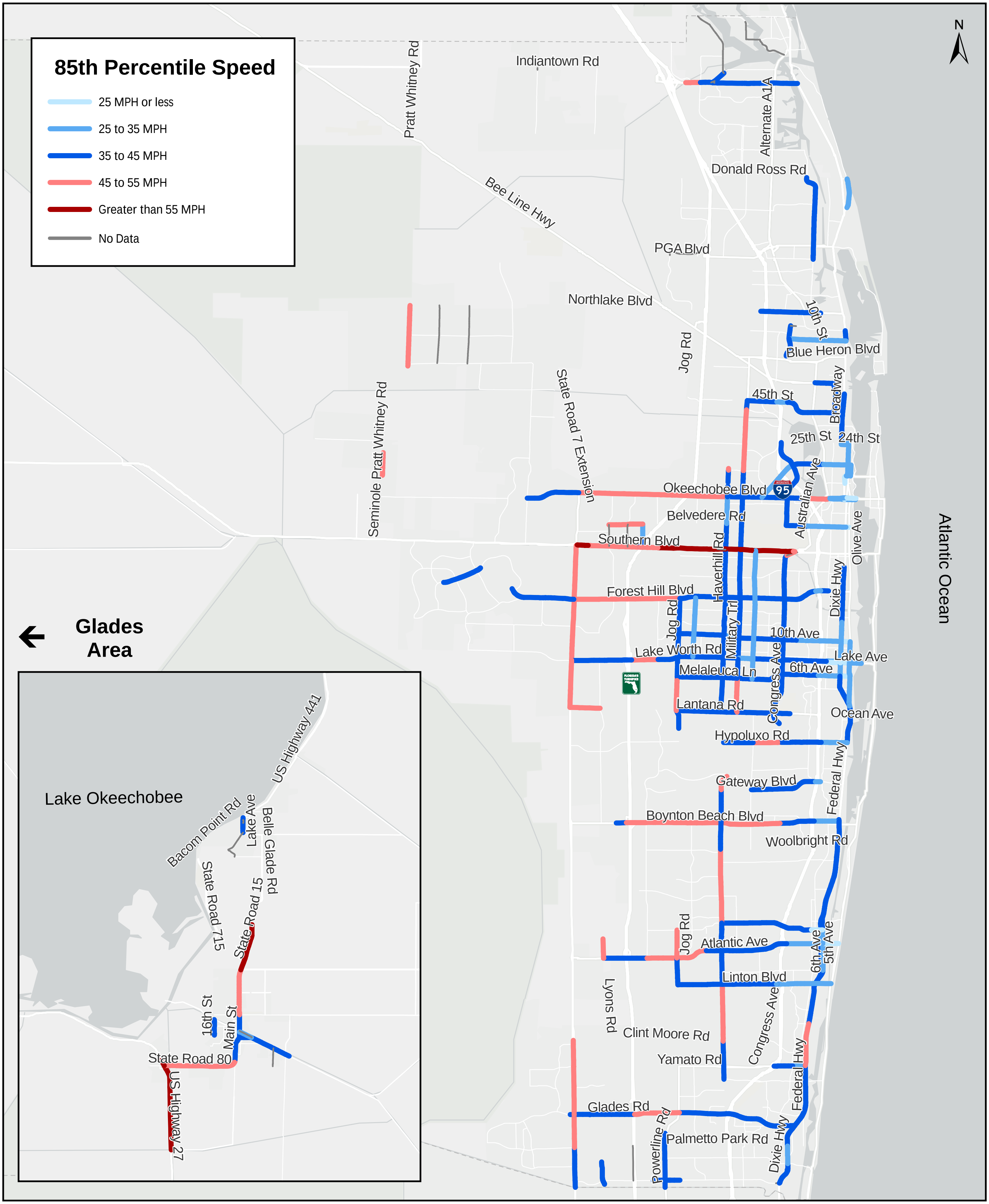
Figure 16

Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

PALM BEACH Transportation Planning Agency

Weekend 85th Percentile Speed



Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 17

0 1 2 4 6 8 Miles

Weekend 50th Percentile Speed

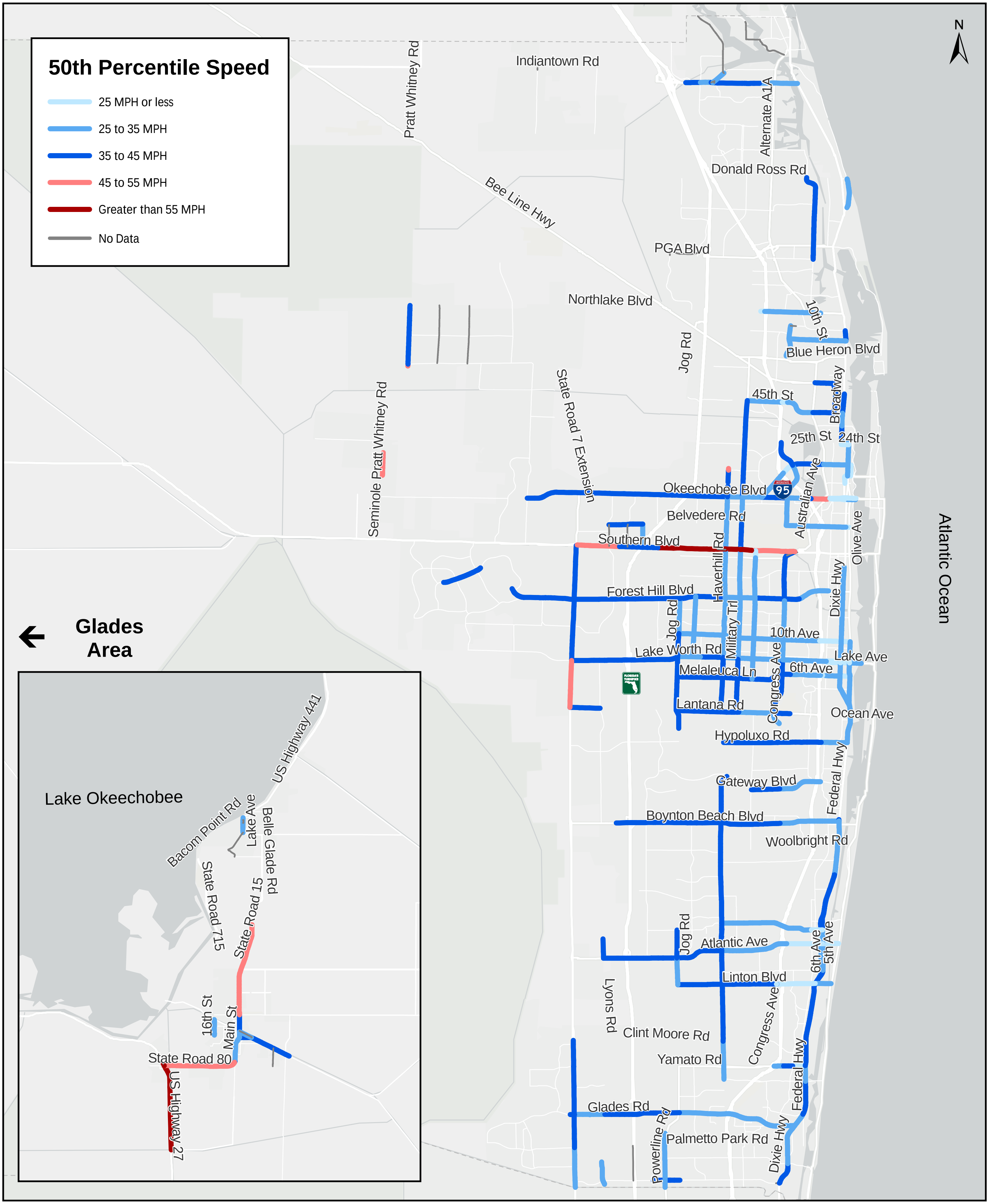


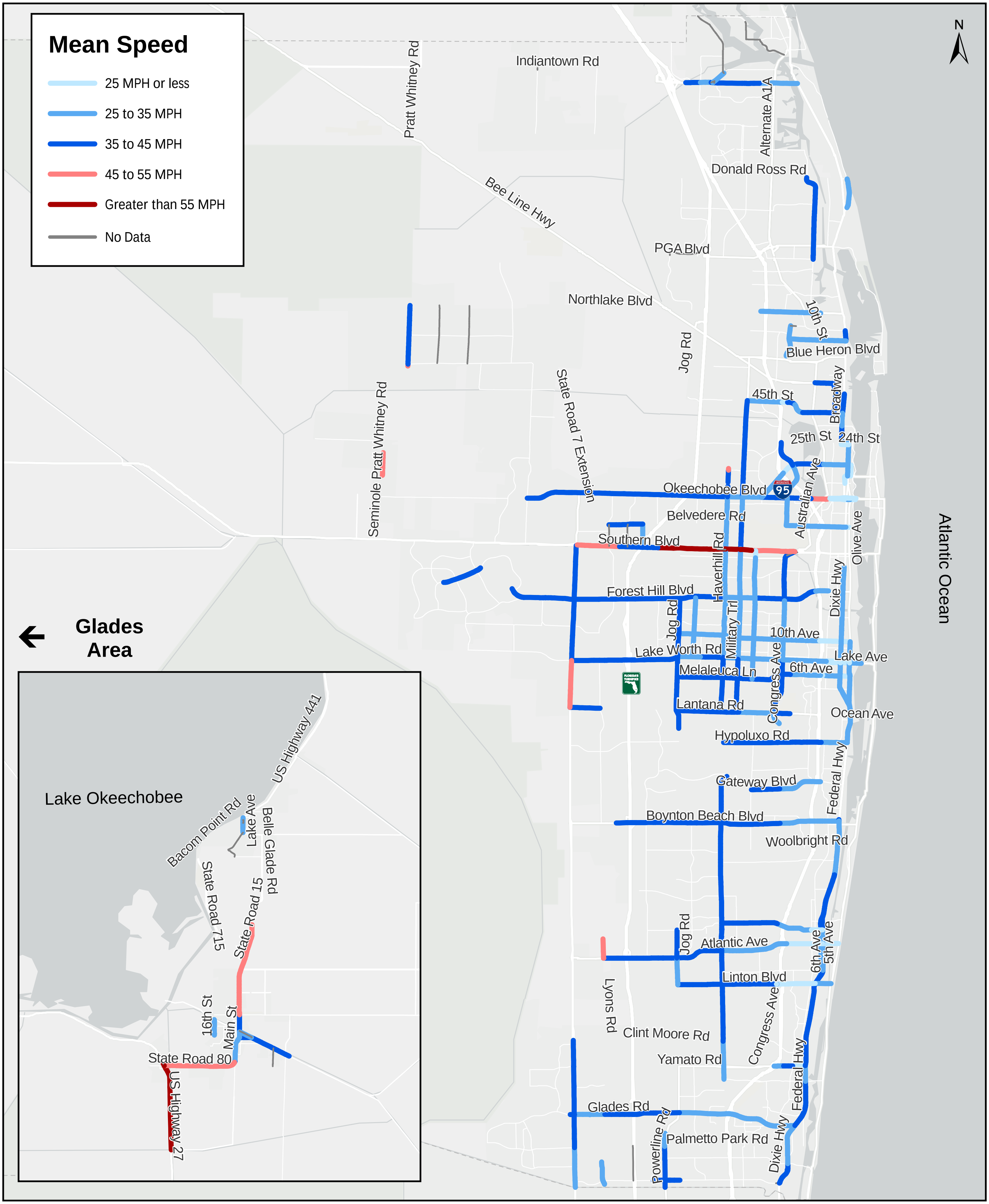
Figure 18

Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

PALM BEACH Transportation Planning Agency

Weekend Mean Speed



Date: 8/7/2024

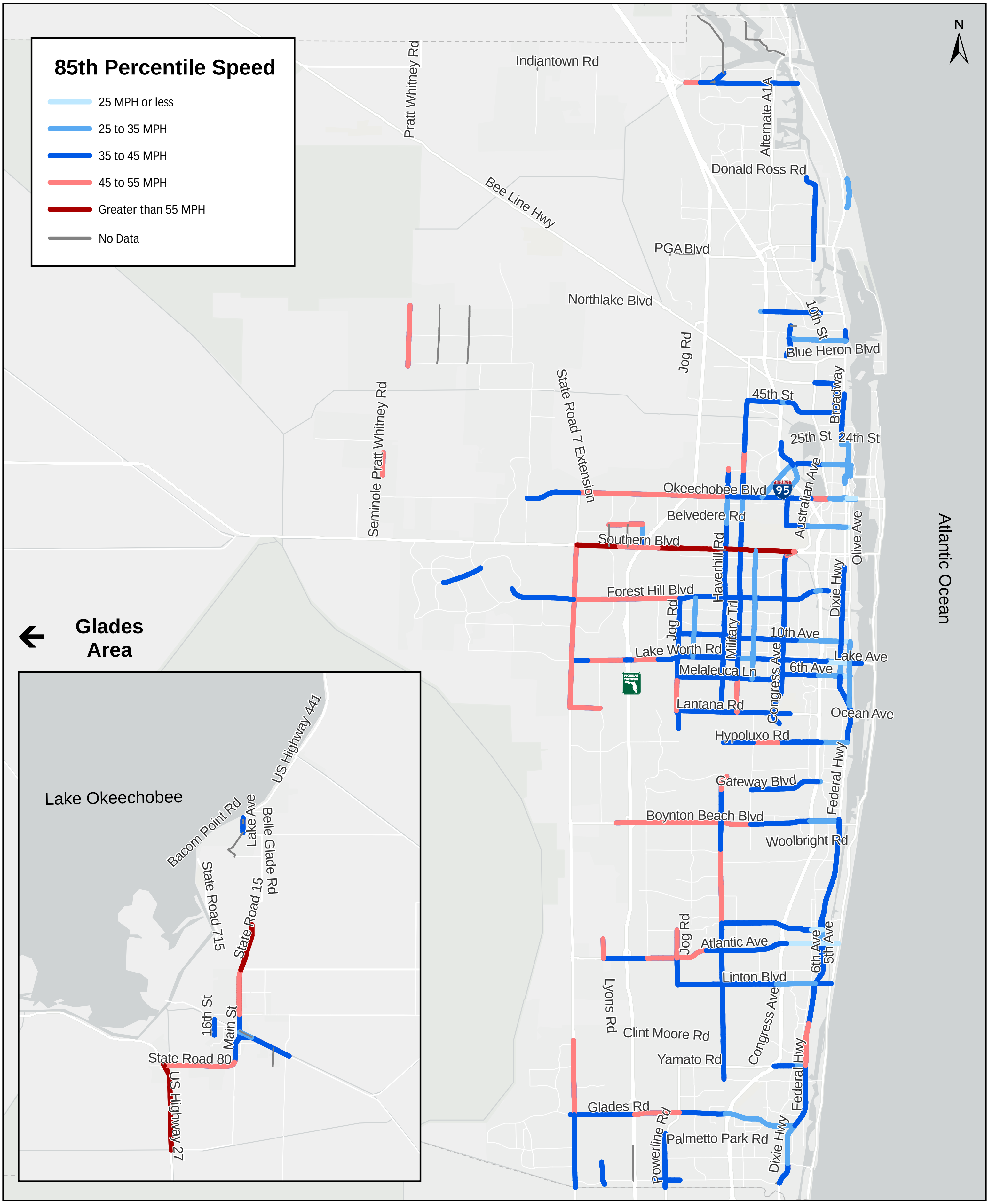
Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 19

0 1 2 4 6 8 Miles

Palm Beach Transportation Planning Agency

Overnight 85th Percentile Speed



Date: 8/7/2024

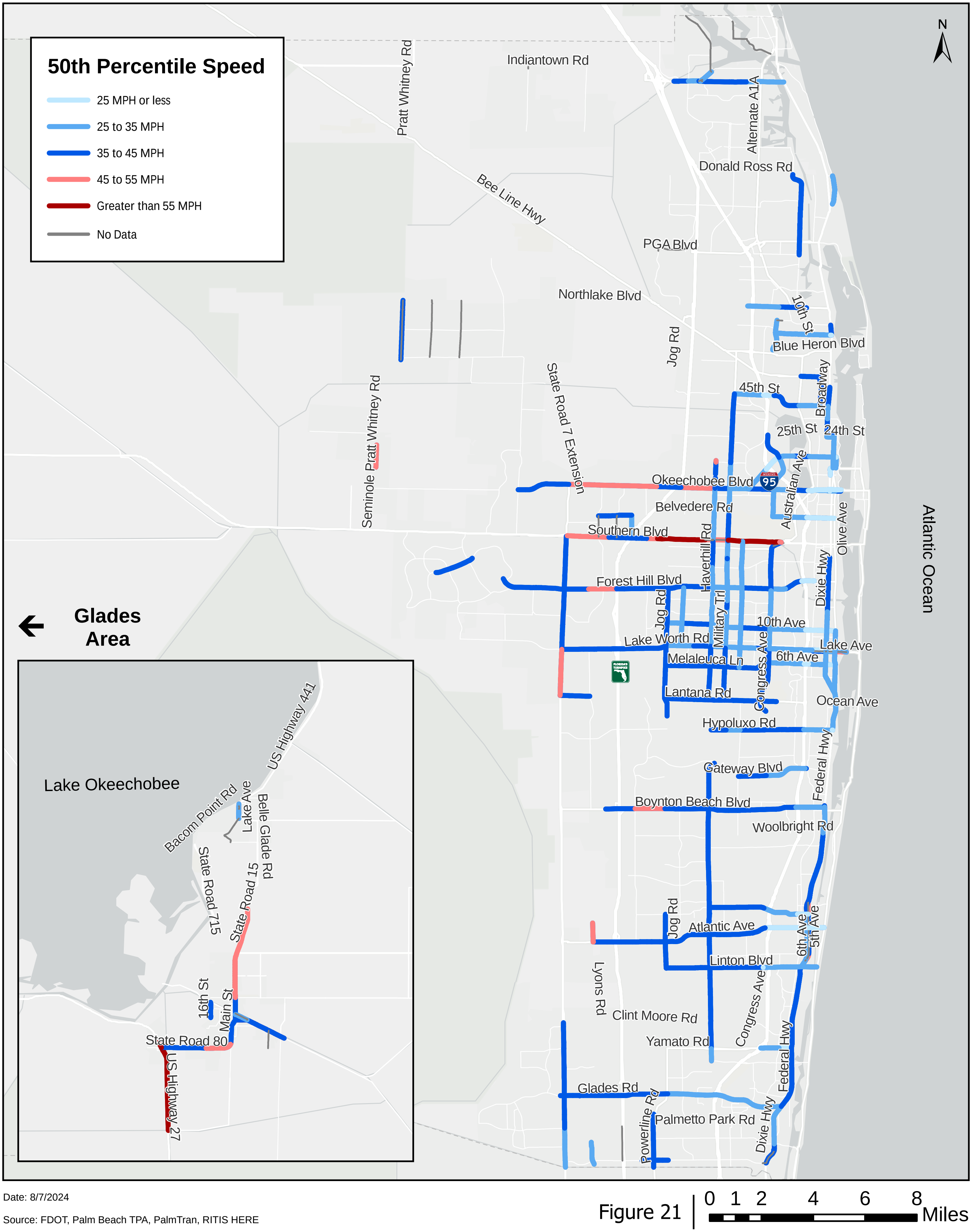
Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 20

0 1 2 4 6 8 Miles

Palm Beach Transportation Planning Agency

Overnight 50th Percentile Speed



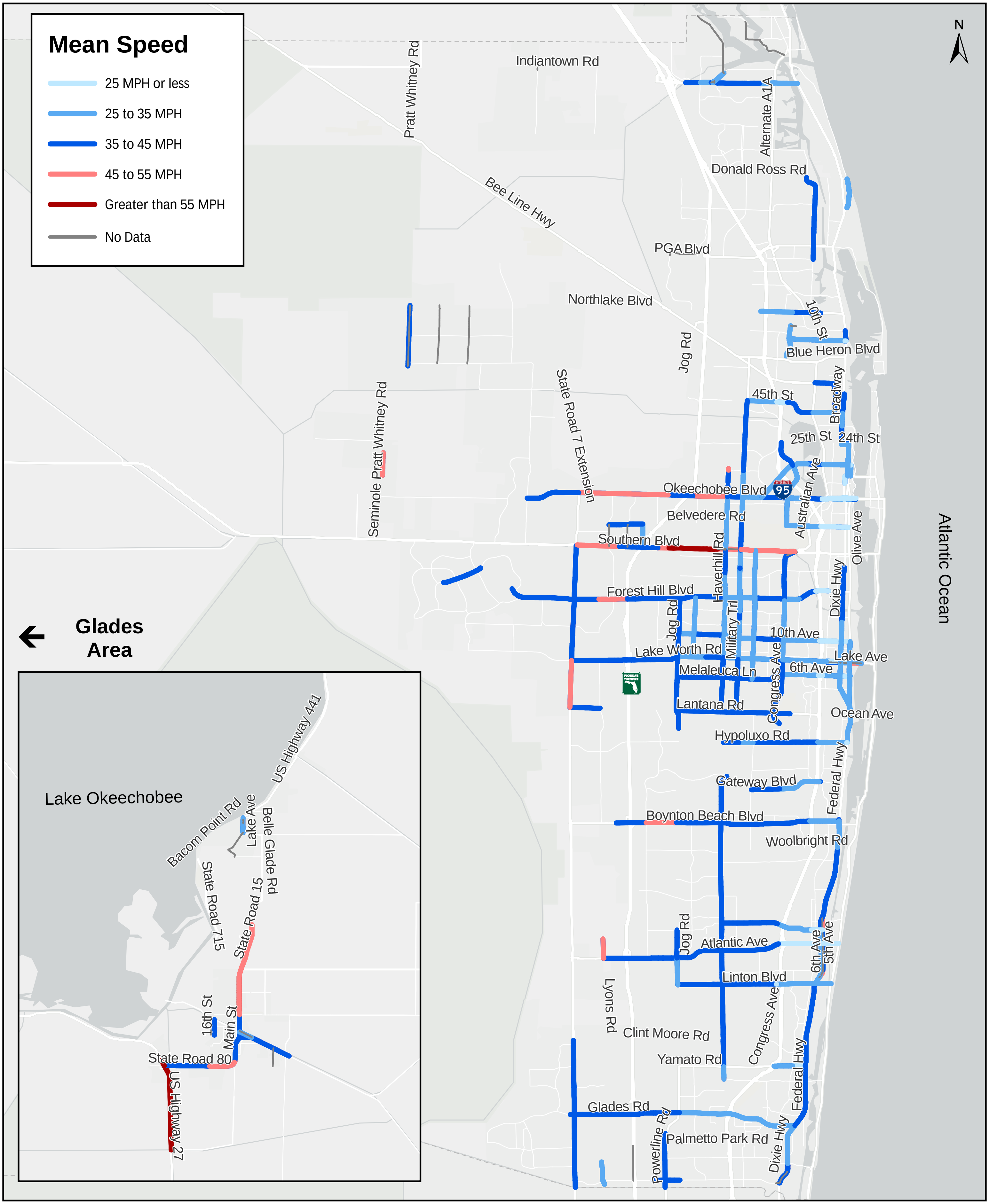
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 21

PALM BEACH Transportation Planning Agency

Overnight Mean Speed



Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 22

0 1 2 4 6 8 Miles

Appendix C – Speed Comparison Methodology and Results

Speed Comparison Methodology

After the positive and negative TMC speed data were combined onto a single line segment, the maximum value for the 85th percentile, 50th percentile, and average speed was selected for each period. This provided a single set of 85th percentile, 50th percentile, and average speeds for each segment across all time periods. Once the maximum values were determined, the posted speed data was subtracted from the corresponding speed data:

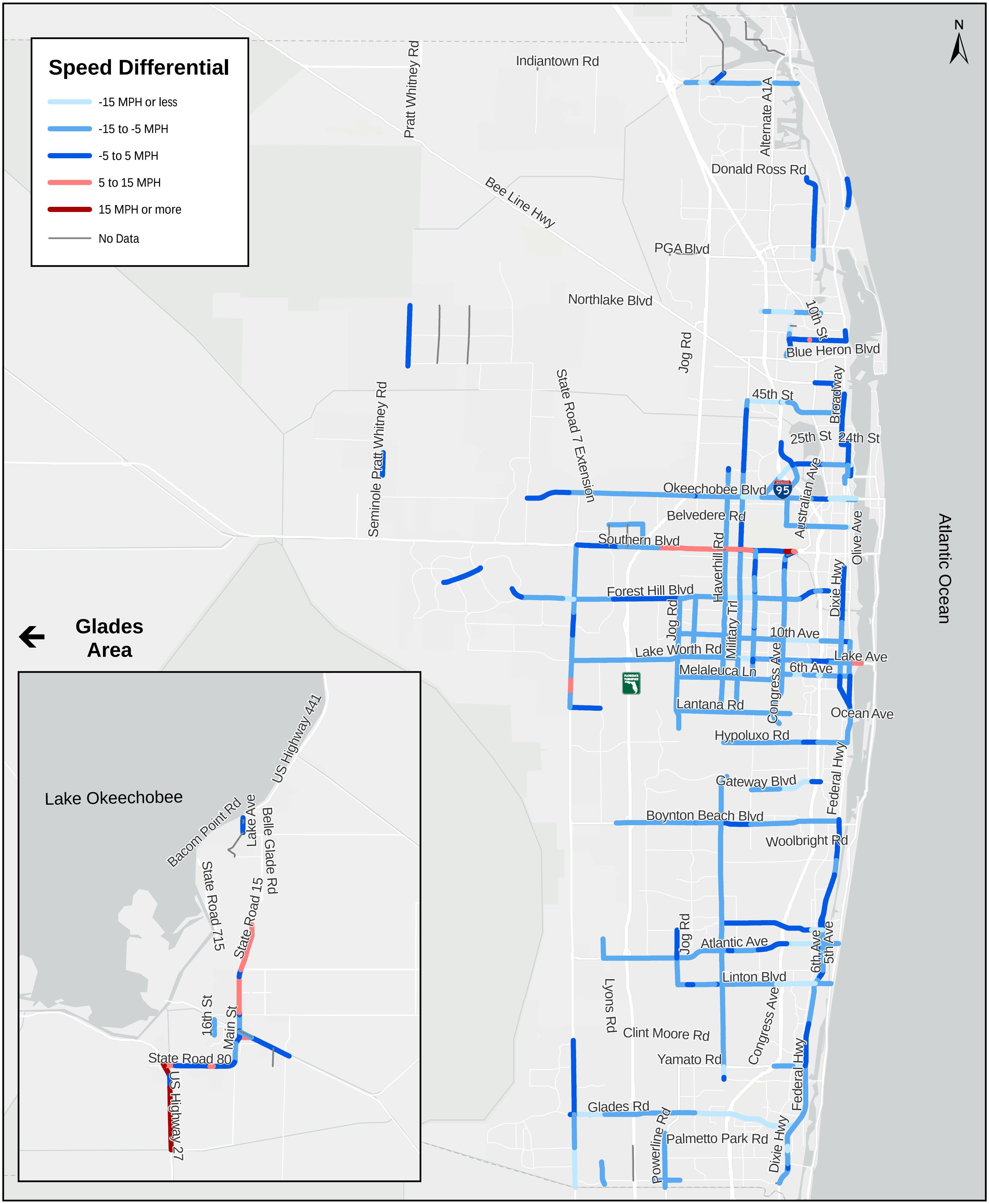
- Weekday
  - 85th Percentile Speed – Posted Speed
  - 50th Percentile Speed – Posted Speed
  - Average Speed – Posted Speed
- Weekend
  - 85th Percentile Speed – Posted Speed
  - 50th Percentile Speed – Posted Speed
  - Average Speed – Posted Speed
- Overnight
  - 85th Percentile Speed – Posted Speed
  - 50th Percentile Speed – Posted Speed
  - Average Speed – Posted Speed

Speed Comparison Results

Figure 24 through **Figure 31** depicts the speed comparison results

PALM BEACH Transportation Planning Agency

Weekday 50th Percentile Speed Minus Posted Speed



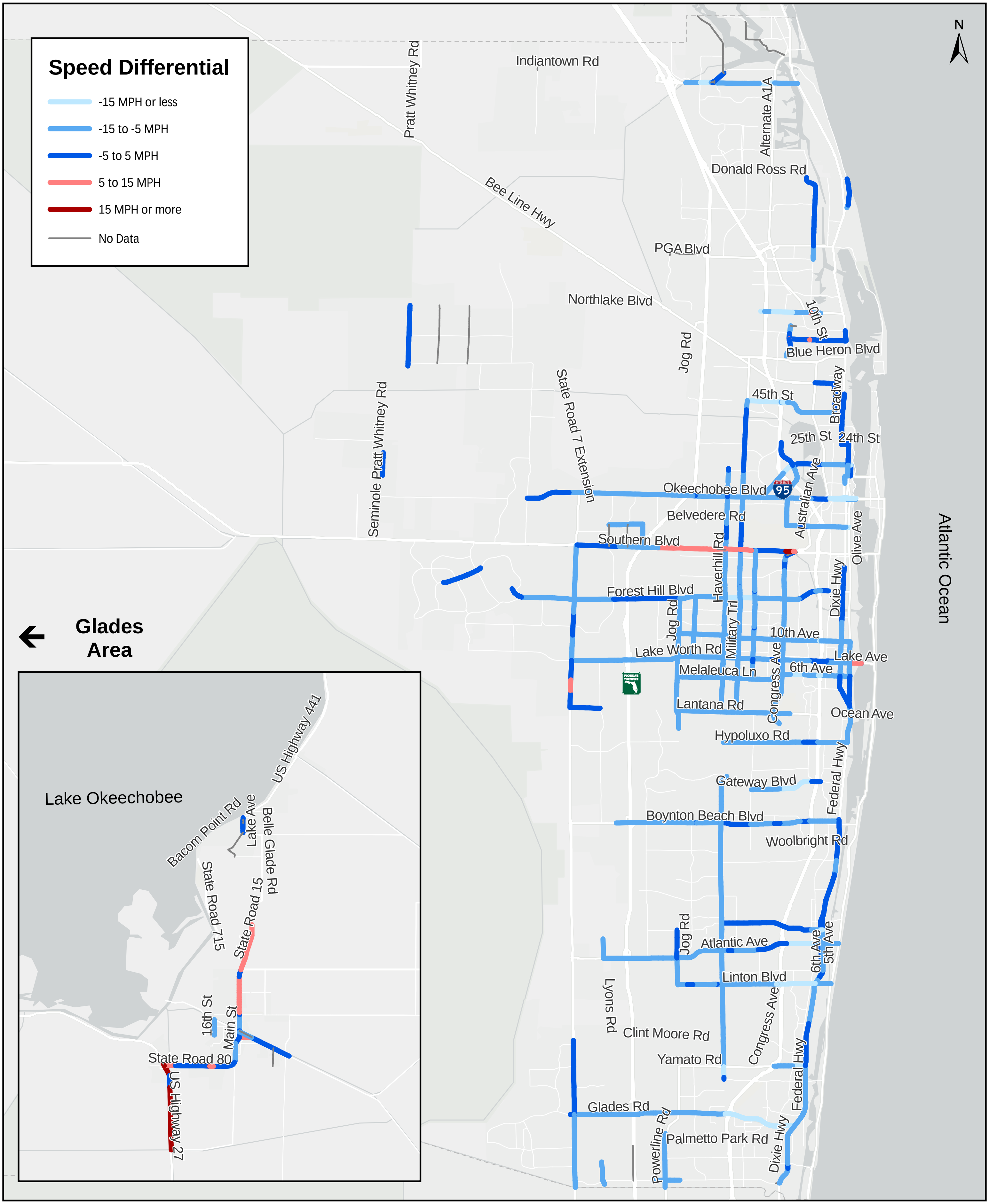
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 23

0 1 2 4 6 8 Miles

Weekday Mean Speed Minus Posted Speed



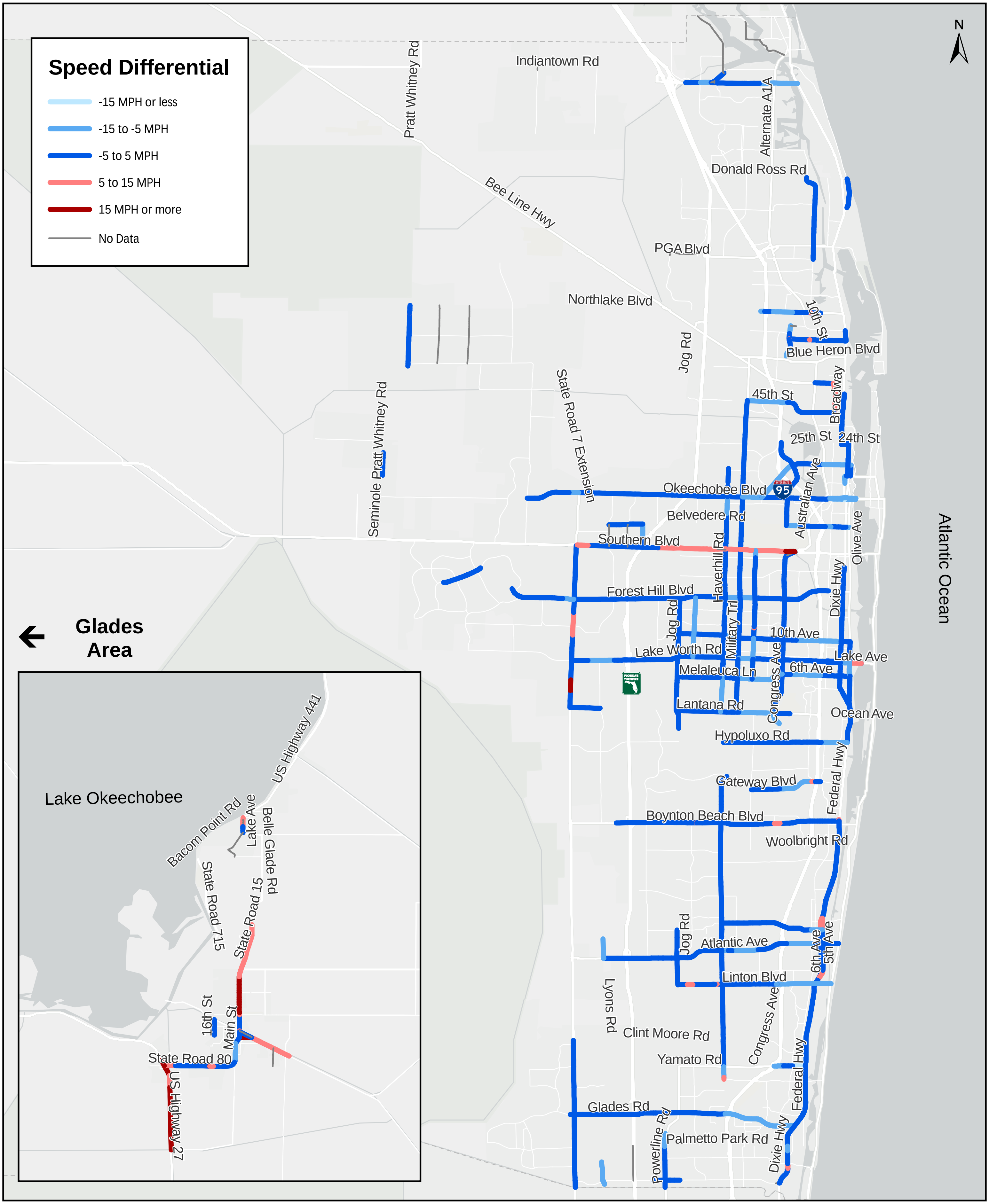
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 24

PALM BEACH Transportation Planning Agency

Weekend 85th Percentile Speed Minus Posted Speed



Date: 8/7/2024

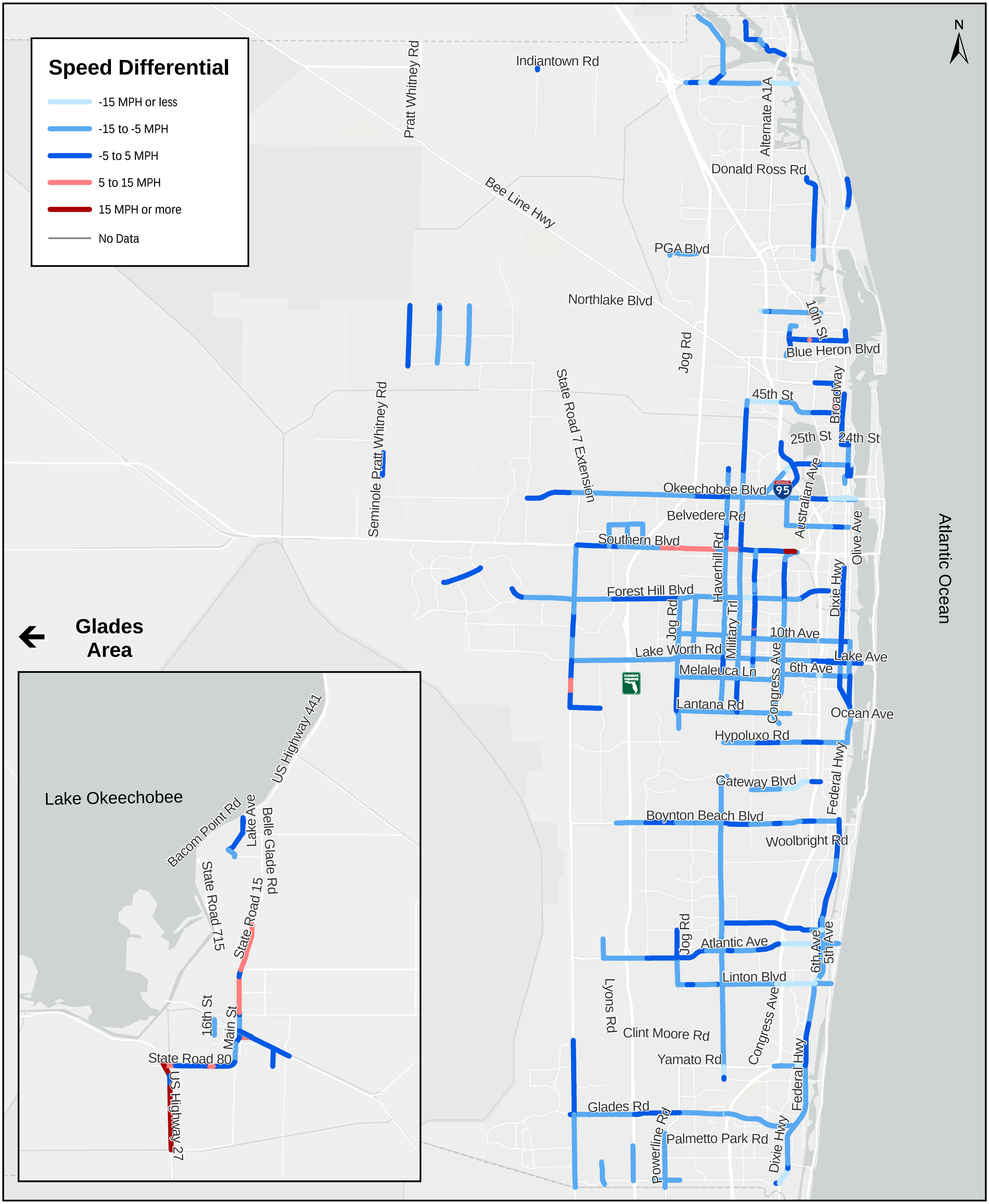
Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 25

0 1 2 4 6 8 Miles

PALM BEACH Transportation Planning Agency

Weekend 50th Percentile Speed Minus Posted Speed



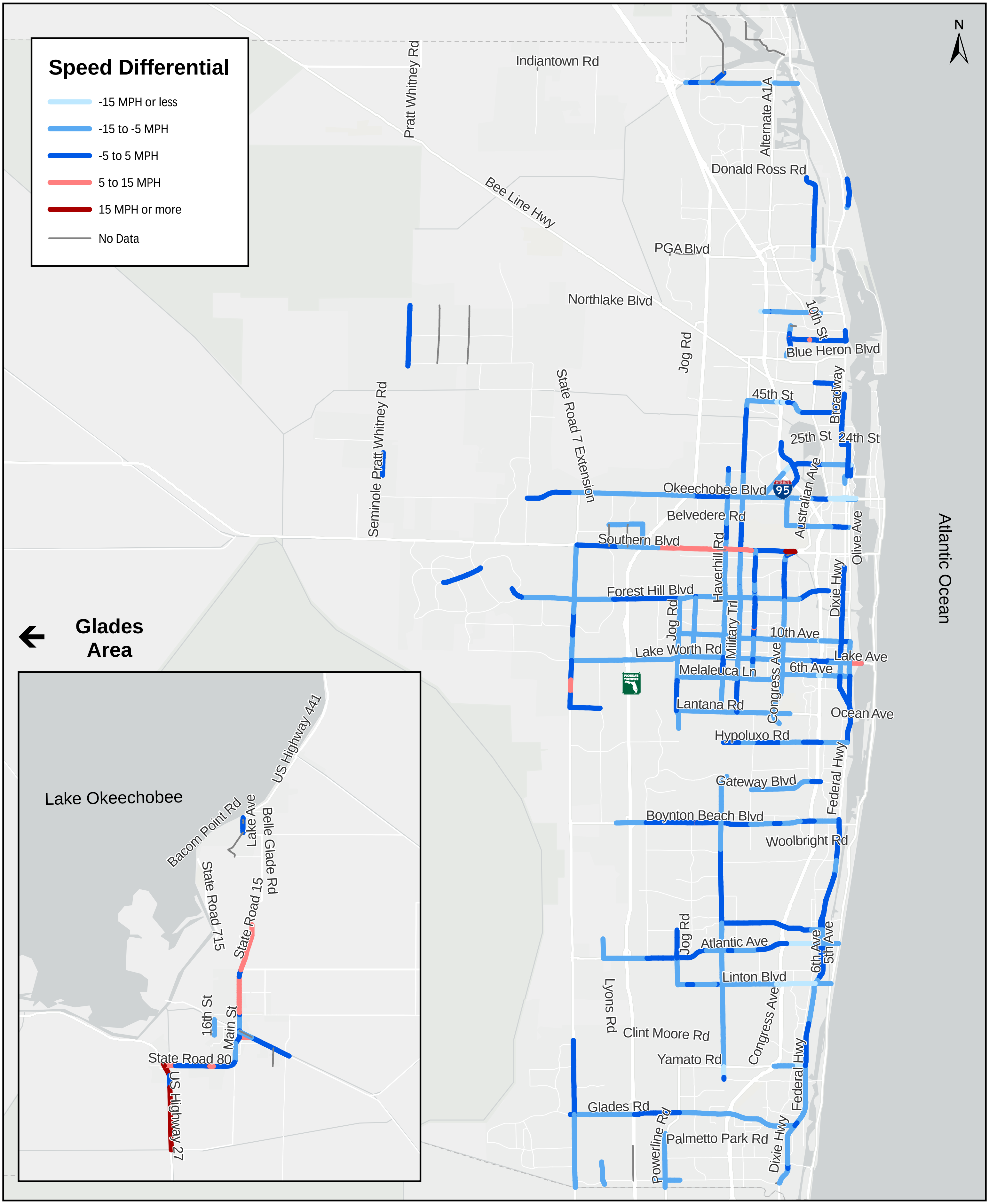
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 26

PALM BEACH Transportation Planning Agency

Weekend Mean Speed Minus Posted Speed



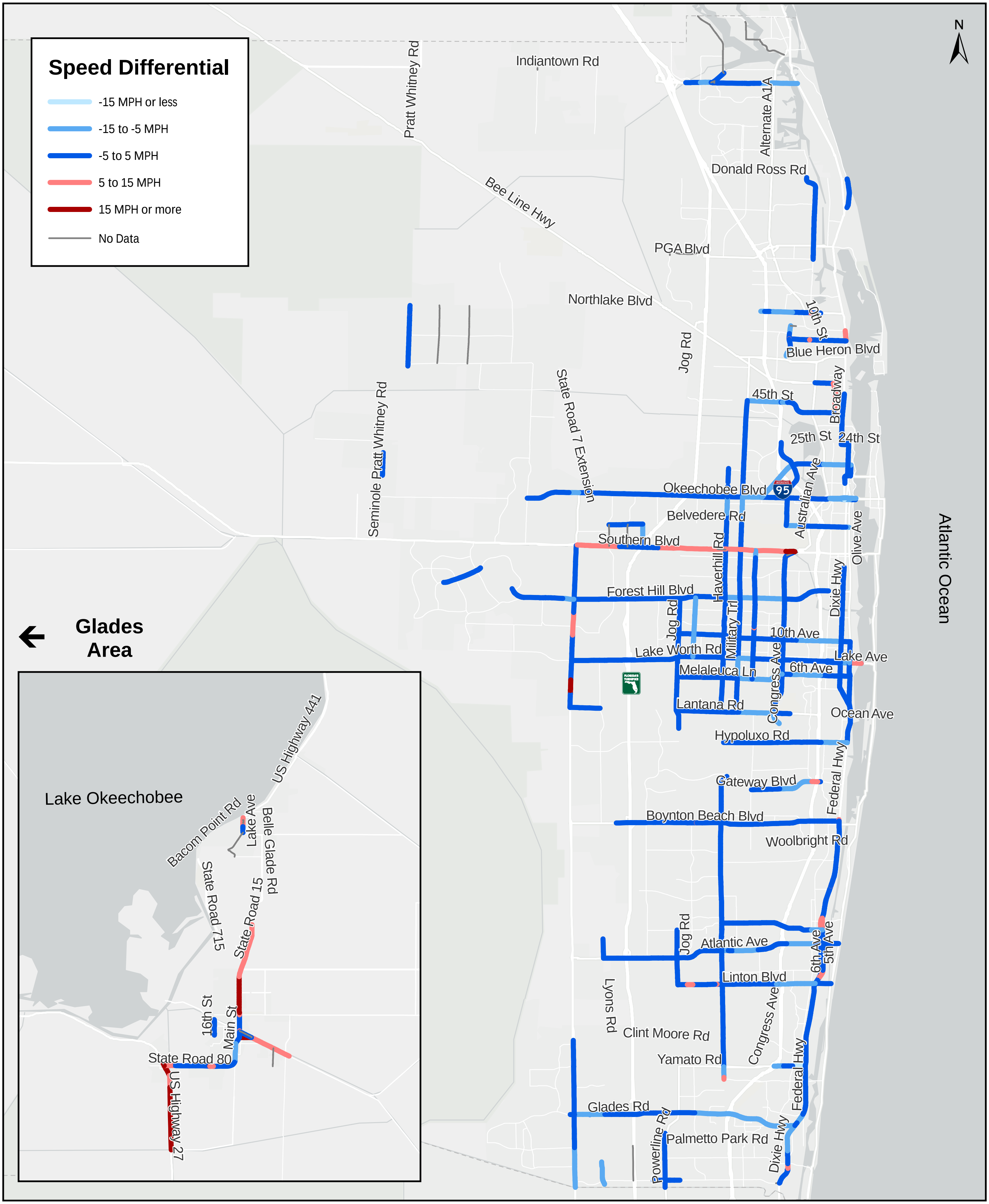
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 27

0 1 2 4 6 8 Miles

Overnight 85th Percentile Speed Minus Posted Speed



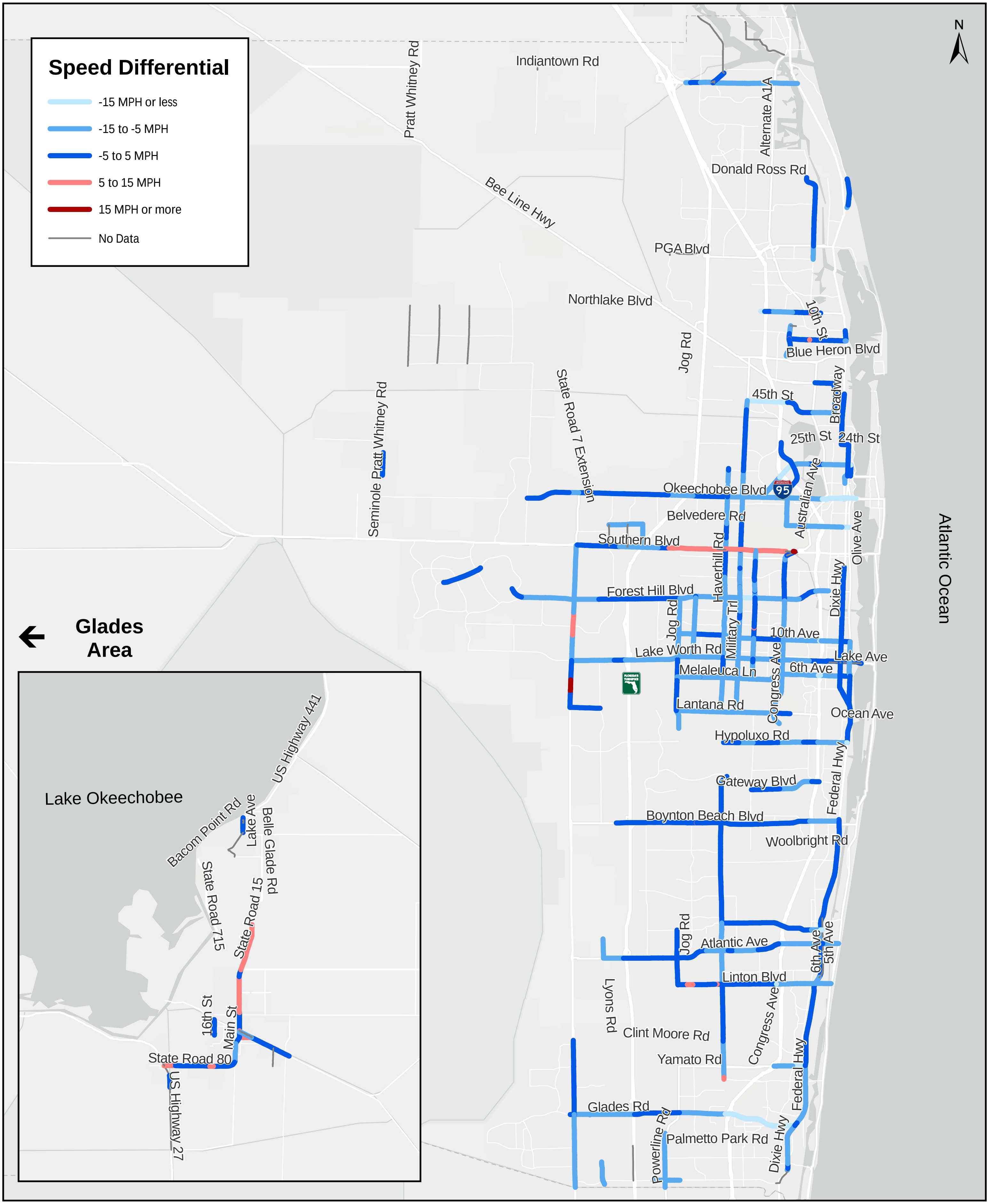
Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 28

Palm Beach Transportation Planning Agency

Overnight 50th Percentile Speed Minus Posted Speed

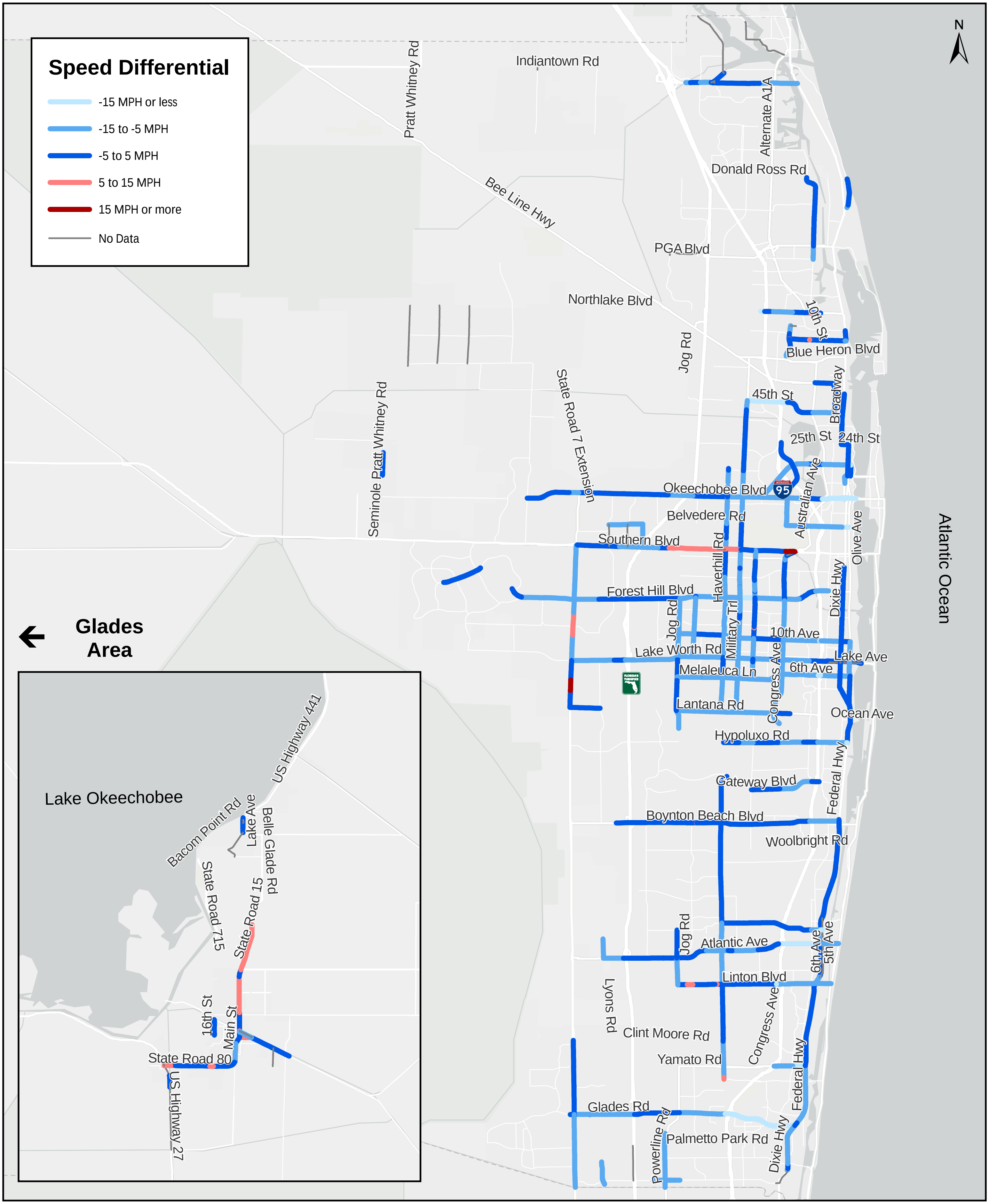


Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 29

Overnight Mean Speed Minus Posted Speed



Date: 8/7/2024

Source: FDOT, Palm Beach TPA, PalmTran, RITIS HERE

Figure 30

0 1 2 4 6 8 Miles

Appendix D – Countermeasure Toolkit

Countermeasure Toolkit

The Speed Management Countermeasure Toolkit references industry best practices consistent with the Safe System Approach including the FDOT Florida Design Manual (FDM), FDOT Traffic Engineering Manual (TEM), NCHRP Report 969: Traffic Signal Control Strategies for Pedestrians and Bicyclists, FHWA Proven Safety Countermeasures, FHWA Signal Timing Manual, NACTO Urban Street Design Guide, and NACTO Don't Give Up at the Intersection.

The Countermeasure Toolkit provides an array of options for potential countermeasures on roadways throughout Palm Beach County. Each countermeasure also has a suggested applicability based on the number of lanes and context. For each priority speed management corridor, a detailed evaluation of the crash data and identification of user needs is recommended. **Table 1.D** through **Table 6.D** outline the Countermeasure Toolkit with countermeasures grouped by type. Throughout the evaluation, if a reduction to the preliminary Target Speed is not feasible, emphasis should be placed on separating bicycles and pedestrians from vehicles, both along a corridor and at intersections.

Operational Countermeasures

Table 1.D - Operational Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Reduced Signal Cycle Length	Long cycle lengths increase pedestrian wait times which can reduce pedestrian compliance.	All signalized intersections.	Short Term. Requires evaluation and coordination with signal maintaining agency.	TEM Section 3.11.4
Leading Pedestrian Interval	Provides up to a 10-second head start (generally 3-7 seconds) for a pedestrian to enter the crosswalk before a conflicting vehicular green.	All Signalized Intersections with any pedestrian volumes.	Short Term. Requires evaluation and coordination with signal maintaining agency.	TEM Section 3.11.5.1
Exclusive Pedestrian Phase	A signal phase where only pedestrian crosswalks are active, and all vehicle signals are red.	Location Specific (high pedestrian demand, high right-turn volumes)	Short Term. Requires evaluation and coordination with signal maintaining agency.	TEM Section 3.11.5.1
Pedestrian Scramble / Barnes Dance	An exclusive pedestrian phase combined with a diagonal crosswalk to allow crossing in all directions.	Location Specific (high pedestrian demand, high right-turn volumes)	Short Term. Requires evaluation and coordination with signal maintaining agency.	TEM Section 3.11.5.1
Pedestrian Recall	Pedestrian signals do not require actuation and are automatic.	Depends on green time and pedestrian demand. At a minimum, suggested for phases in Max recall.	Short Term. Requires evaluation and coordination with signal maintaining agency.	TEM Section 3.11, NCHRP Report 969: Traffic Signal Control Strategies for Pedestrians and Bicyclists

Countermeasure	Description	Applicability	Implementation	Reference
Rest-in-Walk Programming	The pedestrian WALK phase is maximized so the adjacent vehicle green does not end at a fixed interval (ex. 7-seconds).	All signalized intersections.	Short Term. Requires coordination with signal maintaining agency.	TEM Section 3.11; FHWA Traffic Signal Timing Manual
Clearance Interval Updates	A review of yellow, red, and pedestrian clearance intervals.	All signalized intersections.	Short Term. Requires evaluation and coordination with signal maintaining agency.	FHWA Proven Safety Countermeasures, TEM
Two-Stage Pedestrian Crossings	Intersections with long crossing distances could program pedestrian crosswalks as two-staged with protected left-turn movements.	6 lanes or greater or crossing distances greater than 80 feet	Mid-Term. Requires evaluation, coordination with signal maintaining agency, and reconfiguring median.	FDM 222.2.3.1
Corridor Re-timing	Timing signals to a lower speed can reduce speeds along a corridor.	All	Mid-Term. Requires evaluation and coordination with signal maintaining agency.	TEM 3.12, NACTO Urban Street Design Guide

Segment Countermeasures

Table 2.D - Segment Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Lane Narrowing	Reduce lane width to create traffic calming effect. Recommended pairing with other countermeasures, such as bicycle lanes.	All	Short-Term to Mid-Term. Most applicable in a resurfacing project.	FDM 202.3.4
Crossing Opportunities / Midblock Crosswalks	Across a corridor, identify long distances where pedestrians and bicyclists do not have a designated crossing. Depending on land uses and pedestrian and bicycle demand, installing a crossing can reduce pedestrian and bicycle risk.	All	Short-Term to Mid-Term. Most applicable in a Push Button project or resurfacing project.	NACTO Urban Street Design Guide
Lane Repurposing	Reconfigure the existing cross section to reallocate space from a vehicle travel lane to another use (ex. on-street parking, chicanes, separated bicycle lane)	Suggested to evaluate on TPA identified candidates.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.1.1, NACTO Urban Street Design Guide
Chicanes	Creates a meandering effect on roadways by alternating parking or curb extensions.	4-lanes or fewer	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.3.3, NACTO Urban Street Design Guide

Countermeasure	Description	Applicability	Implementation	Reference
Lane Shift	A horizontal deflection through striping, curb extensions, or parking.	4-lanes or fewer	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.3.5, NACTO Urban Street Design Guide
Terminated Vista	Creates an enclosed view through a building, tree, artwork, or other control that alerts drivers a change is imminent.	4-lanes or fewer with a clear context transition.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.3.14
On-Street Parking	On-street parking causes friction for moving vehicles which slows traffic.	4-lanes or fewer	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	NACTO Urban Street Design Guide
Raised Medians	Raised concrete in the center of the roadway that slow traffic and shorten crossing distances.	All, but prioritize currently undivided roadways.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	NACTO Urban Street Design Guide
Access Management	Thoughtful design, application, and control of entry and exit points along a roadway can reduce conflict points as well as trip delay and congestion.	All	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FHWA Proven Safety Countermeasures
Street Trees	A visual cue that narrows a driver's field of view.	All	Mid-Term to Long-Term. Most applicable	FDM 202.3.6

Countermeasure	Description	Applicability	Implementation	Reference
			in resurfacing or reconstruction.	
Centerline Rumble Strips	Grooves in pavement or raised elements that create sound and vibration to alert drivers that their vehicle is nearing the opposite lane of travel.	All undivided roadways, but likely most effective at higher speeds.	Short-Term. Push-Button or resurfacing.	FDM 210.4.6
Safety Edge Treatment	A treatment that angles the edge of pavement 30 degrees away from the roadway, eliminating vertical drop-offs at the pavement's edge.	All without curb	Short-Term. Push-Button or resurfacing.	FHWA Proven Safety Countermeasures
Shoulder Rumble Strips	Grooves in pavement or raised elements that create sound and vibration to alert drivers that their vehicle has left the travel lane.	All without curb	Short-Term. Push-Button or resurfacing.	FHWA Proven Safety Countermeasures
Transverse Rumble Strips	Grooves in pavement or raised elements that create sound and vibration to alert drivers.	4-lanes or fewer with context shifts.	Short-Term. Push-Button or resurfacing.	NCHRP Report 613: Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections

Countermeasure	Description	Applicability	Implementation	Reference
Speed Feedback Signs	A speed measurement device that alerts drivers of their speed or displays messages such as “Slow Down”.	All; however, likely most effective on 4-lanes or fewer.	Short-Term. Push-Button or resurfacing.	FDM 202.3.9

Intersection Countermeasures

Table 3.D - Intersection Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Protected Intersection	An intersection design that provides space for a two-stage bicycle left-turn. Reducing crossing distance through curb extension / splitter which improves yield point.	All, but recommended to be paired with protected bicycle lanes and bicycle signals.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	NACTO Don't Give Up at the Intersection
Raised Intersection	A vertical speed control element that creates slow-speed crossing.	4 lanes or fewer	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.3.8, NACTO Urban Street Design Guide
Centerline Hardening	Extension of traffic separator or centerline at a crosswalk.	All	Short-Term. Maintenance / Quick build or Push-Button.	FDM 210.3.3
Roundabouts	Roundabouts introduce an island in the center of an intersection that creates deflection and adds curvature in the path of a driver.	4 lanes or fewer	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 202.3.1, FHWA Proven Safety Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Innovative/Alternative Intersections	Non-traditional intersection configuration that reduces the number of conflict points and may provide operational benefits.	All	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	NACTO Urban Street Design Guide
Median Refuge Islands	Areas for pedestrians and bicyclists to rest before finishing crossing the roadway.	All divided roadways, but likely most effective at higher speeds.	Short-Term. Push-Button or resurfacing.	FDM 210.3.2.3
Retro-reflective Backplates	Retro-reflective signal backplates increase signal visibility.	All signalized intersections	Short-Term. Maintenance / Quick build or Push-Button.	TEM Section 3.9.2
Curb Extensions	Portions of the curbline that extend into the roadway and shorten crossing distances and increase vehicle turning radii.	All	Short-Term. Push-Button or resurfacing.	FDM 202.3.12, NACTO Urban Street Design Guide

Bicycle Facility Countermeasures

Table 4.D - Bicycle Facility Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Sharrows	Shared lane markings.	4 lanes or less and 35 mph posted speed or lower. Note bicycle lane may be preferred.	Short-Term. Push-Button or resurfacing.	FDM 223.3
Bicycle Lane	A portion of the roadway that is solely for use by bicyclists.	Roadways with design speed less than 45 MPH.	Short-Term. Push-Button or resurfacing.	FDM 223.2.1
Buffered Bicycle Lane	A portion of the roadway that is solely for use by bicyclists and is separated from traffic with striping.	All, but depends on corridor speed and availability to include separation.	Short-Term to Mid-Term. Push-Button or resurfacing.	FDM 223.2.1.1
Separated Bicycle Lane	A portion of the roadway that is solely for use by bicyclists and is physically separated from traffic.	All, but preferred on higher speed facilities, and consider prioritizing 6+ lanes.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 223.2.4
Sidewalk Level Bicycle Lane	A portion of the roadway at sidewalk level that is solely for use by bicyclists.	All, but preferred on higher speed facilities, and consider prioritizing 6+ lanes.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 223.2.4.2

Countermeasure	Description	Applicability	Implementation	Reference
Shared Use Path	A paved facility along a roadway that is physically separated from traffic.	All, but preferred on higher speed facilities, and consider prioritizing 6+ lanes.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	FDM 224
Bicycle Signals	Signals placed at intersections that allow bicycles to move through an intersection before vehicles.	Most effective when combined with a separated bicycle lane and protected intersection.	Short-Term to Mid-Term. Push-Button or resurfacing.	NACTO Urban Bikeway Design Guide
Conflict Markings	Pavement markings intended to increase visibility of bicyclists in bicycle-vehicular conflict areas.	All with bicycle lanes and right-turn lanes.	Short-Term to Mid-Term. Push-Button or resurfacing.	FDM 223.2.1.4, FHWA Separated Bike Lane Planning and Design Guide
Bicycle Boxes	A designated area at a signalized intersection for bicyclists to group and get ahead of the vehicle queue.	All, however, has certain requirements: bike lane must be present, posted speeds at intersection are 35 MPH or less.	Short-Term to Mid-Term. Push-Button or resurfacing.	FDM 223.2.1.5
Two-Stage Left-turn Queue Boxes	A queue box that allows for a bicycle to make a two-stage left-turn.	All, however required right-turn on red prohibition and posted speeds at intersection are 45 mph or less.	Short-Term to Mid-Term. Push-Button or resurfacing.	FDM 223.2.1.5,

Countermeasure	Description	Applicability	Implementation	Reference
Bicycle Boulevard	A street with low existing speeds and volumes that gives priority to bicyclists.	2 lanes or fewer. Consider opportunities to leverage local street network as a bicycle corridor.	Mid-Term to Long-Term. Most applicable in resurfacing or reconstruction.	NACTO Urban Bikeway Design Guide

Pedestrian Facility Countermeasures

Table 5.D - Pedestrian Facility Countermeasures

Countermeasure	Description	Applicability	Implementation	Reference
Special Emphasis Crosswalk	Pavement markings that increase visibility.	All signalized intersections, stop controlled crosswalks in school zones, and all midblock crosswalks.	Short-Term to Mid-Term. Push-Button or resurfacing.	FDM 222.2.3, TEM Section 4.1.2, FDTO Standard Plans 711-001
Decorative Crosswalk	Modifications to a crosswalk through pavement markings or alternative materials (pavers, brick, etc.) that reflect a change in context.	4 lanes or fewer. Should likely only be applied in identified “downtown” areas.	Short-Term to Mid-Term. Push-Button or resurfacing.	FHWA Crosswalk Marking Selection Guide
Rectangular Rapid Flashing Beacon (RRFB)	A flashing signal to assist pedestrians crossing at an unsignalized, marked crossing.	Posted speed is 35 MPH or less, a marked special emphasis crosswalk present, and 4 lanes or less.	Short-Term to Mid-Term. Push-Button or resurfacing.	TEM Section 5.2.7.3
Pedestrian Hybrid Beacons	A traffic control device used to warn and control traffic at unsignalized crossing locations, allowing pedestrians and bicyclists to cross the roadway.	All, however, 6 lanes or more could require a two-stage crossing.	Short-Term to Mid-Term. Push-Button or resurfacing.	TEM Section 5.2.5.2

Countermeasure	Description	Applicability	Implementation	Reference
Midblock Pedestrian Signal	A traffic control device that operates similarly to a PHB which operates as solid red then flashing red. Allows pedestrians and bicyclists to cross midblock.	All, however, 6 lanes or more could require a two-stage crossing.	Short-Term to Mid-Term. Push-Button or resurfacing.	TEM Section 5.2.7.3
Midblock Pedestrian Traffic Signal	A traffic control device that operates similarly as a regular traffic signal. Allows pedestrians and bicyclists to cross midblock.	All, however, 6 lanes or more could require a two-stage crossing. Note in certain contexts a PHB can be replaced with a midblock pedestrian traffic signal.	Short-Term to Mid-Term. Push-Button or resurfacing.	TEM Section 5.2.7.3

Policy Strategies

Table 6.D - Policy Strategies

Countermeasure	Description	Applicability	Implementation	Reference
School Zone Speed Detection System	Camera detection that tickets drivers going over the speed limit in school zones. A Florida statute was passed to allow for automated speed detection in school zones.	All locations with school zones. Should future laws be passed to allow speed detection in other location, the application should be considered for expansion.	Short-Term to Mid-Term. Requires Palm Beach County policy changes.	F.S. 316.0076, FDOT School Zone Speed Detection System
Road Safety Audits	A review of a corridor using a multidisciplinary team that considers all roadway users, accounts for human factors, and identifies countermeasures.	All	Short-Term	FHWA Proven Safety Countermeasures
Local Road Safety Plans	A framework for identifying, analyzing, and prioritizing safety improvements on local roads.	Local Roadways	Short-Term	FHWA Proven Safety Countermeasures
Vision Zero Plans	Plans that implement strategies to eliminate traffic fatalities and severe injuries.	All roadways, although driven by local municipality plans to identify corridors and implement strategies.	Short-Term	Vision Zero: Core Elements for Vision Zero Communities