Arterial Connectivity Study along I-595 Corridor

FM#441954-1-12-01

Mitigation Analysis Methodology

Technical Memorandum #4

February 2021

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Mitigation Analysis Methodology
Technical Memorandum #4

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1. INTRODUCTION

1.1 Introduction

The Arterial Connectivity Study along I-595 Corridor is being conducted to identify and define transportation problems and develop effective solutions to fulfill the goal of providing better connectivity for all modes and to provide congestion relief for travel along the north-south study roadways and their access points with I-595 and SR 84. All types of improvement strategies are being considered including land use and policy strategies; geometric modifications to roadways; pedestrian, bicycle, greenway, and transit infrastructure improvements; and technology and traffic signal improvements.

The Arterial Connectivity Study along I-595 Corridor is being conducted in four main tasks as listed below. Technical Memorandum 4 is part of Task Two and is the fourth of seven deliverables being completed for the Arterial Connectivity Study along I-595 Corridor.

- Task One – Data Collection, Compilation, Development, and Analysis
- Task Two - Develop Deficiency Mitigation Concepts (MCs) and Mitigation Measures (MMs)
- Task Three - Develop a Master Improvement List and Implementation Packages for Mitigation Measures
- Task Four – Outreach and Meetings

This Technical Memorandum #4 describes the multi-tier process that will be used for evaluating corridor deficiencies and developing Mitigation Measures to address these deficiencies. The process describes Measures of Effectiveness (MOEs) and analytical procedures that will be used to develop, evaluate, and recommend Mitigation Concepts. The methodology for evaluating and specifying Local Planning Actions is also documented. The mitigation analysis methodology is described in a step-by-step process in the following sections.

1.2 Study Goal and Objectives

The overall study goal is to provide congestion relief for north-south travel and improve access to and from SR 84 and I-595.

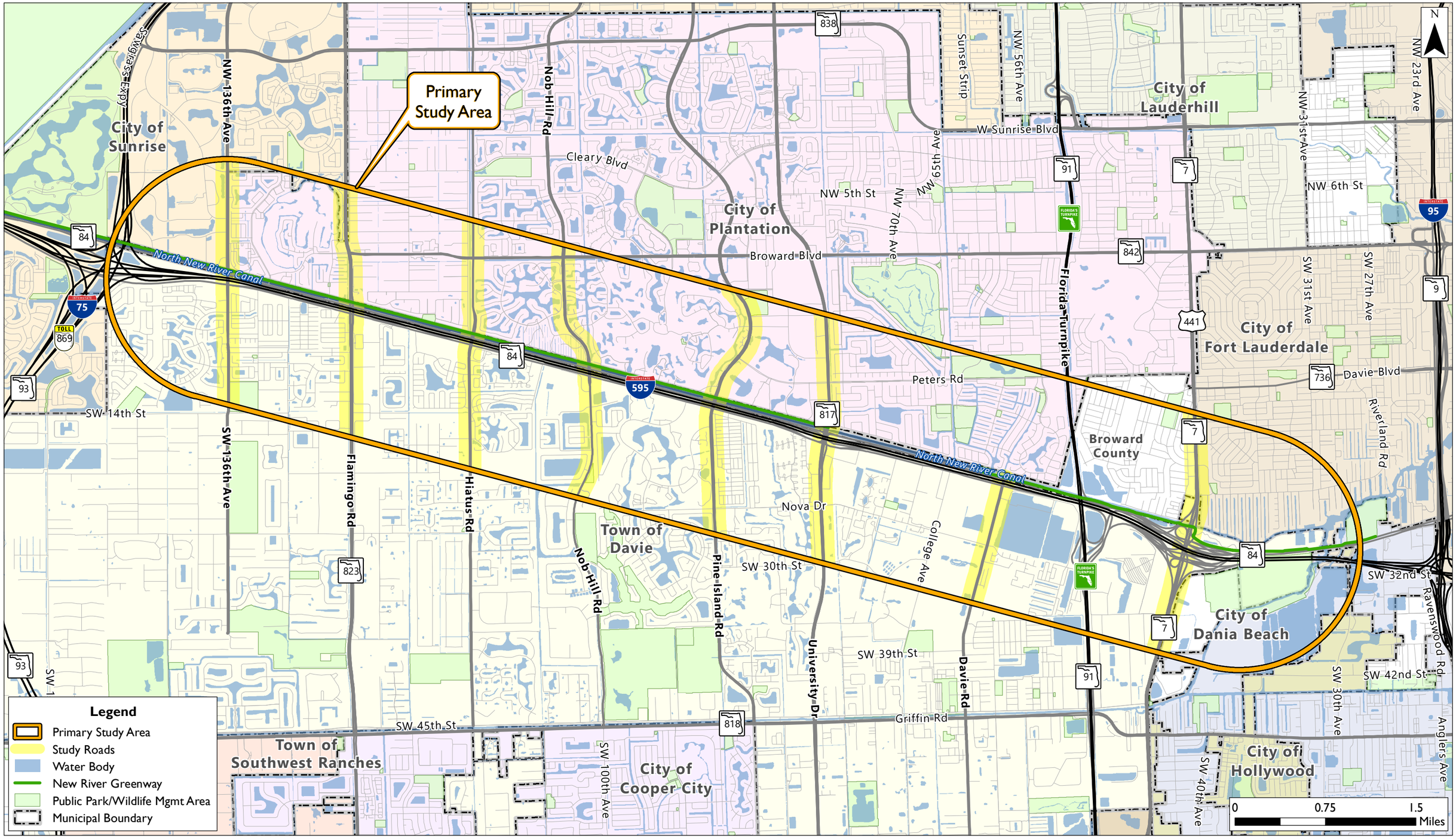
The key objectives for the study are to:

- Identify deficiencies,
- Collaborate with stakeholders to develop effective solutions, and
- Implement a plan of mitigation measures.

1.3 Study Area

The study area is in central Broward County, Florida along the I-595 and SR 84 corridor, between SW 136th Avenue and SR 7/US-441. The study limits extend approximately one mile north and one mile south of I-595 and include the eight north-south arterials that cross I-595 and SR 84. The primary study area and study roadways are shown in Figure 1-1. Below is a list of the primary study roadways along with the approximate limits on each road.

1. SW 136th Avenue from north of NW 8th Street to north of SW 14th Street
2. Flamingo Road / SR 823 from south of NW 8th Street to south of SW 15th Place
3. Hiatus Road from north of Broward Boulevard to south of SW 16th Street / S Harmony Lake Circle
4. Nob Hill Road from Broward Boulevard to SW 22nd Court
5. Pine Island Road from SW 3rd Street to south of Nova Drive
6. University Drive / SR 817 from Federated Road to SW 30th Street
7. Davie Road from I-595 / SR 84 to Broward College entrance / SW 35th Street
8. US-441 / SR 7 from SW 16th Street to Powells Road
9. SR 84 eastbound and westbound from I-75 to I-95



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Arterial Connectivity Study Along I-595
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Study Area

Figure 1-1

1.4 Deficiency Analysis Methodology Overview

The overall analysis methodology is summarized in Figure 1-2. The process starts with identifying the types of transportation deficiencies that should be addressed. This information comes from traffic analysis, safety analysis, and bicycle, pedestrian, and transit analysis. It also comes from input received from stakeholders and comments from the public. Next, the deficiencies are prioritized and classified into simple or complex, and short-term or long-term deficiencies, and information regarding duration and severity is considered as well.

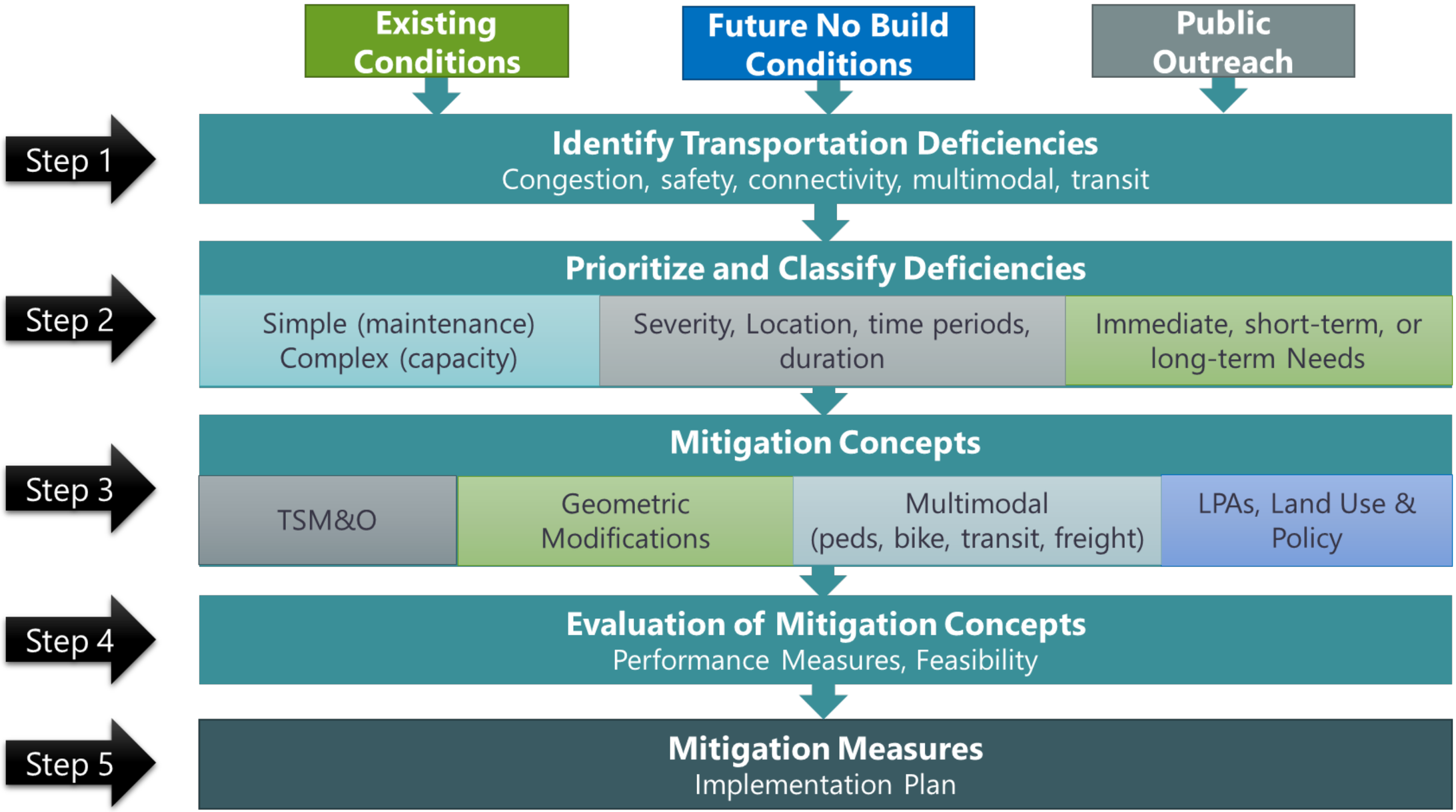
Various types of mitigation concepts are then brainstormed for each corridor, based on the types of deficiencies, and needs that were identified. Various types of mitigation concepts that are being considered include: Transportation System Management and Operations (TSM&O) improvements, geometric modifications, and multimodal improvement concepts. Where physical mitigation concepts cannot completely address deficiencies, local planning actions may also be recommended, including land use, development, access management, safety, and travel demand management strategies.

Once preliminary mitigation concepts are identified, they will then be analyzed from a traffic operations and safety standpoint, and conceptual design plans prepared. The build alternative traffic analysis will document the benefits that each preliminary concept can provide. The conceptual design plans will help determine the feasibility of improvement concepts from a physical standpoint. This includes available horizontal and vertical space needed, right-of-way needed, and potential environmental impacts.

Once the benefits and impacts are identified for preliminary mitigation concepts, and preliminary Local Planning Actions (LPAs), a workshop will be held with FDOT and MPO staff to review and receive input. A second workshop will then be held with the Project Advisory Committee to receive their input on the feasibility and acceptability of the proposed concepts and LPAs. Based on the input received, mitigation concepts and LPAs will be refined. The final recommended mitigation concepts and LPAs will then be documented as recommended Mitigation Measures in Technical Reports 1 and 2, respectively.

Each of these steps are described in more detail in the following sections of the methodology.

Figure 1-2: Deficiency Analysis Methodology Overview



2. IDENTIFYING TRANSPORTATION DEFICIENCIES

2.1 Technical Sources

Several technical sources developed as part of the study, provide the background information and analysis needed to identify or confirm transportation deficiencies along each of the study roadways. These sources are:

1. Technical Memorandum #1 Existing Data
2. Technical Memorandum #2 Existing Conditions Analysis
3. Technical Memorandum #3 No Build 2045 Traffic Analysis

Existing (year 2019) roadway capacity deficiencies, and traffic operational deficiencies are documented in Technical Memorandum #2. Existing safety deficiencies, existing TSM&O conditions, and existing bicycle, pedestrian, and transit facility deficiencies are also identified in Technical Memorandum #2. Future (year 2045) No Build roadway capacity deficiencies, and traffic operational deficiencies are documented in Technical Memorandum #3. The 2045 No Build conditions incorporate planned improvements that are funded for construction,

2.2 Stakeholder and Public Input

From December 2019 through March 2020, the study team received input through a set of initial stakeholder meetings with representatives from adjacent municipalities, and presentations to the Broward Metropolitan Planning Organization (MPO) Board and committees. From this outreach effort, the study team gathered information for various transportation concerns, needs and priorities of the stakeholders. In addition, based on a recommendation from the MPO Citizens Advisory Committee, the study team decided to prepare, advertise, and conduct an online public survey.

A web-based interactive mapping tool known as Wikimap was selected to conduct an online public survey to inform the study. The survey gathered input from the public and all types of transportation users regarding problems and needed transportation improvements in the study area. The online Wikimap public survey was conducted from July 1, 2020 to August 10, 2020. The results are documented in the Wikimap Survey Technical Memorandum.

2.3 Types of Identified Transportation Deficiencies

The following types of transportation deficiencies were identified from the technical analyses and stakeholder and public input.

- Roadway capacity deficiencies based on existing (2019) and future (2045) level of service and volume-to-capacity ratio.
- Intersection operational deficiencies, such as congestion based on public input and existing (2019) and future (2045) level of service, delay, and queues.
- Safety deficiencies based on public input and existing (2019) field reviews, crash analysis, and crash hotspot location information.
- Bicycle, pedestrian, and greenway deficiencies based on public input and existing (2019) field reviews, level of service, and inventory of missing facilities.
- Transit facility deficiencies based on existing (2019) inventory of bus stop infrastructure.
- Freight facility deficiencies based on existing (2019) and future (2045) intersection operational analysis.

University Drive/SR 817, SR 7/US-441 and sections of SR 84 eastbound and westbound have existing daily volumes that exceed the roadway capacity and show signs of needing additional capacity. By 2045, volumes on University Drive/SR 817 and SR 7/US-441 still exceed capacity, and additional study roadway segments on SR 84 eastbound and westbound, and on Nob Hill Road, Pine Island Road, and Davie Road exceed the capacity as well. This indicates where significant modifications may be needed such as additional travel lanes, and/or travel demand reducing strategies such as improving or adding alternative routes.

Under existing conditions, extensive delay and queueing occur during weekday AM or PM peak hours at 17 of the 43 study intersections. This includes intersections on all eight north-south study roadways. By 2045, due to increased volumes, a total of 31 of the 43 study intersections are expected to operate with unacceptable delay and queues in peak hours. This includes all SR 84 study intersections with the north-south study arterials.

Crash data and safety analysis showed that the study roadway with the highest number of crashes over five years is University Drive. Eastbound SR 84 has the second highest number of crashes within the last five years. Thirty-six (36) crash hotspot locations were identified along the eight north-south study roadways, and eastbound and westbound SR 84. Each of these high crash locations have existing deficiencies that need to be addressed.

Existing bicycle, pedestrian, and greenway deficiencies include missing sidewalks, and missing or inadequate bicycle facilities along the arterial study roadway segments. This also includes conflicts for New River Greenway users crossing each of the north-south study arterials, except SR 7/US-441. It also includes an existing gap in the greenway connectivity between University Drive and Davie Road.

Transit deficiencies to be addressed involve missing infrastructure such as a bench or shelter at existing bus stops where they are needed. No deficiencies were identified at the only existing Park-and-Ride lot within the study area at Davie Road and SR 84.

Freight deficiencies within the study area are related to inefficient access to and from the Florida 595 Truck Stop located in the south-east quadrant of I-595 and Florida's Turnpike. Access to the truck stop is through the SR 7/US-441 and I-595 interchange, and the intersection of SR 7/US-441 and Oakes Road. Existing and future 2045 intersection operational deficiencies were identified at the intersection of SR 7/US-441 and Oakes Road.

3. CLASSIFYING AND PRIORITIZING DEFICIENCIES

There are four main considerations when classifying and prioritizing the deficiencies. They are:

- Type of deficiency and improvement
- Timing of deficiency
- Severity of deficiency
- Performance Measures / Measure of Effectiveness

The existing conditions analysis and 2045 No Build conditions analysis is the primary source of this information.

3.1 Type of Transportation Deficiency and Improvement

As noted in Section 2.3, there are many types of transportation deficiencies that were identified within the study area. These include safety, intersection operational, roadway capacity, bicycle, pedestrian, greenway, transit facility, and freight facility deficiencies. Deficiencies which are simpler to address include some safety deficiencies that can be improved through better communication with drivers using better signing or pavement markings. Other simpler to address deficiencies involve addressing inadequate turn lane storage for vehicles at intersections where possible within available right of way, and adding missing sidewalk or transit facility bus stop benches where available public right of way exists.

One of the more complex deficiencies to address are the roadway capacity deficiencies, where the total travel demand exceeds the overall throughput capacity of the roadway. Some of this capacity deficiency can be addressed through intersection improvements. However, some roadways such as University Drive, have volumes that far exceed the roadway capacity. In these cases, multiple types of improvement strategies will be needed to help address and reduce the traffic volume on the roadway. Types of improvements that will be investigated to address these types of complex deficiencies involve modifications to the existing roadway to add capacity (additional lanes), improvements to parallel roadway facilities, new roadway connections to better distribute and disperse traffic, and improvements and policies to encourage use of other modes of travel.

An example of a complex deficiency for pedestrians and bicyclists is at the New River Greenway crossings of the north-south arterials, where the lack of a direct connection and volume of conflicts with fast moving vehicles is a concern. The many physical constraints located near the crossings, such as the roadways and canals, will require complex improvement concepts in terms of infrastructure and operations.

In many cases, the type of deficiency can quickly point to the type of improvement needed to address the deficiency. An example is missing sidewalk. In this instance, adding sidewalk will typically be the improvement to resolve this deficiency. When classifying deficiencies, the types of deficiencies will generally be grouped based on the associated improvements as follows:

1) Minor Improvements - These are maintenance type improvements or the simplest, least expensive, and least time-consuming type of improvements to implement. Many times, these can be addressed through an agency's existing maintenance contract, and can be addressed within months. Examples include adding, replacing or repairing signs, pavement markings, traffic signal heads, crosswalks, or curb modifications within existing right of way.

2) Intermediate Improvements - These are improvements that need some design plans completed first, or other intermediate steps such as coordination and approval from other agencies or utilities, before improvements can be constructed. These can have a moderate implementation cost ranging from hundreds of thousands of dollars to a few million dollars. Improvements in this category can take one to ten years to implement. Examples include adding auxiliary lanes such as turn lanes, extending storage bays, modifying median openings, or adding new traffic signals within existing right of way.

3) Major Improvements – These are improvements that require modifying or adding new bridge structure such as a flyover, adding capacity or a new lane along an arterial in each direction, or significantly modifying or adding infrastructure. Improvements would be considered major if they require acquiring new right of way or they are expected to involve environmental impacts which must be avoided or mitigated. These are generally higher cost improvements, which can be tens or hundreds of millions of dollars to design and construct. They generally involve a high level of coordination, review, and acceptance through the NEPA or PD&E process as the next step. Major improvements typically take ten to twenty years to implement.

3.2 Timing of Deficiency

The timing of when an improvement is needed is based on the estimated timeframe of when the deficiency is shown as occurring. To help classify and prioritize deficiencies and improvements, they can be grouped into the following categories.

1) Immediate need for improvement – These are items that have an urgency and need to be addressed immediately. They may also have shown a problem in the past. These will be identified from public input and existing conditions analysis. An example is a missing sign, or an existing hotspot crash location with a five-year history, or an intersection operating at LOS F with long queues.
2) Short-term need for improvement – These are items that need to be addressed in the next year to five years. These can be identified based on existing conditions analysis. They are locations that have some minor issues today, or that are just beginning to show failing LOS, or are not yet failing but are very close to needing improvement. A slight increase in traffic volume shows the need for improvement.
3) Long-term need for improvement – These are items that are not shown to be failing under existing conditions, but show a deficiency and need for improvement by 2045.

3.3 Severity of Deficiency

When prioritizing deficiencies, additional available information will be considered. This includes information about how often a problem occurs and the duration that it occurs. Based on field observations and analysis it can be determined whether a problem is recurring most days of the week, and whether it occurs during both AM and PM peak hours, or only one peak hour. The more often a problem occurs, the higher priority it will be to address it.

Another consideration is the magnitude of the impact from the deficiency. The number of drivers or transportation users impacted per day will be considered. This will involve reviewing and comparing AADT for a roadway, or pedestrian/bicycle count data for a crossing. A higher priority will be given to locations where a higher number of people are being impacted by the deficiency.

In addition, the severity of the deficiency in terms of safety will also be considered. The frequency, type, and severity of crashes occurring at a location will be considered. Locations where there is a higher frequency of severe types of crashes (fatalities and injuries), and locations with a higher frequency of pedestrian and bicycle related crashes, will be given a higher priority.

3.4 Performance Measures

Performance measures are the quantitative indicators used to evaluate, report and compare how well the transportation network is performing. In this study, performance measures are used during all steps of the process. Performance measures were used to report how well the transportation network is performing in terms of existing capacity, operations, safety, and connectivity. The performance measures reported in the Existing Conditions Technical Memorandum #2 for example include level of service (LOS), volume-to-capacity, delay, queue lengths, miles of pedestrian and bicycle facilities, and number of crashes by type. Roadway capacity and traffic operational performance measures for future year 2045 are reported in the No Build 2045 Technical Memorandum #3.

Reported performance measures helped identify where there are deficiencies within the study area, when there are deficiencies, and the magnitude of deficiencies. Based on comparing the existing performance measure values to the 2045 No Build performance measure values, it is expected that conditions will become worse in the future and deficiencies will increase. More locations will be deficient in terms of operations, and the duration and magnitude of the deficiencies will increase.

To help with classifying and prioritizing deficiencies for each study roadway, key performance measures from the analysis of each of the nine study roadways, will be summarized on a Performance Measure Dashboard. Performance measures will be used to show at a glance how well the corridor is performing today under existing conditions, in the future with estimated 2045 No Build conditions, and under 2045 Build conditions. The goal of using the dashboard, is to show how the transportation network is currently performing, how conditions are expected to trend between now and 2045, and how the proposed 2045 Build Mitigation Measures are expected to improve any existing or future conditions which are deficient.

The Performance Measure Dashboard for each study arterial will report sixteen (16) measures in five categories as noted below.

1) Safety
    a. Annual crash rate for the study road
    b. Five-year total number of fatal and injury crashes along the study road
    c. Five-year total number of pedestrian and bicycle related crashes along the study road
2) Mobility
    a. Percentage of study road with daily LOS D or better
    b. Percentage of study intersections with LOS D or better in both peak hours
    c. Total minutes of average vehicular delay experienced at all signalized study intersections along the arterial during both the AM and PM peak hours
3) Pedestrian & Bicycle
    a. Percentage of road with pedestrian LOS D or better
    b. Percent pedestrian facility coverage along the study road
    c. Percentage of road with bicycle LOS D or better
    d. Percent bicycle facility coverage along the study road
    e. New River Greenway crossing ability to cross safely & efficiently - ranges based on:
        - Crossing distance – major detour from route (0%), to at-grade direct crossing (50%)
        - Level of crossing protection – no protection (0%), to grade separation (50%)
4) Transit
    a. Percent bus stops with a bench
    b. Percent bus stops with a shelter
5) Other – Local Planning Actions
    a. Policies to improve safety
    b. Policies to reduce congestion
    c. Policies to improve connectivity / efficiency of travel

An example Performance Measure Dashboard for the SW/NW 136th Avenue study roadway is provided in Appendix A.

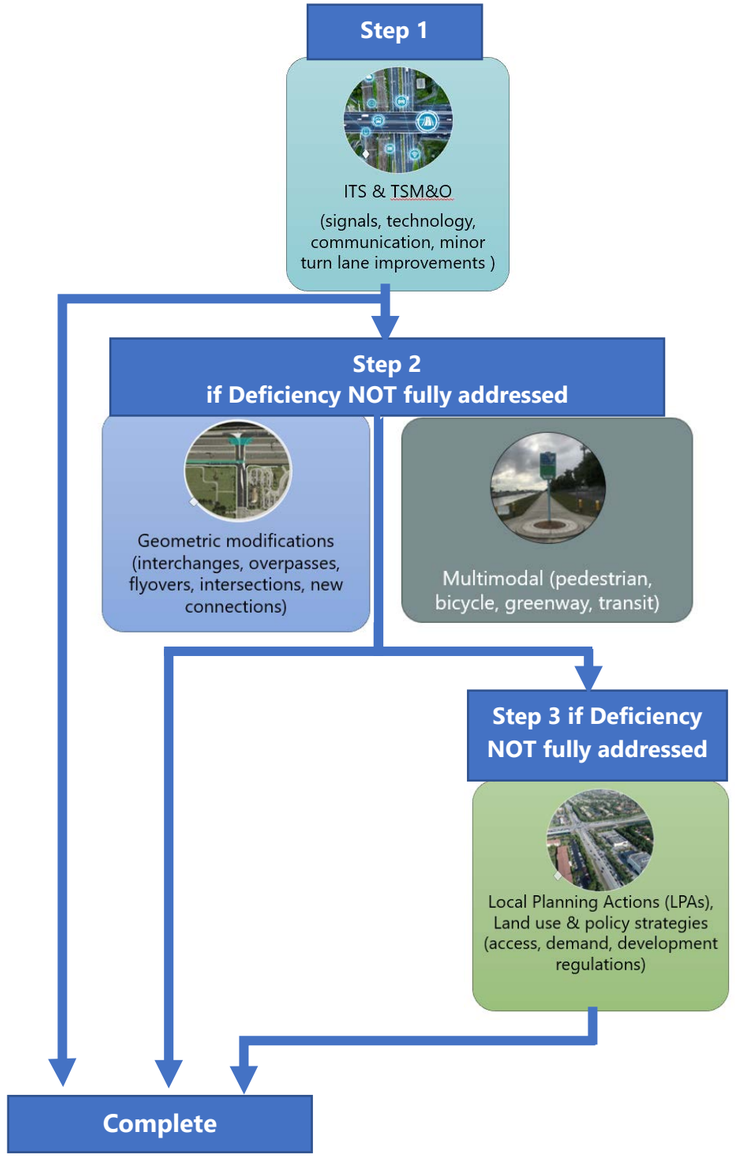
4. DEVELOPING MITIGATION CONCEPTS

4.1 Three-Step Process

For purposes of this study, improvements will be evaluated wherever a safety, intersection operational, roadway capacity, bicycle, pedestrian, greenway, transit facility, or freight facility deficiency was identified and validated, based on input from the public survey and technical analysis. For example, roadway deficiencies include whenever a roadway segment or overall intersection is determined to operate below the LOS D target. Mitigation Concepts will be developed in a three-step process to ensure all the types of deficiencies are addressed and will build upon each other. The three-step process is described below and shown in Figure 4-1.

1. First, smaller-scale Transportation System Management and Operations (TSM&O) type transportation improvements will be evaluated to try to improve intersections operating below LOS D, or to address safety deficiencies or other adverse field conditions. These include additional turn lanes, improved turn bay storage, modified signal phasing, and other signal technology enhancements. If these types of improvements can not address the deficiency, then the team will move on to step two in the process.
2. Where smaller-scale TSM&O improvements cannot fully address the deficiency, larger-scale geometric modifications such as additional through lanes, interchange modifications, additional overpasses or flyovers, major intersection reconfigurations, and new alternative parallel routes will be evaluated. Along with roadway geometric improvements, missing sidewalk, missing bicycle lanes, and missing transit facility infrastructure will also be evaluated and included in the concepts. If these types of improvements cannot fully address the deficiency, then the team will move on to step three in the process.
3. Where modified or additional infrastructure cannot fully address all of the deficiencies along a study roadway, the team will also evaluate existing policies set by the local governments to determine whether existing policies should be highlighted and enforced, and whether new policies need to be recommended. Types of existing or new policies that will be considered include policies that encourage joint access between adjacent properties to improve connectivity and efficiency of travel; travel demand management policies that can reduce trips on roadways during peak hours and help reduce congestion; and policies that can enhance safety, such as education and enforcement campaigns to create better awareness of safe driving practices, and discourage unsafe driving behaviors.

Figure 4-1: Process of Developing Mitigation Concepts



4.2 Context Classification

When developing mitigation concepts, the Context Classification for each study roadway must also be considered. After consulting with the FDOT District Four Complete Streets team, it was determined that the FDOT District Four Systemwide Provisional Context Classification (SPCC) (Version 1.0) will be used for the study roadways in the Arterial Connectivity Study, except where a recent Project Level Context Classification (PLCC) is available. The primary purpose of the SPCC is to help guide the development and implementation of FDOT projects in planning and as a starting point for determining a PLCC for design. The SPCC provides a common frame of reference for all partners to understand the intent of context classification and how it relates to roadway design decisions. Both the existing and future SPCC information will be considered. A copy of the existing (2017) and future (2040) Version 1.0 SPCC refined smoothed roadway segment maps for Broward County, from the October 2017 *Context Classification Approach for District Four, Systemwide Provisional Context Classification – Final Report*, are provided in Appendix B.

The FDOT District Four SPCC Version 1.0 is one of a set of maps produced by FDOT District 4 to provide an overall picture of provisional context classifications for each county in the district and the district as a whole. The maps provide a perspective consistent with the State Highway System as a system serving multiple jurisdictions and reflect use of spatial data available districtwide and a standardized approach consistent with context classification measures identified by FDOT. FDOT District Four uses the SPCC as a starting point for assigning context classifications for projects on state roads. The information may also be useful for planning purposes. See reports available from FDOT District Four for more information on data sources used to produce the SPCC maps.

FDOT District Four is currently working on a new Version 2.0 of the SPCC which is expected to be completed in the next year. Therefore, there may be changes made in the future to the SPCC that is documented and used in this study. Future projects should review and determine the appropriate SPCC or PLCC to utilize at that time.

One recent Project Level Context Classification (PLCC) determination, which is different than the SPCC, was identified within the study area. The PLCC was identified for a project along University Drive/SR 817 (FM# 432066-9) from north of westbound SR 84 to north of NW 1st Street (north of Broward Boulevard). The PLCC for this segment of University Drive is "C3C-Suburban Commercial" and will be relied upon for this study as well.

5. EVALUATION OF MITIGATION CONCEPTS AND LOCAL PLANNING ACTIONS

For each type of mitigation concept and local planning action, a toolbox of strategies, performance measures, and analysis tools are necessary. The following sections describe the strategies, performance measures and analysis tools that will be considered for the evaluation of mitigation concepts.

5.1 Evaluating TSM&O Mitigation Concepts

The types of strategies to be considered as TS&MO mitigation concepts include the following.

- Addition of turn lanes
- Turn lane extensions
- Access management
- Signal upgrades
- Dynamic Lane Assignment
- Advance Signal Control Strategies
- Active Arterial Management

The performance measures that will be evaluated while analyzing these strategies include:

- LOS – Highway Capacity Manual (HCM) methodology
- Delay
- Queue lengths
- Crashes

The tools and references that will be used to evaluate these types of mitigation concepts are Synchro using HCM methodology, and the FDOT District Four TSM&O Master Plan.

5.2 Evaluating Geometric Modification Mitigation Concepts

The types of strategies to be considered under the umbrella of geometric modification mitigation concepts include the following.

- Corridor capacity improvements (additional through lanes)
- Intersection and interchange capacity improvements (additional lanes, overpasses, flyovers, interchange modifications, alternative intersection concepts)
- Reliever routes
- New connections

Corridor level performance measures that will be assessed to evaluate geometric modification mitigation concepts, include:

- LOS – FDOT Generalized Service Volume Tables
- v/c ratio
- Estimated travel time
- % miles severely congested (<LOS D)
- Crashes

Intersection level performance measures that will be assessed to evaluate geometric modification mitigation concepts include:

- LOS – Highway Capacity Manual (HCM) methodology
- v/c ratio
- Delay
- Queue Lengths
- Number of crashes

The tools and references that will be used to evaluate these types of mitigation concepts are:

- FDOT Generalized Service Volume Tables
- Synchro using HCM methodology
- Intersection Control Evaluation (ICE) CAP-X tool
- Safety Performance for Intersection Control Evaluation (SPICE) tool

5.3 Evaluating Multimodal Mitigation Concepts

The types of strategies to be considered under the umbrella of multimodal mitigation concepts include the following.

- New or improved bicycle facilities (bicycle lanes, shoulder, etc.)
- New or improved sidewalks
- Improved greenway crossings
- Signal enhancements intended to improve pedestrian or bicycle or transit operations
- Bus stop upgrades (added benches and shelters)

The performance measures that will be evaluated while analyzing these types of mitigation concepts include:

- Pedestrian LOS
- Bicycle LOS
- Pedestrian and Bicycle Crashes
- % Pedestrian Facility Coverage
- % Bicycle Facility Coverage
- % Bus Stops with a bench
- % Bus Stops with a shelter

The tools and references that will be used to evaluate these types of mitigation concepts are:

- FDOT's ARTPLAN multimodal level of service analysis tool
- GIS layers showing multimodal facilities and features
- Broward County Transit (BCT) plans

5.4 Evaluating Local Planning Actions

When other strategies are not enough to fully address a deficiency, local planning actions (LPAs) will also be considered in conjunction with mitigation concepts. First, existing policies that the local governments have in place will be identified that could help address deficiencies along a corridor. If existing policies do not address the deficiency, then a new policy will be identified that could be implemented.

Below are some examples of types of existing or new policies that will be considered. These may be codified in local government comprehensive plans or land development regulations.

- New development or redevelopment within the study area is required to implement transit supportive measures such as providing micro-mobility services on-site, contributing toward a transit circulator, providing incentives to use transit, implementing paid parking, or reducing the number of available parking spaces.
- The agency/new development will implement travel demand management strategies such as allowing up to 25% of its workforce to utilize flexible working hours and work-from-home options, to reduce congestion on roadways during weekday AM and PM peak hours.
- Access to and from new development along adjacent major roadways will be limited and connectivity between adjacent parcels will be provided.

- The agency will implement an annual safety education and enforcement campaign within the study area, to help educate drivers and enforce safe driving habits.
- The agency will pursue funding to implement a safety communication and monitoring program, to encourage slower speeds and reduce crashes.

The types of performance measures that will be considered while analyzing local planning actions include the following listed below. This will be a qualitative assessment of performance measures.

- Roadway volume-to-capacity (v/c) ratio
- Vehicle-Miles-Traveled (VMT)
- Crashes

The tools and references that will be used to evaluate these types of mitigation concepts are:

- Local government comprehensive plans
- Relevant policy strategies implemented in other similar areas

5.5 Feasibility of Mitigation Concepts

Once preliminary mitigation concept plans (sketch level) are developed, the next step is to identify and evaluate potential benefits and impacts. The benefits of the improvements are identified from the analysis. Benefits may fall into one or more of the following categories:

- Congestion relief
- Safety enhancement
- Connectivity enhancement
- Pedestrian/bicycle enhancement
- Transit/freight enhancement

Potential impacts associated with a proposed transportation improvement project will be identified from estimating the costs, right of way needs, and identifying potential social, economic, natural and physical environmental impacts to the surrounding area. In this step, the FDOT Long Range Estimates (LRE) software will be utilized to estimate preliminary costs of construction. To estimate right-of-way needs, property lines will be superimposed over the conceptual design plans, to determine if additional public right of way is needed to accommodate the improvements. If right of way is needed, then the location of where it is needed, and how much right of way is needed will be estimated. In addition, the type of impact to adjacent property from acquiring this right of way will be identified. This includes business damages or other types of impacts. The study team will identify generally where right of way is needed, and FDOT may estimate cost as appropriate.

In addition, the concept plans will also be used to conduct a desktop review of potential social economic, and environmental effects using the FDOT ETDM software. The information obtained from the ETDM database will include nearby wetlands, historical resources, Section 4(f) resources, sociocultural effects, water resources, protected species and habitat, and contaminated sites. This information will be used to quickly determine whether or not proposed mitigation concepts could have significant impacts, and whether or not a PD&E Study would be required as a next step to further evaluate the impacts and determine an optimal solution.

The information that is gathered regarding the costs and potential right of way and environmental impacts that are associated with each preliminary mitigation concept will be weighed against the estimated benefits to determine feasibility. Also, mitigation concepts that are expected to have fatal flaws will be screened out, and not recommended for further evaluation. Fatal flaws include the inability to acquire needed right of way, exorbitant cost for construction compared to benefits, or potential impacts to any Section 4(f) resources such as schools, public parks, cemeteries, or historic sites.

5.6 Feasibility of Local Planning Actions

Once preliminary local planning actions (LPAs) are identified, the next step is to meet with the appropriate local planning agencies to discuss and determine the feasibility of enforcing existing LPAs and/or enacting new LPAs where needed. The study team will hold coordination meetings with the local planning agencies and will describe the need for LPAs, and the benefits that existing and/or proposed LPAs could provide for the study area. The pros and cons of implementing the LPAs will be discussed, and how they could be enacted. These coordination meetings will include discussion of partnering opportunities with other agencies, and whether the local government would be supportive of the LPAs.

From the discussions it will be determined whether the local agency will agree to take action to enforce existing LPAs or enact any new LPAs. The coordination meetings will be documented, and any agreed upon LPAs will be documented as recommended feasible local planning actions for further implementation.

6. MITIGATION MEASURES

Once preliminary mitigation concepts and preliminary local planning actions are identified, analyzed and concept plans prepared, they will be presented at a workshop with FDOT and Broward MPO staff, and at a workshop with the Project Advisory Committee (PAC). During these workshops, the study team will seek input and feedback from FDOT, MPO, County, and local municipality staff regarding the mitigation concepts and local planning actions. The input received from the stakeholders at the workshops will be used to revise and refine the concepts and local planning actions into acceptable mitigation concepts and local planning actions, that will be recommended for further evaluation.

Mitigation measures consist of acceptable mitigation concepts. Mitigation measures will be documented in Technical Report #1. Recommended local planning actions will be documented in Technical Report #2. The mitigation measures will then be bundled into construction projects based on the type of improvement, cost of construction, and timeframe when they are needed, and will be documented in an implementation plan.

APPENDICES

APPENDIX A – Example Performance Measure Dashboard

ARTERIAL CONNECTIVITY STUDY ALONG I-595

CORRIDOR:

NW/SW 136th Avenue

SAFETY	Existing Conditions	2045 No Build	2045 Build	Desired Trend
Annual Crash Rate	6.2	INCREASE	DECREASE	DECREASE
5 Year Total # of Fatal & Injury Crashes	176	INCREASE	NO CHANGE	DECREASE
5 Year Total # of Ped & Bicycle Related Crashes	6	INCREASE	DECREASE	DECREASE
MOBILITY				
% of Study Road with Daily LOS D or better	100%	100% NO CHANGE	XXX% NO CHANGE	NO CHANGE
% of Study Intersections with LOS D or better in both peak hours	50%	50% NO CHANGE	XXX INCREASE	100% INCREASE
Minutes of Delay during Peak Hours	6.6	21 INCREASE	XXX DECREASE	DECREASE

ARTERIAL CONNECTIVITY STUDY ALONG I-595

CORRIDOR:

NW/SW 136th Avenue

PEDESTRIAN / BICYCLE

	Existing Conditions	2045 No Build	2045 Build	Desired Trend
% Study Road with Pedestrian LOS D or better	100%	NO CHANGE	XXX NO CHANGE	NO CHANGE
% Pedestrian Facility Coverage	81%	NO CHANGE	XXX INCREASE	INCREASE
% Study Road with Bicycle LOS D or better	0%	NO CHANGE	XXX NO CHANGE	NO CHANGE
% Bicycle Facility Coverage	0%	NO CHANGE	XXX INCREASE	INCREASE
New River Greenway Xing ❑ Crossing distance - major detour from route (0%), at-grade direct crossing (50%) ❑ Level of crossing protection – no protection (0%), grade separation (50%)	0	NO CHANGE	XXX INCREASE	INCREASE

ARTERIAL CONNECTIVITY STUDY ALONG I-595

CORRIDOR: NW/SW 136th Avenue

TRANSIT

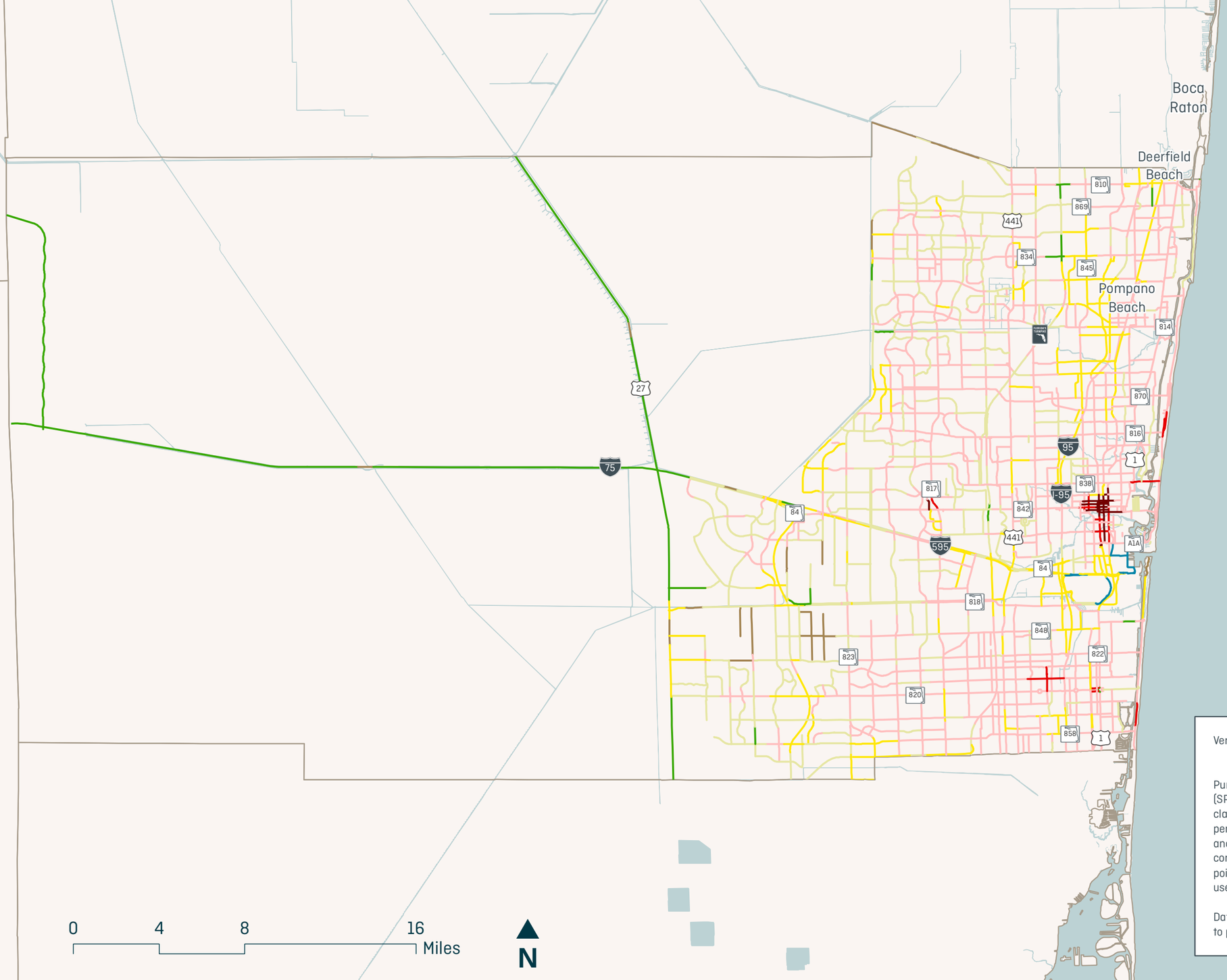
	Existing Conditions	2045 No Build	2045 Build	Desired Trend
% Stops with a Bench	12%	NO CHANGE	XXX INCREASE	INCREASE
% Stops with a Shelter	0%	NO CHANGE	XXX INCREASE	INCREASE

OTHER – LOCAL PLANNING ACTIONS

Policies to Improve Safety	0	NO CHANGE	NO CHANGE	NO CHANGE
Policies to Reduce Congestion	0	NO CHANGE	XXX INCREASE	INCREASE
Policies to Improve Connectivity / Efficiency of Travel	0	NO CHANGE	NO CHANGE	NO CHANGE

APPENDIX B – FDOT District Four Systemwide Provisional Context Classification Maps

DISTRICT 4 SYSTEMWIDE PROVISIONAL CONTEXT CLASSIFICATION BROWARD COUNTY



Refined Smoothed Roadway Segments, Existing (2017)

- C1 - Natural
- C2 - Rural
- C3R - Suburban Residential
- C3C - Suburban Commercial
- C4 - Urban General
- C5 - Urban Center
- C6 - Urban Core
- SD - Special District

0 4 8 16 Miles

N

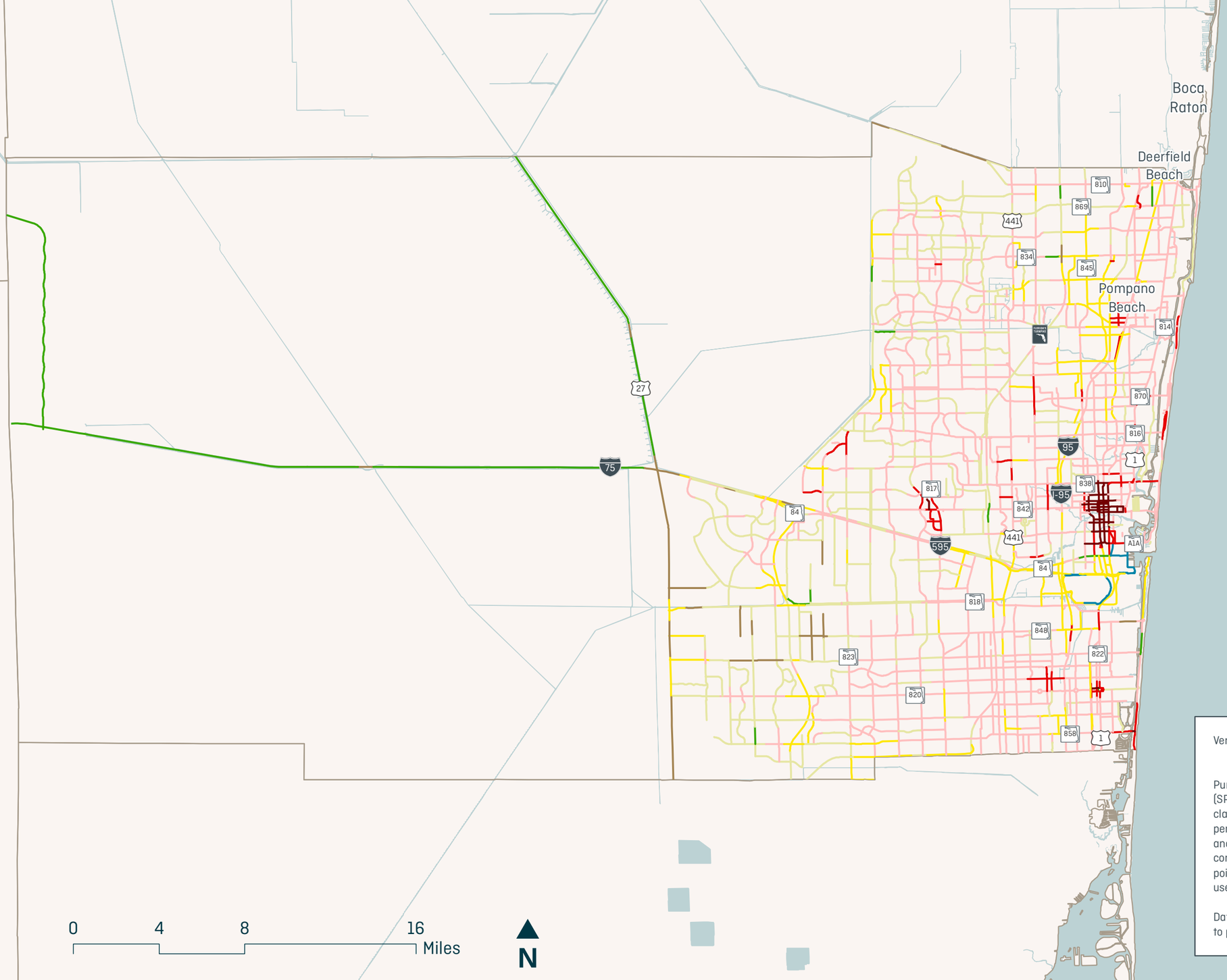
Version 1.0 - October 2017

FDOT

Purpose/Intended Uses: This is one of a set of Systemwide Provisional Context Classification (SPCC) maps produced by FDOT District 4 to provide an overall picture of provisional context classifications for each county in the district and the district as a whole. The maps provide a perspective consistent with the State Highway System as a system serving multiple jurisdictions and reflect use of spatial data available districtwide and a standardized approach consistent with context classification measures identified by FDOT. FDOT District 4 uses the SPCC as a starting point for assigning context classifications for projects on state roads. The information also may be useful for planning purposes.

Data Sources: See reports available from FDOT District 4 for more information on data sources used to produce the SPCC maps.

DISTRICT 4 SYSTEMWIDE PROVISIONAL CONTEXT CLASSIFICATION BROWARD COUNTY



Refined Smoothed Roadway Segments, Future (2040)

- C1 - Natural
- C2 - Rural
- C3R - Suburban Residential
- C3C - Suburban Commercial
- C4 - Urban General
- C5 - Urban Center
- C6 - Urban Core
- SD - Special District

0 4 8 16 Miles

N

Version 1.0 - October 2017

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