PRELIMINARY ENGINEERING REPORT

PROJECT DEVELOPMENT AND ENVIRONMENT STUDY
STATE ROAD 9 (I-95)

From North of Oakland Park Boulevard (SR 816)
to South of Glades Road (SR 808)
Mileposts 13.742-25.307 and 0.000-2.014

VOLUME 1 OF 3

ETDM Number 3330
Broward and Palm Beach Counties
FPID Numbers 409359-1-22-01 and 409355-1-22-01
FAP Numbers 0951-609-I and 0951-608-I
Prepared for:

DISTRICT FOUR
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309

FINAL

AUGUST 2013

PRELIMINARY ENGINEERING REPORT

Volume 1 of 3

This preliminary engineering report contains detailed engineering information that fulfills the purpose and need for project on:

State Road 9 (Interstate 95) Project Development and Environment Study

Project Study Limits:

From North of Oakland Park Boulevard (SR 816) to South of Glades Road (SR 808)
In Broward County (Mileposts 13.742-25.307) and
Palm Beach County (Mileposts 0.000-2.014)

ETDM Number 3330
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Prepared for:

FDOT District Four
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309

Prepared by:
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AUGUST 2013

FINAL

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered engineer in the State of Florida practicing with The Corradino Group, a Florida Corporation authorized to operate as an engineering business, P.E. #7665, by the State of Florida Department of Professional Regulation, Board of Engineers, and that I have prepared or approved the evaluation, findings, opinions or technical advice hereby reported for:

FPID Numbers:	409359-1 and 409355-1
FAP Numbers:	0951-609-1 and 0951-908-1
ETDM Number:	3330
Project:	SR 9/Interstate 95 Project Development and Environment Study
County:	Broward and Palm Beach
FDOT Project Manager:	Henry Oaikhena, P.E.

I acknowledge that the procedure and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

Signature_____________________________

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Date: June 21, 2013

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1.0 SUMMARY OF PROJECT

This preliminary engineering report contains detailed engineering information that fulfills the purpose and need for project on *State Road 9 (Interstate 95) Project Development and Environment Study* from north of Oakland Park Boulevard (SR 816) to south of Glades Road (SR 808) in Broward County (Mileposts 13.742-25.307) and Palm Beach County (Mileposts 0.00-2.014), dated June 2013.

The total project length is approximately 13.5 miles. ***Figure 1.1*** depicts the project location and PD&E study area. The study limits for each county are described below:

1. Broward County, from North of Oakland Park Boulevard to the Broward/Palm Beach County Line – 11.565 miles (FM# 409359-1) Mileposts 13.742-25.307.
2. Palm Beach County, from the Broward/Palm Beach County Line to South of Glades Road – 2.014 miles (FM #409355-1) Mileposts 0.0-2.014.

The objective of the I-95 PD&E Study is to satisfy the National Environmental Policy Act (NEPA) process. These measures are a prerequisite for receiving Location and Design Concept Acceptance (LDCA) from Federal Highway Administration (FHWA), an essential step in qualifying for the federal funds needed to implement the proposed improvements.

The primary purpose of this project is to design a transportation system that will offer new commuting choices and more reliable travel during congested periods with the implementation of an express lanes system.

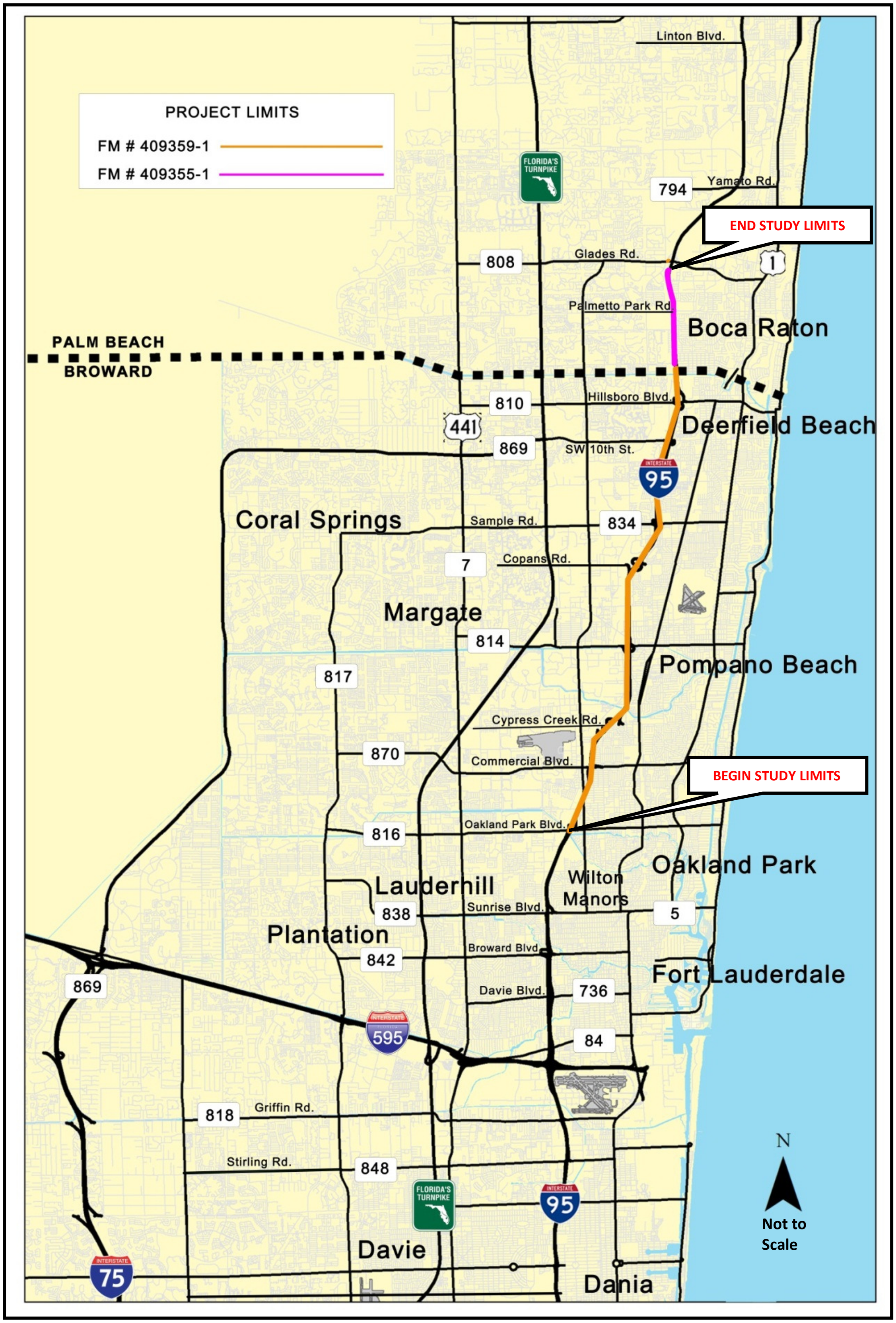


Figure 1.1 – Project Location Map

1.1 BACKGROUND

The I-95 corridor is considered the "spine" of the transportation system in southeast Florida. Master planning of major transportation facilities such as I-95 has been essential to facilitate the availability of capacity within the transportation network and to support the region's high growth. The FDOT has been involved in both master planning and implementation of master plan recommendations for the past three decades. Over the past few decades, Miami-Dade, Broward and Palm Beach Counties have experienced a high demographic growth which has translated into traffic volumes exceeding the capacity of the corridor. These high volumes have brought congestion during the peak hours on I-95 to unacceptable levels of service.

In early 1980s, FDOT began a major study for the I-95 corridor from the Miami-Dade/Broward County line to north of Glades Road in Palm Beach County. The *Interstate 95 High Occupancy Vehicle Lane Study* was completed in March 1984 and provided the preliminary engineering data and environmental documentation needed to initiate the design of High Occupancy Vehicle (HOV) lanes, auxiliary lanes, and interchange improvements. This study offered the basis for subsequent studies along the corridor during the late 1980s and throughout the 1990s.

In September 2003, the FDOT finalized a master planning study for the I-95/I-595 corridors and the South Florida Rail Corridor (SFRC), which evaluated the existing deficiencies and recommended possible future improvements along these corridors within the following limits:

- I-95 from the Miami-Dade/Broward County Line to Indiantown Road (SR 706) in Palm Beach County
- I-595 from SW 136th Avenue to US 1 in Broward County
- SFRC from the Miami-Dade/Broward County Line to the Palm Beach/Martin County Line

This PD&E study is one of the recommendations outlined in the master plan process. The main objective would be to improve the capacity of the I-95 transportation corridor within the specified limits by identifying and implementing viable and appropriate multimodal alternatives. The Locally Preferred

Alternative (LPA) from the master plan study, within the PD&E study limits, consisted of the following improvements:

- Add an additional general purpose lane for a total of four general purpose lanes in each direction
- Add auxiliary lanes between interchanges
- Interchange improvements

In 2007, the FDOT began this PD&E study to evaluate in detail the LPA recommendations from the master plan and identify a corridor alternative that is environmentally feasible and publically compatible which will meet the need determined in the planning phase. A year into the study, the travel demand forecasting efforts were completed and showed that adding an additional general purpose lane within the study limits will not improve the existing and future operations of the corridor. The additional lane was not expected to accommodate the projected travel demand and growth along the corridor. Therefore, the FDOT decided to put the study on hold and return to the planning phase to evaluate other possible concepts that could address the anticipated high demand and growth corridor wide.

Late in 2007, the FDOT completed the *Managed Lanes Comprehensive Traffic and Revenue Study*, which evaluated the potential operations of the corridor with the implementation of two tolled express lanes. The study determined that the improvements will offer potential time savings of up to 38 minutes during peak travel periods by providing continuous express lanes along I-95 throughout Miami-Dade, Broward, and Palm Beach Counties.

In 2009, the FDOT began the *I-95 Corridor Planning Study*, between Stirling Road (SR 848) in Broward County and Indiantown Road (SR 706) in Palm Beach County, to evaluate the feasibility of adding tolled express lanes in the median of I-95. The study was completed in January 2012 and determined that express lanes along this portion of I-95 was feasible and could be studied further during the PD&E phase to evaluate the concept as a viable alternative along the corridor.

The FDOT was also tasked by the state legislature to conduct the *I-95 Transportation Alternatives Study* to identify cost-effective measures that could be implemented to alleviate congestion along the I-95 corridor, facilitate emergency and security responses and foster economic development. The study was completed in 2010.

The results of these planning-level studies identified, recommended, and prioritized the development of an integrated multimodal transportation system which is economically efficient, safe, and environmentally sound. These studies' results led the FDOT to re-start this PD&E study in 2012 with the focus of evaluating capacity improvements along the corridor with the implementation of an express lanes system.

1.2 PROJECT DESCRIPTION

The project study area, as shown in ***Figure 1.1***, is located in northeast Broward County and southeast Palm Beach County; and is approximately 13.5 miles in length. The limits extend along I-95 from north of Oakland Park Boulevard (SR 816) to south of Glades Road (SR 808).

I-95 is the primary north-south interstate facility that links all major cities along the Atlantic seaboard and is one of the most important transportation systems in southeast Florida. I-95 is one of the only two major expressways, Florida's Turnpike being the other, that connect the major employment centers and residential areas within the South Florida tri-county area. The corridor serves the Boca Raton Airport, Florida Atlantic University, Fort Lauderdale-Hollywood International Airport, Palm Beach International Airport and major shopping malls and business centers. Within the study limits, I-95 is a major connector between northern Broward County and southern Palm Beach County and serves as a feeder route to east/west corridors along the facility. I-95 is part of the Strategic Intermodal System (SIS) and National Highway System (NHS). In addition, I-95 is designated as an evacuation route along the east coast of Florida.

I-95, within the study limits, is an eight-lane divided limited access facility classified as an urban principal arterial interstate. The existing speed limit along I-95 is posted at 65 miles per hour (MPH). The access management classification for this corridor is Class 1.2, Freeway in an existing urbanized area with limited access.

The project area traverses two counties and the following five municipalities:

- Oakland Park
- Fort Lauderdale
- Pompano Beach
- Deerfield Beach
- Boca Raton

This section of I-95 has interchange connections with major roadway facilities including Commercial Boulevard (SR 870), Cypress Creek Road, Atlantic Boulevard (SR 814), Copans Road, Sample Road (SR 834), SW 10th Street (SR 869), Hillsboro Boulevard (SR 810) and Palmetto Park Road. SW 10th Street provides a direct connection between I-95 and the Sawgrass Expressway.

The primary purpose of this project is to design a transportation system that will offer new commuting choices and more reliable travel during congested periods with the implementation of an express lanes system. The purpose of these express lanes is to improve mobility, relieve congestion, and provide additional travel options along the I-95 corridor. Express lanes will provide additional capacity and maximize vehicle throughput reducing delays for all travelers in the corridor, especially those traveling by carpool, vanpool or bus. This project will provide continuity with the proposed I-95 express lanes system immediately to the south of the study limits, as well as the existing I-95 express lanes system in Miami-Dade County, as envisioned in the *I-95 Corridor Planning Study.*

The corridor improvements will consist of two tolled express lanes in each direction along the I-95 corridor within the study limits. These improvements are needed to address future vehicular growth projected in the area, improve highway safety, enhance hurricane and other emergency evacuations, and improve system connectivity with major arterials along the corridor. The express lanes will create an opportunity to accommodate a Bus Rapid Transit (BRT) system that will allow express bus service between counties with connections to the existing park-and-ride lots along the corridor. The express lanes will have a variable toll pricing based on congestion to optimize the traffic flow.

1.3 Purpose and Need of the Project

The overall project objectives of this PD&E study are described below:

- Design a transportation system that will offer new commuting choices and more reliable travel times during congested periods that can be constructed within the existing right of way resulting in a feasible and cost effective project.
- Evaluate future mainline improvements in terms of safety, capacity, operations and interstate access that can be constructed and open to traffic in a short term.
- Maximize long-term capacity needs and long-term mobility needs of the corridor.

The purpose and need for the project is based on the following criteria:

- **Capacity/Transportation Demand –** The I-95 project corridor operates at Level of Service (LOS) F. The HOV lanes, depending on the location, are currently either operating near capacity or under capacity. Without improvements, the project corridor will continue to experience high delays and will continue to operate at LOS F in the year 2040. Driving conditions for residents and commuters will continue to deteriorate well below acceptable LOS standards.

- **Plan Consistency –** The I-95 capacity improvements project is in the 2035 Long-Range Transportation Plan (LRTP) and the five-year Transportation Improvement Program (TIP) for each of the respective counties as well as the State Transportation Improvement Program (STIP).

- **Growth Management Planning –** This section of I-95 is one of the most heavily traveled sections of urban interstate in the nation. As traffic levels increase due to population and employment growth, both along the corridor and in the region, capacity improvements will become increasingly important to continue facilitating north/south traffic movement throughout the tri-county area and Southeast Florida. The regional roadway system is close to build-out and the ability to add more traffic lanes is limited. The Broward County area is only able to grow inward since it is geographically constrained.

- **System Linkage –** This project is intended to evaluate strategies that maximize long-term capacity needs, long-term mobility needs, travel reliability and travel options for motorists and transit users along the I-95 corridor throughout Broward and Palm Beach Counties.

- **Modal Interrelationships (Freight Activity) –** Capacity improvements along the I-95 project corridor are critical in order to enhance the mobility of goods by alleviating current and future congestion along the corridor and on the surrounding freight network. Reduced congestion will serve to maintain and improve viable access to the major transportation facilities and businesses of the area (including connectors to freight activity centers/local distribution facilities or between the regional freight corridors).

- **Emergency Evacuation:** As part of the emergency evacuation route network designated by the Florida Division of Emergency Management, I-95 is critical in facilitating the movement of traffic during emergency evacuation periods. This facility connects other major arterials and highways designated on the state evacuation route network within the project limits, such as I-595 and the Florida's Turnpike. The project will allow for enhanced emergency access and incident response times.

1.3.1 CAPACITY/TRANSPORTATION DEMAND

According to data extracted from the 2011 FDOT Florida Traffic Information database and the 2040 South East Regional Planning Model (SERPM) network (developed during the PD&E study), the existing and future traffic conditions for the I-95 project corridor within the project limits are as follows:

- The 2011 Annual Average Daily Traffic (AADT) volume is projected to grow from an average of 220,000 vehicle trips per day to 282,000 vehicle trips per day in 2040 (1.0% annual growth rate).
- The average roadway volume-to-capacity (v/c) ratio is approximately 1.4. This indicates that the roadway has exceeded its designated service volume and LOS standard. In other words, the traffic volume exceeds capacity in the number of lanes available to accommodate the traffic demand.

- The 2011 AADT volume is projected to increase from 12,540 truck trips per day (5.7%) to 16,074 truck trips per day in 2040 (assuming the percentage of trucks on the road remains the same as the base year percentage).

Based on the 2012 FDOT Generalized Annual Average Daily Volumes Table 1 of the FDOT *Quality/Level of Service Handbook*, the I-95 project corridor operates at LOS F. It is important to note that the HOV lanes along much of this corridor are also operating, depending on the location, either near capacity or under capacity, offering little time savings to carpools/vanpools on I-95. The under capacity issue is related to the restrictions that only two passenger per vehicle can only use the HOV lanes. As a result of the corridor being over capacity, travel demand is shifting vehicles onto less appropriate facilities. This, in turn, is negatively impacting the quality of life in local neighborhoods, as well as increasing driver frustration, reducing safety and increasing trip travel time. Without improvements, the project corridor will continue to experience high delays and will continue to operate at LOS F by the design year of 2040. Driving conditions for residents and commuters along the adjacent corridors connecting with I-95 will also deteriorate well below acceptable LOS standards.

The proposed capacity improvements project is expected to provide Southeast Florida motorists and transit users with a viable option for consistent and dependable travel.

1.3.2 Plan Consistency

The I-95 capacity improvements project is in the 2035 LRTP and the 2012/2013-2016/2017 TIP for each of the respective counties as well as the STIP. The design and construction phases are listed in the FDOT Work Program under four financial project identification numbers (see ***Table 1.1***).

Table 1.1 Project Funding Plan					
Financial Project Identification Number	Project Limit	Design		Construction	
		Fiscal Year	Funds	Fiscal Year	Funds
409359-2	From Oakland Park Boulevard to Atlantic Boulevard	2015	$1,700,000	2022	$85,600,000
409359-3	From Atlantic Boulevard to Sample Road	2015	$1,500,000	2024	$72,500,000
409359-4	From Sample Road to the Broward/Palm Beach County Line	2015	$1,100,000	2024	$82,700,000
409355-2	From the Broward/Palm Beach County Line to Glades Road	2015	$900,000	2024	$46,800,000

Source: FDOT Work Program

FDOT District Four will continue to coordinate with Broward County, Palm Beach County, Broward MPO and Palm Beach MPO to ensure that funding is identified for future project phases in the TIP, LRTP, STIP and FDOT SIS Cost Feasible Plan.

1.3.3 Growth Management

I-95 is recognized as a corridor that is vital to the economic development of Broward and Palm Beach Counties. Serving as one of two major expressways that connect the major employment centers and residential areas of the tri-county area, the I-95 project segment fills an important role in facilitating the north/south movement of traffic in Southeast Florida. The project segment traverses a dense urban area with predominantly commercial and residential uses lining the corridor. The project area is located within two counties and several municipalities, a few of whom presently support designated Community Redevelopment Areas. These areas are defined as having the ability to accommodate residential infill and development interest due to their access to regional transportation corridors, support infrastructure and services. In addition, the project corridor supports and promotes the economic development and expansion activities of two major regional employers, Fort Lauderdale-Hollywood International Airport and Port Everglades (located south of the study limits).

Based on socioeconomic data extracted from the traffic analysis zones of the 2035 South East Regional Planning Model (SERPM), which encompass the I-95 project corridor:

- Population is projected to grow along the corridor from 21,339 in 2005 to 26,636 in 2035 (0.8% annual growth rate).
- Employment along the corridor is projected to grow from 22,879 in 2005 to 33,008 in 2035 (1.5% annual growth rate).

Similarly, according to projections prepared for the Broward MPO 2035 LRTP:

- Population within the county is forecasted to increase from 1,747,399 in 2005 to 2,250,830 in 2035 (1.0% annual growth rate).
- Employment within the county is projected to grow from 735,731 in 2005 to 1,011,286 in 2035 (1.3% annual growth rate).

Similarly, according to projections prepared for the Palm Beach MPO 2035 LRTP:

- Population within the county is forecasted to increase from 1,270,302 in 2005 to 1,677,170 in 2035 (1.1% annual growth rate).
- Employment within the county is projected to grow from 544,496 in 2005 to 800,045 in 2035 (1.6% annual growth rate).

At the time of this report, 2005 was the LRTP base year and 2035 was the LRTP horizon year.

This section of I-95 is one of the most heavily traveled sections of the corridor with an estimated AADT of 220,000 vehicle trips per day. The traffic volume is expected to exceed 282,000 vehicle trips per day by the year 2040. As traffic levels increase due to population and employment growth, both along the corridor and in the region, capacity improvements will become increasingly important in this area in order to continue facilitating a reliable north/south traffic movement. Broward County is only able to grow inward due to geographical constraints of the Atlantic Ocean to the east, the Everglades to the west and urbanized Miami-Dade County to the south. The regional roadway system is also close to build-out and the ability to add more traffic lanes is limited. The project is anticipated to meet the mobility needs of the area by alleviating current and future congestion on the corridor and surrounding roadway network. The additional capacity will allow I-95 to continue to serve as an important arterial in facilitating the north/south movement of traffic in Southeast Florida, thus improving access between communities of Miami-Dade, Broward, and Palm Beach Counties.

1.3.4 System Linkage

Capacity improvements on I-95 from north of Oakland Park Boulevard to south of Glades Road are intended to complement and support the following improvements presently underway along the I-95 corridor throughout Miami-Dade, Broward, and Palm Beach Counties:

- **SR 9 (I-95) from Golden Glades Interchange to I-595 (SR 862), ETDM Project #3174 in Miami-Dade and Broward Counties –** Referred to as "95 Express Phase 2", this project will extend the existing dual express lanes that were previously constructed in each direction along I-95 as part of the "95 Express Phase 1" project. Approximately 11 miles in length, the "95 Express Phase 2" project will implement two tolled express lanes in each direction by converting the existing single HOV to an express lane and by adding a second express lane through widening. The express lanes will have variable toll pricing based on congestion. Project construction (under a design-build contract) broke ground in November 2011 and is anticipated to be completed by early 2014.

- **SR 9 (I-95) from Stirling Road (SR 848) to North of Oakland Park Boulevard (SR 816), ETDM Project #13168 in Broward County –** Approximately 8.6 miles in length, this project is currently in the PD&E phase. As part of the PD&E process, alternatives are presently being analyzed for the proposed widening of I-95. The primary purpose of this project is to enhance operational capacity and relieve congestionin order to maximize long-term capacity needs and long-term mobility needs along the I-95 corridor. The PD&E study is anticipated to be completed by summer 2013.

- **SR 9 (I-95) from South of Glades Road (SR 808) to Linton Boulevard, ETDM Project #3333 in Palm Beach County –** Approximately 6 miles in length, this project is currently in a design reevaluation phase. The PD&E phase recommended the addition of one general purpose lane in each direction for a total of ten lanes (eight general purpose lanes and two

HOV lanes). This recommendation is the same one from the I-95 master plan study. However, the reevaluation is considering to modify the proposed typical section. The reevaluation is anticipated to be completed by fall 2013.

1.3.5 MODAL INTERRELATIONSHIPS

Freight Activity – I-95 is the primary interstate route along the east coast of the United States extending from Maine to Florida and serving some of the most populated urban areas in the country. In Florida, I-95 is a designated SIS facility. The SIS is a statewide network of highway, railway and waterway corridors as well as transportation hubs that handle the bulk of Florida's passenger and freight traffic. Highways that are designated as part of the SIS network provide for movement of high volumes of goods and people at high speeds. The SIS highway network is composed of interconnected limited- and controlled-access roadways (which include designated SIS highway corridors) that provide for high-speed and high-volume traffic movements within the state to serve both interstate and regional commerce and long-distance trips. This statewide transportation network accommodates high occupancy vehicles, express bus transit and, in some corridors, passenger rail service.

Within southeast Florida, I-95 is a vital north/south transportation corridor providing important regional access to major east/west and north/south transportation corridors, as well as residential and employment activity centers and other regional destinations in the area. Within the project limits, I-95 connects to the local roadway network and a number of additional SIS facilities such as I-595, Florida's Turnpike, Fort Lauderdale-Hollywood International Airport and Port Everglades.

Several SIS facilities also run parallel to the I-95 corridor including the FEC Railway, FEC Intermodal Terminal and South Florida Regional Transportation Authority Tri-Rail. According to the Broward County Urban Freight/Intermodal Mobility Study (completed in 2008), the I-95 project corridor supports three freight industry zones:

- I-95/Powerline Road Corridor
- I-595/Airport Zone (Mega Transport Zone)
- South County/Other

It should be noted that the current daily truck volume on the corridor is expected to increase as freight activity within these zones expands. The proposed capacity improvements along the I-95 project corridor are critical to enhance the mobility of goods by alleviating current and future congestion along the corridor and on the surrounding freight network. Reduced congestion will serve to maintain and improve viable access to the major transportation facilities and businesses of the area (including connectors to freight activity centers/local distribution facilities or between the regional freight corridors).

Transit and Non-Motorized Travel – Direct route services that do not require transfers will be explored for cross county trips to initially provide uncongested routes for buses on I-95 and subsequently on a regional network. Local transit currently operates a number of local routes within the limits of the project; however, none use the I-95 corridor. By adding capacity to the corridor and improving the operations during the peak hour periods, inter-county regional express bus service can be extended throughout the corridor providing an opportunity for express bus service to qualify as Bus Rapid Transit, offering faster and more reliable service for many transit users.

1.3.6 EMERGENCY EVACUATION

I-95 serves as part of the emergency evacuation route network designated by the Florida Division of Emergency Management. Also designated as a Broward and Palm Beach Counties evacuation facility, I-95 is critical in facilitating traffic during emergency evacuation periods as it connects to other major arterials and highways of the state evacuation route network (i.e., I-595 and the Florida's Turnpike). The project is anticipated to:

- Improve emergency evacuation capabilities by enhancing connectivity and accessibility to other major arterials designated on the state evacuation route network.
- Increase the capacity of traffic that can be evacuated during an emergency event.
- Allow for enhanced emergency access and incident response times due to the ability to improve the operational speeds of the corridor.

1.4 COMMITMENTS AND RECOMMENDATIONS

The FDOT made a series of commitments and recommendations during the course of the PD&E study pertaining to the I-95 corridor improvements. The following section summarizes the commitments and recommendations that will be adhered to during the future transportation phases.

During construction, the FDOT will comply with all provisions of the most recent version of the FDOT *Standard Specifications for Road and Bridge Construction*. In addition, the FDOT is committed to the following measures for the I-95 project:

Traffic and Transportation: The FDOT is committed to the following measures in order to eliminate and/or reduce impacts to traffic and transportation:

1. The sequence of construction will be planned in such a way as to minimize traffic delays. The project will involve the development and use of a Maintenance of Traffic (MOT) Plan. This plan will include traffic management and signage, access to local businesses and residences, detour routes, public notification of alternate routes, emergency services coordination and project scheduling. The local news media will be notified in advance of road closings and other construction-related activities, which could excessively inconvenience the community so that business owners, residents, and/or tourists in the area can plan travel routes in advance. A sign providing the name, address, and telephone of an FDOT contact person will be displayed on-site to assist the public in obtaining answers to questions or complaints about project construction.
2. The FDOT will perform detailed safety evaluations at the identified high crash locations after the PD&E Study or during design to quantitatively determine the impact of the proposed improvements and evaluate and address safety improvements if required. The detailed analysis will include preparation of collision diagrams, additional field reviews, expected value analysis and review of police reports (if necessary) to identify the crash patterns and potential countermeasures at each of the identified locations.
3. The FDOT will prepare an Incident Management Plan for the deployment of the next phase of express lanes. This plan will build upon and be coordinated with the existing Incident Management Plan in place for 95 Express Phases I and II and with our agency partners. The plan will be submitted to FHWA for review and approval.

4. The FDOT is in the process of completing a study for the development of a Regional Concept of Transportation Operations. The FDOT will continue to work with our agency partners to prepare a Concept of Operations Plan. This plan will be submitted to FHWA for review and approval.
5. The FDOT is committed to holding additional workshops, if necessary, to discuss tolling and potential changes in ingress/egress points to the express lanes system.
6. Access to businesses, residences, institutions and through traffic will be maintained to the maximum extent possible during project implementation.
7. Preliminary bridge structure load ratings were completed during the PD&E study resulting in seven potential structural load capacity design variations. The final bridge structure load ratings evaluation and design variation packages (if necessary) will be completed during the design phase of the project.

Relocations: No relocations are anticipated; however, should relocations be necessary, the FDOT is committed to:

8. If required, the FDOT will carry out a Right of Way and Relocation Program in accordance with the Florida Statute 339-09 and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646 as amended by Public Law 100-17).

Public Services and Utilities: The FDOT is committed to the following measures in order to eliminate and/or reduce impacts to public services and utilities:

9. The FDOT will coordinate with all service providers, including emergency services and utility providers during final design to confirm that access is maintained and alternate routes are developed.
10. During construction, the FDOT will maintain uninterrupted utility service to the extent practical.

Land Use: The FDOT is committed to the following measure in order to maintain consistency with land use:

11. Prior to the advancement of future project phases, the FDOT will coordinate with the county and affected municipalities to confirm the project is consistent with each local government's comprehensive plan.

12. The FDOT will coordinate with the area municipalities regarding any potential impacts to the interchanges or potential pond sites within their city as this project progresses through the design and construction phases.

Landscaping: The FDOT is committed to the following measures in regards to landscaping along the project corridor:

13. During final design, consideration will be given to the preservation or relocation of existing landscaping and/or and inclusion of new landscaping. This will be done in collaboration with the Broward and Palm Beach Metropolitan Planning Organizations and local jurisdiction.

Permits: The FDOT is committed to obtaining the following environmental permits for the project, if still deemed to be appropriate based on the level of impacts determined by the final design of the project:

14. Environmental Resource Permit (SFWMD), Right of Way Occupancy Permit (SFWMD), Water Use Permit for Construction Dewatering (SFWMD), Section 404 Dredge and Fill Permit (USACE), Bridge Permit (USCG), National Pollutant Discharge Elimination Permit (FDEP), and Local Drainage District Approvals/Permits.

Wetlands and Protected Species: The FDOT is committed to the following measures in order to eliminate and/or reduce impacts to wetlands and protected species including the following:

15. Direct impacts to stormwater management/drainage features will be mitigated by the creation of a new stormwater management/drainage system, which is anticipated to result in no net loss of stormwater management/drainage features dominated by hydrophytic vegetation and no net loss of functional value in terms of water quality or habitat value. If it is determined during final design and permitting that the new stormwater management/drainage system does not fully compensate for the proposed impacts, these impacts would be mitigated along with the proposed wetland mitigation. Any proposed wetland compensatory mitigation would have to be provided within the same basin as the wood stork impacts or at a USFWS-approved mitigation bank and would have to fully compensate for the biomass loss.

16. The FDOT commits to coordinating with the FWC Gopher Tortoise Permit Coordinator to facilitate a 100% Gopher Tortoise Survey with live trapping of individual gopher tortoise to a recipient site approved by the FWC. Biologists conducting this survey will also watch for observations of any other listed species at the time of the survey.
17. The FDOT will install silt fencing along the edge of the construction limits adjacent to the Blazing Star Preserve to prohibit any gopher tortoises or other protected species from entering the area following relocation activities.
18. The FDOT will incorporate the most current eastern indigo snake protection guidelines, entitled Standard Protection Measures for the Eastern Indigo Snake, into the final project design and will require that the construction contractor abide strictly to the guidelines during construction.
19. The FDOT will incorporate the most current manatee protection guidelines, entitled Standard Manatee Conditions for In-Water Work, into the final project design and will require that the construction contractor abide strictly to the guidelines during construction.
20. The FDOT's contractor will be advised of state and local laws regarding the harassment of alligators prior to any construction activities.

Contamination: The FDOT is committed to the following measures in order to eliminate and/or reduce impacts to contaminated sites:

21. The FDOT District Four Planning and Environmental Management Office will utilize the information contained in the *Contamination Screening Evaluation Report* to determine the need for additional investigation. The Level 2 Contamination Assessment investigation will be conducted during the design phase and prior to any right of way acquisition, should any become necessary.
22. The FDOT will adhere to the procedures set forth in the FDOT *Standard Specifications for Road and Bridge Construction*, specifying the contractor's responsibilities in regard to encountering petroleum-contaminated soil and/or groundwater.

Water Quality: The FDOT is committed to the following measure in order to eliminate and/or reduce impacts to water quality:

23. Water quality impacts resulting from erosion and sedimentation during construction activities will be controlled in accordance with the latest edition

of the FDOT *Standard Specifications for Road and Bridge Construction* and through the use of BMPs, including temporary erosion control measures.

Noise: The FDOT is committed to the following measures in order to eliminate and/or reduce impacts from noise and vibration:

24. The FDOT is committed to the construction of feasible noise abatement measures at the locations where noise barriers have been recommended for further consideration during the final design phase, contingent upon the following conditions:
    a. Detailed noise analyses during the final design process support the need for abatement.
    b. Reasonable cost analyses indicate that the economic cost of the barriers will not exceed the cost reasonable criterion.
    c. Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.
    d. Community input regarding desires, types, heights and locations of barriers has been solicited by the FDOT.
    e. Any other mitigating circumstances found in *Section 17-4.6.1* of the FDOT *PD&E Manual* have been analyzed.
25. A reassessment of the project corridor for additional sites particularly sensitive to construction noise and/or vibration will be performed during design to ensure that impacts to such sites are minimized. Coordination between the FDOT and the operators of any construction noise/vibration sensitive locations identified during design will occur, and if applicable, Technical Special Provisions (TSP) developed for the project's contract package in order to ensure that impacts to such businesses are minimized.
26. The FDOT will re-evaluate the feasibility and reasonableness of noise abatement measures during final design if warranted by changes to the project's design.
27. Construction noise and vibration impacts will be minimized by adherence to the controls listed in the latest edition of the FDOT *Standard Specifications for Road and Bridge Construction*.

Air Quality: The FDOT is committed to the following measure in order to eliminate and/or reduce impacts to air quality:

28. Construction activities for the proposed action may potentially have short-term air quality impacts within the immediate vicinity of the project. Construction activities may generate temporary increases in air pollutant emissions in the form of dust from earthwork and unpaved roads and smoke from open burning. Such emissions and potential impacts will be minimized by adherence to all applicable State and local regulations and to the latest edition of the FDOT *Standard Specifications for Road and Bridge Construction.*

Cultural Resources: The FDOT is committed to the following measure in order to eliminate and/or reduce impacts to cultural resources:

29. The FDOT will not store or stage equipment or materials within the Hillsboro Canal and the FEC Railway ROW boundaries and these resources will not be temporarily occupied during construction.

Navigation: The FDOT is committed to the following measure in order to maintain navigability within the Hillsboro Canal:

30. A U.S. Coast Guard Bridge Permit will be obtained for any unavoidable impacts to the portion of the Hillsboro Canal beneath I-95.

Reevaluation: In the event of a reevaluation, the FDOT is committed to the following:

31. If the project is advanced through a Design-Build or Design-Build-Finance, the FDOT will continue to coordinate with FHWA.

1.5 Description of Proposed Action

The proposed alternative recommends the following corridor improvements between north of Oakland Park Boulevard and south of Glades Road in Broward and Palm Beach Counties:

- Convert the existing HOV lane to a tolled express lane.
- Add one tolled express lane for a total of two express lanes in each direction in the center of the corridor.
- Provide access points at selected locations along the corridor to enter and exit the express lanes system.
- The express lanes will have variable toll pricing based on congestion to optimize traffic flow.
- Maintain the existing number of general purpose lanes and auxiliary lanes.
- Create an opportunity for a Bus Rapid Transit (BRT). A BRT is an express bus service that will operate within the express lanes system.
- Transit (buses) and registered high occupancy vehicles with three or more people (HOV-3) will be able to use the express lane system at no cost.

The proposed alternative typical section will consist of the following roadway elements:

- Four 12-foot (12') wide express lanes (two in each direction)
- Six 12-foot (12') wide general purpose lanes (three in each direction)
- Four-foot (4') wide buffer with tubular markers separating the general purpose lanes from the express lanes
- A 12-foot (12') wide paved inside shoulder
- A 12-foot (12') wide outside shoulder (ten-feet (10') paved and two-feet (2') unpaved)
- A two and a half-foot (2.5') wide center barrier wall
- Twelve-foot (12') wide auxiliary lanes at selected locations

A total of 42 bridges exist within the study limits. As part of the proposed alternative, 28 bridges are anticipated to be widened and two are anticipated to be replaced. Stormwater runoff will be conveyed and contained within the existing right of way. Approximately 32.15 acres of stormwater drainage feature will be impacted by the project. The stormwater drainage features will be replaced with new features. Eight new noise walls were recommended for further consideration based on the noise analysis. No right of way acquisition is anticipated for the project.

2.0 EXISTING CONDITIONS

The methodology utilized for evaluating the existing conditions along I-95 consisted of data gathering in the areas of roadway, bridge, and environmental characteristics. The existing conditions assessment began with the collection and review of all data pertaining to the existing facility through reviewing existing documents, conducting on-site inventories and collecting pertinent data that would serve as a basis for evaluation. The following sections describe the existing conditions within the study limits.

2.1 FUNCTIONAL CLASSIFICATION

I-95, within the study limits, is classified as an urban principal arterial interstate. The access management classification is Class 1.2, Freeway in an Existing Urbanized Area with Limited Access. I-95 is an integral part of the Strategic Intermodal System (SIS) and National Highway System (NHS) networks.

2.2 TYPICAL SECTION

I-95, within the study limits, is an eight-lane divided limited access facility. The existing roadway typical section varies slightly and consists primarily of two 12-foot (12') wide HOV lanes (one in each direction), six 12-foot (12') wide general purpose lanes (three in each direction), two-foot (2') wide buffer areas with pavement markings separating the general purpose lanes from the HOV lanes, 12-foot (12') wide paved inside shoulders, 12-foot (12') wide outside shoulders (ten-foot (10') paved and two-foot (2') unpaved) and a two and a half-foot (2.5') wide center barrier wall. Twelve-foot (12') wide auxiliary lanes exist at selected locations.

The I-95 corridor typical section, south of Commercial Boulevard, has an additional general purpose lane in each direction for a total of eight general purpose lanes. The southbound on-ramp at Commercial Boulevard from the existing westbound to southbound flyover becomes the fourth lane south of the interchange. In the northbound direction, the additional fourth lane ends and becomes the off-ramp to Commercial Boulevard. ***Figures 2.1 and 2.2*** show the existing typical sections along the corridor within the study limits.

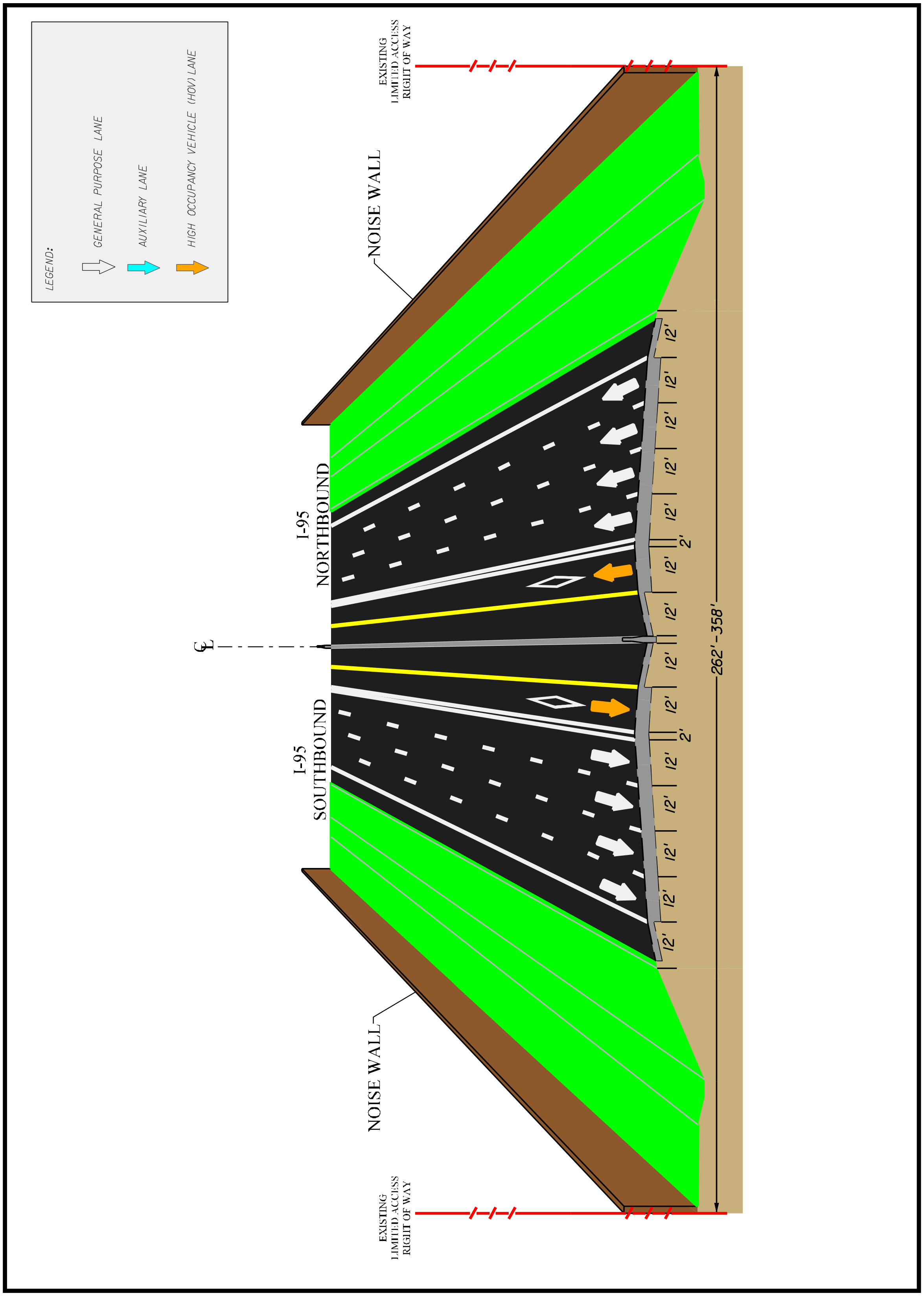


Figure 2.1 – Existing Typical Section between Oakland Park Boulevard and Commercial Boulevard

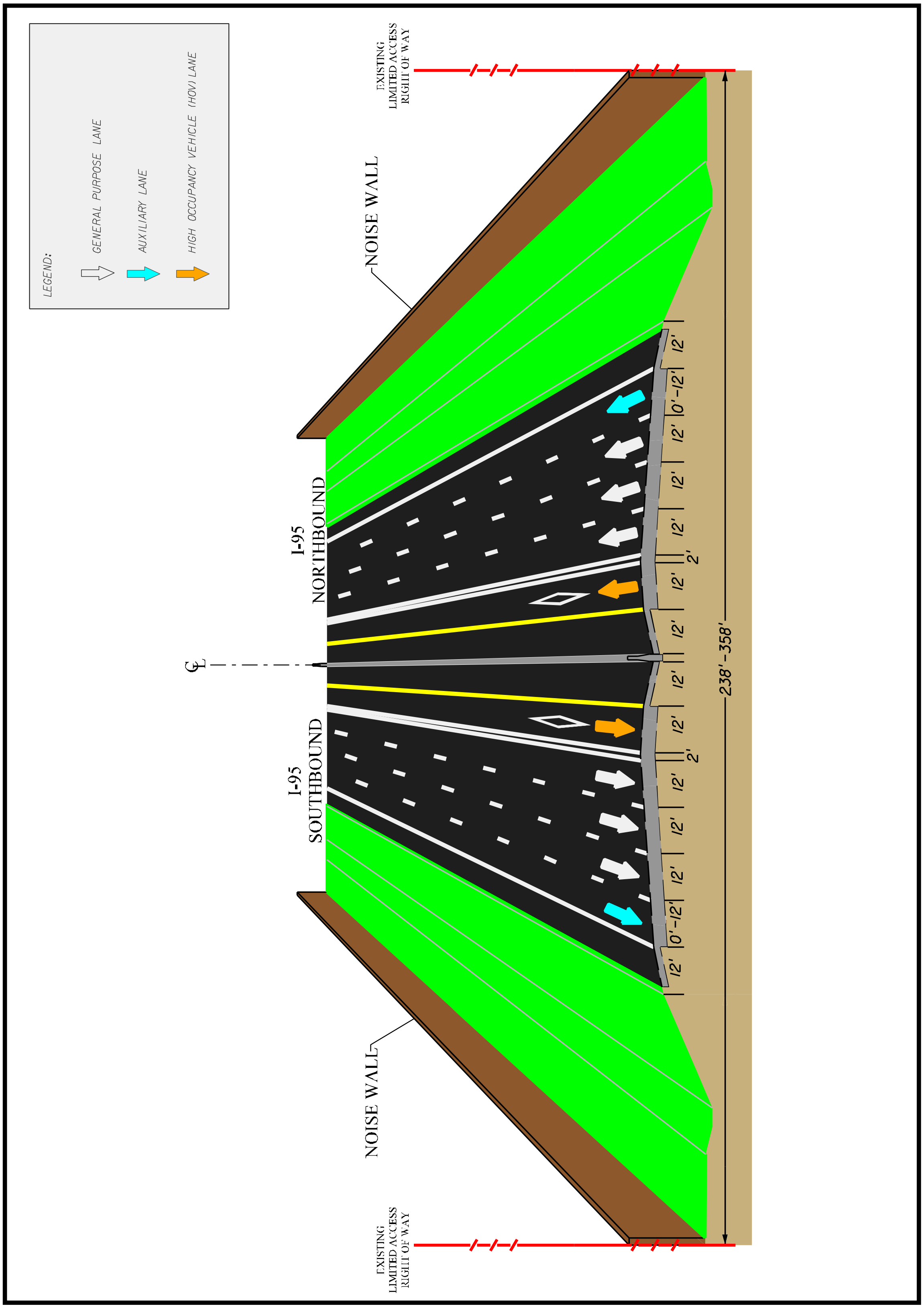


Figure 2.2 – Existing Typical Section between Commercial Boulevard and Glades Road

2.3 Pedestrian and Bicycle Facilities

I-95 is a limited access facility, therefore, there are no designated pedestrian or bicycle accommodations along the corridor. Pedestrians and bicycles are not permitted on limited access corridors.

2.4 Multimodal Facilities

Along the corridor, within the study limits, there is a wide variety of modes of public transportation. Some of these modes of public transportation are:

- Transit Services
- Railroads
- Van-Pool/Car-Pool
- Park and Ride Facilities
- Multimodal/Intermodal Facilities
- Private Passenger Services

Appendix A, Corridor Base Maps, depicts the location of these facilities along the corridor within the study limits.

2.4.1 Transit Services

There is a variety of transit services provided within the limits of the study. Within Broward County is Broward County Transit (BCT) and within Palm Beach County is Palm Tran, both of which are regionally coordinated by the South Florida Regional Transportation Authority (SFRTA). SFRTA also provides Tri-Rail Shuttle service in both counties.

The BCT provides fixed-stop bus service within and across the study area. The BCT bus routes 72, 14, 55, 60, 62, 42, 20, 83, 34, and 48 are located in the study limits (see ***Appendix A***). BCT also assists the following municipalities with their community bus services.

- City of Oakland Park – East and West Route
- City of Pompano Beach – Green West Route, Blue Route and Green Route
- City of Deerfield Beach – Express I Route

Palm Tran provides fixed-stop bus service within and across the study area. The Palm Tran bus routes 92, 91, 2, and 3 are located in the study limits.

In addition to general bus service, BCT and Palm Tran provide the following services within the study area:

- **TOPS –** The TOPS paratransit service is for ADA-eligible citizens, on a reservation basis.
- **Emergency Services –** BCT uses their bus fleet for emergency evacuation service during hurricane events.

SFRTA has shuttle bus services (bus routes CC-1, DB-1, and DB-2) that originate from selected Tri-Rail stations.

2.4.2 RAILROADS

The South Florida Rail Corridor is a dual railroad track that runs parallel to the west side of the I-95 project corridor. This railroad line is currently under the jurisdiction of the SFRTA and owned by the FDOT. It was formerly owned by CSX Transportation and continues to carry CSX freight trains. The SFRTA also operates the commuter rail service called Tri-Rail on these tracks. Within the study limits, there are three Tri-Rail stations (see ***Appendix A***):

- Cypress Creek Station
- Pompano Beach Station
- Deerfield Beach Station

Amtrak also operates passenger trains on the South Florida Rail Corridor. Within the study limits, the Deerfield Beach Amtrak station is co-located with the Tri-Rail station.

To the east of the study area, generally parallel to the I-95 project corridor, is the Florida East Coast (FEC) Railway freight railroad track. This railroad line extends beyond the study limits to both the north and south. A single spur railroad track crosses under I-95 between Atlantic Boulevard and Copans Road. This spur line connects the FEC railroad track to private warehouses west of the I-95 corridor. This spur line does not connect with the South Florida Rail Corridor.

2.4.3 Van-pool/Car-pool

The FDOT offers a regional commuter assistance program, the South Florida Commuter Services (SFCS) Program, to promote alternatives to drive-alone commuting. SFCS includes car-pool (for 2-4 people) and van-pool (7-12 people) programs, all of which can use the HOV lanes on I-95. These car-pool and van-pool services use on a daily basis the park and ride facilities within the I-95 study corridor.

2.4.4 Park and Ride Facilities

Within the study limits, there are four Park and Ride lots servicing the commuters using the facilities along the corridor. These are:

- Commercial Boulevard
- Cypress Creek Tri-Rail
- Pompano Beach Tri-Rail
- Deerfield Beach Tri-Rail

2.4.5 Multimodal/Intermodal Facilities

A multimodal facility is any facility which combines two or more modes of travel, for example from bus to airplane, or from ship to rail. Within the study limits there are three intermodal facilities. These are:

- Cypress Creek Tri-Rail Station (Tri-Rail, bus, park and ride)
- Pompano Beach Tri-Rail Station (Tri-Rail, bus, park and ride)
- Deerfield Beach Tri-Rail Station (Tri-Rail, Amtrak, bus, park and ride)

Within close proximity to the study corridor, there are four additional significant intermodal facilities. These are:

- Fort Lauderdale/Hollywood International Airport (passenger air, air freight, bus, truck transfer)
- Port Everglades (passenger water, water freight, freight-to-rail facility, bus, truck transfer)
- Palm Beach International Airport (passenger air, air freight, bus)
- Port of Palm Beach (passenger water, water freight, freight-to-rail facility)

2.4.6 PRIVATE PASSENGER SERVICES

In addition to the public transportation modes noted above, Greyhound bus lines, a private passenger service, also serves the general I-95 project corridor area. However, there are no bus terminals located within the study limits.

2.5 RIGHT OF WAY

The existing limited access right of way varies slightly within the study limits. The right of way is generally consistent throughout the corridor except at the interchanges, where it varies to accommodate entrance and exit ramps. ***Table 2.1*** summarizes the available right of way along the corridor. ***Appendix A***, Corridor Base Maps, illustrates the existing right of way within the study limits.

Table 2.1
Summary of Existing Limited Access Right of Way

Roadway Section	Right of Way Width (feet)
Oakland Park Boulevard – Commercial Boulevard	337-374
Commercial Boulevard - Cypress Creek Road	315-372
Cypress Creek Road – Atlantic Boulevard	337-500
Atlantic Boulevard - Copans Road	280-340
Copans Road - Sample Road	338
Sample Road – SW 10th Street	270-300
SW 10th Street - Hillsboro Boulevard	270-285
Hillsboro Boulevard - Palmetto Park Road	270-300
Palmetto Park Road- Glades Road	285-346

Source: 2007 Project Survey

2.6 Geometric Elements

The existing geometric elements for the corridor were obtained from as-built plans provided by the FDOT and from the project survey. This segment of I-95 was constructed in the 1970s. Since then, the corridor has been widened and the alignment has been modified. The design speed of the corridor is 65 MPH.

2.6.1 Cross Section

The existing typical pavement cross slope of the project corridor is consistent throughout the study limits except for the segments within horizontal curves, where the superelevation rates range from 0.02 to 0.08 (see ***Table 2.2***). Typically, the inside shoulder slopes to the inside ranging from 0.02 to 0.06. The HOV lane and the adjacent buffer also slope to the inside at 0.02. The three general purpose lanes slope to the outside at 0.02. Auxiliary lanes, where present, slope to the outside at 0.03. The outside shoulder typically slopes to the outside at 0.06.

Where open drainage exists, the swale areas generally have 1:6 front slopes (1 vertical to 6 horizontal length units) and 1:4 back slopes; however, swale conditions vary throughout the corridor.

2.6.2 Horizontal Alignment

The existing horizontal alignment was reviewed and evaluated in order to identify the existing geometric characteristics along the corridor. The evaluation also verified if the existing facility meets the current design standards for horizontal curves and sight distance. The design elements reviewed during the evaluation of the existing horizontal alignment conditions included curve radius, curve length, stopping sight distance (SSD), and superelevation of the roadway surface.

The mainline alignment contains twelve horizontal curves within the study limits. The radius of each horizontal curve meets current FDOT and American Association of State Highway and Transportation Officials (AASHTO) criteria for 65 MPH. ***Table 2.2*** summarizes the geometric characteristics for the existing horizontal alignment. For stationing references, see ***Appendix A***, Corridor Base Maps. Based on the current design standards for horizontal curves and sight distance, ***Table 2.2*** shows that the project corridor has two locations that do not meet stopping sight distance requirements.

Table 2.2
Existing Horizontal Alignment Geometric Characteristics

Location/ Adjacent Cross Road	Station	Milepost[1]	Radius of Curve (ft)	Length of Curve (ft)	Degree of Curve D	Deflection Angle Δ	Superelevation e	SSD Value	SSD Required for 65 MPH Interstate Florida PPM		SSD Required for 65 MPH AASHTO	
Oakland Park Boulevard Interchange	PC 512+15.05 PI 516+91.43 PT 521+65.61	13.45	5,729.58	950.56	01°00'00"	09°30'20" (LT)	0.039	910	730	✓	645	✓
North of Prospect Road	PC 578+90.13 PI 583+34.90 PT 587+72.63	14.71	2,864.79	882.50	02°00'00"	17°39'00" (LT)	0.074	645	730	✗	645	✓
North of Commercial Boulevard	PC 613+94.89 PI 618+64.37 PT 623+32.67	15.38	7,639.44	937.78	00°45'00"	07°02'00" (RT)	0.028	1,050	730	✓	645	✓
South of Andrews Avenue	PC 623+32.67 PI 636+00.66 PT 647+98.67	15.71	4,297.18	2,466.00	01°20'00"	32°52'48" (RT)	0.052	789	730	✓	645	✓
North of Cypress Creek Road	PC 687+21.01 PI 702+84.14 PT 716+88.44	16.97	3,819.72	2,967.44	01°30'00"	44°30'42" (LT)	0.058	742	730	✓	645	✓
South of Copans Road	PC 858+65.55 PI 867+54.23 PT 875+75.60	20.09	2,546.48	1,710.05	02°15'00"	38°28'34" (RT)	0.080	608	730	✗	645	✗
North of Copans Road	PC 915+50.67 PI 928+88.32 PT 941+24.00	21.25	3,819.72	2,573.33	01°30'00"	38°36'00" (LT)	0.058	742	730	✓	645	✓
North of Sample Road	PC 976+31.79 PI 983+99.12 PT 991+57.37	22.30	5,729.58	1,525.58	01°00'00"	15°15'21" (RT)	0.040	910	730	✓	645	✓
Hillsboro Blvd Interchange	PC 1089+35.77 PI 1101+88.25 PT 1114+18.64	24.53	7,639.44	2,482.87	00°45'00"	18°37'17" (LT)	0.030	1,050	730	✓	645	✓
South of Palmetto Park Road	PC 1191+32.98 PI 1203.63.85 PT 1215+92.66	1.14	24,555.33	2,459.69	00°14'00"	05°44'21" (RT)	NC[2]	∞	730	✓	645	✓
Palmetto Park Road Interchange	PC 1224+15.05 PI 1233+51.61 PT 1242+71.75	1.71	5,729.58	1,856.70	01°00'00"	18°34'01" (LT)	0.037	910	730	✓	645	✓
North of Palmetto Park Road	PC 1248+31.16 PI 1265+40.73 PT 1281+53.93	2.31	5,729.58	3,322.77	01°00'00"	33°13'40" (RT)	0.037	910	730	✓	645	✓

Notes : [1] Based on the location of the Point of intersection (PI)
[2]NC = Normal Crown (0.02)
SSD = Stopping Sight Distance

✗ = Does not meet criteria
✓ = Meets required criteria

2.6.3 VERTICAL ALIGNMENT

The existing vertical alignment was reviewed and evaluated in order to identify the existing geometric characteristics along the corridor. The evaluation also verified if the existing facilities meet the current design standards for vertical curves and sight distance. The following components were verified during the review: percent grade, changes in grade, SSD, length of vertical curve, and K value.

The K value of a vertical curve is simply the length of the curve divided by the change in grade of the curve. The minimum K value set forth in the FDOT *Plans Preparation Manual (PPM) Volume I, Chapter 2, Section 2.8.2* is based on a minimum SSD requirement. If the curve K value meets the minimum criteria, the SSD criterion is also met. The minimum K value assigned to a crest vertical curve is based on the driver's ability to see over the curve, while for a sag vertical curve is based on the headlight illumination distance. The minimum lengths of the vertical curves and the percent grades were also verified against the criteria in Section 2.8.2 of the PPM.

The current as-built plans and existing roadway survey illustrates the presence of a split profile grade line (PGL), an independent PGL for each direction, along I-95 from north of Oakland Park Boulevard (Station 532+00) to north of the Commercial Boulevard (Station 620+00). The split PGL merges into a single PGL, for both directions, and continues north beyond the limits of the study.

Within the limits of the spilt PGL, the corridor has four crest vertical curves and three sag vertical curves. Along the single PGL, there are 13 crest vertical curves and 16 sag vertical curves.

Twenty one roadway grade separations and a pedestrian overpass exist within the limits of the study along the corridor and are listed below:

- I-95 over NW 38th Street
- I-95 over Powerline Road
- I-95 over Prospect Road
- I-95 over Commercial Boulevard
- Commercial Boulevard flyover ramp over I-95
- Andrews Avenue over I-95

- I-95 over Cypress Creek Road
- I-95 over McNab Road
- Race Track Road over I-95
- I-95 over Atlantic Boulevard
- I-95 over Hammondville Road
- I-95 over FEC Railroad Tracks
- I-95 over NW 15th Street
- I-95 over Copans Road
- I-95 over Sample Road
- NE 48th Street over I-95
- SW 10th Street over I-95
- I-95 over Hillsboro Boulevard
- SW 18th Street over I-95
- I-95 over Camino Real
- I-95 over Palmetto Park Road

Table 2.3 lists the vertical curve parameters and existing characteristics. For stationing references, see ***Appendix A***, Corridor Base Maps.

Table 2.3
Existing Vertical Alignment Geometric Characteristics

Location	Type of Curve	VPI Station	Approximate Milepost	VPI Elevation (ft)	PGL High/Low (ft)	Grade (Back) %	Grade (Ahead) %	Length of Curve (ft)	Length Required for Interstate[1]		K-Value	K-Value Required for 65 MPH Interstate[1]		K-Value Required for 65 MPH AASHTO	
Oakland Park Boulevard	Sag	531+70	13.73	3.27	12.35	-2.02	2.01	1,800	800	✓	446	181	✓	157	✓
NW 38th Street	Crest	544+40	13.97	28.86	29.08	2.01	0.22	650	1,000	✗	363	401	✗	193	✓
Prospect Road	Crest	574+80	14.55	35.08	34.32	0.22	-1.31	800	1,000	✗	521	401	✓	193	✓
	Sag	587+56	14.79	18.00	21.41	-1.31	1.00	1,200	800	✓	519	181	✓	157	✓
Commercial Boulevard	Crest	605+95	15.14	36.23	32.66	1.00	-2.49	1,000	1,800	✗	287	401	✗	193	✓
	Sag	615+25	15.31	12.33	12.93	-2.49	0.21	600	800	✗	222	181	✓	157	✓
Cypress Creek Road	Sag	654+80	16.06	18.47 [2]	19.38 [2]	-0.24	2.72	800	800	✓	270	181	✓	157	✓
	Crest[3]	661+80	16.20	37.51 [2]	39.81 [2]	2.72	0.77	600	1,800	✗	308	401	✗	193	✓
	Crest[3]	666+80	16.29	-	-	-	-	400			< 313	401	✗	193	✓
	Crest[3]	670+80	16.37	36.53 [2]	38.89 [2]	-1.11	-1.90	400			506	401	✓	193	✓
	Sag[3]	682+80	16.59	14.75 [2]	16.54 [2]	-1.60	1.03	600	800	✓	228	181	✓	157	✓
McNab Road	Sag[3]	688+80	16.71	20.81 [2]	29.27 [2]	1.03	2.82	600			335	181	✓	157	✓
	Crest	700+30	16.93	51.57 [2]	41.7 [2]	2.59	-2.80	1,500	1,000	✓	278	401	✗	193	✓
	Sag	711+80	17.14	19.37 [2]	18.73 [2]	-2.80	-0.16	800	800	✓	303	181	✓	157	✓
Atlantic Boulevard	Sag	770+80	18.26	20.61 [2]	19.65 [2]	0.24	3.23	800	800	✓	268	181	✓	157	✓
	Crest	781+80	18.47	-	-	3.23	-2.80	1,400	1,800	✗	232	401	✗	193	✓
	Sag	794+80	18.72	19.75 [2]	19.50 [2]	-2.80	-0.15	600	800	✗	227	181	✓	157	✓
NW 15th Street	Sag	811+80	19.04	22.49 [2]	20.25 [2]	0.40	3.16	800	800	✓	290	181	✓	157	✓
	Crest	822+80	19.25	-	45.80 [2]	3.16	-2.70	1,400	1,000	✓	239	401	✗	193	✓
	Sag	835+80	19.49	22.25 [2]	20.60 [2]	-2.70	-0.55	600	800	✗	280	181	✓	157	✓
Copans Road	Crest	887+10	20.46	-	44.20 [2]	1.15	-2.62	940	1,800	✗	249	401	✗	193	✓

Table 2.3
Existing Vertical Alignment Geometric Characteristics

Location	Type of Curve	VPI Station	Approximate Milepost	VPI Elevation (ft)	PGL High/Low (ft)	Grade (Back) %	Grade (Ahead) %	Length of Curve (ft)	Length Required for Interstate[1]		K-Value	K-Value Required for 65 MPH Interstate[1]		K-Value Required for 65 MPH AASHTO	
	Sag	895+80	20.63	-	24.37 [2]	-2.62	0.00	600	800	✘	230	181	✓	157	✓
Sample Road	Sag	935+80	21.39	23.35	22.55	0.20	2.37	800	800	✓	369	181	✓	157	✓
	Crest[3]	942+45	21.51	39.11	40.11	2.37	0.45	530	1,800	✘	276	401	✘	193	✓
	Crest [3]	949+70	21.65	39.98	40.09	-0.10	-2.68	546			211	401	✘	193	✓
	Sag	956+80	21.78	20.84	20.68	-2.60	-0.04	800	800	✓	312	181	✓	157	✓
Hillsboro Boulevard	Sag	1096+00	24.42	16.85	16.85	0.00	2.50	800	800	✓	320	181	✓	157	✓
	Crest[3]	1102+90	24.55	34.10	34.98	2.50	0.29	580	1,800	✘	262	401	✘	193	✓
	Crest[3]	1111+05	24.70	33.50	34.80	-0.49	-2.63	589			274	401	✘	193	✓
	Sag	1118+00	24.84	15.23	14.83	-2.63	-0.10	800	800	✓	310	181	✓	157	✓
Camino Real	Sag	1191+00	0.90	16.55	16.68	0.20	2.48	550	800	✘	233	181	✓	157	✓
	Crest	1201+50	1.10	43.39	36.09	2.48	-1.60	1,500	1,000	✓	368	401	✘	193	✓
Palmetto Park Road	Sag	1213+38	1.33	24.39	28.23	-1.60	2.08	875	800	✓	238	181	✓	157	✓
	Crest	1224+25	1.53	46.20	39.83	2.01	-2.14	1,230	1,800	✘	297	401	✘	193	✓
	Sag	1237+83	1.79	17.10	17.10	-2.14	0.00	900	800	✓	420	181	✓	157	✓

Source : As-built Plans and Project Survey

Notes: [1] From FDOT PPM Volume I, Chapter 2, Section 2.8.2

[2] Elevations are based on top of median barrier, per as-built plans

[3] Asymmetrical Compound Vertical Curve

VPI = Vertical Point of Intersection

PGL = Profile Grade Line

✓ = Meets required criteria

✘ = Does not meet criteria

\- Not Available

The existing vertical components of the corridor meet all the current FDOT and AASHTO criteria for 65 MPH, except at the following locations within the study limits:

- The length of a crest vertical curve along the mainline on an Interstate is not to be less than 1,000 feet for open highway and 1,800 feet within interchanges as per PPM Volume 1, Chapter 2, Table 2.8.5. The following crest vertical curves do not meet the criteria for minimum length of curve:
    - I-95 at NW 38th Street, Station 544+40
    - I-95 at Prospect Road, Station 574+80
    - I-95 at Commercial Boulevard, Station 605+95
    - I-95 at Cypress Creek Road, Station 661+80, Station 666+80 and Station 670+80
    - I-95 at Atlantic Boulevard Station 781+80
    - I-95 at Copans Road, Station 887+10
    - I-95 at Sample Road, Station 942+45 and Station 949+70
    - I-95 at Hillsboro Boulevard Station 1102+90 and Station 1111+05
    - I-95 at Palmetto Park Road Station 1224+25

- The length of a sag vertical curve along the mainline on an Interstate is not to be less than 800 feet as per PPM Volume 1, Chapter 2, Table 2.8.6 of the. The following crest vertical curves do not meet the criteria for minimum length of curve:
    - I-95 at Commercial Boulevard, Station 615+25
    - I-95 at Atlantic Boulevard, Station 794+80
    - I-95 at NW 15th Street, Station 835+80
    - I-95 at Copans Road, Station 895+80
    - I-95 at Camino Real Station 1191+00

- The required K-value of a crest vertical curve is 401 as per PPM Volume 1, Chapter 2, Table 2.8.5 (65 MPH, interstate). The following crest vertical curves do not meet the criteria for minimum K-value:
    - I-95 at NW 38th Street, Station 544+40
    - I-95 at Commercial Boulevard, Station 605+95
    - I-95 at Cypress Creek Road, Station 661+80 and Station 666+80

- I-95 at McNab Road, Station 700+30
- I-95 at Atlantic Boulevard, Station 781+80
- I-95 at NW 15th Street, Station 822+80
- I-95 at Copans Road, Station 887+10
- I-95 at Sample Road, Station 942+45 and Station 949+70
- I-95 at Hillsboro Boulevard, Station 1102+90 and Station 1111+05
- I-95 at Camino Real, Station 1201+50
- I-95 at Palmetto Park Road, Station 1224+25

Based on the current design standards for vertical curves and sight distance, the evaluation shows that the project corridor has 11 locations that do not meet PPM stopping sight distance requirements and 14 locations that do not meet PPM length of curve requirements. These elements met the AASHTO criteria.

2.6.4 HORIZONTAL AND VERTICAL CLEARANCES

Horizontal Clearance – The horizontal clearance relates to the lateral clearance between the travel way and any roadside obstruction. This roadside recovery area, called recoverable terrain, can be used by an errant vehicle to potentially regain control of the vehicle or by disabled vehicles as a place of refuge. Horizontal clearance requirements vary depending on the design speed, typical section, traffic volumes, lane type and roadside obstruction or feature.

Highways with flush shoulders where right-of-way is not restricted have sufficient widths to provide clear zones. Therefore, the horizontal clearance requirements for certain features and objects are based on maintaining a clear zone wide enough to provide the recoverable terrain. As set forth in the *PPM Volume I, Chapter 2, Section 2.11, Table 2.11.11*, the recoverable terrain widths for a design speed greater than 55 MPH are as follows:

- Travel lanes and multilane ramps: 36 feet.
- Auxiliary lanes and single lane ramps: 24 feet.

Along the I-95 mainline, within the study limits, the recoverable terrain requirements are met for the mainline and ramps.

Another horizontal clearance component is the border width. A border width is a roadside area that accommodates signing, drainage features, guardrail, fencing, maintenance access and utilities. Border width on limited access facilities is measured from the edge of the outside traffic lane to the right-of-way line. The criteria shown in the PPM Volume I, Chapter 2, Section, 2.5.1, Table 2.5.3, for freeways including interchanges ramps indicates a required border width of 94 feet. The border widths along the mainline and within the interchanges (for each quadrant) are included in ***Table 2.4*** and ***Table 2.5***.

Based on the current design standards for border width, ***Table 2.4*** and ***Table 2.5*** show that the project corridor has 21 locations that do not meet border width requirements.

Table 2.4
Summary of Existing Border Width - Mainline

Roadway Section	Border Width (feet)		Border Width Required	
	Northbound	Southbound		
Oakland Park Boulevard - NW 39th Street/ NW 38th Street	91-95	41-128	94	✗
NW 39th Street/ NW 38th Street - Powerline Road	94	112	94	✓
Powerline Road - Prospect Road	94	113	94	✓
Prospect Road - Commercial Boulevard	48-94	42-116	94	✗
Commercial Boulevard - Andrews Avenue	34-128	72-126	94	✗
Andrews Avenue - Cypress Creek Road	62-100	76-200	94	✗
Cypress Creek Road - McNab Road	139-200	122-125	94	✓
McNab Road - SW 3rd Street	90-142	75-184	94	✗
SW 3rd Street - NW 15th Street	45-90	83-126	94	✗
NW 15th Street - Copans Road	54-113	64-94	94	✗
Copans Road - Sample Road	73-133	51-95	94	✗
Sample Road - NW 48th Street	87-106	47-110	94	✗
NW 48th Street - SW 10th Street	85-87	41-55	94	✗
SW 10th Street - Hillsboro Boulevard	70-100	54-56	94	✗
Hillsboro Boulevard - Palmetto Park Road	86-122	45-146	94	✗
Palmetto Park Road- Glades Road	81-150	68-74	94	✗

Source: Project Survey ✗ = Does not meet criteria ✓ = Meets required criteria

Table 2.5 Summary of Existing Border Width - Interchanges						
Interchange	Border Width (feet)				Border Width Required	
	NW[1]	NE[1]	SW[1]	SE[1]		
Commercial Boulevard	70-73	29-117	92-105	39-94	94	✘
Cypress Creek Road	89-214	98-149	18-94	40-99	94	✘
Atlantic Boulevard	30-107	33-81	30-51	39-56	94	✘
Copans Road	48-50	48-131	50-89	79-117	94	✘
Sample Road	40-84	86-88	57-99	37-130	94	✘
SW 10th Street	31-72		21-103	17-159	94	✘
Hillsboro Boulevard	27-49	45-107	41-53	44-78	94	✘
Palmetto Park Road	46-170	45-82	75-91	57-82	94	✘

Source: Project Survey,
Note: [1]Interchange Quadrant
✘ = Does not meet criteria

Vertical Clearance – The vertical clearance relates to the adequate clear height of an overpass/overhead or underpass structure/facility to the roadway and shoulder areas. In accordance with the *PPM Volume I, Chapter 2, Section 2.10, Table 2.10.1*, the vertical clearance criteria for a bridge over a roadway is 16'-6", for a roadway over railroad is 23'-6", and for a pedestrian bridge over a roadway is 17'-6". AASHTO requires a minimum vertical clearance of 16' for structures passing over a roadway. The vertical clearance along the I-95 corridor is below the PPM minimum clearance for 8 bridges in both directions and below the AASHTO minimum clearance for 23 bridges in both directions. The characteristics for each bridge, including vertical clearance, are summarized in ***Table 2.21*** and ***Table 2.22*** (see ***Section 2.14***).

2.6.5 DESIGN AND POSTED SPEEDS

A review of existing plans provided by the FDOT indicated that the design speed for the study corridor has varied from 60 MPH to 70 MPH historically. The existing posted speed for the corridor is 65 MPH. A speed study performed by the FDOT in 2011 determined that a design speed of 65 MPH is appropriate for this corridor. Therefore, considering the posted speed, geometry of existing roadway features and the results from the speed study, a 65 MPH design speed was established for the corridor.

2.6.6 Roadway Signing

An existing corridor sign inventory was performed along the I-95 mainline within the study limits. Signs are typically classified as regulatory, warning, guide, motorist information signs (general service signs) and Intelligent Transportation System (ITS).

As part of the documentation effort, each major roadway sign was photographed, inventoried, numbered, classified and located on aerial photography. The sign structure numbers were also collected where available. As summarized in ***Table 2.6***, a total of 198 major signs were found within the study limits. ***Appendix B*** depicts the locations of all the signs. The following quantities of major signs and classifications were identified within the study limits:

Table 2.6
Roadway Signing Inventory

Type of Sign	Quantity
Regulatory Signs	36
Warning Signs	0
Guide Signs	111
Motorist Information Signs	44
Intelligent Transportation System	7

Source: Sign Inventory and Field Review

2.6.6.1 *Intelligent Transportation System*

The I-95 corridor within the project limits is currently monitored, analyzed, and managed from the FDOT District Four SunGuide℠ Transportation Management Center (TMC) using SunGuide℠ software to control and monitor ITS. ***Appendix C*** graphically shows the existing system within the study limits.

The following is a description of the existing ITS components:

- **Pan-Tilt-Zoom (PTZ) Closed Circuit Television (CCTV) cameras**: CCTV cameras currently provide nearly 100 percent coverage of the project corridor and enable traffic monitoring and early incident detection capabilities. Within or approaching the project limits, the District Four SunGuide℠ TMC operates 17 CCTV cameras. The existing CCTV locations are listed in ***Table 2.7***.

Table 2.7 Closed-Circuit Television Location and Structure Type			
ID Number	**Location**	**Station**	**Structure Type**
CCTV-95-19	Southbound I-95 south of Prospect Road	570+60	On Pole
CCTV-95-20	Southbound I-95 south of Andrews Avenue	630+95	On Pole
CCTV-95-21	Southbound I-95 south of Cypress Creek Road	663+15	On Pole
CCTV-95-22	Southbound I-95 north of McNab Road	702+67	On Pole
CCTV-95-23	Southbound I-95 south of Race Track Road	743+62	On Pole
CCTV-95-24	Southbound I-95 north of Atlantic Boulevard	780+55	On Pole
CCTV-95-25	Southbound I-95 north of NW 15th Street	830+64	On Pole
CCTV-95-26	Southbound I-95 south of Copans Road	851+70	On Pole
CCTV-95-27	Southbound I-95 north of Copans Road	886+70	On Pole
CCTV-95-28	Southbound I-95 south of Sample Road	944+40	On Pole
CCTV-95-29	Southbound I-95 south of NE 48th Street	986+45	On Pole
CCTV-95-30	Southbound I-95 south of SW 10th Street	1026+70	On Pole
CCTV-95-31	Southbound I-95 south of SW 10th Street	1054+45	On Pole
CCTV-95-32	Southbound I-95 north of Hillsboro Boulevard	1108+35	On Pole
CCTV-95-33	Southbound I-95 south of SW 18th Street	1143+80	On Pole
CCTV-95-34	Northbound I-95 south of Camino Real	1190+40	On Pole
CCTV-95-35	Southbound I-95 south of Palmetto Park Road	1223+10	On Pole

- **Dynamic Message Signs (DMS)**: DMS signs are currently deployed along the project corridor to inform motorists of current traffic conditions and incidents such as crashes, disabled vehicles, road work, car fires, hazmat spills, evacuations and emergency alerts. The District Four SunGuide℠ TMC currently operates six general purpose lane DMS signs within or approaching the project limits. The existing DMS locations are listed in ***Table 2.8***.

Table 2.8 Dynamic Message Sign Location and Structure Type			
ID Number	**Location**	**Station**	**Structure Type**
DMS-95-9	Northbound I-95 north of Cypress Creek Road	684+65	Overhead Truss
DMS-95-10	Southbound I-95 north of McNab Road	722+44	Overhead Truss
DMS-95-11	Southbound I-95 south of Copans Road	849+65	Overhead Truss
DMS-95-12	Northbound I-95 south of Copans Road	849+47	Overhead Truss
DMS-95-13	Southbound I-95 south of NE 48th Street	999+75	Overhead Truss
DMS-95-14	Southbound I-95 north of NE 48th Street	1011+70	Overhead Truss
DMS-95-15	Southbound I-95 north of Hillsboro Boulevard	1140+40	Overhead Truss

- **Highway Advisory Radio (HAR) System:** The corridor HAR system includes TMC equipment which is connected to each transmitter site over a fiber optic communications link. This allows complete remote control of each transmitter from the TMC, via downloading of messages in digital form. The existing HAR locations are listed in ***Table 2.9***.

Table 2.9 Highway Advisory Radio Location and Structure Type			
ID Number	**Location**	**Station**	**Structure Type**
HAR-95-06	Northbound I-95 south of Race Track Road	743+50	HAR Beacon
HAR-95-07	Southbound I-95 south of Race Track Road	744+00	HAR Beacon
HAR-95-08	Southbound I-95 south of SW 10th Street	1052+00	HAR Beacon
HAR-95-09	Southbound I-95 north of Palmetto Park Road	1234+45	HAR Beacon
HAR-95-10	Northbound I-95 north of Palmetto Park Road	1248+45	HAR Beacon

- **Vehicle Detection System**: Microwave Vehicle Detection System (MVDS) sensors are part of the District Four Vehicle Detection System. These devices are non-intrusive mounted on poles along the shoulders and collect volume, vehicle type, average speed, and long vehicle count data. Within the project limits, the District Four SunGuide℠ TMC currently operates 29 MVDS. There are loop detectors within the project corridor. The existing MVDS locations are listed in ***Table 2.10***.

Table 2.10 Microwave Vehicle Detection System Location and Structure Type			
ID Number	Location	Station	Structure Type
DS-95-28	Southbound I-95 north of Oakland Park Boulevard	539+70	On Pole
DS-95-29	Southbound I-95 south of Prospect Road	570+60	On Pole
DS-95-30	Southbound I-95 south of Commercial Boulevard	597+83	On Pole
DS-95-31	Southbound I-95 north of Commercial Boulevard	630+95	On Pole
DS-95-32	Southbound I-95 south of Andrews Avenue	645+30	On Pole
DS-95-33	Southbound I-95 south of Cypress Creek Road	664+00	On Pole
DS-95-34	Southbound I-95 north of McNab Road	722+44	On Overhead Truss
DS-95-35	Southbound I-95 north of McNab Road	702+67	On Pole
DS-95-36	Southbound I-95 south of Race Track Road	743+62	On Pole
DS-95-37	Southbound I-95 north of Atlantic Boulevard	780+55	On Pole
DS-95-38	Southbound I-95 north of Dr. Martin L King Jr. Boulevard	805+00	On Pole
DS-95-39	Southbound I-95 north of NW 15th Street	830+64	On Pole
DS-95-40	Northbound I-95 south of Copans Road	849+47	On Overhead Truss
DS-95-41	Southbound I-95 south of Copans Road	849+65	On Overhead Truss
DS-95-42	Southbound I-95 north of Copans Road	886+88	On Pole
DS-95-43	Southbound I-95 north of Copans Road	917+55	On Sign Structure
DS-95-44	Southbound I-95 south of Sample Road	944+40	On Pole
DS-95-45	Southbound I-95 south of Palmetto Park Road	1211+36	On Pole
DS-95-46	Southbound I-95 north of Sample Road	986+45	On Pole
DS-95-47	Southbound I-95 north of NE 48th Street	1011+70	On Overhead Truss
DS-95-48	Southbound I-95 south of SW 10th Street	1026+70	On Pole
DS-95-49	Southbound I-95 south of SW 10th Street	1054+45	On Pole
DS-95-50	Southbound I-95 north of SW 10th Street	1081+75	On Sign Structure
DS-95-51	Southbound I-95 north of Hillsboro Boulevard	1108+35	On Pole
DS-95-52	Southbound I-95 south of Hillsboro Boulevard	1140+40	On Overhead Truss
DS-95-53	Northbound I-95 north of SW 18th Street	1164+90	On Pole
DS-95-54	Northbound I-95 south of Camino Real	1190+40	On Pole
DS-95-55	Southbound I-95 south of Palmetto Park Road	1222+65	On Pole
DS-95-56	Northbound I-95 north of Palmetto Park Road	1246+25	On Pole

- **Fiber Optic Communication System**: Fiber Optic (FO) infrastructure for the currently deployed ITS equipment is located along the I-95 southbound swale from Oakland Park Boulevard to the Broward/Palm Beach County line and then crosses I-95 to continue along the northbound swale. The FDOT has a 48-strand FO backbone as well as some 96-strand cable along the project corridor. The FDOT typically provides FO connections to their CCTV cameras, MVDS sensors, and DMS signs.

2.7 DRAINAGE

The information presented in this section is a summary of the _Preliminary Drainage Report,_, a companion document to this PD&E study. The study limits lie within the South Florida Water Management District's (SFWMD) C-13 East, C-14, Pompano Canal, and Hillsboro Canal Drainage Basins, which are located in eastern Broward and Palm Beach Counties. The drainage design of the project must meet the stormwater quality and quantity criteria of the FDOT and the SFWMD, as well as the United States Environmental Protection Agency (USEPA).

The existing drainage for the I-95 project corridor is divided into four drainage basins. ***Appendix D*** includes the pre-development drainage map for each basin along the corridor within the study limits.

Basin 1 – This drainage basin encompasses I-95 from Oakland Park Boulevard to Commercial Boulevard. Runoff from I-95 sheet flows into interchange infield areas and roadside swales located along both sides of I-95. These roadside swales provide for water quality treatment and stormwater attenuation through the use of ditch block weirs. The excess stormwater runoff overflows these weirs and discharges directly into a wet pond, located in the northwest quadrant of the I-95 interchange with Oakland Park Boulevard, for ultimate disposal. This basin is located within the SFWMD's C-13 East Basin.

Basin 2 – This drainage basin encompasses I-95 from Commercial Boulevard to McNab Road. Runoff from I-95 sheet flows into interchange infield areas and roadside swales located along both sides of I-95. These roadside swales provide for water quality treatment and stormwater attenuation through the use of ditch block weirs. The excess stormwater runoff overflows these weirs and discharges directly into the C-14 Canal, located just south of McNab Road, for ultimate disposal. This basin is located within the SFWMD's C-14 Basin.

Basin 3 – This drainage basin encompasses I-95 from McNab Road to Copans Road. Runoff from I-95 sheet flows into interchange infield areas and roadside swales located along both sides of I-95. These roadside swales provide for water quality treatment and stormwater attenuation through the use of ditch block weirs. The excess stormwater runoff overflows these weirs and discharges directly into a tributary canal of the Pompano Canal located along the east side of I-95, just north of the interchange with Atlantic Boulevard, for ultimate disposal. This basin is located within the SFWMD's Pompano Canal Basin.

Basin 4 – This drainage basin encompasses I-95 from Copans Road to just north of Palmetto Park Road. Runoff from I-95 sheet flows into interchange infield areas and roadside swales located along both sides of I-95, and into a tributary canal of the Hillsboro Canal, located along the west side of I-95. These roadside swales provide for water quality treatment and stormwater attenuation through the use of ditch block weirs. The excess stormwater runoff overflows these weirs and discharges directly into the Hillsboro Canal, located along the Broward/Palm Beach County Line, for ultimate disposal. This basin is located within the SFWMD's Hillsboro Canal Basin.

The SFWMD and the FDOT require that the pre-development offsite discharge rates and volumes are not be exceeded by the proposed design for the SFWMD 25 year – 72 hour storm, as well as the greater of either the 100 year – 1 hour, 100 year – 8 hour, or the 100 year – 24 hour FDOT design storms.

2.8 SAFETY ANALYSIS

Traffic crash data along the I-95 corridor was obtained from the FDOT Traffic Operations Division Crash Analysis Reporting System (CARS) database for the most recent five years available (2007-2011). The crash data included information on:

- Number of crashes
- Type of crash
- Severity (injury and fatality)

Relevant safety statistics such as crash rates and safety ratios were calculated within the study corridor limits. ***Tables 2.11*** through ***2.15*** summarize the crash data for the years 2007 through 2011. A detailed graphical and tabular crash data analysis is provided in ***Appendix E***.

The actual crash rate is a function of the number of crashes. The expression of the actual crash rate is as follows:

$$\frac{\text{Number of Crashes in a Year}}{(\text{Number of Vehicles (ADT) x 365 x Length in Miles})/1,000,000} = \text{Crash Per Million Vehicle Miles}$$

The critical crash rate is a function of the average crash rate for the category of highway being tested. The expression is as follows:

$$C = R + K\sqrt{\frac{R}{M}} - \frac{1}{2M}$$

Where:
C= Critical crash rate for segments
R= Average crash rate for the category of highway being tested (crashes per million vehicle miles)
M=Average vehicle exposure for one year at the location (million vehicles miles)
K=Statistical significance constant (1.645 rural, 3.291 urban)

The critical crash rate is a statistically derived number, greater than the average rate, which serves as a screening measure to identify locations where crash occurrence is higher than should be expected for a given facility type and for which safety measures should be considered. If the actual crash rate for a location is greater than the critical rate, then the location should be evaluated further to determine the reason(s) for the high crashes.

A safety ratio analysis was performed for the corridor to compare the crash rates to the statewide average crash rates on similar corridors with the same roadway and traffic volume characteristics. A safety ratio is defined as the actual crash rate divided by the critical crash rate. The safety ratio was calculated by assessing the corridor, in each county. The two major factors in the safety ratio calculation are traffic volumes and number of crashes.

The average safety ratio for the I-95 corridor in Broward County is **1.118**, which means there are sections within the study limits in Broward County that have already reached the high crash location thresholds. As shown in ***Table 2.11***, the actual crash rates for I-95 in Broward County, within the study limits, are greater than the critical rates for all five years. In addition, the actual crash rate for the I-95 corridor in Broward County is consistently higher than the state average crash rate.

The average safety ratio for the I-95 corridor in Palm Beach County is **1.089**, which means there are sections within the study limits in Palm Beach County that have already reached the high crash location thresholds. As shown in ***Table 2.11***, the actual crash rates for I-95 in Palm Beach County, within the study limits, are greater than the critical rates for 2008, 2009, and 2010. In addition, the actual crash rate for the I-95 corridor in Palm Beach County is consistently higher than the state average crash rate.

Table 2.11
Crash Analysis Summary

Limits	Year	Number of Crashes	Number of Fatal Crashes	Number of Injury Crashes	Actual Crash Rate	Critical Crash Rate	Safety Ratio	Confidence Level	State Average Crash Rate
Broward County									
From North of Oakland Park Boulevard to Palm Beach County Line	2007	907	5	374	0.934	0.788	1.185	99.99%	0.700
	2008	740	5	323	0.760	0.728	1.044	99.99%	0.644
	2009	748	5	353	0.808	0.771	1.048	99.99%	0.682
	2010	817	2	400	0.870	0.796	1.093	99.99%	0.706
	2011	842	8	377	0.889	0.730	1.218	99.99%	0.645
	Average	**811**	**5**	**365**	**0.852**	**0.763**	**1.118**	**99.99%**	**0.675**
Palm Beach County									
From Broward County Line to South of Glades Road	2007	134	0	61	0.878	0.920	0.954	99.63%	0.700
	2008	129	2	62	0.877	0.858	1.022	99.98%	0.644
	2009	157	1	93	1.105	0.907	1.218	99.99%	0.682
	2010	191	0	91	1.368	0.936	1.462	99.99%	0.706
	2011	96	0	35	0.682	0.864	0.789	72.52%	0.645
	Average	**141**	**1**	**68**	**0.982**	**0.897**	**1.089**	**94.42%**	**0.675**

The crash statistics along I-95 within the study limits in both counties are summarized on ***Table 2.12*** and ***Table 2.13***. As depicted on ***Table 2.12***, within the study area, a total of **4,054** crashes were recorded along I-95 in Broward County between the years 2007 and 2011, with an average of **811** crashes per year. The highest number of crashes was recorded in 2007 with **907** crashes and the lowest number of crashes was recorded in 2008 with **740** crashes. The annual number of fatal crashes remained relatively the same over the five-year period, with an average of **five** fatal crashes per year. The annual number of injury crashes also remained relatively the same over the five-year period, with average of **365** injury crashes per year.

As depicted on ***Table 2.13***, within the study area, a total of **707** crashes were recorded along I-95 in Palm Beach County between the years 2007 and 2011, with an average of **141** crashes per year. The highest number of crashes was recorded in 2010 with **191**crashes and the lowest number of crashes was recorded in 2011 with **96** crashes. The annual number of fatal crashes ranged from zero to two over the five-year period, with an average of less than **one** fatal crash per year. The annual number of injury crashes ranged widely from **35** to **91** injury crashes over the five-year period.

Along I-95 in Broward County, rear-end crashes are the most common type of crashes recorded, and account for an average of **41.59%** of the crashes. Sideswipes crashes are the second most common with an average of **16.5%**, and hitting fixed object crashes are the third most common with an average of **10.53%** of the total crashes.

Along I-95 in Palm Beach County, rear-end crashes are the most common type of crashes recorded and account for an average of **46.68%** of the crashes. Sideswipes crashes are the second most common with an average of **13.15%**, and hitting fixed object crashes are the third most common with an average of **11.46%** of the total crashes.

The high percentage of rear-end and sideswipe crashes found along the corridor are typical of roadways experiencing heavy traffic congestion and weaving movements between interchanges, similar to I-95. The majority of the crashes in the study corridor listed careless driving and improper lane change as the contributing causes. Fixed object crashes include collisions with signs, utility and light poles, guardrail, concrete barrier walls, and bridges.

Table 2.12
Crash Statistics Summary - Broward County
From MP 13.742 to MP 25.307

Characteristic	Type of Crash	Number of Crashes – Year 2007	2008	2009	2010	2011	5 Year Total Crashes	Mean Crashes per Year	Percent of Total
Crash Type	Rear End	383	286	319	366	332	1,686	337	41.59%
	Head On	7	3	2	8	2	22	4	0.54%
	Angle	57	64	40	61	52	274	55	6.76%
	Left Turn	0	0	0	0	1	1	0	0.02%
	Right Turn	0	0	0	0	0	0	0	0.00%
	Sideswipe	213	176	150	130	0	669	134	16.50%
	Backed Into	2	3	1	1	0	7	1	0.17%
	Coll. w/ Parked Car	3	0	2	2	1	8	2	0.20%
	Coll. w/ Pedestrian	3	0	3	0	0	6	1	0.15%
	Coll. w/ Bicycle	0	0	0	0	0	0	0	0.00%
	Fixed Object	99	89	89	66	84	427	85	10.53%
	Ran Off Road	5	5	3	4	2	19	4	0.47%
	Overturned	19	13	7	12	12	63	13	1.55%
	Other	116	101	132	167	356	872	174	21.51%
	Total Crashes	**907**	**740**	**748**	**817**	**842**	**4,054**	**811**	**100.00%**
Severity	Property Damage Only	528	412	390	415	457	2,202	440	54.32%
	Fatal Crashes	5	5	5	2	8	25	5	0.62%
	Injury Crashes	374	323	353	400	377	1,827	365	45.07%
Lighting Conditions	Daylight	591	500	501	556	538	2,686	537	66.26%
	Dusk	10	16	7	17	12	62	12	1.53%
	Dawn	2	8	9	15	15	49	10	1.21%
	Dark	303	216	231	229	277	1,256	251	30.98%
	Unknown	1	0	0	0	0	1	0	0.02%
Surface Conditions	Dry	754	628	591	655	628	3,256	651	80.32%
	Wet	143	111	155	161	214	784	157	19.34%
	Others	10	1	2	1	0	14	3	0.35%
Month of Year	January	84	51	79	60	65	339	68	8.36%
	February	70	63	61	59	87	340	68	8.39%
	March	81	60	63	62	92	358	72	8.83%
	April	73	59	52	53	76	313	63	7.72%
	May	85	60	65	85	55	350	70	8.63%
	June	97	65	73	70	78	383	77	9.45%
	July	65	53	69	56	55	298	60	7.35%
	August	61	48	63	62	79	313	63	7.72%
	September	80	63	65	79	52	339	68	8.36%
	October	73	73	51	59	92	348	70	8.58%
	November	73	70	65	105	57	370	74	9.13%
	December	65	75	42	67	54	303	61	7.47%
Day of Week	Sunday	94	74	89	73	87	417	83	10.29%
	Monday	126	117	122	96	123	584	117	14.41%
	Tuesday	142	121	107	111	126	607	121	14.97%
	Wednesday	148	116	105	153	127	649	130	16.01%
	Thursday	131	110	105	146	138	630	126	15.54%
	Friday	149	130	135	148	137	699	140	17.24%
	Saturday	117	72	85	90	104	468	94	11.54%
Hour of Day	00:00-06:00	112	90	105	105	112	524	105	12.93%
	06:00-09:00	176	146	167	166	163	818	164	20.18%
	09:00-11:00	86	52	57	65	69	329	66	8.12%
	11:00-13:00	73	57	49	48	37	264	53	6.51%
	13:00-15:00	82	69	71	75	54	351	70	8.66%
	15:00-18:00	146	165	140	189	206	846	169	20.87%
	18:00-24:00	232	161	159	169	201	922	184	22.74%

Table 2.13
Crash Statistics Summary - Palm Beach County
From MP 0.000 to MP 2.014

Characteristic	Type of Crash	Number of Crashes					5 Year Total Crashes	Mean Crashes per Year	Percent of Total
		Year							
		2007	2008	2009	2010	2011			
Crash Type	Rear End	53	53	86	95	43	330	66	46.68%
	Head On	5	5	5	3	1	19	4	2.69%
	Angle	15	16	12	9	4	56	11	7.92%
	Left Turn	0	0	0	1	0	1	0	0.14%
	Right Turn	0	0	0	0	0	0	0	0.00%
	Sideswipe	27	22	17	27	0	93	19	13.15%
	Backed Into	0	0	0	0	0	0	0	0.00%
	Coll. w/ Parked Car	0	0	0	0	0	0	0	0.00%
	Coll. w/ Pedestrian	0	0	0	1	0	1	0	0.14%
	Coll. w/ Bicycle	0	0	0	0	0	0	0	0.00%
	Fixed Object	13	11	16	22	19	81	16	11.46%
	Ran Off Road	0	1	0	0	0	1	0	0.14%
	Overturned	3	1	2	6	0	12	2	1.70%
	Other	18	20	19	27	29	113	23	15.98%
	Total Crashes	**134**	**129**	**157**	**191**	**96**	**707**	**141**	**100.00%**
Severity	Property Damage Only	73	65	63	100	61	362	72	51.20%
	Fatal Crashes	0	2	1	0	0	3	1	0.42%
	Injury Crashes	61	62	93	91	35	342	68	48.37%
Lighting Conditions	Daylight	88	81	96	136	62	463	93	65.49%
	Dusk	3	8	10	7	1	29	6	4.10%
	Dawn	0	0	1	1	2	4	1	0.57%
	Dark	43	40	50	47	31	211	42	29.84%
	Unknown	0	0	0	0	0	0	0	0.00%
Surface Conditions	Dry	110	92	108	133	68	511	102	72.28%
	Wet	24	37	48	58	28	195	39	27.58%
	Others	0	0	1	0	0	1	0	0.14%
Month of Year	January	9	5	7	16	9	46	9	6.51%
	February	6	11	9	18	6	50	10	7.07%
	March	13	17	5	24	7	66	13	9.34%
	April	8	15	9	9	6	47	9	6.65%
	May	16	6	11	13	7	53	11	7.50%
	June	13	7	15	10	5	50	10	7.07%
	July	13	11	13	8	12	57	11	8.06%
	August	9	13	14	22	6	64	13	9.05%
	September	11	10	12	32	11	76	15	10.75%
	October	14	12	19	14	9	68	14	9.62%
	November	15	7	27	15	9	73	15	10.33%
	December	7	15	16	10	9	57	11	8.06%
Day of Week	Sunday	16	10	12	15	11	64	13	9.05%
	Monday	15	19	20	27	12	93	19	13.15%
	Tuesday	20	15	26	33	21	115	23	16.27%
	Wednesday	23	25	37	34	18	137	27	19.38%
	Thursday	21	29	21	33	13	117	23	16.55%
	Friday	24	19	31	37	10	121	24	17.11%
	Saturday	15	12	10	12	11	60	12	8.49%
Hour of Day	00:00-06:00	13	13	13	20	15	74	15	10.47%
	06:00-09:00	26	23	30	25	17	121	24	17.11%
	09:00-11:00	6	11	14	21	12	64	13	9.05%
	11:00-13:00	5	9	10	18	4	46	9	6.51%
	13:00-15:00	15	8	12	13	6	54	11	7.64%
	15:00-18:00	37	35	44	56	19	191	38	27.02%
	18:00-24:00	30	30	34	38	23	155	31	21.92%

High crash segments and high crash spot locations were found within the study limits. These locations are described in ***Table 2.14, Table 2.15*** and ***Figure 2.3***. The rankings noted in these tables are based on a statewide ranking system program developed by the FDOT. These rankings basically sort all the high crash roadway locations throughout the State of Florida. The program gives four different ranking selections according to the selected criteria. The four ranking options are:

1. Rank by Confidence Level
2. Rank by Crash Rate
3. Rank by Total Number of Crashes
4. Rank by Total Number of Injuries and Fatalities

The criteria used for this analysis was Rank by Confidence Level. This ranking is the only ranking that includes all the other criteria and factors in order to determine the ranking. The confidence level is a measure of certainty that a road has deficiencies that are causing high number of crashes. This numerical value is derived from a calculation that includes the number of crashes, length of roadway segment, statewide average crash rate, average annual daily traffic, and actual crash rate. The values of the confidence level can only range from 0.0% to 99.99%. Any roadway segment whose value is above 50% should be evaluated further to determine the reason(s) for the high crashes.

High crash segments and high crash spots were identified in both counties of the study area. The confidence levels for the identified spots and segments within the study limits ranged from 72.52-99.99%. These values indicate that these particular areas within the study limits should be evaluated further to determine the reason(s) for the high crashes.

Between the years 2007 and 2011, there were **45** segments and **12** spots on I-95 in Broward County, within the study limits, which were identified in the statewide high crash ranking. In Palm Beach County, there were **nine** high crash segments and **four** high crash spots in the ranking, for the same five-year period.

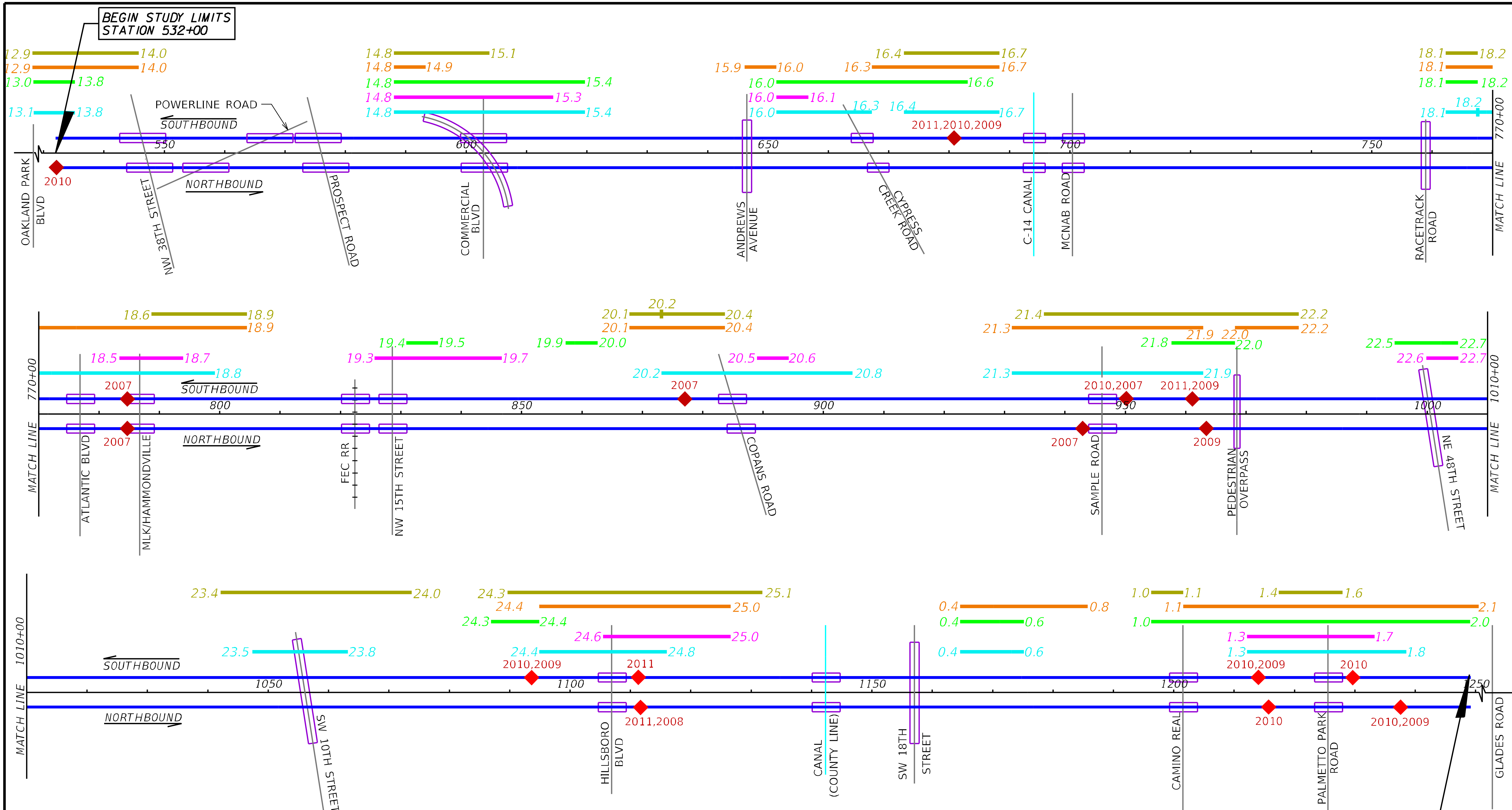
Table 2.14
High Crash Segments

Rank*	Mile Post Range	Year	Location
Broward County			
#149	13.1 - 13.8	2007	Oakland Park Boulevard Interchange
#141	13.0 - 13.8	2009	
#122	12.9 - 14.0	2010	
#80	12.9 - 14.0	2011	
#155	14.8 - 15.4	2007	Commercial Boulevard Interchange
#232	14.8 - 15.3	2008	
#120	14.8 - 15.4	2009	
#399	14.8 - 14.9	2010	
#178	14.8 - 15.1	2011	
#257	16.0 - 16.3	2007	Cypress Creek Road Interchange
#411	16.4 - 16.7	2007	
#358	16.0 - 16.1	2008	
#145	16.0 - 16.6	2009	
#339	15.9 - 16.0	2010	
#422	16.3 - 116.7	2010	
#309	16.4 - 16.7	2011	
#495	18.1- 18.2	2007	Atlantic Boulevard Interchange
#115	18.2 - 18.8	2007	
#452	18.5 - 18.7	2008	
#476	18.1 - 18.2	2009	
#111	18.1 - 18.9	2010	
#192	18.1 - 18.2	2011	
#219	18.6 - 18.9	2011	
#284	19.3 - 19.7	2008	Substandard Horizontal Curve Area
#209	19.4 - 19.5	2009	
#288	19.9 - 20.0	2009	
#101	20.2 - 20.8	2007	Copans Road Interchange
#155	20.6 - 20.6	2008	
#195	20.1 - 20.4	2010	
#316	20.1 - 20.2	2011	
#499	20.2 - 20.4	2011	
#74	21.3 - 21.9	2007	Sample Road Interchange and Influence Area
#200	22.6 - 22.7	2008	
#258	21.8- 22.0	2009	
#257	22.5 - 22.7	2009	
#129	21.3 - 21.9	2010	
#276	22.0 - 22.2	2010	
#138	21.4 - 22.2	2011	
#286	23.5 - 23.8	2007	SW 10th Street Interchange
#148	23.4 - 24.0	2011	
#279	24.4 - 24.8	2007	Hillsboro Boulevard Interchange
#384	24.6 - 25.0	2008	
#562	24.3 - 24.4	2009	
#206	24.4 - 25.0	2010	
#83	24.3 - 25.1	2011	
Palm Beach County			
#433	0.4 - 0.6	2007	Palmetto Park Road Interchange and Influence Area
#169	1.3 - 1.8	2007	
#258	1.3 - 1.7	2008	
#550	0.4 - 0.6	2009	
#85	1.0 - 2.0	2009	
#421	0.4 - 0.8	2010	
#82	1.1 - 2.1	2010	
#272	1.0 - 1.1	2011	
#452	1.4 - 1.6	2011	

* Based on FDOT ranking statewide, per year

Table 2.15 High Crash Spots			
Rank*	**Mile Post**	**Year**	**Location**
Broward County			
#580	13.742	2010	On-ramp to I-95 northbound from Oakland Park Boulevard
#545 #591 #339	16.558	2009 2010 2011	Off-ramp from I-95 southbound to Cypress Creek Road
#563	18.525	2007	On-ramp to I-95 northbound from Atlantic Boulevard
#564	18.525	2007	Off-ramp from I-95 southbound to Atlantic Boulevard
#476	20.274	2007	Off-ramp from I-95 southbound to Copans Road eastbound
#573	21.522	2007	On-ramp to I-95 northbound from Sample Road eastbound
#544 #504	21.659	2007 2010	On-ramp to I-95 southbound from Sample Road westbound
#326 #437	21.866	2009 2011	Off-ramp from I-95 southbound to Sample Road
#396	21.91	2009	On-ramp to I-95 northbound from Sample Road westbound
#386 #531	24.376	2009 2010	On-ramp to I-95 southbound from Hillsboro Boulevard eastbound
#434	24.711	2011	On-ramp to I-95 southbound from Hillsboro Boulevard westbound
#541 #334	24.718	2008 2011	Off-ramp from I-95 northbound to Hillsboro Boulevard westbound
Palm Beach County			
#426 #137	1.336	2009 2010	On-ramp to I-95 southbound from Palmetto Park Road eastbound
#488	1.368	2010	Off-ramp from I-95 northbound to Palmetto Park Road
#546	1.632	2010	On-ramp to I-95 southbound from Palmetto Park Road westbound
#985 #292	1.782	2009 2010	On-ramp to I-95 northbound from Palmetto Park Road westbound

* Based on FDOT ranking statewide per year



LEGEND:

MP — MP (olive)	2011 HIGH CRASH SEGMENT (BOTH DIRECTIONS)
MP — MP (orange)	2010 HIGH CRASH SEGMENT (BOTH DIRECTIONS)
MP — MP (green)	2009 HIGH CRASH SEGMENT (BOTH DIRECTIONS)
MP — MP (magenta)	2008 HIGH CRASH SEGMENT (BOTH DIRECTIONS)
MP — MP (cyan)	2007 HIGH CRASH SEGMENT (BOTH DIRECTIONS)
(blue line)	NORTHBOUND AND SOUTHBOUND MAINLINE
(box)	OVERPASS STRUCTURE
◆ 2009	HIGH CRASH SPOT LOCATIONS AND REPORTED YEAR(S)

FLORIDA DEPARTMENT OF TRANSPORTATION
BROWARD AND PALM BEACH COUNTIES

January 2013

I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)

HIGH CRASH LOCATIONS

FIGURE 2.3

As noted in ***Table 2.14*** and depicted on ***Figure 2.3***, all the high crash segments are located within the interchange influence areas except for one location between Atlantic Boulevard and Copans Road. At this location, there is a horizontal curve that does not meet stopping sight distance requirements. This location is identified in the statewide high crash ranking for the years 2008 and 2009. Each interchange area is noted in the high crash segment ranking for at least two of the five study years. The following interchange influence areas are noted in the high crash segment ranking for all five of the study years:

- Commercial Boulevard
- Cypress Creek Road
- Atlantic Boulevard
- Sample Road
- Hillsboro Boulevard
- Palmetto Park Road

As noted in ***Table 2.15*** and depicted on ***Figure 2.3***, all of the high crash spots along the I-95 corridor are located at the on-ramp and off-ramp merge and diverge points of the interchanges. The off-ramp from I-95 southbound to Cypress Creek Road is noted in the high crash spot ranking for the years 2009, 2010, and 2011.

2.9 INTERCHANGES, INTERSECTIONS AND SIGNALIZATION

There are eight interchanges within the study limits. Each interchange has a different configuration with a unique ramp configuration. The study interchanges and configuration types are listed in ***Table 2.16***.

Table 2.16
Interchange Configuration

Interchange Location	Type
Commercial Boulevard	Diamond with a Flyover Ramp
Cypress Creek Road	Partial Cloverleaf AB
Atlantic Boulevard	Partial Cloverleaf AB
Copans Road	Cloverleaf Minus One Loop
Sample Road	Partial Cloverleaf A
SW 10th Street	Diamond/One Quadrant Loop
Hillsboro Boulevard	Cloverleaf Minus One Loop
Palmetto Park Road	Diamond Plus One Loop

The interchanges provide system-to-service connections to and from major arterial/collector facilities along the I-95 corridor within the study limits. SW 10th Street provides a direct connection between I-95 and the Sawgrass Expressway.

There are 15 signalized intersections within the study limits. These intersections are located at the ramp terminal of each interchange along the cross streets.

1. Commercial Boulevard West Ramp Terminal
2. Commercial Boulevard East Ramp Terminal
3. Cypress Creek Road West Ramp Terminal
4. Cypress Creek Road East Ramp Terminal
5. Atlantic Boulevard West Ramp Terminal
6. Atlantic Boulevard East Ramp Terminal
7. Copans Road East Ramp Terminal
8. Sample Road West Ramp Terminal
9. Sample Road East Ramp Terminal
10. SW 10th Street West Ramp Terminal, On-Ramp
11. SW 10th Street West Ramp Terminal, Off-Ramp
12. SW 10th Street East Ramp Terminal
13. Hillsboro Boulevard West Ramp Terminal
14. Palmetto Park Road West Ramp Terminal
15. Palmetto Park Road East Ramp Terminal

The intersections are under the operational control of the Broward County and Palm Beach County Public Works Traffic Engineering Divisions. The signals are actuated and the cycle length varies between 75 and 190 seconds.

2.10 TRAFFIC

2.10.1 DATA COLLECTION

The information presented in this section is a summary of the *Traffic Data Collection Report*, a companion document to this PD&E study. This report documents the traffic counts compilation, process and locations. The report also documents existing field conditions and other operational information along the corridor.

Traffic data was collected to evaluate the existing conditions and to provide a basis for future traffic analysis. The following information was collected within the study area:

- Arterial/Ramp 72-hour bi-directional Automatic Traffic Recorder (ATR) hose-counts
- Turning Movement Counts (TMC) in 15-minute intervals (3-hr in the AM and 3-hr in the PM)
- Field observations at each signalized intersection
- I-95 Mainline Travel Time Runs

The following information was provided by FDOT and Broward County Traffic Operations Division within the study area:

- I-95 Mainline 24-hour bi-directional vehicle classifications
- I-95 Mainline 48-hour bi-directional vehicle volumes in 15-minute intervals
- Traffic Signal Information

Where data was not available, the Statewide Transportation Engineering Warehouse for Archived Regional Data (STEWARD) database and FDOT 2010 Traffic Information (2010 FTI) Database were considered as a source.

A system wide peak hour was selected based on the peak hour assessment performed along the I-95 mainline corridor. The peak hour is the highest one hour traffic within the peak period. Different segments of the freeway can peak at different times. Therefore, a thorough assessment of the traffic data collected was performed to identify one peak hour during AM conditions and one peak hour during PM conditions. The ramps' peak hours were also verified to confirm the mainline peak hour assessment. The evaluation showed that the majority of the I-95 mainline corridor peaks at 7:15-8:15 AM and 4:45-5:45 PM.

2.10.2 Traffic Operational Analysis

The information presented in this section is a summary of the *Traffic Analysis Technical Memorandum*, a companion document to this PD&E study. This report documents the traffic operational analysis of the existing conditions and selected build alternative in support of the PD&E study. The tasks performed as part of this evaluation include the collection of existing geometric conditions, review of conceptual design build alternative, development of existing, opening, interim and design year operational results and micro-simulation. This memorandum also documents the micro-simulation development, calibration procedures and parameters used as part of the traffic operational analysis.

An existing traffic operational analysis was conducted for the 2011 base condition for the mainline segments, ramp junctions and ramp terminal intersections. The first part of the analysis consisted of a basic freeway, merge, diverge and weaving segment analysis used to determine the current conditions under which the I-95 segments are operating. Level of Service (LOS) and densities for each analyzed segment were determined as a baseline to compare with modifications proposed in this study. The second part of the analysis consisted of determining the LOS and delay at each ramp terminal along the arterial corridors. The analysis was conducted using Highway Capacity Software (HCS) Version 5.5 and Synchro 8.0.

The LOS for each freeway segment was determined using the freeway facility analysis module of the HCS. The measure of effectiveness used to estimate the LOS was density. The freeway facility analysis module integrates the basic freeway segment, ramp junction and freeway weaving procedures into a corridor freeway facility analysis. The methodology adjusts vehicle speeds appropriately to account for effects in adjacent segments. Where a single-lane on-ramp results in a lane addition, the capacity of the ramp is governed by the ramp geometry itself and not by the ramp-freeway junction. Capacity checks were performed for the on-ramps' lane additions. Similarly, capacity checks were performed for single-lane off-ramps resulting in a lane drop. In these cases, capacity checks do not report density or LOS. If the capacity can handle the demand, then OK was reported. If the capacity cannot handle the demand, then FAIL was reported. Two-lane off-ramps resulting in a lane drop were analyzed as a major diverge area as described in the HCM Chapter 25.

The freeway facility analysis was divided into two sections since the HCS can only analyze up to 25 segments at the time. The two segment limits are:

- From North of Oakland Park Boulevard to Copans Road
- From Copans Road to South of Glades Road

The FDOT's Statewide Minimum LOS Standards for the State Highway System were updated and made effective April 18, 2012. It is the Department's intent to plan, design and operate the State Highway System at an acceptable LOS for the traveling public. The automobile mode LOS standard for the State Highway System during peak travel hours in urbanized areas is LOS D.

Table 2.17, Table 2.18A, Table 2.18B and ***Appendix F*** summarize the existing 2011 operational analysis results as well as link-by-link 2011 traffic volumes. ***Table 2.17*** summarizes the ramp terminal intersection analysis results. ***Tables 2.18A*** and ***2.18B*** summarize the basic freeway segments, ramps merge/diverge junctions and weaving segment analysis results. ***Appendix F*** also depicts the existing geometric configuration including the number of lanes, interchange layouts and intersection configurations, as well as link-by-link 2011 traffic volumes.

Table 2.17
2011 Traffic Operational Analysis Results
Ramp Terminal Intersections

Synchro Report Number	Location	2011	
		DELAY AM (PM)	LOS AM(PM)
Commercial Boulevard Interchange			
1	West Ramp Terminal	12.1 (12.2)	B (B)
2	East Ramp Terminal	61.4 (36.6)	E (D)
Cypress Creek Road Interchange			
1	West Ramp Terminal	45.6 (51.5)	D (D)
2	East Ramp Terminal	10.7 (13.3)	B (B)
Atlantic Boulevard Interchange			
1	West Ramp Terminal	34.5 (34.1)	C (C)
2	East Ramp Terminal	19.0 (21.4)	B (C)
Copans Road Interchange			
1	East Ramp Terminal	15.8 (14.5)	B (B)
Sample Road Interchange			
1	West Ramp Terminal	12.2 (14.1)	B (B)
2	East Ramp Terminal	15.1 (16.4)	B (B)
SW 10th Street Interchange			
1	West Ramp Terminal, On-Ramp	17.7 (17.0)	B (B)
2	West Ramp Terminal, Off-Ramp	24.1 (21.7)	C (C)
3	East Ramp Terminal	58.3 (61.9)	E (E)
Hillsboro Boulevard Interchange			
1	West Ramp Terminal	38.4 (22.0)	D (C)
Palmetto Park Road Interchange			
1	West Ramp Terminal	14.1 (16.3)	B (B)
2	East Ramp Terminal	33.2 (38.0)	C (D)

Table 2.18A

2011 HCM Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	HCS Segment #	DDHV AM (PM)	Density Range AM(PM)	V/C AM(PM)	LOS AM(PM)
I-95 Northbound						
Between Oakland Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Commercial Boulevard EB & WB Off-Ramp	Mainline	1	7,232 (6,997)	26.1 (27.7)	0.75 (0.74)	D (D)
I-95 NB to Commercial Boulevard EB & WB	Off-Ramp (Diverge)	2	2,020 (1,600)	41.5 (33.9)	1.00 (0.99)	F (D)
Between I-95 NB to Commercial Boulevard EB & WB Off-Ramp and Commeracial Boulevard EB & WB to I-95 NB On-Ramp	Mainline	3	5,212 (5,397)	31.7 (28.5)	0.85 (0.76)	D (D)
Commercial Boulevard EB & WB to I-95 NB	On-Ramp (Merge)	4	1,030 (1,010)	39.7 (32.7)	1.00 (0.90)	E (D)
Between Commercial Boulevard EB & WB to I-95 NB On-Ramp and I-95 NB to Cypress Creek Road EB & Park/Ride Lot Off-Ramp	Mainline	5	6,242 (6,407)	27.2 (25.9)	0.75 (0.68)	D (C)
I-95 NB to Cypress Creek Road EB and Park & Ride Lot	Off-Ramp (Diverge)	6	590 (460)	34.6 (30.3)	1.00 (0.90)	D (D)
Between I-95 NB to Cypress Creek Road WB & Park/Ride Lot Off-Ramp and I-95 NB to Cypress Creek Road WB Off-Ramp	Mainline	7	5,652 (5,947)	45.0 (33.1)	1.00 (0.84)	F (D)
I-95 NB to Cypress Creek Road WB	Off-Ramp (Diverge)	8	920 (540)	31.1 (32.9)	1.00 (0.84)	D (D)
Between I-95 NB to Cypress Creek Road WB Off-Ramp and Cypress Creek Road EB & WB to I-95 NB On-Ramp	Mainline	9	4,732 (5,407)	31.5 (28.8)	0.85 (0.76)	D (D)
Cypress Creek Road EB & WB to I-95 NB	On-Ramp (Merge)	10	1,050 (1,220)	36.2 (35.6)	1.00 (0.93)	E (E)
Between Cypress Creek Road EB & WB to I-95 NB On-Ramp and I-95 NB to Atlantic Boulevard EB & WB Off-Ramp	Mainline	11	5,782 (6,627)	26.5 (26.5)	0.75 (0.70)	D (D)
I-95 NB to Atlantic Boulevard EB & WB	Off-Ramp (Diverge)	12	1,310 (1,490)	32.2 (32.6)	1.00 (0.93)	D (D)
Between I-95 NB to Atlantic Boulevard EB & WB Off-Ramp and Atlantic Boulevard EB to I-95 NB On-Ramp	Mainline	13	4,472 (5,137)	34.6 (27.3)	0.90 (0.72)	D (D)
Atlantic Boulevard EB to I-95 NB	On-Ramp (Merge)	14	730 (640)	31.2 (32.1)	1.00 (0.81)	D (D)
Between Atlantic Boulevard EB to I-95 NB On-Ramp and Atlantic Boulevard WB to I-95 NB On-Ramp	Mainline	15	5,202 (5,777)	34.7 (32.0)	0.90 (0.81)	D (D)
Atlantic Boulevard WB to I-95 NB	On-Ramp (Merge)	16	720 (650)	37.4 (33.0)	1.00 (0.91)	E (D)
Between Atlantic Boulevard WB to I-95 NB On-Ramp and I-95 NB to Copans Road EB & WB Off-Ramp	Mainline	17	5,922 (6,427)	26.5 (25.0)	0.75 (0.68)	D (C)
I-95 NB to Copans Road EB & WB	Off-Ramp (Diverge)	18	1,240 (1,180)	33.4 (30.5)	1.00 (0.91)	D (D)
Between I-95 NB to Copans Road EB & WB Off-Ramp and Copans Road EB to I-95 NB On-Ramp	Mainline	19	4,682 (5,247)	38.1 (27.7)	0.94 (0.74)	E (D)
Copans Road EB to I-95 NB	On-Ramp (Merge)	20	420 (340)	30.3 (30.4)	1.00 (0.79)	D (D)

Location	Roadway	HCS Segment #	DDHV AM (PM)	Density Range AM(PM)	V/C AM(PM)	LOS AM(PM)
I-95 Northbound						
Between Copans Road EB to I-95 NB On-Ramp and Copans Road WB to I-95 NB On-Ramp	Mainline	1	5,102 (5,587)	27.7 (30.2)	0.72 (0.79)	D (D)
Between Copans Road WB to I-95 NB On-Ramp and I-95 NB to Sample Road EB & WB Off-Ramp	Weaving (Type A)	2	5,462 (5,967)	24.3 (28.2)	0.65 (0.73)	C (D)
Between I-95 NB to Sample Road EB & WB Off-Ramp and Sample Road EB to I-95 NB On-Ramp	Mainline	3	4,342 (4,527)	23.3 (24.0)	0.61 (0.64)	C (C)
Sample Road EB to I-95 NB	On-Ramp (Merge)	4	550 (440)	27.3 (27.5)	0.69 (0.70)	C (C)
Between Sample Road EB to I-95 NB On-Ramp and Sample Road WB to I-95 NB On-Ramp	Mainline	5	4,892 (4,967)	26.5 (26.6)	0.69 (0.70)	D (D)
Sample Road WB to I-95 NB	On-Ramp (Merge)	6	360 (340)	31.2 (31.2)	0.74 (0.75)	D (D)
Between Sample Road WB to I-95 NB On-Ramp and I-95 NB to SW 10th Street EB & WB Off-Ramp	Mainline	7	5,252 (5,307)	28.4 (28.4)	0.74 (0.75)	D (D)
I-95 NB to SW 10th Street EB & WB	Off-Ramp (Diverge)	8	850 (940)	30.9 (30.9)	0.74 (0.75)	D (D)
Between I-95 NB to SW 10th Street EB & WB Off-Ramp and SW 10th Street EB & WB to I-95 NB On-Ramp	Mainline	9	4,402 (4,367)	23.1 (22.9)	0.62 (0.62)	C (C)
SW 10th Street EB & WB to I-95 NB	On-Ramp (Merge)	10	1,260 (800)	29.0 (26.5)	0.80 (0.73)	D (C)
Between SW 10th Street EB & WB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard EB Off-Ramp	Mainline	11	5,662 (5,167)	30.7 (27.8)	0.80 (0.73)	D (D)
I-95 NB to Hillsboro Boulevard EB	Off-Ramp (Diverge)	12	540 (490)	34.2 (31.3)	0.80 (0.73)	D (D)
Between I-95 NB to Hillsboro Boulevard EB Off-Ramp and Hillsboro Boulevard EB to I-95 NB On-Ramp	Mainline	13	5,122 (4,677)	27.2 (24.2)	0.72 (0.66)	D (C)
Between Hillsboro Boulevard EB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard WB Off-Ramp	Weaving (Type A)	14	5,602 (5,167)	26.9 (24.4)	0.72 (0.67)	C (C)
Between I-95 NB to Hillsboro Boulevard WB Off-Ramp and Hillsboro Boulevard WB to I-95 NB On-Ramp	Mainline	15	5,032 (4,637)	26.9 (24.5)	0.71 (0.66)	D (C)
Hillsboro Boulevard WB to I-95 NB	On-Ramp (Merge)	16	570 (560)	34.3 (31.0)	0.79 (0.74)	D (D)
Between Hillsboro Boulevard WB to I-95 NB On-Ramp and I-95 NB to Palmetto Park Road EB & WB Off-Ramp	Mainline	17	5,602 (5,197)	31.1 (27.3)	0.79 (0.74)	D (D)
I-95 NB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	18	1,460 (1,130)	34.3 (30.9)	0.79 (0.74)	D (D)
Between I-95 NB to Palmetto Park Road EB & WB Off-Ramp and Palmettto Park Road EB & WB to I-95 NB On-Ramp	Mainline	19	4,142 (4,067)	21.1 (20.5)	0.58 (0.57)	C (C)
Palmetto Park Road EB & WB to I-95 NB	On-Ramp (Merge)	20	1,100 (930)	25.2 (24.2)	0.74 (0.70)	C (C)
Between Palmetto Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Glades Road EB & WB Off-Ramp	Mainline	21	5,242 (4,997)	20.0 (18.9)	0.55 (0.52)	C (C)

Table 2.18B
2011 HCM Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	HCS Segment #	DDHV AM (PM)	Density Range AM(PM)	V/C AM(PM)	LOS AM(PM)
I-95 Southbound						
Between Glades Road EB to I-95 SB On-Ramp and I-95 SB to Palmetto Park Road Off-Ramp	Mainline	1	5,393 (5,830)	20.0 (21.8)	0.57 (0.62)	C (C)
I-95 SB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	2	890 (1,120)	23.2 (27.5)	0.76 (0.62)	C (C)
Between I-95 SB to Palmetto Park Road Off-Ramp and Palmetto Road WB to I-95 SB On-Ramp	Mainline	3	4,503 (4,710)	24.1 (23.7)	0.63 (0.66)	C (C)
Palmetto Park Road WB to I-95 SB	On-Ramp (Merge)	4	490 (620)	27.3 (27.6)	0.71 (0.76)	C (C)
Between Palmetto Road WB to I-95 SB On-Ramp and I-95 SB to Palmetto Park Road Off-Ramp	Mainline	5	4,993 (5,330)	27.2 (27.6)	0.71 (0.76)	D (D)
Palmetto Park Road EB to I-95 SB	On-Ramp (Merge)	6	640 (420)	35.9 (32.5)	0.80 (0.81)	E (D)
Between Palmetto Park Road EB to I-95 SB On-Ramp and I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp	Mainline	7	5,633 (5,750)	34.0 (30.7)	0.80 (0.81)	D (D)
I-95 SB to Hillsboro Boulevard EB & WB	Off-Ramp (Diverge)	8	1,000 (980)	29.4 (25.6)	0.80 (0.81)	D (C)
Between I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp and Hillsboro Boulevard WB to I-95 SB On-Ramp	Mainline	9	4,633 (4,770)	25.7 (25.2)	0.66 (0.68)	C (C)
Hillsboro Boulevard WB to I-95 SB	On-Ramp (Merge)	10	370 (490)	28.9 (29.3)	0.71 (0.74)	D (D)
Between Hillsboro Boulevard WB to I-95 SB On-Ramp and Hillsboro Boulevard EB to I-95 SB On-Ramp	Mainline	11	5,003 (5,260)	28.1 (28.1)	0.71 (0.74)	D (D)
Hillsboro Boulevard EB to I-95 SB	On-Ramp (Merge)	12	570 (560)	33.4 (35.7)	0.79 (0.82)	D (E)
I-95 SB to SW 10th Street EB & WB	Off-Ramp (Diverge)	13	870 (950)	34.3 (36.8)	0.79 (0.82)	D (E)
Between I-95 SB to SW 10th Street EB & WB Off-Ramp and SW 10th Street WB & EB to I-95 SB On-Ramp	Mainline	14	4,703 (4,870)	25.2 (26.5)	0.66 (0.69)	C (D)
SW 10th Street WB & EB to I-95 SB	On-Ramp (Merge)	15	980 (1,000)	29.7 (31.8)	0.80 (0.83)	D (D)
Between SW 10th Street WB & EB to I-95 SB On-Ramp and I-95 SB to Sample Road EB & WB Off-Ramp	Mainline	16	5,683 (5,870)	31.9 (33.5)	0.80 (0.83)	D (D)
I-95 SB to Sample Road EB & WB	Off-Ramp (Diverge)	17	740 (970)	34.9 (36.0)	0.80 (0.83)	D (E)
Between I-95 SB to Sample Road EB & WB Off-Ramp and Sample Road WB to I-95 SB On-Ramp	Mainline	18	4,943 (4,900)	26.6 (26.4)	0.70 (0.69)	D (D)
Sample Road WB to I-95 SB	On-Ramp (Merge)	19	670 (530)	31.8 (30.9)	0.79 (0.77)	D (D)
Between Sample Road WB to I-95 SB On-Ramp and Sample Road EB to I-95 SB On-Ramp	Mainline	20	5,613 (5,430)	31.4 (29.9)	0.79 (0.77)	D (D)
Between Sample Road EB to I-95 SB On-Ramp and I-95 SB to Copans Road WB Off-Ramp	Weaving (Type A)	21	6,423 (6,030)	28.7 (25.6)	0.75 (0.68)	D (C)

Location	Roadway	HCS Segment #	DDHV AM (PM)	Density Range AM(PM)	V/C AM(PM)	LOS AM(PM)
I-95 Southbound						
Between I-95 SB to Copans Road WB Off-Ramp and Copans Road WB to I-95 SB On-Ramp	Mainline	1	5,873 (5,630)	33.2 (31.1)	0.83 (0.79)	D (D)
Between Copans Road WB to I-95 SB On-Ramp and I-95 SB to Copans Road EB Off-Ramp	Weaving (Type A)	2	6,273 (6,020)	28.6 (27.2)	0.75 (0.72)	D (C)
Between I-95 SB to Copans Road EB Off-Ramp and Copans Road EB to I-95 SB On-Ramp	Mainline	3	5,913 (5,680)	33.5 (31.5)	0.83 (0.80)	D (D)
Copans Road EB to I-95 SB	On-Ramp (Merge)	4	760 (600)	34.7 (32.9)	0.94 (0.89)	D (D)
Between Copans Road EB to I-95 SB On-Ramp and I-95 SB to Atlantic Boulevard WB Off-Ramp	Mainline	5	6,673 (6,280)	26.4 (24.9)	0.71 (0.66)	D (C)
I-95 SB to Atlantic Boulevard WB	Off-Ramp (Diverge)	6	660 (770)	32.4 (30.4)	0.94 (0.89)	D (D)
Between I-95 SB to Atlantic Boulevard WB Off-Ramp and I-95 SB to Atlantic Boulevard EB Off-Ramp	Mainline	7	6,013 (5,510)	34.5 (30.2)	0.85 (0.78)	D (D)
I-95 SB to Atlantic Boulevard EB	Off-Ramp (Diverge)	8	570 (650)	30.9 (27.9)	0.85 (0.78)	D (C)
Between I-95 SB to Atlantic Boulevard EB Off-Ramp and Atlantic Boulevard WB & EB to I-95 SB On-Ramp	Mainline	9	5,443 (4,860)	29.7 (25.8)	0.77 (0.69)	D (C)
Atlantic Boulevard WB & EB to I-95 SB	On-Ramp (Merge)	10	1,260 (1,190)	35.4 (30.9)	0.94 (0.85)	E (D)
Between Atlantic Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB to Cypress Creek Road EB & WB Off-Ramp	Mainline	11	6,703 (6,050)	27.2 (23.9)	0.71 (0.64)	D (C)
I-95 SB to Cypress Creek Road EB & WB	Off-Ramp (Diverge)	12	1,390 (1,250)	23.8 (19.3)	0.94 (0.85)	C (B)
Between I-95 SB to Cypress Creek Road EB & WB Off-Ramp and Cypress Creek Road WB to I-95 SB On-Ramp	Mainline	13	5,313 (4,800)	29.1 (24.9)	0.75 (0.68)	D (C)
Cypress Creek Road WB to I-95 SB	On-Ramp (Merge)	14	510 (520)	31.4 (27.3)	0.82 (0.75)	D (C)
Between Cypress Creek Road WB to I-95 SB On-Ramp and Park & Ride Lot Exit to I-95 SB On-Ramp	Mainline	15	5,823 (5,320)	33.1 (28.2)	0.82 (0.75)	D (D)
Park & Ride Lot Exit to I-95 SB	On-Ramp (Merge)	16	30 (150)	35.2 (32.2)	0.83 (0.77)	E (D)
Between Andrews Avenue SB to I-95 SB On-Ramp and I-95 SB to Commercial Boulevard EB & WB Off-Ramp	Weaving (Type A)	17	6,663 (6,800)	35.3 (40.5)	0.88 (0.97)	F (F)
Between I-95 SB to Commercial Boulevard EB & WB Off-Ramp and Commercial Boulevard EB to I-95 SB On-Ramp	Mainline	18	5,603 (5,670)	30.9 (30.5)	0.79 (0.80)	D (D)
Commercial Boulevard EB to I-95 SB	On-Ramp (Merge)	19	710 (1,080)	33.5 (34.8)	0.89 (0.95)	D (D)
Commercial Boulevard WB to I-95 SB	On-Ramp (Merge)	20	730 (880)	51.4 (53.1)	0.74 (0.81)	E (E)
Between Commercial Boulevard WB to I-95 SB On-Ramp and I-95 SB to Oakland Park Boulevard EB & WB Off-Ramp	Mainline	21	7,043 (7,630)	28.3 (30.9)	0.74 (0.81)	D (D)

A summary of the existing operational analysis results is as follows:

Basic Freeway Analysis – The freeway mainline, within the study limits, was divided into segments for the purpose of evaluating each segment for the existing conditions. The capacity analysis shows that the following two basic freeway segments are currently operating at an unacceptable LOS (worst peak period LOS):

- Northbound at Cypress Creek Road Interchange between the off-ramps (LOS F-AM)
- Northbound at Copans Road Interchange between the off-ramp and the eastbound to northbound on-ramp (LOS E-AM)

Ramp Merge/Diverge Analysis – For this analysis, the exit and entrance ramps to and from the freeway were analyzed within the study limits. The capacity analysis shows that the following 11 ramps are currently operating at an unacceptable LOS (worst peak period LOS):

- Northbound off-ramp to Commercial Boulevard (LOS F-AM)
- Northbound on-ramp from Commercial Boulevard (LOS E-AM)
- Northbound on-ramp from Cypress Creek Road (LOS E-AM/PM)
- Northbound on-ramp from Atlantic Boulevard westbound (LOS E-AM)
- Southbound on-ramp from Palmetto Park Road eastbound (LOS E-AM)
- Southbound on-ramp from Hillsboro Boulevard eastbound (LOS E-PM)
- Southbound off-ramp to SW 10th Street (LOS E-PM)
- Southbound off-ramp to Sample Road (LOS E-PM)
- Southbound on-ramp from Atlantic Boulevard (LOS E-AM)
- Southbound on-ramp from the Cypress Creek Road Park and Ride Lot (LOS E-AM)
- Southbound on-ramp from Commercial Boulevard westbound LOS E-AM/PM)

Weaving Analysis – This analysis evaluated all the weaving sections typically formed where an on-ramp is closely (less or equal to 2,500 feet) followed by an off-ramp and the two are joined by one or more auxiliary lanes. The facility module of the HCS integrates the weaving procedures and adjusts vehicle speeds appropriately to account for effects in adjacent segments. The capacity analysis shows that the following weaving segment is currently operating at an unacceptable LOS F:

- I-95 southbound between Andrews Avenue on-ramp and Commercial Boulevard off-ramp (AM and PM).

Intersection Analysis – The capacity analysis shows that the following two intersections are currently operating at an unacceptable LOS (worst peak period LOS):

- Commercial Boulevard East Ramp Terminal (LOS E-AM)
- SW 10th Street East Ramp Terminal (LOS E-AM/PM)

Micro-simulation – Speeds in the HOV lane were higher than on the general purpose lanes. The PM peak period has a higher level of congestion when compared to the AM peak period. Speed profiles indicate that there are two congestion segments; one segment is from Oakland Park Boulevard to Cypress Creek Road and the other segment is from SW 10th Street to Hillsboro Boulevard. Most ramps operate at speeds higher than 25 MPH except for the following two ramps:

- Southbound off-ramp to Hillsboro Boulevard operates at 24 MPH during the PM peak hour
- Northbound off-ramp to Atlantic Boulevard operates at 23 MPH during the PM peak hour

2.11 LIGHTING

The existing lighting along the corridor consists of 250-W and 400-W High Pressure Sodium (HPS) luminaires on standard aluminum poles. The pole mounting height varies from 40 to 50 feet. The light poles are located on the median barrier wall throughout the mainline at an approximate spacing of 270 feet. At the interchanges, the light poles are located outside the shoulder. The roadway lighting is maintained by FDOT under a maintenance contract. All of the interchange bridges have a lighting feature under the deck. Overpasses that do not connect to I-95 via an interchange do not have a lighting feature under the deck.

2.12 LANDSCAPING

The following four interchanges have a landscaped area that is maintained by the local municipalities:

- Copans Road – City of Pompano Beach
- Atlantic Boulevard – City of Pompano Beach
- SW 10th Street – City of Deerfield Beach
- Hillsboro Boulevard – City of Deerfield Beach

2.13 UTILITIES

Several utilities are located with the study corridor. ***Table 2.19*** lists the existing utility owner and contact information for the 26 companies identified in the project area. Each company was contacted in order to solicit its feedback on the location of its facilities and invite each of them to a Utility Coordination Meeting which was held on August 9, 2012.

Table 2.19
Existing Utility Companies

Utility	Owner	Contact	Phone
Communications	AT&T Transmission	Greg Jacobson	(813) 342-0512
	AT&T Distribution AFL	Otis Keeve	(954) 723-2540
	AT&T Distribution	Steve Massie	(305) 222-8745
	Comcast Cable	Leonard Maxwell-Newbold	(954) 444-5113
	Comcast – WPB	Donald Stephens	(561) 454-5866
	Communications LLC	Judy Henry	(720) 888-2061
	FDOT	Fran Delgado	(954) 847-2690
	FPL Fiber Net	Danny Haskett	(305)552-2024
	Verizon/MCI	Dean Boyers	(972) 729-6322
	XO Communications	Anthony Kowaleski	(305) 356-3160
Electric	FPL Distribution Broward	Byron Sample	(954) 321-2056
	FPL Distribution Palm Beach	Dan Augustin	(561) 742-2003
	FPL Transmission	George Beck	(561) 904-3604
Gas	Florida Gas Transmission Company	Joseph Sanchez	(407) 838-7171
	Florida Public Utilities Company	Vince Krepps	(561) 838-1782
	Peoples Gas/TECO	Angel Quant	(954) 453-0814
Municipal	Broward County OES – Traffic Engineering	Lee Billingsley	(954) 357-6408
	Broward County OES – Water Supply	Tony Hui	(954) 831-0747
	City of Boca Raton – Water	Leif Ahnell	(561) 393-7703
	City of Boca Raton – Traffic	T. Douglas Hess	(561) 416-3369
	City of Deerfield Beach	Dennis Girisgen	(954) 480-4269
	City of Fort Lauderdale	Julie Leonard	(954) 828-7802
	City of Oakland Park	Joseph Teolis	(954) 630-4441
	City of Pompano Beach	Alessandra Delfico	(954) 786-4144
	City of Wilton Manors	Dave Archackie	(954) 390-2100
	Palm Beach County Traffic Division	Rod Friedel	(561) 681-4371

Of the 26 companies, 19 responded to the request and five attended the coordination meeting. Of the 19 responsive companies, four stated that they do not have facilities in the project vicinity (AT&T Transmission, City of Wilton Manors, Florida Gas Transmission Company, and Florida Public Utilities Company).

Corridor base maps showing approximate locations of the existing utilities are provided in ***Appendix G***. A review of the provided utility information revealed a buried fiberoptic line along the west edge of pavement for the entire project length in Broward County, supporting the ITS SunGuide^{SM} system.

The City of Fort Lauderdale Charles W. Fiveash Regional Water Treatment Plant is located adjacent to the west side of I-95 between Oakland Park Boulevard and Commercial Boulevard. This facility both supplies water and treats wastewater.

Approximately 101 utility crossings have been noted within the study limits, most commonly found in and around interchanges and overpasses. The utility and crossing locations are summarized below:

Above ground electric transmission crossings (5):

- 230 KV at NW 38th Street
- 230 KV south of Powerline Road
- 230 KV at Prospect Road
- 138 KV south of Sample Road
- 138 KV at Palmetto Park Road

Above ground electric distribution crossings (7):

- 13 KV at NW 38th Street
- 13 KV south of Andrews Avenue
- 13 KV north of Dr. Martin Luther King Jr. Boulevard
- 13 KV at SW 10th Street
- 7.6 KV at SW 18th Street
- 7.6 KV north of SW 18th Street
- 7.6 kV south of Glades Road

Gas utility crossings (6):

- 4-inch at Race Track Road
- 6-inch at Atlantic Boulevard

- 6-inch at Dr. Martin Luther King Jr. Boulevard
- 3-inch at Sample Road
- 3-inch at NE 48th Street
- 4-inch at Hillsboro Boulevard (planned to be in service by 2012)

Force main sanitary sewer utility crossings (13):

- Abandoned line at Commercial Boulevard
- 4-inch south of Andrews Avenue
- 16-inch at Atlantic Boulevard
- 4-inch at Dr. Martin Luther King Jr. Boulevard
- 8-inch at NW 15th Street
- 42-inch at NW 15th Street
- 8-inch north of Sample Road
- Abandoned line south of NE 48th Street
- 30-inch at NE 48th Street
- 20-inch at SW 10th Street
- 18-inch south of Hillsboro Boulevard
- 16-inch at Hillsboro Boulevard
- Dual, 10-inch at Camino Real

Water line utility crossings (27):

- 54-inch at NW 38th Street
- 30-inch at Powerline Road*
- 36-inch at Powerline Road*
- 36-inch at Prospect Road
- 30-inch at Andrews Avenue
- 6-inch north of Andrews Avenue
- 20-inch at Cypress Creek Road
- 54-inch at Copans Road
- 24-inch south of Sample Road
- 12-inch at Sample Road
- 8-inch north of Sample Road
- 12-inch south of NE 48th Street
- 30-inch at NE 48th Street
- 16-inch at SW 10th Street
- 20-inch south of Hillsboro Boulevard
- 24-inch south of Hillsboro Boulevard
- 12-inch at Hillsboro Boulevard

- 12-inch at Broward/Palm Beach County line
- Dual, 12-inch south of SW 18th Street
- 12-inch at SW 18th Street
- 12-inch north of SW 18th Street
- 12-inch south of Camino Real
- 12-inch at Camino Real
- Irrigation line at Camino Real
- 16-inch at Palmetto Park Road
- Irrigation at Palmetto Park Road
- 10-inch south of Glades Road

Buried electric distribution crossings (13):

- 13 KV at south of Prospect Road
- 13 KV at Cypress Creek Road
- 13 KV at McNab Road
- 13 KV at south of Race Track Road
- 13 KV at Dr. Martin Luther King Jr. Boulevard
- 13 KV at railroad crossing, south of NW 15th Street
- 13 KV at Copans Road
- 13 KV at south of Sample Road
- 13 KV north of Sample Road
- 13 KV at NE 48th Street
- 13 KV at SW 10th Street
- 13 KV at Hillsboro Boulevard
- 7.6 KV at Camino Real

Buried communication line crossings (26):

- Broward County Traffic Engineering Division (BCTED) at Prospect Road
- Four 4-inch AT&T north of Prospect Road
- Dual, BCTED at Commercial Boulevard
- BCTED at Andrews Avenue
- Nine 4-inch AT&T at Cypress Creek Road
- SunGuide north of Cypress Creek Road
- One 4-inch AT&T at McNab Road
- AT&T north of McNab Road
- BCTED at Race Track Road
- Six 4-inch AT&T at Atlantic Boulevard
- BCTED at Atlantic Boulevard

- AT&T at Dr. Martin Luther King Jr. Boulevard
- Twelve 4-inch AT&T north of Dr. Martin Luther King Jr. Boulevard
- One 4-inch AT&T at NW 15th Street
- Dual, SunGuide north of NW 15th Street
- Twelve 4-inch AT&T at Sample Road
- BCTED at Sample Road
- BCTED at NE 48th Street
- One 4-inch AT&T north of NE 48th Street
- BCTED at SW 10th Street
- Thirteen 4-inch AT&T at SW 10th Street
- BCTED at Hillsboro Boulevard
- Six 4-inch AT &T at Hillsboro Boulevard
- Nine 4-inch AT&T at Camino Real
- Twenty 4-inch AT&T at Camino Real
- City of Boca Raton at Palmetto Park Road

2.14 PAVEMENT CONDITION

The FDOT annually performs an evaluation of pavement referred to as a pavement condition survey. Each section of pavement is rated for cracking, ride, and rutting on a 0-10 scale; with 0 being the worst and 10 the best. If any of these categories falls under its respective critical value, the pavement is considered deficient. A crack rating of 6.4 or less is considered deficient. The minimum threshold for the ride criteria is 6.5 for speed limits greater than 50 MPH. Based on the FDOT's *Pavement Conditions Forecast Report* dated September 28, 2012, the rated pavement conditions for the project corridor, section numbers 86070000 (Broward) and 93220000 (Palm Beach), are shown in ***Table 2.20***.

Table 2.20 Pavement Condition Survey					
Direction	Section BMP	Section EMP	2012		
			Crack	Ride	Rut
Broward County					
Northbound	10.775	14.245	10.0	7.6	10.0
	14.245	16.862	10.0	7.6	9.0
	16.862	21.119	10.0	8.0	9.0
	21.119	25.307	10.0	7.7	9.0
Southbound	10.775	14.245	10.0	7.6	9.0
	14.245	16.862	9.0	7.5	9.0
	16.862	21.119	9.0	7.9	9.0
	21.119	25.307	9.0	7.7	9.0
Palm Beach County					
Northbound	0.000	4.303	10.0	8.0	9.0
Southbound	0.000	4.303	10.0	8.0	9.0

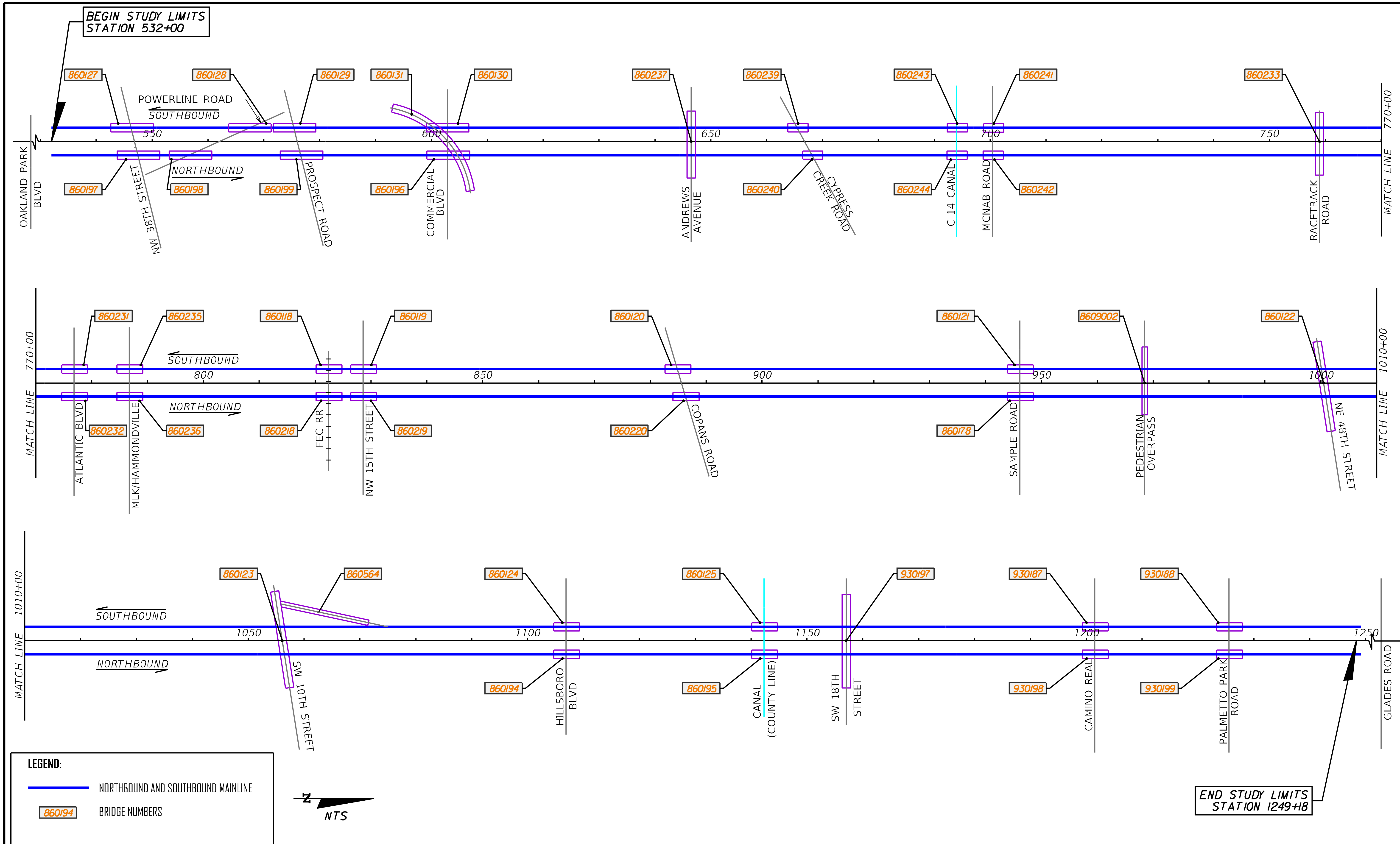
Based on ***Table 2.20***, the project corridor pavement conditions are within acceptable thresholds.

2.15 EXISTING BRIDGES

There are 42 existing bridges located within the study limits (see ***Figure 2.4*** and ***Appendix A*** for bridge locations).

- 35 bridges along the I-95 mainline
  - Four bridges over water (Cypress Creek Canal and Hillsboro Canal)
  - Two bridges over railroad tracks (FEC)
- 7 bridges over I-95

Table 2.21 and ***Table 2.22*** identify the locations, descriptions, and specific details about each of the bridges along the I-95 project corridor. The following data was collected and analyzed for each structure: location, geometrics, alignment, type of structure, and condition. ***Appendix H*** includes detailed information on existing bridge structures.



FLORIDA DEPARTMENT OF TRANSPORTATION
BROWARD AND PALM BEACH COUNTIES

January 2013

I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)

BRIDGE LOCATIONS

FIGURE 2.4

Table 2.21
I-95 Existing Bridge Characteristics - Broward County

LOCATION			GEOMETRICS			ALIGNMENT				STRUCTURAL				CONDITION					
Bridge ID No.	Bridge Location	Direction	Structure Length (ft)[1,2]	Deck Width (ft)[1,2]	No. of Lanes	Skew Angles (Degrees)[1]	Horizontal Clearance[1,2,3] Inside (LF)	Horizontal Clearance[1,2,3] Outside (RT)	Min. Vertical Clearance[1,2]	Number of Spans[1,2]	Max. Span (ft)[1,2]	Superstructure Type[1,2]	Substructure Type[1,2]	Year Built / Widened[1]	Sufficiency Rating (%)[1]	Health Index (%)[1]	Inspection Date[1]	Number of Documented Hits	Significant Deficiencies[1]
860197	I-95 North over NW 38th Street	Northbound	187'-0"	86'-8"	5	24	0	28'-6"	15'-11"	3	91.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1974 / 1990	91.5	99.6	1/17/2012		Vertical Clearance
860127	I-95 South over NW 38th Street	Southbound	187'-0"	86'-8"	5	24	0'-0"	28'-6"	15'-11"	3	91.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1974 / 1990	91.5	99.5	1/17/2012		Vertical Clearance
860198	I-95 North over Powerline Road	Northbound	501'-0"	86'-8"	5	66	6'-2"	14'-1"	17'-2"	4	153.3	Steel continuous stringer/girder	Multi-Column Pier	1974 / 1990	88.0	82.5	7/29/2011		None
860128	I-95 South over Powerline Road	Southbound	501'-0"	86'-8"	5	66	6'-2"	14'-1"	17'-2"	4	153.3	Steel continuous Stringer/Girder	Multi-Column Pier	1974 / 1990	88.0	82.3	5/18/2010		None
860199	I-95 North over Prospect Road	Northbound	181'-0"	86'-8"	5	23	5'-0"	1'-7"	15'-11"	3	91.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Single-Column Pier	1974 / 1990	85.5	100.0	3/8/2010		Underclearances - Intolerable; Functionally Obsolete, Vertical Clearance
860129	I-95 South over Prospect Road	Southbound	181'-0"	90'-4"	5	23	5'-0"	1'-7"	15'-11"	3	91.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Single-Column Pier	1974 / 1990	86.8	99.3	3/8/2010		Underclearances - Intolerable; Functionally Obsolete, Vertical Clearance
860131	Commercial Boulevard Flyover to I-95 South	Westbound to Southbound	769'-1"	29'-3"	1	0	8'-0"	9'-8"	16'-5"	8	134.0	Steel continuous / Prestressed Concrete Stringer/Girder	Hammer Head Pier	1974	91.0	100.0	6/10/2010		Underclearances - Tolerable, Vertical Clearance
860196	I-95 North over Commercial Boulevard	Northbound	176'-9"	70'-6"	4	5	1'-6"	6'-6"	15'-7" Over / 15'-0" Under	2	92.3	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Hammer Head Pier	1974 / 1990	83.0	99.8	4/21/2010		Underclearances - Tolerable, Vertical Clearance
860130	I-95 South over Commercial Boulevard	Southbound	176'-9"	70'-6"	4	5	1'-6"	6'-7"	15'-7" Over / 15'-0" Under	2	92.3	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Hammer Head Pier	1974 / 1990	83.0	99.7	4/21/2010	4	Underclearances - Tolerable, Vertical Clearance
860237	North Andrews Avenue Overpass over I-95	Eastbound and Westbound	284'-0"	99'-10"	4	14	11'-9"	34'-4"	15'-7"	4	103.6	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975	96.7	99.9	8/26/2010		Underclearances - Tolerable, Vertical Clearance
860240	I-95 North over Cypress Creek Road	Northbound	319'-0"	79'-4"	4	48	5'-10"	6'-10"	18'-5"	4	99.8	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975 / 1990	83.0	100.0	6/14/2010		Underclearances - Tolerable

Table 2.21
I-95 Existing Bridge Characteristics - Broward County

LOCATION			GEOMETRICS			ALIGNMENT				STRUCTURAL				CONDITION					
Bridge ID No.	Bridge Location	Direction	Structure Length (ft)[1,2]	Deck Width (ft)[1,2]	No. of Lanes	Skew Angles (Degrees)[1]	Horizontal Clearance[1,2,3] Inside (LF)	Horizontal Clearance[1,2,3] Outside (RT)	Min. Vertical Clearance[1,2]	Number of Spans[1,2]	Max. Span (ft)[1,2]	Superstructure Type[1,2]	Substructure Type[1,2]	Year Built / Widened[1]	Sufficiency Rating (%)[1]	Health Index (%)[1]	Inspection Date[1]	Number of Documented Hits	Significant Deficiencies[1]
860239	I-95 South over Cypress Creek Road	Southbound	319'-0"	87'-4"	5	48	5'-10"	6'-10"	18'-5"	4	99.8	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1976 / 1990	83.0	100.0	6/14/2010		Underclearances - Tolerable
860244	I-95 North over C-14 Canal	Northbound	252'-0"	97'-1"	5	18	—	—	—	3	84.0	Prestressed Concrete Stringer/Girder	Multi-Pile Bent	1975 / 1990	85.0	99.6	1/18/2012		None
860243	I-95 South over C-14 Canal	Southbound	252'-0"	86'-7"	5	18	—	—	—	3	84.0	Prestressed Concrete Stringer/Girder	Multi-Pile Bent	1975 / 1990	85.0	99.5	1/18/2012		None
860242	I-95 North over McNab Road	Northbound	286'-0"	91'-4"	5	25	7'-2"	47'-3"	19'-0"	4	97.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1976 / 1990	92.7	99.3	6/16/2010		
860241	I-95 South over McNab Road	Southbound	286'-0"	86'-7"	5	25	7'-2"	47'-3"	19'-0"	4	97.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Hammer Head Pier	1976 / 1990	92.7	99.3	6/16/2010		
860233	SW 3rd Street Overpass over I-95	Eastbound and Westbound	300'-0"	98'-0"	6	0	9'-0"	14'-1"	16'-1"	4	114.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975	98.0	86.8	3/8/2011		Vertical Clearance
860232	I-95 North over Atlantic Boulevard	Northbound	212'-0"	87'-4"	5	0	3'-0"	14'-1"	15'-2"	4	73.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975 / 1990	85.0	99.1	4/29/2010		Vertical Clearance
860231	I-95 South over Atlantic Boulevard	Southbound	212'-0"	87'-4"	5	0	3'-0"	14'-1"	15'-2"	4	73.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975 / 1990	85.0	99.1	4/29/2010	1	Vertical Clearance
860236	I-95 North over Hammondville Road	Northbound	175'-0"	109'-0" varies	5	7	—	9'-6"	16'-4"	3	93.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975 / 1990	82.9	99.1	4/28/2010		Vertical Clearance
860235	I-95 South over Hammondville Road	Southbound	175'-0"	117'-0" varies	5	13	—	9'-6"	16'-4"	3	93.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1975 / 1990	83.6	99.3	4/28/2010		Approach Guardrail Ends - Substandard, Vertical Clearance
860218	I-95 North over FEC Railroad	Northbound	145'-0"	86'-8"	5	1	0'-0"	18'-0"	22'-0"	3	61.5	Prestressed Concrete Stringer/Girder	Multi-Pile Bent	1971/ 1990	85.0	98.7	3/1/2010		Vertical Clearance

Table 2.21
I-95 Existing Bridge Characteristics - Broward County

LOCATION			GEOMETRICS			ALIGNMENT				STRUCTURAL				CONDITION					
Bridge ID No.	Bridge Location	Direction	Structure Length (ft)[1,2]	Deck Width (ft)[1,2]	No. of Lanes	Skew Angles (Degrees)[1]	Horizontal Clearance[1,2,3] Inside (LF)	Horizontal Clearance[1,2,3] Outside (RT)	Min. Vertical Clearance[1,2]	Number of Spans[1,2]	Max. Span (ft)[1,2]	Superstructure Type[1,2]	Substructure Type[1,2]	Year Built / Widened[1]	Sufficiency Rating (%)[1]	Health Index (%)[1]	Inspection Date[1]	Number of Documented Hits	Significant Deficiencies[1]
860118	I-95 South over FEC Railroad	Southbound	145'-0"	86'-8"	5	1	0'-0"	17'-8"	22'-6"	3	61.5	Prestressed Concrete Stringer/Girder	Multi-Pile Bent	1971/ 1990	85.0	98.3	3/1/2010		Vertical Clearance
860219	I-95 North over NW 15th Street	Northbound	177'-0"	86'-8"	5	0	0'-0"	31'-6"	15'-11"	3	91.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Hammer Head Pier	1972/ 1990	85.0	99.3	4/12/2010		Vertical Clearance
860119	I-95 South over NW 15th Street	Southbound	177'-0"	86'-8"	5	0	0'-0"	31'-6"	15'-11"	3	91.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Hammer Head Pier	1972/ 1990	85.0	99.3	4/12/2010	1	Vertical Clearance
860220	I-95 North over Copans Road	Northbound	290'-0"	87'-4"	5	40	7'-0"	25'-0"	15'-6"	4	95.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1971/ 1990	85.2	99.1	5/18/2011	3	Transitions - Substandard; Approach Guardrail Ends - Substandard, Vertical Clearance
860120	I-95 South over Copans Road	Southbound	290'-0"	87'-4"	5	40	7'-0"	25'-0"	15'-6"	4	95.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1971/ 1990	83.3	99.1	5/18/2011	1	Transitions - Substandard; Approach Guardrail Ends - Substandard, Vertical Clearance
860178	I-95 North over Sample Road	Northbound	224'-0"	87'-1"	5	2	6'-6"	15'-1"	15'-0"	4	74.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1974/ 1990	85.0	98.7	6/24/2010	3	Vertical Clearance
860121	I-95 South over Sample Road	Southbound	224'-0"	87'-0"	5	2	6'-6"	15'-1"	15'-0"	4	74.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1974/ 1990	85.0	98.7	6/24/2010	2	Vertical Clearance
869002	Pedestrian Crossing Overpass over I-95	Eastbound and Westbound	222.8	11'-0"	—	0	11'-9"	33'-5"	8'-0" Over / 16'-0" Under	2	111.4	Prestressed Concrete Stringer/Girder	Hammer Head Pier	1973	NA	96.7	2/25/2010		Ultimate strength and/or serviceability review of the superstructure and/or the bridge has been recommended; Underclearances - Above Tolerable, Vertical Clearance
860122	NW 48th Street Overpass over I-95	Eastbound and Westbound	272'-0"	97'-9"	4	16	9'-2"	30'-9"	16'-2"	4	104.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1973	96.0	98.5	6/9/2010		Underclearances - Above Tolerable, Vertical Clearance
860123	SW 10th Street Overpass over I-95	Eastbound and Westbound	272'-0"	97'-9"	7	16	10'-0"	30'-1"	16'-2"	4	103.8	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972	89.1	98.6	6/8/2010		Vertical Clearance

Table 2.21
I-95 Existing Bridge Characteristics - Broward County

LOCATION			GEOMETRICS			ALIGNMENT				STRUCTURAL				CONDITION					
Bridge ID No.	Bridge Location	Direction	Structure Length (ft)[1,2]	Deck Width (ft)[1,2]	No. of Lanes	Skew Angles (Degrees)[1]	Horizontal Clearance[1,2,3] Inside (LF)	Horizontal Clearance[1,2,3] Outside (RT)	Min. Vertical Clearance[1,2]	Number of Spans[1,2]	Max. Span (ft)[1,2]	Superstructure Type[1,2]	Substructure Type[1,2]	Year Built / Widened[1]	Sufficiency Rating (%)[1]	Health Index (%)[1]	Inspection Date[1]	Number of Documented Hits	Significant Deficiencies[1]
860564	I-95 South off-ramp to SW 10th Street	Southbound	455'-0"	31'-7"	1	0	0	0	—	7	65.0	Prestressed Concrete Stringer/Girder	Multi-Pile Bent	1988	99.6	99.3	8/11/2010		
860194	I-95 North over Hillsboro Boulevard	Northbound	231'-0"	87'-1"	5	6	7'-2"	15'-0"	14'-8"	4	74.3	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	85.5	99.0	5/12/2011		Vertical Clearance
860124	I-95 South over Hillsboro Boulevard	Southbound	231'-0"	87'-1"	5	6	7'-2"	15'-0"	14'-9"	4	74.3	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	89.4	98.8	5/12/2011		Vertical Clearance
860195	I-95 North over Hillsboro Canal	Northbound	200'-0"	82'-6"	4	3	—	—	4'-10"	6	33.3	Prestressed Concrete Slab	Multi-Pile Bent	1973/ 1990	93.5	91.7	8/3/2010		—
860125	I-95 South over Hillsboro Canal	Southbound	200'-0"	90'-6"	5	3	—	—	4'-10"	6	33.3	Prestressed Concrete Slab	Multi-Pile Bent	1973/ 1990	90.9	92.1	8/3/2010		—

Source: [1] Bridge Inspection Report, [2] As-Built Plans, [3] Survey Data
Note: NB: Northbound, SB: Southbound, EB: Eastbound, WB: Westbound
PCG: Prestressed Concrete Girder, SCG: Steel Continuous Girder

Table 2.22
I-95 Existing Bridge Characteristics - Palm Beach County

LOCATION			GEOMETRICS			ALIGNMENT				STRUCTURAL				CONDITION					
Bridge ID No.	**Bridge Location**	**Direction**	**Structure Length (ft)[1,2]**	**Deck Width (ft)[1,2]**	**No. of Lanes**	**Skew Angles (Degrees)[1]**	**Horizontal Clearance[1,2,3]**		**Min. Vertical Clearance[1,2]**	**Number of Spans[1,2]**	**Max. Span (ft)[1,2]**	**Superstructure Type[1,2]**	**Substructure Type[1,2]**	**Year Built / Widened[1]**	**Sufficiency Rating (%)[1]**	**Health Index (%)[1]**	**Inspection Date[1]**	**Number of Documented Hits**	**Significant Deficiencies[1]**
							Inside (LF)	**Outside (RT)**											
930197	SW 18th Street Overpass over I-95	Eastbound and Westbound	270'-2"	45'-7"	2	4	9'-9"	29'-9"	16'-4"	4	91.0	Prestressed Concrete Stringer/Girder	Multi-Column Pier / Single-Column Pier	1972	94.7	98.7	9/8/2011		Bridge Railings - Substandard; Transitions - Substandard; Approach Guardrail Ends - Substandard, Vertical Clearance
930198	I-95 North over Camino Real	Northbound	160'-11"	79'-4"	4	0	0	18'	15'-0"	3	91.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	90.9	98.5	9/20/2011		Vertical Clearance
930187	I-95 South over Camino Real	Southbound	160'-11"	79'-4"	4	0	0	18	15'-0"	3	91.5	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	86.9	98.5	9/20/2011		Vertical Clearance
930199	I-95 North over Palmetto Park Road	Northbound	192'-6"	79'-4"	4	0	1'-4"	2'-4"	15'-2"	2	98.8	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	94.0	98.9	9/16/2011	1	Underclearances - Intolerable; Functionally Obsolete, Vertical Clearance
930188	I-95 South over Palmetto Park Road	Southbound	192'-6"	87'-4"	5	0	1'-4"	2'-4"	15'-2"	2	98.8	Prestressed Concrete Stringer/Girder	Multi-Column Pier	1972/ 1990	93.5	98.7	9/16/2011	2	Underclearances - Intolerable; Approach Guardrail Ends - Substandard; Functionally Obsolete, Vertical Clearance

Source: [1] Bridge Inspection Report, [2] As-Built Plans, [3] Survey Data
Note: NB: Northbound, SB: Southbound, EB: Eastbound, WB: Westbound
PCG: Prestressed Concrete Girder, SCG: Steel Continuous Girder

2.15.1 Type of Structure

All of the existing bridges, within the study limits, are composed of prestressed concrete girder superstructures (AASHTO Beams) supported on multi-column bents, with the exception of the following bridges:

- The two I-95 bridges over Powerline Road (Bridge No. 860198 and Bridge No. 860128) are steel continuous plate girders.
- The Commercial Boulevard flyover from westbound Commercial Boulevard to southbound I-95 (Bridge No. 860131) is an eight-span structure with a two-span steel continuous girder system over I-95 with three prestressed concrete girder approach spans on each side supported on hammerhead piers.
- The two I-95 bridges over the Hillsboro Canal (Bridge No. 860195 and Bridge No. 860125) are prestressed concrete slab units with an inside widening of a cast-in-place reinforced concrete flat slab supported on pile bents.

The type of structure for each bridge along the corridor is summarized in ***Table 2.21*** and ***Table 2.22***. ***Appendix H*** includes detailed information on existing bridge structure types.

2.15.2 Condition

The FDOT performs biennial inspections and evaluations of all fixed bridges under its jurisdiction as part of the "National Bridge Inventory (NBI) and Structural Inventory and Appraisal Program" required by the FHWA. The latest available bridge inspection reports were obtained through the FDOT for all the existing bridges. These reports were reviewed for every bridge and the pertinent information was recorded, including the sufficiency rating, the health index, vertical and horizontal clearances, and noted deficiencies.

The health index is a tool that measures the overall condition of a bridge. A lower health index indicates that more work is needed in order to bring the bridge to an ideal condition. The sufficiency rating is an index tool used to determine whether a bridge that is structurally deficient or functionally obsolete should be repaired or replaced and is not a direct reflection of the bridges' ability to carry traffic loads. The sufficiency rating considers several factors, approximately half of which relates to the condition of the bridge itself and the rest relates to the obsolescence of its design and its importance to the public.

The sufficiency ratings are assigned on a scale of 0 to 100, with 0 failing and 100 excellent. The sufficiency rating is the formula used to evaluate the remaining service of a bridge by rating four groups of factors:

1. Structural Adequacy and Safety
2. Serviceability and Functional Obsolescence
3. Essential for Public Use
4. Special Reductions

A review of the existing bridge inspection reports indicated that all bridges have acceptable health indexes varying from 82.3 to 100 and acceptable sufficiency ratings varying from 82.9 to 99.6. Bridge load rating capacity forms were also obtained from the FDOT and reviewed to verify the structural capacity for each bridge. The forms indicate both the inventory and operating ratings. Based on the inspection reports, all bridges are in good condition with some deficiencies. The condition of each of the bridges is summarized in ***Table 2.21*** and ***Table 2.22. Appendix H*** includes detailed information on existing bridge structure conditions.

2.15.3 HORIZONTAL AND VERTICAL CLEARANCE

Horizontal Clearance – The horizontal clearance underneath the existing bridges is the lateral distance from the roadway edge of travel lane to the bridge abutment or piers. The horizontal clearance requirements for most roadside features and objects are established on providing the required recoverable terrain (clear zone) width. Both the FDOT PPM and AASHTO require bridge piers and abutment walls to be placed outside the clear zone unless shielded by a crash worthy barrier. Based on the FDOT PPM, the required width of clear zone for the project corridor from the edge of travel lane is 36 feet for travel lanes and multilane ramps, and 24 feet with auxiliary lanes and single lane ramps. According to the project survey and field reviews, all the bridge structures are either adequately protected and/or meet the clear zone width criteria.

Vertical Clearance – The vertical clearance relates to the adequate clear height of an overpass/overhead or underpass structure/facility to the roadway and shoulder areas. In accordance with the PPM Volume I, Chapter 2, Section 2.10, Table 2.10.1, the vertical clearance criteria for a bridge over a roadway is 16'-6", for a roadway over railroad is 23'-6", and for a pedestrian bridge over a roadway is 17'-6". AASHTO requires a minimum vertical clearance of 16' for structures passing over a roadway. The vertical clearance along the I-95 corridor is below the PPM minimum clearance for 8 bridges in both directions and below the AASHTO minimum clearance for 23 bridges in both directions. As part of this study, these clearances will be maintained at their current level to not further reduce the required clearances. In order to move forward with a bridge widening where there is a substandard vertical clearance, an approval will be required through an FDOT variation or an FHWA exception process.

The bridges over the Hillsboro Canal currently have a vertical clearance less than the six feet required by the United States Coast Guard (USCG) for a navigational waterway. These two flat slab type bridges have a history of maintenance issues and emergency repairs.

The horizontal and vertical clearance of each bridge is summarized in ***Table 2.21*** and ***Table 2.22***. ***Appendix H*** includes detailed information on existing bridge structure clearances.

2.15.4 SPAN ARRANGEMENT

The span arrangement for all the bridges over I-95 varies from two to eight spans. The remaining bridge structures along I-95, most are medium span concrete bridges composed of AASHTO type beams with multi-column bents, with two exceptions: the steel continuous plate girders superstructures over Powerline Road and the precast cast-in-place flat slab superstructures over the Hillsboro Canal supported on pile bents. The span arrangement of each of the bridges is summarized in ***Table 2.21*** and ***Table 2.22***. ***Appendix H*** includes detailed information on existing bridge structure span arrangements.

2.15.5 HISTORICAL SIGNIFICANCE

None of the existing bridges along I-95 within the study limits has been designated a historical bridge.

2.15.6 Structural Geotechnical Information

The existing soil boring information was collected along the corridor within the project limits for all the bridge locations. ***Appendix I*** includes the soil profile sheets.

2.16 Geotechnical Data

The information presented in this section is a summary of the *Geotechnical Report, Roadway Soils Survey and Bridge Structures*, a companion document to this PD&E study. The Soil Map of Broward and Palm Beach Counties published by the United States Department of Agriculture (USDA) was reviewed for general near-surface soil information within the general project vicinity. This information indicates that there are 24 soil mapping units. The map soil units encountered are as follows:

In Broward County:
- Arents, organic substratum-Urban land complex
- Arents-Urban land complex
- Duette-Urban land complex
- Immokalee, limestone substratum-Urban land complex
- Immokalee-Urban land complex
- Margate fine sand
- Matlasha gravelly fine sand, limestone substratum
- Paola-Urban land complex
- Pompano fine sand
- Pomello fine sand
- Sanibel muck
- St. Lucie fine sand
- Udorthents
- Udorthents shaped
- Urban land

In Palm Beach County:
- Anclote fine sand
- Basinger fine sand
- Basinger-Urban land complex
- Immokalee fine sand
- Myakka-Urban land complex

- Okeelanta muck
- Pomello fine sand, 0 to 5 percent slopes
- St. Lucie-Paola-Urban land complex, 0 to 8 percent slopes
- Udorthents, 2 to 35 percent slopes

The most commonly encountered soil in Broward County was Udorthents shaped, which is characterized by somewhat poorly drained soil and the one in Palm Beach County was Immokalee fine sand, which is characterized by poorly drained soil.

A description of the general profile of the existing soils, within the study limits, was determined by test borings performed throughout the study limits. The test boring depths ranged from five to 20 feet. Soils and soil profiles found in borings drilled for the roadway alignment study generally consisted of four general types:

1. Dark brown to brown sand with silt, some organic stain, some grass roots, sometimes with some limerock gravel (Topsoil A-8)
2. Light brown to brown sand with silt, sometimes with some organic stain, sometimes with some limerock fragments (A-3)

2A. Light brown to brown sand and limerock fragments, with silt to slightly silty (A- 3/A-1-b)

3. Light brown to brown sand, slightly silty to silty, sometimes with some limerock fragments (A-2-4)
4. Light gray to gray silty sand (A-4)

The majority of the project corridor is underlain with interlayering of Strata 2 and 2A. However, Stratum 3 soils were found at numerous boring locations at various depths along the project corridor. Stratum 4 soils were found at only two boring locations at 4 and 13 feet below grade.

The roadway alignment is considered to be in a slightly aggressive environment, based on nine corrosion tests conducted for the project to determine the environment of the area. Any topsoil encountered will have to be removed for the proposed improvements in accordance with the FDOT <u>*Design Standards for Design, Construction, Maintenance and Utility Operations on the State Highway Systems, Index 110.*</u>

The depths of groundwater tables were measured at the locations of the structural bridge borings drilled proximate to the existing bridge structures. In the borings drilled proximate to the I-95 bridges, the groundwater table depths ranged between 2.3 and 11.0 feet below existing grade of the borings. The depth to the water table was measured in each of the auger borings. Depth to groundwater measured in the borings drilled along I-95 ranged between four feet and 14.0 feet below ground surface. However, in many locations, groundwater was not encountered within the depth of the borings. The wide variation in groundwater table depths is attributed to the difference in site grades.

Thirty-two structural borings were performed at selected bridges to depths of 85 feet. The structural borings, drilled at approximate locations of the proposed bridge widening, generally indicated that the sites are underlain with interlayering of sands, limestone, sometimes mixed with silty sands. Based on the conditions encountered by the structural borings, the soil conditions will provide the required bearing capacity support for a deep foundation system such as 18 to 24-inch square prestressed concrete piles and 36 to 48-inch diameter drilled shafts. The existing substructures are considered to be in a slightly to extremely aggressive environment, based on 16 corrosion tests at each proposed bridge location to determine the environment of the area.

In addition, two Borehole Permeability (BHP) Tests were performed at each interchange/intersection of I-95 with cross roads. Hence, a total of 18 BHP tests were completed. The test results for 0 to 10 feet intervals ranged from 1.5 to 64.1 ft/day.

2.17 TRANSPORTATION PLANS

The transportation plans from the Broward and Palm Beach MPOs were reviewed to identify any programmed/planned projects along the project corridor and the major cross streets. Annually, the MPOs develop the TIP which is a comprehensive list of federal, state, and locally funded transportation projects within the counties. The MPOs also develop the LRTP which sets the framework for future transportation improvements for the next 20 years. ***Table 2.23*** summarizes the various future transportation plans within the study limits.

Table 2.23
Transportation Plans

Road Name	Location	Project Description	Program Year
Roadways and Highways			
SW 10th Street	At I-95 Interchange	Interchange Modification	2013
I-95	All I-95 interchanges in Broward County	Interchange Improvements	2013
I-95 Express Lanes	From I-595 to Palm Beach County Line	4 Express lanes	2021-2025
I-95	Broward County Line to Indiantown Road Express Lanes	Mainline/Interchanges	2035 LRTP
I-95	From Commercial Boulevard to South of Atlantic Boulevard	Add Express Lanes	2013-2014
I-95	From South of Atlantic Boulevard to South of Sample Road	Add Express Lanes	2013-2014
I-95	From South of Sample Road to Palm Beach County Line	Add Express Lanes	2013-2014
I-95	From SR 848/Stirling Road to Broward/Palm Beach County Line	Add Express Lanes	2016-2017
I-95 Auxiliary Lanes	From Broward County Line to South of Glades Road	Add Express Lanes	2013-2014
I-95	From Broward/Palm Beach County Line to Linton Boulevard	Add Express Lanes	2016-2017
ITS			
I-95	I-95 & I-595	Ramp Signaling	2013
I-95/595/75/SIRV		Severe Incident Response Vehicle	2012-2016
I-95/595/75/SIRV		Severe Incident Response Vehicle	2016-2017
Bicycle and Pedestrian			
Atlantic Boulevard	From I-95 to Dixie Highway	Bicycle Project	2014-2015
Atlantic Boulevard	From Powerline Road to I-95	Pedestrian Project	2021-2025
Copans Road	From I-95 to Dixie Highway	Bicycle Project	2021-2025

2.18 ONGOING PROJECTS ALONG I-95

South Florida is continuously improving its transportation network particularly the I-95 corridor which is an important north/south facility in South Florida. The express lanes proposed on I-95 from north of Oakland Park Boulevard to south of Glades Road are intended to complement and support the following improvements presently underway to the south and north by providing continuous express lanes along the I-95 corridor throughout Miami-Dade, Broward, and Palm Beach Counties.

95 Express Phase 2 – (FM # 422796-1 and FM# 422796-2) The 95 Express Phase 2 will extend the existing express lanes north from the Golden Glades Interchange to Broward Boulevard (SR 842) by converting the existing HOV lanes to two tolled express lanes in each direction. Other work includes installing ITS components, modifying the Ives Dairy Road Interchange, bridge widening at selected locations and installing new noise walls between Hollywood Boulevard and Taft Street. Construction began in November 2011 and will last approximately three years.

I-95 PD&E Study between Stirling Road and North of Oakland Park Boulevard – (FM # 429804-1) Approximately 8.6 miles in length, this project is currently in the PD&E phase. As part of the PD&E process, alternatives are presently being analyzed for the proposed widening of I-95. Similar to 95 Express Phase 2, the primary purpose of this project is to enhance operational capacity and relieve congestion along the I-95 corridor by converting the existing HOV lane to a tolled express lane and adding one additional tolled express lane for a total of two express lanes in each direction in the median of I-95. The express lanes will have variable toll pricing based on congestion. The PD&E study is anticipated to be completed by summer 2013. Coordination with this PD&E study is ongoing in order to maintain consistency of design and harmonization of the entry/exit points of the express lanes.

I-95 Reevaluation between Glades Road and Linton Boulevard – (FM# 412420-1) Approximately 6 miles in length, this project is currently in a design reevaluation phase. The PD&E phase recommended the addition of one general purpose lane in each direction for a total of ten lanes (eight general purpose lanes and two HOV lanes). This recommendation came from the I-95 master plan study. However, the reevaluation is considering a similar typical section to the one in this PD&E study between north of Oakland Park Boulevard and south of Glades Road, which is to convert the existing HOV lane to a tolled express lane and add one additional tolled express lane for a total of two express lanes in each direction in the median of I-95. This project will also maintain the existing number of general purpose lanes. Reevaluations serve to insure project compliance with all applicable Federal and State laws prior to the advancement of the project to the next major production phase such as design, R/W acquisition, or construction advertisement. The reevaluation process also provides mechanisms to identify and update commitments made by FDOT during the project development process. Any new commitments or laws which may have come into effect since the approval of the original final environmental document are addressed in the reevaluation. The reevaluation schedule is also being coordinated with the two PD&E studies to the south and is anticipated to be completed in the summer of 2013.

I-95 Ramp Metering Feasibility Study – Ramp signals have been installed along several entrance points of I-95 from Ives Dairy Road to NW 62 Street within Miami-Dade County. The signals, which alternate from red to green, control the rate at which vehicles enter the highway to reduce the disruption caused by ramp traffic at the entrances. The ramp signals work based on real-time traffic conditions and are typically activated during the weekday rush-hour period to ease congestion during times of heavy expressway use. The signals increase average travel speeds and improve the overall trip reliability. The FDOT District Four is currently conducting a feasibility study for the installation of ramp metering along I-95 in Broward County.

Figure 2.5 depicts the on-going express lanes projects along I-95. These projects are all part of a larger plan for implementation of an express lanes network (ELN) within South Florida. A multi-agency Regional Concept of Transportation Operations plan is being developed that lays out the framework of an ELN within South Florida.

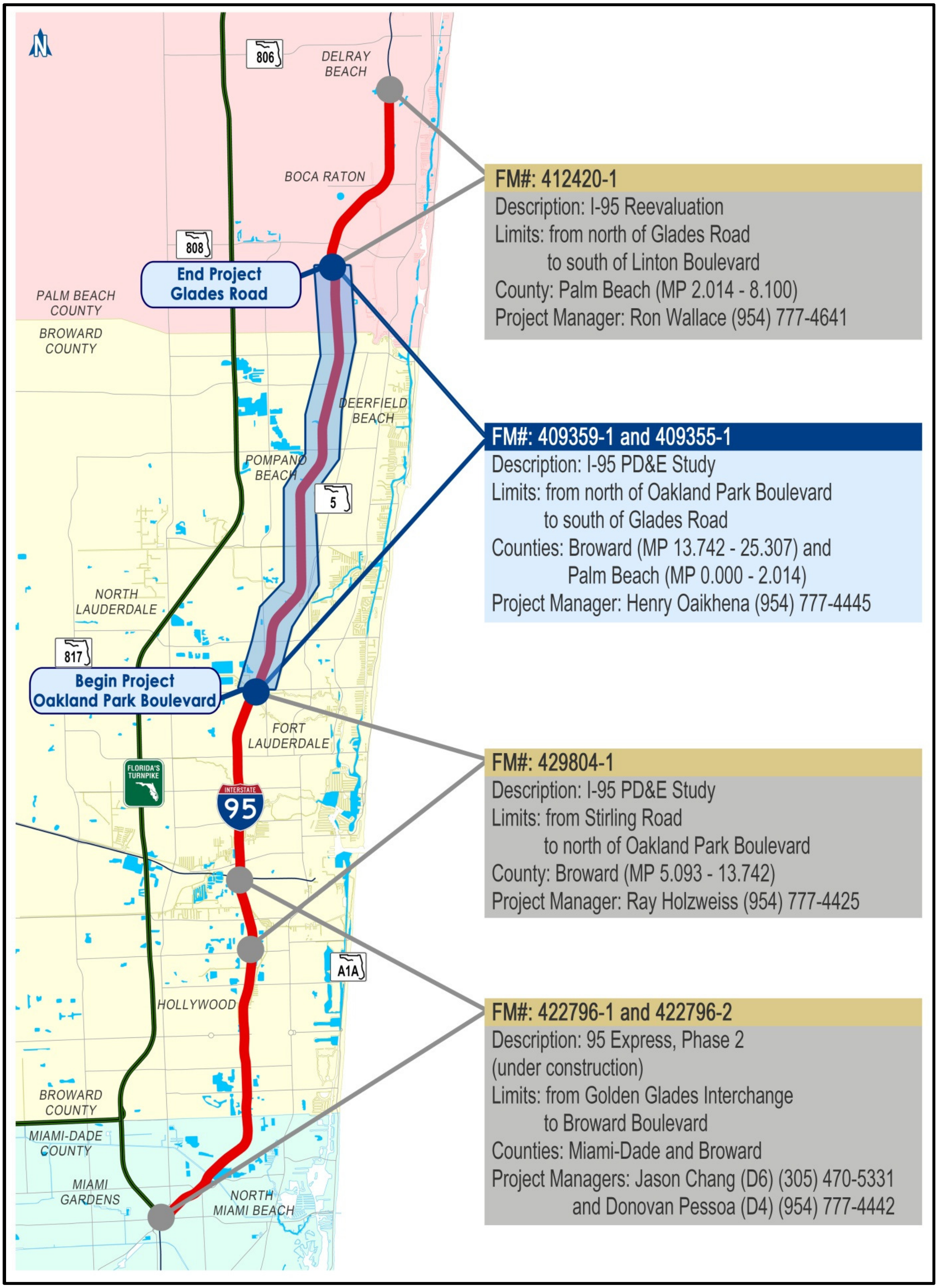


Figure 2.5 – I-95 Express Lanes Projects Underway

2.18.1 REGIONAL CONCEPT FOR TRANSPORTATION OPERATIONS

Express lanes were successfully implemented in Miami-Dade County on I-95 as part of the 95 Express project which became operational in 2008. In order to maximize the benefits of the express lanes, the FDOT is developing projects on individual roadway corridors as part of an overall connected express lanes network. However, developing an express lanes network is a complex initiative. As such, the multi-agency Regional Concept for Transportation Operations (RCTO) plan is being developed. The plan will include the policies, operational guidelines and goals for how the express lanes network will operate regionally and how to achieve those mutually agreed upon goals. The RCTO development partners includes several transportation partners such as FHWA, FDOT District Four and District Six, the Miami- Dade Expressway Authority (MDX), Florida's Turnpike Enterprise, MPOs, transit agencies, and other public agencies. The RCTO document is anticipated to be completed within the first quarter of 2013. The current vision of the regional system will include express lanes on facilities such as I-95, I-595, I-75, SR 826 (Palmetto Expressway), and could ultimately include additional roadway systems such as SR 924, SR 874, SR 836 (Dolphin Expressway), the Homestead Extension of the Florida's Turnpike (HEFT) and the US 1 Busway. ***Figure 2.5A*** presents a concept of the potential express lanes network within South Florida.

SOUTH FLORIDA EXPRESS LANES NETWORK

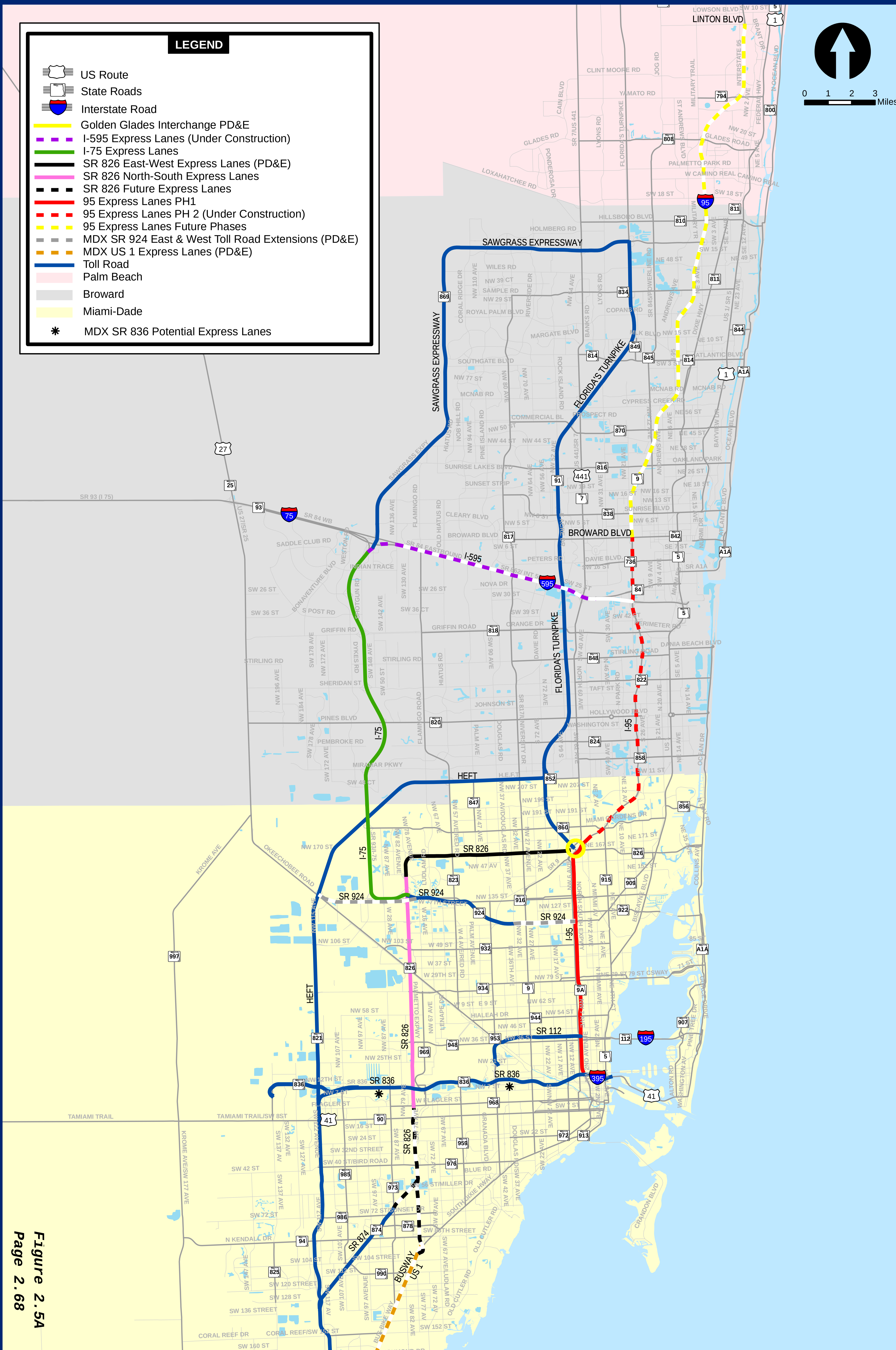


Figure 2.5A
Page 2.68

2.19 EXISTING LAND USE

The I-95 project corridor is located within two counties (Broward and Palm Beach Counties) and five municipalities (Fort Lauderdale, Oakland Park, Pompano Beach, Deerfield Beach, and Boca Raton). The project corridor traverses a number of land use categories on record with the Broward County Planning and Redevelopment Division and Palm Beach County Planning, Zoning, and Building Department. ***Figure 2.6*** illustrates the existing land use within the study limits in Broward and Palm Beach counties. The project study area encompasses a mixture of land use classifications:

- Agricultural
- Industrial
- Institutional
- Mining
- Public and Semi-Public
- Recreational
- Residential
- Retail and Office
- Vacant Non-residential
- Vacant Residential

In general, I-95 corridor acts as delineation between the distinct areas to the west and east of the project study area. Along the east side of the I-95 project study area, the majority of land uses are comprised of Residential areas with pockets of Retail and Office space and Public and Semi-public land uses. The majority of the west side of the study area is comprised of Industrial land uses with a lesser amount of Retail and Office space and Residential land uses.

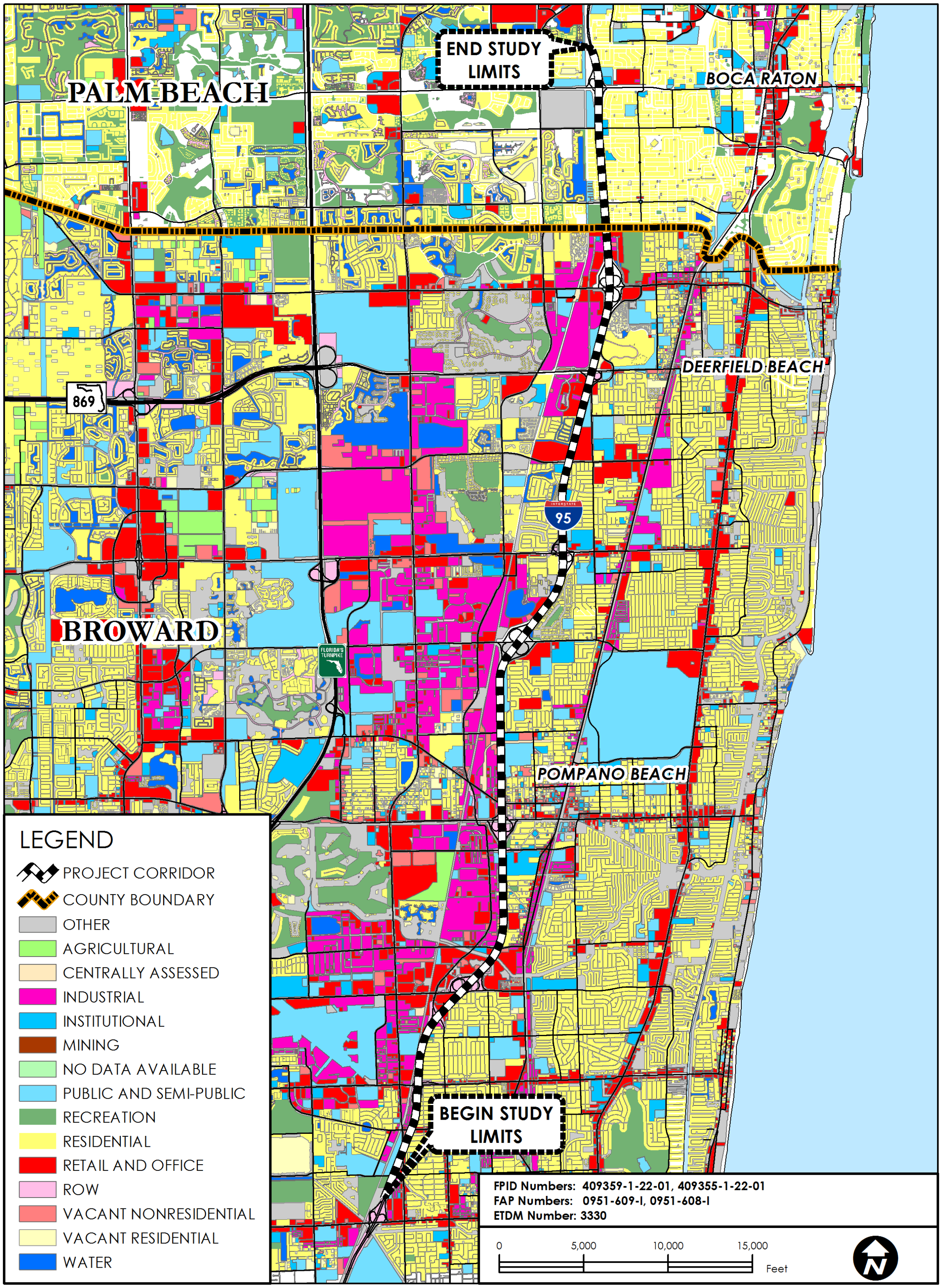


Figure 2.6 – Existing Land Use Map

2.20 COMMUNITY SERVICES

A *Sociocultural Effects Evaluation Report* was prepared for this project, which is available for review at the FDOT District Four office in Fort Lauderdale, Florida. Community service facilities provide a gathering place for adjacent neighborhood and community members, as well as serving the needs of the surrounding areas. For the purpose of this study, community facilities include:

- Cemeteries
- Colleges and universities
- Community centers
- Cultural centers
- Daycare facilities
- Fire stations
- Government buildings
- Hospitals
- Libraries
- Nursing home facilities
- Other healthcare facilities
- Other social services
- Religious institutions
- Schools
- Shopping centers
- Temporary housing facilities

The community service facilities discussed below are located within or in close proximity to the project study area. Recreational areas and parklands are described in ***Section 2.22.3***.

Cemeteries
There is one cemetery located in close proximity to the project corridor, SCI Funeral Services of Florida, Inc. (200 West Copans Road), as shown on ***Figure 2.7*** at the end of this section.

Colleges and Universities
There are three universities and one college located in close proximity to the project corridor, as shown on ***Figure 2.8*** at the end of this section.

- Keiser University (1500 NW 49th Street)
- City College (2000 West Commercial Boulevard)
- Barry University – Fort Lauderdale Campus (1835 South Perimeter Road)
- Florida Atlantic University (777 Glades Road)

Community Centers
There are 16 community center located in close proximity to the project corridor, as shown on ***Figure 2.9*** at the end of this section.

- Juvenile Diabetes Foundation International (3411 Powerline Road)
- Elks BPO North Lauderdale Lodge (248 West Prospect Road)
- North Andrews Community Center (250 NE 65th Street)
- Multiple Sclerosis Foundation (6350 North Andrews Avenue)
- Rotary Club of Fort Lauderdale – Cypress Creek (400 Corporate Drive)
- Anti-Defamation League of B Nai B Rith (6600 North Andrews Avenue)
- Gulf Stream Baptist Association (600 SW 3rd Street)
- United Way of Broward County (100 SW 12th Avenue)
- National Organization for Women in Broward County (3201 NW 4th Terrace)
- Broward Association of the Deaf (362 West Sample Road)
- Alzheimer's Association (201 West Sample Road)
- All Nations (1015 West Newport Center Drive)
- Deerfield Country Club (50 Fairway Drive)
- Royal Oak LNDG (1950 SW 8th Street)
- Boca Sailing and Racquet Club (1900 West Camino Real)
- Sath Conferences Association (1489 West Palmetto Park Road)

Cultural Centers

There are two cultural centers, including a movie theater and a museum, in close proximity to the project corridor, as shown on ***Figure 2.10*** at the end of this section.

- Cypress Creek Cinema 16 (6515 North Andrews Avenue)
- South Florida Railway Museum (1300 West Hillsboro Boulevard)

Daycare Facilities

There are 11 daycare facilities in close proximity to the project corridor, as shown on ***Figure 2.11*** at the end of this section.

- Pride and Joy Learning Center (400 West Prospect Road)
- For Him Christian Academy (600 SW 3rd Street)
- Rhonda Beal (1511 NW 7th Way)
- Hopewell Preschool Academy (900 NW 15th Street)
- Sandy Clark (672 SW 21st Street)
- United Cerebral Palsy of Broward – Bright Horizons ASP (3901 NW 1st Terrace)
- Puffin Learning Academy (1287 East Newport Center Drive)

- J.M. Family Center (640 Jim Moran Boulevard)
- Rainbow of Love Preschool (1251 SW 15th Avenue)
- The Schmidt Family YMCA – Development Center at Mae Volen (1515 Palmetto Park Road)
- Boca Babysitting, Inc. (1430 NW 4th Street)

Fire Stations

There are four fire stations within close proximity to the project corridor, as shown on ***Figure 2.12*** at the end of this section.

- Oakland Park Fire Rescue Station 20 (4721 NW 9th Avenue)
- Pompano Beach Fire Rescue Station 61 (2121 NW 3rd Avenue)
- Deerfield Beach Fire Rescue Station 102 (1401 SW 11th Way)
- Boca Raton Fire Rescue Station 2 (1 SW 12th Avenue)

Government Buildings

There are four government buildings, including two post offices, a city hall, and a county courthouse, in close proximity to the project corridor, as shown on ***Figure 2.13*** at the end of this section.

- U.S. Post Office – Fort Lauderdale (4350 North Andrews Avenue)
- Pompano Beach City Hall (100 West Atlantic Boulevard)
- Broward County – North Regional Courthouse (1600 West Hillsboro Boulevard)
- U.S. Post Office (1275 West Palmetto Park Road)

Hospitals

There is one hospital, the North Broward Medical Center (201 East Sample Road), located in close proximity to the project corridor, as shown on ***Figure 2.14*** at the end of this section.

Libraries

There are two library branch locations in close proximity to the project corridor, as shown on ***Figure 2.15*** at the end of this section.

- Northwest Branch Library (1580 NW 3rd Avenue)
- Century Plaza Branch Library (1856-A West Hillsboro Boulevard

Nursing Home Facilities

There are eight nursing home facilities located in close proximity to the project corridor, as shown on ***Figure 2.16*** at the end of this section.

- Paradise Manor (365 NW 43rd Court)
- Medflo Assisted Living Facility (4348 NW 5th Avenue)
- Amwill Assisting Living, Inc. (840 SW 8th Street)
- John Knox Village of Florida (840 Lakeside Circle)
- John Knox Village Health Center (830 Lakeside Circle)
- Pompano Retirement Village (501 SW 2nd Place)
- Avondale Manors Retirement Home (509-521 SW 2nd Terrace)
- Pompano Rehab and Nursing Center (51 West Sample Road)

Other Healthcare Facilities

There are two other healthcare facilities located in close proximity to the project corridor, as shown on ***Figure 2.17*** at the end of this section.

- Lifestyle Lift (6600 North Andrews Avenue)
- Rand Surgical Pavilion Corp (5 West Sample Road)

Other Social Services

There are 36 other social service facilities located in close proximity to the project corridor, as shown on ***Figure 2.18*** at the end of this section.

- Comprehensive Orthopedic Physical Therapy (3221 NW 10th Terrace)
- Pediatric Services of Americas (3223 NW 10th Terrace)
- Kids World Academy (870 NW 34th Street)
- American Cancer Society (3407 NW 9th Avenue)
- Advanced Technology Institute Career Training Center (3501 NW 9th Avenue)
- SJ Foundations of Broward (999 West Prospect Road)
- Peer Center, Inc. (4545 Powerline Road)
- Comfort Keepers (5715 North Andrews Way)
- Paralyzed Veterans Association (6200 North Andrews Avenue)
- Sundance Rehabilitation Corp. (600 Corporate Drive)
- American Family Counseling Centers (6250 North Andrews Avenue)
- Multiple Sclerosis Foundation (6350 North Andrews Avenue)
- Bookman Lewis PA (6750 North Andrews Avenue)

- International Union of Painters and Allied Trades District Council (78 1300 SW 12th Avenue)
- Monarch House (721 SW 9th Street)
- Rose Manor Assisted Living Facility (840 SW 8th Street)
- Pompano Treatment Center (380 SW 12th Avenue)
- A Center for Counseling (150 SW 12th Avenue)
- Service Master Clean (933 NW 31st Avenue)
- J.V. Nelson Homehealth Aide Services (250 West Sample Road)
- Parkinson Outreach Program (50 East Sample Road)
- After School Programs, Inc. (4157 NW 1st Terrace)
- Remington House of Pompano Beach (4700 NW 3rd Avenue)
- Jodi B. Green, PA (1191 East Newport Center Drive)
- Food for the Poor (550 SW 12th Avenue)
- Food for the Poor (652 SW 12th Avenue)
- All Florida Fire and Mold (252 SW 12th Avenue)
- Jewish National Fund Broward and Palm Beach Counties Region (242 SW 12th Avenue)
- Barton Protective Services, Inc. (700 West Hillsboro Boulevard)
- Kasky & Kasky, PA (400 Fairway Drive)
- Atlantic Art (1685 SW 16th Street)
- Mae Volen Senior Center (1515 West Palmetto Park Road)
- Boca Counseling Center (1489 West Palmetto Park Road)
- Children's Pavilion Granny Nannies (1541 West Palmetto Park Road)
- Retarded Citizens of Palm Beach (1633 SW 4th Street)
- Friends of Israel Disabled Veterans (1900 Glades Road)

Religious Institutions

There are 17 religious institutions in close proximity to the project corridor, as shown on ***Figure 2.19*** at the end of this section.

- All Saints Catholic Church (3460 Powerline Road)
- Community of Christ (330 NW 44th Street)
- St. Henry Catholic Church (1500 South Andrews Avenue)
- L'Eglise de Dieu Des (1301 South Dixie Highway)
- Church of God of Pompano Beach (1000 SW 10th Street)
- Light International Assemblies of God (600 SW 3rd Street)
- Church of God in Christ (404 NW 8th Street)
- Antioch Missionary Baptist Church (502 SW 8th Street)

- Broward Haitian Mission (1001 NW 6th Street)
- Seventh-Day Adventist Church Slaem (733 SW 6th Street)
- Hopewell Missionary Baptist Church (894 NW 15th Street)
- Zion Mission, Inc. (3400 NW 21st Avenue)
- Parkway United Methodist Church
- Grace Baptist Church
- Church of Jesus Christ of Latter-Day Saints (1530 West Camino Real)
- Trinity Church of God (1251 SW 15th Avenue)
- Calvary Chapel – Fort Lauderdale (1551 West Camino Real)

Schools

There are 14 schools located in close proximity to the project corridor, including seven elementary schools, three middle schools, three high schools, and one other education facilities, as shown on ***Figure 2.20*** at the end of this section.

Elementary Schools:

- Lloyd Estates Elementary (750 NW 41st Street)
- North Andrew Gardens Elementary (345 NE 56th Street)
- Cypress Elementary (851 SW 3rd Avenue)
- Sanders Park Elementary (800 NW 16th Street)
- Palmview Elementary (2601 NW 1st Avenue)
- Tedder Elementary (4157 NW 1st Terrace)
- Addison Mizner Elementary (199 SW 12th Avenue)

Middle Schools:

- James S. Rickards Middle (6000 NW 9th Avenue)
- Crystal Lake Middle (3551 NW 3rd Avenue)
- Boca Raton Middle (1251 NW 8th Street)

High Schools:

- Northeast High (700 NW 56th Street)
- Blanche Ely High (1201 NW 6th Avenue)
- Deerfield Beach High (650 SW 3rd Avenue)

Other Educational Facilities:

- Bright Horizon Center (3901 NW 1st Terrace)

Shopping Centers

There are nine shopping centers located in close proximity to the project corridor, as shown on ***Figure 2.21*** at the end of this section.

- Pinecrest Shopping Plaza (900 NE 62nd Street)
- 62nd Street Plaza (901 East Cypress Creek Road)
- Dailand Park Shopping Center (6201 North Andrews Avenue)
- Sample Square Shopping Center (501-599 East Sample Road)
- Crystal Lakes Plaza (801 West Sample Road)
- Palms Trail Plaza (1101 South Military Trail)
- Palmetto Park Square (1401 Palmetto Park Road)
- Shops of Boca Center (5050 Town Center Circle)
- University Commons (1400 Glades Road)

Temporary Housing Facilities

There are ten temporary housing facilities located in close proximity to the project corridor, as shown in ***Figure 2.22*** at the end of this section.

- Red Roof Inn #10249 (4800 Powerline Road)
- El Palacio Hotel and Conference Center (4900 Powerline Road)
- Extended Stay America #869 (5851 North Andrews Avenue)
- Fort Lauderdale Marriott North (6650 North Andrews Avenue)
- Extended Stay American #9808 (1401 SW 15th Street)
- Forum (600 SW 3rd Street)
- Best Western (1050 West Newport Center Drive)
- Extended Stay America #328 (1200 FAU Research Park Boulevard)
- Comfort Suites (1040 West Newport Center Drive)
- La Quinta Inn and Suites #7707 (100 SW 12th Avenue)

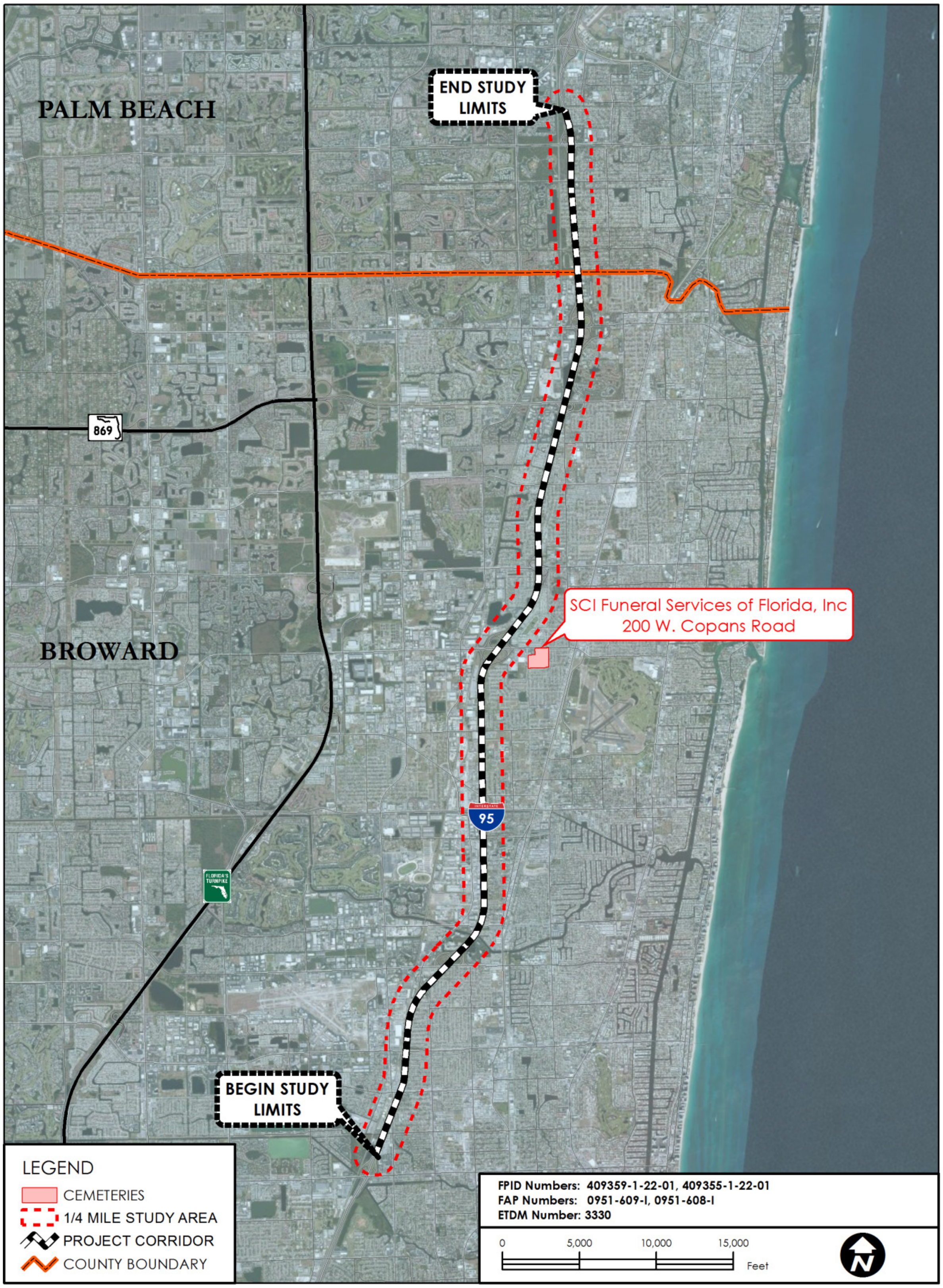


Figure 2.7 – Cemeteries

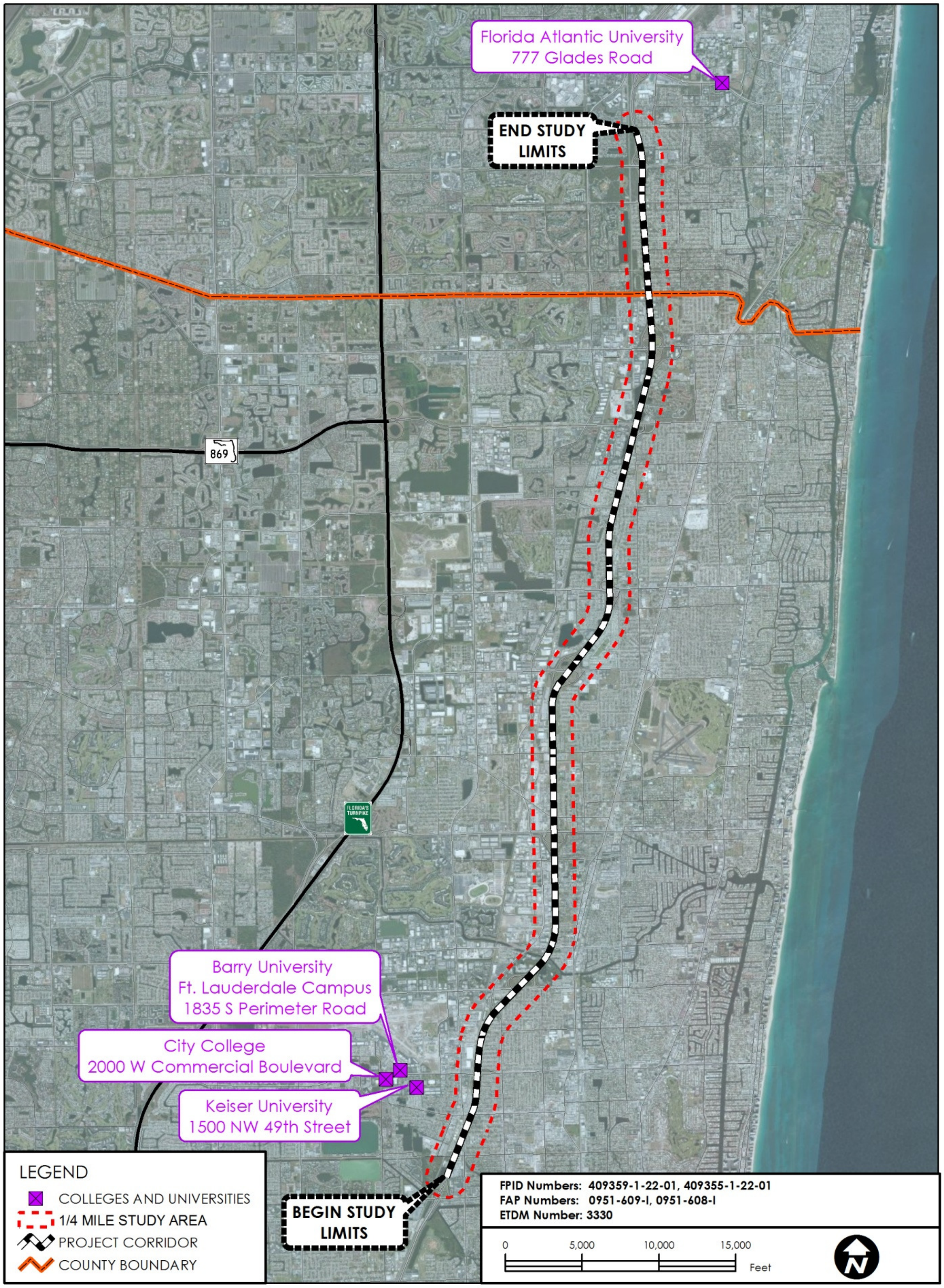


Figure 2.8 – Colleges and Universities

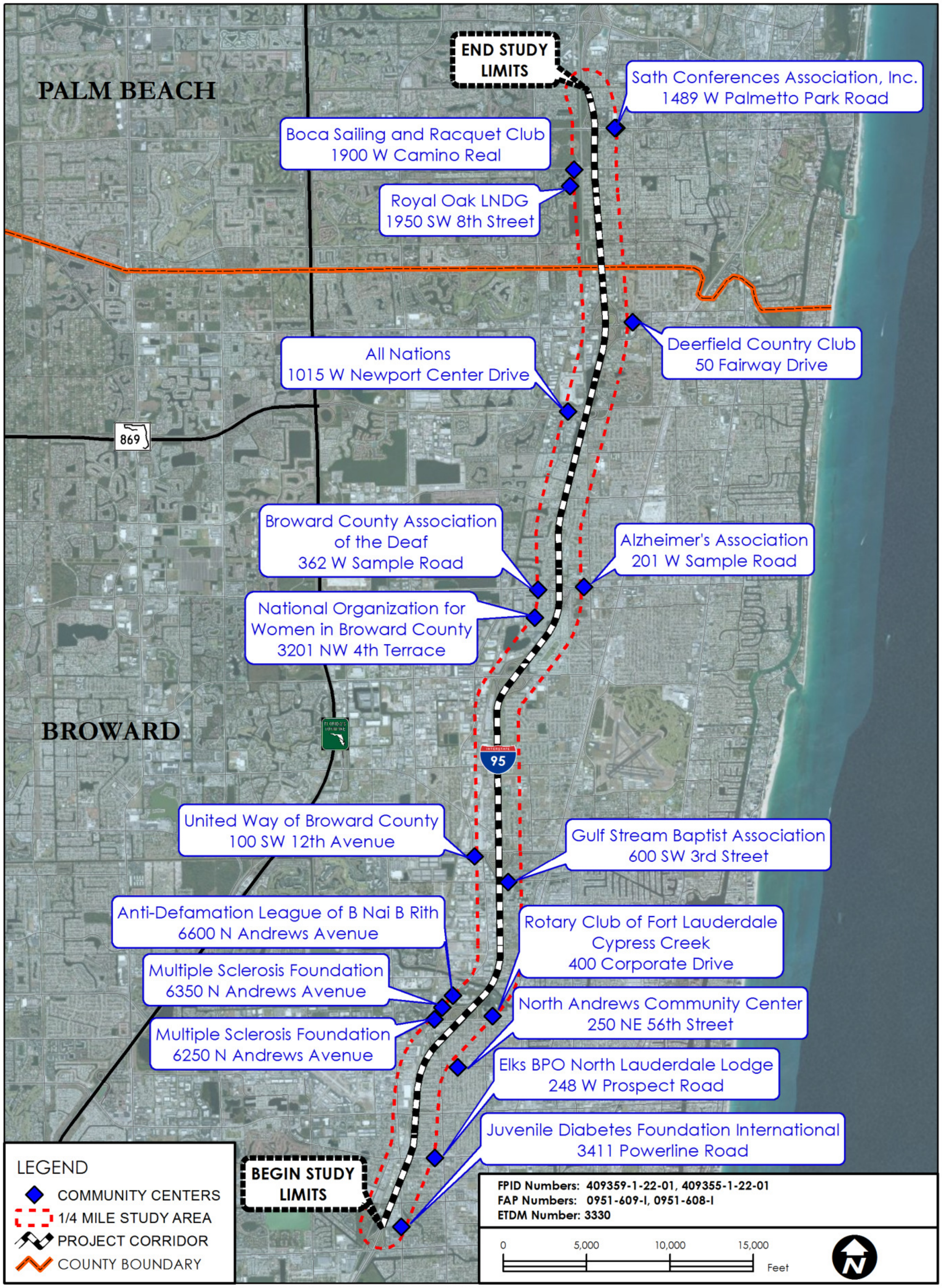


Figure 2.9 – Community Centers

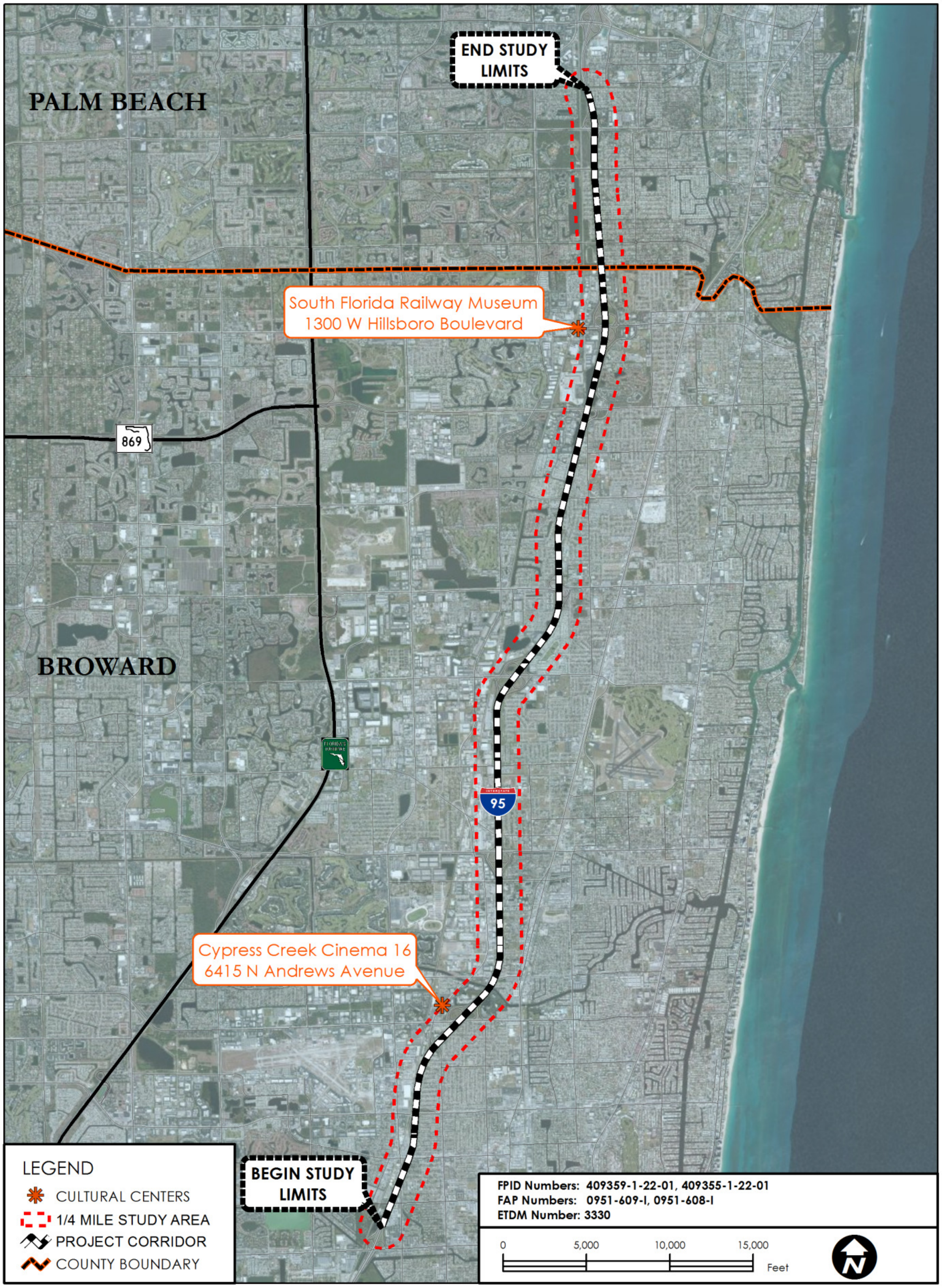


Figure 2.10 – Cultural Centers

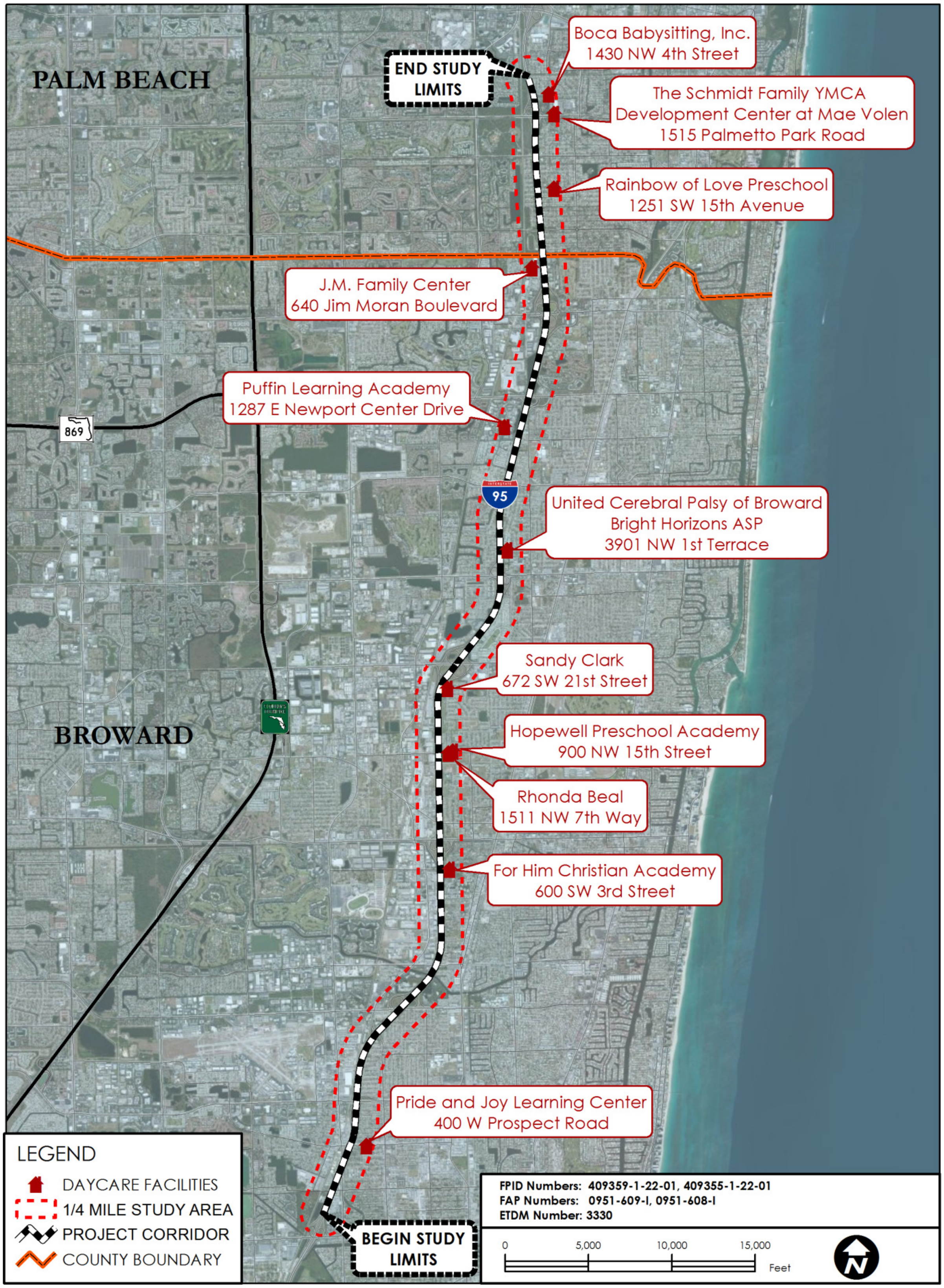


Figure 2.11 – Daycare Facilities

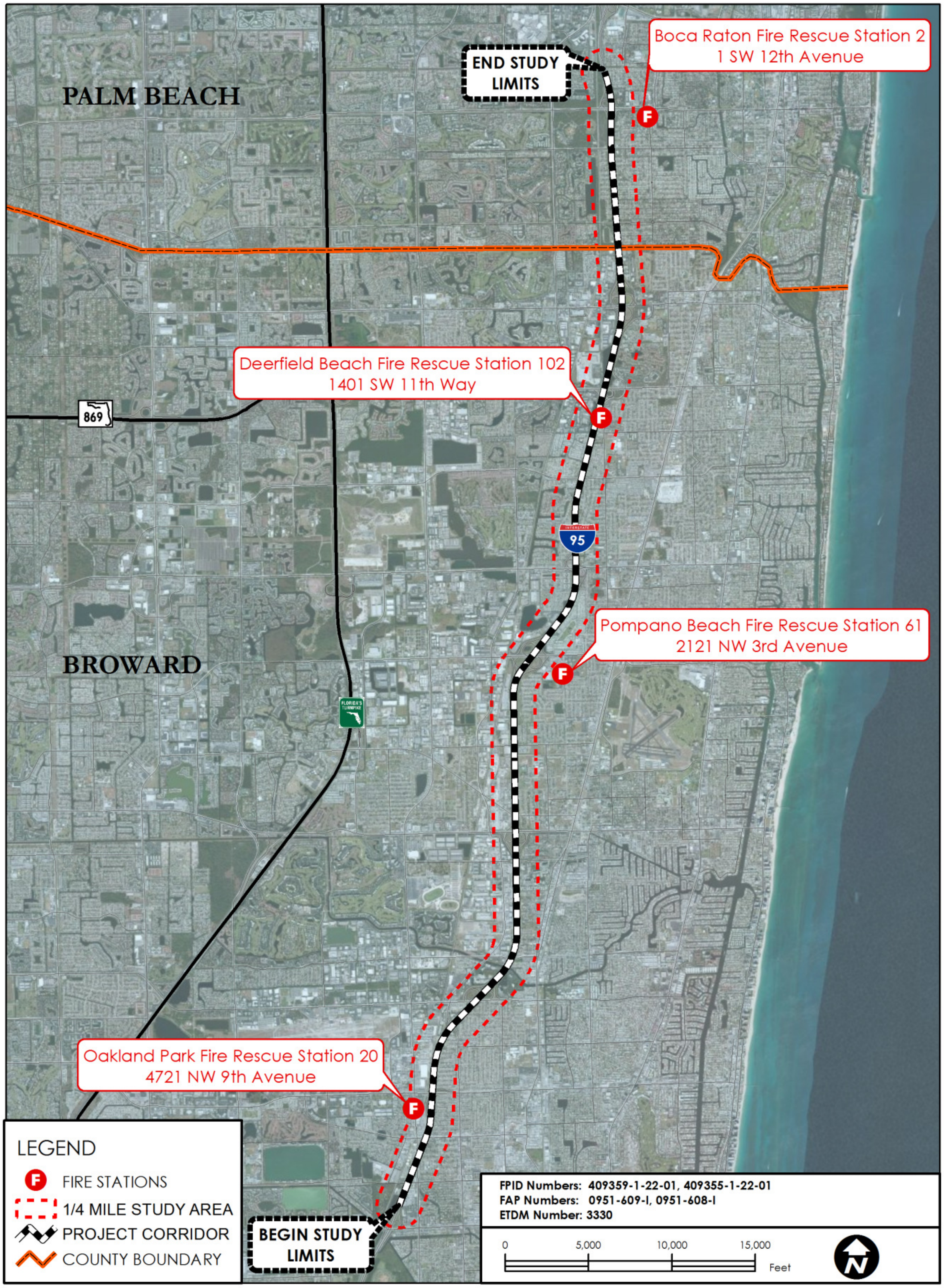


Figure 2.12 – Fire Stations

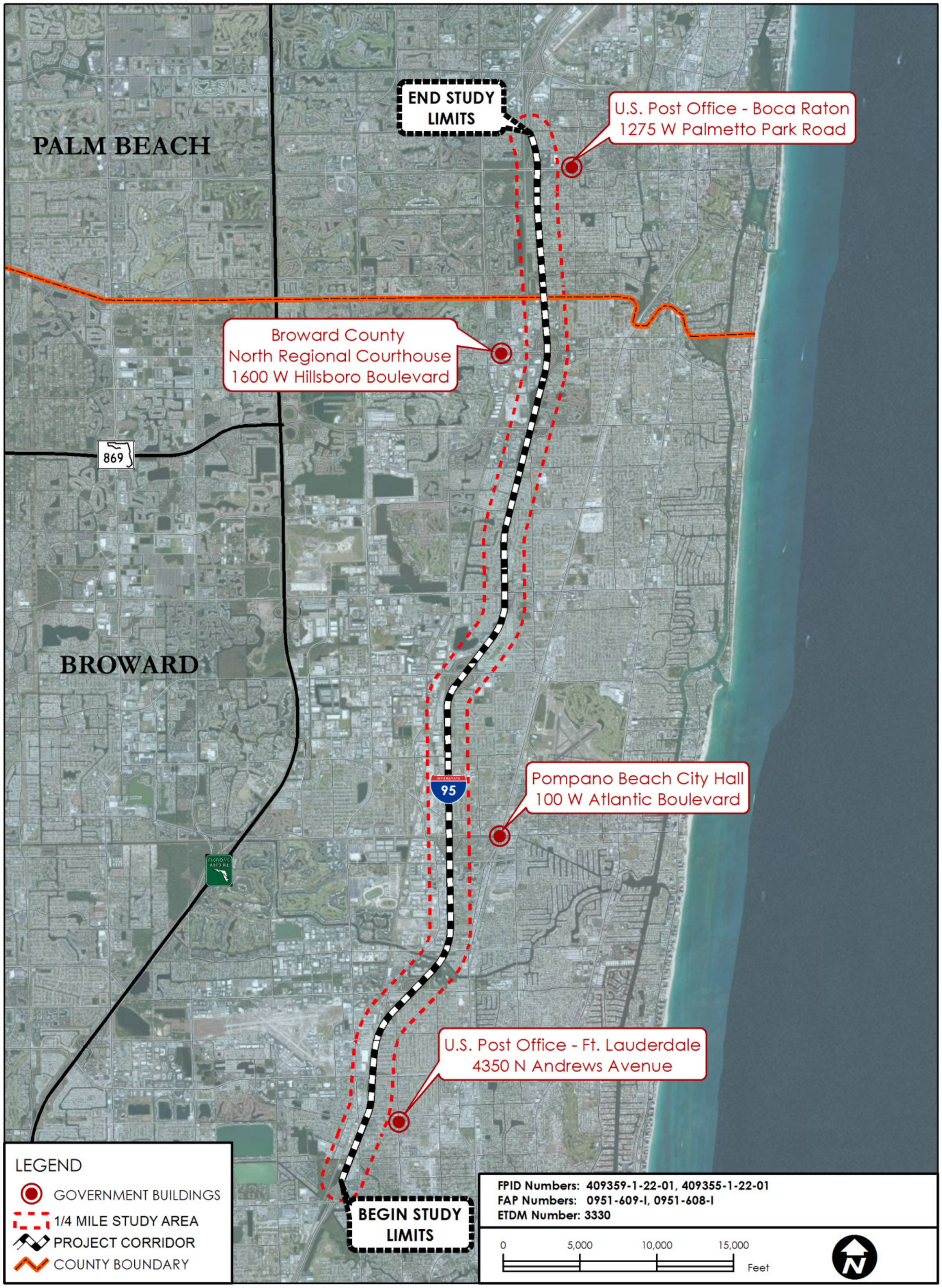


Figure 2.13 – Government Facilities

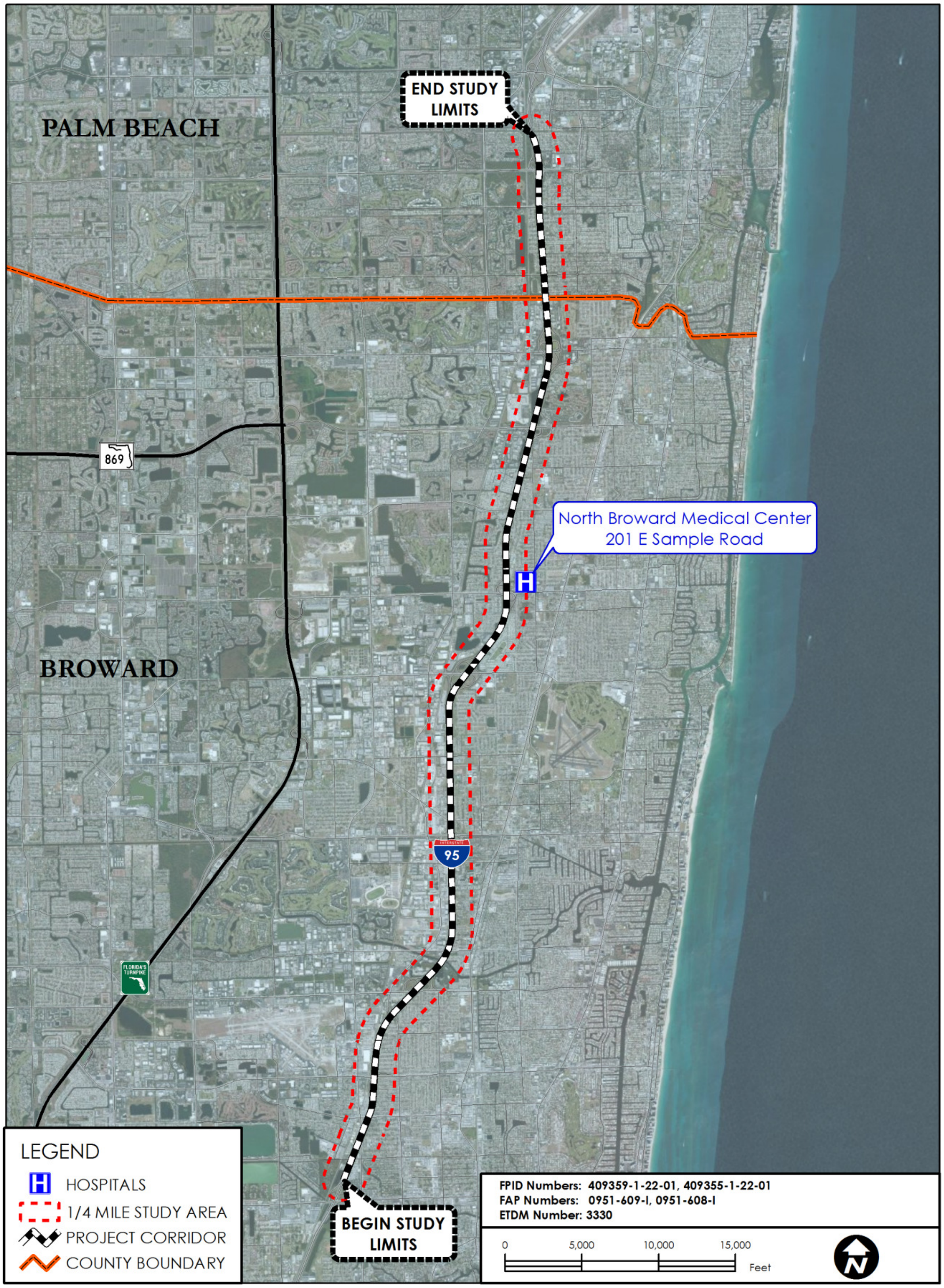


Figure 2.14 – Hospitals

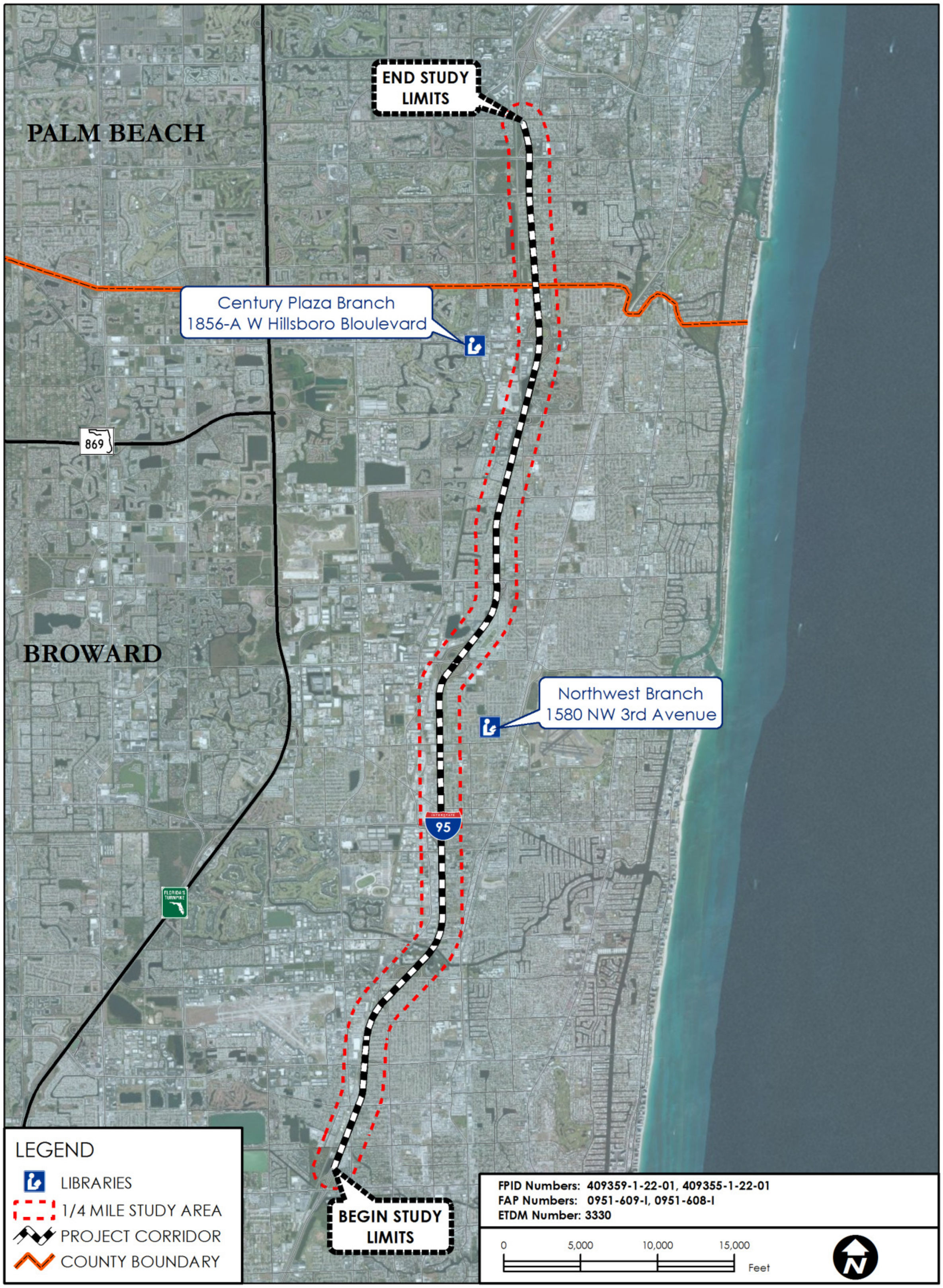


Figure 2.15 – Libraries

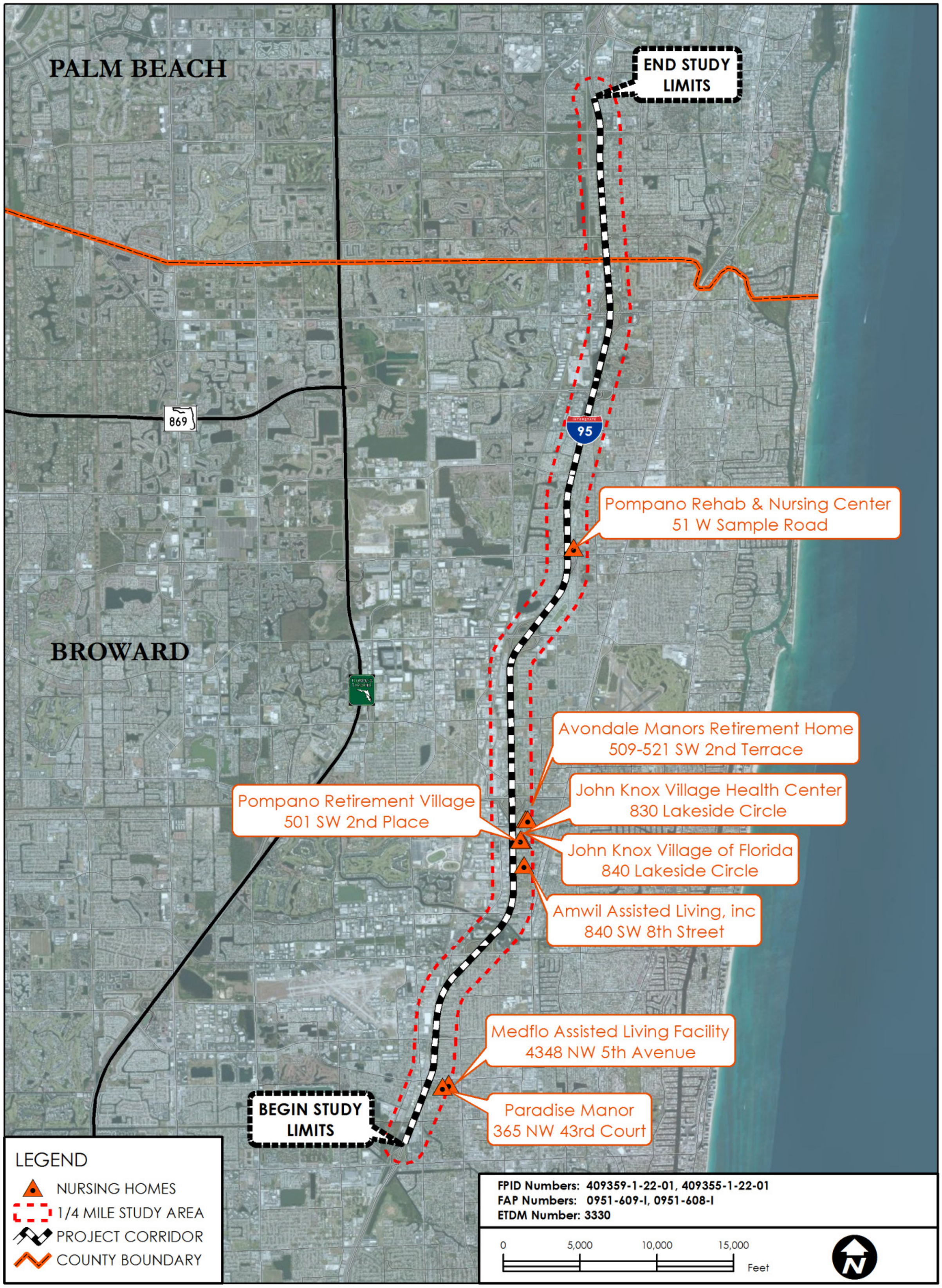


Figure 2.16 – Nursing Homes/Assisted Living Facilities

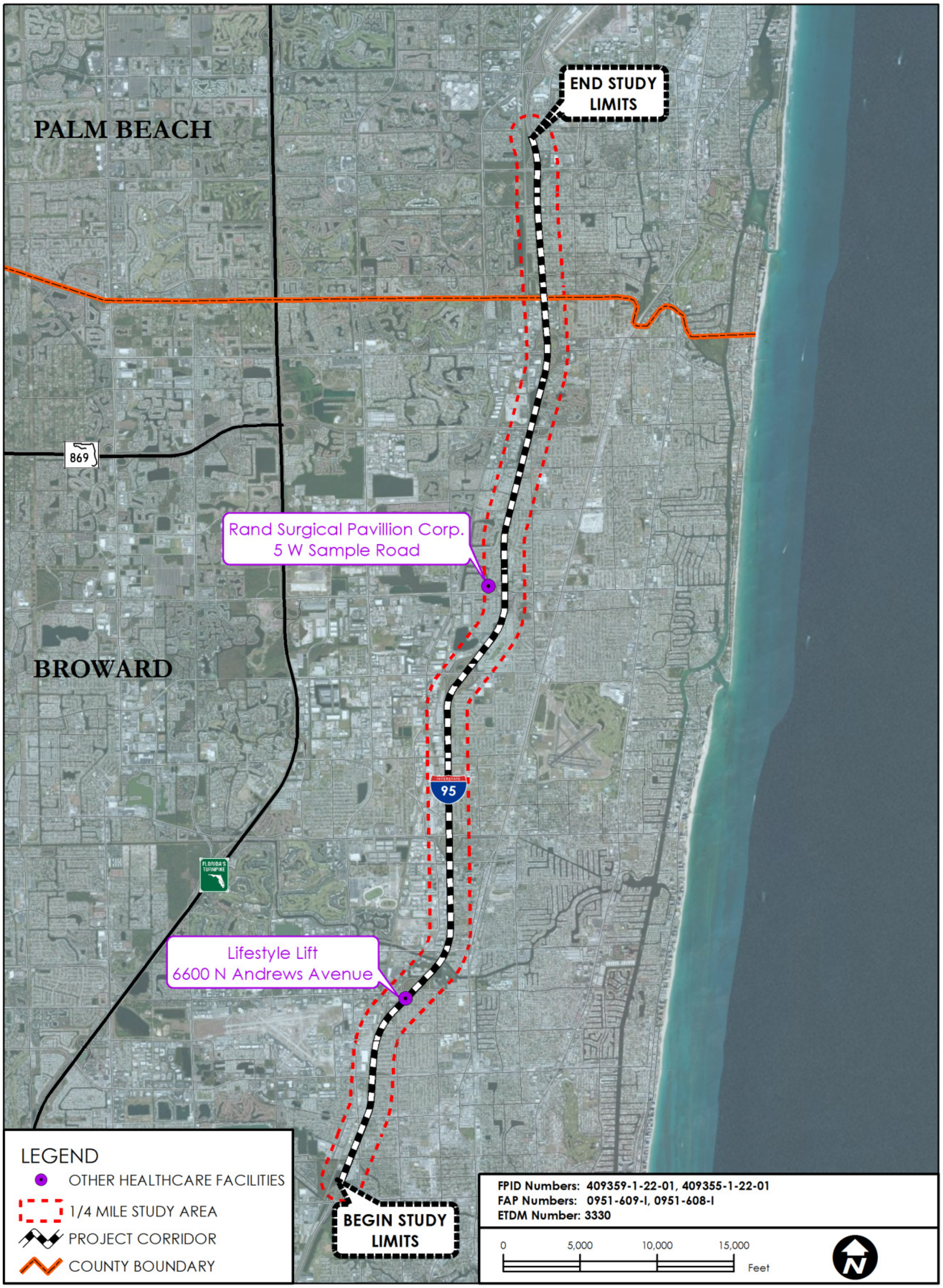


Figure 2.17 – Other Healthcare Facilities

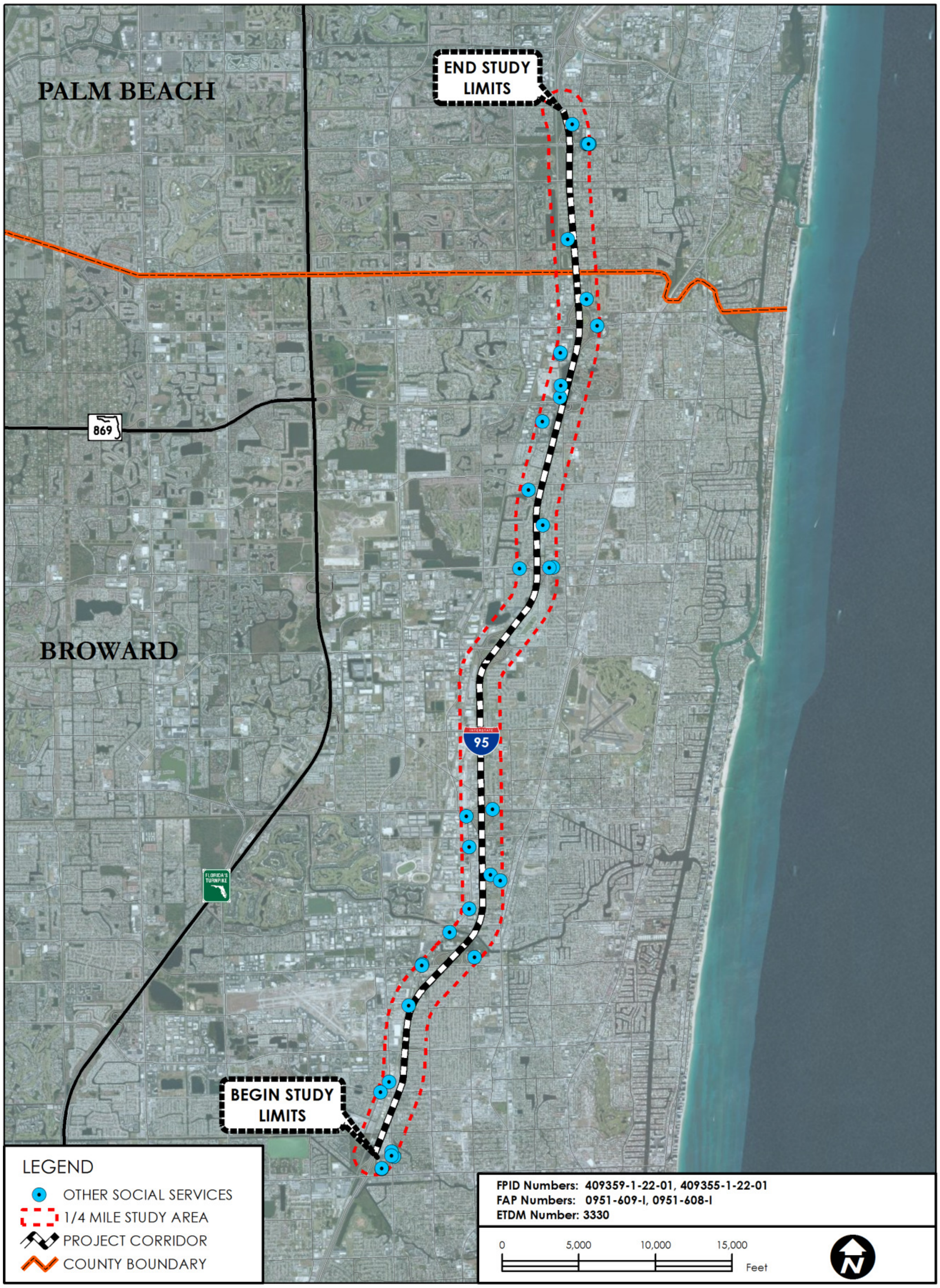


Figure 2.18 – Other Social Services

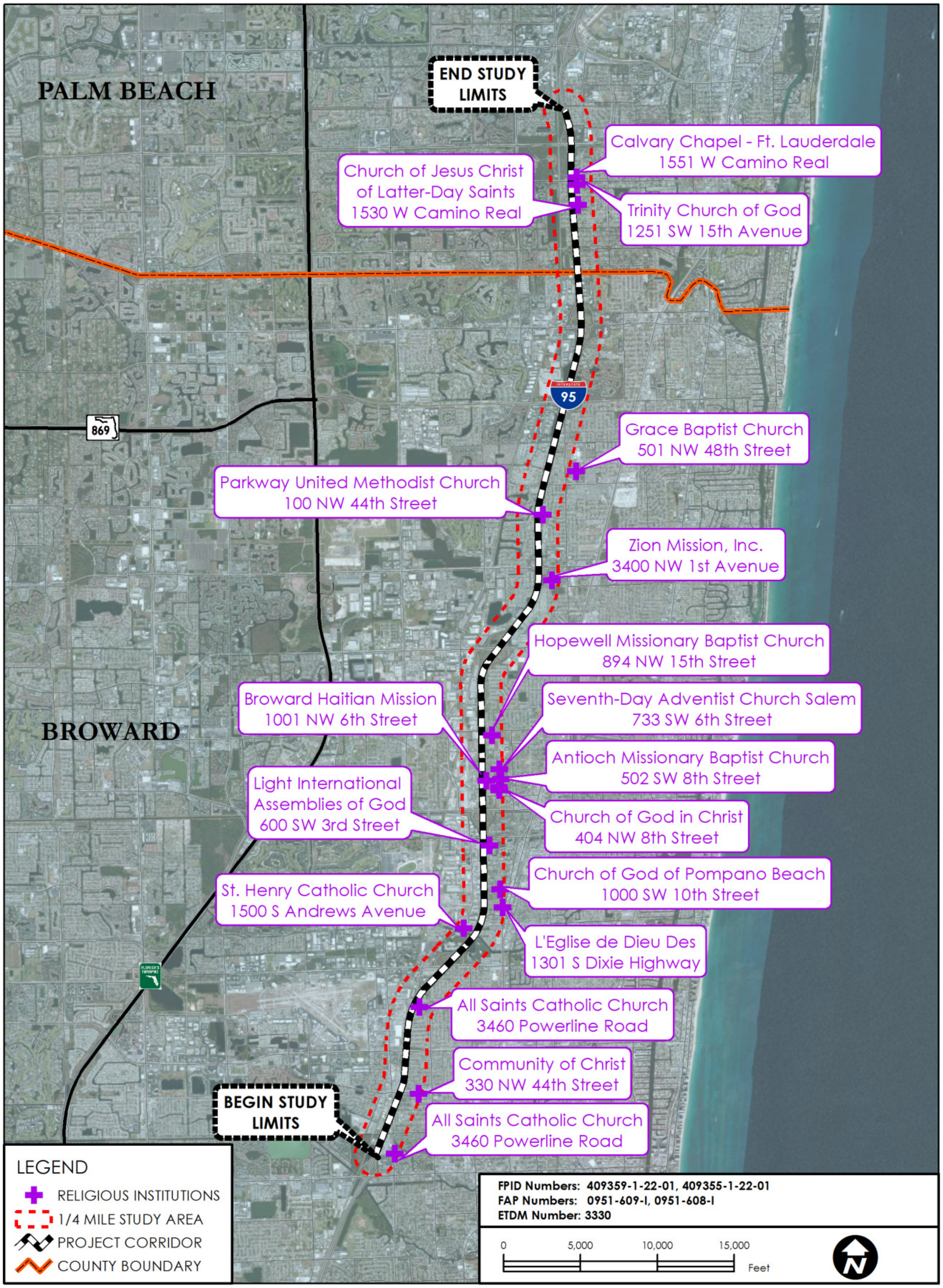


Figure 2.19 – Religious Facilities

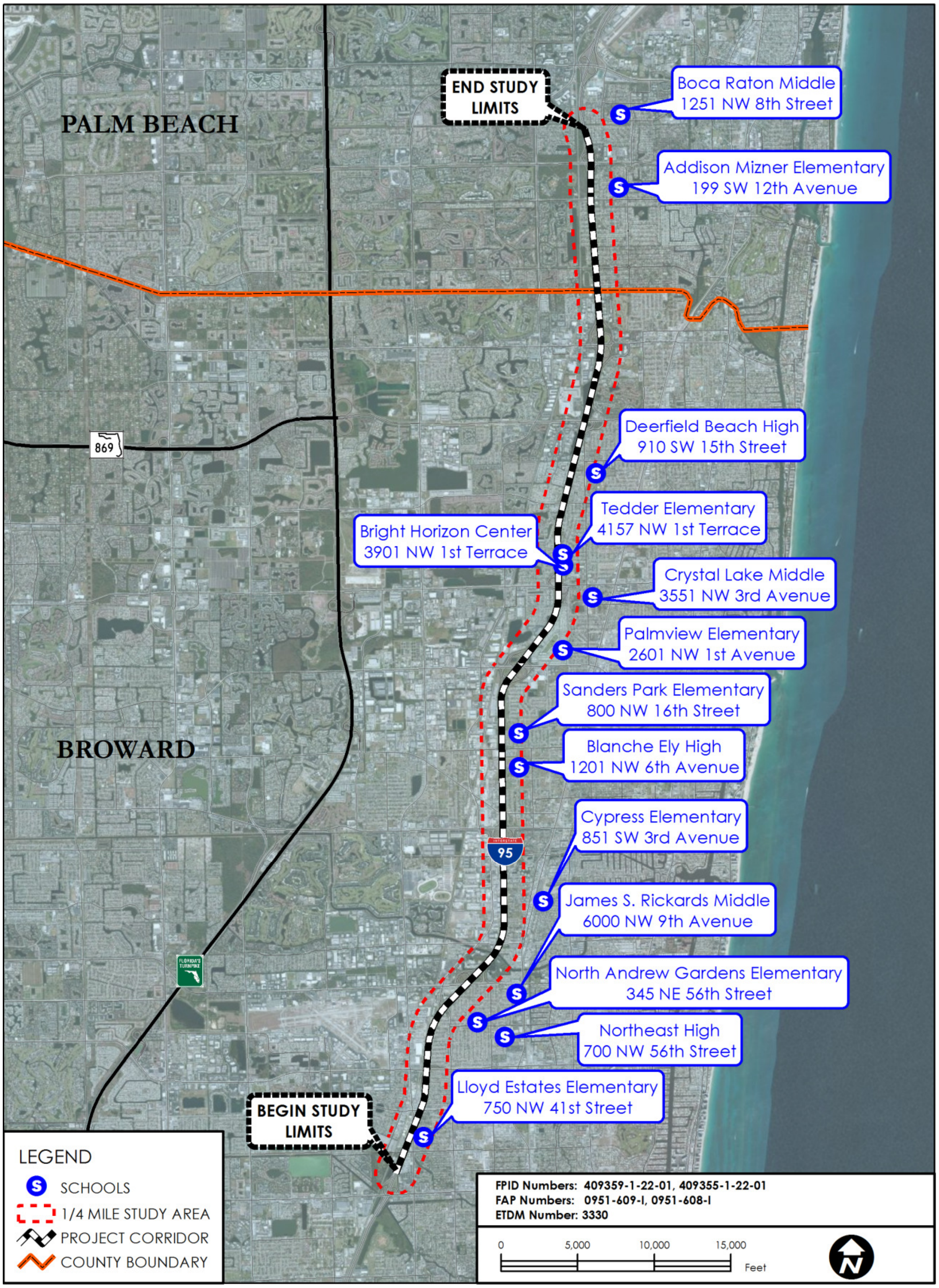


Figure 2.20 – Schools

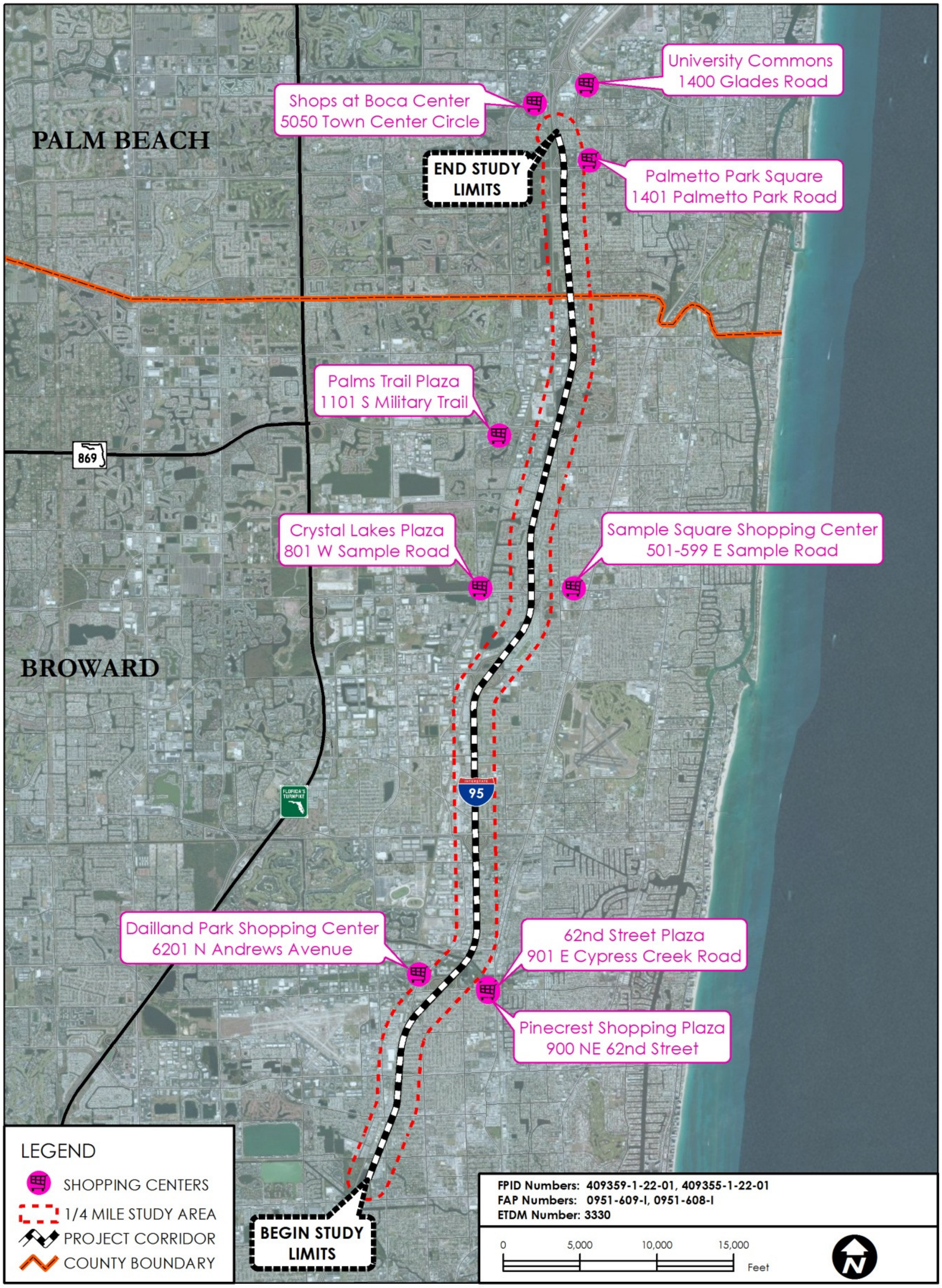


Figure 2.21 – Shopping Centers

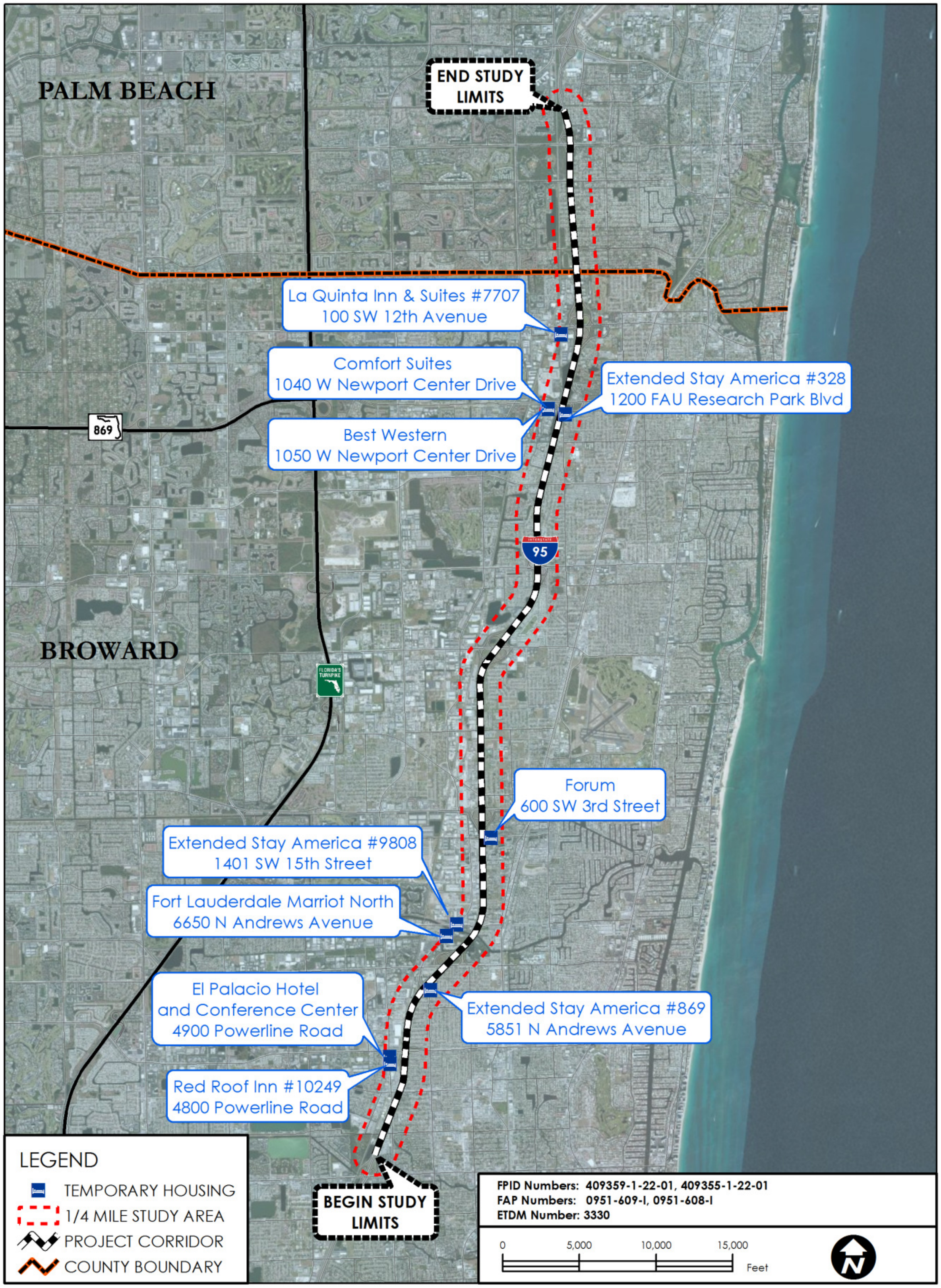


Figure 2.22 – Temporary Housing Facilities

2.21 EVACUATION ROUTES AND EMERGENCY SERVICES

The State Emergency Response Team (SERT) identified the potential for natural disasters to occur within South Florida, principally the likelihood of a major hurricane making landfall in South Florida. Due to this natural disaster potential, SERT designated several of the major north-south roadway corridors throughout Broward and Palm Beach County as crucial evacuation routes, including the entire I-95 corridor due to the ability for these facilities to expedite the movement of high traffic volumes. SR 869 is also an evacuation route which ties directly into the proposed project corridor. ***Figure 2.23*** identifies the SERT-designated evacuation.

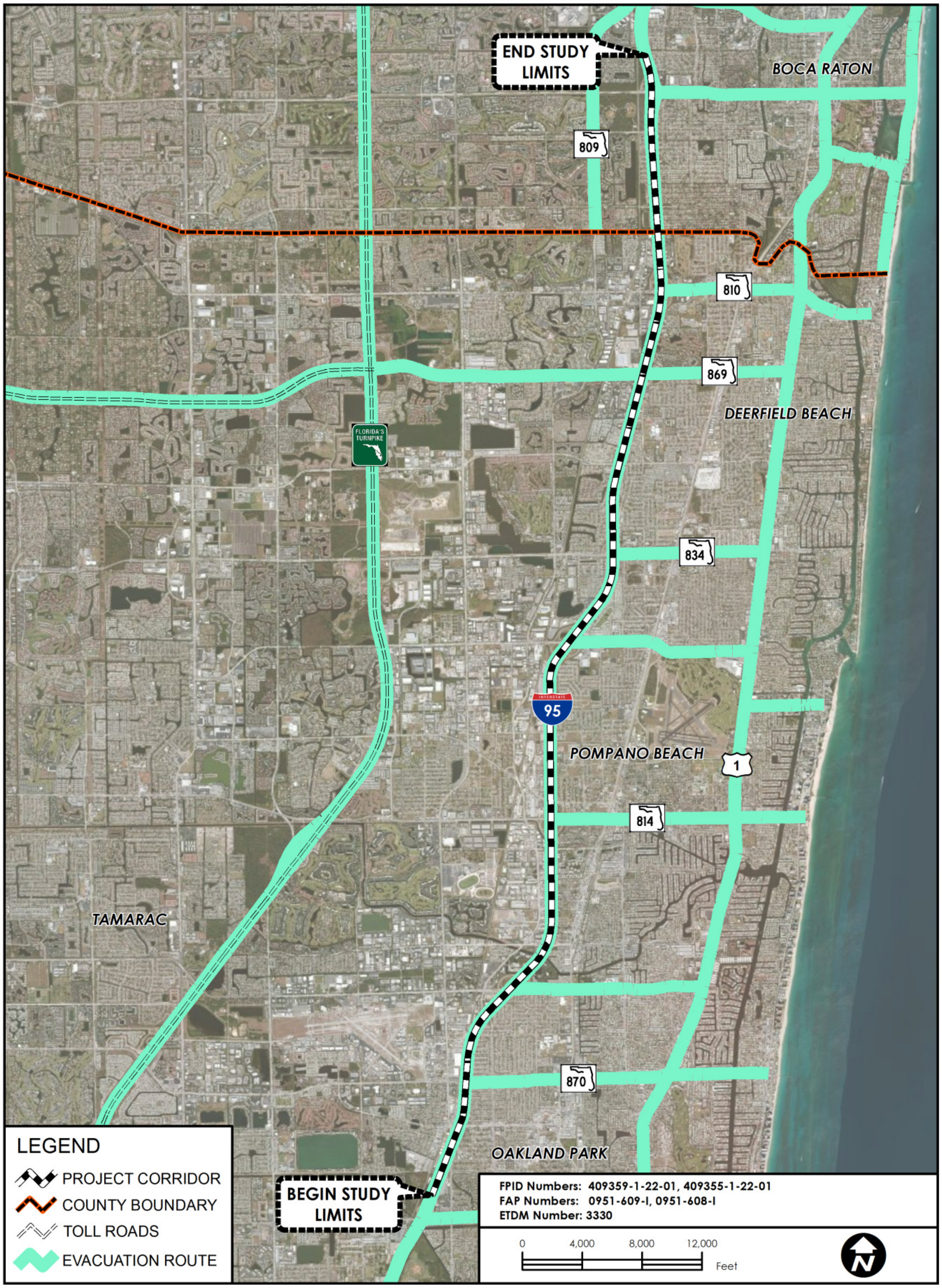


Figure 2.23 – Designated Evacuation Routes

2.22 Cultural Features

2.22.1 Section 4(f)

In compliance with the Department of Transportation Act of 1966 [Title 49, U.S. Code, Section 1653(f)], as amended, and in accordance with the FDOT PD&E Manual, Part 2, Chapter 13 – Section 4(f) Evaluations (dated May 22, 1998), the I-95 study corridor was evaluated for potential Section 4(f) involvement. The provisions of Section 4(f) apply to any significant publicly-owned parks, recreation areas, or wildlife and waterfowl refuges; historic and archeological sites; and properties which represent public multiple-use land holdings.

"Significant" as applied to Section 4(f) resources is determined based on the availability and function of the historic and/or archaeological site, recreational resource, park, and/or wildlife/waterfowl refuge area relative to the community objectives for those facilities and the role the site in question plays in fulfilling those objectives. The agencies that have jurisdiction over these sites make a significance determination based on the criteria described above and submit a "Statement of Significance" letter to the FDOT. Resources are presumed to be significant unless the official having jurisdiction over the site concludes that the entire site is not significant.

Nine park/recreational resources within the vicinity of the project study corridor were identified for potential Section 4(f) involvement with this project:

- Mills Pond Park (2201 NW 9th Avenue); owned by the City of Fort Lauderdale
- John D. Eastern Park (1000 NW 38th Street); owned by Broward County
- Oakland Bark Park (971 NW 38th Street); owned by the City of Oakland Park
- North Andrews Gardens Neighborhood Park (500 NW 56th Street); owned by the City of Oakland Park
- Fairview Park (801 SW 8th Street); owned by the City of Pompano Beach
- Avondale Park (225 SW 6th Avenue); owned by the City of Pompano Beach
- Mitchell/Moore Park and Recreation Center (901 NW 10th Street); owned by the City of Pompano Beach
- Weaver Community Park (800 NW 20th Street); owned by the City of Pompano Beach

- Blazing Star Preserve (1751 West Camino Real Road); owned by the City of Boca Raton

These sites are discussed in further detail in ***Section 2.22.3*** of the report and the *Section 4(f) Determination of Applicability* Report prepared as part of this project.

In addition to the above sites, the following sites within the vicinity of the project study area may be protected under the historic/archaeological resources category for potential Section 4(f) involvement with this project:

- Pompano Canal (BD3226)
- Hillsboro Canal (BD3229/PB10311)
- Lateral Canal L-48 (PB12919)
- Lateral Canal L-47 (PB12920)
- Lateral Canal L-46 (PB12921)
- Circa 1930 Frame Vernacular House (BD2324)
- Circa 1932 Frame Vernacular (BD2325)
- One canoe (BD60) recovered from the cypress swamp adjacent to the Cypress Creek Canal suggests this area may be archaeologically sensitive

Due to their status as potential National Register of Historic Places (NRHP) eligible resources, these sites are discussed in further detail in ***Section 2.22.2*** and the Cultural Resource Assessment Survey prepared as part of this project.

2.22.2 HISTORIC/ARCHAEOLOGICAL

A *Cultural Resource Assessment Survey* (CRAS) was prepared for this project in accordance with the procedures contained in Title 36 Code of Federal Regulations (CFR) Part 800 and in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 12 – Archeological and Historical Resources (dated January 12, 1999). This assessment was designed and implemented to comply with Section 106 of the *National Historic Preservation Act (NHPA) of 1966* (Public Law 89-655, as amended), as implemented by 36 CFR 800 (*Protection of Historic Properties*, effective January 2001); Chapter 267, *Florida Statutes (FS)*; Section 4(f) of the *Department of Transportation Act of 1966*, as amended (49 USC 303). For additional information regarding cultural and historical resources, please refer to the *Cultural Resource Assessment Survey* report completed for this project, which is on file at the FDOT District Four office in Fort Lauderdale, Florida.

The historic resources survey resulted in the identification of six previously recorded historic resources (8BD3226, 8BD3229 and 8PB10311, 8BD4087, 8PB12919, 8PB14495, and 8PB14496) within the Area of Potential Affect (APE). The identified historic resources include one railroad and five canals. A Florida Master Site File (FMSF) form was not updated for the L-48 Canal (8PB12919) as this resource was found to be unchanged since its previous recordation. FMSF forms were updated for the remaining historic resources, as the extent of the historic linear resources within the APE had not been previously documented.

Of the identified historic resources, two are considered eligible for listing in the National Register: the Florida East Coast (FEC) Railway (8BD4087) and the Hillsboro Canal (8BD3229 and 8PB10311). Portions of each resource outside of the APE have been determined eligible for listing in the National Register by the SHPO, and the portions within the APE also possess significance and integrity.

In addition to the CRAS, a Cultural Resource Reconnaissance Survey (CRRS) was performed to provide preliminary cultural resource information for areas outside of the established APE. The limits of this reconnaissance survey consisted of resources that are located directly adjacent to the I-95 right of way. This reconnaissance survey resulted in the identification of one previously recorded National Register–eligible historic resource: the Seaboard Air Line (CSX) Railroad (8BD4649 and 8PB12917).

Figure 2.24 depicts the locations of all historic resources sites.

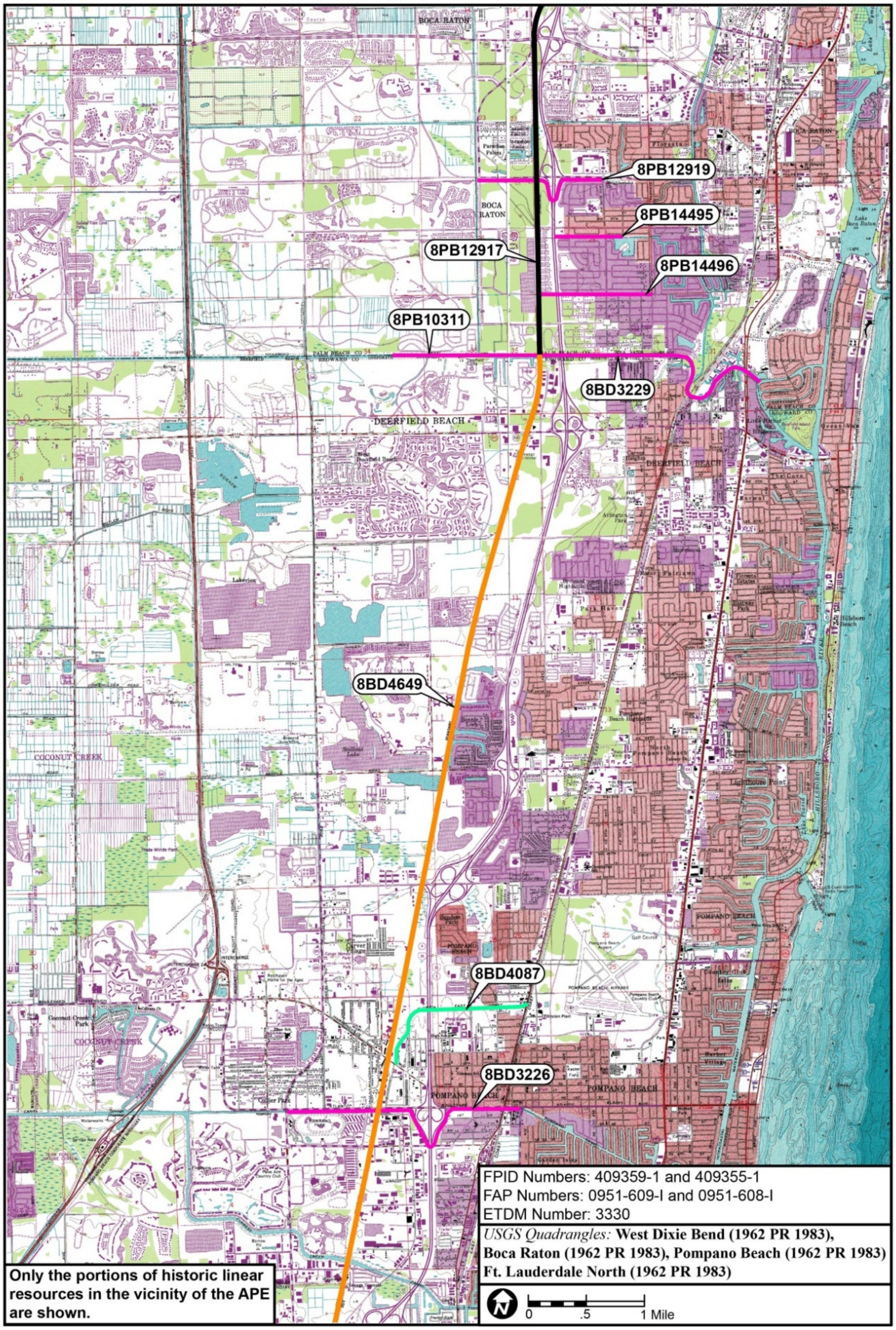


Figure 2.24 – Historic Resources Sites

2.22.3 RECREATIONAL AREAS

There are nine park/recreational areas along the I-95 corridor within the study limits. ***Figure 2.25*** at the end of this section depicts the locations of all park/recreational areas. The park/recreational areas are summarized here:

John D. Easterlin Park – John D. Easterlin Park is a 46.6-acre recreation area located west of I-95 and the CSX railroad tracks, south of NW 38th Street and north of Oakland Park Boulevard. This property houses a Broward County Administration building. This park is owned and managed by Broward County.

Oakland Bark Park – Oakland Bark Park is a 2.25-acre dog park located on the west side of I-95 at 971 NW 38th Street, Oakland Park, Florida. This park is owned and managed by the City of Oakland Park.

North Andrews Gardens Neighborhood Park – North Andrews Gardens Neighborhood Park is a 1.03-acre recreational park located east of I-95 in Oakland Park, Florida. It is bordered to the west by NW 4th Avenue and NW 3rd Avenue. The City of Oakland Park owns and manages North Andrews Neighborhood Park.

Fairview Park – Fairview Park is a 2.4-acre recreation area located east of I-95 in Pompano Beach, Florida. It is bordered on the north by SW 7th street, on the south by SW 8th Street, and on the east by SW 8th Avenue. The City of Pompano Beach owns and manages Fairview Park.

Avondale Park – Avondale Park is a 2.5-acre recreation area located on the east side of I-95 just west of SW 6th Avenue in Pompano Beach, Florida. The City of Pompano Beach owns and manages Avondale Park.

Mitchell/Moore Park and Recreation Center – Mitchell/Moore Park and Community Center is a 15.8-acre recreational area located east of I-95 at the western terminus of NW 10th street in Pompano Beach, Florida. The City of Pompano Beach owns and manages the Mitchell/Moore Park and Community Center.

Weaver Community Park – Weaver Community Park is a 12.4-acre recreation area located on the east side of I-95 just south of the Copans Road interchange in Pompano Beach, Florida. The City of Pompano Beach owns and manages Weaver Community Park.

Crystal Lake Sand Pine Scrub Area – The Crystal Lake Sand Pine Scrub Area is a 24.2-acre natural area located on the east side of I-95 at 3299 NE 3rd Avenue, Pompano Beach, Florida. This natural area is owned and managed by Broward County.

Blazing Star Preserve – Blazing Star Preserve is a 26-acre nature preserve located on the west side of I-95 in Boca Raton, between I-95 and the CSX railroad to the west. It is bounded by Palmetto Park Road to the north and West Camino Real to the south. The City of Boca Raton owns and operates Blazing Star Preserve.

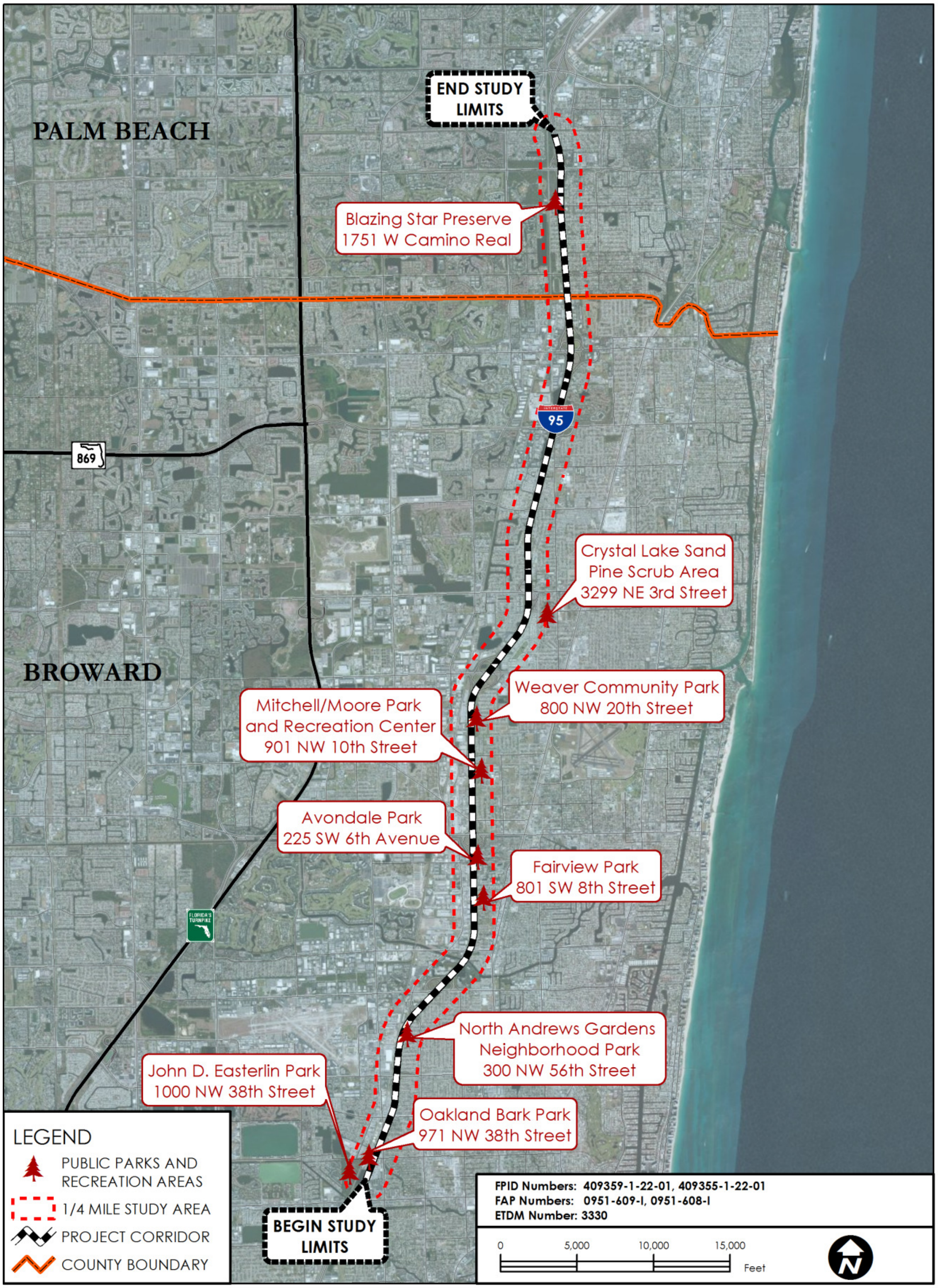


Figure 2.25 – Existing Parks/Recreational Areas

2.23 NATURAL AND BIOLOGICAL FEATURES

2.23.1 WETLANDS AND SURFACE WATERS

A *Wetland Evaluation Report* (WER) was prepared pursuant to Presidential Executive Order 11990, entitled "Protection of Wetlands," and the National Environmental Policy Act (NEPA), and in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 18 – Wetlands (dated April 22, 2013). For additional information regarding wetlands, stormwater management/drainage features, and surface waters, please refer to the WER completed for this project, which is on file at the FDOT District Four office in Fort Lauderdale, Florida.

The project area was reviewed to identify, map, and assess wetlands and surface water communities that are located within or adjacent to the I-95 PD&E study corridor. In order to determine preliminary locations and boundaries of the existing wetland, stormwater management/drainage, and surface water communities within and adjacent to the project area, available site-specific data was collected and reviewed. Using this information, the approximate boundaries of existing wetland, stormwater management/drainage, and surface water communities were mapped in Geographic Information Systems (GIS) on aerial photography (see ***Appendix J***).

Project biologists familiar with South Florida wetland community types conducted field investigations of the study area from June 2012 through August 2012. The purpose of the field investigations was to locate, delineate and/or field verify the boundaries of the existing wetland, stormwater management/drainage, and surface water communities identified during the in-house data review and well as areas not previously identified. The extent of jurisdictional wetlands, stormwater management/drainage features, and/or surface waters for the study corridor were determined using the methodologies outlined in the USACE Atlantic and Gulf Coast Regional Supplement to the Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Florida Wetlands Delineation Manual/Chapter 62-340 Florida Administrative Code, Delineation of the Landward Extent of Wetlands and Surface Waters (FDEP, 2008). During the field investigation, attention was given to identifying plant species composition for each wetland, stormwater management/drainage, and surface water community delineated as well as its adjacent upland habitats. Exotic plant infestations, shifts in historical communities, and any other disturbances were noted. Wildlife observations and signs of wildlife utilization at each wetland, stormwater management/drainage, and surface water community and adjacent upland habitats were also noted.

Based on the field investigations conducted for this project (June 2012 through August 2012), the existing conditions of the wetlands, stormwater management/drainage features, and surface waters vary in terms of habitat value, quality, level of intrusion by exotic/invasive (undesirable) species, and degree of geographical isolation.

A total of two wetland areas consisting of one community type (as classified by FLUCFCS codes), 82 engineered stormwater management/drainage features dominated by hydrophytic vegetation consisting of six habitat types, and 21 surface waters consisting of two community types were identified along the project study corridor. ***Table 2.24*** shows the assessment area identification number, size (acres), FLUCFCS code/description, and USFWS code/description. The locations of these features are depicted on aerial maps in ***Appendix J***.

Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
Wetlands					
W-1	1.76	630	Wetland Forested Mixed	PFO3C	Palustrine, Forested, Broad-leaved Evergreen, Seasonally Flooded
W-2	0.16	630	Wetland Forested Mixed	PFO3C	Palustrine, Forested, Broad-leaved Evergreen, Seasonally Flooded
Stormwater Management/Drainage Features					
D-1	0.16	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-2	0.27	814/640	Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-3	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-4	0.11	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded

**Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor**

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
D-5	0.33	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-6	0.10	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-7	0.64	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-8	0.13	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-9	0.05	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-10	0.26	814/621	Roads and Highways/Cypress	PFO2C	Palustrine, Forested, Needle-leaved Deciduous, Seasonally Flooded
D-11	0.10	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-12	0.19	814/621	Roads and Highways/Cypress	PFO2C	Palustrine, Forested, Needle-leaved Deciduous, Seasonally Flooded
D-13	4.60	814/631/ 641/643	Roads and Highways/Wetland scrub/Freshwater Marshes/Wet Prairies	PEM1A/ PAB3F/ PFO1C	Palustrine, Emergent, Persistent, Temporarily Flooded/Palustrine, Rooted Vascular, Semi-permanently Flooded/ Palustrine, Forested, Broad-leaved Deciduous, Seasonally Flooded
D-14	1.37	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1F	Palustrine, Emergent, Persistent, Semi-permanently Flooded
D-15	0.07	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-16	0.71	814/631/ 641/643	Roads and Highways/Wetland scrub/Freshwater Marshes/Wet Prairies	PEM1A/ PAB3F/ PSS1C	Palustrine, Emergent, Persistent, Temporarily Flooded/Palustrine, Rooted Vascular, Semi-permanently Flooded/ Palustrine, Scrub-Shrub, Broad-leaved Deciduous, Seasonally Flooded
D-17	0.98	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A/ PFOC	Palustrine, Emergent, Persistent, Temporarily Flooded/Palustrine, Forested, Seasonally Flooded

Table 2.24 Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor					
ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
D-18	0.10	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-19	<0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-20	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-21	0.10	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-22	0.47	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-23	0.44	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-24	1.00	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-25	0.67	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-26	1.56	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-27	0.14	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-28	0.03	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-29	0.14	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-30	<0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-31	0.19	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-32	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-33	0.11	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-34	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-35	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded

Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
D-36	<0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-37	0.13	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-38	0.05	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-39	0.09	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-40	0.49	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-41	1.76	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1F	Palustrine, Emergent, Persistent, Semi-permanently Flooded
D-42	0.44	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-43	1.53	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-44	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-45	0.07	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-46	2.53	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-47	3.72	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-48	0.16	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-49	0.16	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-50	0.73	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-51	2.81	814/640/ 644	Roads and Highways/Vegetated Non-forested Wetlands/Emergent Aquatic Vegetation	PEM1A/ PAB3F	Palustrine, Emergent, Persistent, Temporarily Flooded/Palustrine Aquatic Bed, Rooted Vascular, Semipermanently flooded
D-52	0.70	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded

Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
D-53	0.90	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-54	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-55	1.12	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-56	0.92	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PAB4F	Palustrine, Aquatic Bed, Floating Vascular, Semi-permanently Flooded
D-57	0.15	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-58	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-59	0.14	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-60	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-61	0.14	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-62	0.22	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-63	0.04	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-64	0.14	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-65	0.13	814/644	Roads and Highways/Emergent Aquatic Vegetation	PEM1F	Palustrine, Emergent, Persistent, Semi-permanently Flooded
D-66	0.04	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-67	0.06	814/644	Roads and Highways/Emergent Aquatic Vegetation	PEM1F	Palustrine, Emergent, Persistent, Semi-permanently Flooded
D-68	0.04	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-69	0.08	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded

Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
D-70	0.12	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-71	0.62	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
D-72	0.41	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-73	<0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-74	<0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-75	0.13	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-76	0.29	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
D-77	0.17	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-78	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-79	0.41	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
D-80	0.76	814/630	Roads and Highways/Wetland Forested Mixed	PFOC	Palustrine, Forested, Seasonally Flooded
D-81	0.01	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
D-82	0.02	814/640	Roads and Highways/Vegetated Non-Forested Wetlands	PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
Surface Waters					
SW-1	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-2	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-3	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated

Table 2.24
Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor

ID No.	Size (Acres*)	FLUCFCS Code	FLUCFCS Description	USFWS Code	USFWS Description
SW-4	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-5	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-6	N/A	534	Reservoirs less than 10 Acres	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-7	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-8	N/A	510	Streams and Waterways	R2UBHx	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated
SW-9	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-10	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-11	N/A	534	Reservoirs less than 10 Acres	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-12	N/A	510	Streams and Waterways	PUBFx	Palustrine, Uncosolidated Bottom, Semipermanently Flooded, Excavated
SW-13	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated
SW-14	N/A	534	Reservoirs less than 10 Acres	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-15	N/A	510	Streams and Waterways	R2ABHx	Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Excavated

Table 2.24 Wetlands, Stormwater Management/Drainage Features, and Surface Waters within the I-95 Study Corridor					
ID No.	**Size (Acres*)**	**FLUCFCS Code**	**FLUCFCS Description**	**USFWS Code**	**USFWS Description**
SW-16	N/A	534	Reservoirs less than 10 Acres	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-17	N/A	534	Reservoirs less than 10 Acres	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-18	N/A	510	Streams and Waterways	PUB/ EMFx x	Palustrine, Unconsolidated Bottom/Emergent, Semipermanently Flooded, Excavated
SW-19	N/A	510	Streams and Waterways	R2UBHx	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated
SW-20	N/A	510	Streams and Waterways	PABHx	Palustrine, Aquatic Bed, Permanently Flooded, Excavated
SW-21	N/A	510	Streams and Waterways	PUBFx	Palustrine, Unconsolidated Bottom, Semipermanently Flooded, Excavated

* Rounded to the nearest hundredth.
FLUCFCS = Florida Land Use, Cover, and Forms Classification System
USFWS = U.S. Fish and Wildlife Service
N/A = Not Applicable

2.23.2 FLOODPLAINS

Pursuant to Presidential Executive Order 11988, entitled "Floodplain Management," U.S. Department of Transportation Order 5650.2, and Chapter 23, CFR 650A, and in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 24 – Floodplains (dated January 7, 2008), the project alternatives were analyzed for potential floodplain impacts. Floodplain impacts were incorporated into the WER prepared for this project, which is available on file at the FDOT District Four offices in Fort Lauderdale, Florida.

According to the revised 2012 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Community Panels 12011C0206F, 12011C0208F, 12011C0050F, 12011C0109F, 12011C0117F, 12011C0119F, 12011C0108F, 12011C0120F, 1201950006C, 12011C0050F, the I-95 PD&E Study corridor passes through four distinct flood zones: AE, AH, X, and X-500. These areas are represented on ***Figure 2.26***.

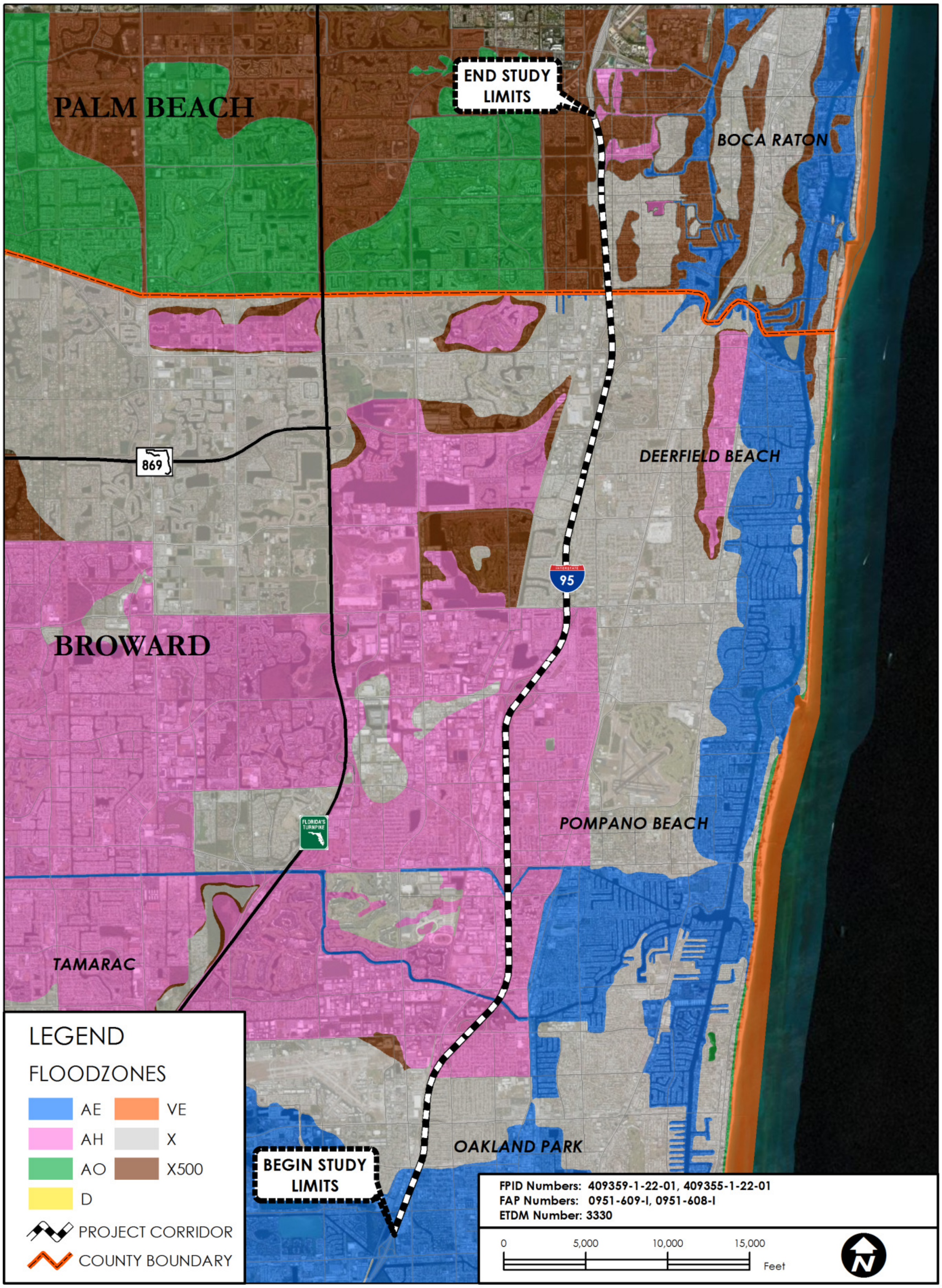


Figure 2.26 – Floodplains Map

2.23.3 OTHERS

Aquatic Preserves

In accordance with Chapter 18-20, Florida Administrative Code, and the FDOT *PD&E Manual*, Part 2, Chapter 19 – Aquatic Preserves (dated January 11, 2011), the project corridor was evaluated for the potential presence of aquatic preserves. No aquatic preserves are located within the project study area.

Water Quality

In accordance with the FDOT *PD&E Manual*, Part 2, Chapter 20 – Water Quality (dated February 25, 2004), a Water Quality Impact Evaluation has been conducted for this project. The Water Quality Impact Evaluation is contained in the WER prepared as part of this PD&E study, which is included in the WER prepared for this project and available for review at the FDOT District Four offices in Fort Lauderdale, Florida.

Biscayne Aquifer

The project area is underlain by the Biscayne Aquifer. The Biscayne Aquifer is the surficial aquifer of Broward County and southeast Palm Beach County. It is the only named aquifer in the surficial aquifer system in Broward County and is the principal aquifer in Broward and Palm Beach counties. As such, it has been declared a sole-source aquifer (Federal Register Notice, 1979).

The Biscayne Aquifer, named after Biscayne Bay, is the source of the most important water supplies developed in southeastern Florida. It is the most productive of the shallow non-artesian aquifers in the area and is one of the most permeable in the world. The aquifer extends along the eastern coast form southern Miami-Dade County into coastal Palm Beach County as a wedge-shaped underground reservoir having the thin edge to the west. It underlies the Everglades as far as northern Broward County, though in that area it is comparatively thin, and the permeability is not as high as it is farther east and south.

The Biscayne Aquifer is composed of water-bearing rocks ranging in age from upper Miocene through Pleistocene. The aquifer is comprised, from bottom to top, of parts or all of the following formations:

1. Tamiami Formation (including only the uppermost part of the formation—a thin layer of highly permeable Tamiami Limestone of Mansfield);
2. Caloosahatchee Marl (relatively insignificant erosion remnants and isolated reefs);
3. Fort Thompson Formation (the southern part);
4. Anastasia Formation;
5. Key Largo Limestone; and
6. Pamlico Sand.

Outstanding Florida Waters

In accordance with Chapter 62-302, Florida Administrative Code, and the FDOT *PD&E Manual*, Part 2, Chapter 21 – Outstanding Florida Waters (dated January 11, 2011), the project corridor was evaluated for the potential presence of Outstanding Florida Waters. No Outstanding Florida Waters are located within the project study area.

Wild and Scenic Rivers

In accordance with the FDOT *PD&E Manual*, Part 2, Chapter 23 – Wild and Scenic Rivers (dated January 8, 2008), the project corridor was evaluated for the potential presence of wild and scenic rivers. No wild and scenic rivers are located within the project study area.

Coastal Zone Consistency

In accordance with the FDOT *PD&E Manual*, Part 2, Chapter 25 – Coastal Zone Consistency (dated April 12, 2011), this project was reviewed by the Florida Department of Environmental Protection (FDEP) for consistency with the Florida Coastal Zone Management Plan.

Coastal Barrier Resources

In accordance with the FDOT *PD&E Manual*, Part 2, Chapter 26 – Coastal Barrier Resources (dated February 1, 2011), this project was reviewed for involvement with coastal barrier resources. No coastal barrier resources exist within the project limits.

Scenic Highways

In accordance with the FDOT *PD&E Manual*, Part 2, Chapter 29 – Scenic Highways (dated October 13, 1998), the project corridor was evaluated for involvement with designated scenic highways. No designated scenic highways are located within the project area.

Farmlands
In accordance with the Farmland Protection Policy Act of 1984 and the FDOT *PD&E* Manual, Part 2, Chapter 28 – Farmlands (dated May 11, 2010), this project was reviewed for involvement with farmlands. Per coordination with the U.S. Department of Agriculture, Natural Resources Conservation Service, lands within current roadway right-of-way are not considered Prime and/or Unique Farmlands; therefore, no Prime or Unique Farmlands exist within the project study area.

2.23.4 WILDLIFE AND HABITAT

This project has been evaluated for the potential presence of threatened and endangered species in accordance with Section 7(c) of the Endangered Species Act of 1973 as amended by Rules 39-25.002, 39-27.002, and 39-27.011 of the Wildlife Code of the State of Florida (Chapter 39, Florida Administrative Code). An *Endangered Species Biological Assessment* (ESBA) was prepared in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 27 – Wildlife and Habitat Impacts (dated October 1, 1991). For additional information on wildlife and habitat, please refer to the ESBA prepared for this project, which is on file at the FDOT District Four office in Fort Lauderdale, Florida.

Upland and wetland community types within the project study area were evaluated in order to assess the I-95 PD&E study area for the potential occurrence of federal and state-listed protected species (flora and fauna). The composition of each natural community type was determined using published data and field reviews. The approximate boundaries of upland, wetland, and surface water communities were mapped in GIS on aerial photography. Each community type was then classified using the FLUCFCS (FDOT, 1999) and the USFWS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et. al., 1979), where applicable.

Project biologists familiar with South Florida natural community types conducted field investigations of the project corridor. Wildlife surveys were conducted on May 23rd and November 13th, 2012. In addition to the formal wildlife surveys, project biologists documented all observed species identified during routine field assessments associated with the project conducted between June 2012 and August 2012. During these investigations, the preliminarily-defined community type boundaries and FLUCFCS/USFWS classification codes established through literature reviews and aerial photograph interpretation were verified and/or refined. During the field investigations, transects were employed within each biotic community observed along the project corridor. Each community type was evaluated by direct observation for its potential to provide habitat for wildlife species based on the availability of existing resources (e.g., food sources, nesting areas).

Upland Communities

A majority of the areas within and directly adjacent to the project corridor have been developed or otherwise altered due to commercial, industrial, and residential development and modification of the natural features. Nine upland community types (with multiple FLUCFCS codes) were identified within the I-95 PD&E Study area (refer to the ESBA for detailed descriptions of these habitat types):

- Pine Flatwoods (FLUFCS 411)
- Sand Pine (FLUFCS 413)
- Xeric Oak (FLUFCS 421)
- Xeric Oak Disturbed (FLUFCS 4211)
- Brazilian Pepper (FLUCFCS 422)
- Upland Scrub, Pine and Hardwoods (FLUCFCS 436)
- Upland Scrub, Pine and Hardwoods – Highly Disturbed (FLUCFCS 4361)
- Mixed Hardwoods (FLUCFCS 438)
- Urban and Built-Up/Residential/Transportation, Communication, and Utilities/ Roads and Highways (FLUCFCS 100, 800, and 814)

Wildlife species that would potentially utilize these habitats are discussed in subsequent sections of this project.

Wetlands, Stormwater Management/Drainage Features, and Surface Waters
The wetlands, stormwater management/drainage features, and surface waters located along the project corridor are summarized in ***Section 2.22.1*** of this report and discussed in detail in the WER prepared for this project.

Protected Species

In accordance with Section 7 of the Endangered Species Act of 1973, as amended, and Chapter 68 of the Florida Administrative Code, the project study area was evaluated for the potential occurrence of federal and state-listed protected plant and animal species. Literature reviews, agency database searches and coordination, and a habitat field review were conducted to identify protected species and critical habitat that might occur within the study area.

The I-95 project corridor was surveyed for plants and wildlife on May 23rd and November 13th, 2012, by project scientists familiar with protected species in the area. Two types of survey methodology were employed for this study: pedestrian transects (for plants and wildlife) and stationary observation points (for wildlife). After completion of the pedestrian transects, a total of three stationary observation stations were established to maximize the amount of wildlife to be observed during the study periods. Two project scientists spent thirty minutes at each site during both the morning and evening (dawn/dusk) sessions. These surveys were only conducted in one seasonal event due to time constraints associated with the project schedule, but data from adjacent projects was utilized to extrapolate the autumn avian migration patterns throughout the area. During the field assessments, wildlife observations were recorded in the morning hours (07:00 – 09:00) and again in the late afternoon/early evening hours (17:00 – 19:00). These times coincided with the most active foraging times for many species surveyed. In addition to the stationary wildlife surveys, biologists documented all observed species identified during routine field assessments associated with the project. Project scientists sought to identify notable macro vertebrates/invertebrates including, but not limited to birds, mammals, reptiles, amphibians, and fish. Any observations of listed plant and wildlife species or indicators of their presence (i.e., vocalizations, tracks, scat, burrows, etc.) within and immediately adjacent to the project limits were documented and included in the ESBA.

Table 2.25 lists the federal and state-listed wildlife and plant species with the potential to occur within the project study area, based on potential availability of suitable habitat and known ranges. Each species is given a rating of low, moderate, or high likelihood of occurring within the project corridor.

Table 2.25
Federal and State-Listed Species with the Potential to Occur within the Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential	Observed
Mammals					
Florida mouse	*Podomys floridanus*	NL	SSC	Moderate	No
Sherman's fox squirrel	*Sciurus niger shermani*	NL	SSC	Low	No
Florida manatee	*Trichechus manatus latirostris*	E	FE	High	No
Birds					
Bald eagle*	*Haliaeetus leucocephalus*	NL	NL	Low	No
Black skimmer	*Rynchops niger*	NL	SSC	High	Yes
Brown pelican	*Pelecanus occidentalis*	NL	SSC	High	Yes
Florida burrowing owl	*Athene cunicularia floridana*	NL	SSC	High	No
Florida scrub-jay	*Aphelocoma coerulescens*	T	FT	Low	No
Least tern	*Sternula antillarum*	NL	ST	High	Yes
Limpkin	*Aramus guarauna*	NL	SSC	Moderate	No
Little blue heron	*Egretta caerulea*	NL	SSC	High	Yes
Roseate spoonbill	*Platalea ajaja*	NL	SSC	Moderate	No
Snowy egret	*Egretta thula*	NL	SSC	High	Yes
Southeastern American kestrel	*Falco sparverius paulus*	NL	ST	High	Yes
Tricolored heron	*Egretta tricolor*	NL	SSC	High	Yes
White ibis	*Eudocimus albus*	NL	SSC	High	Yes
Wood stork	*Mycteria americana*	E	FE	High	Yes
Reptiles					
American alligator	*Alligator mississippiensis*	T (S/A)	FT (S/A)	Moderate	No
Eastern indigo snake	*Drymarchon corais couperi*	T	FT	Moderate	No
Florida pine snake	*Pituophis melanoleucus mugitus*	NL	SSC	Moderate	No
Gopher tortoise	*Gopherus polyphemus*	NL	ST	High	Yes
Amphibians					
Gopher frog	*Rana capito*	NL	SSC	Moderate	No

* The bald eagle is not listed by the U.S. Fish and Wildlife Service or Florida Fish and Wildlife Conservation Commission as a protected species, but this species is protected by the *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act*.

E = Endangered
T = Threatened
FE = Federally Endangered
FT = Federally Threatened

T (S/A) = Threatened due to Similarity of Appearance
FT (S/A) = Federally Threatened due to Similarity of Appearance
ST = State Threatened
SSC = Species of Special Concern

Sources: U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, and Florida Natural Areas Inventory

Designated Habitats

Critical Habitats – Critical Habitat is a specific, federally-designated, geographic area that is essential for the conservation of a threatened or endangered species that may require special management and protection, but they are not considered a refuge or sanctuary for the species. Critical Habitat may include an area that is not currently occupied by the species, but that will be needed for its recovery. An area is designated as Critical Habitat after the USFWS or National Marine Fisheries Service (NMFS) publishes a proposed federal regulation in the Federal Register and then receives public comments on the proposal. The final boundaries of the critical habitat areas are also published in the Federal Register. There is no Critical Habitat located within the project corridor.

Strategic Habitat Conservation Areas (SHCAs) – Strategic Habitat Conservation Areas are defined as regions not in public ownership, which are recommended for protection in order to maintain biological diversity. These Strategic Habitat Conservation Area designations are intended to indicate that the existing land use should be maintained in order to conserve state-wide biodiversity. The SHCAs were originally mapped state-wide in association with the FWC's *Closing the Gaps in Florida's Wildlife Habitat Conservation System* (Cox, *et al*., 1994) report. Since 1994, landscape-level habitat changes, transfer of land from private to public ownership, and changes in land use have all altered the applicability of the originally mapped SHCAs. Advances in technological capabilities, revised habitat data, and more extensive species occurrence data facilitated a reassessment of Florida's biodiversity protection status. Additionally, advances in population viability modeling techniques allow for more in-depth examination of wildlife habitat needs that were not available in the previous report. The results of the reanalysis have identified SHCAs for a new selection of focal species, including many species that were in the original report. According to the updated report, *Wildlife Habitat Conservation Needs in Florida: Updated*

Recommendations for Strategic Habitat Conservation Areas (Endries, *et al*., 2009), and associated GIS data layers, there are no SHCAs within the project corridor; however, SHCAs for the Florida mouse and burrowing owl exist in small scattered areas in general proximity to the project corridor.

Essential Fish Habitat

An *Essential Fish Habitat (EFH) Assessment* was conducted in accordance with the FDOT PD&E Manual, Part 2, Chapter 11 (dated 11/26/2007). This assessment fulfills the requirements set forth in the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996, and associated implementing regulations. The MSFCMA, as amended, established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan (FMP). Section 305(b)(2) of the MSFCMA requires Federal-action agencies to consult with the National Oceanic and Atmospheric Administration NMFS on all actions or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. EFH is defined in the MSFCMA and the South Atlantic Fisheries Management Council's *Habitat Plan for the South Atlantic Region* (1998) as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" [16 U.S.C. 1802(10)]. Additionally, Habitat Areas of Particular Concern (HAPC) are subsets of EFH that merit special considerations for habitat conservation which are listed in the EFH Guidelines [50 CFR 600.815(a)(8)]. HAPC are defined by: 1) the importance of the ecological function provided by the habitat; 2) the extent to which the habitat is sensitive to human-induced environmental degradation; 3) whether, and to what extent, development activities are, or will be, stressing the habitat type; and 4) the rarity of the habitat type.

2.24 PHYSICAL FEATURES

2.24.1 AIR QUALITY

The information presented in this section is part of the *Air Quality Technical Memorandum* (AQTM). The proposed project has the potential to alter traffic conditions and influence the air quality within the project study area. Potential air quality impacts in the area surrounding the project corridor were assessed for all viable project alternatives, including the No-Build Alternative, in accordance with applicable FHWA guidelines and guidelines contained in Part 2, Chapter 16 of the FDOT *PD&E Manual* (dated April 27, 2010).

The pollutants of primary concern with roadway traffic are ozone (O_3), oxides of nitrogen (NOx), hydrocarbons (HC), small particulate matter (PM10), and carbon monoxide (CO). Ozone, NOx, HC and PM10 are analyzed at the program level unless specific review of an individual project is requested by appropriate reviewing agencies. Since CO is a localized pollutant that is emitted directly into the atmosphere by vehicles, it is analyzed for individual roadway projects where substantial changes to the traffic conditions are anticipated. The National Ambient Air Quality Standard (NAAQS) for CO is 35 parts per million (PPM) for one-hour periods and 9 PPM for eight-hour periods.

2.24.2 NOISE

The information presented in this section is part of the *Noise Study Report* (NSR). The traffic noise study was conducted in accordance with the FDOT PD&E Manual, Part 2, Chapter 17 – Noise (dated May 24, 2011) and Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (dated July 13, 2010). The primary objectives of the noise study were to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that, under the Build Alternatives, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and Federal Highway Administration (FHWA). Other objectives of this study include consideration of construction noise and vibration impacts and the development of noise level isopleths, which can be used in the future by local municipal and county government agencies to identify compatible land uses.

The FHWA has established NAC for seven land use activity categories. These criteria determine when an impact occurs and when consideration of noise abatement analysis is required. Maximum noise level thresholds have been established for five of these activity categories. These maximum thresholds, or criteria levels, represent the upper limit of acceptable traffic noise level conditions. The July 2010 NAC levels are presented in ***Table 2.26***.

Table 2.26 Noise Abatement Criteria [Hourly A-Weighted Sound Level-Decibels (dB(A))]				
Activity Category	Activity Leq(h)[1]		Evaluation Location	Description of Activity Category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	–	–	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	–	–	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

[1] The Leq(h) Activity Criteria values are for impact determination only and are not a design standard for noise abatement measures.

[2] Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

Developed lands along the project corridor were evaluated to identify noise sensitive receptor sites that may be impacted by traffic noise associated with the proposed improvements. Noise sensitive receptor sites represent any property where frequent exterior human use occurs and where a lowered noise level would be of benefit. These include residences (FHWA Noise Abatement

Activity Category B); other noise sensitive areas such as parks and recreational areas, medical facilities, schools, and places of worship (Category C); and noise sensitive commercial properties such as restaurants (Category E). Noise sensitive sites also include interior use areas where no exterior activities occur for facilities such as auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, recording studios, and schools (Category D).

A GIS review and field reconnaissance were conducted to identify potentially noise sensitive sites along the limits of this project. Approximately 1,784 nearby noise sensitive sites were identified along the project corridor (see ***Table 2.27***). These sites include nearby residences, schools, religious facilities, parks, pools and medical facilities. Many of the nearby neighborhoods consist of single-family homes located in dense residential communities; however, there are several large apartment and condominium complexes. Twenty-two (22) noise barriers are located within the limits of this project. These noise barriers include shoulder-mounted and ground-mounted noise barriers that range in height from six to 21 feet tall. Approximately 993 residences and 11 non-residential noise sensitive sites are located behind these noise barriers.

Table 2.27
Noise Sensitive Sites

Project Segment	Residential Noise Sensitive Sites	Non-Residential and Special-Use Noise Sensitive Sites
Oakland Park Boulevard to Commercial Boulevard	90	3
Commercial Boulevard to Cypress Creek Road	71	1
Cypress Creek Road to Atlantic Boulevard	290	3
Atlantic Boulevard to Copans Road	187	3
Copans Road to Sample Road	477	1
Sample Road to SW 10th Street	375	8
SW 10th Street to Hillsboro Boulevard	137	1
Hillsboro Boulevard to Pompano Park Road	157	4

2.24.3 CONTAMINATION

A contamination screening evaluation was performed to evaluate the potential presence of contaminated sites within the I-95 study corridor. A Contamination Screening Evaluation Report (CSER) was prepared pursuant to the FHWA's *Technical Advisory T 6640.8A* and in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 22 – Contamination Impacts (dated January 17, 2008). For additional information on contamination, please refer to the CSER prepared for this project, which is on file at the FDOT District Four office in Fort Lauderdale, Florida.

A review of all available data occurred, including agency file reviews at the Broward County Pollution Prevention, Remediation, and Air Quality Division (BCPPRAQD), Palm Beach County Department of Environmental Resources Management, and the FDEP, and a review of Environmental Data Resources, Inc. agency database search (within ¼-mile radius of the project corridor), city directories, Sanborn Fire Insurance Company maps, and aerial photography from 1963 through 2000. In addition, a field reconnaissance was conducted on accessible right of way adjacent to the project on June 28 and 29, 2012, to further evaluate the potential for environmental contamination. The field reconnaissance also served to confirm current business address listings and site conditions.

After a review of all available data, such as agency file reviews at Broward and Palm Beach counties and FDEP, the EDR database report, aerial photography, and the site reconnaissance, 61 sites of potential environmental concern were identified for the I-95 project corridor; of these, 21 sites are rated as High risk, 25 sites are rated as Medium risk and 15 sites are rated as Low risk. Remaining sites identified in the above-referenced sources are not considered to pose potential contamination concerns either because of the current regulatory status of the site, the site's location/distance from the project corridor, and/or the direction with reference to the I-95 project corridor (down-gradient/cross-gradient). The 61 potential contamination concerns are summarized in ***Table 2.28*** and mapped on ***Sheets 1*** through ***25*** of ***Appendix K***. Relevant documents, notes, and copies of agency files for all of the sites determined to be High Risk are also included in the CSER.

Table 2.28
Potential Contamination Concerns

Site #	Risk Rating	Site Name	FDEP Facility ID	Address	City/State/Zip Code	County
1	**MEDIUM**	Broward County Parks & Recreation No. 13	8732768	950 NW 38th Street	Oakland Park, FL 33309	Broward
2	**MEDIUM**	Broward County School Board – Twin Lakes Bus Facility	8622523	3895 NW 10th Avenue	Oakland Park, FL 33309	Broward
3	**MEDIUM**	Broward County School Board - Maintenance Department	8622521	3810 NW 10th Avenue	Oakland Park, FL 33309	Broward
4	**LOW**	Ft. Lauderdale City Utilities Complex	8622597	949 NW 38th Street	Oakland Park, FL 33309	Broward
5	**MEDIUM**	Ft. Lauderdale City Five Ash Water Treatment Plant	8943040	4321 NW 9th Avenue	Fort Lauderdale, FL 33309	Broward
6	**HIGH**	FDOT Right of Way Parcel 103A	9701012	899 West Prospect Road	Oakland Park, FL 33309	Broward
7	**HIGH**	Lyons Property	9700578	481 West Prospect Road	Fort Lauderdale, FL 33309	Broward
8	**HIGH**	Sunoco Twin Oil Company	8627788	4891 Powerline Road	Oakland Park, FL 33309	Broward
9	**HIGH**	First Coast Energy No. 1818	8501625	890 NW 50th Street	Fort Lauderdale, FL 33309	Broward
10	**HIGH**	Adventure Petroleum (AKA Powerline British Petroleum Amaco)	8501632	4999 Powerline Road	Fort Lauderdale, FL 33309	Broward
11	**HIGH**	7-Eleven Food Store No. 34825	8501585	901 West Commercial Blvd.	Fort Lauderdale, FL 33309	Broward
12	**LOW**	BJ's Wholesale Clubs #181	9809646	5100 NW 9th Avenue	Fort Lauderdale, FL 33309	Broward
13	**MEDIUM**	Thompson Office Equipment	8838264	5301 NW 9th Avenue	Fort Lauderdale, FL 33310	Broward

Table 2.28
Potential Contamination Concerns

Site #	Risk Rating	Site Name	FDEP Facility ID	Address	City/State/Zip Code	County
14	**HIGH**	FDOT Operations Center	8622445	5548 NW 9th Avenue	Fort Lauderdale, FL 33309	Broward
15	**HIGH**	Hollingsworth Solderless Terminal	No FDEP ID USEPA ID: FLD004119681	700 NW 57th Place	Fort Lauderdale, FL 33309	Broward
16	**LOW**	Broward Trade Centre	9402000	200 West Cypress Creek Road	Fort Lauderdale, FL 33309	Broward
17	**LOW**	Westin Hotel Cypress Creek	9202030	400 Corporate Drive	Fort Lauderdale, FL 33334	Broward
18	**MEDIUM**	ABC Cutting Contractors	8838455	2001 North Andrews Avenue	Pompano Beach, FL 33069	Broward
19	**MEDIUM**	Dixie Auto Parts & Salvage	9063875	1621 South Dixie Highway	Pompano Beach, FL 33060	Broward
20	**HIGH**	Radiant Oil Company of Florida	9101898	1000 NW 13th Avenue	Pompano Beach, FL 33069	Broward
21	**MEDIUM**	General Roofing Industries	8838267	951 South Andrews Avenue	Pompano Beach, FL 33069	Broward
22	**MEDIUM**	Associated Grocers of Florida	8622346	1141 SW 12th Avenue	Pompano Beach, FL 33069	Broward
23	**MEDIUM**	Carpenter Contractors of America	8840237	941 SW 12th Avenue	Pompano Beach, FL 33069	Broward
24	**HIGH**	Sultan & Sons	8627971	650 SW 9th Terrace	Pompano Beach, FL 33069	Broward
25	**MEDIUM**	Everglades Paving Company	9201422	697 SW 9th Terrace	Pompano Beach, FL 33069	Broward
26	**MEDIUM**	The Store Room (formerly Lambda Novatronics)	No FDEP ID	500 South Andrews Avenue	Pompano Beach, FL 33069	Broward

Table 2.28 Potential Contamination Concerns						
Site #	**Risk Rating**	**Site Name**	**FDEP Facility ID**	**Address**	**City/State/Zip Code**	**County**
			USEPA ID: FLD00414603			
27	**LOW**	Humana Hospital Cypress (AKA Reach The Children)	9045938	600 SW 3rd Street	Pompano Beach, FL 33060	Broward
28	**MEDIUM**	Florida Power and Light Pompano Service Center	8622464	330 SW 12th Avenue	Pompano Beach, FL 33069	Broward
29	**HIGH**	Atlantic Lumber	8734833	1291 West Atlantic Blvd.	Pompano Beach, FL 33069	Broward
30	**MEDIUM**	Broward Disposal Corporation	8501638	201 NW 12th Avenue	Pompano Beach, FL 33069	Broward
31	**HIGH**	Hardy Brothers Station	8502084	1126 Hammondville Road	Pompano Beach, FL 33069	Broward
32	**HIGH**	Ray Anthony International	8837800	280 NW 12th Avenue	Pompano Beach, FL 33069	Broward
33	**HIGH**	Lind-Rich	8502237	1199 Hammondville Road	Pompano Beach, FL 33069	Broward
34	**HIGH**	TM Window & Door	FDEP Site Investigation Section Number 529-1	601 NW 12th Avenue	Pompano Beach, FL 33069	Broward
35	**MEDIUM**	Trademark Metals Recycling	9801547	811 NW 13th Avenue	Pompano Beach, FL 33069	Broward
36	**MEDIUM**	Scrap Metal Recycling	8942834	840 NW 12th Terrace	Pompano Beach, FL 33070	Broward
37	**HIGH**	Pompano Electric - 0020	8942834	1200 NW 15th Avenue	Pompano Beach, FL 33069	Broward
38	**MEDIUM**	Florida Power and Light #7831	8622477	900 SE 15th Street	Pompano Beach, FL 33060	Broward
39	**MEDIUM**	Martin Brower	9808541	1661 NW 12th Avenue	Pompano Beach, FL 33069	Broward

Table 2.28
Potential Contamination Concerns

Site #	Risk Rating	Site Name	FDEP Facility ID	Address	City/State/Zip Code	County
40	**MEDIUM**	Gold Coast Beverage Distributors	8841281	1751 NW 12th Avenue	Pompano Beach, FL 33069	Broward
41	**MEDIUM**	Copans Road Dump	Landfill ID 53353	350 West Copans Road	Pompano Beach, FL 33060	Broward
42	**MEDIUM**	Cemex - North Pompano Ready Mix	8622333	1150 NW 24th Street	Pompano Beach, FL 33064	Broward
43	**HIGH**	British Petroleum Copans No. 614	8502690	290 West Copans Road	Pompano Beach, FL 33064	Broward
44	**MEDIUM**	Chevron-Copans Road	8501760	1231 West Copans Road	Pompano Beach, FL 33064	Broward
45	**HIGH**	Chevron-Assura Shaun Corporation	8501787	390 West Sample Road	Pompano Beach, FL 33064	Broward
46	**HIGH**	Sample Road Operating, LLC	9804918	250 East Sample Road	Pompano Beach, FL 33064	Broward
47	**LOW**	North Broward Hospital District	8731639	201 East Sample Road	Pompano Beach, FL 33064	Broward
48	**LOW**	Broward County School Board - Tedder Elementary School	9047396	4157 NE 1st Terrace	Pompano Beach, FL 33064	Broward
49	**LOW**	Broward County School Board - Bright Horizons	9047323	3901 NE 1st Terrace	Pompano Beach, FL 33064	Broward
50	**MEDIUM**	DDI Transport Spill Site	9802066	I-95- North of Sample Road	Pompano Beach, FL	Broward
51	**LOW**	City of Deerfield Beach Mitigation Operation Center	9808466	1345 SW 11th Way	Deerfield Beach, FL 33441	Broward
52	**LOW**	Quest Laboratories, Inc.	9812216	1300 E Newport Center Dr	Deerfield Beach, FL 33442	Broward

Table 2.28 Potential Contamination Concerns						
Site #	**Risk Rating**	**Site Name**	**FDEP Facility ID**	**Address**	**City/State/Zip Code**	**County**
53	**LOW**	University of Miami Sylvester Comprehensive Cancer Care Center	9811006	1192 E Newport Center Dr	Deerfield Beach, FL 33442	Broward
54	**LOW**	MAPEI Corporation	9700509	1144 E Newport Center Dr	Deerfield Beach, FL 33442	Broward
55	**LOW**	Best Western of Newport Drive	9807870	1050 E Newport Center Dr	Deerfield Beach, FL 33442	Broward
56	**LOW**	7-Eleven Store No. 34839	9700573	900 SW 10th Street	Deerfield Beach, FL 33441	Broward
57	**HIGH**	Publix Supermarket	8945000	777 SW 12th Avenue	Deerfield Beach, FL 33442	Broward
58	**HIGH**	7-Eleven Food Store No. 34801	8502350	1200 West Hillsboro Blvd.	Deerfield Beach, FL 33442	Broward
59	**MEDIUM**	Sunshine No. 300035	8731682	1277 West Hillsboro Blvd.	Deerfield Beach, FL 33442	Broward
60	**MEDIUM**	FDOT Tri-Rail Spill	9202776	South Florida Rail Corridor and Camino Real Road	Boca Raton, FL 33486	Palm Beach
61	**LOW**	Cingular Wireless Fuel Spill	9806102	1551 West Camino Real	Boca Raton, FL 33486	Palm Beach

Wellfield Protection Areas

The Wellfield Protection Programs in both Broward County and Palm Beach County protect the aquifer by restricting land uses within the vicinity of the public wellfield protection areas. No part of the project corridor crosses the wellfield protection areas in the Palm Beach County. However, the following sections of the project corridor within Broward County cross wellfield protection areas:

- The section of the project corridor between SW 4th Street and NW 2nd Street borders zone 3 of the City of Deerfield Beach wellfield protection area.
- The section of the project corridor between NE 50th Street to SW 11th Court intersects zones 2 and 3 of the City of Deerfield Beach wellfield protection area.
- The section of the project corridor between West Copans Road to NE 29th Street borders zone 3 of the City of Pompano Beach wellfield protection area.

The local groundwater flow may be influenced by the groundwater recovery schedules of the above referenced wellfields located in northern Broward County. All phases of work will comply with the requirements of the applicable codes of each of the respective counties. Therefore, the proposed project is not expected to affect potable water quality.

Brownfields

Brownfields are sites that are generally abandoned, idled, or underused industrial and commercial properties where expansion or redevelopment is complicated by actual or perceived environmental contamination. A brownfield area is a contiguous area of one or more brownfield sites, some of which may not be contaminated. These are designated as such by a local government by adoption of resolution. Economic incentives, tax credits, a streamlined process, and low interest loans are some of the resources available through the Brownfields Program to redevelopers who clean up and develop a designated brownfield site.

A portion of the project corridor is located within the Pompano Beach Northwest Brownfield Area, designated by Broward County. It is bordered to the south by Atlantic Boulevard and to the north by Copans Road (Broward County

Brownfield Areas Map, April 2012). The site-specific contamination concern(s) within this designated brownfield area have been identified and are discussed in the CSER. Considering the fact that a portion of the project corridor is an area designated as a brownfield area, the potential for soil and/or groundwater contamination from local or regional sources does exist.

Asbestos Surveys

In August 2011, GLE Associates performed a survey for the asbestos-containing materials (ACM) to identify accessible ACM in various bridges along and across the project corridor (I-95) in Broward County and Palm Beach County, Florida. The survey was conducted pursuant to National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements. This survey was performed by Mr. Mike Love and Mr. Jeff Knight, EPA/AHERA (Environmental Protection Agency/Asbestos Hazard Emergency Response Act) accredited asbestos inspectors.

Toxicity Characteristic Leaching Procedure (TCLP) Sampling and Paint Screening Surveys

GLE Associates performed limited toxicity characteristic leaching procedure (TCLP) sampling and paint screening surveys on the following bridges in Broward County, Florida:

- Bridge # 860128: Southbound Interstate 95 (I-95/SR-9) over Northwest 9th Avenue (SR-845 / Powerline Road) (MP 14.27)
- Bridge # 860198: Northbound Interstate 95 (I-95/SR-9) over Northwest 9th Avenue (SR-845 / Powerline Road) (MP 14.243)

The surveys were conducted in August 2011, by Mr. Jeffrey Knight and Mr. Michael Love, under the supervision of John Simmons, of GLE Associates. Individual reports for the four bridges are available for review at FDOT IV offices in Fort Lauderdale, Florida for further details.

The bridges are constructed of pre-stressed concrete and metal beam structures with two supporting slope abutments. Sub-structure was provided by three pre-stressed concrete intermediate bent frames. The bridges overlie/intersect eastbound and westbound Northwest 9th Avenue (SR-845/Powerline Road).

A total of one representative paint sample was collected from each of the two bridges as shown in ***Table 2.29***.

Table 2.29 Summary of Sampling Locations				
#	**Bridge#**	**Sample ID**		**Sample Location**
1	860128	860128	I-95 SB over Powerline Road	Green Paint on Beam Span
2	860198	860198	I-95 NB over Powerline Road	Green Paint on Beam Span

The paint samples were shipped under strict chain-of-custody to EHS Laboratories in Richmond, Virginia, a laboratory accredited by the Florida Department of Health, the National Environmental Laboratory Accreditation Program (NELAP), and the American Industrial Hygiene Association Laboratory Accreditation Program (AIHA LAP).

2.25 AESTHETICS

The I-95 corridor within the project limits consists of a highly urbanized highway roadway corridor, with few aesthetic features present for motorists traveling the corridor. Some of the park/recreational areas (discussed in ***Section 2.22.3***) and the historic sites (discussed in ***Section 2.22.2***) could be considered aesthetic features to the extent that they can be viewed by passing motorists along the roadway corridor; however, views of these features are highly limited by the existing roadway infrastructure. Broward County also has a proposed greenway network, which crosses I-95 along the project corridor, which could be considered a visual resource in the future.

3.0 PLANNING PHASE/CORRIDOR ANALYSIS

3.1 MASTER PLAN SUMMARY

I-95 is considered the "spine" of the transportation system in southeast Florida. This corridor is the primary interstate facility linking all major cities along the Atlantic seaboard from Maine to Florida. Master planning of major transportation corridors such as the I-95 has been vital to facilitate the availability of capacity within the transportation network and to support the growth in the region.

The FDOT began a major study in the early 1980s, *Interstate 95 High Occupancy Vehicle Lane Study,* for the I-95 corridor from the Miami-Dade/Broward County line to north of Glades Road (SR 808) in Palm Beach County. The study was completed in March 1984. The study provided the preliminary engineering data and environmental documentation needed to initiate the design of HOV lanes, auxiliary lanes, and interchange improvements. This study provided the basis for several subsequent studies along the I-95 corridor during the late 1980s and throughout the 1990s.

As a result of the population growth in the southeast Florida during the past three decades, the FDOT conducted a study to address the escalating congestion along the corridor. Building upon the previous studies, in 2003 the FDOT finalized a master planning study for the I-95/I-595 corridors and the South Florida Rail Corridor (SFRC). The *I-95/I-595 Master Plan Study* evaluated the existing deficiencies and recommended possible future improvements along the corridor. The master plan study followed a process designed to reach the resultant improvement recommendations through an appropriate level of technical work and a coordinated public involvement program.

A Tier 1 assessment of the corridors was performed prior to commencing the master plan study. This assessment examined several Conceptual Mobility Enhancement Alternatives that suggested improvements to alternate travel modalities and transportation network components such as transit system, mainline improvements, HOV lanes, and ITS elements.

Four alternatives plus a Do-Nothing Alternative were evaluated during the Tier 2 analysis. The results of the Tier 2 alternatives were distributed to local, regional, state and federal agencies for review and comments. A preliminary Locally Preferred Alternative (LPA) was identified based on the comments and feedback from the agencies.

The preliminary LPA incorporated the improvements adopted by the Broward and Palm Beach County MPOs in their 2020 LRTP which included the planned expansion of Tri-Rail services. This alternative addressed capacity deficiencies in both corridors and included the following elements:

Broward County – The preliminary LPA adopted the county's LRTP for the I-95 corridor to facilitate continuity and compatibility with the Palm Beach County plan. The Broward County LRTP included the widening of I-95 from Commercial Boulevard to the Broward/Palm Beach County Line from eight lanes to ten lanes, eight general purpose lanes and two HOV lanes.

Palm Beach County – The preliminary LPA adopted the county's LRTP for the I-95 corridor to facilitate continuity and compatibility with the Broward County plan. The 2020 West Palm Beach Urban Study Area LRTP included the widening of I-95 from eight lanes to ten lanes from the Broward/Palm Beach County Line to PGA Boulevard, eight general purpose lanes and two HOV lanes.

Tri-Rail – The preliminary LPA adopted the improvements included in the Tri-Rail Master Plan. This plan proposed a double track along the entire Tri-Rail corridor, reducing the headway to 20 minutes. Moreover, the plan proposed new Tri-Rail stations along the limits.

The LPA was evaluated during Tier 3, and an implementation plan was developed as part of the study. The plan included the following recommendations:

- I-95 from Commercial Boulevard to Linton Boulevard
    - Prepare a Systems Interchange Modification Report that includes the analysis of a potential new interchange connection between Glades Road and Yamato Road.
    - Prepare a PD&E study between Commercial Boulevard and Cypress Creek Road to widen the corridor to ten lanes.
    - Prepare a PD&E Study between Cypress Creek Road and Linton Boulevard to widen the corridor to ten lanes.

- I-95 from Linton Boulevard to Okeechobee Boulevard – Prepare a PD&E study to widen the corridor to ten lanes.
- I-95 from Okeechobee Boulevard to Indiantown Road – The original PD&E study, from Okeechobee Boulevard to PGA Boulevard, was updated and its northern limits extended to Indiantown Road. The entire segment was planned as a ten-lane typical section.
- I-95 Interchange with SR 710 – Prepare an Interchange Justification Report for a possible new interchange connection.

Interim safety improvements were also recommended at the following high accident rate interchanges:

- Sheridan Street – Improve the northbound off-ramp to two lanes and provide a dual right turn.
- Sunrise Boulevard – Provide additional storage on the southbound off-ramp and an additional right turn lane at the intersection.
- Oakland Park Boulevard – Construct a two-lane off-ramp in the southbound direction with three lanes of available storage on the ramp.
- I-95 southbound between Andrews Avenue and Commercial Boulevard – Construct a collector distributor road with an overpass at Commercial Boulevard.
- Atlantic Boulevard Signalized Intersections: Provide a dual left turn for the westbound to southbound on-ramp, improve the southbound to westbound off-ramp with a dual right turn and triple left turn.
- Yamato Road – Provide a two-lane southbound on-ramp and construct auxiliary lanes in both directions between Glades Road and Yamato Road.

The ITS improvements for the corridor included the recommendations from the *Southeast Florida Intelligent Corridor System Final Report*. These improvements comprised the use of service patrols, installation of DMS signs, loop detectors, and CCTV.

3.2 I-95 Corridor Planning Study

In 2009, the FDOT began the *I-95 Corridor Planning Study (CPS)*, between Stirling Road (SR 848) in Broward County and Indiantown Road (SR 706) in Palm Beach County, to evaluate the feasibility of adding tolled express lanes in the median of I-95. The study was completed in January 2012 and determined that express lanes along this portion of I-95 was feasible and could be studied further during the PD&E phase to evaluate the concept as a viable alternative along the corridor.

The I-95 CPS assessment of express lanes alternatives was divided into four phases:

- Development of typical section alternatives
- Typical section screening and refinement
- Concept Development
- Potential express lanes access point locations

The express lanes assessment process addressed major technical elements, including travel demand forecasting, traffic operations, and conceptual highway design.

Support for the implementation of express lanes has gained momentum with the success of 95 Express Phase 1. The FDOT Secretary Prasad has stated his wish to build on that success by implementing other express lanes projects in Florida. The FDOT has established a new policy of tolling new interstate and bridge capacity. The policy states that all new capacity on interstates and expressways should be tolled where feasible or at the very least tolls should complement traditional funding in delivering the improvements and new capacity.

3.3 I-95 Corridor Analysis from North of Oakland Park Boulevard to South of Glades Road

This project study is considered a Level II analysis, which represents a study for projects on existing alignments where alternative corridors are not being considered and opportunity exists for an interconnected multimodal transportation system. A corridor, in planning studies, is a broad geographical band that follows a general directional flow and connects major sources of trips. A multimodal corridor may contain a number of cross streets, highways, transit lines, and routes. The corridor analysis section of this study consists of evaluating the existing I-95 corridor and addressing mainline capacity deficiencies. Improving the existing corridor is the only feasible alternative at this time.

The improvements will consist of implementing two express lanes in each direction along the I-95 corridor within the project limits. These improvements are needed to address future vehicular growth projected in the area, improve highway safety, enhance hurricane and other emergency evacuations, and improve system connectivity with major arterials along the corridor. The express lanes will create an opportunity to accommodate a BRT system that will allow bus service between counties, with connections to the existing park-and-ride facilities along the corridor.

Constrained right of way, coupled with the development intensity along the corridor, present challenges for accommodating future traffic growth by widening the mainline. However, two express lanes could be incorporated along the corridor with minimal widening of the mainline and by restriping existing general purpose lanes.

3.4 CONCEPTUAL EVALUATION

The purpose of this section is to discuss the concepts that were developed during the initial phase of the study. All concepts were evaluated in a general manner and analyzed in order to select a build alternative.

3.4.1 CONCEPTUAL TYPICAL SECTIONS

Four conceptual typical sections were considered in the initial phase of the PD&E study. All the concepts propose to add two express lanes in each direction along I-95, provide access points at selected locations along the corridor to enter and exit the express lanes system while maintaining the existing number of general purpose lanes throughout the corridor. In general, the concepts vary on the roadway width (lanes and shoulders) and type of separation between the express lanes and general purpose lanes. The preliminary development and evaluation of these concepts were based on established design controls for the various elements of the project such as roadway width, median width, shoulder width, horizontal alignment and drainage considerations. Other key evaluation features included interchange improvements, structures, environmental impacts, right-of-way, utility impacts, maintenance of traffic and construction costs.

Concept #1- Barrier Wall Separated Express Lanes

In Concept #1, the express lanes will be separated from the general purpose lanes with a rigid concrete barrier wall. The express lanes inside shoulder width will be six feet (6') wide and the outside shoulder width will be ten feet (10') wide (see ***Figure 3.1*** at the end of this section).

Concept #2- Tubular Marker Separated Express Lanes

In Concept #2, the express lanes will be separated from the general purpose lanes with a tubular marker and a four-foot (4') wide buffer. The express lanes inside shoulder width will be twelve feet (12') wide (see ***Figure 3.1*** *at the end of this section*).

Concept #3- Tubular Marker Separated Express Lanes

In Concept #3, the express lanes will be separated from the general purpose lanes with a tubular marker and a four-foot (4') wide buffer. Concept #3 is similar to Concept #2 (see ***Figure 3.2*** at the end of this section). The only difference is the reduction of the typical section width (express lanes, roadway shoulders and/or buffer widths) at the following four locations:

- Commercial Boulevard Interchange Flyover
- Andrews Avenue Overpass
- Racetrack Road Overpass
- SW 10th Street Interchange Overpass
- NE 48th Street Overpass

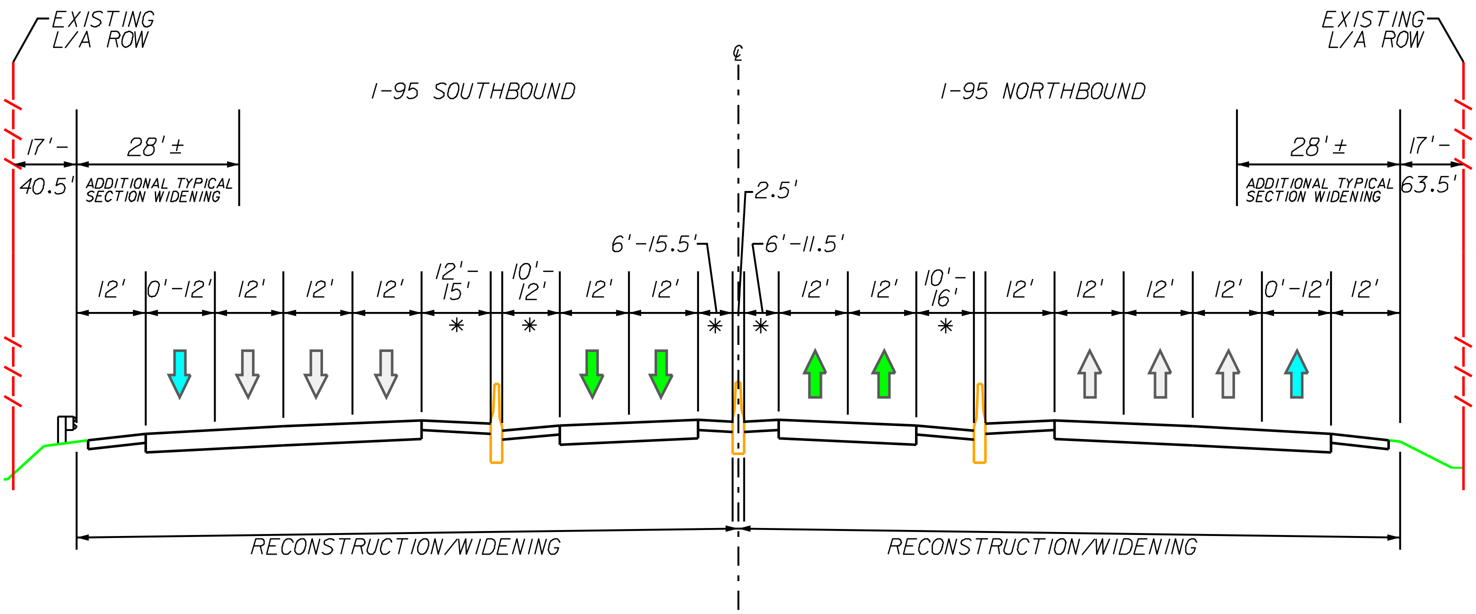
The existing footprint under these structures cannot accommodate the proposed roadway typical section. Therefore, the typical sections will need to be reduced in order to avoid reconstructing these cross streets (roadway and structure). ***Figure 3.2*** depicts the proposed typical sections at these constrained locations.

Concept #4- 95 Express Phase 2 (Tubular Marker Separated Express Lanes)

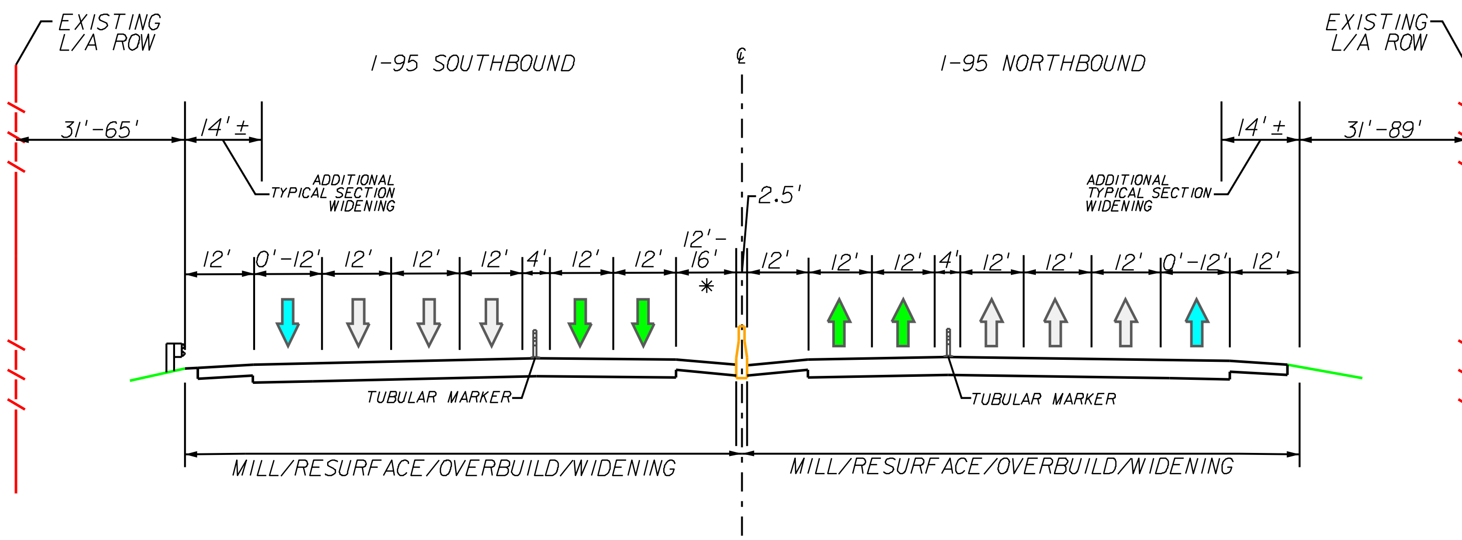
In Concept #4, the express lanes will be separated from the general purpose lanes with a tubular marker and a three-foot (3') wide buffer. Concept #4 is similar to Concepts #2 and #3 (see ***Figure 3.3*** at the end of this section). The main difference is the reduction of the typical section width (express lanes width, one general purpose lane width and roadway shoulders width) is throughout the entire project study limits. This typical section is consistent with the 95 Express Phase 2 typical sections, currently under construction between the Golden Glades Interchange in Miami-Dade County and Interstate 595 in Broward County.

GENERAL PURPOSE LANE
EXPRESS LANE
AUXILIARY LANE

CONCEPT #1 TYPICAL SECTION



CONCEPT #2 TYPICAL SECTION



* LOW VALUE IS TYPICAL, BUT VARIES IN SPECIFIC LOCATIONS DUE TO STOPPING SIGHT DISTANCE CRITERION

NOTES: DESIGN SPEED = 65 MPH
L/A = LIMITED ACCESS

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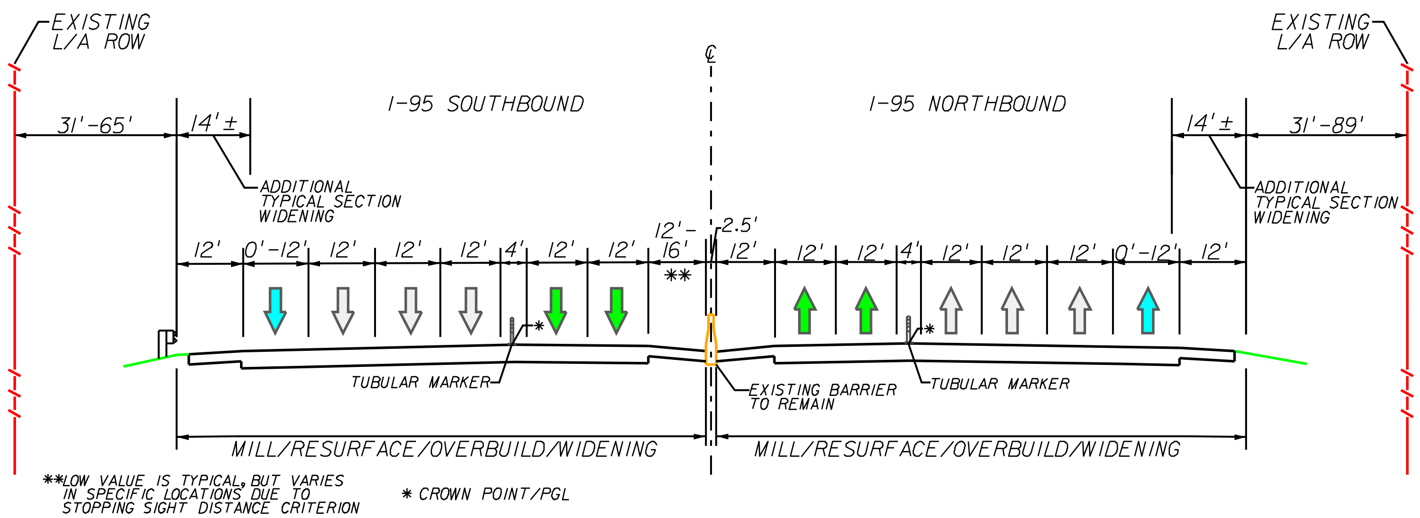
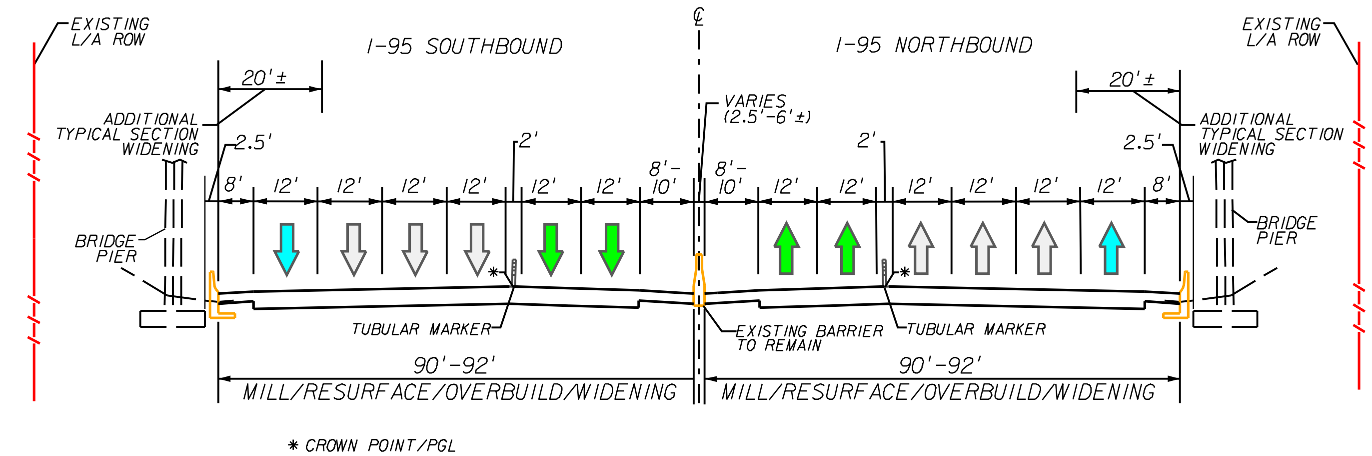
CONCEPT #1 AND CONCEPT # 2	FIGURE 3.1
CONCEPTUAL TYPICAL SECTION EVALUATION	PAGE 3-7

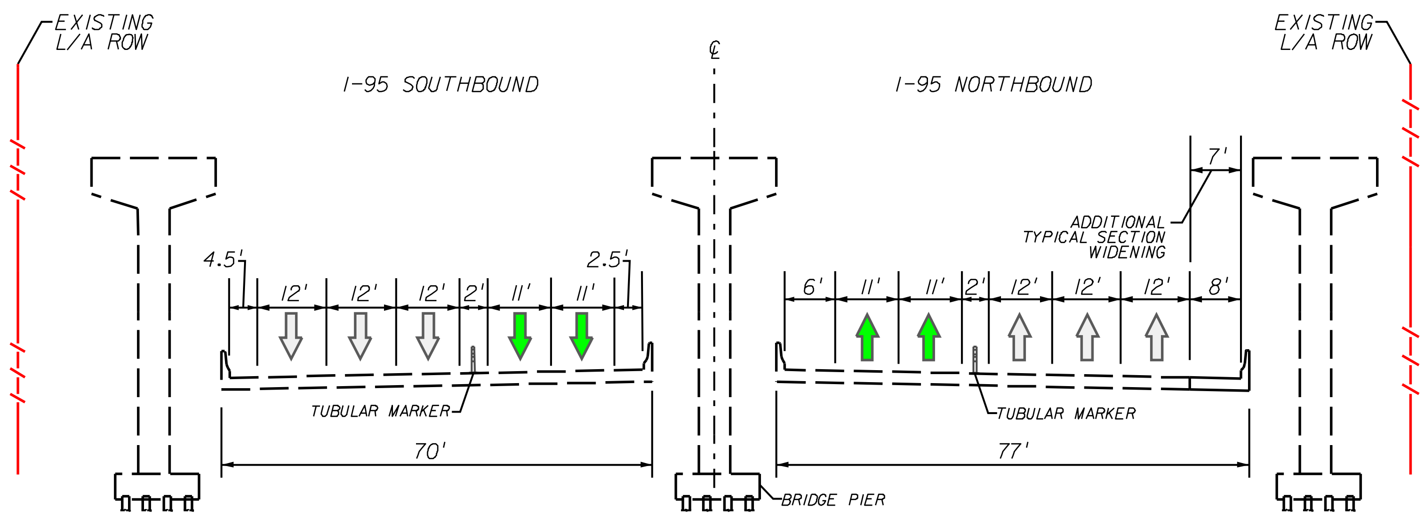
CONCEPT #3 TYPICAL SECTION



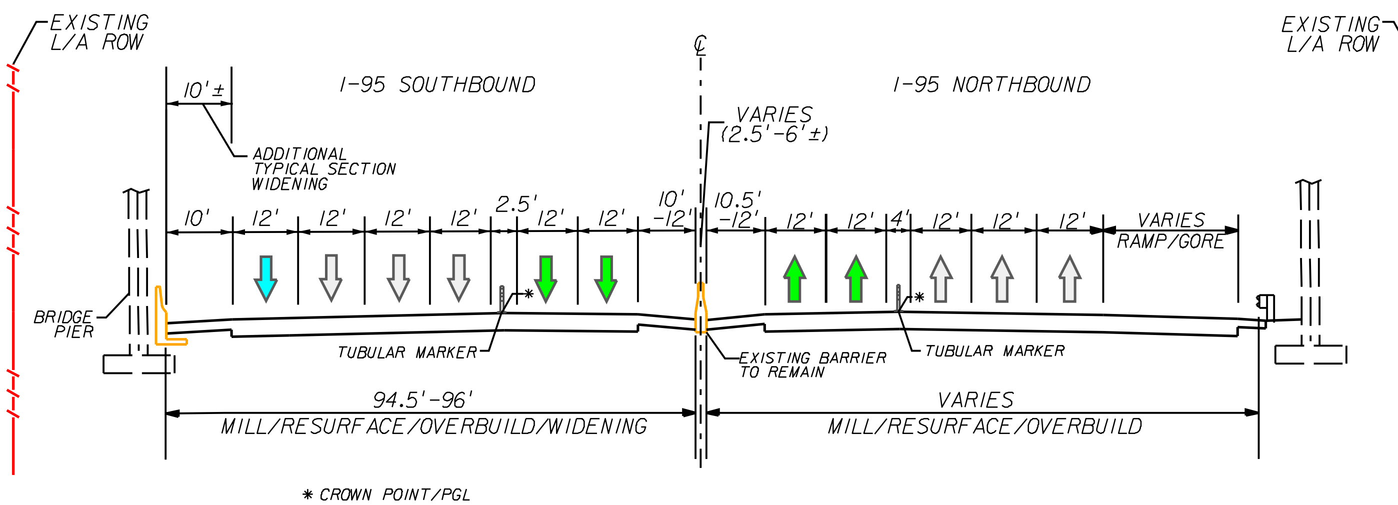
TYPICAL SECTION IN CONSTRAINED AREA (NE 48TH STREET)



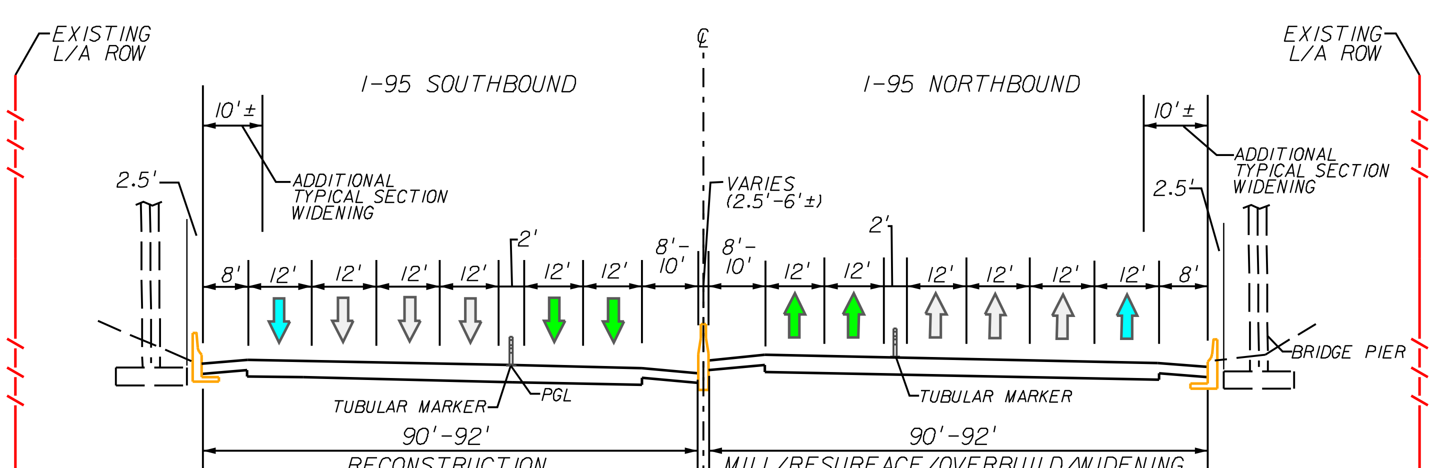
TYPICAL SECTION IN CONSTRAINED AREA (COMMERCIAL BOULEVARD)



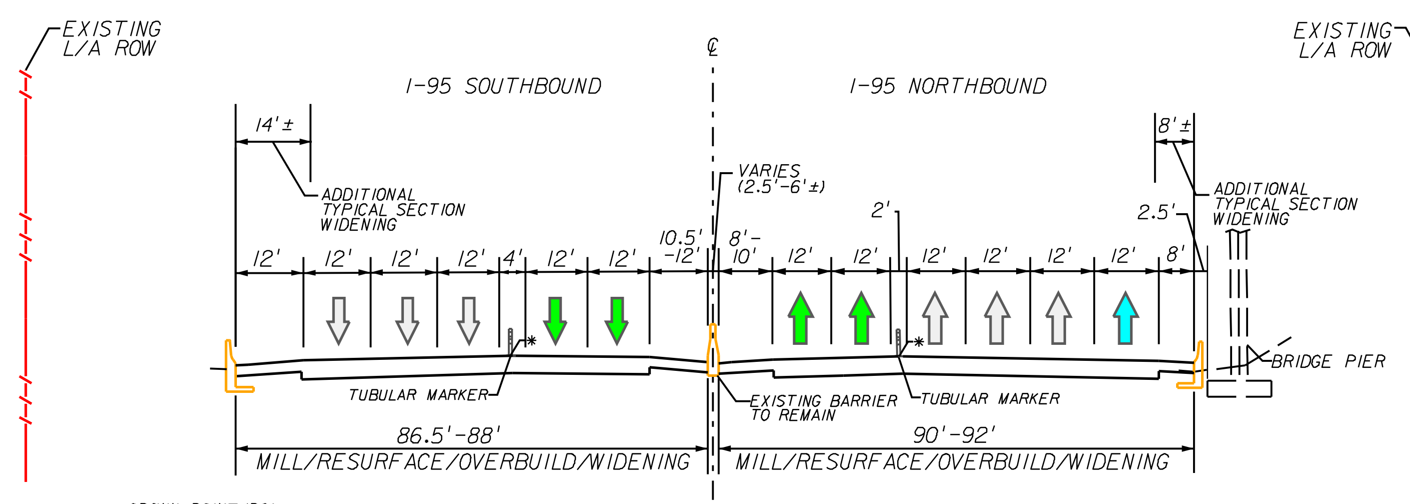
TYPICAL SECTION IN CONSTRAINED AREA (RACE TRACK ROAD)



TYPICAL SECTION IN CONSTRAINED AREA (ANDREWS AVENUE)



TYPICAL SECTION IN CONSTRAINED AREA (SW 10TH STREET)



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ETDM: 3330

NOTES/LEGEND:
GENERAL PURPOSE LANE — EXPRESS LANE — AUXILIARY LANE

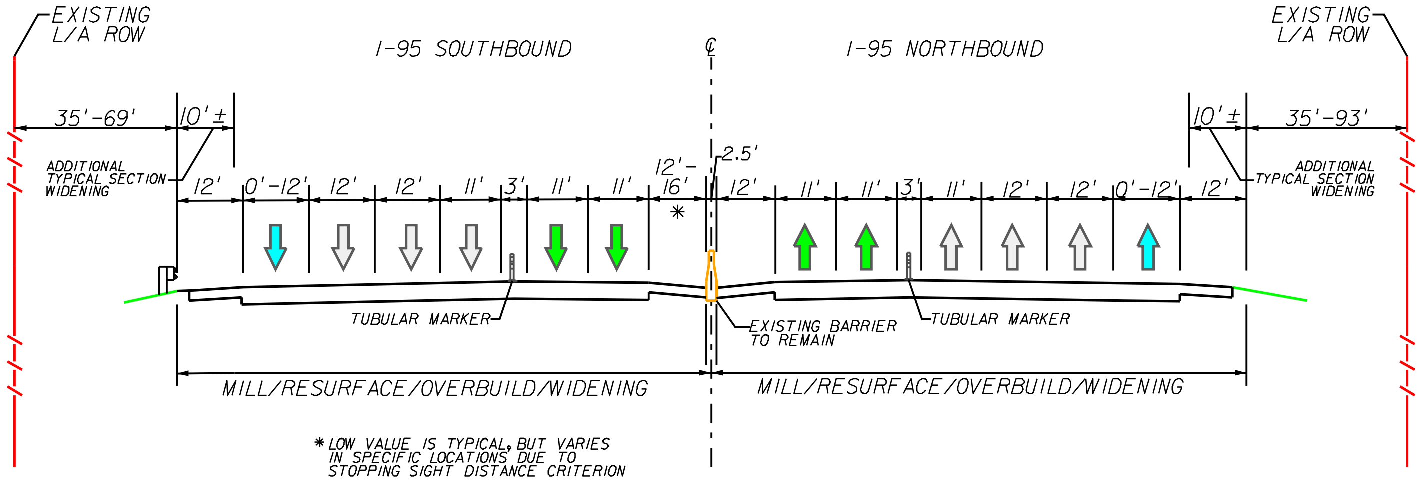
DESIGN SPEED = 65 mph
L/A ROW = LIMITED ACCESS RIGHT OF WAY

CONCEPT # 3

CONCEPTUAL TYPICAL SECTION EVALUATION

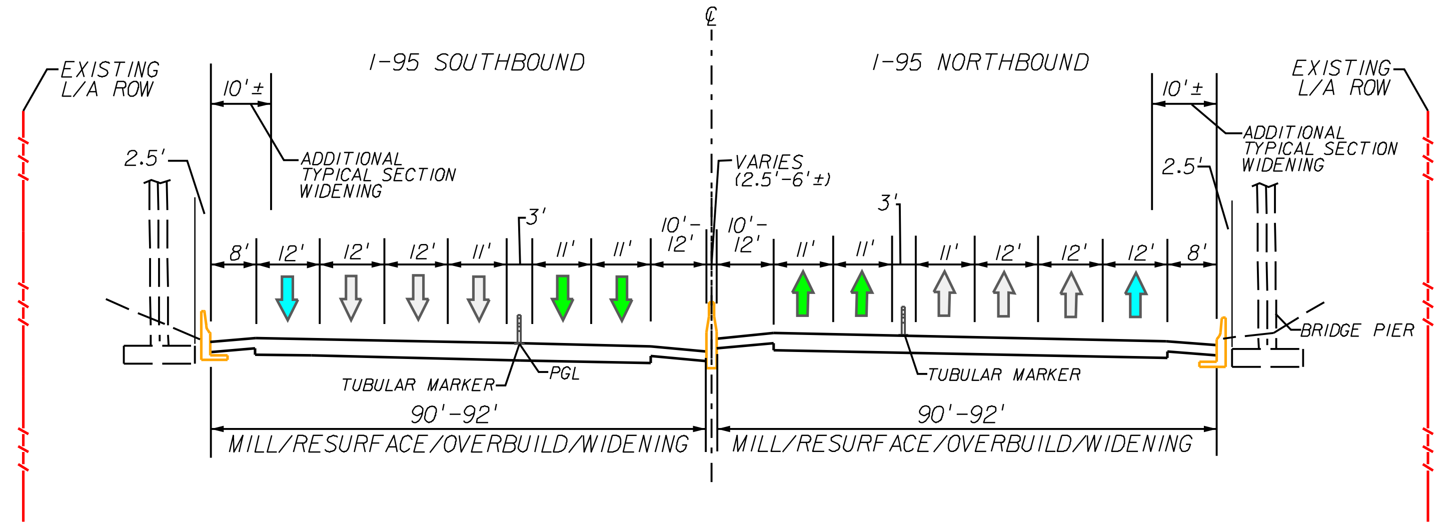
FIGURE 3.2

CONCEPT #4 TYPICAL SECTION



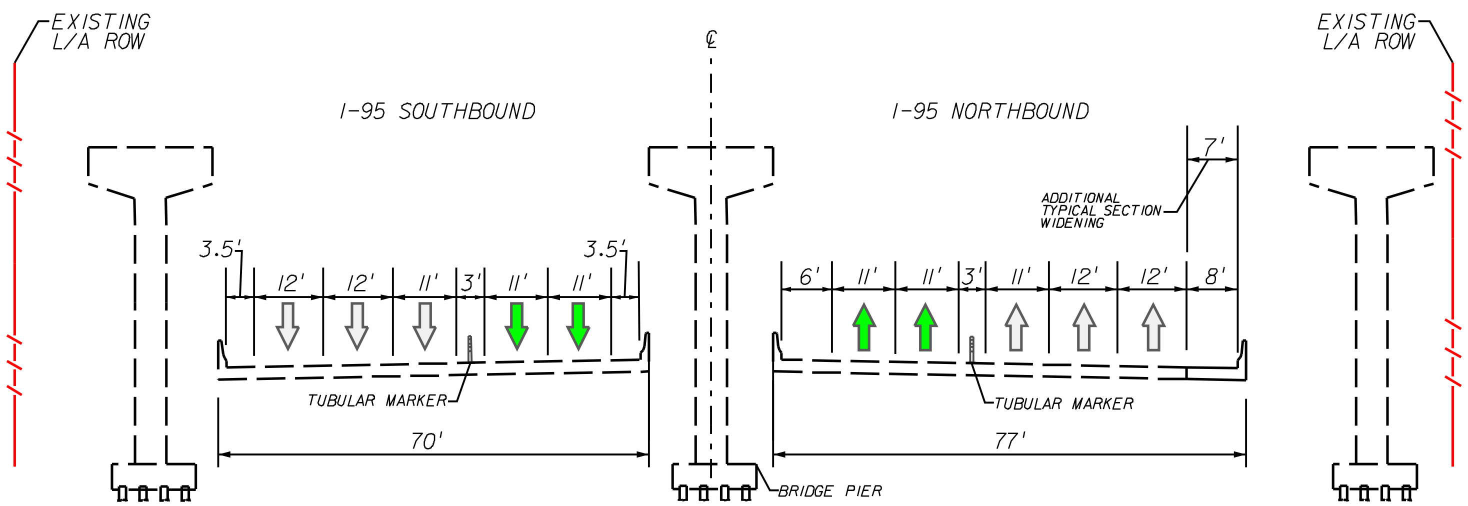
NOTES: DESIGN SPEED = 65 MPH
L/A = LIMITED ACCESS

TYPICAL SECTION IN CONSTRAINED AREA
(ANDREWS AVENUE)



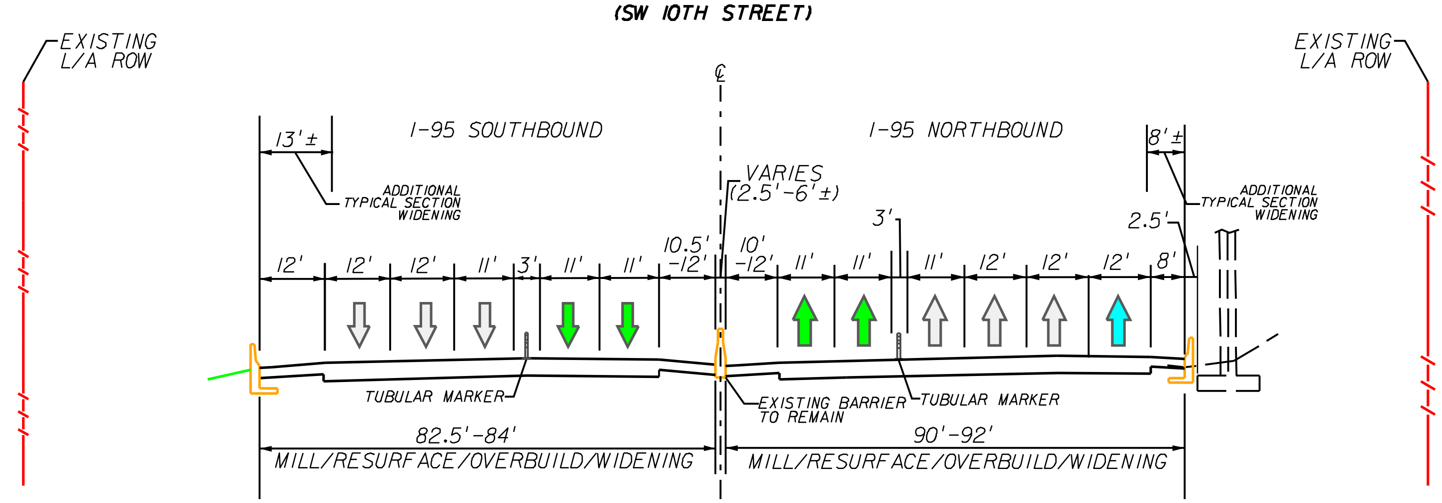
PROPOSED TYPICAL SECTION

TYPICAL SECTION IN CONSTRAINED AREA
(COMMERCIAL BOULEVARD)



PROPOSED TYPICAL SECTION

TYPICAL SECTION IN CONSTRAINED AREA
(SW 10TH STREET)



I-95 (SR 9) PD&E STUDY
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ETDM: 3330

NOTES/LEGEND:
GENERAL PURPOSE LANE
EXPRESS LANE
AUXILIARY LANE
DESIGN SPEED = 65 mph
L/A ROW = LIMITED ACCESS RIGHT OF WAY

CONCEPT # 4
CONCEPTUAL TYPICAL SECTION EVALUATION

FIGURE 3.3

3.4.2 PRELIMINARY TYPICAL SECTION EVALUATION

The key evaluation features considered in the preliminary typical section evaluation are described below and summarized in ***Table 3.1*** (see ***Page 3-17***).

3.4.2.1 *Roadway, Mainline and Interchanges*

Concept #1 will require the placement of new roadway and drainage features (inside and outside) throughout the entire corridor including a significant change in cross slope. It is highly unlikely that any existing pavement could be preserved. Therefore, this concept will require a total reconstruction of the corridor. The total width of the typical section will increase approximately twenty-eight feet (28') on each side. The increase of 28' will impact all the overpasses and interchanges within the study limits. Therefore, all the interchange ramps will need to be reconfigured with major design modification implications. The interchange design modifications will require the preparation of a Systems Interchange Modification Report (SIMR).

Concept #2 will not require total reconstruction. The total width of the typical section will be widened approximately fourteen feet (14') on each side. The increase of 14' will impact all the overpasses and interchanges within the study limits. Therefore, all the interchange ramps will need to be partially realigned. The interchange ramp realignments and the impacts to the Commercial Boulevard and SW 10th Street interchanges will require the preparation of a SIMR.

Concept #3 will not require total reconstruction (similar to Concept #2). The total width of the typical section will be widened approximately fourteen feet (14') on each side. The increase of 14' will impact all the overpasses and interchanges within the study limits except for the structures over I-95. Therefore, all the interchange ramps will need to be partially realigned. The interchange ramp realignments will not require the preparation of a SIMR.

Concept #4 will not require total reconstruction (similar to Concepts #2 and #3). The total width of the typical section will increase approximately ten feet (10') on each side. The increase of 10' will impact all the overpasses and interchanges within the study limits except for the structures over I-95. Therefore, all the interchange ramps will need to be partially realigned. The interchange ramp realignments will not require the preparation of a SIMR.

3.4.2.2 *Design Exceptions and Variations*

Concept #1 will require the reconstruction of the corridor. The total width of the typical section will increase approximately twenty-eight feet (28') on each side within the existing right of way. This concept will meet all roadway criteria and standards (FDOT and AASHTO) along the mainline. All existing border width, vertical alignment and vertical clearance design exceptions and variations will remain. These existing design exceptions and variations exist throughout most of the study limits.

Concept #2 proposes to widen the typical section approximately fourteen feet (14') on each side within the existing right of way proposing standard lane and shoulder widths. All existing border width, vertical alignment and vertical clearance design exceptions and variations will remain. These existing design exceptions and variations exist throughout most of the study limits.

Concept #3 proposes to widen the typical section approximately fourteen feet (14') on each side within the existing right of way (similar to Concept #2). All existing border width, vertical alignment and vertical clearance design exceptions and variations will remain. These existing design exceptions and variations exist throughout most of the study limits. In order to avoid reconstructing the areas of Commercial Boulevard Interchange, Andrews Avenue Overpass and SW 10th Street Interchange the following additional design exceptions and variations will be required:

- Lane Width (Design Exception)
- Shoulder Width (Design Exception and Variation)

This concept will meet all future roadway lane and shoulder width standards (FDOT and AASHTO) for about 96% of the study limits.

Concept #4 proposes to widen the typical section approximately ten (feet 10') on each side within the existing right of way. All existing border width, vertical alignment and vertical clearance design exceptions and variations will remain. These existing design exceptions and variations exist throughout most of the study limits. In order to minimize impacts throughout the corridor and avoid reconstructing the areas of Commercial Boulevard Interchange, Andrews

Avenue Overpass and SW 10th Street Interchange the following additional design exceptions and variations will be required:

- Lane Width (Design Exception)
- Shoulder Width (Design Exception and Variation)

Border width, shoulder width, lane width, vertical alignment and vertical clearance will not be met throughout most of the corridor.

Table 3.1(see ***Page 3-17***) summarizes the numbers of design exceptions and variations anticipated for each concept.

3.4.2.3 *Bridge Analysis*

There are forty-two (42) bridge structures along the study limits. Widening and replacement of these bridges were considered in the evaluation. All bridges have adequate sufficiency ratings. The driving consideration for replacement has been the inability to maintain the existing vertical clearance and/or the footprint underneath cannot accommodate the proposed typical sections. By using a shallower superstructure, most of the structures along I-95 can be widened. Based on the preliminary corridor survey data, 33 bridges do not meet the FDOT vertical clearance criteria and 26 bridges do not meet the AASHTO vertical clearance criteria.

Concept #1 proposes to replace ten bridges and to widen 30 bridges. Concept #2 proposes to replace five bridges and to widen 29 bridges. Concepts #3 and #4 propose to replace two bridges and to widen 28 bridges.

3.4.2.4 *Drainage Analysis*

A preliminary drainage analysis was conducted to estimate whether offsite ponds will be needed to meet water quantity and water quality parameters along the corridor. The analysis was performed by following the approved processes and techniques consistent with the *FDOT Drainage Manual.*

- Determined drainage basin boundaries based upon an aerial survey of project hydraulic features and a review of the existing roadway plans.

- Calculated the new impervious areas for each alternative based upon the drainage basin limits and the proposed typical sections.
- Calculated the required water quality retention volume based upon the new impervious drainage areas.
- Calculated the required attenuation volume based on the 25-year 72-hour design storm.
- Determined the lost swale storage volume for each drainage basin based upon the proposed typical sections.
- Added the lost swale storage volume to the required attenuation volume in order to determine the total required attenuation storage volume.
- Determined the additional available infield area storage volume assuming an allowable rise of 0.3 feet in stage and subtracted this volume from the total required attenuation storage volume.
- Determined the maximum length of French drain that can be added to each drainage basin.
- Calculated the amount of runoff that can be handled by the length of the proposed French drain and subtracted that volume from the adjusted total required attenuation storage volume.
- The remaining required attenuation volume was then used to determine the additional right-of-way requirements for the placement of retention ponds.

The preliminary drainage analysis determined that Concept #1 will require approximately fifty-eight (58) acres for offsite ponds and 110,000 linear feet of French drains. After widening the corridor to construct this concept, the remaining right-of-way areas cannot accommodate the required drainage features. Therefore, right-of-way acquisition will be necessary to accommodate the new drainage system.

Concepts #2, #3 and #4 will not require offsite ponds. Concepts #2 and #3 will require approximately 51,300 linear feet of French drains. Concept #4 will not require French drains. After widening the corridor to construct these concepts, the remaining right-of-way areas can accommodate the required drainage features. Therefore, right-of-way acquisition will not be necessary.

3.4.2.5 *Environmental Impacts*

Environmental Justice – Concept #1 will require right-of-way acquisition to accommodate 58 acres of offsite ponds. At this point of the study, the locations of these offsite ponds were not determined. The proposed location of the offsite ponds may require the relocation/displacement of both residential and commercial properties along the corridor.

Concepts #2, #3 and #4 will not require right-of-way acquisition. Therefore, no social, business or neighborhood impacts are anticipated.

Wetlands – In order to determine wetland and surface water communities within and adjacent to the project corridor, available site-specific data was collected and reviewed. There are several wetland and surface water types within and adjacent to the proposed project corridor, which offer the potential for hydrophytic vegetation and wildlife utilization. These areas were categorized using the Florida Land Use, Cover, and Forms Classification System Manual (FDOT, 1999) and the USFWS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al, 1979).

For the most part, the wetlands found within the corridor are considered low quality. The majority of the wetland areas are maintained wet swales and stormwater conveyance features along with the littoral areas associated with stormwater detention ponds.

Concept #1 is anticipated to have the most impacts with approximately 29 acres. Concepts #2, #3 and #4 will have the same type of impact of approximately 14 acres. Almost all the impacts are to existing longitudinal swales and interchange retention areas. In most cases, they are low quality isolated areas.

Noise Impacts – GIS review and field reconnaissances were conducted to identify potentially noise sensitive sites along the limits of this project. Approximately 1,586 first and second-row noise sensitive sites were identified along the project corridor. These sites include residences, schools, religious facilities, parks, hotel pools, and medical facilities.

The wider typical section footprint required for Concept #1 will bring the travel lanes noise source closer to the existing noise receptors. However, the proposed traffic barriers adjacent to the express lanes will cancel some of the tire noise from the express lanes, resulting in similar noise impacts to the other concepts. The existing noise barriers would require relocation and additional noise barriers may be required. The widening required under Concepts #2, #3, and #4 will also bring the travel lanes noise source closer to the existing noise receptors. Under these three concepts, existing noise barriers would be maintained, although additional noise barriers may be required.

3.4.2.6 *Right of Way Impacts*

No right of way acquisition is anticipated to accommodate the roadway improvements under Concepts #2, #3 and #4. However, Concept #1 will require right of way acquisition to accommodate 58 acres of offsite ponds and the new drainage system. At this point of the study, the locations of these offsite ponds were not determined. The proposed location of these offsite ponds may require the relocation/displacement of both residential and commercial properties along the corridor.

3.4.2.7 *Utility Impacts*

Utility impacts will be more severe under Concept #1 than under Concepts #2, #3 and #4. Multiple utility facilities exist within all the interchanges and structures over I-95. Concepts #1 and #2 will require the most interchange and overpass impacts.

3.4.2.8 *Maintenance of Traffic*

Concept #1 will require the most complex maintenance of traffic. This concept requires major roadway, interchange, and bridge reconstruction. There is no expected preservation of the existing roadway. However, the existing roadway can be utilized to facilitate the maintenance of traffic operations. Concept #2 requires widening of the mainline only. Therefore, maintenance of traffic for the mainline will differ only slightly from Concepts #3 and #4. However, several interchanges and structures will require reconstruction. This reconstruction will make the maintenance of traffic for Concept #2 more complex than Concepts #3 and #4. Concepts #3 and #4 will require widening of the mainline and bridges and only minor modifications at the interchanges. The maintenance of traffic for these two concepts should only feature minimal challenges and impacts when compared to Concepts #1 and #2.

3.4.2.9 *Conceptual Construction Cost*

Preliminary conceptual construction costs were prepared for each concept. The conceptual construction costs included the major cost components typically associated with highway construction including earthwork, roadway, shoulder, median, drainage, signing, lighting, signalization, structures and interchange construction. The construction cost did not include ITS and large guide signs. The estimated construction costs were generated using the FDOT Long Range Estimate (LRE) cost estimating system. The total estimated construction costs for each concept are as follows:

- Concept #1 – $428 million
- Concept #2 – $248 million
- Concept #3 – $224 million
- Concept #4 – $205 million

The total estimated construction costs included ten percent (10%) Maintenance of Traffic, eight percent (8%) Mobilization and twenty percent (20%) Project Unknown/Contingency.

Table 3.1 Conceptual Typical Section Evaluation					
Features		**Concept #1** Barrier Wall Separated Express Lanes	**Concept #2** Tubular Marker Separated Express Lanes	**Concept #3** Same as Concept #2 but with a reduced typical section at Commercial Boulevard, Andrews Avenue and SW 10th Street	**Concept #4** I-95 Express Lanes Phase II Tubular Marker Separated Express Lanes
Roadway/Mainline	Reconstruction	Yes	No	No	No
	Widening (Mill/Resurface/Overbuild)	No	Yes (14 feet)	Yes (8-14 feet)	Yes (10 feet)
	Design Variations	Border Width Vertical Alignment Vertical Clearance	Border Width Vertical Alignment Vertical Clearance	Border Width Inside Shoulder Width Outside Shoulder Width Vertical Alignment Vertical Clearance	Border Width Inside Shoulder Width Outside Shoulder Width Vertical Alignment Vertical Clearance
	Design Exceptions	Vertical Clearance	Vertical Clearance	Lane Width Inside Shoulder Width Outside Shoulder Width Vertical Clearance	Lane Width Inside Shoulder Width Outside Shoulder Width Vertical Clearance
Interchanges	Ramp Realignment	All (IMR)	Partial (IMR)	Partial (IOAR)	Partial (IOAR)
	Design Modifications	Yes	No	No	No
Structures	Replacement	10 Bridges	5 Bridges	2 Bridge	2 Bridge
	Widening	30 Bridges	29 Bridges	28 Bridges	28 Bridges
Drainage	Off-Site Ponds	Yes	Potentially	Potentially	Potentially
Environmental Impacts	Environmental Justice	Potentially	No Impacts	No Impacts	No Impacts
	Wetlands	Most impacts anticipated (29 acres)	Less impacts than Concept #1, same impacts as Concepts #3 and #4 (14 acres)	Same impacts as Concepts #2 and #4 (14 acres)	Same impacts as Concepts #2 and #3 (14 acres)
	Noise	Most impacts anticipated	Less impacts than Concept #1, but more impacts than Concepts #3 and #4	Less impacts than Concepts #1 and #2, same impacts as Concept #4	Less impacts than Concepts #1 and #2, same impacts as Concept #3
	Section 4(f) and Section 106	No Impacts	No Impacts	No Impacts	No Impacts
Right-of-Way	Acquisition	Yes	Potentially	Potentially	Potentially
	Relocation	Potentially	No	No	No
Utility Impacts		Most impacts anticipated	Less impacts than Concept #1, but more impacts than Concepts #3 and #4	Less impacts than Concepts #1 and #2, same impacts as Concept #4	Less impacts than Concepts #1 and #2, same impacts as Concept #3
Maintenance of Traffic		Most impacts anticipated	Less impacts than Concept #1, but more impacts than Concepts #3 and #4	Less impacts than Concepts #1 and #2, same impacts as Concept #4	Less impacts than Concepts #1 and #2, same impacts as Concept #3
Conceptual Construction Cost		$428 M	$248 M	$224 M	$205 M

3.4.3 CONCEPTUAL TYPICAL SECTION SELECTION

The typical sections for Concepts #1 and #2 meet all design criteria and standards as required by the FDOT and the American Association of State Highway and Transportation Officials (AASHTO). However, constructing these wider typical sections along I-95 to accommodate the FDOT and AASHTO design criteria would require major reconstruction of the facility and major impacts to highly traveled arterial cross streets. Concept #1 would require substantial right of way acquisition and would impact all the adjacent properties and arterial cross streets along the corridor. In addition, a wider footprint would result in environmental and drainage impacts to the canals and wetlands abutting and crossing the corridor. Concept #2 will significantly impact three of the most highly traveled arterial cross streets within the study limits:

- Commercial Boulevard – Six-lane divided corridor within a three level diamond interchange under I-95
- Andrews Avenue – Four-lane divided corridor over I-95
- SW 10th Street – Six-lane divided corridor within a diamond/one quadrant loop interchange over I-95

These three corridors would require reconstruction (roadway and bridge) in order to accommodate the proposed typical section. The cost associated with the reconstruction, property impacts and environmental impacts would substantially increase the total project cost, resulting in an unfeasible project. Therefore, Concepts #1 and #2 were eliminated from further analysis.

Concepts #3 and #4 were developed in order to preserve the existing roadway alignment, maintain the existing footprint of the facility without the reconstruction of the mainline corridor and to minimize arterial cross street impacts. Concept #4 proposes to reduce the express lanes and one general purpose lane to eleven feet (11') wide and the buffer width to three feet (3') wide. During the concept's reviews by the FDOT and the Federal Highway Administration (FHWA), reducing the travel lanes throughout the corridor was not a design the reviewers were supporting during the typical section development.

Speed was a primary consideration when evaluating the potential adverse impacts of lane width on safety. On high-speed roadways like I-95, the primary safety concern with reductions in lane width is crash types related to lane departure. In addition, trucks and other large vehicles can affect safety and operations by off-tracking into adjacent lanes, the buffer and/or the shoulder. Therefore, not providing the required lane widths along the corridor could produce an unfavorable effect by reducing the relative safety factors. As a result, Concept #4 was eliminated from further analysis.

Based on the conceptual evaluation conducted and documented during the initial phase of the study, it is clear that *Concept #3* will meet the overall project objectives of this PD&E study. These objectives are:

- Design a transportation system that will offer new commuting choices and more reliable travel times during congested periods with the implementation of an express lanes system that can be constructed within the existing right-of-way resulting in a feasible and cost effective project.
- Advance the region's emerging express lanes network to provide immediate congestion relief with minimal impacts to the existing facility.
- Evaluate future mainline improvements in terms of safety, capacity, operations and interstate access that can be constructed and open to traffic in a short term.
- Improve the overall mobility of the I-95 daily users, especially the longer trips.

4.0 PROJECT DESIGN STANDARDS

Design standards are well defined for Florida's limited access facilities. Design standards and criteria provide the framework for evaluating the current geometry, existing deficiencies and future design to meet the mobility needs of the corridor. Specifically, they help establish the roadway typical section, cross-sections, and acceptable interchange configurations.

4.1 GEOMETRIC DESIGN ELEMENTS

Design control and standards used to develop typical sections, horizontal and vertical alignments, and other design features are summarized in the following sections. The criteria are those specified by the FDOT for state roadways. Design criteria presented in this section are based on the design parameters outlined in the following references:

- 2004 American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, Fifth Edition.
- 2013 FDOT, Design Standards for Design, Construction, Maintenance and Utility Operations on the State Highway System.
- 2013 FDOT, Standard Specifications for Roadway and Bridge Construction.
- 2013 FDOT, Plans Preparation Manual (PPM), Volumes I and II.
- 2009 FHWA, Manual on Uniform Traffic Control Devices (MUTCD).
- 2003 FHWA, A Guide for High Occupancy Toll (HOT) Lane Development.

4.1.1 ROADWAY DESIGN ELEMENTS

Roadway design elements and applicable design standards considered in the design of the typical sections for the corridor are summarized in ***Table 4.1***.

Table 4.1
Roadway Design Elements and Standards

Design Element	Design Standard								Source
Lane Width									
Mainline I-95	12 ft								PPM, Vol. I, Tables 2.1.1, page 2-8, and 2.1.2, page 2-9
One Lane Ramp	15 ft (Tangent)								PPM, Vol. I, Table 2.1.3, page 2-10
Two Lanes Ramp	24 ft (Tangent)								
HOT (separated or concurrent flow)	12 ft								A Guide for HOT Lane Development, page 37
Median Width									
With Barrier	26 ft								PPM, Vol. I, Table 2.2.1, page 2-20
Shoulder Width	**Without Shoulder Gutter**				**With Shoulder Gutter**				
	Full Width		**Paved Width**		**Full Width**		**Paved Width**		
	Outside	**Median /Left**	**Outside**	**Median /Left**	**Outside**	**Median /Left**	**Outside**	**Median /Left**	
Mainline I-95	12 ft	12 ft	10 ft	10 ft	15.5 ft	15.5 ft	8 ft	8 ft	PPM, Vol. I, Table 2.3.1, page 2-23
One Lane Ramp	6 ft	6 ft	4 ft	2 ft	11.5 ft	11.5 ft	4 ft	4 ft	
Two Lanes Ramp	12 ft	8 ft	10 ft	4 ft	15.5 ft	13.5 ft	8 ft	6 ft	
Bridge Shoulder Width									
Mainline-Two Lanes	6 ft Inside, 10 ft Outside								PPM, Vol. I, Figure 2.0.1, page 2-4
Mainline-Three Lanes +	10 ft Inside and Outside								
Ramp-One Lane	6 ft Inside and Outside								
Ramp-Two Lanes	6 ft Inside, 10 ft Outside								
Separation Width for HOT Lane									
HOT (one lane or concurrent flow)	2-4 ft for non-barrier separated operations. Buffer Area includes permanently placed markers.								A Guide for HOT Lane Development, Figure 8 page 39
Roadway Cross Section Slope									
Roadway Standard Pavement	0.03 maximum (> 45 MPH)								PPM, Vol. I, Figure 2.1.1, page 2-13
	0.04 maximum (≤ 45 MPH)								
Inside Shoulder	0.05 - 0.06								PPM, Vol. I, Table 2.3.1, page 2-23
Outside Shoulder	0.06								

Table 4.1 Roadway Design Elements and Standards		
Design Element	**Design Standard**	**Source**
Maximum Shoulder Cross Slope Break	0.07	PPM, Vol.1, Figure 2.3.1, Page 2-27
Bridge Deck	0.02	PPM, Vol.1, Section 2.1.5, page 2-12
Maximum algebraic difference between adjacent through lanes	0.04	PPM, Vol.1, Figure 2.1.1, page 2-13
Front Slope	1:6 when the height of fill is between 0 ft to 5 ft	PPM, Vol. I, Table 2.4.1, page 2-32
	1:6 to edge of clear zone then 1:4 when the height of fill is between 5 ft to 10 ft	
	1:6 to edge of clear zone then 1:3 when the height of fill is between 10 ft to 20 ft	
	1:2 with guardrail when height of fill is greater than 20 ft	
Back Slope	1:4 or 1:3 with a standard width trapezoidal ditch and 1:6 front slope	
Transverse Slope	1:10 or flatter (freeway), 1:4 (others)	
Border Width		
Mainline I-95	94 ft (1)	PPM, Vol. I, Table 2.5.3, page 2-36
Recoverable Terrain (Clear Zone)		
Mainline I-95	36 ft	PPM, Vol. I, Table 2.11.11 ≥ 1500 AADT, Section 4.1, page 2-75
One Lane Ramp	10 - 18 ft	
Two Lane Ramp	18 - 30 ft	
Auxiliary Lane	24 ft	
Roadway Base Clearance		
	3.0 ft above SHGW Elevation	PPM, Vol.1, Table 2.6.3, page 2-39

[1] Measured from the edge of the outside travel lane to the right of way line.

4.1.2 Horizontal and Vertical Alignment

Design elements and applicable design standards considered in the design of the horizontal and vertical alignments such as profiles, curves, and vertical clearances are summarized in ***Table 4.2***.

Table 4.2
Horizontal and Vertical Alignment Design Elements and Standards

Design Element	Design Standard	Source
Design Vehicle		
Mainline I-95	WB 65 or WB 67	AASHTO, page 17
Mainline I-95	WB 62FL	PPM, Vol. 1, Figure 1.12.1, page 1-19
Design Speed		
Mainline I-95	65 MPH	PPM, Vol. I, Tables 1.9.1 & 1.9.2, page 1-15-1-16
Ramps	30-55 MPH	
Maximum Deflection without curve		
Mainline I-95	0° 45' 00" for V ≥ 45 MPH	PPM, Vol. I, Table 2.8.1a, page 2-44
Ramps (without Curb and Gutter)	0° 45' 00" for V ≥ 45 MPH	
	2° 00' 00" for V ≤ 40 MPH	
Length of Horizontal Curve		
Mainline I-95 (Length=30x Design Speed)	1950 ft for V = 65 MPH	PPM, Vol. I, Table 2.8.2a, page 2-45
Mainline (Minimum Length=15x Design Speed)	975 ft for V = 65 MPH	
Ramps (Length=15x Design Speed)	450 ft for V = 30 MPH	
Ramps (Length=15x Design Speed)	825 ft for V = 55 MPH	
Ramps (Minimum)	400 ft	

Table 4.2
Horizontal and Vertical Alignment Design Elements and Standards

Design Element	Design Standard	Source
Maximum Degree of Curve		
Mainline I-95	3° 00' with R=1910 ft	PPM, Vol. I, Table 2.8.3, page 2-46
Ramps	24° 45' (30 mph) with R = 231 ft	(e_{max} 0.10), page 2-46
	6° 30' (55 mph) with R = 881 ft	
Maximum Profile Grade		
Mainline I-95	3%	PPM, Vol. I, Table 2.6.1, page 2-38
Ramps	7% (25-30 MPH)	
	6% (35-40 MPH)	
	5% (45-50 MPH)	
Maximum Change in Grade without Vertical Curve		
Mainline I-95	0.30%	PPM, Vol. I, Table 2.6.2, page 2-38
Ramps	1.00% - 0.6%	
Minimum Stopping Sight Distance		
Mainline I-95	730 ft	PPM, Vol. I, Table 2.7.1, page 2-40
Ramps	200 ft - 495 ft	
Minimum Decision Sight Distance		
Mainline I-95	1365 ft (Urban)	AASHTO Exhibit 3-3, page 116
Minimum Crest Vertical Curve Length		
Mainline I-95	1000 ft (Interstate open highway)	PPM, Vol. I, Table 2.8.5, page 2-48
	1800 ft (Interstate within interchanges)	
Ramps (Length=3x Design Speed)	90 ft (30 MPH) - 165 ft (55 MPH)	
K value for Crest Vertical Curve		
Mainline I-95	401(65 MPH)	PPM, Vol. I, Table 2.8.5, page 2-48

Table 4.2
Horizontal and Vertical Alignment Design Elements and Standards

Design Element	Design Standard	Source
Minimum Sag Vertical Curve Length		
Mainline I-95	800 ft (Interstate)	PPM, Vol. I, Table 2.8.6, page 2-49
Ramps (Length=3x Design Speed)	90 ft (30 MPH) - 165 ft (55 MPH)	
K value for Sag Vertical Curve		
Mainline I-95	181(65 MPH)	PPM, Vol. I, Table 2.8.6, page 2-49
Superelevation (e)		
Maximum Superelevation for an Urban Freeway	0.10	PPM, Vol. I, Table 2.9.1, page 2-51
Superelevation Transition Rate (65-70 mph)	1:200 for 6 lanes	PPM, Vol. 1, Table 2.9.3, page 2-55
	1:190 for 8 lanes	
Superelevation Transition Ratio (Curve:Tangent)	20:80 preferred	PPM, Vol. 1, page 2-50
	50:50 minimum	
Minimum Vertical Clearances		
Bridge over Roadways	16.5 ft	PPM, Vol. I, Table 2.10.1, page 2-62
Roadway over Railroad	23.5 ft	
Pedestrian Bridge over Roadway	17.5 ft	
Overhead Sign Structure	17.5 ft	PPM, Vol. I, Table 2.10.2, page 2-63
Overhead DMS Structures	19.5 ft	PPM, Vol. I, Table 2.10.4, page 2-63
Minimum Spacing Between Ramps		
Off-ramp to Off-ramp	1000 ft	AASHTO Exhibit 10-68, page 844
On-ramp to On-ramp	1000 ft	
On-ramp to Off-ramp (Weaving)	2000 ft	
Off-ramp to On-ramp	500 ft	
Entrance Ramp		
Taper Length	300 ft (minimum)	AASHTO, page 844-860
Acceleration Length	Varies	
Exit Ramp		
Taper Length	250 ft (minimum)	AASHTO, page 844-860
Deceleration Length	Varies	

Table 4.2 Horizontal and Vertical Alignment Design Elements and Standards		
Design Element	**Design Standard**	**Source**
Minimum Lane Drop Taper		
Basic Lane	50:1 (70:1 desirable)	AASHTO, Page 818
Auxiliary Lane	50:1 (70:1 desirable)	
Exit Ramp Design		
Divergence	2° to 5° typical	AASHTO Exhibits 10-72, page 850; Design Standard Index 525
	FDOT ≈ 4°	

4.2 Drainage Design Criteria

The design criteria presented in this section are based on the design parameters outlined in the following references:

- 2013 FDOT, Drainage Manual (DM)
- 2013 FDOT, Plans Preparation Manual (PPM), Volumes I and II
- 2013 FDOT, Design Standards for Design, Construction, Maintenance and Utility Operations on the State Highway Systems
- 2013 FDOT, Standard Specifications for Roadway and Bridge Construction
- 2012 SFWMD, Environmental Resource Permit Information Manual, Volume IV

Design criteria considered in the development of the drainage for this project are summarized in ***Table 4.3***.

Table 4.3 Drainage Design Criteria		
Design Element	**Design Standard**	**Source**
Open Channel Design Frequency	10 Year for Ditches/Swales 25 Year for Outfall Ditches and Canals	DM Section 2.2
Open Channel Minimum Slope	0.0005 ft/ft	DM Section 2.4.2
Channel Velocity (Maximum)	4 fps for Sod Lining 5 fps for Stake Sod Lining 6 fps for Riprap Rubble Lining 10 fps for Rigid Lining	DM Table 2.4
Storm Drain Design Frequency	3 Year for General Design 10 Year for Interstate Facilities	DM Section 3.3
Storm Drain Design Tailwater	Stormwater Ponds: Peak stage in the pond during storm drain design event French Drains: Design Head over the outlet control structure Regulated Canals: Agency regulated control elevation	DM Section 3.4
Minimum Time of Concentration	10 Minutes	DM Section 3.5.1
Minimum Pipe Slope	Minimum Slope which produces a storm drain velocity of 2.5 fps when full	DM Section 2.4.2 DM Section 3.6.1
Hydraulic Gradient	When minor the Hydraulic Grade Line (HGL) energy losses are not considered, HGL shall be 1 ft below the theoretical gutter elevation	DM Section 3.6.2
Outlet Velocity	When outlet velocity exceeds 6 fps provide special channel lining and/or energy dissipater	DM Section 3.6.3
Spread Standards	Spread resulting from 4 inches per hour shall be limited to: ½ lane for < 45 MPH 8 ft of lane clear for 45 MPH to 55 MPH No encroachment for > 55 MPH	DM Section 3.9
Minimum Pipe Size	18 inches	DM Section 3.10.1
Maximum Pipe Length	<u>Pipe without French Drains</u> 300 ft for 18 inches pipes 400 ft for 24 to 36 inches pipes 500 ft for > 42 inches pipes <u>French Drains (Minimum Length from Access)</u> 150 ft for 18 to 30 inches pipes 200 ft for > 36 inches pipes	DM Section 3.10.1
Cross Drains Design Frequency	50 years for Mainline Interstate and Facilities with projected 20 year ADT > 1500 25 years for Facilities with projected 20 year ADT <	DM Section 4.3

Table 4.3 Drainage Design Criteria		
Design Element	**Design Standard**	**Source**
	1500 10 years for roadside ditch culverts	
Detention and Retention Ponds Maintenance Berm	20 ft minimum between top edge of normal pool elevation and right of way line, 15 ft adjacent to the water sloped at 1:8 or flatter	DM Section 5.3.4.2 SFWMD ERP Manual Section 7.5
Detention and Retention Ponds Freeboard	1 ft freeboard required above peak design stage	DM Section 5.3.4.2
Wet Detention and Retention Ponds Requirements	Total Area = 0.5 acre minimum Slopes between control elevation and 2 ft below it shall be 1:4 or flatter	DM Figure 5-1 SFWMD ERP Manual Section 7.4
Water Quality Requirements	Wet Detention: Greater of 1 inch over total project area or 2.5 inches over total impervious Dry Detention: 75% of wet detention Wet/Dry Retention: 50% of wet or dry detention accordingly	SFWMD ERP Manual Section 5.2.1
Water Quality Requirements	Post Development discharge rate equal to or less than pre development discharge rate for 25 year – 3 day storm event, or rates specified in district criteria	SFWMD ERP Manual Section 6.2 and 6.3
Floodplain Encroachment	No encroachment allowed	SFWMD ERP Manual Section 6.4
Outfall Structures	Structures shall include baffles systems. Structures shall include bleed down notch or orifice that allows ½ inches of the detention volume to be discharged within 24 hours.	SFWMD ERP Manual Section 7.1 and 7.2

5.0 ALTERNATIVE ALIGNMENT ANALYSIS

5.1 NO-BUILD ALTERNATIVE

The No-Build Alternative proposes to keep the existing roadway and interchange configurations into the future without improvements. No traffic capacity, operation, or safety improvements would be implemented throughout the corridor. The effect associated with this alternative includes the acceptance of existing highly congested traffic conditions. Also, travel demand will increase significantly over the next 20 years, given the continued growth expected in Broward and Palm Beach Counties. This alternative is considered to be a viable alternative during the public hearing and final selection phase to serve as a comparison to the study's proposed alternatives.

The No-Build Alternative has a number of positive aspects, since it would not require expenditure of public funds for design, construction and/or utility relocation. Traffic would not be disrupted due to construction, therefore, avoiding inconveniences to local residents and businesses. Also, there would be no direct or secondary impacts to the environment, the socio-economic characteristics, community cohesion, or system linkage of the area.

However, the No-Build Alternative fails to fulfill the needs of this project for the area. If no long-term improvements are made, I-95 and the surrounding cross roads will experience heavy congestion during the peak hours and will operate at undesirable levels of services. The congestion within the area will cause additional impacts to these roadways. Such impacts may include excessive delays in travel time, a large reduction of average travel speeds, excess fuel consumption from idling vehicles, increased air pollutants (particularly hydrocarbons and carbon monoxide) and a potential increase in rear end and sideswipe collisions.

5.2 TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS ALTERNATIVE

The Transportation Systems Management and Operations (TSMO) alternatives are comprised of minor improvement options that are typically developed to alleviate specific traffic congestion and safety problems, or to get the maximum utilization out of the existing facility by improving operational efficiency. TSMO alternatives may include, but not limited to, the following improvements to the mainline and interchanges:

- Add auxiliary lanes between interchanges
- Add exclusive turn lanes at the interchange ramp terminals and adjacent intersections
- Increase turn-lane storage at the interchange ramp terminals and adjacent intersections
- Capacity improvements at the ramp junctions
- Signal optimization
- Enhance signage
- New ITS technologies and infrastructure

However, a TSMO Alternative will not significantly improve the capacity issues through the corridor by the design year 2040. Long-term improvements are necessary to mitigate the existing traffic conditions and increase capacity to accommodate future travel demand.

5.3 MULTI-MODAL ALTERNATIVES

Multi-modal alternatives are comprised of a range of improvements to each of the modal systems (roadway, transit and non-motorized) within a specific study area. The most common are Travel Demand Management and the expansion of current facilities and/or development of new facilities. This PD&E study is focused on providing highway capacity improvements along the I-95 mainline only. Therefore, multi-modal improvements were not considered as part of this study. As a result, alternative travel modes were not considered in this study.

5.4 ALTERNATIVE EVALUATION

The No-Build and TSMO Alternatives will not provide adequate traffic capacity or operational improvements to the corridor. Therefore, additional study concepts were developed to increase capacity and improve traffic operations for the corridor. Various corridor typical section concepts were considered during the early stages of the PD&E study (***see Section 3.4***). After the Department's review and concurrency of the final conceptual evaluation of the corridor typical section concepts, a Build Alternative was identified to move forward in the study. Based on this preliminary evaluation, *Concept #3* was selected as the recommended Build Alternative.

A No-Build Alternative and one Build Alternative were considered in this PD&E study as the only viable alternatives.

The Build Alternative proposes the following corridor improvements:

- Convert the existing HOV lane to a tolled express lane.
- Add one tolled express lane for a total of two express lanes in each direction in the center of the corridor.
- Provide access points at selected locations along the corridor to enter and exit the express lanes system.
- Maintain the existing number of general purpose lanes.
- Create an opportunity for a Bus Rapid Transit (BRT). A BRT is an express bus service that will operate within the express lanes system.

5.4.1 TYPICAL SECTIONS

The No-Build Alternative typical section is the same as the existing typical section. The No-Build Alternative consists of the following roadway elements:

- Two 12-foot (12') wide HOV lanes (one in each direction)
- Six 12-foot (12') wide general purpose lanes (three in each direction)
- Two-foot (2') wide buffer separating the general purpose lanes from the HOV lanes
- A 12-foot (12') wide paved inside shoulder
- A 12-foot (12') wide outside shoulder (ten feet (10') paved and two-feet (2') unpaved)
- A two and a half-foot (2.5') wide center barrier wall
- Twelve-foot (12') wide auxiliary lanes exist at selected locations.

The I-95 corridor typical section, south of Commercial Boulevard, has an additional general purpose lane in each direction for a total of eight general purpose lanes. The southbound on-ramp at Commercial Boulevard from the existing westbound to southbound flyover becomes the fourth lane south of the interchange. In the northbound direction, the additional fourth lane ends and becomes the off-ramp to Commercial Boulevard. ***Figures 5.1*** and ***5.2*** show the No-Build Alternative typical sections.

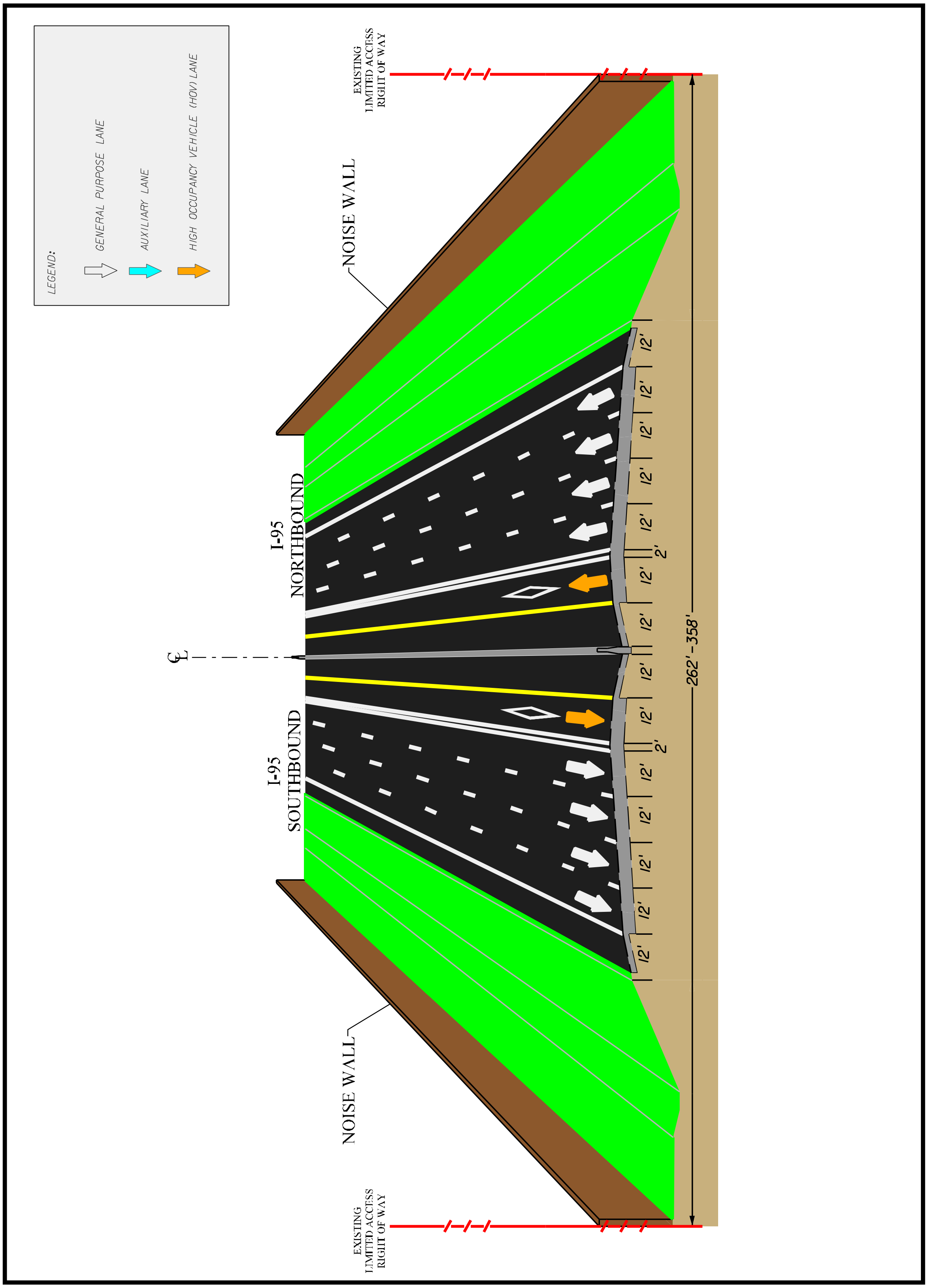


Figure 5.1 – No-Build Alternative Typical Section between Oakland Park Boulevard and Commercial Boulevard

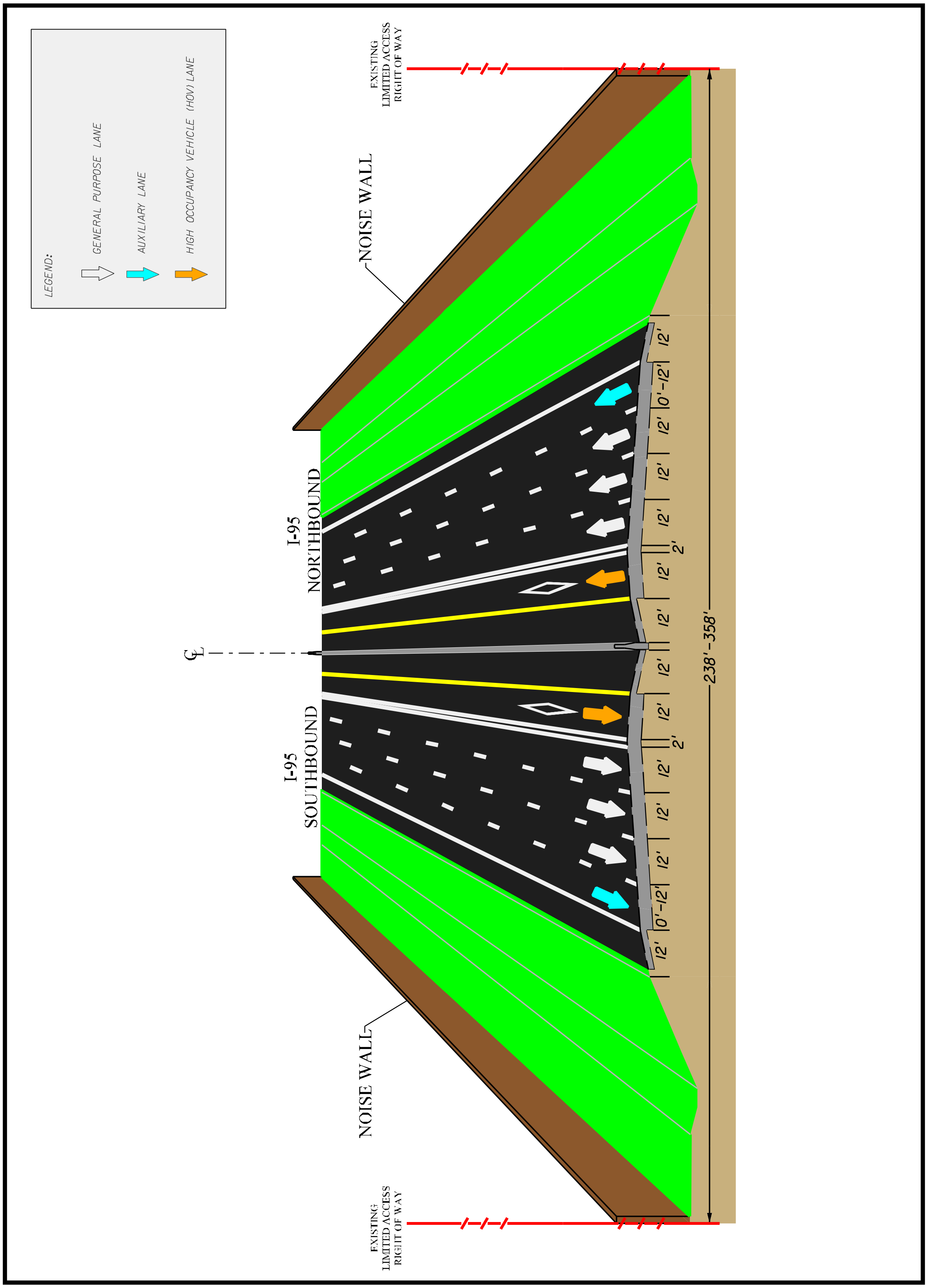


Figure 5.2 – No-Build Alternative Typical Section between Commercial Boulevard and Glades Road

The Build Alternative typical section will consist of the following roadway elements:

- Four 12-foot (12') wide express lanes (two in each direction)
- Six 12-foot (12') wide general purpose lanes (three in each direction)
- Four-foot (4') wide buffer with tubular markers separating the general purpose lanes from the express lanes
- A 12-foot (12') wide paved inside shoulder
- A 12-foot (12') wide outside shoulder (ten-feet (10') paved and two-feet (2') unpaved)
- A two and a half-foot (2.5') wide center barrier wall
- Twelve-foot (12') wide auxiliary lanes at selected locations

Figure 5.3 shows the Build Alternative typical section. The Build Alternative typical section will need to be reduced (express lanes, roadway shoulders and/or buffer widths) at the following five locations in order to avoid reconstructing these cross streets (roadway and structure). The existing footprint under these structures cannot accommodate the proposed roadway typical section (***see Figure 5.4***).

- Commercial Boulevard Interchange
  - Express lanes width from 12' to 11'
  - Buffer width from 4' to 2'
  - Northbound inside shoulder from 12' to 6'
  - Northbound outside shoulder from 12' to 8'
  - Southbound inside shoulder from 12' to 2.5'
  - Southbound outside shoulder from 12' to 4.5'
- Andrews Avenue Overpass
  - Buffer width from 4' to 2'
  - Inside and outside shoulder width from 12' to 8'
- Racetrack Road Overpass
  - Northbound inside shoulder from 12' to 10.5'
  - Southbound inside shoulder from 12' to 10'
  - Southbound buffer width from 4' to 2.5'
  - Southbound outside shoulder from 12' to 10'
- SW 10th Street Interchange
  - Northbound buffer width from 4' to 2'
  - Northbound inside shoulder from 12' to 8'
  - Northbound outside shoulder from 12' to 8'
  - Southbound inside shoulder from 12' to 10.5'
- NE 48th Street Overpass
  - Buffer width from 4' to 2'
  - Inside and outside shoulder width from 12' to 8'

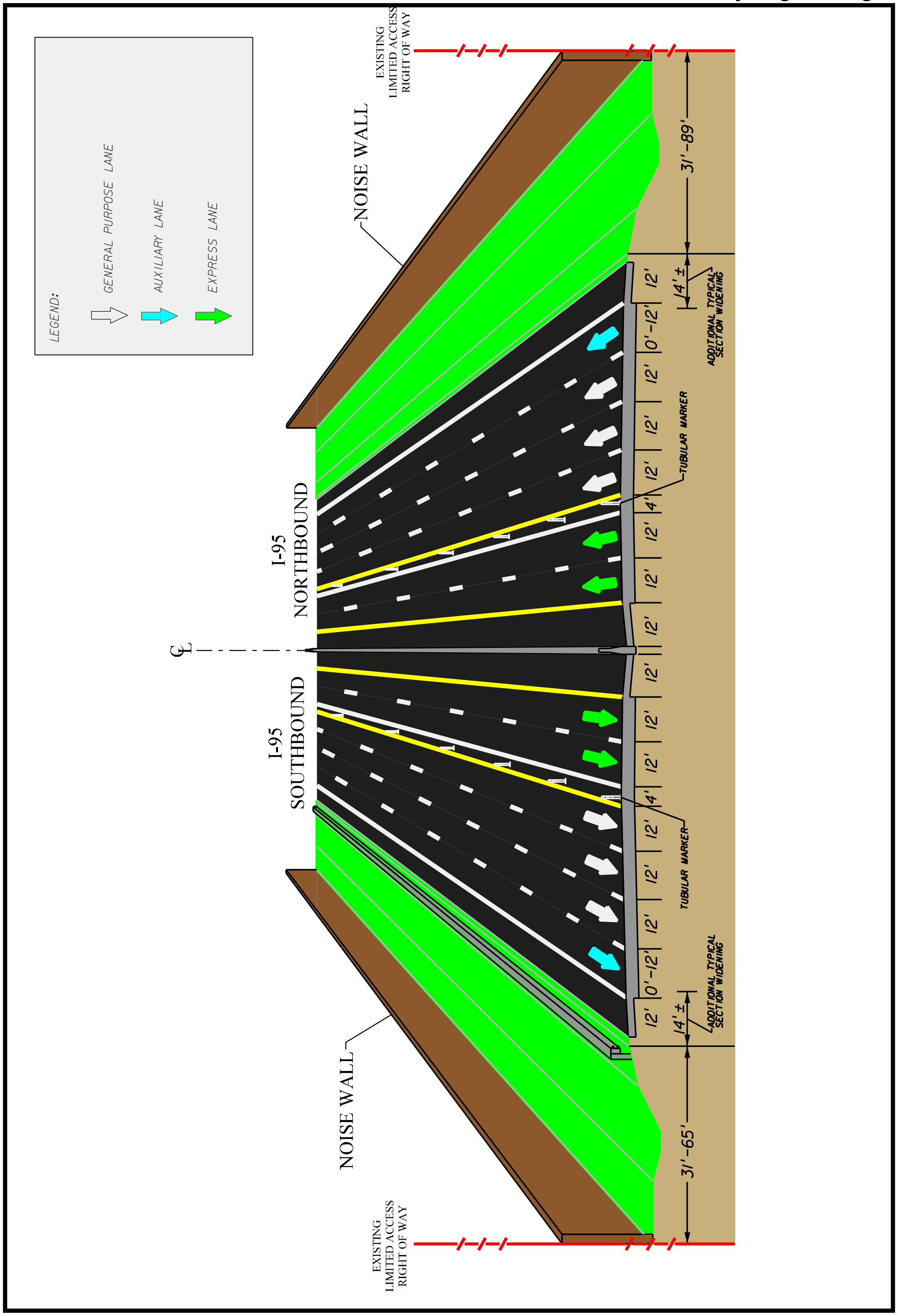
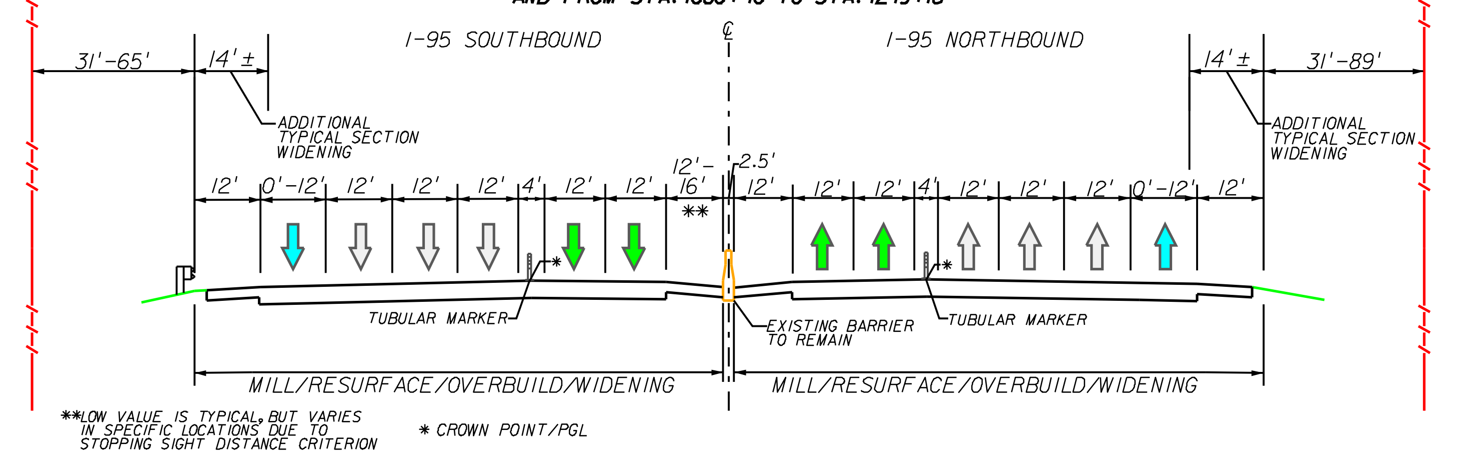
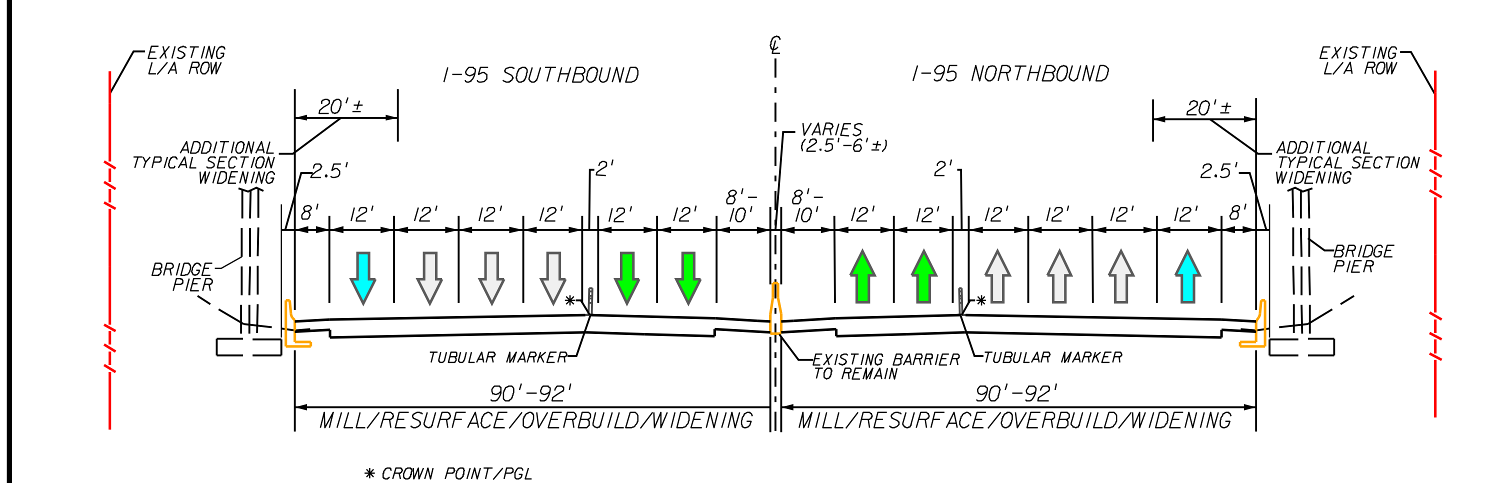


Figure 5.3 – Build Alternative Typical Section between Oakland Park Boulevard and Glades Road

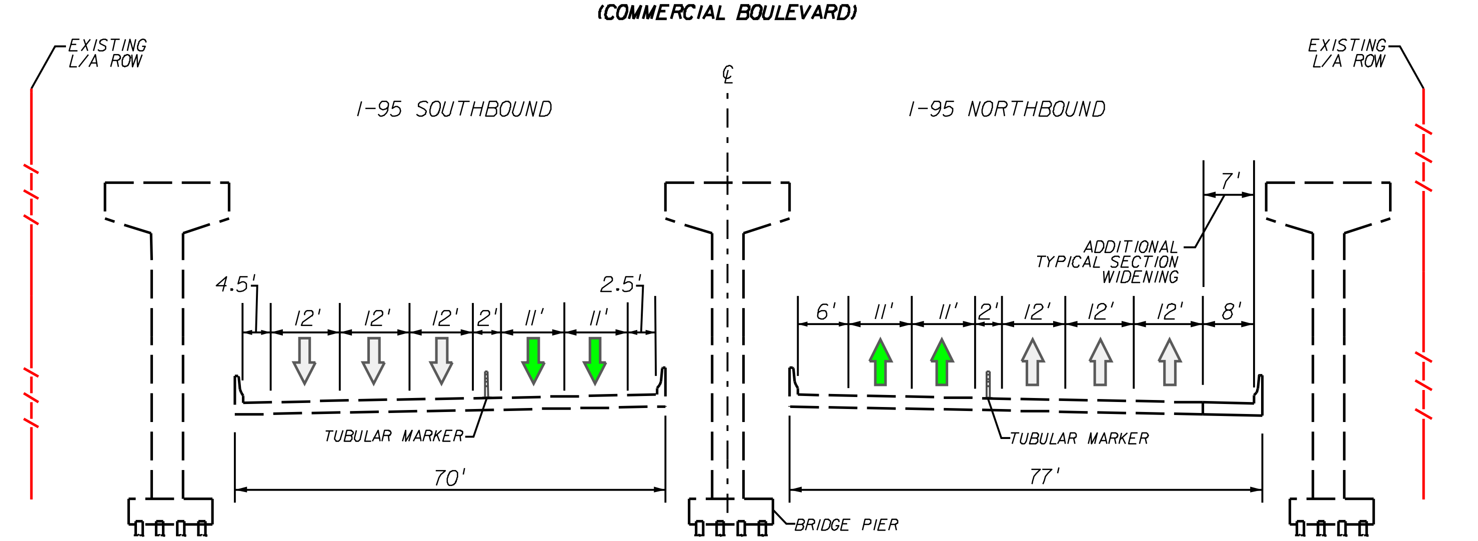
CONCEPT #3 TYPICAL SECTION
FROM STA: 532+00 TO STA: 597+90,
FROM STA: 607+30 TO STA: 642+15,
FROM STA: 651+20 TO STA: 755+95,
FROM STA: 761+95 TO STA: 996+50,
FROM STA: 1004+30 TO STA: 1052+10
AND FROM STA: 1060+40 TO STA: 1249+18



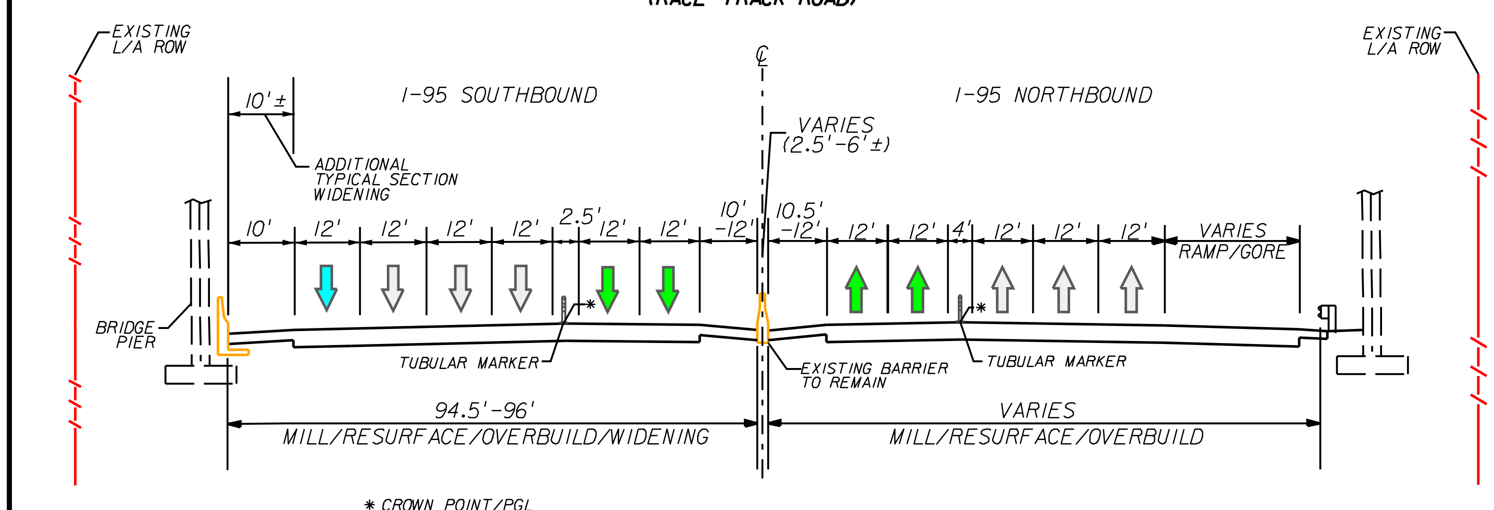
TYPICAL SECTION IN CONSTRAINED AREA
FROM STA: 996+50 TO STA: 1004+30
(NE 48TH STREET)



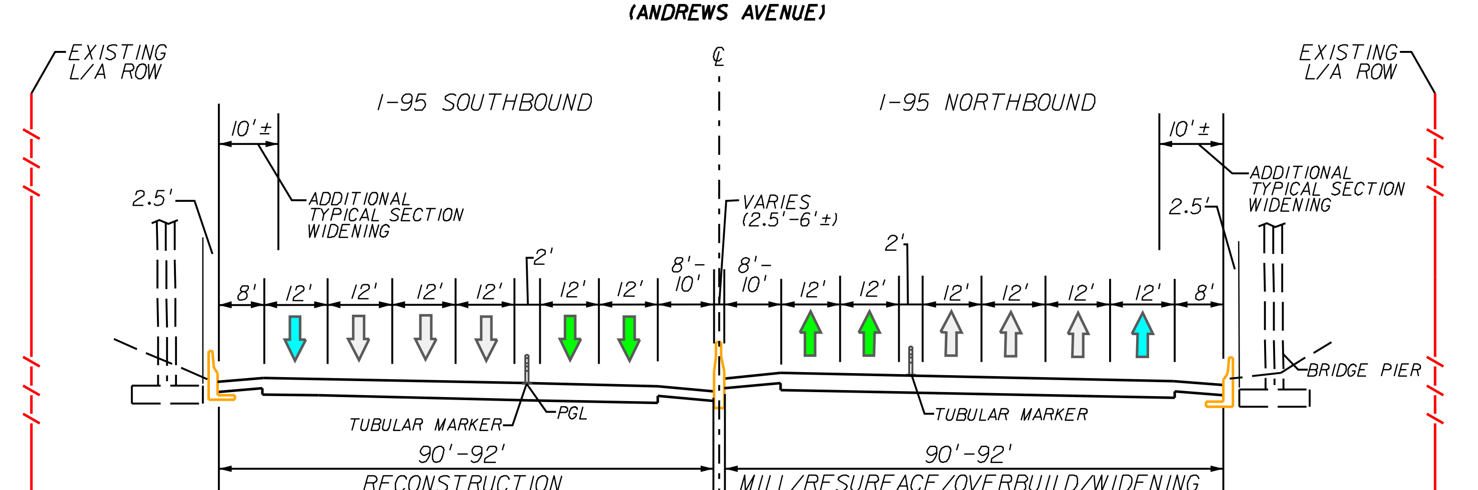
TYPICAL SECTION IN CONSTRAINED AREA
FROM STA: 597+90 TO STA: 607+30
(COMMERCIAL BOULEVARD)



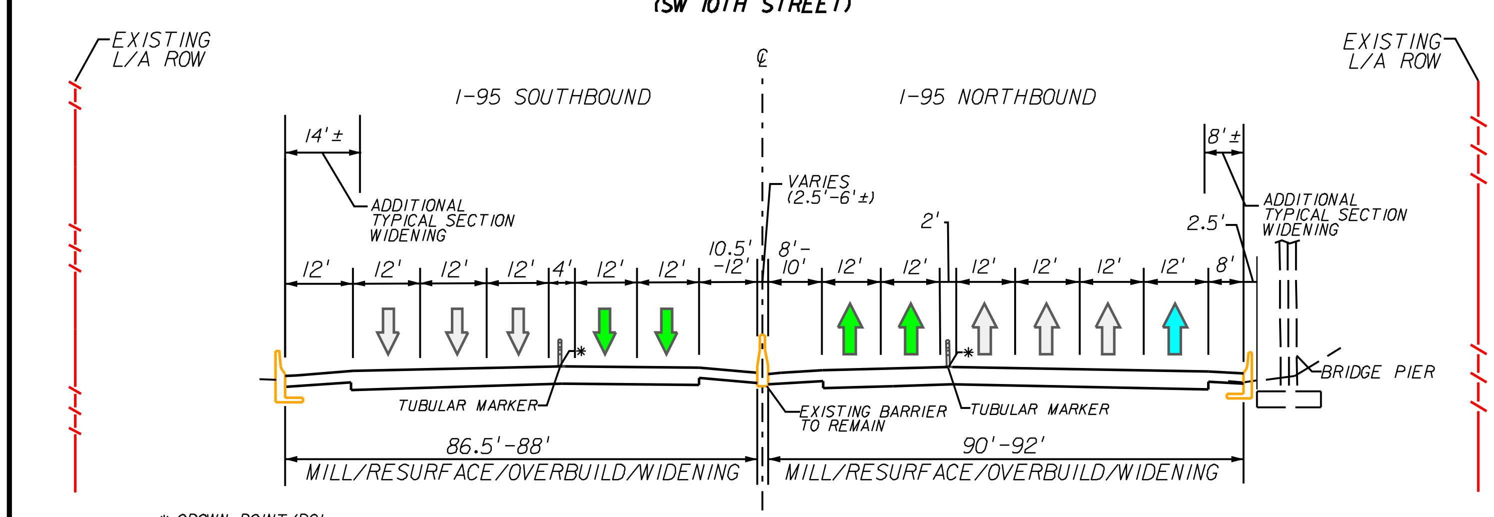
TYPICAL SECTION IN CONSTRAINED AREA
FROM STA: 755+95 TO STA: 761+95
(RACE TRACK ROAD)



TYPICAL SECTION IN CONSTRAINED AREA
FROM STA: 642+15 TO STA: 651+20
(ANDREWS AVENUE)



TYPICAL SECTION IN CONSTRAINED AREA
FROM STA: 1052+10 TO STA: 1060+40
(SW 10TH STREET)



I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)
ETDM: 3330

NOTES/LEGEND:
GENERAL PURPOSE LANE   EXPRESS LANE   AUXILIARY LANE
DESIGN SPEED = 65 mph
STATION RANGES FOR CONSTRAINED AREAS INCLUDE TRANSITIONS
L/A ROW = LIMITED ACCESS RIGHT OF WAY

BUILD ALTERNATIVE
ROADWAY CROSS SECTIONS

FIGURE 5.4

5.4.2 HORIZONTAL AND VERTICAL ALIGNMENT

The No-Build Alternative proposes to keep the existing roadway horizontal and vertical alignment elements into the future without improvements.

The design of the Build Alternative strives to adhere to the design standards depicted in ***Section 4.0.*** This section summarizes the geometric characteristics for the proposed horizontal and vertical alignment along the corridor.

The focus of this project is to design an express lanes system that can be constructed within the existing right of way resulting in a feasible and cost effective project that can be constructed and open to traffic in a short timeframe. Therefore, the Build Alternative concentrates in widening the existing corridor to accommodate the proposed improvements without major reconstruction. At the same time, the PD&E study also identified deficiencies related to safety along the corridor that could be improved without major impacts to the schedule and cost of this project.

Horizontal Alignment – The Build Alternative is proposing to keep the existing horizontal alignment throughout the corridor except at following two locations:

1. Horizontal curve north of Prospect Road
2. Horizontal curve south of Copans Road

Based on the current design standards for horizontal curves and stopping sight distance (SSD), these locations do not meet SSD requirements. In both cases, the sight distance along the innermost travel lane is blocked by the median barrier wall. The Build Alternative improvements will reconstruct these two locations to meet the required FDOT PPM SSD criteria (see highlighted rows in ***Table 5.1***). These substandard locations were redesigned as part of the Build Alternative by realigning the centerline radius (locations 1 and 2) and by increasing the shoulder width (location 2 only). ***Appendix L Sheets 3 and 12*** show the proposed typical section at these locations.

Table 5.1
Proposed Horizontal Alignment Geometric Characteristics

Location/ Adjacent Cross Road	Station	Milepost[1]	Radius of Curve (ft)	Length of Curve (ft)	Degree of Curve D	Deflection Angle Δ	Superelevation e	SSD Value	SSD Required for 65 MPH Interstate		SSD Required for 65 MPH AASHTO	
Oakland Park Boulevard Interchange	PC 512+15.05 PI 516+91.43 PT 521+65.61	13.45	5,729.58	950.56	01°00'00"	09°30'20" (LT)	0.039	910	730	✓	645	✓
North of Prospect Road	PC 578+90.13 PI 583+34.90 PT 587+72.63	14.71	3,787.00	1,166.59	01°30'47"	17°39'00" (LT)	0.049	740	730	✓	645	✓
North of Commercial Boulevard	PC 613+94.89 PI 618+64.37 PT 623+32.67	15.38	7,639.44	937.78	00°45'00"	07°02'00" (RT)	0.028	1,050	730	✓	645	✓
South of Andrews Avenue	PC 623+32.67 PI 636+00.66 PT 647+98.67	15.71	4,297.18	2,466.00	01°20'00"	32°52'48" (RT)	0.052	789	730	✓	645	✓
North of Cypress Creek Road	PC 687+21.01 PI 702+84.14 PT 716+88.44	16.97	3,819.72	2,967.44	01°30'00"	44°30'42" (LT)	0.058	742	730	✓	645	✓
South of Copans Road	PC 858+65.55 PI 867+54.23 PT 875+75.60	20.09	3,083.00	1,989.63	01°51'30"	36°58'34" (RT)	0.059	739	730	✓	645	✓
North of Copans Road	PC 915+50.67 PI 928+88.32 PT 941+24.00	21.25	3,819.72	2,573.33	01°30'00"	38°36'00" (LT)	0.058	742	730	✓	645	✓
North of Sample Road	PC 976+31.79 PI 983+99.12 PT 991+57.37	22.30	5,729.58	1,525.58	01°00'00"	15°15'21" (RT)	0.040	910	730	✓	645	✓
Hillsboro Blvd Interchange	PC 1089+35.77 PI 1101+88.25 PT 1114+18.64	24.53	7,639.44	2,482.87	00°45'00"	18°37'17" (LT)	0.030	1,050	730	✓	645	✓
South of Palmetto Park Road	PC 1191+32.98 PI 1203.63.85 PT 1215+92.66	1.14	24,555.33	2,459.69	00°14'00"	05°44'21" (RT)	NC[2]	∞	730	✓	645	✓
Palmetto Park Road Interchange	PC 1224+15.05 PI 1233+51.61 PT 1242+71.75	1.71	5,729.58	1,856.70	01°00'00"	18°34'01" (LT)	0.037	910	730	✓	645	✓
North of Palmetto Park Road	PC 1248+31.16 PI 1265+40.73 PT 1281+53.93	2.31	5,729.58	3,322.77	01°00'00"	33°13'40" (RT)	0.037	910	730	✓	645	✓

Notes : [1] Based on the location of the Point of intersection (PI)
[2]NC = Normal Crown (0.02)
✓ Meets required criteria

Table 5.2
Proposed Vertical Alignment Geometric Characteristics

Location	Type of Curve	VPI Station	Approximate Milepost	VPI Elevation (ft)	PGL High/Low (ft)	Grade (Back) %	Grade (Ahead) %	Length of Curve (ft)	Length Required for Interstate[1]		K-Value	K-Value Required for 65 MPH Interstate[1]		K-Value Required for 65 MPH AASHTO	
Oakland Park Boulevard	Sag	531+70	13.73	3.27	12.35	-2.02	2.01	1,800	800	✓	446	181	✓	157	✓
NW 38th Street	Crest	544+40	13.97	28.86	29.08	2.01	0.22	650	1,000	**DV**	363	401	**DV**	193	✓
Prospect Road	Crest	574+80	14.55	35.08	34.32	0.22	-1.31	800	1,000	**DV**	521	401	✓	193	✓
	Sag	587+56	14.79	18.00	21.41	-1.31	1.00	1,200	800	✓	519	181	✓	157	✓
Commercial Boulevard	Crest	605+95	15.14	36.23	32.66	1.00	-2.49	1,000	1,800	**DV**	287	401	**DV**	193	✓
	Sag	615+25	15.31	12.33	12.93	-2.49	0.21	600	800	**DV**	222	181	✓	157	✓
Andrews Avenue (southbound only)	Sag	647+05	15.92	14.27	14.98	-0.33	0.39	800	800	✓	1,110	181	✓	157	✓
Cypress Creek Road	Sag	654+80	16.06	18.47 [2]	19.38 [2]	-0.24	2.72	800	800	✓	270	181	✓	157	✓
	Crest[3]	661+80	16.20	37.51 [2]	39.81 [2]	2.72	0.77	600	1,800	**DV**	308	401	**DV**	193	✓
	Crest[3]	666+80	16.29	-	-	-	-	400			< 313	401	**DV**	193	✓
	Crest[3]	670+80	16.37	36.53 [2]	38.89 [2]	-1.11	-1.90	400			506	401	✓	193	✓
	Sag[3]	682+80	16.59	14.75 [2]	16.54 [2]	-1.60	1.03	600	800	✓	228	181	✓	157	✓
McNab Road	Sag[3]	688+80	16.71	20.81 [2]	29.27 [2]	1.03	2.82	600			335	181	✓	157	✓
	Crest	700+30	16.93	51.57 [2]	41.7 [2]	2.59	-2.80	1,500	1,000	✓	278	401	**DV**	193	✓
	Sag	711+80	17.14	19.37 [2]	18.73 [2]	-2.80	-0.16	800	800	✓	303	181	✓	157	✓
Atlantic Boulevard	Sag	770+80	18.26	20.61 [2]	19.65 [2]	0.24	3.23	800	800	✓	268	181	✓	157	✓
	Crest	781+80	18.47	-	-	3.23	-2.80	1,400	1,800	**DV**	232	401	**DV**	193	✓
	Sag	794+80	18.72	19.75 [2]	19.50 [2]	-2.80	-0.15	600	800	**DV**	227	181	✓	157	✓
NW 15th Street	Sag	811+80	19.04	22.49 [2]	20.25 [2]	0.40	3.16	800	800	✓	290	181	✓	157	✓
	Crest	822+80	19.25	-	45.80 [2]	3.16	-2.70	1,400	1,000	✓	239	401	**DV**	193	✓
	Sag	835+80	19.49	22.25 [2]	20.60 [2]	-2.70	-0.55	600	800	**DV**	280	181	✓	157	✓

Table 5.2
Proposed Vertical Alignment Geometric Characteristics

Location	Type of Curve	VPI Station	Approximate Milepost	VPI Elevation (ft)	PGL High/Low (ft)	Grade (Back) %	Grade (Ahead) %	Length of Curve (ft)	Length Required for Interstate[1]		K-Value	K-Value Required for 65 MPH Interstate[1]		K-Value Required for 65 MPH AASHTO	
Copans Road	Crest	887+10	20.46	-	44.20 [2]	1.15	-2.62	940	1,800	**DV**	249	401	**DV**	193	✓
	Sag	895+80	20.63	-	24.37 [2]	-2.62	0.00	600	800	**DV**	230	181	✓	157	✓
Sample Road	Sag	935+80	21.39	23.35	22.55	0.20	2.37	800	800	✓	369	181	✓	157	✓
	Crest[3]	942+45	21.51	39.11	40.11	2.37	0.45	530	1,800	**DV**	276	401	**DV**	193	✓
	Crest[3]	949+70	21.65	39.98	40.09	-0.10	-2.68	546			211	401	**DV**	193	✓
	Sag	956+80	21.78	20.84	20.68	-2.60	-0.04	800	800	✓	312	181	✓	157	✓
Pedestrian Overpass	Sag	968+49	22.01	18.28	18.84	-0.30	0.27	800	800	✓	1,420	181	✓	157	✓
Hillsboro Boulevard	Sag	1096+00	24.42	16.85	16.85	0.00	2.50	800	800	✓	320	181	✓	157	✓
	Crest[3]	1102+90	24.55	34.10	34.98	2.50	0.29	580	1,800	**DV**	262	401	**DV**	193	✓
	Crest[3]	1111+05	24.70	33.50	34.80	-0.49	-2.63	589			274	401	**DV**	193	✓
	Sag	1118+00	24.84	15.23	14.83	-2.63	-0.10	800	800	✓	310	181	✓	157	✓
Hillsboro Canal	Sag	1133+20	25.12	14.35	14.40	-0.01	0.80	800	800	✓	981	181	✓	157	✓
	Crest	1142+23	25.30	21.59	19.57	0.80	-0.82	1,000	1,000	✓	615	401	✓	193	✓
	Sag	1151+27	0.15	14.15	14.10	-0.82	-0.01	800	800	✓	988	181	✓	157	✓
Camino Real	Sag	1191+00	0.90	16.55	16.68	0.20	2.48	550	800	**DV**	233	181	✓	157	✓
	Crest	1201+50	1.10	43.39	36.09	2.48	-1.60	1,500	1,000	✓	368	401	**DV**	193	✓
Palmetto Park Road	Sag	1213+38	1.33	24.39	28.23	-1.60	2.08	875	800	✓	238	181	✓	157	✓
	Crest	1224+25	1.53	46.20	39.83	2.01	-2.14	1,230	1,800	**DV**	297	401	**DV**	193	✓
	Sag	1237+83	1.79	17.10	17.10	-2.14	0.00	900	800	✓	420	181	✓	157	✓

Source : As-built Plans, Project Survey, and Digital Terrain Modeling Survey
Notes: [1] From FDOT PPM Volume I, Chapter 2, Section 2.8.2

[2] Elevations are based on top of median barrier, per as-built plans

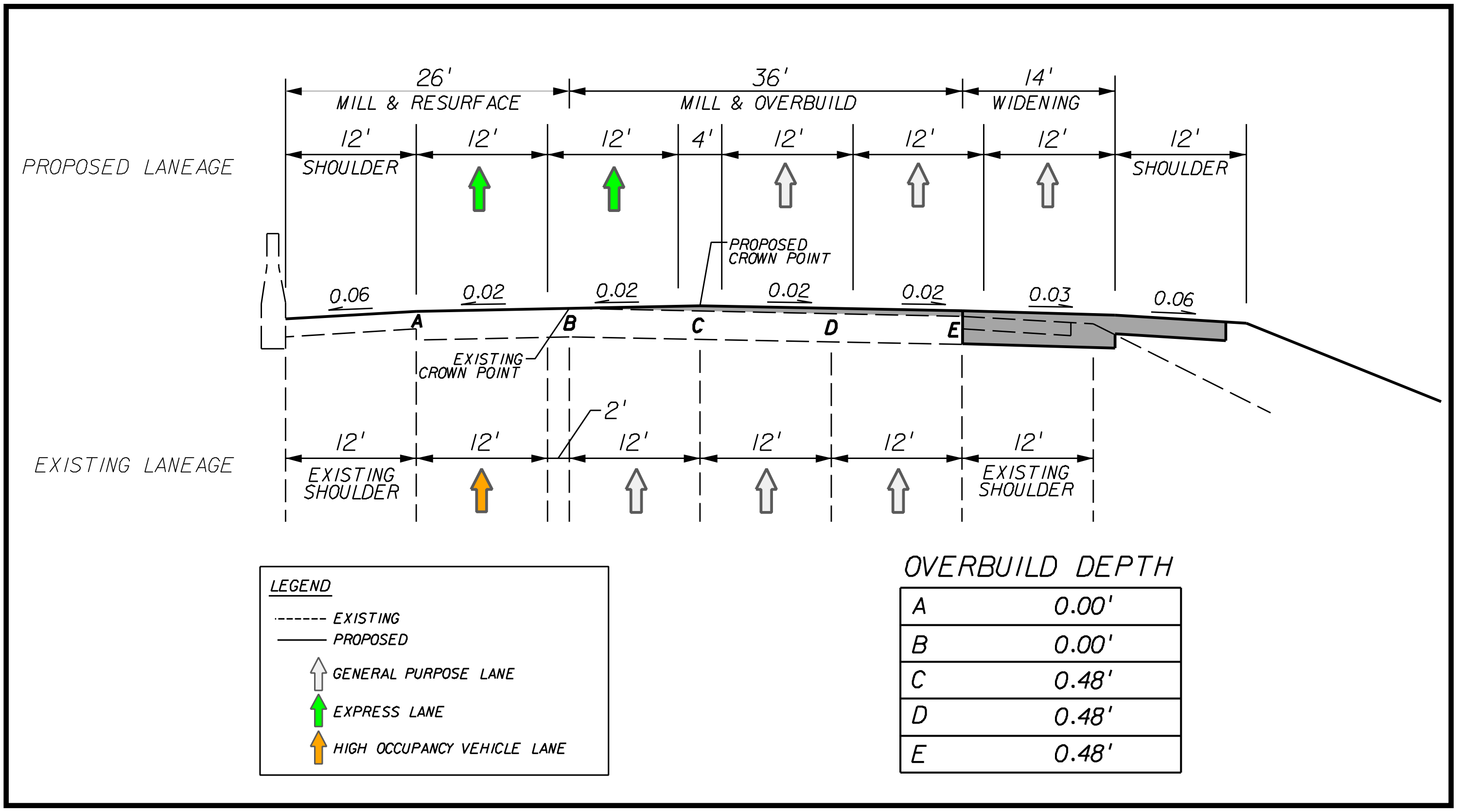
[3] Asymmetrical Compound Vertical Curve

✓ Meets required criteria

DV Design Variation

\- Not Available

Cross Slope – The Build Alternative is proposing to widen the existing typical section approximately 14 feet to the outside (both directions) in order to add one more express lane to the inside. This will require moving the pavement crown point to the outside in order to have the two express lanes and half of the buffer sloping to the median while the other half of the buffer and the general purpose lanes slope to the outside (see ***Figure 5.5***). Relocating the pavement crown point will require to mill and overbuild to achieve the required cross slope. The overbuild thickness will vary between 0 and six inches (0.48').



OVERBUILD DEPTH

A	0.00'
B	0.00'
C	0.48'
D	0.48'
E	0.48'

Figure 5.5 – Proposed Typical Section Pavement Overbuild

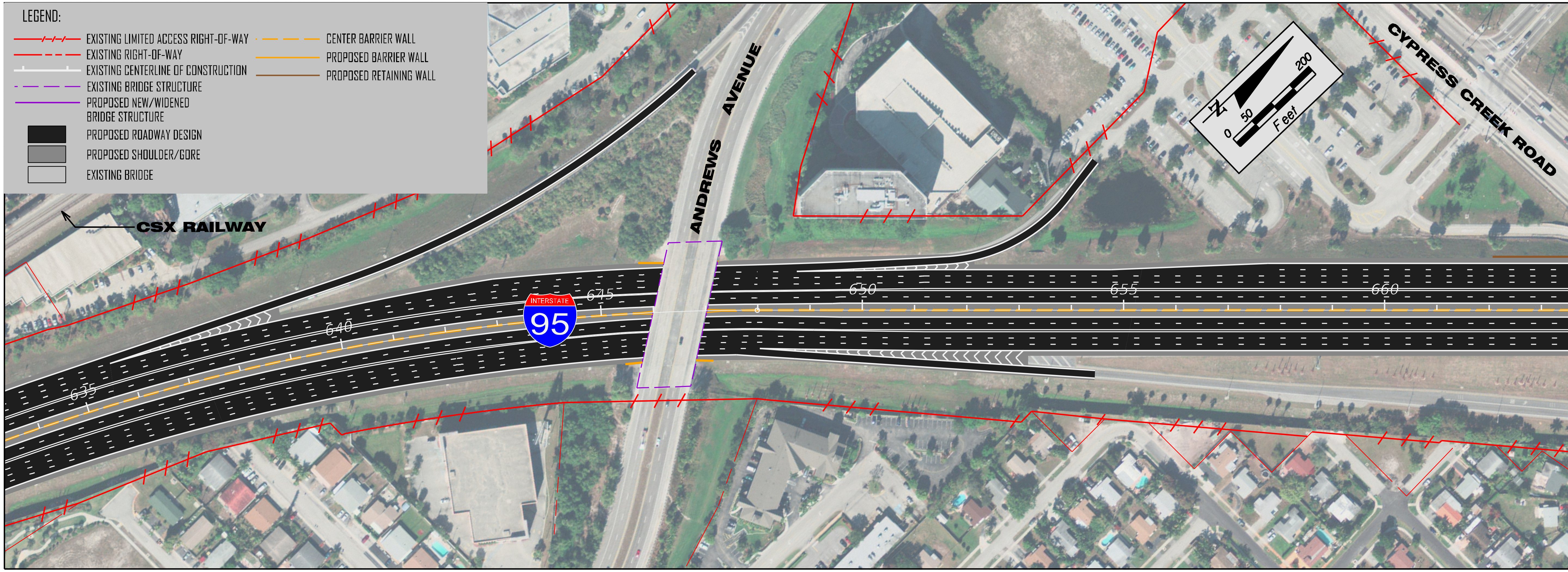
Cross Slope (under the cross street overpasses) – The additional pavement due to the relocation of the pavement crown will raise the mainline profile throughout the corridor, including under the existing cross street overpasses. In order to maintain the existing vertical clearance at these locations, the pavement will need to be lowered along the express lanes between 0 and three inches.

Interchanges – The Build Alternative is proposing to widen the existing typical section approximately 14 feet to the outside (both directions) in order to add one more express lane to the inside. Therefore, every interchange ramp (on-ramp and off-ramp) will need to be realigned in order to tie in to the new mainline typical section. The extent of the ramp realignment is depicted in ***Appendix L***, Concept Plans. The geometry at each location was kept as close as possible to the existing one by introducing compound curves and/or offsetting the ramps toward the right of way line while preserving the existing design speed of each ramp.

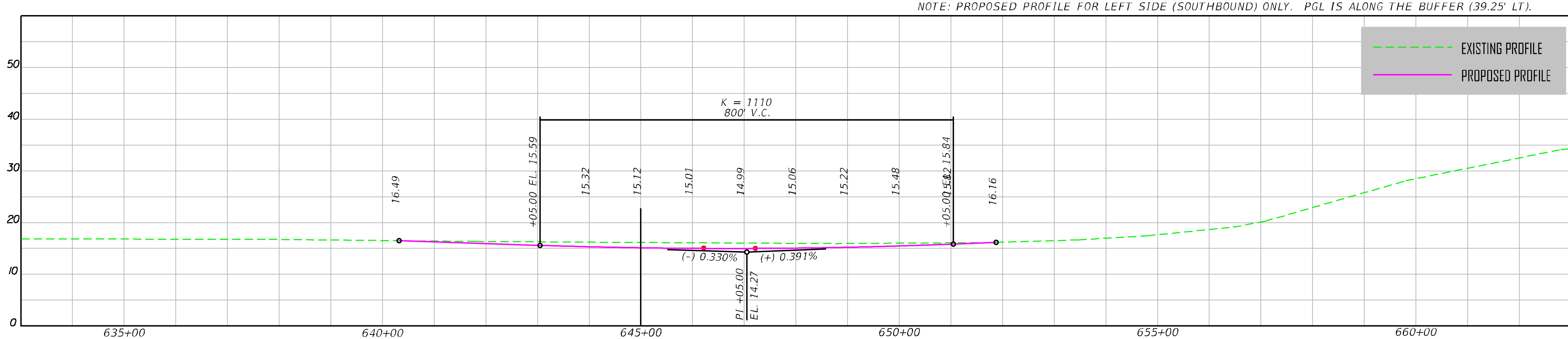
Vertical Alignment – The Build Alternative is proposing to keep the existing vertical alignment throughout the corridor except at following three locations:

1. Under Andrews Avenue Bridge Overpass – This location has a substandard vertical clearance between the outside I-95 southbound lanes and the Andrews Avenue overpass bridge. The existing minimum vertical clearance is 15.58' between the highest superelevated outside lane and the structure above. This substandard condition is compounded by the Build Alternative design as the proposed widening will continue outward at the superelevated cross slope. The FDOT and AASHTO design standards require the vertical clearance to be no less than 16'-6" and 16'-0" respectively. As part of this study, it was determined that the most feasible remedy will be the lowering of the southbound profile grade by approximately one foot. That elevation change is sufficient to satisfy the AASHTO requirement, thus avoiding the need for a design exception (see ***Figure 5.6***). Due to the high elevation of the center pier foundation, the pavement cannot we be lowered further in order to avoid a design variation. Therefore, a vertical clearance design variation will be required at this location.

2. Under Pedestrian Bridge Overpass – The existing vertical clearance between the I-95 pavement crown and the pedestrian crossing structure is 16 feet. The FDOT requirement for vertical clearance in this case is 17'-6". As part of this study, it was determined that the most feasible remedy will be the lowering of the I-95 profile grade by at least 1'-6". This elevation change is sufficient to match the FDOT requirement, thus avoiding the need for a design exception or variation (see ***Figure 5.7***).



NOTE: PROPOSED PROFILE FOR LEFT SIDE (SOUTHBOUND) ONLY. PGL IS ALONG THE BUFFER (39.25' LT).



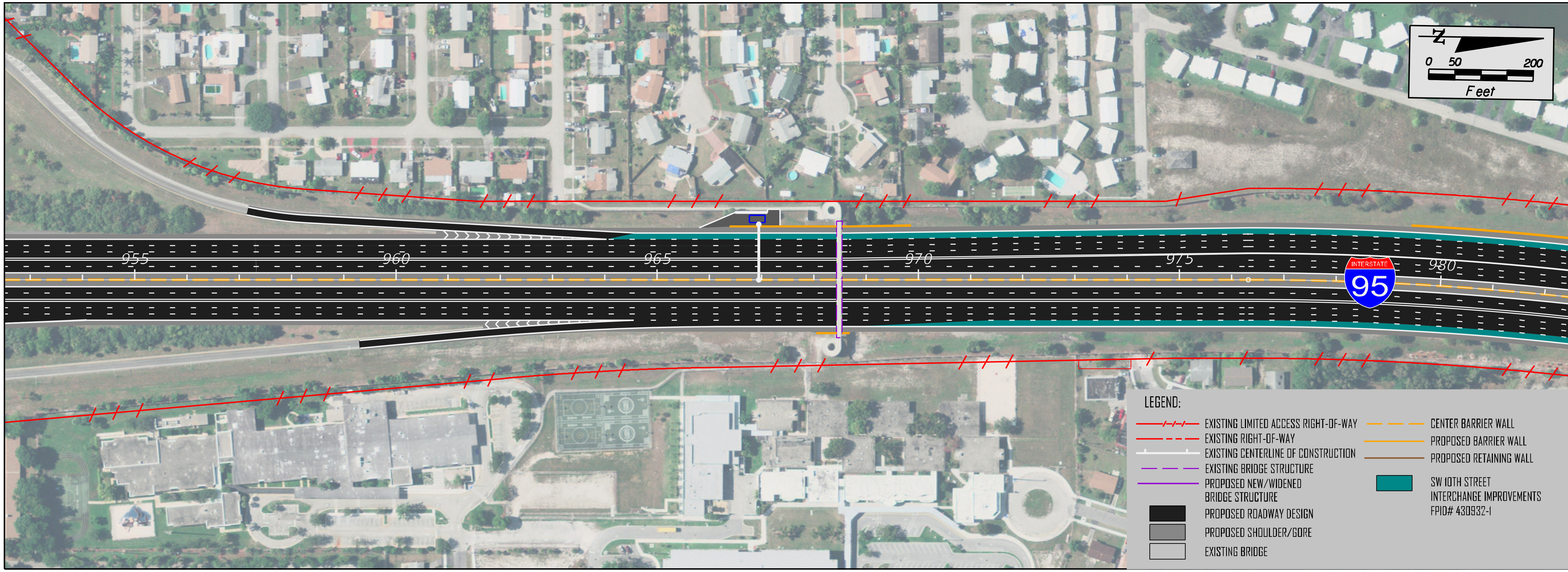
FLORIDA DEPARTMENT OF TRANSPORTATION
BROWARD AND PALM BEACH COUNTIES

March 2013

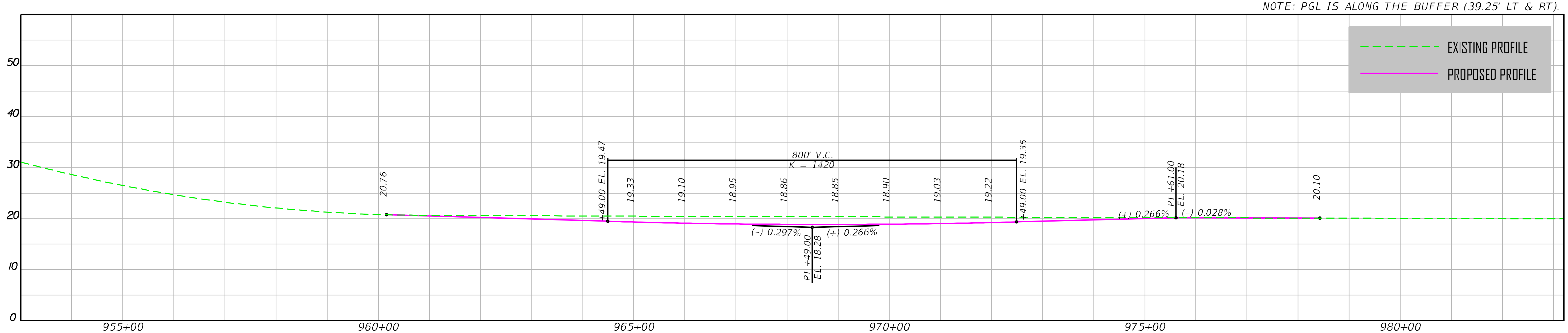
I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)
ETDM: 3330

PLAN AND PROFILE SHEET
PROFILE UNDER ANDREWS AVENUE (SOUTHBOUND ONLY)

FIGURE 5.6



NOTE: PGL IS ALONG THE BUFFER (39.25' LT & RT).



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PLAN AND PROFILE SHEET
PROFILE UNDER PEDESTRIAN CROSSING

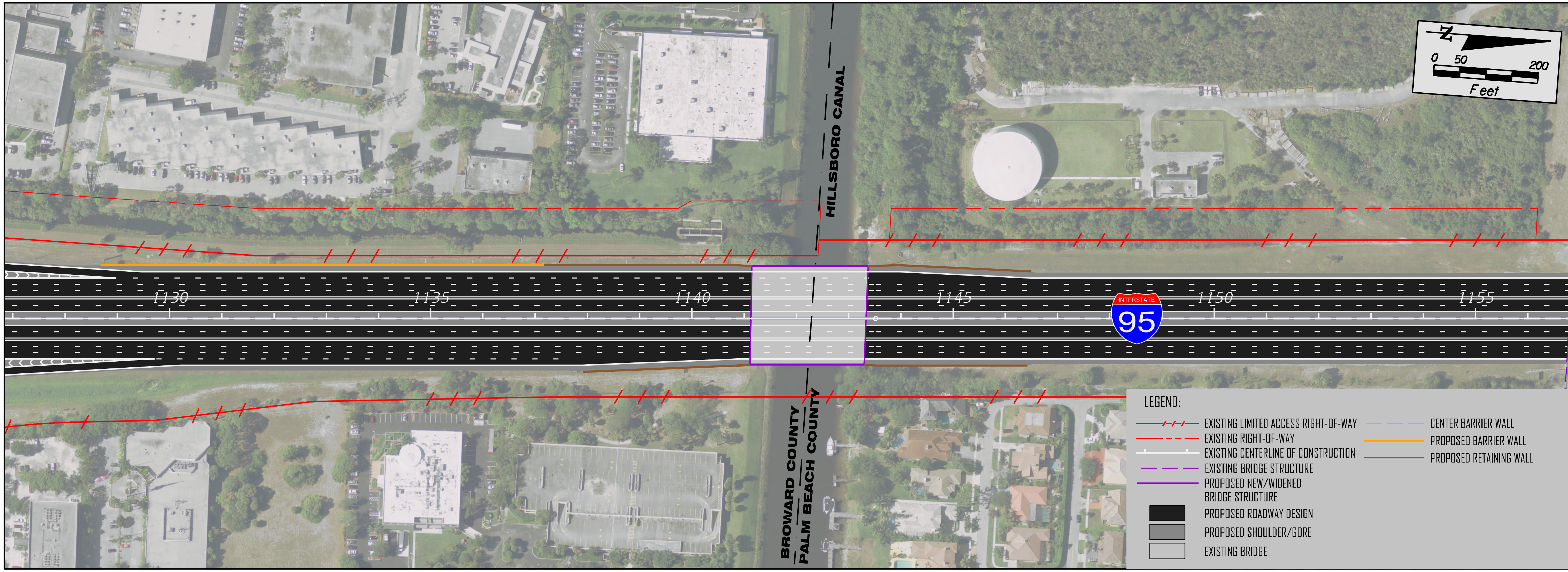
FIGURE 5.7

3. Hillsboro Canal Bridge – As part of this study, it was determined that the northbound and southbound bridges over the Hillsboro Canal at the Broward/Palm Beach County line will need to be replaced due to maintenance issues and substandard vertical clearance. The new bridge deck will be constructed 5.17' higher than the existing bridge. This elevation was determined considering a new structure depth of 48" (the existing structure depth is only 18"), widening at 0.02 cross slope (effective widening = 10.92'). This new elevation will match the adjacent CSX Railroad bridge structure immediately to the west. Coordination with the United States Coast Guard (USCG) required raising the I-95 bridges to meet the adjacent CSX bridge structure in order to maintain the proper vertical clearance for recreational navigation. The Hillsboro Canal is a designated recreational navigation waterway. The proposed profile does not impact the Hillsboro Boulevard Interchange nor do the existing vertical clearance between I-95 and the SW 18th Street overpass just to the north (see ***Figure 5.8***).

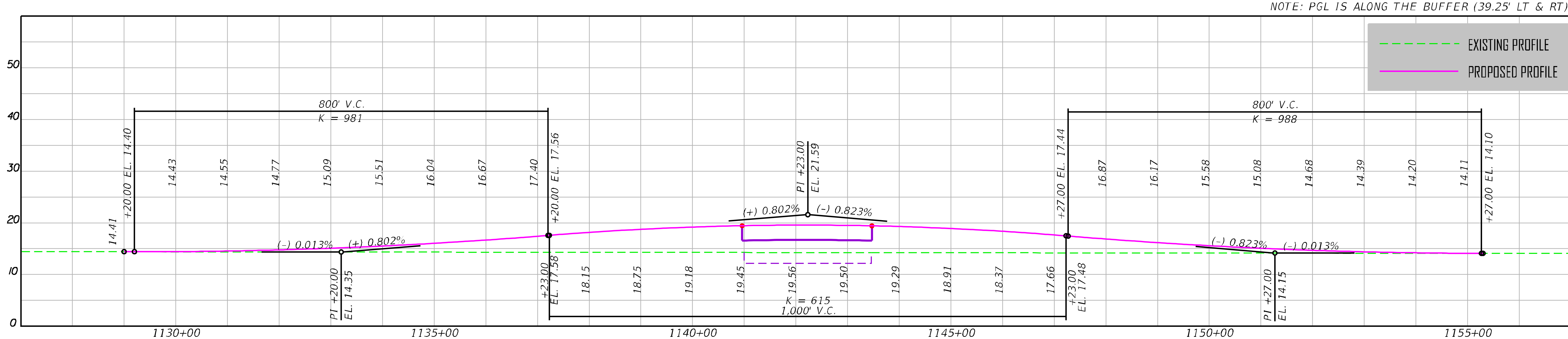
5.4.3 Conceptual Plans

As documented in ***Section 5.4***, one Build Alternative was evaluated as part of the preliminary design phase of this PD&E study. ***Appendix L*** shows the conceptual plans including, but not limited to, the following elements:

- Project corridor study limits
- Existing limited access right of way
- Existing right of way
- Existing centerline of construction
- Existing bridge structures
- Proposed new/widened bridge structures
- Proposed roadway design
- Proposed edge of shoulder pavement
- Existing barrier walls
- Proposed barrier walls
- Proposed retaining walls
- Roadway cross sections (at selected locations)



NOTE: PGL IS ALONG THE BUFFER (39.25' LT & RT).



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FPID: 409359-1-22-01 (BROWARD COUNTY)
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PLAN AND PROFILE SHEET
PROFILE OVER HILLSBORO CANAL

FIGURE 5.8

5.4.4 RIGHT OF WAY

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements.

No right of way acquisition is anticipated to accommodate the roadway improvements required to implement the Build Alternative.

5.4.5 COST ESTIMATE

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements. Therefore, the cost estimate for the No-Build Alternative is $0.

The PD&E study developed a cost estimate for the considered Build Alternative. The estimated construction costs were generated using the FDOT Long Range Estimate (LRE) cost estimating system. The estimates included the major cost components typically associated with highway construction. The total cost estimate for the Build Alternative is approximately $240,000,000. The total cost estimate includes ten percent Maintenance of Traffic (MOT), eight percent Mobilization, 15 percent Design Build, six percent Construction Engineering and Inspection and a miscellaneous Non-Bid Components cost. These costs are preliminary in nature and will be refined as the project enters subsequent transportation phases. ***Table 5.3*** breaks down the construction cost estimates by segment.

Table 5.3 Cost Estimate		
Financial Project Identification Number	**Project Limit**	**Cost**
Construction Cost Estimate		
409359-2	From Oakland Park Boulevard to Atlantic Boulevard	$48,894,000
409359-3	From Atlantic Boulevard to Sample Road	$45,123,000
409359-4	From Sample Road to the Broward/Palm Beach County Line	$56,807,000
409355-2	From the Broward/Palm Beach County Line to Glades Road	$27,393,000
Total Construction Cost		**$178,217,000**
Total Cost Estimate		
Cost Category		
Maintenance of Traffic (10%)		$17,821,700
Mobilization (8%)		$15,683,096
Design Build (15%)		$25,406,616
Non-Bid Components		$1,359,100
Construction Engineering and Inspection (6%)		$10,693,020
Total Cost Estimate		**$249,180,532**

5.4.6 Preliminary Drainage Analysis

The No-Build Alternative proposes to keep the existing drainage system of the corridor into the future.

A *Preliminary Drainage Report*, a companion document to this PD&E study, was prepared as part of this project. The report identifies the local, state, and federal design criteria to be used along the corridor. In addition, the report addresses the drainage design solutions needed to meet these criteria for the Build Alternative.

The proposed drainage design for the Build Alternative has the capacity to handle the runoff from the proposed widening, maximize its water quality treatment capability, and outfall at a rate no greater than in the pre-development conditions. The proposed drainage system for the Build Alternative will essentially maintain the same basin boundaries as in the pre-development conditions.

The project is divided into four major basins and 97 sub-basins. The major basins were delineated based upon the eventual outfall into a surface water body, while the sub-basins were delineated based upon the locations of the existing weirs. The project land use for all four basins is classified as highway. The proposed drainage designs for the four basins are described below and summarized in ***Appendix D***.

Basin 1 – The limits for Basin 1 are from the begin project, located just north of Oakland Park Boulevard, to Commercial Boulevard. Stormwater runoff is routed via storm sewers and drainage swales into a wet pond located in the northwest quadrant of the I-95 interchange with Oakland Park Boulevard. The proposed Build Alternative widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by re-working the eastbound swales of I-95, thus increasing the storage capacity of these swales.

Basin 2 – The limits for Basin 2 are from Commercial Boulevard to McNab Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into the C-14 Canal. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating four of the interchange infield areas within the I-95 interchange with Cypress Creek Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

Basin 3 – The limits for Basin 3 are from McNab Road to Copans Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into a tributary canal of the Pompano Canal located along the east side of I-95 just north of the interchange with Atlantic Boulevard. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating four of the interchange infield areas within the I-95 interchange with Atlantic Boulevard as well as four of the interchange infield areas within the I-95 interchange with Copans Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

Basin 4 – The limits for Basin 4 are from Copans Road to the end project, located just north of the I-95 interchange with Palmetto Park Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into a tributary canal of the Hillsboro Canal located along the west side of I-95. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating two of the interchange infield areas within the I-95 interchange with Copans Road, four of the interchange infield areas within the I-95 interchange with Sample Road, one of the interchange infield areas within the I-95 interchange with SW 10th Street, four of the interchange infield areas within the I-95 interchange with Hillsboro Boulevard, and two of the interchange infield areas within the I-95 interchange with Palmetto Park Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

5.4.6.1 *Alternate Materials Analysis*

The proposed project is classified as a major highway facility. The FDOT's Culvert Service Life Estimator computer program will be used in order to determine the applicable materials for the proposed storm sewers, cross drains, side drains, gutter drains, and vertical drains, to complete the alternatives materials analysis.

5.4.6.2 *Floodplain Compensation Storage*

A *Location Hydraulics Report*, a companion document to this PD&E study, was prepared as part of this project. This report evaluates 100-year floodplain encroachments as a result of the roadway improvements addressed in the I-95 project. The intent is to confirm that the existing level of flood protection provided for the 100-year design storm is maintained after construction of the proposed roadway improvements.

The Federal Emergency Management's (FEMA) Flood Insurance Rate Maps (FIRM) were reviewed in order to determine if there are any areas encroaching upon the 100-year floodplains. See ***Appendix D*** for the FEMA FIRM maps denoting the project corridor. Based on the FEMA FIRM, there are 10 floodplain encroachments along the study corridor.

FDOT drainage criteria require that pre-development offsite impacts in the form of flood stages and discharge rates not be increased in the post-development conditions for design storms up to and including the 100-year frequency storm. The proposed Build Alternative widening of I-95 is negligible when compared to the overall magnitude of the drainage basins. As a result, any floodplain encroachments due to the proposed widening of I-95 are considered negligible.

The SFWMD has jurisdiction over the stormwater quality criteria for the proposed project. The SFWMD requires that all projects meet state water quality standards, as set forth in Chapter 17-302, FAC.

The proposed project will be required by the SFWMD to treat only the new impervious area using the requirements for wet detention systems. Per SFWMD criteria, a nutrient loading analysis based upon the modified Harper methodology was conducted and is provided in the *Location Hydraulics Report*. The total net change in phosphorous loading between existing and proposed conditions, across the four project basins, is 0.00 kg/yr.

The proposed improvements to I-95 are Category 5 (projects on existing alignment involving replacement of drainage structures in heavily urbanized flood plains). Replacement drainage structures for this project are limited to hydraulically equivalent structures. The limitations to the hydraulic equivalency being proposed are basically due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location was not considered in this category since it defeats the project purpose or is economically unfeasible. Since flooding conditions in the project area are inherent in the topography or are a result of other outside contributing sources, and since there is no practical alternative to totally eradicate flood impacts or even reduce them in any significant amount, existing flooding will continue, but not be increased.

The proposed structures will be hydraulically equivalent to or greater than that of the existing structures and backwater surface elevations are not expected to increase. As a result, this project will not affect existing flood heights or flood plain limits. This project will not result in any new or increased adverse environmental impacts, and there will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes.

5.4.7 Lighting

The No-Build Alternative proposes to keep the existing lighting system of the corridor into the future.

Light poles for the I-95 mainline are predominantly located within the median. For most of the corridor, the existing median will not be impacted by the Build Alternative. The existing lighting for the corridor will be maintained. However, the median sections north of Prospect Road and south of Copans Road (see ***Appendix L Sheets 3 and 12***) will be reconstructed to meet horizontal stopping sight distance requirements. Therefore, the lighting system at these sections will need to be relocated from the existing median to the proposed median barrier wall.

5.4.8 Utility Impacts

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements. Therefore, the No-Build Alternative will not have utility impacts.

The utility companies with known facilities within the study limits were contacted at the beginning of the PD&E study requesting to provide the FDOT the location of their existing and planned facilities. Corridor base plans showing approximate locations of utilities are contained in ***Appendix G***. A preliminary evaluation for potential utility impacts associated with the Build Alternative was performed along the corridor. The results indicate that there is potential for involvement with the following utility companies located within the limited and/or local right of way.

The widening associated with the Build Alternative could potentially impact the facilities that cross I-95 within the study limits. The widening associated with the Build Alternative is not anticipated to impact the City of Fort Lauderdale Charles W. Fiveash Regional Water Treatment Plant, located adjacent to the west side of I-95 between Oakland Park Boulevard and Commercial Boulevard.

There are approximately 101 utility crossings noted within the study limits, most commonly found in and around interchanges and overpasses. The widening associated with the Build Alternative could potentially impact all the utility crossings. The potential utility companies and crossing locations are summarized below (stationing is approximated):

Florida Power and Light

There are 12 above ground electrical lines and 13 buried electrical lines that cross I-95 within the study limits.

Above ground electric transmission crossings (5):

- 230 KV at NW 38th Street – Station 546+50
- 230 KV south of Powerline Road – Station 558+50
- 230 KV at Prospect Road – Station 576+50
- 138 KV south of Sample Road – Station 933+25
- 138 KV at Palmetto Park Road – Station 1224+25

Above ground electric distribution crossings (7):

- 13 KV at NW 38th Street – Station 547+25
- 13 KV south of Andrews Avenue – Station 639+00
- 13 KV north of Dr. Martin Luther King Jr. Boulevard – Station 808+50
- 13 KV at SW 10th Street – Station 1054+75
- 7.6 KV at SW 18th Street – Station 1158+75
- 7.6 KV north of SW 18th Street – Station 1160+25
- 7.6 kV south of Glades Road – Station 1250+75

Buried electric distribution crossings (13):

- 13 KV at south of Prospect Road – Station 572+00
- 13 KV at Cypress Creek Road – Station 668+00
- 13 KV at McNab Road – Station 701+50
- 13 KV at south of Race Track Road – Station 743+75
- 13 KV at Dr. Martin Luther King Jr. Boulevard – Station 785+75
- 13 KV at the railroad crossing, south of NW 15th Street – Station 821+50
- 13 KV at Copans Road – Station 886+50
- 13 KV at south of Sample Road – Station 934+00
- 13 KV north of Sample Road – Station 954+25
- 13 KV at NE 48th Street – Station 1002+00
- 13 KV at SW 10th Street – Station 1055+25
- 13 KV at Hillsboro Boulevard – Station 1108+00
- 7.6 KV at Camino Real – Station 1201+75

Peoples Gas/TECO

There are six gas lines that cross I-95 within the study limits.

- 4-inch at Race Track Road – Station 757+75
- 6-inch at Atlantic Boulevard – Station 775+50
- 6-inch at Dr. Martin Luther King Jr. Boulevard – Station 787+00
- 3-inch at Sample Road – Station 946+00

- 3-inch at NE 48th Street – Station 1001+50
- 4-inch at Hillsboro Boulevard – Station 1107+75

Broward County OES – Water Supply

This utility company has five force main sanitary sewer lines (two are abandoned) that cross I-95 within the study limits.

- Abandoned line at Commercial Boulevard – Station 602+50
- 4-inch south of Andrews Avenue – Station 632+25
- 8-inch north of Sample Road – Station 974+25
- Abandoned line south of NE 48th Street – Station 985+25
- 30-inch at NE 48th Street – Station 1001+50

City of Pompano Beach

This utility company has four force main sanitary sewer lines that cross I-95 within the study limits.

- 16-inch at Atlantic Boulevard – Station 776+75
- 4-inch at Dr. Martin Luther King Jr. Boulevard – Station 786+25
- 8-inch at NW 15th Street – Station 828+50
- 42-inch at NW 15th Street – Station 828+50

City of Deerfield Beach

This utility company has three force main sanitary sewer lines that cross I-95 within the study limits.

- 20-inch at SW 10th Street – Station 1055+25
- 18-inch south of Hillsboro Boulevard – Station 1083+50
- 16-inch at Hillsboro Boulevard – Station 1106+75

City of Boca Raton – Water

This utility company has one set of dual force main sanitary sewer lines that cross I-95 within the study limits.

- Dual, 10-inch at Camino Real – Station 1201+50

City of Fort Lauderdale

This utility company has five water lines that cross I-95 within the study limits.

- 54-inch at NW 38th Street – Station 546+50
- 36-inch at Powerline Road – Station 562+00
- 30-inch at Powerline Road – Station 565+00

- 36-inch at Prospect Road – Station 575+75
- 30-inch at Andrews Avenue – Station 646+50

Broward County OES – Water Supply

This utility company has eight water lines that cross I-95 within the study limits.

- 6-inch north of Andrews Avenue – Station 650+75
- 20-inch at Cypress Creek Road – Station 665+50
- 54-inch at Copans Road –Station 885+50
- 24-inch south of Sample Road – Station 933+50
- 12-inch at Sample Road – Station 947+00
- 8-inch north of Sample Road – Station 974+00
- 12-inch south of NE 48th Street – Station 985+00
- 30-inch at NE 48th Street – Station 999+25

City of Deerfield Beach

This utility company has five water lines that cross I-95 within the study limits.

- 16-inch at SW 10th Street – Station 1057+00
- 20-inch south of Hillsboro Boulevard – Station 1083+00
- 24-inch south of Hillsboro Boulevard – Station 1083+50
- 12-inch at Hillsboro Boulevard – Station 1107+00
- 12-inch at Broward/Palm Beach County line – Station 1140+75

City of Boca Raton – Water

This utility company has nine water lines that cross I-95 within the study limits.

- Dual, 12-inch south of SW 18th Street – Station 1155+50
- 12-inch at SW 18th Street – Station 1160+50
- 12-inch north of SW 18th Street – Station 1172+50
- 12-inch south of Camino Real – Station 1189+50
- 12-inch at Camino Real – Station 1201+50
- Irrigation line at Camino Real – Station 1202+00
- 16-inch at Palmetto Park Road – Station 1225+75
- Irrigation at Palmetto Park Road – Station 1226+50
- 10-inch south of Glades Road – Station 1249+50

Broward County OES – Traffic Engineering Division

This utility company has nine fiberoptic telecommunication lines that cross I-95 within the study limits (one is co-located with FDOT).

- Prospect Road – Station 576+00
- Dual, at Commercial Boulevard – Station 603+50
- Andrews Avenue – Station 646+00
- Race Track Road – Station 758+50
- Atlantic Boulevard – Station 777+50
- Sample Road – Station 947+00
- NE 48th Street – Station 999+75(shared with FDOT)
- SW 10th Street – Station 1055+25
- Hillsboro Boulevard – Station 1106+00

AT&T

This utility company has 14 data communication lines that cross I-95 within the study limits.

- Four 4-inch north of Prospect Road – Station 579+25
- Nine 4-inch at Cypress Creek Road – Station 667+25
- One 4-inch at McNab Road – Station 700+00
- North of McNab Road – Station 710+00
- Six 4-inch at Atlantic Boulevard – Station 777+50
- Dr. Martin Luther King Jr. Boulevard – Station 786+25
- Twelve 4-inch north of Dr. Martin Luther King Jr. Boulevard – Station 795+75
- One 4-inch at NW 15th Street – Station 828+50
- Twelve 4-inch AT&T at Sample Road – Station 946+50
- One 4-inch north of NE 48th Street – Station 1021+00
- Thirteen 4-inch at SW 10th Street – Station 1056+75
- Six 4-inch at Hillsboro Boulevard – Station 1107+50
- Nine 4-inch at Camino Real – Station 1201+25
- Twenty 4-inch at Camino Real – Station 1201+50

FDOT

The widening associated with the Build Alternative could potentially impact the buried fiberoptic line which is located along the west edge of pavement for the entire project length in Broward County, supporting the FDOT SunGuide ITS system. This utility company has three data communication lines which support the SunGuide system that cross I-95 within the study limits (one is co-located with BCTED).

- North of Cypress Creek Road – Station 689+00
- Dual, north of NW 15th Street – Station 849+50

- NE 48th Street – Station 999+75(shared with BCTED)

City of Boca Raton - Traffic

This utility company has one buried fiberoptic communication line that crosses I-95 within the study limits.

- Palmetto Park Road – Station 1225+00

In summary, nine utility companies could potentially be impacted by the proposed improvements. ***Table 5.4*** shows an approximate number of potential impacts by alternative for each utility company.

Table 5.4
Summary of Potential Utility Impacts

Utility	Number of Impacts
AT&T	14
Broward County OES[1,2]	23
City of Boca Raton	13
City of Deerfield Beach	8
City of Fort Lauderdale	5
City of Pompano Beach	4
FDOT[2]	4
FPL	25
Peoples Gas/TECO	6

1 Two force main facilities are abandoned
2 One communication facility is co-located between Broward County OES and FDOT

Coordination with the utility companies described in this section will continue during the PD&E transportation phase. Further refinement of the proposed design and utility field verification will be carried out during the final Design transportation phase. Special construction equipment and techniques may be utilized to avoid utility conflicts. In unique locations, where the special construction equipment and techniques cannot avoid utility relocations, the need for relocation of the particular utility and the cost will be determined during the Design transportation phase.

5.4.9 PROPOSED INTELLIGENT TRANSPORTATION SYSTEM

The No-Build Alternative proposes to keep the existing Intelligent Transportation System (ITS) equipment of the corridor into the future.

The tolling strategy considered for the Build Alternative is a segmental system with gantry points located right after each ingress point in order to capture existing traffic traveling on the express lane and new traffic entering the express lane system. ***Appendix C*** graphically shows the proposed system within the study limits.

Existing Fiber Optic (FO) infrastructure is located along the I-95 southbound swale from Oakland Park Boulevard to the Broward/Palm Beach County Line, and crosses I-95 to continue on the northbound swale for the currently deployed ITS equipment. The FDOT installed 48 strand FO backbones for laterals, and 96 strand cables for main backbone along the project corridor of which approximately 60% will be impacted by the Build Alternative. Therefore, the entire FO cable within the project limits will be replaced with four, two inch (4-2") HDPE conduit runs, with one conduit used for a new 144SM FOC main backbone. The existing four, one and one quarter inch (4-1.25") HDEP conduits that remain will accommodate the 2-72SM new FOC in one the conduits. The remaining conduit runs will be used for power cables and trace wires.

The proposed ITS network plans depicted in ***Appendix C*** shows the existing ITS devices that will remain and the ones that will be replaced. Additional Closed Circuit Television (CCTV) and Microwave Vehicle Detection System (MVDS) will be necessary to provide 100% coverage and traffic detection for the general purpose lanes and express lanes. Incidental items to the ITS devices such as pull and splice boxes are not depicted in the proposed preliminary plans. The existing Highway Advisory Radio (HAR) signs are shown to be relocated. The final location will be determined during the Design phase.

The following is a description of the proposed ITS components:

- **Fiber Optic Conduit System –** The Fiber Optic conduit trunks proposed for this project shall consist of four, two inch (4-2") HDPE conduits. A typical conduit system will be placed using the open cut trench method.

Conduits shall also be placed using directional bore method when crossing an existing pavement, railroad, and other conflicts as required by FDOT standards. Conduits shall be bridge attached when crossing canals or at locations where underground conduit installation is not possible. The permanent conduit trunk has been proposed within the FDOT right of way limits and accessible by the FDOT maintenance personnel and vehicles.

- **Pull Boxes –** New pull boxes are proposed along the new conduit backbone and conduit laterals from the conduit backbone to ITS devices. Pull boxes are to be installed beside each ITS field device and spaced at a maximum of 1,000 feet. Separate pull boxes shall be installed for fiber optic cable communications and for power conductors.

- **Splice Boxes –** Splice boxes are proposed along the fiber optic conduit backbone at maximum length of 2,500 feet and where the conduit laterals interconnect with the main fiber optic conduit backbone.

- **Proposed Structures –** The proposed project will include seven structures consisting of one Dynamic Message Sign (DMS), three Dual Toll Rate Signs (DTRS) and three Status Lane Signs (SLS) placed upstream of each ingress point over the general purpose lanes. At each egress point a DMS and DTRS structure will be placed to provide upstream information and advice the motorist of any upcoming event in the express lanes, including toll price information for the next segment with enough distance to make a decision to exit or remain in the express lanes. There are a total of 36 ITS sign structures proposed for this project as depicted in **Table 5.5**.

Table 5.5 Proposed ITS Structures				
#	Type	Description	Station	Location
1	DMS	Northbound I-95 north of NW 38th Street	553+00	EL
2	TRS	Northbound I-95 south of Prospect Road	566+00	EL
3	TRS	Northbound I-95 south of Andrews Avenue	638+00	GPL
4	DMS	Northbound I-95 south of Cypress Creek Road	664+00	GPL
5	SLS	Northbound I-95 north of Cypress Creek Rd (1Mile)	683+20	GPL
6	TRS	Northbound I-95 south of McNab Road	696+00	GPL
7	SLS	Northbound I-95 north of McNab Road (1/2 Mile)	712+00	GPL
8	TRS	Northbound I-95 north of McNab Road	722+40	GPL
9	SLS	Northbound I-95 north of McNab Road	736+00	EL
10	DMS	Northbound I-95 north of Sample Road	970+00	EL
11	TRS	Northbound I-95 north of Sample Road	991+00	EL
12	TRS	Northbound I-95 north of SW 10th Street	1079+00	GPL
13	DMS	Northbound I-95 south of Hillsboro Boulevard	1103+00	GPL
14	SLS	Northbound I-95 north of Hillsboro Boulevard (1 Mile)	1120+70	GPL
15	TRS	Northbound I-95 north of Hillsboro Boulevard	1134+00	GPL
16	SLS	Northbound I-95 south of SW 18th Street (1/2 Mile)	1147+00	GPL
17	TRS	Northbound I-95 north of SW 18th Street	1162+00	GPL
18	SLS	Northbound I-95 north of SW 18th Street	1177+00	EL
19	DMS	Southbound I-95 south of Palmetto Park Road	1219+00	EL
20	TRS	Southbound I-95 south of Palmetto Park Road	1205+00	EL
21	TRS	Southbound I-95 north of Hillsboro Boulevard	1115+00	GPL
22	DMS	Southbound I-95 south of Hillsboro Boulevard	1090+00	GPL
23	SLS	Southbound I-95 north of SW 10th Street (1 Mile)	1071+00	GPL
24	TRS	Southbound I-95 south of SW 10th Street	1051+00	GPL
25	SLS	Southbound I-95 south of SW 10th Street (1/2 Mile)	1040+00	GPL
26	TRS	Southbound I-95 south of SW 10th Street	1028+00	GPL
27	SLS	Southbound I-95 north of NE 48th Street	1010+00	EL
28	DMS	Southbound I-95 south of NW 15th Street	811+20	EL
29	TRS	Southbound I-95 south of Race Track Road	757+00	EL

Table 5.5 Proposed ITS Structures				
#	**Type**	**Description**	**Station**	**Location**
30	TRS	Southbound I-95 south of Cypress Creek Road	660+00	GPL
31	DMS	Southbound I-95 south of Andrews Avenue	637+00	GPL
32	SLS	Southbound I-95 north of Commercial Blvd (1 Mile)	607+00	GPL
33	TRS	Southbound I-95 south of Commercial Boulevard	592+00	GPL
34	SLS	Southbound I-95 north of Prospect Road (1/2 Mile)	578+50	GPL
35	TRS	Southbound I-95 north of Powerline Road	568+00	GPL
36	SLS	Southbound I-95 north of W 38th Street	549+00	EL

Note; EL – Express Lanes
GPL – General Purpose Lanes

- **Proposed Gantry Equipment Buildings –** The proposed project will include three equipment toll buildings, located directly beside the toll gantry, adjacent to the shoulder pavement and right after each ingress point, Each equipment building location will include the following:
  - Access driveway
  - Parking area
  - Above ground diesel fuel tank
  - Emergency diesel generator
  - Diesel fuel control/monitor panel
  - Toll equipment structure
  - Toll equipment structure foundation
  - Condensate drywell
  - Concrete median barrier wall
  - Concrete bumper guard
  - 12" reinforced concrete slab
  - 6" concrete sidewalk
  - 4" diameter galvanized permanent pipe bollards
  - Anchor pipe bollard to top of spread footer
  - Electrical service meter
  - Gravel
  - ITS interface pull boxes

The location of the toll gantries and buildings are listed in **Table 5.6**.

Table 5.6 Proposed Gantry Equipment Building				
#	**Type**	**Description**	**Station**	**Location**
1	Gantry	Northbound I-95 south of Race Track Road	755+00	swale
2	Gantry	Northbound I-95 south of Camino Real	1189+50	swale
3	Gantry	Southbound I-95 south of NE 48th Street	967+00	swale

- **Closed Circuit Television (CCTV) Cameras –** CCTV cameras proposed shall provide complete 100% coverage of all I-95 lanes and all connector ramps. The CCTV cameras shall be used to monitor, detect and verify incidents during and after reconstruction of the express lanes. Besides general surveillance cameras, additional separate confirmation cameras shall be installed upstream approximately 350 feet to view and confirm the messages displayed for each of the DMS, CMS and TRS signs proposed along the I-95 corridor.

  The CCTV cameras shall be managed with command and control from an FDOT SunGuide TMC operator. The CCTV cameras shall be located outside the clear zone or shall be protected with guard rail and pole mounted at a minimum of 40 feet above roadway level. The proposed CCTV locations are listed in **Table 5.7**.

Table 5.7
Closed-Circuit Television Location and Structure Type

ID Number	Location	Station	Structure Type	Status
CCTV-95-19	Southbound I-95 south of Prospect Road	570+60	On Pole	To Remain
CCTV-95-20	Southbound I-95 south of Andrew Avenue	630+95	On Pole	To Remain
CCTV-95-21	Southbound I-95 south of Cypress Creek Road	663+15	On Pole	To Replace
CCTV-95-22	Southbound I-95 north of McNab Road	702+67	On Pole	To Replace
CCTV-95-23	Southbound I-95 south of Race Track Road	743+62	On Pole	To Replace
CCTV-95-24	Southbound I-95 north of Atlantic Boulevard	780+55	On Pole	To Replace
CCTV-95-25	Southbound I-95 north of NW 15th Street	830+64	On Pole	To Replace
CCTV-95-26	Southbound I-95 south of Copans Road	851+70	On Pole	To Replace
CCTV-95-27	Southbound I-95 north of Copans Road	886+70	On Pole	To Replace
CCTV-95-28	Southbound I-95 south of Sample Road	944+40	On Pole	To Replace
CCTV-95-29	Southbound I-95 south of NE 48th Street	986+45	On Pole	To Replace
CCTV-95-30	Southbound I-95 south of SW 10th Street	1026+70	On Pole	To Replace
CCTV-95-31	Southbound I-95 south of SW 10th Street	1054+45	On Pole	To Replace
CCTV-95-32	Southbound I-95 north of Hillsboro Boulevard	1108+35	On Pole	To Replace
CCTV-95-33	Southbound I-95 south of SW 18th Street	1143+80	On Pole	To Replace
CCTV-95-34	Northbound I-95 south of Camino Real	1190+40	On Pole	To Replace
CCTV-95-35	Southbound I-95 south of Palmetto Park Road	1223+10	On Pole	To Remain

- **Dynamic Message Signs (DMS) –** The DMS shall be placed upstream of high accident areas, bottlenecks and major decision points like ramps. The vertical and horizontal curvatures of the roadway shall be analyzed before the final locations of the DMS are determined. Separate DMS shall also be provided for the express lanes as deemed necessary. The proposed DMS locations are listed in **Table 5.8**.

Table 5.8 Dynamic Message Sign Location and Structure Type				
ID Number	Location	Station	Structure Type	Status
DMS-95-9	Northbound I-95 north of Cypress Creek Road	684+65	Overhead Truss	To Replace
DMS-95-10	Southbound I-95 north of McNab Road	722+44	Overhead Truss	To Replace
DMS-95-11	Southbound I-95 south of Copans Road	849+65	Overhead Truss	To Replace
DMS-95-12	Northbound I-95 south of Copans Road	849+47	Overhead Truss	To Remain
DMS-95-13	Southbound I-95 south of NE 48th Street	999+75	Overhead Truss	To Remain
DMS-95-14	Southbound I-95 north of NE 48th Street	1011+70	Overhead Truss	To Replace
DMS-95-15	Southbound I-95 north of Hillsboro Boulevard	1140+40	Overhead Truss	To Remain

- **Microwave Vehicle Detection System (MVDS) –** A Microwave Vehicle Detection System (MVDS) shall be installed along I-95 for traffic monitoring and incident detection. Microwave vehicle detectors shall be provided to cover traffic volume, vehicle type and speed information for all the general purpose and express lanes in both the northbound and southbound directions. The detectors shall be auto calibrating, IP addressable and capable of detecting vehicles at a minimum distance of 200 feet. The detector assemblies shall be placed at an average interval of approximately one-third mile on new concrete poles. Detectors must be placed away from lane drops, acceleration lanes and other similar conditions. The proposed MVDS locations are listed in **Table 5.9**.

Table 5.9 Microwave Vehicle Detection System Location and Structure Type				
ID Number	**Location**	**Station**	**Structure Type**	**Status**
DS-95-28	Southbound I-95 north of Oakland Park Boulevard	539+70	On Pole	To Replace
DS-95-29	Southbound I-95 south of Prospect Road	570+60	On Pole	To Remain
DS-95-30	Southbound I-95 south of Commercial Boulevard	597+83	On Pole	To Replace
DS-95-31	Southbound I-95 north of Commercial Boulevard	630+95	On Pole	To Replace
DS-95-32	Southbound I-95 south of Andrews Avenue	645+30	On Pole	To Replace
DS-95-33	Southbound I-95 south of Cypress Creek Road	663+15	On Pole	To Replace
DS-95-34	Southbound I-95 north of McNab Road	722+44	On Overhead Truss	To Replace
DS-95-35	Southbound I-95 north of McNab Road	702+67	On Pole	To Replace
DS-95-36	Southbound I-95 south of Race Track Road	743+62	On Pole	To Replace
DS-95-37	Southbound I-95 north of Atlantic Boulevard	780+55	On Pole	To Replace
DS-95-38	Southbound I-95 north of Dr. Martin L King Jr. Boulevard	805+00	On Pole	To Replace
DS-95-39	Southbound I-95 north of NW 15th Street	830+64	On Pole	To Replace

Table 5.9 Microwave Vehicle Detection System Location and Structure Type				
ID Number	Location	Station	Structure Type	Status
DS-95-40	Northbound I-95 south of Copans Road	849+47	On Overhead Truss	To Remain
DS-95-41	Southbound I-95 south of Copans Road	849+65	On Overhead Truss	To Replace
DS-95-42	Southbound I-95 north of Copans Road	886+88	On Pole	To Replace
DS-95-43	Southbound I-95 north of Copans Road	917+55	On Sign Structure	To Replace
DS-95-44	Southbound I-95 south of Sample Road	944+40	On Pole	To Replace
DS-95-45	Southbound I-95 south of Palmetto Park Road	1211+36	On Pole	To Replace
DS-95-46	Southbound I-95 north of Sample Road	986+45	On Pole	To Replace
DS-95-47	Southbound I-95 north of NE 48th Street	1011+70	On Overhead Truss	To Replace
DS-95-48	Southbound I-95 south of SW 10th Street	1026+70	On Pole	To Replace
DS-95-49	Southbound I-95 south of SW 10th Street	1054+45	On Pole	To Replace
DS-95-50	Southbound I-95 north of SW 10th Street	1081+75	On Sign Structure	To Replace
DS-95-51	Southbound I-95 north of Hillsboro Boulevard	1108+35	On Pole	To Replace

Table 5.9 Microwave Vehicle Detection System Location and Structure Type				
ID Number	Location	Station	Structure Type	Status
DS-95-52	Southbound I-95 south of Hillsboro Boulevard	1140+40	On Overhead Truss	To Remain
DS-95-53	Northbound I-95 north of SW 18th Street	1164+90	On Pole	To Replace
DS-95-54	Northbound I-95 south of Camino Real	1190+40	On Pole	To Replace
DS-95-55	Southbound I-95 south of Palmetto Park Road	1222+65	On Pole	To Replace
DS-95-56	Northbound I-95 north of Palmetto Park Road	1246+25	On Pole	To Replace

- **Highway Advisory Radio (HAR) System:** The corridor HAR system includes TMC equipment which is connected to each transmitter site over a fiber optic communications link. This allows complete remote control of each transmitter from the TMC, via downloading of messages in digital form. The proposed HAR locations are listed in ***Table 5.10***.

Table 5.10 Highway Advisory Radio Location and Structure Type				
ID Number	Location	Station	Structure Type	Status
HAR-95-06	Northbound I-95 south of Race Track Road	743+50	HAR Beacon	To Relocate
HAR-95-07	Southbound I-95 south of Race Track Road	744+00	HAR Beacon	To Relocate
HAR-95-08	Southbound I-95 south of SW 10th Street	1052+00	HAR Beacon	To Relocate
HAR-95-09	Southbound I-95 north of Palmetto Park Road	1234+45	HAR Beacon	To Relocate
HAR-95-10	Northbound I-95 north of Palmetto Park Road	1248+45	HAR Beacon	To Relocate

5.4.10 TRAFFIC CONTROL CONCEPTS

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future. Therefore, the No-Build Alternative will not have a traffic control concept.

The Build Alternative traffic control plan proposes to keep all travel lanes open at all times during construction, except at the southbound section under the Andrews Avenue overpass. This section may require a lane closure as part of one of the maintenance of traffic (MOT) phases due to the narrow footprint under the overpass structure. Short lane closures may be necessary during off-peaks to change construction phases. Advance notice of any lane closure will be given to minimize disruption to roadway users. ***Figures 5.9-5.12*** show the typical sections during construction. ***Appendix M*** shows the detailed MOT phases at selected locations along the corridor, including the bridge structures. The roadway mainline will consist of two MOT phases (see ***Figures 5.9-5.11***).

- **Phase I –** Shift traffic to the inside
    - Remove the HOV lane designation. The HOV lane will become a general purpose lane.
    - Reduce the inside shoulder width to 10'.
    - Reduce the travel lanes width to 11' (except for the center lane).
    - Overbuild the pavement corridor approximately 0.25' to move the crown point to the outside so it is temporarily located between the second and third travel lane.
    - Construct the proposed outside widening section.

- **Phase II –** Shift travel lanes to final location
    - Overbuild the pavement corridor approximately 0.25' to move the crown point to the outside to the final location between the express lanes and the general purpose lanes (4' buffer).
    - Resurface the remaining pavement corridor.

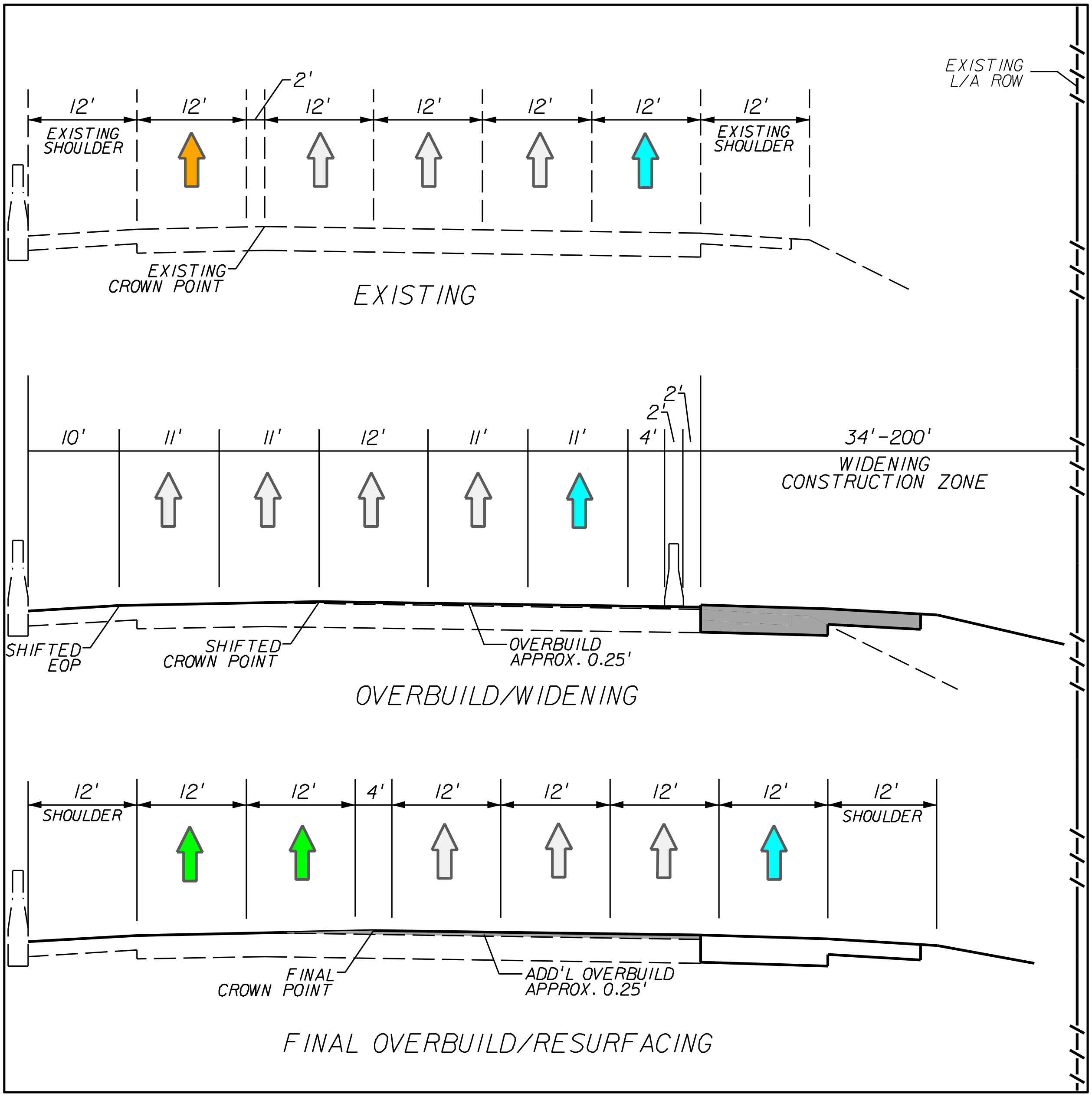


Figure 5.9 – Maintenance of Traffic Typical Section (Mainline Widening with Existing Auxiliary Lane)

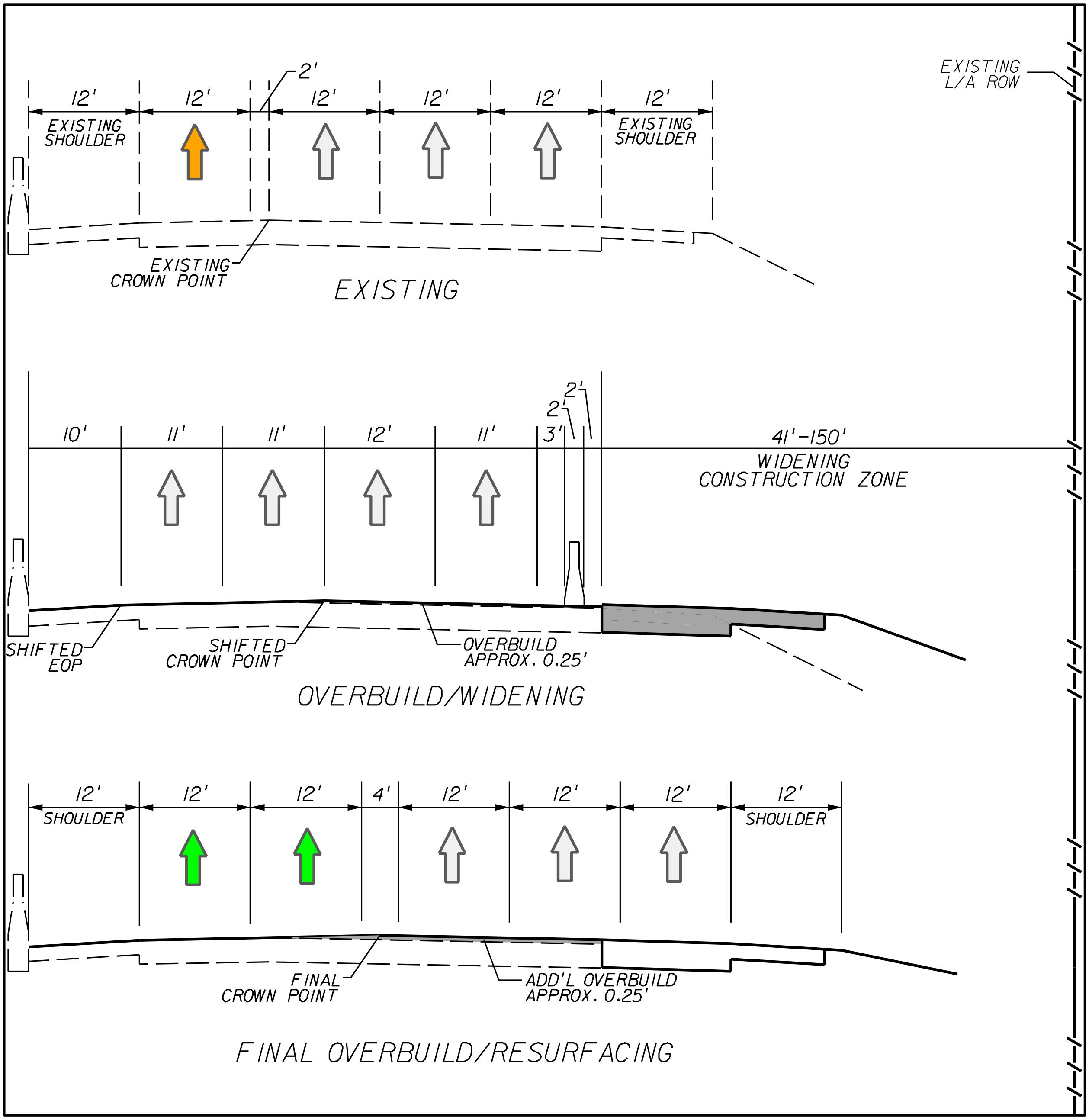


Figure 5.10 – Maintenance of Traffic Typical Section (Mainline Widening without Existing Auxiliary Lane)

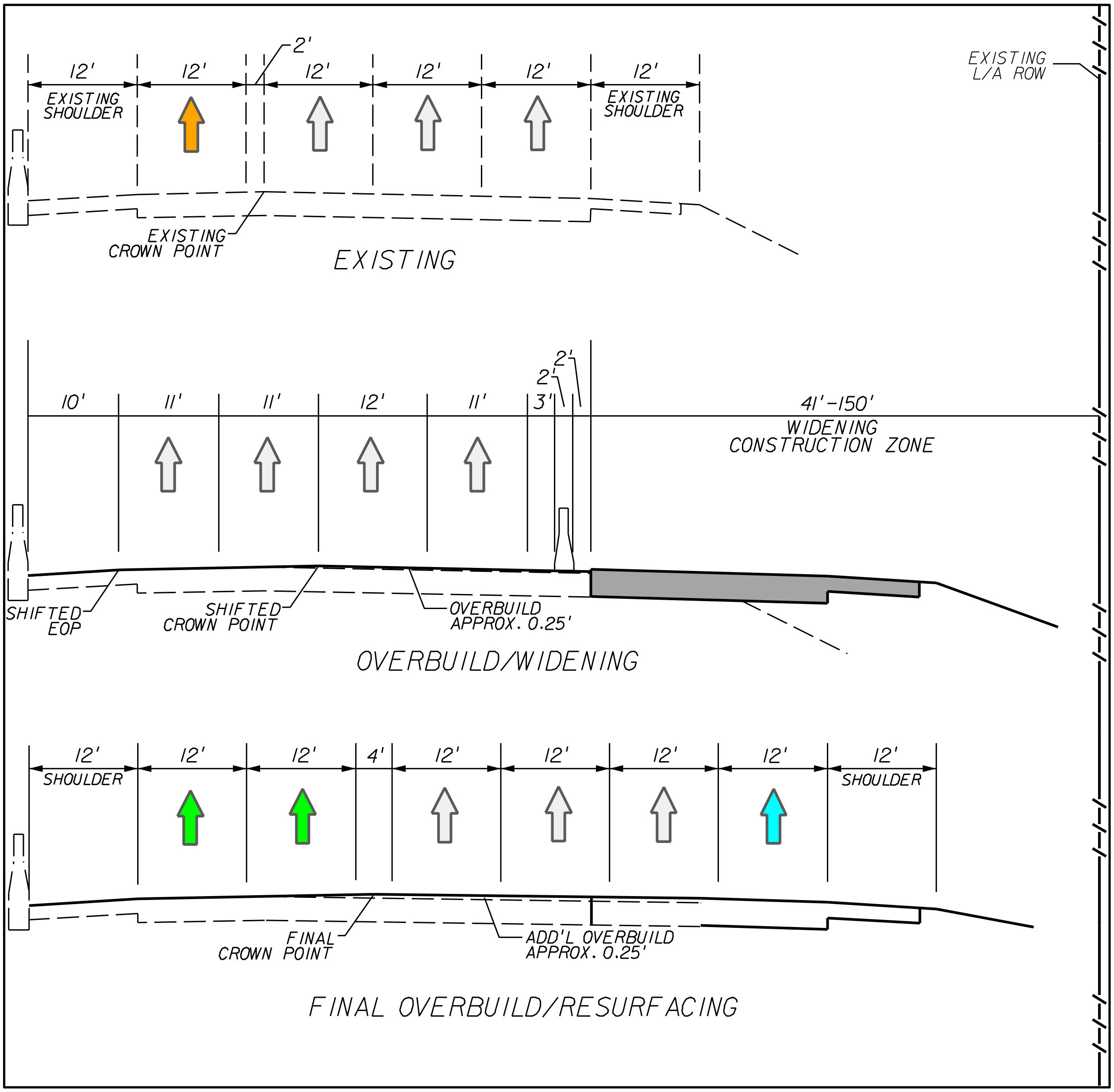


Figure 5.11 – Maintenance of Traffic Typical Section (Mainline Widening including New Auxiliary Lane)

The roadway mainline under the bridge overpasses will consist of three MOT phases (see ***Figure 5.12***).

- **Phase I –** Shift traffic to the inside
  - Remove the HOV lane designation. The HOV lane will become a general purpose lane.
  - Reduce the inside shoulder width.
  - Reduce the travel lanes width to 11’ (except for the center lane).
  - Overbuild the pavement corridor approximately 0.25’ to move the crown point to the outside so it is temporarily located between the second and third travel lane.
  - Construct the proposed outside widening section.

- **Phase II –** Shift traffic to the outside
  - Reduce the outside shoulder width.
  - Maintain all travel lanes at 11’ (except for the center lane).
  - Reconstruct the inside to lower the pavement in order to maintain the existing vertical clearance.

- **Phase III –** Shift travel lanes to final location
  - Mill and Resurface the remaining pavement corridor and move the crown point to the outside to the final location between the express lanes and the general purpose lanes (4’ buffer).

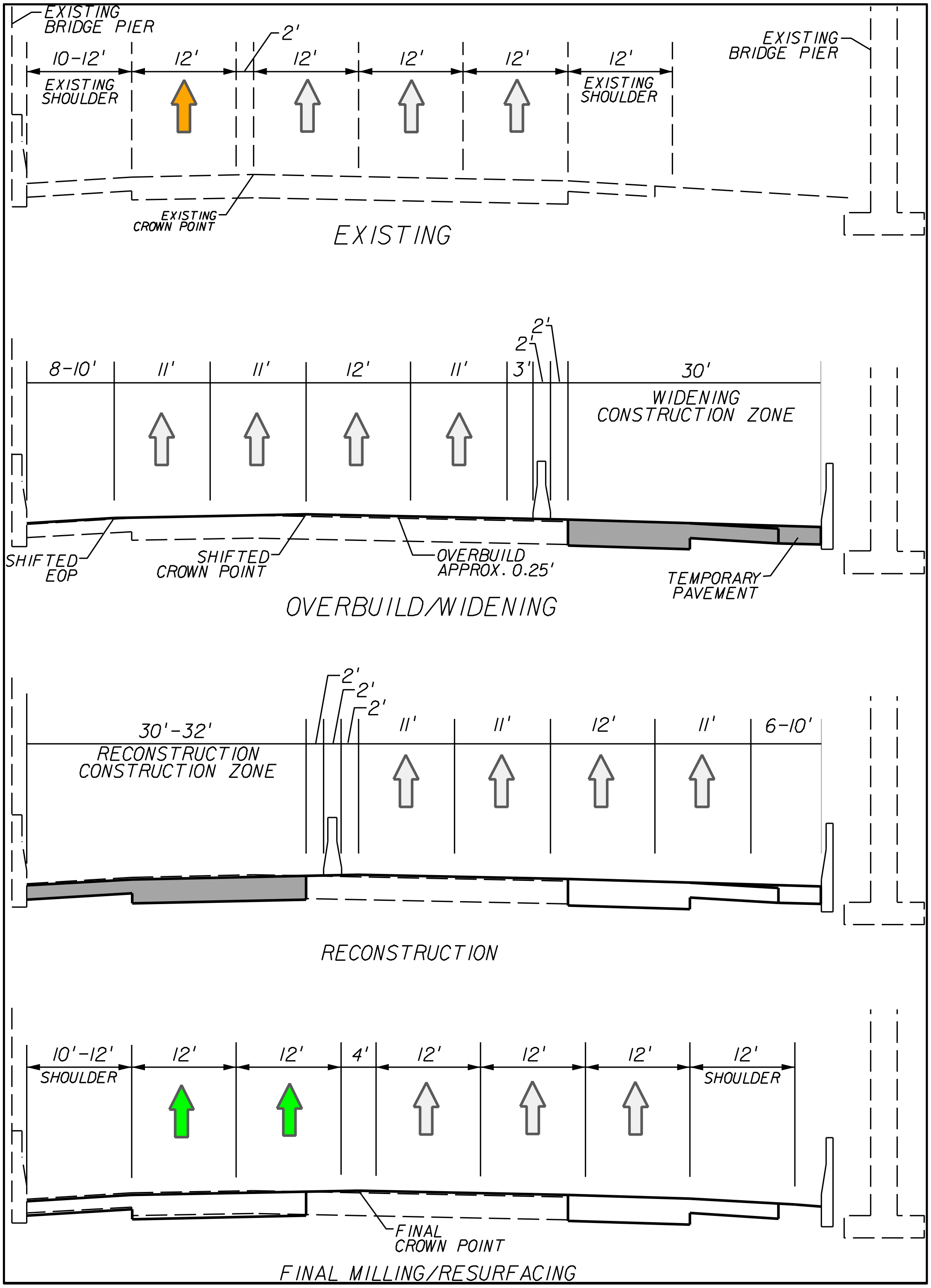


Figure 5.12 – Maintenance of Traffic Typical Section (Mainline Widening under the Overpasses)

5.4.11 Bicycle and Pedestrian Accommodations

I-95 is a limited access facility with no designated pedestrian or bicycle accommodations along the corridor. Pedestrians and bicycles are not permitted on limited access corridors, therefore, no pedestrian or bicycle facilities are planned for the I-95 corridor.

5.4.12 Multi-Modal Accommodations

This PD&E study did not include a multi-modal analysis component within this section of I-95. The focus of the study is to provide highway capacity improvements along the I-95 mainline only by implementing an express lanes system. Therefore, multi-modal improvements were not considered as part of this study. However, the Build Alternative was developed with the idea of proposing and implementing a BRT system along the express lanes. The proposed express lanes system will create an opportunity for the local transit agencies to implement a BRT system similar to the one in operation in 95 Express Phase 1 in Miami-Dade County.

5.4.13 Access Management

I-95 is a limited access facility with an Access Class 1, Area Type 1, under the FDOT Access Management Classification System. Based on the access and type, the minimum interchange spacing allowed is one mile per the *PPM, Volume 1, Chapter 1, Table 1.8.1*. There are eight interchanges within the study limits. The interchange spacing complies with the FDOT Access Management Guideline Rule 14.97 (see ***Table 5.11***). No access management modifications are proposed as part of the No-Build and Build Alternatives.

Table 5.11
Access Management/Interchange Spacing

Cross Street	Mile Post	Current Spacing to Next Interchange (Miles)	Complies with Interchange Spacing?
Commercial Boulevard	15.080	1.6	Yes
Cypress Creek Road	16.282	1.2	Yes
Atlantic Boulevard	18.375	2.1	Yes
Copans Road	20.426	2.1	Yes
Sample Road	21.582	1.2	Yes
SW 10th Street	23.664	2.1	Yes
Hillsboro Boulevard	24.637	1.0	Yes
Palmetto Park Road	1.558	2.2	Yes

5.4.13.1 *Express Lanes Access Points*

The potential express lanes access points were determined and recommended during the *I-95 Corridor Planning Study.* The limits of the study were between Stirling Road in Broward County and Indiantown Road in Palm Beach County. The study evaluated the feasibility of express lanes access points that will maximize the potential users of the express lanes by serving the highest commuter travel demand, compliment the multimodal transportation network and have minimal impact to the existing highway structures and interchanges. The main objectives of the potential locations are to serve major home to work trip pairs and provide connections to multimodal facilities. These access points were refined during this PD&E study taking into account public input, roadway design criteria, right of way availability and results from the traffic operational analysis.

The Build Alternative proposes eight potential access points at selected locations along the corridor to enter and exit the express lanes system. Access points along I-95 will be constructed at the following locations:

1. **Northbound egress at Commercial Boulevard** – This access point will service vehicles wanting to exit the express lanes system from I-95 northbound to the following I-95 downstream interchanges:
    - Cypress Creek Road
    - Atlantic Boulevard
    - Copans Road
    - Sample Road

    This access point will also service vehicles and transit buses with the Cypress Creek Road park-and-ride lot and Tri-Rail station as their destination.
2. **Northbound ingress just south of Atlantic Boulevard** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
    - Hallandale Beach Boulevard
    - Hollywood Boulevard
    - Sheridan Street
    - Stirling Road
    - Griffin Road
    - I-595
    - SR 84
    - Davie Boulevard
    - Broward Boulevard
    - Sunrise Boulevard
    - Oakland Park Boulevard
    - Commercial Boulevard
    - Cypress Creek Road

    This access point will also service vehicles and transit buses coming from the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot.
3. **Northbound egress just south of SW 10th Street** – This access point will service vehicles wanting to exit the express lanes system from I-95 northbound to the following I-95 downstream interchanges:

   - SW 10th Street – Direct access to the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Hillsboro Boulevard
   - Palmetto Park Road
   - Glades Road
   - Spanish River Boulevard – Proposed new interchange
   - Yamato Road
4. **Northbound ingress just south of Palmetto Park Road** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Atlantic Boulevard
   - Copans Road
   - Sample Road
   - SW 10th Street – Direct access from the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Hillsboro Boulevard

   This access point will also service vehicles and transit buses coming from the Deerfield Beach park-and-ride lot and Tri-Rail station.
5. **Southbound egress just south of Palmetto Park Road** – This access point will service vehicles wanting to exit the express lanes system from I-95 southbound to the following I-95 downstream interchanges:
   - Hillsboro Boulevard
   - SW 10th Street – Direct access from the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Sample Road
   - Copans Road
   - Atlantic Boulevard

   This access point will also service vehicles and transit buses with the Deerfield Beach park-and-ride lot and Tri-Rail station as their destination.
6. **Southbound ingress south of SW 10th Street** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Yamato Road
   - Spanish River Boulevard – Proposed new interchange
   - Glades Road
   - Palmetto Park Road
   - Hillsboro Boulevard

- SW 10th Street – Direct access to the Sawgrass Expressway (SR 869) is provided via SW 10th Street

This access point will also service vehicles and transit buses coming from the Deerfield Beach park-and-ride lot and Tri-Rail station.

7. **Southbound egress just south of Atlantic Boulevard** – This access point will service vehicles wanting to exit the express lanes system to the following I-95 downstream interchanges:
   - Cypress Creek Road
   - Commercial Boulevard
   - Oakland Park Boulevard
   - Sunrise Boulevard
   - Broward Boulevard
   - Davie Boulevard
   - SR 84
   - I-595
   - Griffin Road
   - Stirling Road
   - Sheridan Street
   - Hollywood Boulevard
   - Hallandale Beach Boulevard

   This access point will also service vehicles and transit buses with the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot as their destination.
8. **Southbound ingress south of Commercial Boulevard** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Sample Road
   - Copans Road
   - Atlantic Boulevard
   - Cypress Creek Road
   - Commercial Boulevard

   This access point will also service vehicles and transit buses coming from the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot.

Figure 5.13 depicts the locations of the express lanes access points between Stirling Road in Broward County and Indiantown Road in Palm Beach County.

I-95 PD&E AND CORRIDOR PLANNING STUDIES
POTENTIAL ENTRANCE/EXIT LOCATIONS TO EXPRESS LANES

(SUBJECT TO CHANGE)

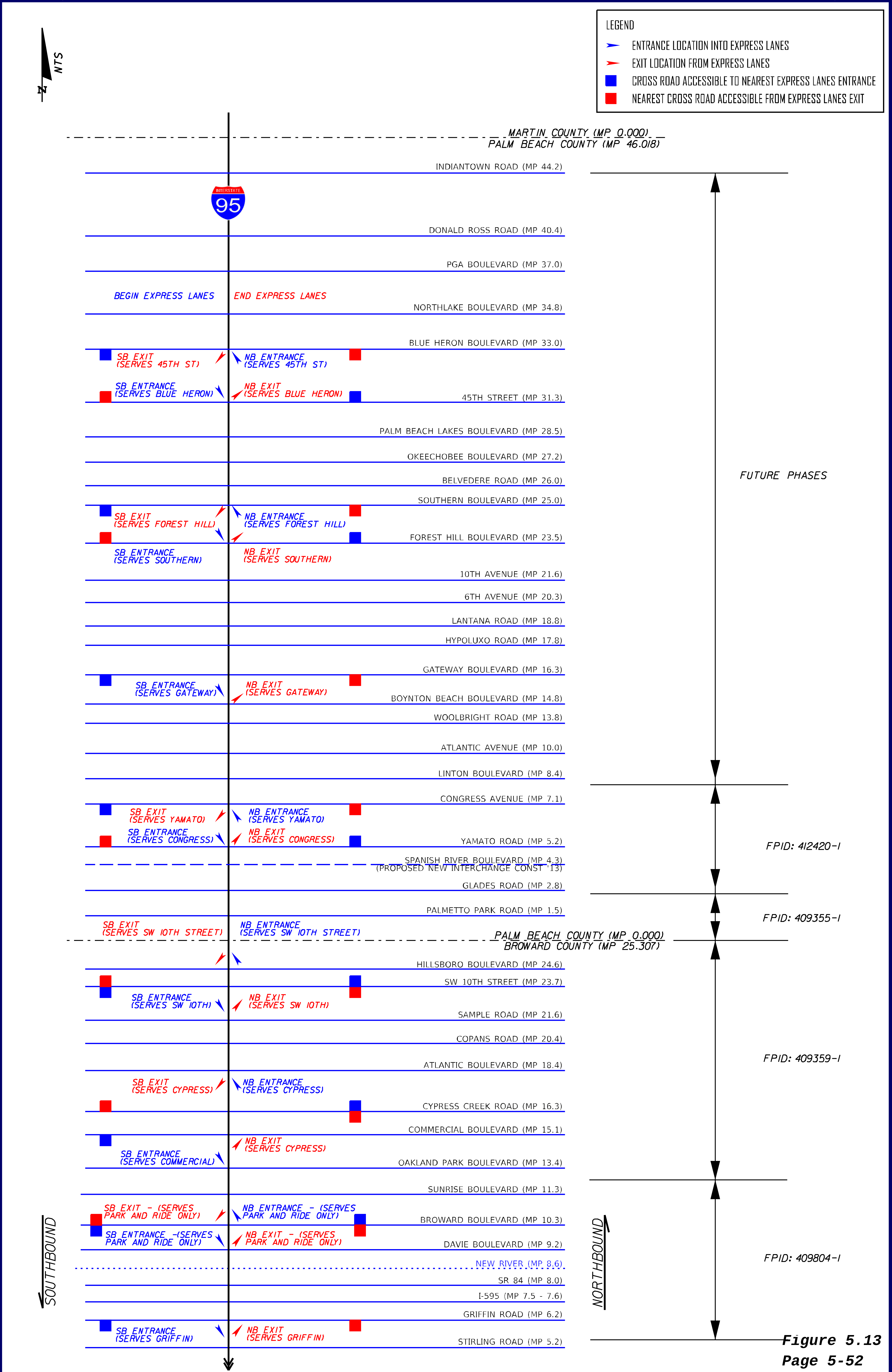


Figure 5.13

5.4.14 TRAFFIC

The information presented in this section is a summary of the *Corridor Design Traffic Report and the Traffic Analysis Technical Memorandum*, companion documents to this PD&E study.

The *Corridor Design Traffic Report* documents the travel demand modeling methodologies and analysis standards as part of the PD&E process. The objective of this report was to clearly describe the model calibration methods specific to the study, model forecasting procedures and modeling results. This report also documents the travel demand forecast for the study area, data analysis, and calculation of the study area AADT volumes, Directional Design Hourly Volumes (DDHV) and Origin-Destination (O-D) Matrices.

The development of future traffic volumes for the project was based on the approved FDOT and MPO Southeast Regional Planning Model Version 6.5 (SERPM). SERPM is a multimodal travel demand model which covers the three urban counties of Southeast Florida – Palm Beach, Broward and Miami-Dade.

This section presents the analysis results for the future proposed lane configuration under projected traffic conditions. This analysis followed the same process and methodology as the existing traffic operational analysis. The future analysis years for this study are as follows:

- Opening Year – 2020 Build Alternative
- Interim Year – 2030 Build Alternative
- Design Year – 2040 No-Build Alternative
- Design Year – 2040 Build Alternative

Tables 5.12, 5.13A, 5.13B and ***Appendix F*** summarize the future operational analysis results as well as link-by-link traffic volumes. ***Appendix F*** also depicts the future geometric configuration including the number of lanes, interchange layouts and intersection configurations.

Table 5.12 Future Traffic Operational Analysis Results Ramp Terminal Intersections									
Synchro Report Number	Location	2040 No-Build		2040 Build		2030 Build		2020 Build	
		DELAY AM (PM)	LOS AM(PM)	DELAY AM (PM)	LOS AM(PM)	DELAY AM (PM)	LOS AM(PM)	DELAY AM (PM)	LOS AM(PM)
Commercial Boulevard Interchange									
1	West Ramp Terminal	9.1 (10.7)	A (B)	9.2 (10.7)	A (B)	11.1 (11.4)	B (B)	11.3 (12.1)	B (B)
2	East Ramp Terminal	46.8 (38.8)	D (D)	42.8 (38.7)	D (D)	49.9 (34.4)	D (C)	52.3 (34.3)	D (C)
Cypress Creek Road Interchange									
1	West Ramp Terminal	81.7 (72.2)	F (E)	75.4 (100.2)	E (F)	71.6 (70.2)	E (E)	57.9 (58.2)	E (E)
2	East Ramp Terminal	13.3 (19.0)	B (B)	13.5 (20.4)	B (C)	15.6 (17.2)	B (B)	9.5 (11.6)	A (B)
Atlantic Boulevard Interchange									
1	West Ramp Terminal	35.4 (34.7)	D (C)	34.7 (33.2)	C (C)	37.2 (34.4)	D (C)	35.4 (34.8)	D (C)
2	East Ramp Terminal	18.2 (21.1)	B (C)	18.6 (21.5)	B (C)	16.1 (12.0)	B (B)	22.6 (21.6)	C (C)
Copans Road Interchange									
1	East Ramp Terminal	23.6 (21.0)	C (C)	26.5 (21.3)	C (C)	28.2 (21.3)	C (C)	19.1 (18.4)	B (B)
Sample Road Interchange									
1	West Ramp Terminal	16.3 (19.8)	B (B)	15.4 (18.4)	B (B)	14.6 (18.0)	B (B)	13.8 (20.0)	B (B)
2	East Ramp Terminal	17.1 (22.5)	B (C)	21.8 (30.7)	C (C)	20.2 (27.1)	C (C)	19.3 (21.5)	B (C)
SW 10th Street Interchange									
1	West Ramp Terminal, On-Ramp	9.1 (29.9)	A (C)	11.3 (25.3)	B (C)	8.7 (34.4)	A (C)	7.5 (17.8)	A (B)
2	West Ramp Terminal, Off-Ramp	118.7 (72.2)	F (E)	14.8 (20.5)	B (C)	12.6 (17.2)	B (B)	12.4 (15.1)	B (B)
3	East Ramp Terminal	114.3 (68.7)	F (E)	39.3 (47.2)	D (D)	33.9 (37.7)	C (D)	31.4 (34.6)	C (C)
Hillsboro Boulevard Interchange									
1	West Ramp Terminal	31.3 (30.4)	C (C)	20.5 (28.7)	C (C)	18.5 (24.4)	B (C)	20.7 (21.6)	C (C)
Palmetto Park Road Interchange									
1	West Ramp Terminal	16.1 (16.1)	B (B)	23.3 (18.7)	C (B)	15.0 (18.3)	B (B)	15.3 (16.3)	B (B)
2	East Ramp Terminal	43.2 (61.4)	D (E)	33.3 (45.7)	C (D)	28.2 (45.6)	C (D)	27.3 (43.5)	C (D)

Table 5.13A
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	2040 No-Build HCS Segment #	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)				Density Range AM(PM)				V/C AM(PM)				LOS AM(PM)			
				2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build
I-95 Northbound																			
Between Oakland Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Commercial Boulevard EB & WB Off-Ramp	Mainline	1	1	8,158 (7,752)	8,173 (7,830)	7,977 (7,914)	7,374 (7,324)	26.1 (26.1)	26.1 (26.1)	26.1 (26.1)	26.1 (26.1)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)	D (D)
I-95 NB to Commercial Boulevard EB & WB	Off-Ramp (Major Diverge)*	2	2	2,324 (1,807)	2,398 (1,954)	2,379 (1,876)	2,310 (1,785)	45.3 (42.7)	22.2 (21.3)*	21.7 (21.6)*	20.1 (20.0)*	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	F (F)	C (B)*	C (C)*	C (B)*
Between I-95 NB to Commercial Boulevard EB & WB Off-Ramp and Commeracial Boulevard EB & WB to I-95 NB On-Ramp	Mainline	3		5,834 (5,945)				30.4 (30.5)				0.83 (0.84)				D (D)			
Between I-95 NB to Commercial Boulevard EB & WB Off-Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Boulevard	Mainline		3		5,739 (5,876)	5,598 (6,038)	5,064 (5,539)		33.9 (35.3)	34.5 (40.0)	35.6 (38.3)		0.89 (0.91)	0.90 (0.96)	0.91 (0.94)		D (E)	D (E)	E (E)
I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Boulevard	On-Ramp (Merge)		4		791 (660)	736 (281)	632 (405)		42.0 (42.2)	39.4 (39.4)	33.6 (35.4)		1.00 (1.00)	1.00 (1.00)	1.00 (1.00)		E (E)	E (E)	D (E)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Blvd and Commercial Boulevard EB & WB to I-95 NB On-Ramp	Mainline		5		6,530 (6,536)	6,334 (6,319)	5,696 (5,944)		30.4 (30.8)	30.6 (31.6)	30.6 (31.0)		0.83 (0.84)	0.84 (0.85)	0.84 (0.84)		D (D)	D (D)	D (D)
Commercial Boulevard EB & WB to I-95 NB	On-Ramp (Merge)	4	6	1,540 (1.166)	1,202 (1,135)	1,157 (1,038)	1,152 (1,113)	49.3 (50.8)	70.0 (67.2)	59.4 (54.6)	46.4 (49.5)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Commeracial Boulevard EB & WB to I-95 NB On-Ramp and I-95 NB to Cypress Creek Road EB & Park/Ride Lot Off-Ramp	Mainline	5	7	7,374 (7,111)	7,732 (7,671)	7,491 (7,357)	6,848 (7,057)	27.9 (28.0)	29.3 (29.1)	28.5 (28.2)	27.6 (27.8)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)	D (D)
I-95 NB to Cypress Creek Road EB and Park & Ride Lot	Off-Ramp (Diverge)	6	8	600 (510)	647 (557)	570 (574)	633 (589)	40.2 (38.7)	42.3 (41.9)	40.9 (40.1)	37.2 (38.4)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Cypress Creek Road EB & Park/Ride Lot Off-Ramp and I-95 NB to Cypress Creek Road WB Off-Ramp	Mainline	7	9	6,774 (6,601)	7,085 (7,114)	6,921 (6,783)	6,215 (6,468)	45.0 (45.0)	45.0 (45.0)	45.0 (45.0)	45.0 (45.0)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	F (F)	F (F)	F (F)	F (F)
I-95 NB to Cypress Creek Road WB	Off-Ramp (Diverge)	8	10	1,005 (547)	1,030 (593)	975 (582)	926 (541)	36.9 (35.9)	38.0 (38.2)	37.1 (36.3)	33.0 (34.5)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (E)	E (F)	E (E)	D (D)
Between I-95 NB to Cypress Creek Road WB Off-Ramp and Cypress Creek Road EB & WB to I-95 NB On-Ramp	Mainline	9	11	5,769 (6,054)	6,055 (6,521)	5,946 (6,201)	5,289 (5,927)	30.4 (30.4)	30.4 (30.4)	30.4 (30.4)	30.4 (30.4)	0.83 (0.83)	0.83 (0.83)	0.83 (0.83)	0.83 (0.83)	D (D)	D (D)	D (D)	D (D)
Cypress Creek Road EB & WB to I-95 NB	On-Ramp (Merge)	10	12	1,384 (1,653)	1,635 (1,810)	1,497 (1,595)	1,299 (1,499)	48.2 (53.5)	53.3 (69.5)	51.1 (56.7)	41.3 (50.8)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Cypress Creek Road EB & WB to I-95 NB On-Ramp and I-95 NB to Atlantic Boulevard EB & WB Off-Ramp	Mainline	11		7,153 (7,707)				26.5 (26.5)				0.75 (0.75)				D (D)			
Between Cypress Creek Road EB & WB to I-95 NB On-Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes at Atlantic Blvd	Mainline		13		7,690 (8,331)	7,443 (7,796)	6,588 (7,426)		27.5 (28.3)	27.4 (27.7)	26.9 (27.4)		0.75 (0.75)	0.75 (0.75)	0.75 (0.75)		D (D)	D (D)	D (D)
I-95 NB GP Lanes to I-95 NB HOT Lanes before Atlantic Boulevard	Off-Ramp (Diverge)		14		892 (634)	793 (459)	200 (132)		30.3 (33.0)	29.3 (30.7)	25.8 (29.2)		0.75 (0.75)	0.75 (0.75)	0.75 (0.75)		D (D)	D (D)	C (D)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes at Atlantic Blvd and I-95 NB to Atlantic Boulevard EB & WB Off-Ramp	Mainline		15		6,798 (7,697)	6,650 (7,337)	6,388 (7,294)		26.5 (26.5)	26.5 (26.5)	26.5 (26.5)		0.75 (0.75)	0.75 (0.75)	0.75 (0.75)		D (D)	D (D)	D (D)
I-95 NB to Atlantic Boulevard EB & WB	Off-Ramp (Diverge)	12	16	1,297 (1,611)	1,291 (1,599)	1,234 (1,430)	1,302 (1,483)	39.1 (42.5)	37.0 (42.4)	36.1 (40.2)	34.6 (40.0)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Atlantic Boulevard EB & WB Off-Ramp and Atlantic Boulevard EB to I-95 NB On-Ramp	Mainline	13	17	5,856 (6,096)	5,507 (6,098)	5,416 (5,907)	5,086 (5,811)	34.2 (33.7)	35.7 (33.6)	35.1 (34.3)	34.6 (34.2)	0.89 (0.88)	0.91 (0.88)	0.90 (0.89)	0.90 (0.89)	D (D)	E (D)	E (D)	D (D)
Atlantic Boulevard EB to I-95 NB	On-Ramp (Merge)	14	18	760 (817)	628 (823)	676 (754)	728 (761)	41.1 (45.2)	36.2 (44.9)	35.9 (41.3)	33.8 (40.3)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (E)	E (E)	E (E)	D (E)
Between Atlantic Boulevard EB to I-95 NB On-Ramp and Atlantic Boulevard WB to I-95 NB On-Ramp	Mainline	15	19	6,616 (6,913)	6,135 (6,921)	6,092 (6,661)	5,814 (6,572)	34.6 (36.3)	35.4 (36.2)	36.0 (36.9)	36.0 (36.7)	0.90 (0.92)	0.91 (0.92)	0.92 (0.93)	0.92 (0.92)	D (E)	E (E)	E (E)	E (E)
Atlantic Boulevard WB to I-95 NB	On-Ramp (Merge)	16	20	727 (571)	653 (576)	595 (516)	594 (538)	53.1 (57.4)	43.1 (58.0)	41.7 (48.8)	38.9 (47.4)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Atlantic Boulevard WB to I-95 NB On-Ramp and I-95 NB to Copans Road EB & WB Off-Ramp	Mainline	17	21	7,343 (7,484)	6,788 (7,497)	6,687 (7,177)	6,408 (7,110)	26.5 (26.5)	26.5 (26.5)	26.5 (26.5)	26.5 (26.5)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)	D (D)
I-95 NB to Copans Road EB & WB	Off-Ramp (Diverge)	18	22	1,794 (1,657)	1,799 (1,739)	1,790 (1,652)	1,521 (1,437)	40.2 (41.1)	36.9 (41.2)	36.4 (39.2)	34.7 (38.8)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Copans Road EB & WB Off-Ramp and Copans Road EB to I-95 NB On-Ramp	Mainline	19	23	5,549 (5,827)	4,989 (5,758)	4,897 (5,525)	4,887 (5,673)	37.8 (37.5)	37.3 (38.3)	38.1 (39.1)	38.1 (39.2)	0.94 (0.93)	0.93 (0.94)	0.94 (0.95)	0.94 (0.95)	E (E)	E (E)	E (E)	E (E)
Copans Road EB to I-95 NB	On-Ramp (Merge)	20	24	445 (472)	484 (402)	424 (345)	420 (339)	35.4 (37.5)	31.3 (36.3)	30.3 (34.1)	30.2 (35.1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (E)	D (E)	D (D)	D (E)
Between Copans Road EB to I-95 NB On-Ramp and Copans Road WB to I-95 NB On-Ramp	Mainline	1	1	5,994 (6,299)	5,473 (6,160)	5,321 (5,870)	5,307 (6,012)	31.5 (36.2)	27.5 (34.8)	26.5 (32.1)	26.4 (33.4)	0.84 (0.89)	0.77 (0.87)	0.75 (0.83)	0.75 (0.85)	D (E)	D (D)	D (D)	D (D)
Between Copans Road WB to I-95 NB On-Ramp and I-95 NB to Sample Road EB & WB Off-Ramp	Weaving (Type A)	2	2	6,413 (6,724)	5,947 (6,566)	5,686 (6,269)	5,669 (6,402)	29.5 (32.6)	28.8 (32.0)	26.5 (29.8)	26.4 (29.9)	0.76 (0.82)	0.76 (0.82)	0.70 (0.77)	0.70 (0.76)	D (D)	D (D)	C (D)	C (D)
Between I-95 NB to Sample Road EB & WB Off-Ramp and Sample Road EB to I-95 NB On-Ramp	Mainline	3	3	5,127 (5,123)	4,326 (4,803)	4,201 (4,673)	4,191 (4,883)	33.4 (26.6)	31.1 (24.7)	29.1 (24.0)	28.9 (25.2)	0.88 (0.72)	0.84 (0.68)	0.80 (0.66)	0.80 (0.69)	D (D)	D (C)	D (C)	D (C)
Sample Road EB to I-95 NB	On-Ramp (Merge)	4	4	846 (525)	560 (471)	559 (468)	550 (465)	36.0 (30.5)	27.7 (28.0)	26.9 (27.3)	26.8 (28.5)	1.00 (0.80)	0.92 (0.74)	0.88 (0.72)	0.88 (0.75)	E (D)	C (D)	C (C)	C (D)
Between Sample Road EB to I-95 NB On-Ramp and Sample Road WB to I-95 NB On-Ramp	Mainline	5	5	5,973 (5,648)	4,886 (5,274)	4,760 (5,141)	4,741 (5,348)	32.7 (30.3)	36.7 (27.8)	33.9 (27.1)	33.6 (28.2)	0.87 (0.80)	0.92 (0.74)	0.88 (0.72)	0.88 (0.75)	D (D)	E (D)	D (D)	D (D)
Sample Road WB to I-95 NB	On-Ramp (Merge)	6	6	921 (553)	492 (396)	488 (392)	360 (340)	46.0 (35.7)	30.7 (28.5)	29.8 (27.7)	28.8 (28.7)	1.00 (0.87)	0.99 (0.80)	0.95 (0.78)	0.93 (0.80)	E (E)	OK (OK)	OK (OK)	OK (OK)
Between Sample Road WB to I-95 NB On-Ramp and I-95 NB to SW 10th Street EB & WB Off-Ramp	Mainline	7		6,894 (6,201)				45.0 (35.2)				1.00 (0.87)				F (E)			
Between Sample Road WB to I-95 NB On-Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes before SW 10th Street	Mainline		7		5,378 (5,670)	5,248 (5,533)	5,101 (5,688)		26.1 (21.7)	24.9 (21.2)	24.2 (21.8)		0.83 (0.80)	0.71 (0.59)	0.70 (0.60)		D (C)	C (C)	C (C)
I-95 NB HOT Lanes to I-95 NB GP Lanes before SW 10th Street	On-Ramp (Merge)		8		1,511 (883)	1,537 (895)	1,819 (784)		30.0 (36.5)	29.5 (35.7)	30.6 (35.8)		1.00 (0.92)	0.87 (0.68)	0.89 (0.68)		D (E)	D (E)	D (E)

Table 5.13A
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	2040 No-Build HCS Segment #	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)				Density Range AM(PM)				V/C AM(PM)				LOS AM(PM)			
				2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build
I-95 Northbound																			
Between I-95 NB HOT Lanes to I-95 NB GP Lanes at SW 10th St and I-95 NB to SW 10th Street EB & WB Off-Ramp	Mainline		9		6,889 (6,553)	6,785 (6,428)	6,920 (6,472)		26.2 (25.7)	26.1 (25.1)	26.3 (25.3)		1.00 (0.92)	0.75 (0.68)	0.75 (0.68)		D (C)	D (C)	D (C)
I-95 NB to SW 10th Street EB & WB	Off-Ramp (Major Diverge)*	8	10	1,285 (1,155)	1,395 (1,343)	1,146 (1,202)	1,008 (1,122)	37.6 (35.4)	18.8 (17.9)*	5.5 (3.5)*	5.9 (3.1)*	1.00 (0.87)	1.00 (0.92)	1.00 (0.91)	1.00 (0.91)	E (E)	B (B)*	A (A)*	A (A)*
Between I-95 NB to SW 10th Street EB & WB Off-Ramp and SW 10th Street EB & WB to I-95 NB On-Ramp	Mainline	9	11	5,609 (5,046)				30.8 (26.1)				0.84 (0.71)				D (D)			
Between I-95 NB to SW 10th Street EB & WB Off-Ramp and SW 10th Street EB to I-95 NB On-Ramp	Mainline		11		5,494 (5,210)	5,639 (5,226)	5,912 (5,350)		35.0 (27.2)	37.0 (27.3)	37.1 (28.1)		0.83 (0.73)	0.93 (0.74)	0.93 (0.75)		D (D)	E (D)	E (D)
SW 10th Street EB & WB to I-95 NB	On-Ramp (Merge)	10		1,138 (1,200)				44.8 (31.9)				1.00 (0.88)				E (D)			
SW 10th Street EB to I-95 NB	On-Ramp (Merge)		12		690 (923)	514 (796)	501 (732)		37.6 (34.6)	37.1 (34.0)	39.5 (34.4)		1.00 (0.91)	1.00 (0.85)	1.00 (0.86)		OK (OK)	OK (OK)	OK (OK)
Between SW 10th Street EB & WB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard EB Off-Ramp	Mainline	11		6,747 (6,246)				45.0 (35.6)				1.00 (0.88)				F (E)			
SW 10th Street WB to I-95 NB	On-Ramp (Merge)		13		743 (316)	599 (228)	584 (276)		28.4 (37.1)	28.4 (35.7)	28.5 (36.5)		1.00 (0.91)	0.75 (0.66)	0.75 (0.67)		D (E)	D (E)	D (E)
I-95 NB to Hillsboro Boulevard EB	Off-Ramp (Diverge)	12	14	859 (543)	765 (441)	702 (444)	716 (391)	36.7 (37.1)	37.1 (30.2)	36.1 (29.0)	37.5 (29.7)	1.00 (0.88)	1.00 (0.91)	1.00 (0.88)	1.00 (0.90)	E (E)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Hillsboro Boulevard EB Off-Ramp and Hillsboro Boulevard EB to I-95 NB On-Ramp	Mainline	13	15	5,888 (5,703)	6,162 (6,008)	6,050 (5,806)	6,281 (5,967)	45.0 (30.7)	45.0 (33.3)	41.6 (31.6)	45.0 (33.0)	1.00 (0.80)	1.00 (0.85)	0.98 (0.82)	1.00 (0.84)	F (D)	F (D)	E (D)	F (D)
Between Hillsboro Boulevard EB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard WB Off-Ramp	Weaving (Type A)	14	16	6,411 (6,002)	6,943 (6,382)	6,932 (6,102)	7,005 (6,342)	31.7 (27.8)	34.4 (29.3)	35.7 (27.3)	35.2 (28.5)	0.90 (0.74)	0.88 (0.76)	0.90 (0.72)	0.88 (0.75)	D (C)	D (D)	F (C)	F (D)
Between I-95 NB to Hillsboro Boulevard WB Off-Ramp and Hillsboro Boulevard WB to I-95 NB On-Ramp	Mainline	15	17	5,825 (5,534)	6,521 (5,945)	6,354 (5,693)	6,429 (6,024)	32.5 (29.6)	31.0 (33.0)	31.2 (30.9)	33.5 (33.7)	0.87 (0.78)	0.85 (0.84)	0.85 (0.81)	0.88 (0.85)	D (D)	D (D)	D (D)	D (D)
Hillsboro Boulevard WB to I-95 NB	On-Ramp (Merge)	16	18	918 (667)	1,086 (714)	1,063 (706)	818 (658)	44.5 (36.3)	67.4 (36.0)	58.5 (34.4)	52.9 (36.2)	1.00 (0.88)	1.00 (0.94)	1.00 (0.91)	1.00 (0.95)	E (E)	F (E)	F (D)	F (E)
Between Hillsboro Boulevard WB to I-95 NB On-Ramp and I-95 NB to Palmetto Park Road EB & WB Off-Ramp	Mainline	17		6,743 (6,201)				45.0 (35.5)				1.00 (0.88)				F (E)			
Between Hillsboro Boulevard WB to I-95 NB On-Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes at Palmetto Park Rd	Mainline		19		7,607 (6,659)	7,417 (6,399)	7,247 (6,682)		45.0 (41.0)	45.0 (37.7)	45.0 (41.3)		1.00 (0.94)	1.00 (0.91)	1.00 (0.95)		F (E)	F (E)	F (E)
I-95 NB GP Lanes to I-95 NB HOT Lanes before Palmetto Park Road	Off-Ramp (Diverge)		20		509 (282)	409 (336)	200 (120)		41.0 (35.6)	39.9 (34.1)	38.9 (35.8)		1.00 (0.94)	1.00 (0.91)	1.00 (0.95)		F (E)	F (D)	F (E)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes at Palmetto Park Rd and I-95 NB to Palmetto Park Road EB & WB Off-Ramp	Mainline		21		7,098 (6,377)	7,008 (6,063)	7,047 (6,562)		45.0 (37.4)	45.0 (34.1)	45.0 (39.7)		1.00 (0.90)	1.00 (0.86)	1.00 (0.93)		F (E)	F (D)	F (E)
I-95 NB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	18	22	1,456 (1,256)	1,414 (1,115)	1,306 (1,169)	1,294 (1,227)	36.7 (36.6)	38.8 (37.2)	38.3 (35.4)	38.5 (38.3)	1.00 (0.88)	1.00 (0.90)	1.00 (0.86)	1.00 (0.93)	E (E)	F (E)	E (E)	E (E)
Between I-95 NB to Palmetto Park Road EB & WB Off-Ramp and Palmettto Park Road EB & WB to I-95 NB On-Ramp	Mainline	19	23	5,287 (4,945)	5,684 (5,262)	5,702 (4,894)	5,753 (5,335)	30.4 (25.5)	30.4 (27.5)	30.4 (25.2)	30.4 (28.0)	0.83 (0.70)	0.83 (0.74)	0.83 (0.69)	0.83 (0.75)	D (C)	D (D)	D (C)	D (D)
Palmetto Park Road EB & WB to I-95 NB	On-Ramp (Merge)	20	24	1,931 (1,419)	1,626 (1,394)	1,672 (1,364)	1,359 (1,190)	41.5 (32.1)	46.8 (32.6)	47.1 (31.5)	47.9 (33.1)	1.00 (0.90)	1.00 (0.94)	1.00 (0.88)	1.00 (0.92)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Palmetto Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Glades Road EB & WB Off-Ramp	Mainline	21	25	7,218 (6,364)	7,310 (6,656)	7,374 (6,258)	7,112 (6,525)	27.2 (25.3)	27.8 (27.0)	27.8 (25.4)	27.9 (26.6)	0.75 (0.66)	0.75 (0.70)	0.75 (0.66)	0.75 (0.69)	D (C)	D (D)	D (C)	D (D)
I-95 Northbound - HOT Lanes																			
South of Commercial Boulevard	Mainline		1		3,495 (2,892)	1,893 (1,319)	2,791 (1,809)		26.9 (21.8)	14.2 (9.9)	21.0 (13.6)		0.73 (0.60)	0.39 (0.27)	0.58 (0.38)		D (C)	B (A)	C (B)
I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp Between N of Commercial Boulevard and S of Cypress Creek Road	Off-Ramp (Diverge)		2		791 (660)	736 (281)	632 (405)		28.7 (23.2)	14.2 (9.0)	22.3 (13.4)		0.73 (0.60)	0.39 (0.27)	0.58 (0.38)		D (C)	B (A)	C (B)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp	Mainline		3		2,704 (2,232)	1,157 (1,038)	2,159 (1,404)		20.3 (16.8)	8.7 (7.8)	16.2 (10.6)		0.56 (0.47)	0.24 (0.22)	0.45 (0.29)		C (B)	A (A)	B (A)
I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp Between N of Cypress Creek Road and S of Atlantic Boulevard	On-Ramp (Merge)		4		892 (634)	793 (459)	200 (132)		25.2 (19.3)	11.7 (8.1)	15.3 (8.6)		0.75 (0.60)	0.41 (0.31)	0.49 (0.32)		C (B)	B (A)	B (A)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp	Mainline		5		3,596 (2,866)	1,950 (1,497)	2,359 (1,536)		27.9 (21.6)	14.7 (11.3)	17.7 (11.5)		0.75 (0.60)	0.41 (0.31)	0.49 (0.32)		D (C)	B (B)	B (B)
I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp Between N of Sample Road and S of SW 10th Street	Off-Ramp (Diverge)		6		1,511 (883)	1,537 (895)	1,819 (784)		31.4 (24.8)	16.5 (12.4)	20.2 (12.8)		0.75 (0.60)	0.41 (0.31)	0.49 (0.32)		D (C)	B (B)	C (B)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp	Mainline		7		2,085 (1,983)	413 (602)	540 (752)		15.7 (14.9)	3.1 (4.5)	4.1 (5.7)		0.43 (0.41)	0.09 (0.13)	0.11 (0.16)		B (B)	A (A)	A (A)
I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp Between N of Hillsboro Boulevard and S of Palmetto Park Road	On-Ramp (Merge)		8		509 (282)	409 (336)	200 (120)		17.1 (14.5)	2.6 (3.6)	2.0 (3.2)		0.54 (0.47)	0.17 (0.20)	0.15 (0.18)		B (B)	A (A)	A (A)
North of Palmetto Park Road	Mainline		9		2,594 (2,265)	822 (938)	740 (872)		19.5 (17.0)	6.2 (7.1)	5.6 (6.6)		0.54 (0.47)	0.17 (0.20)	0.15 (0.18)		C (B)	A (A)	A (A)

NOTE: No-Build operational analysis was performed using the DDHV volumes without HOV lanes.

Table 5.13B
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	2040 No-Build HCS Segment #	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)				Density Range AM(PM)				V/C AM(PM)				LOS AM(PM)			
				2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build
I-95 Southbound																			
Between Glades Road EB to I-95 SB On-Ramp and I-95 SB to Palmetto Park Road Off-Ramp	Mainline	1	1	6,228 (7,045)	6,561 (7,556)	6,217 (7,433)	5,596 (6,679)	23.9 (27.7)	25.4 (26.1)	23.9 (26.1)	21.4 (25.9)	0.66 (0.74)	0.69 (0.75)	0.66 (0.75)	0.59 (0.71)	C (D)	C (D)	C (D)	C (C)
I-95 SB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	2	2	1,189 (1,527)	1,306 (1,510)	1,134 (1,475)	955 (1,385)	29.0 (35.2)	30.9 (41.5)	28.8 (40.8)	25.3 (31.6)	0.88 (0.74)	0.92 (1.00)	0.88 (1.00)	0.79 (0.94)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Palmetto Park Road Off-Ramp and Palmetto Road WB to I-95 SB On-Ramp	Mainline	3	3	5,039 (5,518)	5,255 (6,046)	5,083 (5,958)	4,641 (5,294)	26.1 (29.3)	27.5 (35.3)	26.4 (35.7)	23.8 (27.7)	0.71 (0.78)	0.74 (0.91)	0.72 (0.91)	0.65 (0.75)	D (D)	D (E)	D (E)	C (D)
Palmetto Park Road WB to I-95 SB	On-Ramp (Merge)	4	4	597 (548)	554 (625)	576 (593)	539 (610)	29.9 (32.6)	30.9 (42.1)	30.0 (40.6)	27.2 (31.5)	0.80 (0.86)	0.82 (1.00)	0.80 (1.00)	0.73 (0.84)	D (D)	D (E)	D (E)	C (D)
Between Palmetto Park Road WB to I-95 SB On-Ramp and Palmetto Park Road EB to I-95 SB On-Ramp	Mainline	5	5	5,636 (6,066)	5,809 (6,671)	5,659 (6,551)	5,180 (5,904)	30.4 (34.1)	31.8 (37.5)	30.6 (37.8)	27.2 (32.7)	0.80 (0.86)	0.82 (0.94)	0.80 (0.94)	0.73 (0.84)	D (D)	D (E)	D (E)	D (D)
Palmetto Park Road EB to I-95 SB	On-Ramp (Merge)	6	6	956 (614)	863 (455)	670 (427)	971 (380)	37.8 (38.5)	37.9 (50.5)	36.0 (47.5)	34.7 (35.9)	0.93 (0.95)	0.95 (1.00)	0.90 (1.00)	0.87 (0.89)	E (E)	E (F)	E (E)	D (E)
Between Palmetto Park Road EB to I-95 SB On-Ramp and I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp	Mainline	7		6,592 (6,680)				40.1 (41.3)				0.93 (0.95)				E (E)			
Between Palmetto Park Road EB to I-95 SB On-Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Boulevard	Mainline		7		6,672 (7,126)	6,329 (6,978)	6,151 (6,284)		41.1 (41.6)	36.9 (39.7)	35.0 (36.4)		0.95 (0.98)	0.90 (0.96)	0.87 (0.89)		E (E)	E (E)	D (E)
I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Boulevard	On-Ramp (Merge)		8		202 (156)	200 (284)	200 (200)		35.6 (78.6)	33.7 (74.7)	32.7 (33.5)		0.97 (1.00)	0.92 (1.00)	0.90 (0.92)		E (F)	D (F)	D (D)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Blvd and I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp	Mainline		9		6,874 (7,282)	6,529 (7,262)	6,351 (6,484)		44.2 (45.0)	39.3 (45.0)	37.1 (38.7)		0.97 (1.00)	0.92 (1.00)	0.90 (0.92)		E (F)	E (F)	E (E)
I-95 SB to Hillsboro Boulevard EB & WB	Off-Ramp (Diverge)	8	10	979 (1,353)	1,062 (1,601)	871 (1,291)	957 (1,200)	31.1 (31.7)	32.8 (39.9)	30.7 (39.8)	29.7 (30.5)	0.93 (0.95)	0.97 (1.00)	0.92 (1.00)	0.90 (0.92)	D (D)	D (F)	D (F)	D (D)
Between I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp and Hillsboro Boulevard WB to I-95 SB On-Ramp	Mainline	9	11	5,613 (5,327)	5,812 (5,681)	5,658 (5,971)	5,394 (5,284)	30.2 (28.1)	31.9 (37.2)	30.6 (37.6)	28.6 (27.9)	0.80 (0.75)	0.82 (0.93)	0.80 (0.94)	0.76 (0.75)	D (D)	D (E)	D (E)	D (D)
Hillsboro Boulevard WB to I-95 SB	On-Ramp (Merge)	10	12	391 (460)	360 (511)	333 (483)	297 (418)	32.6 (31.3)	33.8 (37.2)	32.7 (39.5)	30.8 (30.8)	0.85 (0.82)	0.87 (1.00)	0.84 (1.00)	0.80 (0.80)	D (D)	D (E)	D (E)	D (D)
Between Hillsboro Boulevard WB to I-95 SB On-Ramp and Hillsboro Boulevard EB to I-95 SB On-Ramp	Mainline	11	13	6,004 (5,787)	6,172 (6,192)	5,991 (6,454)	5,691 (5,702)	33.3 (31.4)	34.9 (45.0)	33.2 (45.0)	30.6 (30.7)	0.85 (0.82)	0.87 (1.00)	0.84 (1.00)	0.80 (0.80)	D (D)	D (F)	D (F)	D (D)
Hillsboro Boulevard EB to I-95 SB	On-Ramp (Merge)	12		664 (574)				38.1 (36.5)				0.94 (0.90)				E (E)			
I-95 SB to SW 10th Street EB & WB	Off-Ramp (Diverge)	13		1,363 (1,046)				39.6 (37.4)				0.94 (0.90)				E (E)			
Between Hillsboro Boulevard EB to I-95 SB On-Ramp and I-95 SB to SW 10th Street EB & WB On-Ramp	Weaving (Type B)		14		6,889 (6,741)	6,667 (7,029)	6,311 (6,141)		29.4 (27.2)	27.8 (28.5)	26.0 (24.4)		0.75 (0.76)	0.72 (0.76)	0.69 (0.66)		D (C)	C (D)	C (C)
Between I-95 SB to SW 10th Street EB & WB Off-Ramp and SW 10th Street WB & EB to I-95 SB On-Ramp	Mainline	14	15	5,305 (5,315)	5,525 (5,710)	5,475 (5,986)	5,203 (5,181)	27.8 (27.9)	29.4 (30.4)	29.0 (30.4)	27.1 (27.0)	0.75 (075)	0.78 (0.83)	0.77 (0.83)	0.73 (0.73)	D (D)	D (D)	D (D)	D (D)
SW 10th Street WB & EB to I-95 SB	On-Ramp (Merge)	15	16	1,308 (1,006)	1,368 (1,193)	1,276 (1,213)	1,168 (1,139)	33.6 (32.0)	35.0 (47.1)	33.7 (52.0)	32.1 (31.8)	0.93 (0.89)	0.97 (1.00)	0.95 (1.00)	0.90 (0.89)	D (D)	OK (OK)	OK (OK)	OK (OK)
Between SW 10th Street WB & EB to I-95 SB On-Ramp and I-95 SB to Sample Road EB & WB Off-Ramp	Mainline	16		6,613 (6,321)				39.9 (36.4)				0.93 (0.89)				E (E)			
Between SW 10th Street WB & EB to I-95 SB On-Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road	Mainline		17		6,893 (6,903)	6,751 (7,199)	6,371 (6,320)		27.6 (26.9)	26.8 (27.1)	25.1 (24.9)		0.73 (0.75)	0.71 (0.75)	0.67 (0.67)		D (D)	D (D)	C (C)
I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road	Off-Ramp (Diverge)		18		667 (908)	565 (1,239)	546 (932)		37.8 (37.5)	36.7 (39.2)	34.7 (34.5)		0.97 (1.00)	0.95 (1.00)	0.90 (0.89)		E (E)	E (F)	D (D)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road and I-95 SB to Sample Road EB & WB Off-Ramp	Mainline		19		6,226 (5,995)	6,186 (5,960)	5,825 (5,388)		23.9 (26.5)	23.8 (26.5)	22.3 (20.6)		0.66 (0.75)	0.65 (0.75)	0.62 (0.57)		C (D)	C (D)	C (C)
I-95 SB to Sample Road EB & WB	Off-Ramp (Diverge)	17	20	1,215 (1,272)	1,011 (976)	924 (973)	848 (970)	38.9 (37.2)	28.9 (32.4)	28.7 (32.2)	26.6 (24.1)	0.93 (0.89)	0.88 (1.00)	0.87 (1.00)	0.82 (0.76)	E (E)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Sample Road EB & WB Off-Ramp and Sample Road WB to I-95 SB On-Ramp	Mainline	18	21	5,398 (5,049)	5,215 (5,019)	5,262 (4,987)	4,977 (4,418)	28.5 (26.2)	27.2 (34.9)	27.5 (35.1)	25.7 (22.7)	0.76 (0.71)	0.74 (0.90)	0.74 (0.90)	0.70 (0.62)	D (D)	D (D)	D (E)	C (C)
Sample Road WB to I-95 SB	On-Ramp (Merge)	19	22	789 (687)	870 (694)	747 (682)	670 (585)	33.9 (31.2)	31.9 (33.2)	31.5 (32.9)	29.4 (25.7)	0.87 (0.81)	0.86 (1.00)	0.85 (1.00)	0.80 (0.71)	D (D)	D (D)	D (D)	D (C)
Between Sample Road WB to I-95 SB On-Ramp and Sample Road EB to I-95 SB On-Ramp	Mainline	20	23	6,187 (5,736)	6,085 (5,713)	6,009 (5,669)	5,647 (5,003)	35.0 (31.0)	34.0 (45.0)	33.3 (45.0)	30.3 (26.1)	0.87 (0.81)	0.86 (1.00)	0.85 (1.00)	0.80 (0.71)	E (D)	D (F)	D (F)	D (D)
Between Sample Road EB to I-95 SB On-Ramp and I-95 SB to Copans Road WB Off-Ramp	Weaving (Type A)	21	24	7,013 (6,428)	6,909 (6,527)	6,831 (6,357)	6,463 (5,647)	32.2 (28.3)	30.0 (28.1)	29.5 (26.4)	27.5 (22.9)	0.82 (0.74)	0.77 (0.89)	0.76 (0.86)	0.72 (0.62)	D (D)	D (D)	D (C)	C (C)
Between I-95 SB to Copans Road WB Off-Ramp and Copans Road WB to I-95 SB On-Ramp	Mainline	1	1	6,331 (5,876)	6,208 (5,872)	6,172 (5,860)	5,913 (5,245)	34.7 (30.5)	33.5 (30.5)	33.1 (30.4)	32.5 (27.4)	0.89 (0.83)	0.88 (0.83)	0.87 (0.83)	0.83 (0.74)	D (D)	D (D)	D (D)	D (D)
Between Copans Road WB to I-95 SB On-Ramp and I-95 SB to Copans Road EB Off-Ramp	Weaving (Type A)	2	2	6,865 (6,500)	6,734 (6,515)	6,695 (6,483)	6,373 (5,758)	32.5 (31.2)	31.2 (30.7)	30.9 (30.3)	28.9 (25.9)	0.83 (0.80)	0.80 (0.79)	0.79 (0.78)	0.75 (0.69)	D (D)	D (D)	D (D)	D (C)
Between I-95 SB to Copans Road EB Off-Ramp and Copans Road EB to I-95 SB On-Ramp	Mainline	3	3	6,523 (6,100)	6,391 (6,144)	6,354 (6,141)	6,033 (5,416)	30.5 (32.7)	30.4 (32.6)	30.8 (33.1)	33.6 (28.6)	0.84 (0.87)	0.83 (0.87)	0.84 (0.88)	0.85 (0.76)	D (D)	D (D)	D (D)	D (D)
Copans Road EB to I-95 SB	On-Ramp (Merge)	4	4	1,170 (914)	1,217 (926)	1,133 (876)	937 (776)	68.8 (35.3)	62.2 (48.2)	58.8 (47.1)	35.6 (31.1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.98 (0.87)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Copans Road EB to I-95 SB On-Ramp and I-95 SB to Atlantic Boulevard WB Off-Ramp	Mainline	5	5	7,693 (7,014)	7,608 (7,070)	7,487 (7,017)	6,970 (6,192)	26.5 (26.5)	26.5 (26.5)	26.5 (26.5)	27.3 (23.8)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	0.74 (0.65)	D (D)	D (D)	D (D)	D (C)
I-95 SB to Atlantic Boulevard WB	Off-Ramp (Diverge)	6	6	850 (815)	856 (807)	774 (817)	831 (853)	42.4 (38.3)	41.9 (38.6)	41.1 (38.3)	33.3 (28.7)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.98 (0.87)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Atlantic Boulevard WB Off-Ramp and I-95 SB to Atlantic Boulevard EB Off-Ramp	Mainline	7	7	6,843 (6,199)	6,752 (6,263)	6,713 (6,200)	6,139 (5,339)	45.0 (45.0)	45.0 (45.0)	45.0 (45.0)	34.6 (28.1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.87 (0.75)	F (F)	F (F)	F (F)	D (D)
I-95 SB to Atlantic Boulevard EB	Off-Ramp (Diverge)	8	8	536 (598)	450 (538)	410 (575)	462 (568)	37.3 (33.5)	36.7 (33.9)	36.5 (33.5)	30.7 (26.1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.87 (0.75)	E (D)	E (D)	E (D)	D (C)

Table 5.13B
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	2040 No-Build HCS Segment #	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)				Density Range AM(PM)				V/C AM(PM)				LOS AM(PM)			
				2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build	2040 No-Build	2040 Build	2030 Build	2020 Build
I-95 Southbound																			
Between I-95 SB to Atlantic Boulevard EB Off-Ramp and Atlantic Boulevard WB & EB to I-95 SB On-Ramp	Mainline	9	9	6,307 (5,601)	6,302 (5,725)	6,303 (5,625)	5,677 (4,771)	31.8 (31.9)	32.0 (31.3)	31.1 (30.8)	30.5 (24.5)	0.86 (0.86)	0.86 (0.85)	0.85 (0.84)	0.80 (0.67)	D (D)	D (D)	D (D)	D (C)
Atlantic Boulevard WB & EB to I-95 SB	On-Ramp (Merge)	10	10	1,020 (1,010)	994 (1,072)	1,093 (1,130)	1,104 (1,081)	53.7 (31.6)	52.0 (42.7)	55.1 (42.3)	34.7 (29.2)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.96 (0.82)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Between Atlantic Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB to Cypress Creek Road EB & WB Off-Ramp	Mainline	11		7,327 (6,611)				26.5 (26.5)				0.75 (0.75)				D (D)			
Between Atlantic Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes at Cypress Creek Rd	Mainline		11		7,296 (6,797)	7,396 (6,755)	6,781 (5,852)		27.2 (26.7)	27.4 (26.7)	26.9 (22.9)		0.75 (0.75)	0.75 (0.75)	0.72 (0.62)		D (D)	D (D)	D (C)
I-95 SB HOT Lanes to I-95 SB GP Lanes before Cypress Creek Road	On-Ramp (Merge)		12		418 (461)	318 (404)	200 (201)		36.1 (32.6)	36.7 (32.1)	36.6 (31.3)		0.79 (0.80)	0.78 (0.79)	0.74 (0.64)		E (D)	E (D)	E (D)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes at Cypress Creek Rd and I-95 SB to Cypress Creek Road EB & WB Off-Ramp	Mainline		13		7,714 (7,258)	7,714 (7,159)	6,981 (6,053)		28.7 (28.9)	28.1 (28.6)	27.4 (23.2)		0.79 (0.80)	0.78 (0.79)	0.74 (0.64)		D (D)	D (D)	D (C)
I-95 SB to Cypress Creek Road EB & WB	Off-Ramp (Diverge)	12	14	2,078 (1,858)	2,085 (2,269)	1,940 (1,933)	1,788 (1,791)	28.7 (25.8)	26.5 (26.4)	26.5 (26.4)	27.0 (21.2)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	0.74 (0.64)	D (C)	C (C)	C (C)	C (C)
Between I-95 SB to Cypress Creek Road EB & WB Off-Ramp and Cypress Creek Road WB to I-95 SB On-Ramp	Mainline	13	15	5,249 (4,753)	5,629 (4,989)	5,774 (5,226)	5,193 (4,262)	35.8 (36.9)	36.3 (36.5)	36.3 (36.5)	27.1 (21.9)	0.91 (0.93)	0.92 (0.92)	0.92 (0.92)	0.73 (0.60)	E (E)	E (E)	E (E)	D (C)
Cypress Creek Road WB to I-95 SB	On-Ramp (Merge)	14	16	612 (521)	570 (553)	570 (551)	513 (521)	34.1 (26.4)	36.6 (31.7)	37.9 (33.4)	29.1 (23.7)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.80 (0.67)	D (C)	E (D)	E (D)	D (C)
Between Cypress Creek Road WB to I-95 SB On-Ramp and Park & Ride Lot Exit to I-95 SB On-Ramp	Mainline	15	17	5,861 (5,274)	6,199 (5,542)	6,344 (5,777)	5,706 (4,783)	43.8 (41.9)	43.8 (41.9)	43.8 (41.9)	30.8 (24.8)	1.00 (0.98)	1.00 (0.98)	1.00 (0.98)	0.80 (0.67)	E (E)	E (E)	E (E)	D (C)
Park & Ride Lot Exit to I-95 SB	On-Ramp (Merge)	16	18	30 (150)	30 (150)	30 (150)	30 (150)	35.0 (33.3)	38.6 (35.8)	39.7 (36.2)	31.7 (27.0)	0.88 (0.86)	0.96 (0.92)	0.98 (0.92)	0.81 (0.70)	E (D)	E (E)	E (E)	D (C)
Between Andrews Avenue SB to I-95 SB On-Ramp and I-95 SB to Commercial Boulevard EB & WB Off-Ramp	Weaving (Type A)*	17	19	7,003 (7,037)	7,472 (7,435)	7,460 (7,476)	6,615 (6,376)	40.7 (44.7)	21.0 (19.8)*	21.0 (19.5)*	19.0 (16.5)*	0.99 (1.00)	0.91 (0.96)	0.90 (0.96)	0.84 (0.86)	F (F)	C (B)*	C (B)*	B (B)*
Between I-95 SB to Commercial Boulevard EB & WB Off-Ramp and Commercial Boulevard EB to I-95 SB On-Ramp	Mainline	18	20	5,731 (5,777)	6,342 (6,175)	6,292 (6,208)	5,478 (5,288)	33.8 (30.4)	35.2 (30.4)	33.9 (30.4)	29.0 (27.7)	0.89 (0.83)	0.91 (0.83)	0.89 (0.83)	0.77 (0.75)	D (D)	E (D)	D (D)	D (D)
Commercial Boulevard EB to I-95 SB	On-Ramp (Merge)	19	21	805 (1,267)	671 (1,177)	792 (1,379)	840 (1,273)	33.0 (33.3)	46.3 (56.1)	47.9 (57.1)	32.1 (33.3)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.89 (0.92)	OK (OK)	OK (OK)	OK (OK)	OK (OK)
Commercial Boulevard WB to I-95 SB	On-Ramp (Merge)	20	22	948 (1,032)	1,035 (1,132)	1,005 (1,109)	798 (1,028)	32.5 (30.0)	35.7 (38.3)	36.2 (41.2)	45.5 (49.2)	0.85 (0.87)	0.86 (0.87)	0.86 (0.89)	0.75 (0.80)	D (D)	E (E)	E (E)	E (E)
Between Commercial Boulevard WB to I-95 SB On-Ramp and I-95 SB to Oakland Park Boulevard EB & WB Off-Ramp	Mainline	21		7,484 (8,076)				31.9 (33.0)				0.85 (0.87)				D (D)			
Between Commercial Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard	Mainline		23		8,048 (8,484)	8,089 (8,696)	7,116 (7,589)		32.4 (33.1)	32.2 (34.4)	28.2 (30.6)		0.86 (0.87)	0.86 (0.89)	0.75 (0.80)		D (D)	D (D)	D (D)
I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard	Off-Ramp (Diverge)		24		707 (799)	588 (754)	449 (777)		30.9 (32.7)	31.1 (33.6)	38.3 (40.9)		0.85 (0.86)	0.84 (0.88)	0.74 (0.79)		D (D)	D (D)	E (E)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard and I-95 SB to Oakland Park Boulevard EB & WB Off-Ramp	Mainline		25		7,341 (7,685)	7,501 (7,942)	6,667 (6,812)		31.6 (32.3)	31.5 (33.5)	24.4 (25.0)		0.85 (0.86)	0.84 (0.88)	0.69 (0.71)		D (D)	D (D)	C (C)
I-95 Southbound - HOT Lanes																			
North of Palmetto Park Road	Mainline		1		1,620 (2,353)	911 (1,629)	691 (981)		12.2 (17.7)	6.8 (12.2)	5.2 (7.4)		0.34 (0.49)	0.19 (0.34)	0.14 (0.20)		B (B)	A (B)	A (A)
I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp Between S of Palmetto Park Road and N of Hillsboro Boulevard	Off-Ramp (Diverge)		2		202 (156)	200 (284)	200 (200)		11.7 (18.4)	5.3 (11.8)	3.3 (5.9)		0.34 (0.49)	0.19 (0.34)	0.14 (0.20)		B (B)	A (B)	A (A)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp	Mainline		3		1,418 (2,197)	711 (1,345)	491 (781)		10.7 (16.5)	5.3 (10.1)	3.7 (5.9)		0.30 (0.46)	0.15 (0.28)	0.10 (0.16)		A (B)	A (A)	A (A)
I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp Between S of SW 10th Street and N of Sample Road	On-Ramp (Merge)		4		667 (908)	565 (1,239)	546 (932)		12.9 (21.1)	6.3 (16.7)	4.3 (9.7)		0.43 (0.65)	0.27 (0.54)	0.22 (0.36)		B (C)	A (B)	A (A)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp	Mainline		5		2,085 (3,105)	1,276 (2,584)	1,037 (1,713)		15.7 (23.5)	9.6 (19.4)	7.8 (12.9)		0.43 (0.65)	0.27 (0.54)	0.22 (0.36)		B (C)	A (C)	A (B)
I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp Between S of Atlantic Boulevard and N of Cypress Creek Road	Off-Ramp (Diverge)		6		418 (461)	318 (404)	200 (201)		15.9 (25.2)	8.6 (20.4)	6.4 (12.6)		0.43 (0.65)	0.27 (0.54)	0.22 (0.36)		B (C)	A (C)	A (B)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp	Mainline		7		1,667 (2,644)	958 (2,180)	837 (1,512)		12.5 (19.9)	7.2 (16.4)	6.3 (11.4)		0.35 (0.55)	0.20 (0.45)	0.17 (0.31)		B (C)	A (B)	A (B)
I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp Between S of Commercial Boulevard and N of Oakland Park Boulevard	On-Ramp (Merge)		8		707 (799)	588 (754)	449 (777)		15.2 (24.0)	8.5 (19.8)	6.4 (14.5)		0.49 (0.72)	0.32 (0.61)	0.27 (0.48)		B (C)	A (B)	A (B)
South of Commercial Boulevard	Mainline		9		2,374 (3,443)	1,546 (2,934)	1,286 (2,289)		17.8 (26.4)	11.6 (22.1)	9.7 (17.2)		0.49 (0.72)	0.32 (0.61)	0.27 (0.48)		B (D)	B (C)	A (B)

NOTE: No Build operational analysis was performed using the DDHV volumes without HOV lanes.

A summary of the HCM future operational analysis results is as follows:

Basic Freeway Analysis – The capacity analysis shows that the following numbers of basic freeway segments will operate at an unacceptable LOS:

- 2040 No-Build Alternative
  - Northbound three LOS E and five LOS F
  - Southbound five LOS E and one LOS F
- 2040 Build Alternative
  - Northbound five LOS E and four LOS F
  - Southbound seven LOS E and four LOS F
- 2030 Build Alternative
  - Northbound six LOS E and three LOS F
  - Southbound seven LOS E and four LOS F
- 2020 Build Alternative
  - Northbound four LOS E and four LOS F
  - Southbound two LOS E

Ramp Merge/Diverge Analysis – The capacity analysis shows that the following numbers of ramps will operate at an unacceptable LOS:

- 2040 No-Build Alternative
  - Northbound ten LOS E and one LOS F
  - Southbound six LOS E
- 2040 Build Alternative
  - Northbound five LOS E and four LOS F
  - Southbound eight LOS E and three LOS F
- 2030 Build Alternative
  - Northbound six LOS E and two LOS F
  - Southbound eight LOS E and three LOS F
- 2020 Build Alternative
  - Northbound six LOS E and two LOS F
  - Southbound four LOS E

Weaving Analysis – The capacity analysis shows that the following numbers of weaving segments will operate at an unacceptable LOS:

- 2040 No-Build Alternative
    - Southbound one LOS F
- 2030 Build Alternative
    - Northbound one LOS F
- 2020 Build Alternative
    - Northbound one LOS F

Intersection Analysis – The capacity analysis shows that the following intersections will operate at an unacceptable LOS (worst peak period LOS):

- 2040 No-Build Alternative
    - Cypress Creek Road West Ramp Terminal (LOS F-AM)
    - SW 10th Street West Ramp Terminal, Off-Ramp (LOS F-AM)
    - SW 10th Street East Ramp Terminal (LOS F-AM)
    - Palmetto Park Road East Ramp Terminal (LOS E-PM)
- 2040 Build Alternative
    - Cypress Creek Road West Ramp Terminal (LOS F-PM)
- 2030 Build Alternative
    - Cypress Creek Road West Ramp Terminal (LOS E-AM/PM)
- 2020 Build Alternative
    - Cypress Creek Road West Ramp Terminal (LOS E-AM/PM)

A summary of the micro-simulation future operational analysis results is as follows:

Network Performance Statistics – A network performance evaluation is an important step when comparing the overall traffic conditions of the study area as a system. A comparison was made between the No-Build and Build Alternatives. The results are summarized in ***Table 5.13C.***

Table 5.13C
Network Performance Statistics

Statistics	No-Build		Build	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Total travel time [h], All Vehicle Types	66,771	77,866	48,614	42,805
Total delay time [h], All Vehicle Types	54,159	66,381	24,199	17,875
Number of vehicles that have left the network, All Vehicle Types	112,657	107,010	259,260	267,662
Number of vehicles in the network, All Vehicle Types	23,249	25,231	17,428	13,022

As shown in ***Table 5.13C***, in terms of the number of vehicles exiting the network, that figure is twice as high for the Build Alternative when comparing it to the No-Build Alternative, which indicates that the Build Alternative can process extensively more traffic than the No-Build Alternative. In terms of total travel time and delay time, the results for the No-Build Alternative are also significantly higher than those for the Build Alternative, which indicates congestion is much severer for the No-Build Alternative than for the Build Alternative.

VISSIM Simulation – A summary of the micro-simulation results is listed below:

- The No-Build Alternative will not be able to accommodate the future demand.
- The Build Alternative is superior to the No-Build Alternative in terms of projected traffic operations.
- The express lanes in the Build Alternative are anticipated to operate satisfactorily throughout the study area.
- The network statistics indicate that congestion is anticipated to be more severe for the No-Build Alternative when compared to the Build Alternative.
- The Build Alternative is anticipated to process twice as much traffic when compared to the No-Build Alternative.
- The total travel time and delay for the No-Build Alternative is anticipated to be significantly higher when compared to the Build Alternative.
- For the Build Alternative during the AM peak hour, the speed range on the general purpose lanes is from 8 MPH to 64 MPH.
- The speed range on the express lanes is from 44 MPH to 72 MPH.
- During the PM peak hour, the speed range on the general purpose lanes is from 10 MPH to 64 MPH.
- The speed on the express lanes is from 67 MPH to 72 MPH.

Based on this analysis, it can be concluded that the performance measures of most of the analyzed segments have either remained the same or improved from the No-Build to the Build Alternative during selected AM and PM peak hours in both directions. The Build Alternative 2040 traffic projections are anticipated to increase an average of 6% during the peak periods when compared to the No-Build Alternative. The Build Alternative will provide the needed capacity to accommodate future traffic growth into the design year 2040.

The Build Alternative express lanes are anticipated to operate at an acceptable LOS throughout the entire corridor, within the study limits. The express lanes will provide superior, consistent and dependable travel times, particularly during peak travel periods. Express lanes will service more vehicles than the existing HOV lanes. Through the use of dynamic pricing, FDOT will be able to manage the amount of traffic in the express lanes and maintain free-flowing speeds even when the general purpose lanes are congested. Motorists who choose to use the express lanes will benefit from reliable travel times. Long trip motorists that commute daily between counties will benefit from using the express lanes by improving their travel time during peak travel periods.

The Build Alternative operational analysis includes the SW 10th Street Interchange improvements (***see Appendix L Sheets #15-20***). These improvements were coordinated with this study in order to provide the best operations of the express lanes access points south and north of the SW 10th Street Interchange. These interchange improvements are currently underway as a separate project, FPID# 430932-1, and will be documented in an Interchange Modification Report.

The operational analysis results show that almost every interchange will need some type of interchange improvement (short term and/or long term) in order to achieve an acceptable LOS. This PD&E study focused on providing improvements (Build Alternative) along the I-95 mainline only by evaluating the implementation of two tolled express lanes along the center of the corridor. Interchange improvements were not included in the scope of work of this study. The FDOT District Four programmed a future Interchange Improvements Master Plan Study that will evaluate short term and long term interchange improvements that could be implemented within the project limits to improve the access to and from the interstate corridor.

5.4.15 Environmental Impacts

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements. Therefore, the No-Build Alternative will not have environmental impacts.

5.4.15.1 *Future Land Use*

Broward and Palm Beach Counties and each of the cities along the project corridor (Fort Lauderdale, Oakland Park, Pompano Beach, Deerfield Beach, and Boca Raton) each have a Comprehensive Plan, developed in accordance with Chapter 163, Florida Statutes, and 9J-5, Florida Administrative Code. Each comprehensive plan establishes goals, objectives, and policies for future growth. The latest version of the comprehensive plan for each of the counties and cities along the project corridor are as follows:

- Broward County Comprehensive Plan amended on December 12, 2006
- Palm Beach County Comprehensive Plan revised on July 23, 2012
- City of Fort Lauderdale Comprehensive Plan adopted in 2008
- City of Oakland Park Comprehensive Plan amended in April 2010
- City of Pompano Beach Comprehensive Plan adopted in January 2010 and amended in 2012
- City of Deerfield Beach Comprehensive Plan adopted January 24, 2012
- City of Boca Raton Comprehensive Plan adopted October 26, 2010

Each plan contains nine required elements, along with optional elements specific to the county's/city's needs, including a Future Land Use Element (FLUE) and a Transportation Element. These elements provide a vision of the county's/city's future transportation network and land use, including those areas along the I-95 corridor within the study area.

The purpose of the FLUE in each of the comprehensive plans is to establish a vision of future land use patterns. As stated in the Palm Beach County Comprehensive Plan (and applicable to the other county and city plans):

> *[The FLUE] defines the components of the community and the interrelationship among them through integrating the complex*

> *relationships between land use and the other elements of the Plan that address the physical, social, and economic needs of [the county/city].*
>
> *The FLUE institutes the framework for growth management and land planning … authorized by Chapter 163, Florida Statues, the "Local Government Comprehensive Planning and Land Development Act." This act requires the FLUE to be consistent with State and regional plans.*

Per Chapter 163, Florida Statutes, the purpose of the Transportation Element is:

> *… to plan for a multimodal transportation system that places emphasis on public transportation systems, where feasible. The element shall provide for a safe, convenient multimodal transportation system, coordinated with the future land use map or map series and designed to support all elements of the comprehensive plan.*

The I-95 express lanes project is in the LRTP and the TIP for each of the respective counties as well as the STIP. As mentioned previously, the FLUE for each of the counties' comprehensive plans is required to be consistent with state and regional plans, including the LRTPs, TIPs, and STIP. Therefore, since this project is included in the LRTPs, TIPs, and STIP, the impacts to land use from this project should have been considered within the FLUE of each of the respective comprehensive plans.

Consistent with the planned future growth in each of the comprehensive plans, and consistent with the LRTPs, TIPs, and STIP, the future land use along the study corridor could be expected to be very similar to the existing land use. The I-95 corridor would continue to act as a delineation of distinct land uses to the west and east of the project study area. Along the east side of the I-95 project study area, the majority of land uses would continue to be comprised of mainly Residential areas with lesser amounts of Retail, Office space, and Public and Semi-public land uses. The majority of the west side of the study area would continue to be comprised of mainly Industrial land uses with lesser amounts of Retail, Office space, and Residential land uses. ***Figure 5.14*** depicts the future land use along the project corridor.

As depicted on the City of Fort Lauderdale Future Land Use Map (completed as part of the city's comprehensive plan), the western side of the project corridor within the city limits consists of land uses designated as Commercial, Industrial, and Employment Center, as well as one parcel designated as Utilities (a water/wastewater treatment plant). The boundaries of the City of Fort Lauderdale do not extend to the eastern side of the project corridor.

As depicted on the City of Oakland Park Future Land Use Map (completed as part of the city's comprehensive plan), the eastern side of the project corridor within the city limits is dominated mainly by Low Density Residential areas bordered by Commercial areas. The western side of the project corridor within the city limits is comprised of a mix of Industrial, Parks/Recreational, Community Facilities, and areas of Residential.

As depicted on the City of Pompano Beach Future Land Use Map (completed as part of the city's comprehensive plan), the eastern side of the project corridor within the city limits is similarly dominated by Low and Medium Density Residential areas bordered by Commercial areas, interspersed with Community Facilities and Recreation and Open Space. The western side of the project corridor within the city limits is dominated almost entirely by Industrial land uses.

As depicted on the City of Deerfield Beach Future Land Use Map (completed as part of the city's comprehensive plan), the eastern side of the project corridor within the city limits is similarly dominated by Residential land uses with a few commercial land uses. The western side of the project corridor within the city limits is mainly dominated by Industrial land uses in the northern portion of the city, with a few residential land uses in the southern portion of the city.

As depicted on the City of Boca Raton Future Land Use Map (completed as part of the city's comprehensive plan), the eastern side of the project corridor within the city limits is dominated by Residential and Institutional (Florida Atlantic University) land uses, with small areas designated as Recreation and Open Space. The western side of the project corridor within the city limits consists of Residential areas in the southern portion of the city, Industrial areas through the central portion of the city, and a Conservation area (Blazing Star Preserve) at the northern edge of the city.

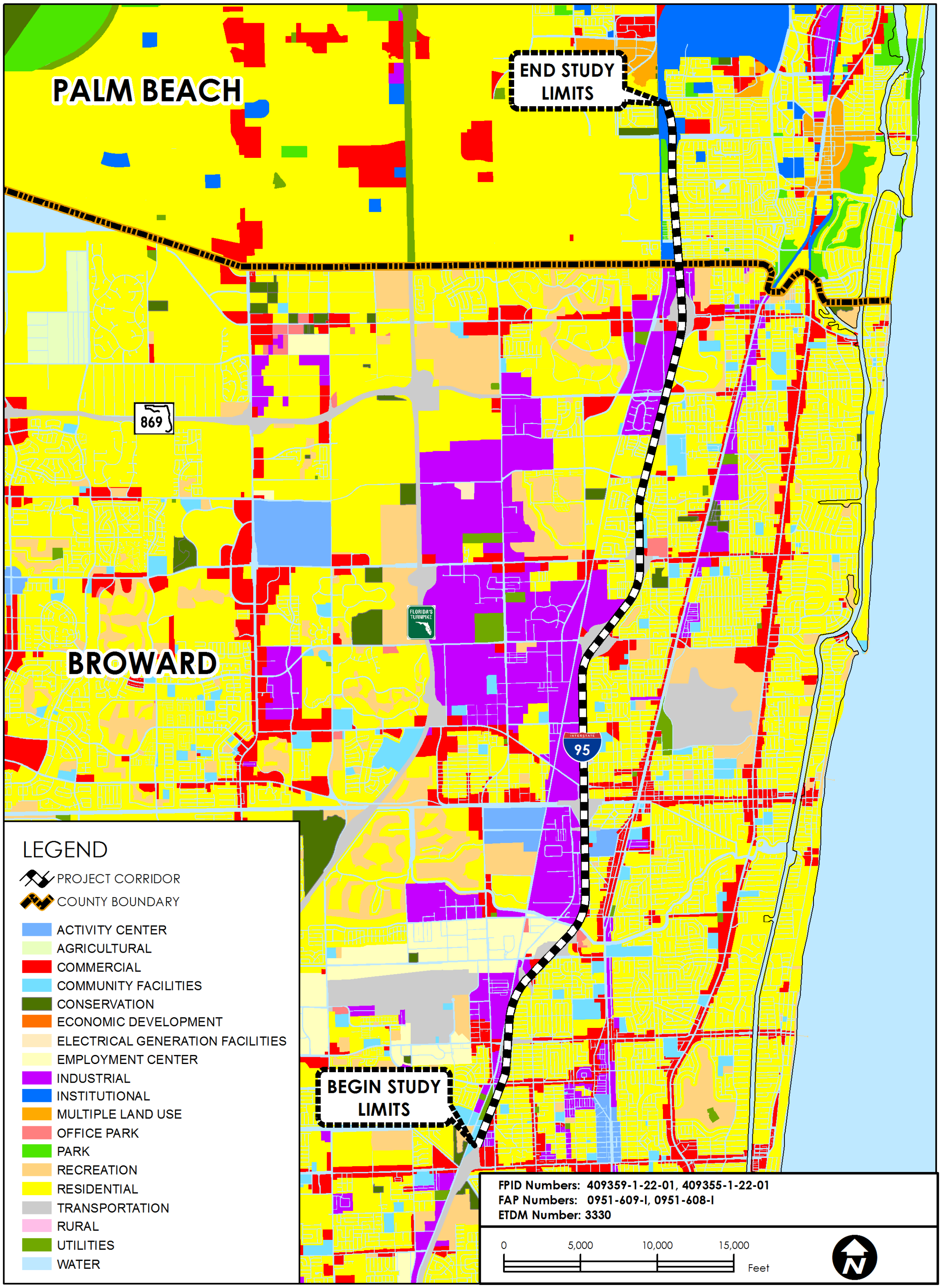


Figure 5.14 – Future Land Use Map

5.4.15.2 *Community Services*

All of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way. Since the I-95 corridor is located along a highly urbanized area, which currently experiences impacts typical of a highly travelled expressway (e.g., traffic congestion, noise, visual), and all of the roadway improvements will occur within the existing FDOT right of way, no long-term adverse impacts to community service facilities are anticipated as a result of project implementation. Short-term impacts caused by construction activities, such as traffic congestion/delays, noise from construction equipment, and dust from roadway construction have all been addressed in the applicable sections of this report. Traffic routes during construction would be controlled by a Maintenance of Traffic plan, and access to community services would be maintained at all times during and following completion of construction.

5.4.15.3 *Evacuation Routes and Emergency Services*

I-95 serves as part of the emergency evacuation route network designated by the Florida Division of Emergency Management. Also designated as a Broward and Palm Beach Counties' evacuation facility, I-95 is critical in facilitating traffic during emergency evacuation periods as it connects to other major arterials and highways of the state evacuation route network (i.e., I-595 and the Florida's Turnpike). The Build Alternative is anticipated to:

- Improve emergency evacuation capabilities by enhancing connectivity and accessibility to other major arterials designated on the state evacuation route network.
- Increase the capacity of traffic that can be evacuated during an emergency event.
- Allow for enhanced emergency access and incident response times due to the ability to maintain operational speeds of 45 MPH in the express lanes system.

5.4.15.4 Cultural Features

Section 4(f)

Since all of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way, no impacts to Section 4(f) sites are anticipated.

A *Section 4(f) Determination of Applicability* Report was prepared for the nine park/recreational Section 4(f) sites. The project would not acquire land from any of the Section 4(f) resources, and there would be no short-term or long term impacts to the resources by the proposed project. Access to all Section 4(f) resources would be maintained during construction because all of the Section 4(f) sites have local street access (no access from I-95). In addition, none of the sites were sensitive to proximity impacts, including noise. The FDOT and FHWA have determined that there will be no Section 4(f) involvement with these nine resources.

Section 106

Since all of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way, no impacts to historic/archeological resources are anticipated.

A request for review letter and a copy of the CRAS were transmitted to the FHWA on March 5, 2013. The FHWA approved the CRAS on April 4, 2013, and provided the following comments:

> *FHWA concurs with the CRAS recommendations re NRHP-eligibility but finds no basis in the report for a determination of no impacts to 8BD3229 and 8PB10311 and 8BD4087. Please cc: Lynn Kelley, FDOT D4; Mark Clasgens, FHWA; and Roy Jackson, FDOT CEMO.*

The FHWA forwarded the request for review letter and a copy of the CRAS to the SHPO for review and concurrence on April 4, 2013. The SHPO concurred with the recommendations and findings in the letter on April 16, 2013.

A determination of effects letter and a copy of the CRAS were transmitted to the FHWA on August 13, 2013. The letter stated:

> *The FEC Railway and Hillsboro Canal have been determined eligible for listing in the NRHP. Based on the project information provided […] which discusses the improvements that will bridge over the resources but within the [right of way], the FDOT finds that the project will have no adverse effect on the significant railroad or canal or the characteristics that determine their National Register eligibility.*

The FHWA approved the recommendations and findings in the letter and forwarded the letter and a copy of the CRAS to the SHPO for review and concurrence. The SHPO concurred with the recommendations and findings in the letter.

<u>5.4.15.5 *Recreational Areas*</u>

All of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way. Since the I-95 corridor is located along a highly urbanized area, which currently experiences impacts typical of a highly travelled expressway (e.g., traffic congestion, noise, visual), and all of the roadway improvements will occur within the existing FDOT right of way, no long-term adverse impacts to recreational areas are anticipated as a result of project implementation. Short-term impacts caused by construction activities, such as traffic congestion/delays, noise from construction equipment, and dust from roadway construction have all been addressed in the applicable sections of this report. Traffic routes during construction would be controlled by a Maintenance of Traffic plan, and access to recreational areas would be maintained at all times during and following completion of construction.

<u>5.4.15.6 *Natural and Biological Features*</u>

<u>*Wetlands and Surface Waters*</u>

Presidential EO 11990 entitled "Protection of Wetlands," dated May 23, 1977, establishes a national policy to "avoid to the extent possible the long-term and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." The USDOT in implementing EO 11990 set forth its policy on wetlands in USDOT Order 5660.1A, “Preservation of the Nation's Wetlands,” dated August 24, 1978, which is "to assure the protection, preservation, and enhancement of the Nation's wetlands to the fullest extent practicable during the planning, construction, and operation of transportation facilities and projects." In accordance with NEPA and this policy, the FDOT has evaluated the I-95 project to determine the extent of impacts to wetland functions and values. If wetland impacts were determined to be unavoidable, the evaluation included a determination of mitigative measures to compensate for impacts to wetlands.

Direct and Indirect Impacts

The proposed Build Alternative for the I-95 project was evaluated for potential impacts to wetlands, stormwater management/drainage features, and surface waters. Based on the footprint of the proposed roadway improvements, the Build Alternative would result in 1.92 acres of direct impacts to wetlands, 32.15 acres of direct impacts to stormwater management/drainage features dominated by hydrophytic vegetation, and 17.36 acres of direct impacts to surface waters, as shown in ***Table 5.14***.

For the two wetland areas with direct impacts (W-1 and W-2), indirect impacts are anticipated because a suitable upland buffer does not exist between the remaining portion of the wetland and the proposed roadway construction. Therefore, indirect impacts were calculated to an average distance of 50 feet beyond the direct impact. This 50-foot distance was determined using best scientific judgment in analyzing what type of indirect impacts will be expected during and following construction and how far into a wetland area those affects will be experienced per agency criteria. Items considered include construction activities, sedimentation resulting from increased turbidity associated with soil disturbance (water quality impacts), interruption to surface water flow, alterations to vegetative communities outside the final roadway footprint, and effects to wildlife in the vicinity of the corridor. Based on these criteria, 0.96 acres of indirect impacts are anticipated as a result of the Build Alternative, as shown in ***Table 5.14***.

Table 5.14 Potential Impacts (Direct and Indirect)		
Assessment Area	**Direct Impacts (Acres)**	**Indirect Impacts (Acres)**
Wetlands		
W-1	1.76	0.55
W-2	0.16	0.41
Total	**1.92**	**0.96**
Stormwater Management/Drainage Features		
Stormwater Retention Swales[1]	12.59	N/A
Stormwater Retention Basins[2]	14.44	N/A
Emergent Wetland Fringe[3]	0.22	N/A
D-13A	2.14	N/A
D-13B	2.14	N/A
D-13C	0.62	N/A
Total	**32.15**	**N/A**
Surface Waters		
Surface Waters	17.36	N/A

N/A = Not applicable
[1] Stormwater Retention Swales include D-1 – D-8, D-18, D-21, D-29 – D-36, D-38 – D-41, D-54 – D-55, D-57 – D-59, D-61 – D-64, D-68 – D-71, D-73 – D-78, and D-81 – D-82.
[2] Stormwater Retention Basins include D-10 – D-12, D-14, D-16 – D-17, D-37, D-42 – D-43, D-45 – D-51, D-56, D-66, D-72, and D-79 – D-80.
[3] Emergent Wetland Fringe includes D-9, D-15, D-19 – D-20, D-44, D-52, D-65, and D-67.

UMAM Assessment

The Uniform Mitigation Assessment Method (UMAM) provides a standardized procedure for assessing the functions provided by wetlands and other surface waters; the amount that those functions are reduced by a proposed impact; and the amount of mitigation necessary to compensate for that loss in terms of current condition, hydrologic connection, uniqueness, location, fish and wildlife utilization, time lag, and mitigation risk. A UMAM assessment was conducted for each of the wetland communities which could be impacted by the proposed project. Please note that a UMAM assessment was not conducted for areas characterized as stormwater management/drainage features or surface waters. Stormwater management/drainage features will be replaced with stormwater management/drainage features in the new project design and therefore, would not require additional mitigation. For the surface waters to be impacted, the presence of native wetland vegetation is limited in these surface waters and mitigation for impacts to surface waters is typically not required.

The total UMAM functional loss as a result of construction of the Build Alternative was calculated to be approximately 1.16 UMAM credits (1.09 credits necessary to compensate for direct impacts and 0.07 credits necessary to compensate for indirect impacts). A summary of the results of the UMAM assessment on the proposed wetland impact areas is provided in ***Table 5.15***. Copies of the UMAM data forms are provided in the WER prepared for this project.

Table 5.15
UMAM Impact Assessment Results

Assessment Area	FLUCFCS	UMAM SCORE (Current)				UMAM SCORE (with Impact)				Impact Delta	Impact Acreage	Functional Loss	Mitigation Credits
		Location and Landscape Support	Water Environment	Community Structure	RAW Score	Location and Landscape Support	Water Environment	Community Structure	Raw Score				
Direct Impacts													
W-1	630	5	7	5	0.57	0	0	0	0.00	-0.57	1.76	-1.00	1.00
W-2	630	5	7	5	0.57	0	0	0	0.00	-0.57	0.16	-0.09	0.09
Total											**1.92**	**-1.09**	**1.09**
Indirect (Secondary) Impacts													
W-1	630	5	7	5	0.57	4	6	5	0.50	-0.07	0.55	-0.04	0.04
W-2	630	5	7	5	0.57	4	6	5	0.50	-0.07	0.41	-0.03	0.03
Total											**0.96**	**-0.07**	**0.07**

Cumulative Impacts

From a regional watershed perspective, the proposed project is located within the Southern Florida Watershed [Hydrologic Unit Code (HUC) 030902] and within the Florida Southeast Coast Cataloging Unit (HUC 03090206). The limits and area covered by the Southern Florida Watershed Unit closely resemble those of the SFWMD's C-100 mitigation basin, therefore the cumulative impact discussion satisfies the requirements of both the USACE and the SFWMD. ***Figure 5.15*** depicts the limits of the Southern Florida Watershed. There are approximately 852,651.10 acres of wetlands (marshes) within portions of Broward and Palm Beach counties located within the Florida Southeast Coast Cataloging Unit (SFWMD, 2011). The proposed Build Alternative direct wetland impacts consist of approximately 1.92 acres, which represents a small fraction of the total wetlands within the basin (0.0002%). The unimpacted wetland areas will still total 852,617.10 acres of similar wetland (marsh) habitats (>99.999% of the total wetlands) following construction. Therefore, the cumulative wetland impacts resulting from the Build Alternative are anticipated to be considered negligible within the Florida Southeast Coast Cataloging Unit as well as the greater Southern Florida Watershed. Additionally, the Build Alternative impacts will be offset via mitigation, thereby resulting in a zero net loss of wetland function (see ***Conceptual Mitigation*** section below for details of the proposed conceptual mitigation).

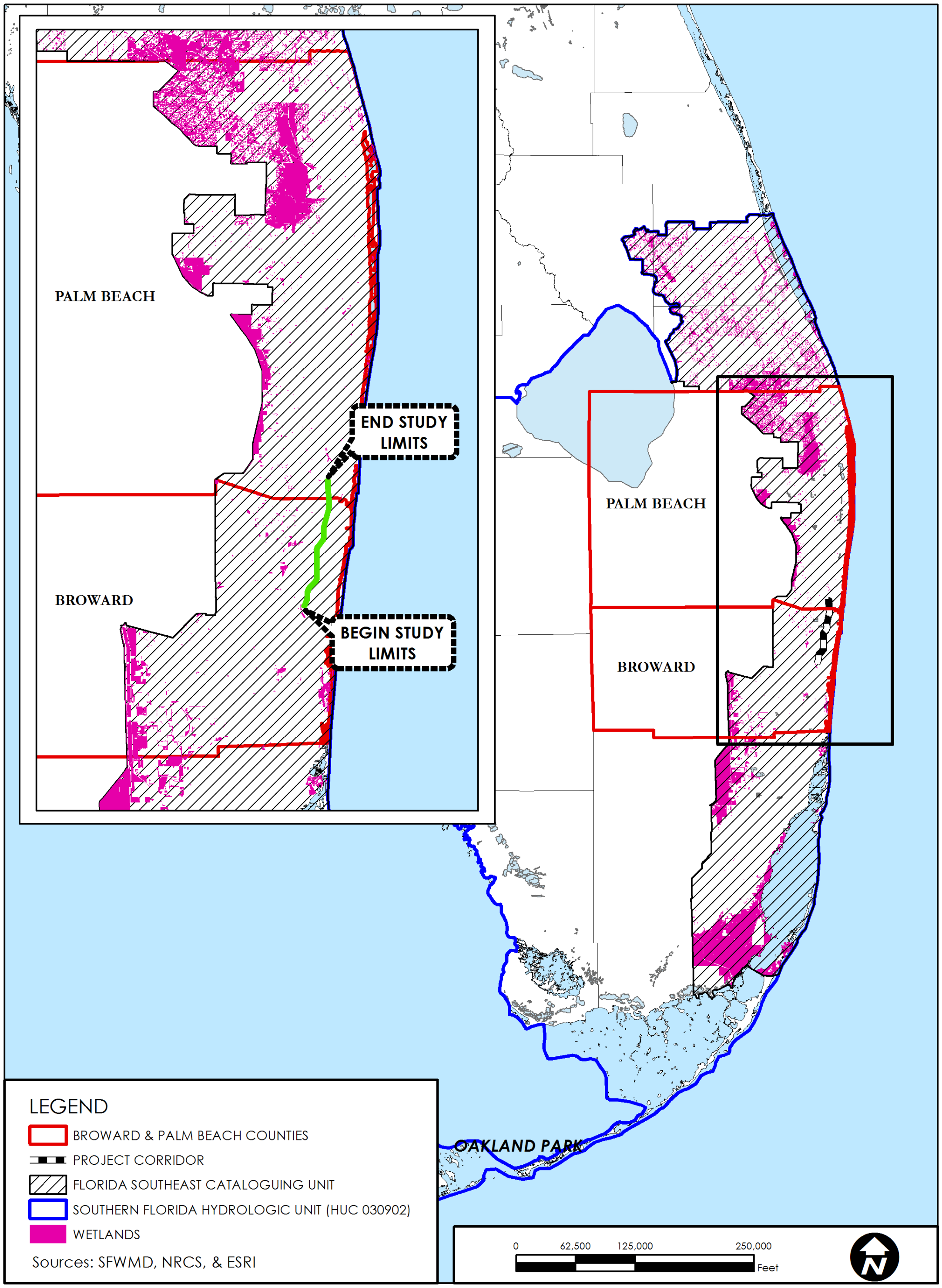


Figure 5.15 – Southern Florida Watershed and Florida Southeast Coast Cataloging Unit Map

Elimination and Reduction of Impacts

No impacts to wetlands or surface waters are anticipated with the No-Build Alternative; however, due the projected demand for roadway capacity within the study area, traffic congestion, delays, and other operational and access deficiencies would remain. Therefore, since the No-Build Alternative does not meet the project purpose and need, it was eliminated from further consideration.

As wetlands lie within and directly adjacent to the project corridor, the complete elimination of wetland and/or surface water impacts is not compatible with any roadway safety or capacity improvements, and there is a sufficient transportation demand to justify the proposed improvements along this corridor.

Typical section concepts were developed with consideration of reducing or eliminating impacts to wetlands and surface waters within the limits of the proposed project. The I-95 corridor is considered the "spine" of the transportation system in southeast Florida. Master planning of major transportation facilities such as I-95 has been essential to facilitate the availability of capacity within the transportation network and to support the region's high growth. The FDOT has been involved in both master planning and implementation of master plan recommendations for the past three decades. Over the past few decades, Miami-Dade, Broward and Palm Beach Counties have experienced a high demographic growth which has translated into traffic volumes exceeding the capacity of the corridor. These high volumes have brought congestion during the peak hours on I-95 to unacceptable levels of service.

The results of these planning-level studies identified, recommended, and prioritized the development of an integrated multimodal transportation system which is economically efficient, safe, and environmentally sound. These studies' results led the FDOT to re-start this PD&E study in 2012 with the focus of evaluating capacity improvements along the corridor with the implementation of an express lanes system.

The typical section concepts were further refined by consideration of the proposed roadway profile and associated typical section in order to ensure that proposed impacts to wetlands and surface waters was reduced as much as possible while meeting the transportation needs of the project. In addition, further efforts to reduce impacts will be implemented as detailed construction plans are developed during the permitting and final design phase of the project including the use of BMPs in accordance with the latest edition of FDOT's _Standard Specifications for Road and Bridge Construction_.

Conceptual Mitigation

Although the Build Alternative was refined to reduce impacts to wetlands to the greatest extent practicable, unavoidable impacts (direct and indirect) to freshwater wetlands are anticipated to occur. Based on the footprint of the proposed roadway improvements, the Build Alternative would result in 1.92 acres of direct impacts and 0.96 acres of indirect impacts to wetlands, 32.15 acres of direct impacts to stormwater management/drainage features dominated by hydrophytic vegetation, and 17.36 acres of direct impacts to surface waters.

Direct impacts to stormwater management/drainage features will be mitigated by the creation of the new stormwater management/drainage system, which is anticipated to result in no net loss of stormwater management/drainage features dominated by hydrophytic vegetation and no net loss of functional value in terms of water quality or habitat value. If it is determined during final design and permitting that the new stormwater management/drainage system does not fully compensate for the proposed impacts, these impacts would be mitigated along with the proposed wetland mitigation discussed below.

For the surface waters proposed to be impacted, the presence of native wetland vegetation is limited in these surface waters and mitigation for impacts to surface waters is typically not required.

The total UMAM functional loss to wetlands that would result from the construction of the Build Alternative was calculated to be 1.16 UMAM credits (1.09 credits necessary to compensate for direct impacts and 0.07 credits necessary to compensate for indirect impacts), as shown in ***Table 5.16***.

Table 5.16 UMAM Analysis for Wetland Impacts				
Assessment Area	**Impact Delta**	**Impact Acreage**	**Functional Loss**	**Mitigation Credits**
Direct Impacts				
W-1	-0.57	1.76	-1.00	1.00
W-2	-0.57	0.16	-0.09	0.09
Total		**1.92**	**-1.09**	**1.09**
Indirect (Secondary) Impacts				
W-1	-0.07	0.55	-0.04	0.04
W-2	-0.07	0.41	-0.03	0.03
Total		**0.96**	**-0.07**	**0.07**

During final design and permitting, this UMAM assessment can be used to determine the appropriate mitigation for wetland impacts. The following options for wetland compensatory mitigation could be considered by the FDOT during the final design and permitting process:

- Request for open competitive bids for the purchase of mitigation credits by the two mitigation banks within the service area of the project impacts (Florida Power and Light Everglades Mitigation Bank and Loxahatchee Mitigation Bank). Both of these mitigation banks currently have sufficient credits available to the FDOT for this project (as of February 2013).
- Wetland enhancements at the SFWMD's DuPuis Wildlife Management Area
- Offsite wetland creation, restoration, or enhancement at an available FDOT surplus property

Refinements of these calculations are expected to occur during the final design and permitting phase of the project. The type and level of mitigation for wetland impacts will be based on the final impact acreages (direct/indirect), the nature of disturbance (temporary/permanent), and the overall quality of the systems.

Agency Coordination and Permitting

Agency coordination to obtain wetland and surface water information for this project occurred through the ETDM Programming Screening (ETDM #3330), the Advance Notification process, and individual conservation with staff at the USACE and the SFWMD. The ETDM review occurred between May 21, 2004, and July 5, 2004, and the Programming Screen Summary Report was published on September 29, 2005. The Summary Degree of Effect for wetlands was listed as 'Moderate' for the Wetlands category. Through the PD&E process for this project, measures have been taken to eliminate and reduce (avoid and minimize) impacts to wetlands to the greatest extent practicable. As wetlands lie within and directly adjacent to the project corridor, the complete elimination of wetland and/or surface water impacts is not compatible with the project purpose and need. Therefore, mitigation is proposed for unavoidable impacts to wetlands. Additionally, all applicable environmental permits will be obtained in accordance with federal, state, and local laws and regulations. Therefore, due to the elimination, reduction, and mitigation measures proposed during the PD&E process, the degree of effect for wetlands for this project is expected to be 'Minimal.' A summary of the wetland-related comments received from the resource agencies charged with commenting on project specific effects to the natural habitats is provided in ***Table 5.17***.

Table 5.17 Summary of ETDM Programming Screen Wetland Resource Comments			
Agency	**Issue**	**Degree of Effect**	**Comments**
U.S. Army Corps of Engineers	Wetlands	Moderate	Based on previous experience in the project area, there are normally ditches/canals that parallel the interstate. These linear features will have to be identified for the Corps review process in addition to other wetlands within the corridor. The EST's database indicates that the site may contain wetlands. The USACE will require: 1) a map showing all wetland impacts within the project corridor including any impacts to ditches/canals; 2) a description of all wetlands within the corridor; 3) a functional assessment of the wetlands proposed to be impacted. The project should be designed to minimize/avoid impacts to these resources to the greatest extent practicable. If impacts to wetlands occur, a mitigation plan should be prepared that fully compensates for the loss of wetland resources.
U.S. Fish and Wildlife Service	Wetlands	Minimal to None	The USFWS notes that the proposed project is located in a highly urbanized area and is not likely to significantly affect fish and wildlife. The database associated with the EST indicated that wetlands were recorded in the project corridor. If wetlands are found to occur within the project area, we recommend that resources be avoided to the greatest extent practicable. If impacts to wetlands are unavoidable, we recommend that the FDOT provides mitigation that fully compensates for the loss of wetland resources.
National Marine Fisheries Service	Wetlands	Moderate	Based on our review of the GIS analysis results for wetlands, it appears that wetlands occur within close proximity to the project corridor. NMFS recommends that adverse impacts to wetlands should be avoided or minimized. If wetlands are directly or indirectly impacted by the proposed project, compensatory mitigation that fully offsets unavoidable impacts to wetland resources should be provided. If a Clean Water Act Section 404 permit from the USACE is required for the proposed work, NMFS may provide comments during the review of the permit application/public notice.

Both the USACE and SFWMD regulate impacts to wetlands within the project area. In June of 2012, and informal discussion of the wetlands associated with the I-95 project was conducted with Mr. Rob Hopper of the SFWMD and Mr. Garett Lips of the USACE. It was noted by the SFWMD that all previously permitted stormwater swales associated with the stormwater management system would not require compensatory wetland mitigation, but littoral zones and natural wetland areas would be assessed during the permitting process and compensatory mitigation will be required. The USACE stated that all stormwater swales demonstrating wetland characteristics and / wood stork foraging habitat will need to be replaced in-kind or the need for compensatory wetland mitigation will be required. Both agencies stated that a site visit to determine jurisdictional wetlands during the permitting process will be required. Representatives from the FDOT and the SFMWD and USACE will be discussing this project at the January interagency meeting; a field visit is anticipated to be scheduled shortly thereafter. While the SFWMD may determine during the permitting process for this project that some of the potentially jurisdictional wetland areas identified in this study may be classified as "other surface waters," due to the USACE claiming all of these areas as jurisdictional wetlands, it is anticipated at this stage of the project (PD&E) that the FDOT will be required to mitigate for impacts to all of these potentially jurisdictional areas. The complexity of the permitting process will depend greatly on the size of the project and/or the extent of impacts to jurisdictional wetland areas.

Other agencies, including the U.S. Environmental Protection Agency, NMFS, USFWS, FDEP, and FWC typically review and comment on permit applications. A list of the permits that are anticipated to be required for this project is provided in ***Table 5.18***, below. The project corridor, I-95, is part of the State Highway System and therefore is exempt from all city and county environmental permitting per Chapter 335.02(4) Florida Statute, which states:

> *335.02 Authority to designate transportation facilities and rights-of-way and establish lanes; procedure for redesignation and relocation; application of local regulations.—*
> *(4) Notwithstanding any general law or special act, regulations of any county, municipality, or special district, including any instrumentality thereof, shall not apply to existing or future transportation facilities, or appurtenances thereto, on the State Highway System.*

In relation to stormwater management and construction in or over secondary canal systems, since the project lies within the limits of the Broward County Water Control Districts 2, 3 and 4 and crosses secondary canals controlled by the Lake Worth Water Control District in Palm Beach County, the FDOT would need to coordinate with the local drainage districts and apply for the necessary drainage approvals/permits from each district, as needed.

Table 5.18
Anticipated Environmental Permits

Permit Type	Issuing Agency
Environmental Resource Permit	SFWMD
Right of Way Occupancy Permit	SFWMD
Water Use Permit (for Construction Dewatering)	SFWMD
Section 404 Dredge and Fill Permit	USACE
Bridge Permit	USCG
National Pollutant Discharge Elimination Permit (NPDES)	FDEP
Local Drainage District Approvals/Permits	Local Drainage Districts

SFWMD = South Florida Water Management District
USACE = U.S. Army Corps of Engineers
USCG = U.S. Coast Guard
FDEP = Florida Department of Environmental Protection

The SFWMD requires an Environmental Resource Permit when construction of any project results in the modification or creation of a surface water management system or results in impacts to wetlands or waters of the state. It is anticipated that an Individual Environmental Resource Permit will be required for this project. It is also anticipated that a Right of Way Occupancy Permit for work within the SFWMD's right of way of its canals will be required from the SFWMD. In addition, if it is determined that dewatering is required for construction of the proposed Build Alternative, a Water Use Permit for construction dewatering will be required from the SFWMD.

With the USACE, an Individual Section 404 Dredge and Fill Permit will be required. An individual permit will require compliance with the 404(b)(1) guidelines, including verification that all impacts have first been eliminated to the greatest extent practicable, that unavoidable impacts have been reduced to the greatest extent practicable, and lastly that unavoidable impacts have been mitigated in the form of wetlands creation, restoration, and/or enhancement.

A US Coast Guard (USCG) Bridge Permit will also be required. Preliminary coordination conducted with the USCG indicated that a USCG Bridge Permit will be required, per (33 CFR Chapter 1, Subchapter J) for the reconstruction of or modification of any existing bridge or causeway, across United States navigable waters. Federal law prohibits construction of any bridge over navigable waters without first receiving authorization from the USCG. According to the USCG (Mr. Brodie Rich and Ms. Evelyn Smart, Seventh District Bridge Branch), the portion of the Hillsboro Canal beneath I-95 is considered to be navigable waters of the United States. The USCG recommended that the FDOT make every attempt to match the existing vertical clearance of the adjacent CSX Railroad bridge at the I-95 crossing.

Under the FDEP's delegated authority to administer the NPDES program, construction sites that will result in greater than one acre of disturbance must file for and obtain either coverage under an appropriate generic permit or an individual permit for point source discharges of stormwater to waters of the U.S. A major component of the NPDES permit is the development of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP identifies potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharges from the site and discusses good engineering practices (i.e., best management practices) that will be used to reduce the pollutants due to construction activities.

<u>*Floodplains*</u>

Replacement drainage structures for this project are limited to hydraulically equivalent structures. The limitations to the hydraulic equivalency being proposed are basically due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location is not considered in this category since it defeats the project purpose or is economically unfeasible. Since flooding conditions in the project area are inherent in the topography or are a result of other outside contributing sources, and since there is no practical alternative to totally eradicate flood impacts or even reduce them in any significant amount, existing flooding will continue, but not be increased.

The proposed structures will be hydraulically equivalent to or greater than that of the existing structures and backwater surface elevations are not expected to increase. As a result, this project will not affect existing flood heights or flood plain limits. This project will not result in any new or increased adverse environmental impacts, and there will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

Others

Aquatic Preserves
No aquatic preserves are located within the project study area; therefore, no impacts to aquatic preserves are anticipated as a result of this project.

Water Quality
A Water Quality Impact Evaluation Checklist was prepared for this project and is included in the WER. Water quality impacts resulting from erosion and sedimentation during construction activities will be controlled in accordance with the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction* and through the use of BMPs, including temporary erosion control measures.

Biscayne Aquifer
The proposed project is not anticipated to have negative impacts to the Biscayne Aquifer system, which is the sole source of potable water for most of southeastern Florida. A copy of the USEPA Sole Source Aquifer letter is included in the WER prepared for this project. All necessary precautions and BMPs pertaining to construction will be followed to prevent adverse impacts to the underlying sole source aquifer.

Outstanding Florida Waters
No Outstanding Florida Waters are located within the project study area; therefore, no impacts to Outstanding Florida Waters are anticipated as a result of this project.

Wild and Scenic Rivers
No wild and scenic rivers are located within the project study area; therefore, no impacts to wild and scenic rivers are anticipated as a result of this project.

Coastal Zone Consistency

This project was reviewed by the FDEP for consistency with the Florida Coastal Zone Management Plan and found to be consistent.

Coastal Barrier Resources

No coastal barrier resources are located within the project study area; therefore, no impacts to coastal barrier resources are anticipated as a result of this project.

Scenic Highways

No scenic highways are located within the project study area; therefore, no impacts to scenic highways are anticipated as a result of this project.

Farmlands

Per coordination with the USDA NRCS, lands within current roadway right of way are not considered Prime and/or Unique Farmlands. Since all roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way, no impacts to Prime and/or Unique Farmlands are anticipated as a result of the proposed project.

Wildlife and Habitat

Upland Communities

The footprint of the build alternative is contained entirely within the existing FDOT right-of-way, designated as Urban and Built-Up/Residential/Transportation, Communication, and Utilities/Roads and Highways (FLUCFCS 100, 800, and 814). These areas are regularly maintained (i.e., vegetation is mowed, trimmed, and/or treated with herbicide) by the FDOT for safety. No impacts to the other upland habitats identified adjacent to the project corridor are anticipated as a result of the proposed project, including Pine Flatwoods (FLUFCS 411), Sand Pine (FLUFCS 413), Xeric Oak (FLUFCS 421), Xeric Oak Disturbed (FLUFCS 4211), Brazilian Pepper (FLUCFCS 422), Upland Scrub, Pine and Hardwoods (FLUCFCS 436), Upland Scrub, Pine and Hardwoods – Highly Disturbed (FLUCFCS 4361), and Mixed Hardwoods (FLUCFCS 438).

Wetlands

Impacts to wetlands, stormwater management/drainage features, and surface waters are summarized in ***Section 5.4.15.6*** of this report and discussed in detail in the WER prepared for this project.

Agency Coordination

Agency coordination to obtain wildlife and habitat information for this project occurred through the ETDM Programming Screening (ETDM #3330), the Advance Notification process, and individual conservation with staff at the USACE and SFWMD. The ETDM review occurred between May 21, 2004, and July 5, 2004, and the Programming Screen Summary Report was published on September 29, 2005. The Summary Degree of Effect was listed as 'Minimal to None' for the Wildlife and Habitat category. A summary of the wildlife and habitat-related comments received from the resource agencies charged with commenting on project specific effects to wildlife and habitat is provided in ***Table 5.19***.

Table 5.19
Summary of ETDM Programming Screen Wetland Resource Comments

Agency	Issue	Degree of Effect	Comments
USFWS	Wildlife and Habitat	Minimal to None	Active nesting colonies of the endangered wood stork are located approximately 6.8 miles, 9.8 miles, 11.8 miles, and 14.7 miles northwest, and 10.7 miles west of the project corridor. Consequently, the project falls within the CFA of these nesting colonies. The USFWS believes that the loss of wetlands within a CFA may reduce foraging opportunities for wood storks. To minimize adverse effects to the wood stork, the USFWS's draft Standard Local Operating Procedures for Endangered Species request that the applicant replace wetlands lost due to the action. The compensation plan should include a temporal lag factor, if necessary, to ensure that wetlands provided as compensation adequately replace the wetland functions lost due to the project. Moreover, wetlands offered as compensation should be of the same hydroperiod, and located within the CFA of the affected wood stork colony. In some cases, the USFWS would accept wetlands compensation located outside the CFA of the affected wood stork nesting colony. Specifically, wetland credits purchased from a USFWS-approved mitigation bank located outside of the CFA would be acceptable to the USFWS, provided that the impacted wetlands occur within the permitted service area of the bank. No other federally-listed species were identified on your project site. The Service has not conducted a site inspection to verify species occurrence or validate the GIS results. However, we assume that listed species occur in suitable ecological communities and recommend site surveys to determine the presence or absence of listed species. The Service notes that the proposed project is located in a highly urbanized area and is not likely to significantly affect fish and wildlife.

USFWS = U.S. Fish and Wildlife Service; CFA = Core Foraging Area

Protected Species
Table 5.20 lists the federal and state-listed wildlife and plant species with the potential to occur within the project corridor, based on the analysis conducted in the ESBA prepared for this project.

Based on the assessment of the protected species identified, wildlife agency correspondence, and the field investigations, no long-term unmitigated adverse impacts are anticipated to occur to protected wildlife or plant species or designated habitats within the project corridor. The FDOT and the FHWA have made a determination of "*may affect, not likely to adversely affect*" for the Florida mouse, Florida manatee, black skimmer, brown pelican, least tern, limpkin, little blue heron, roseate spoonbill, snowy egret, southeastern American kestrel, tricolored heron, white ibis, wood stork, American alligator, eastern indigo snake, Florida pine snake, gopher frog, and gopher tortoise, and a determination of "*no effect*" for the Sherman's fox squirrel, bald eagle, Florida burrowing owl, and Florida scrub-jay. The USFWS issued a concurrence letter for this project on April 24, 2013, concurring with the federally-listed species determinations made by the FDOT and the FHWA (a copy of the concurrence letter issued by the USFWS is provided in the ESBA prepared for this project).

No impacts to Critical Habitats or SHCAs are anticipated as a result of the proposed project.

Table 5.20
Summary of Federal and State-Listed Species with the Potential to Occur within the Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential	Obs.	FDOT/FHWA Determination	Notes
Mammals							
Florida mouse	*Podomys floridanus*	NL	SSC	Moderate	No	May affect, not likely to adversely affect	Biologists should look for occurrences of this species in association with the proposed gopher tortoise survey. Relocations could take place in association with relocation of gopher tortoises, if necessary.
Sherman's fox squirrel	*Sciurus niger shermani*	NL	SSC	Low	No	No effect	No impacts are anticipated.
Florida manatee	*Trichechus manatus latirostris*	E	FE	High	No	May affect, not likely to adversely affect	FWC's *Standard Manatee Conditions for In-Water Work* will be implemented during all in-water construction activities.
Birds							
Bald eagle*	*Haliaeetus leucocephalus*	NL	NL	Low	No	No effect	The closest bald eagle nest identified is seven miles from the project corridor; no adverse impacts are anticipated.
Black skimmer	*Rynchops niger*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Brown pelican	*Pelecanus occidentalis*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Florida burrowing owl	*Athene cunicularia floridana*	NL	SSC	High	No	No effect	Since no owls or burrows were observed along the project corridor, no long-term adverse impacts are anticipated as a result of the proposed project.
Florida scrub-jay	*Aphelocoma coerulescens*	T	FT	Low	No	No effect	No impacts will occur to the Yamato Scrub Natural Area from the proposed project and no scrub-jays were observed or are likely to occur along the project corridor.

Table 5.20
Summary of Federal and State-Listed Species with the Potential to Occur within the Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential	Obs.	FDOT/FHWA Determination	Notes
Least tern	*Sternula antillarum*	NL	ST	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Limpkin	*Aramus guarauna*	NL	SSC	Moderate	No	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Little blue heron	*Egretta caerulea*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Roseate spoonbill	*Platalea ajaja*	NL	SSC	Moderate	No	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Snowy egret	*Egretta thula*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Southeastern American kestrel	*Falco sparverius paulus*	NL	ST	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
Tricolored heron	*Egretta tricolor*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.
White ibis	*Eudocimus albus*	NL	SSC	High	Yes	May affect, not likely to adversely affect	Construction will not significantly reduce available foraging, roosting, or nesting habitat for this species.

Table 5.20
Summary of Federal and State-Listed Species with the Potential to Occur within the Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential	Obs.	FDOT/FHWA Determination	Notes
Wood stork	*Mycteria americana*	E	FE	High	Yes	May affect, not likely to adversely affect	Direct impacts to stormwater management/ drainage features will be mitigated by the creation of the new stormwater management/drainage system, which is anticipated to result in no net loss of stormwater management/drainage features dominated by hydrophytic vegetation and no net loss of functional value in terms of water quality or habitat value. If it is determined during final design and permitting that the new stormwater management/drainage system does not fully compensate for the proposed impacts, these impacts would be mitigated along with the proposed wetland mitigation. Any proposed wetland compensatory mitigation would have to be provided within the same basin as the wood stork impacts or at a USFWS-approved mitigation bank and would have to fully compensate for the biomass loss.
Reptiles							
American alligator	*Alligator mississippiensis*	T (S/A)	FT (S/A)	Moderate	No	May affect, not likely to adversely affect	The FDOT's contractor will be advised of state and local laws regarding the harassment of alligators prior to any construction activities.

Table 5.20 Summary of Federal and State-Listed Species with the Potential to Occur within the Project Corridor							
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**Occurrence Potential**	**Obs.**	**FDOT/FHWA Determination**	**Notes**
Eastern indigo snake	*Drymarchon corais couperi*	T	FT	Moderate	No	May affect, not likely to adversely affect	The FDOT will incorporate the most current protection guidelines, entitled *Standard Protection Measures for the Eastern Indigo Snake*, into the final project design and will require that the construction contractor abide strictly to the guidelines during construction.
Florida pine snake	*Pituophis melanoleucus mugitus*	NL	SSC	Moderate	No	May affect, not likely to adversely affect	Biologists should look for occurrences of this species in association with the proposed gopher tortoise survey. Protection measures will consist of those employed for the Eastern indigo snake.
Amphibians							
Gopher frog	*Rana capito*	NL	SSC	Moderate	No	May affect, not likely to adversely affect	Biologists should look for occurrences of this species in association with the proposed gopher tortoise survey. Silt fencing should be erected along the Blazing Star Preserve to prevent individuals from entering the FDOT right of way during construction.

Table 5.20
Summary of Federal and State-Listed Species with the Potential to Occur within the Project Corridor

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential	Obs.	FDOT/FHWA Determination	Notes
Gopher tortoise	*Gopherus polyphemus*	NL	ST	High	Yes	May affect, not likely to adversely affect	FDOT commits to coordinating with the FWC Gopher Tortoise Permit Coordinator to facilitate a 100% Gopher Tortoise Survey with live trapping of individual gopher tortoise to a recipient site approved by the FWC. The location of most gopher tortoise burrows observed during the original survey were on a steep slope associated with the I-95 roadway and bucket trapping will likely be difficult to conduct. Several neonate/juvenile gopher tortoises were also observed freely traversing under the fence separating the Blazing Star Preserve and the FDOT right of way. Therefore, silt fencing should be installed along this area in association with the survey and relocation efforts to prohibit any addition gopher tortoises from entering the area following the relocations.

* The bald eagle is not listed by the USFWS or FWC as a protected species, but this species is protected by the *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act*.

E = Endangered
T = Threatened
T (S/A) = Threatened due to Similarity of Appearance
FE = Federally Endangered
FT = Federally Threatened
FT (S/A) = Federally Threatened due to Similarity of Appearance
ST = State Threatened
SSC = Species of Special Concern
NL = Not Listed
N/A = Not Applicable

Sources: U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, and Florida Natural Areas Inventory

5.4.15.7 *Physical Features*

Air Quality

The project's No-Build and Build alternatives were assessed for potential air quality impacts at the project level using the FDOT's PC based CO Florida 2012 screening model.

Output from the CO Florida 2012 model includes the estimated one-hour and eight-hour CO level, in PPM, at the default receptor locations and a report stating whether the project passes or fails the screening analysis. A project alternative that passes the CO Florida 2012 model is not expected to result in any violations of the NAAQS for CO and is not likely to have any impact on the air quality of the surrounding area.

The location within the project study area considered to have the greatest potential for traffic generated air quality impacts is the I-95 interchange at Atlantic Boulevard. This location was selected for the CO screening analysis.

The CO screening analysis for this project indicates that the worst-case one-hour CO level is 9.7 PPM for the Build Alternative during the opening year (2040) and 9.0 PPM during the design year (2040). The predicted worst-case eight-hour CO level is estimated to be 5.8 PPM for the Build Alternative during the opening year (2040) and 5.4 PPM during the design year (2040). The results of the CO screening analysis indicate the proposed project is not expected to cause any exceedances of the one-hour or eight-hour NAAQS for CO. Thus, the project passes the CO screening analysis, and air quality impacts resulting from the proposed project are not expected.

Agency coordination to obtain air quality related information occurred through the ETDM Planning and Program Screening and the Advanced Notification process. The ETDM review occurred between May 21, 2004, and July 5, 2004, and the ETDM Programming Screen Summary Report was published on September 29, 2005. No comments were received regarding air quality impacts and no Summary Degree of Effect was assigned for the Air Quality category. Based on the air quality analysis conducted for this project, air quality impacts are not expected to occur as a result of this project.

Construction activities for the proposed action may potentially have short-term air quality impacts within the immediate vicinity of the project. Construction activities may generate temporary increases in air pollutant emissions in the form of dust from earthwork and unpaved roads and smoke from open burning. Such emissions and potential impacts will be minimized by adherence to all applicable state and local regulations and to the latest edition of the FDOT *Standard Specifications for Road and Bridge Construction*.

Noise

Traffic noise levels were predicted for noise sensitive locations along the project corridor for the existing conditions and the Design Year (2040) No-Build and Build Alternative. With the Build Alternative, Design Year traffic noise levels at nearby residences are predicted to range from 44.1 to 76.7 dB(A). The Build Alternative noise levels at special land use sites are predicted to range from 40.3 dB(A) at an interior location at the Calvary Chapel Boca Raton to 71.4 dB(A) at outdoor areas in Avondale Park. With the Build Alternative, noise levels are predicted to exceed the NAC at 422 residences along the project corridor and at eight special land use sites. No other noise sensitive sites within the project study area are predicted to experience traffic noise levels equal to or exceeding the FDOT NAC. Also, no sites are expected to experience any substantial noise level increases as defined by the FDOT [i.e., greater than 15.0 dB(A) over existing levels] with the build alternatives.

FDOT policy requires that the feasibility and reasonableness of noise abatement be considered when the FHWA NAC is approached or exceeded. In accordance with traffic noise study requirements set forth by both the FHWA and FDOT, noise barriers were considered for all noise sensitive receptor sites where design-year traffic noise levels were predicted to equal or exceed the NAC.

A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures. Feasibility primarily concerns engineering considerations including the ability to construct a noise barrier using standard construction methods and techniques. Feasibility also concerns the ability to provide a noise level reduction of at least 5 dB(A) for two or more impacted receivers given certain access, drainage, utility, safety, or maintenance requirements. Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. Reasonableness includes the consideration of the cost of providing noise abatement. To be deemed reasonable, a noise barrier or other noise abatement measure must not exceed the FDOT's reasonable cost criteria of $42,000 per benefited receptor site and must attain the FDOT noise reduction design goal of 7 dB(A) at one or more impacted receptor sites. In addition, once the noise abatement measure has been determined to be reasonable and feasible, the viewpoint of the benefited property owners must be considered.

To facilitate the noise barrier analysis, contiguous noise sensitive areas were grouped together into one of 14 Common Noise Environments (CNE). A CNE represents a group of impacted receptor sites that would benefit from the same noise barrier or barrier system (i.e., overlapping/continuous barriers) and are exposed to similar noise sources and levels, traffic volumes, traffic mix, speeds and topographic features. Generally, CNEs occur between two secondary noise sources, such as interchanges, intersections and/or cross-roads. In addition, the primary method for determining the cost of noise abatement involves a review of the cost per benefited receptor site for the construction of a noise barrier benefiting a single location or CNE (e.g., a subdivision or contiguous impact area). Several of the locations where noise impacts are predicted to occur are near existing noise barriers. In these cases, alternatives such as increasing the length of an existing noise barrier or filling in gaps in noise barrier coverage were selected, since increasing the height of an existing noise barrier is not possible without completely replacing the noise barrier with a new taller noise barrier. (Please refer to NSR for detailed tables and figures, summarizing the results of the noise barrier analyses and recommendations for each of the locations where noise barriers were evaluated, as well as figures of locations where noise barriers were evaluated or planned.)

Table 5.21 summarizes the results of the noise barrier analyses and recommendations for each of the 14 locations where noise barriers were evaluated. Noise barriers meet all of the FDOT's noise barrier feasibility and reasonableness requirements listed above for the following eight CNEs and are recommended for further consideration and public input:

- CNE-E1 – Unnamed Neighborhood, Powerline Road to Commercial Boulevard;
- CNE-E2 – Laguna Pointe Apartments, McNabb Road to SW 13th Court;
- CNE-E3 – Avondale Park, Oaks at Pompano Apartments, Unnamed Neighborhood, SW 3rd Street to Atlantic Boulevard;

- CNE-E6South – Unnamed Neighborhood, NW 15th Street to NW 17th Street;
- CNE-W1 – Olive Glen Apartments and Whispering Pines Apartments, NW 29th Court to NW 33rd Street;
- CNE-E8 – Parkway United Methodist Church, NE 42nd Street to NE 44th Street;
- CNE-E10 – Tivoli Park and Natura Neighborhoods, SW 10th Street to Hillsboro Boulevard; and,
- CNE-W2 – Mizner Forest, SW 18th Street to SW 13th Place.

These noise barriers are expected to benefit approximately 357 residences, 248 of which are predicted to be impacted by this project. Also, the exterior area of one church will benefit from a noise barrier along this project. The FDOT is committed to the construction of feasible noise abatement measures at the locations where noise barriers have been recommended for further consideration during the final design phase, contingent upon the following conditions:

- *Detailed noise analyses during the final design process support the need for abatement;*
- *Reasonable cost analyses indicate that the economic cost of the barrier(s) will not exceed the cost reasonable criterion;*
- *Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved;*
- *Community input regarding desires, types, heights and locations of barriers has been solicited by the FDOT; and*
- *Any other mitigating circumstances found in Section 17-4.6.1 of FDOT's PD&E Manual have been analyzed.*

It is likely that the noise abatement measures for these locations will be constructed if found feasible based on the contingencies listed above. If, during the Final Design phase, any of the contingency conditions listed above cause abatement to no longer be considered reasonable or feasible for a given location(s), such determination(s) will be made prior to requesting approval for construction advertisement. Commitments regarding the exact abatement measure locations, heights, and type (or approved alternatives) will be made during project reevaluation and at a time before the construction advertisement is approved.

The estimated cost to provide noise abatement for the following residential neighborhoods exceeded FDOT's reasonable cost criteria of $42,000 per benefited site:

- CNE-E6North – Unnamed Neighborhood, NW 18th Court to NW 21st Court ($161,588 per benefited site);
- CNE-E9 – Unnamed Neighborhood, SW 15th Street to SW 10th Street ($128,143 per benefited site); and,
- CNE-E11 - Unnamed neighborhood, SW 18th Street to Royal Palm Boulevard ($52,500 per benefited site).

The estimated cost to provide noise abatement for the following non-residential sites exceeded FDODT's reasonable cost criteria for special land use sites:

- CNE-E5 - Mitchell Moore Park; and
- CNE-E6Park – Weaver Community Park.

It was not possible to provide a noise level reduction of at least 7.0 dB(A) for at least one site in the following CNEs:

- CNE-E4 – Unnamed Neighborhood, Atlantic Boulevard to Martin Luther King Boulevard [5.6 dB(A) maximum noise level reduction];
- CNE-E7 – Leisureville Apartments, Copans Road to NW 26th Street [6.8 dB(A) maximum noise level reduction]; and,
- CNE-W3 – Blazing Star Preserve, West Camino Real to Palmetto Park Road [4.2 dB(A) maximum noise level reduction].

Therefore, noise barriers are not recommended for further consideration or construction at these locations. Based on the noise analyses performed to date, there are no apparent solutions available to mitigate the noise impacts at 174 residences and five special land use sites. The traffic noise impacts to these noise sensitive sites are considered to be an unavoidable consequence of the project. At locations where existing shoulder-mounted noise barriers will be physically impacted by this project and it was determined to not be feasible and/or reasonable to replace them with new noise barriers, the existing noise barriers will be replaced in kind during project construction in order to maintain the FDOT's previous noise abatement commitments.

Table 5.21
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Oakland Park Boulevard to Commercial Boulevard	East of I-95	Unnamed	Residential (Activity Category B) Church Interior (Activity Category D)	CD2-E1	Structure	8	960	577+00	586+40	57 Res. and Church Interior	2.7 (8.4)	23	5	28 Res	6.9 (8.4)	$1,129,200	$40,329	Yes	Yes
					Shoulder	14	1,160	586+40	597+80										
					Shoulder	8	1,715	585+00	602+00										
Cypress Creek to Atlantic Boulevard	East of I-95	Laguna Pointe Apartments	Residential (Activity Category B)	CD3-E2	Structure	8	900	699+30	708+30	65	4.5 (8.6)	22	0	22	6.4 (8.6)	$434,400	$19,745	Yes	Yes
					Shoulder	14	520	708+30	713+40										
	East of I-95	Avondale Park, Oaks at Pompano Apartments, Unnamed neighborhood	Residential (Activity Category B) Pool (Activity Category C) Park (Activity Category C)	CD2-E3	Ground	20	1,945	759+60	776+30	31 Res, pool and park	6.2 (8.8)	27 Res and park	8	35 Res and park	7.7 (8.8)	$1,167,000	$33,343	Yes	Yes

Table 5.21
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Atlantic Boulevard to Copans Road	East of I-95	Unnamed	Residential (Activity Category B)	CD2-E4	Shoulder	14	430	777+20	780+33	5	5.6 (5.6)	5	0	5	5.6 (5.6)	$821,400	$164,280	No	No
					Shoulder	14	850	785+51	794+00										
					Structure	8	290	778+00	780+90										
					Shoulder	14	510	780+90	786+00										
	East of I-95	Mitchell Moore Park	Park (Activity Category C)	CD3-E5	Shoulder	14	1,560	798+00	813+60	Park	7.0 (7.0)	Park	0	Park	7.0 (7.0)	$2,239,800	See Appendix D of the NSR	No	Yes
					Structure	8	1,240	813+60	826+00										
					Ground	20	1,950	802+79	822+30										
	East of I-95	Unnamed	Residential (Activity Category B)	CD3-E6South	Structure	8	900	826+00	835+00	22	4.1 (7.2)	22	0	22	6.1 (7.2)	$909,000	$41,318	Yes	Yes
					Ground	20	1,155	831+00	842+55										
	East of I-95	Weaver Community Park	Park (Activity Category C)	CD1-E6Park	Ground	22	3,360	834+00	868+00	Park	6.5 (7.0)	Park	0	Park	6.5 (7.0)	$1,707,600	See Appendix D of the NSR	No	Yes
	East of I-95	Unnamed	Residential (Activity Category B)	CD3-E6North	Shoulder	14	1,690	857+00	874+70	8	7.0 (7.0)	8	0	8	7.0 (7.0)	$1,292,700	$161,588	No	Yes
					Ground	20	780	860+00	868+00										
					Ground	22	610	868+00	874+60										
Copans Road to Sample Road	East of I-95	Leisureville Apartments	Residential (Activity Category B)	CD3-E7	Structure	8	1,220	888+00	900+20	56	4.4 (6.8)	14	0	14	6.8 (6.8)	$743,400	$53,100	No	No
					Ground	22	350	891+00	892+40										
	West of I-95	Olive Glen Apartments and Pool, Whispering Pines Apartments	Residential (Activity Category B) Pool (Activity Category C)	CD3-W1	Shoulder	14	1,935	915+00	935+00	58 Res. and pool	7.7 (10.1)	58 Res. and pool	60 Res.	118 Res. and pool	6.8 (10.1)	$1,341,900	$11,372	Yes	Yes
					Shoulder	14	1,260	932+20	945+00										

Table 5.21
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Sample Road to SW 10th Street	East of I-95	Parkway United Methodist Church	Church (Activity Category C)	CD1-E8	Ground	16	559	978+00	983+59	Play-ground	7.0 (7.0)	Play-ground	0	Play-ground	7.0 (7.0)	$268,320	N/A	N/A	Yes
	East of I-95	Unnamed	Residential (Activity Category B)	CD1-E9	Ground	20	1,495	1044+00	1053+40	9	6.3 (7.5)	7	0	7	6.8 (8.1)	$897,000	$128,143	No	Yes
SW 10th Street to Hillsboro Boulevard	East of I-95	Tivoli Park, Natura	Residential (Activity Category B)	CD3-E10	Ground	20	4,335	1060+50	1101+00	96	7.3 (9.8)	87	32 Res. and pool	119 Res. and pool	7.3 (9.8)	$2,601,000	$21,857	Yes	Yes
Hillsboro Boulevard to Palmetto Park Road	East of I-95	Unnamed	Residential (Activity Category B)	CD4-E11	Shoulder	14	1,725	1206+40	1223+30	6	5.2 (5.2)	6	15	21	6.2 (7.0)	$1,102,500	$52,500	No	Yes
					Shoulder	14	900	1215+60	1224+60										
	West of I-95	Mizner Forest	Residential (Activity Category B)	CD2-W2	Ground	14	1,285	1158+40	1171+09	9	7.2 (8.4)	9	4	13	6.7 (8.4)	$539,700	$41,515	Yes	Yes
	West of I-95	Blazing Star Preserve	Park (Activity Category C)	CD1-W3	Shoulder	14	500	1196+00	1201+00	Park	4.2 (4.2)	0	0	0	N/A	$1,160,100	N/A	No	No
					Structure	8	100	1201+00	1202+00										
					Shoulder	14	2,205	1202+00	1224+00										

Note: SLU = Special Land Use Site

Construction Noise and Vibration

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations due to the heavy equipment typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts. The project area does include residences, hotels, museums, parks, religious facilities and a cemetery that may be affected by noise and vibration associated with construction activities. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction*. According to Section 335.02 of the Florida Statutes, the FDOT is exempt from compliance with local ordinances. However, it is the FDOT's policy is to follow the requirements of local ordinances to the extent that is considered reasonable. Also, the contractor will be instructed to coordinate with the project engineer and the District Noise Specialist should unanticipated noise or vibration issues arise during project construction.

Agency Coordination

Agency coordination to obtain noise-related information for this project occurred through the ETDM Programming Screening (ETDM #3330) and the Advance Notification process. The ETDM review occurred between May 21, 2004, and July 5, 2004, and the Programming Screen Summary Report was published on September 29, 2005. No comments were received on noise-related issues.

To aid in promoting land use compatibility, a copy of the NSR, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to Broward and Palm Beach Counties. In addition, generalized future noise impact contours for properties in the immediate vicinity of the project have been developed for Noise Abatement Activity Categories B/C and E (i.e., residential/other sensitive land uses and sensitive commercial, respectively). These contours represent the approximate distance from the edge of the nearest proposed travel lane of I-95 to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the NAC in the Design Year 2040. These contours do not consider any shielding of noise provided by structures between the receiver and the proposed travel lanes. Contours were generally developed for portions of the project that are located away from significant ground features such as existing noise barriers. Within the project corridor, the distance between the proposed edge of the outside travel lane and the contour at various locations are presented in **Table 5.22**. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond this distance.

Table 5.22
Design Year (2040) Noise Impact Contour Distances

Location	Distance From Proposed Nearest Travel Lane to Noise Contour Line (Feet)	
	71 dB(A) – Activity Category E	66 dB(A) – Activity Category B/C
Between Andrews Avenue and Cypress Creek Road. Generally at-grade. Station 656+00. West Side.	180	370
Between McNabb Road and SW 3rd Street. Generally at-grade. Station 749+00. Both Sides.	305	520
Between Copans Road and Sample Road. Generally at-grade. Station 908+00. West Side.	265	480
Between Hillsboro Boulevard and Palmetto Park Road. Mainline lanes above-grade. Station 1210. West SIde	90	285

Contamination

After a review of all available data, such as agency file reviews at Broward and Palm Beach counties and FDEP, the EDR database report, aerial photography, and the site reconnaissance, 61 sites of potential environmental concern were identified for the I-95 project corridor; of these, 21 sites are rated as High risk, 25 sites are rated as Medium risk and 15 sites are rated as Low risk. Remaining sites identified are not considered to pose potential contamination concerns either because of the current regulatory status of the site, the site's location/distance from the project corridor, and/or the direction with reference to the I-95 project corridor (down-gradient/cross-gradient).

The District Four Planning and Environmental Management Office will utilize the information contained in this report to determine the need for additional investigation during the design phase of the Project. The Level II Contamination Assessment investigation may be conducted prior to any right of way acquisition and/or prior to the design phase, should any become necessary. Based on the findings of updated future review and Level II investigation, the design engineers may be instructed to avoid the areas of concern or to include special provisions with the plans to require that the construction activities performed in the areas of concern be performed by a contamination assessment and remediation contractor specified by the FDOT.

It must be recognized that the possibility exists that some hazardous substances, petroleum products, or environmental contamination not identified during this assessment may exist on or in the immediate vicinity of the project. This is because regulatory agency records are not always complete; not all leaks, spills, and discharges are reported; not all USTs and ASTs are registered. It is unknown if any registered substances were illegally dumped or were deposited during past construction activities.

Agency Coordination

Agency coordination to obtain contamination-related information occurred through the Efficient Transportation Decision Making ETDM Planning and Program Screening and the Advanced Notification process. The Florida Department of Environmental Protection (FDEP) reviewed the project and listed a Degree of Effect of 'Moderate' for contaminated sites. The Summary Degree of Effect for contaminated sites was also listed as 'Moderate' in the ETDM Programming Screen Summary Report.

Asbestos Surveys

The sample details for all the bridges are provided in ***Table 5.23***. Individual reports for the 27 bridges are available for review at the FDOT Four office in Fort Lauderdale, Florida for further details.

Table 5.23
Summary of Asbestos Presence

#	MP	Direction	Bridge#	Bridge Name	ACM Detected
1	25.28	Northbound	860195	I-95 over Hillsboro Canal	No
2	25.28	Southbound	860125	I-95 over Hillsboro Canal	No
3	24.618	Northbound	860194	I-95 over Hillsboro Boulevard	No
4	24.617	Southbound	860124	I-95 over Hillsboro Boulevard	No
5	22.016	East/West	869002	Pedestrian Overpass over I-95	No
6	20.407	Northbound	860220	I-95 over Copans Road	No
7	20.405	Southbound	860120	I-95 over Copans Road	No
8	19.335	Northbound	860219	I-95 over Northwest 15th Street	No
9	19.35	Southbound	860119	I-95 over Northwest 15th Street	No
10	19.236	Northbound	860218	I-95 over FEC Railroad	No
11	19.223	Southbound	860118	I-95 over FEC Railroad	No
12	**18.544**	**Northbound**	**860236**	**I-95 over Hammondville Road**	**YES**
13	**18.544**	**Southbound**	**860235**	**I-95 over Hammondville Road**	**YES**
14	**18.355**	**Northbound**	**860232**	**I-95 over Atlantic Boulevard**	**YES**
15	**18.355**	**Southbound**	**860231**	**I-95 over Atlantic Boulevard**	**YES**
16	16.903	Northbound	860242	I-95 over McNab Road	No
17	16.892	Southbound	860241	I-95 over McNab Road	No
18	14.014	Northbound	860197	I-95 over NW 38th Street	No
19	13.999	Southbound	860127	I-95 over NW 38th Street	No
20	13.442	Northbound	860217	I-95 over Oakland Park Boulevard	No
21	1.795	East/West	860122	Northeast 48th St over I-95	No
22	1.54	Southbound	930198	I-95 over Palmetto Park Road	No
23	1.54	Northbound	930199	I-95 over Palmetto Park Road	No
24	1.087	Northbound	930198	I-95 over West Camino Real	No
25	1.087	Southbound	930197	I-95 over West Camino Real	No
26	0.7	East/West	930197	Southwest 18th St over SB and NB I-95	No
27	0.168	Westbound	860131	Commercial Boulevard Ramp to SB 1-95 over Commercial Boulevard	No

Of the 27 bridges where samples were collected for investigating the presence of ACM, four bridges were found to contain less than 10% regulated ACM (RACM) by PLM analysis:

- Bridge # 860236 – I-95 (northbound) over Hammondville Road
- Bridge # 860235 – I-95 (southbound) over Hammondville Road
- Bridge# 860232 – I-95 (northbound) over Atlantic Boulevard
- Bridge# 860231 – I-95 (southbound) over Atlantic Boulevard

Individual reports for the 27 bridges are available for review at FDOT IV offices in Fort Lauderdale, Florida for further details.

Bridge # 860236:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860235:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860232:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Intermediate Bent Caps, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860231:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida

licensed asbestos abatement contractor prior to carrying out any activities that might disturb this material.

Toxicity Characteristic Leaching Procedure (TCLP) Sampling and Paint Screening Surveys

The paint samples were analyzed for total metals by EPA method SW846 3050B/6010C for cadmium, chromium, lead, and zinc, with concentrations reported as milligrams per kilogram (mg/Kg) to determine applicability of OSHA regulations in 29 CFR 1926 (***Table 5.24***).

Table 5.24
Summary of Paint Chip Analytical Results (Total Metals)

Bridge#	**Sample ID**	**Metals Concentrations (mg/Kg)**			
		Cadmium	Chromium	Lead	Zinc
860128	860128	<20	40	110	83,000
860198	860198	91	88	510	410,000

As shown in the above table, chromium, lead and zinc were detected above the in both the samples. Cadmium was detected in one (860198).

The paint samples were also analyzed by TCLP metals by EPA method SW846 1311/3010B/6010C cadmium, chromium, and lead. The TCLP concentrations were reported as milligrams per liter (mg/L), and compared with the EPA established hazardous waste limits (40 CFR 261.24 Toxicity Characteristic) (see ***Table 5.25***).

Table 5.25
Summary of Paint Chip Analytical Results (TCLP Metals)

Bridge#	Sample ID	Metals Concentrations (mg/L)		
		Cadmium	Chromium	Lead
EPA Limit*		**1.0**	**5.0**	**5.0**
860128	860128	<0.050	<0.050	0.067
860198	860198	<0.050	0.063	0.22

- EPA Limits are based on Maximum Concentration of Contaminants for the Toxicity Characteristic-Table 1 of 40 CFR-261.24

As shown in the above table, cadmium was not detected above the reporting limit in either of the two samples. Chromium was detected above the laboratory reporting limit in one of the samples (860198), but below the EPA limit. Lead was detected above the laboratory reporting limit in both the samples, but below the EPA limit. Based on the laboratory analytical results of the TCLP testing, the waste stream associated with the above two samples is considered "non-hazardous" relative to cadmium, chromium, or lead.

Aesthetics

The I-95 corridor within the project limits consists of a highly urbanized highway roadway corridor, with few aesthetic features present for motorists traveling the corridor. Since all of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way and the roadway will continue to be at the same grade, no impacts to aesthetics are anticipated as a result of the proposed project.

5.4.15.8 *Sociocultural*

All of the proposed roadway improvements associated with the Build Alternative will occur within the existing FDOT right of way. Since the I-95 corridor is located along a highly urbanized area, which currently experiences impacts typical of a highly travelled expressway (e.g., traffic congestion, noise, visual), and all of the roadway improvements will occur within the existing FDOT right of way, no long-term adverse impacts to community service facilities are anticipated as a result of project implementation. Short-term impacts caused by construction activities, such as traffic congestion/delays, noise from construction equipment, and dust from roadway construction have all been addressed in the applicable sections of this report. Traffic routes during construction would be controlled by a Maintenance of Traffic plan, and access to community services would be maintained at all times during and following completion of construction.

5.4.16 BRIDGE ANALYSIS

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements.

A total of 42 bridges exist within the study limits. As part of the Build Alternative, 28 bridges are anticipated to be widened and two are anticipated to be replaced. The proposed widening of each bridge structure along the corridor is summarized in ***Table 5.26*** and ***Appendix H***. ***Appendix H*** details each proposed bridge structure widening approach. ***Table 5.26*** provides the extents of each bridge widening, the bridge cross-slope and associated drop due to the widening, existing beam type, proposed beam type, existing condition load rating information and required design variations and exceptions for both vertical clearances and load capacity.

An independent analysis was conducted to check that the load rating on file is accurate and that the capacity is sufficient. All load rating capacity forms obtained through the Department were performed using an older method of analysis, therefore an updated load rating was performed based on the criteria specified in the FDOT 2013 Structures Manual, Volume 1 – Structures Design Guidelines, Chapter 7, Section 7.1.1. The FDOT criteria specified for proposing a bridge widening is summarized below.

The proposed widening of the existing bridges require a load rating analysis using the new Load and Resistance Factor Rating (LRFR) methodology of their existing conditions to provide certainty that the proposed widening are feasible. This is prescribed in the FDOT *Structures Manual, January 2013, Volume I, Section 7.1*. This section of the Structures Manual states that if the existing load rating was performed using an older method of analysis (Allowable Stress or Load Factor), a new load rating shall be performed using LRFR of the *Manual of Bridge Evaluation (MBE), Section 6, Part A*. This criteria load rates the bridge with the HL93 design load (vehicle plus lane load) specified in the *AASHTO LRFD Bridge Design Specifications, Sixth Edition*. In addition, the new criteria load rates the bridge for the Florida Permit Vehicle, FL 120 and in some cases rates the Florida Legal Trucks (C5, SU4 and ST5), which is required when the HL93 Operating Rating Factor is less than 1.4.

In the event the bridge load rating is less than 1.0 (insufficient) for the design or permit vehicle under the MBE Part A criteria specified, a load rating shall be performed using MBE, Section 6, Part B. The MBE Part B criteria reverts the load rating analysis back to the older method of analysis, which correlates back to Load Factor method of analysis specified in the AASHTO Standard Specification 17th Edition. Under the MBE Part B, the load rating is performed using the HS20 Design Truck and Florida Legal Trucks (C5, SU4 and ST5). This method of analysis does not guarantee that a better rating will result, since there are many different factors that contribute to the two (2) methods of analysis. Therefore, if a performed rating using the MBE, Part A and Part B results in an insufficient rating (LR<1.0), the method providing the best rating is reported. Bridges with insufficient load ratings will require strengthening or replacement unless a Design Variation or a Design Exception is approved prior to moving forward with the widening.

Table 5.26
PROPOSED WIDENING OF BRIDGES

BRIDGE ID	LOCATION	VERTICAL CLEARANCE	OVERHEAD BRIDGE HITS	WIDENING	CROSS SLOPE	DROP DUE TO WIDENING (ft)	EXISTING SUPERST.	LOAD RATINGS			SHEAR OR MOMENT	RATING CHECK	PROPOSED SUPERST.	NET HEIGHT GAIN (in)	DESIGN EXCEPTION/VARIATION	
								Design Truck		FL120					Vertical Clearance	Load Capacity
								OR	IR	OR						
860127	NW 38th Street - SB	15'-11"	No	26.9583	-0.0208	-0.6545	Typ. IV Sp. 52"	1.25	1.06	1	M	OK	FIB 36"	8 2/16	*Exception	None
860197	NW 38th Street - NB	15'-11"	No	17.1667	-0.0208	-0.4509	Typ. IV Sp. 52"	1.25	1.06	1	M	OK	FIB 36"	10 9/16	*Exception	None
860128	Powerline Rd (SR-845) - SB	17'-2"	No	17.1667	-0.0208	-0.4509	Steel Gd. 62"	1.42	1.09	1.46	M	OK	Steel Gd. 60"	2	None	None
860198	Powerline Rd (SR-845) - NB	17'-2"	No	17.1667	-0.0208	-0.4509	Steel Gd. 62"	1.42	1.09	1.46	M	OK	Steel Gd. 60"	2	None	None
860129	Prospect Road (NW 44st) - SB	15'-11"	No	13.5448	-0.021	-0.3779	Typ. IV Sp. 50"	1.13	0.88	0.84	V	NG	FIB 36"	9 7/16	*Exception	Variation
860199	Prospect Road (NW 44st) - NB	15'-11"	No	20.3168	0.0173	0.4505	Typ. IV	1.21	0.88	0.84	V	NG	FIB 36"	19 6/16	*Exception	Variation
860131	Commercial Blvd Flyover	16'-5"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860130	Commercial Blvd (SR-870) - SB	15'-7" Over / 15'-0" Under	Yes	0.0000	-0.0208	0.0000	Typ. IV	NA	NA	NA	NA	NA	No Widening		*Exception	None
860196	Commercial Blvd (SR-870) - NB	15'-7" Over / 15'-0" Under	No	9.1875	-0.0208	-0.2849	Typ. IV	1.2	1.09	1.32	M	OK	FIB 36"	14 9/16	*Exception	None
860237	N. Andrews Ave over I-95	16'-0"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860239	Cypress Creek Road - SB	18'-5"	No	16.3125	-0.0208	-0.4331	Typ. IV	1.27	1.14	1.23	M	OK	FIB 45"	3 13/16	None	None
860240	Cypress Creek Road - NB	18'-5"	No	16.3125	-0.0208	-0.4331	Typ. IV	1.32	1.19	1.21	M	OK	FIB 45"	3 13/16	None	None
860243	Cypress Creek Canal - SB	13'-9"	No	17.0833	-0.058	-1.0288	Typ. IV	1.32	1.2	1.25	M	OK	FIB 36"	5 10/16	None	None
860244	Cypress Creek Canal - NB	13'-9"	No	0.0000	0.058	0.0380	Typ. IV	NA	NA	NA	NA	NA	No Widening		None	None
860241	Mcnab Road - SB	19'-0"	No	16.4167	-0.0208	-0.4353	Typ. IV	1.12	1	1	M	OK	FIB 45"	3 12/16	None	None
860242	Mcnab Road - NB	19'-0"	No	12.2293	0.0208	0.3482	Typ. IV	1.13	1.02	0.92	M	NG	FIB 45"	13 3/16	None	Variation
860233	SW 3rd St over I-95	16'-1"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860231	Atlantic Blvd (SR-814) - SB	15'-2"	Yes	16.3125	-0.0208	-0.4331	Type III	1.06	0.82	0.7	M	NG	FIB 36"	3 13/16	*Exception	Variation
860232	Atlantic Blvd (SR-814) - NB	15'-2"	No	16.3125	-0.0208	-0.4331	Type III	1.06	0.82	0.7	M	NG	FIB 36"	3 13/16	*Exception	Variation
860235	Hammondville Road - SB	16'-4"	No	0.0000	-0.0208	0.0000	Typ. IV	1.12	0.91	0.83	V	NG	No Widening		Variation	Variation
860236	Hammondville Road - NB	16'-4"	No	0.0000	-0.0208	0.0000	Typ. IV	1.07	1	0.83	M	NG	No Widening		Variation	Variation
860118	FEC Railroad - SB	22'-0"	No	16.4167	-0.0208	-0.4353	Type II	1.12	1.03	1	M	OK	FIB Mod. 30"	12/16	None	None
860218	FEC Railroad - NB	22'-6"	No	16.4167	-0.0208	-0.4353	Type II	1.12	1.03	1	M	OK	FIB Mod. 30"	12/16	None	None
860119	NW 15th Street - SB	15'-11"	Yes	16.4167	-0.0208	-0.4353	Typ. IV	1.21	1.09	1	M	OK	FIB 36"	12 12/16	*Exception	None
860219	NW 15th Street - NB	15'-11"	No	16.4167	-0.0208	-0.4353	Typ. IV	1.21	1.09	1	M	OK	FIB 36"	12 12/16	*Exception	None
860120	Copans Road - SB	15'-6"	Yes	22.4167	-0.0208	-0.5601	Typ. IV	1.53	1.36	1.33	M	OK	FIB 45"	2 4/16	*Exception	None
860220	Copans Road - NB	15'-6"	Yes	22.4167	-0.0208	-0.5601	Typ. IV	1.53	1.36	1.33	M	OK	FIB 45"	2 4/16	*Exception	None
860121	Sample Road (SR-834) - SB	15'-0"	Yes	16.4167	-0.0208	-0.4353	Type III	1.3	1.07	1.05	M	OK	FIB 36"	3 12/16	*Exception	None
860178	Sample Road (SR-834) - NB	15'-0"	Yes	16.4167	-0.0208	-0.4353	Type III	1.3	1.07	1.05	M	OK	FIB 36"	3 12/16	*Exception	None
869002	Pedestrian Bridge over I-95	8'-0" Over / 17'-6" Under	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		None	None
860122	NW 48th St over I-95	16'-2"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860123	SW 10th St over I-95	16'-2"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860564	I-95 South off-ramp	—	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		None	None
860124	Hillsboro Blvd (SR-810) - SB	14'-8"	No	20.3646	-0.03	-0.6909	Type III	1.33	1.03	1	M	OK	FIB 36"	11/16	*Exception	None
860194	Hillsboro Blvd (SR-810) - NB	14'-9"	No	20.3646	0.03	0.6909	Type III	1.33	1.03	1	M	OK	FIB 36"	17 5/16	*Exception	None
860125	Hillsboro Canal - SB	4'-10"	No	13.9167	-0.02	-0.3733	Prest.Slab 18"	NA	NA	NA	NA	NA	FIB 36"	0	Bridge Replacement	
860195	Hillsboro Canal - NB	4'-10"	No	9.9167	-0.02	-0.2933	Prest.Slab 18"	NA	NA	NA	NA	NA	FIB 36"	0	Bridge Replacement	
930197	SW 18th St over I-95	16'-4"	No	16'-4"	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
930187	Camino Real - SB	15'-0"	No	12.6667	-0.0208	-0.3573	Typ. IV	1.09	1	NA	M	OK	FIB 36"	13 11/16	*Exception	None
930198	Camino Real - NB	15'-0"	No	12.6667	-0.0208	-0.3573	Typ. IV	1.09	1	NA	M	OK	FIB 36"	13 11/16	*Exception	None
930188	Palmetto Park Road - SB	15'-2"	Yes	16.4167	-0.039	-0.7068	Typ. IV	1.23	1.11	1.43	M	OK	FIB 45"	8/16	*Exception	None
930199	Palmetto Park Road - NB	15'-2"	No	12.4167	0.039	0.5508	Typ. IV	1.3	1.18	1.45	M	OK	FIB 45"	15 10/16	*Exception	None

**Design exceptions based on not meeting the AASHTO minimum 16 feet vertical clearance criteria. However, alternate routes with vertical clearance of 16 feet were identified, therefore a Design Variation may be requested for approval.*

The proposed superstructure for the widening concept shall match the type of the existing superstructure. The bridges composed of AASHTO beams shall use the new Florida-I Beams for the widening. The bridge structure over Powerline Road, composed of steel plate girders, shall use similar steel girders for the widening. The widening of the deck shall match the existing deck thickness but not be less than eight inches, since the widening is classified as "minor widening" based on the *FDOT Structures Design Guidelines, Section 7.2.*

The proposed number of girders shall be arranged to avoid a large overhang and avoid a tributary spacing for the existing exterior beam that would exceed the existing beam loading. The existing substructure elements should be verified for any increase in beam reactions due to the proposed girder arrangements. The proposed girders in most cases will be shallower than the existing girders to maintain the existing vertical clearances.

The existing deck will be saw cut along the center line of the exterior beam. The concrete will be removed without damaging the existing reinforcement to allow for splicing of the transverse reinforcement.

The substructure for the widening shall match element sizes of the existing to maintain its appearance. Existing intermediate multi-column bents may be widened using a hammerhead style pier with similar column and cap sizes. The existing end bents will be simply widened to replicate the existing. The new columns will require design for vehicle collision forces in accordance with the AASHTO Load and Resistance Factor Design (LRFD) methodology Section 3.5.6. All of the substructure elements can be supported on deep pile foundations.

Figures 5.16 and ***5.17*** depict the typical widening concept for the existing bridges with prestressed concrete beams. The bridge structure with steel plate girders will be widened in a similar fashion with the exception of the use of steel plate girders.

Preliminary bridge structure load ratings were completed during the PD&E study resulting in seven potential structural load capacity design variations. The final bridge structure load ratings evaluation and design variation packages (if necessary) will be completed during the design phase of the project.

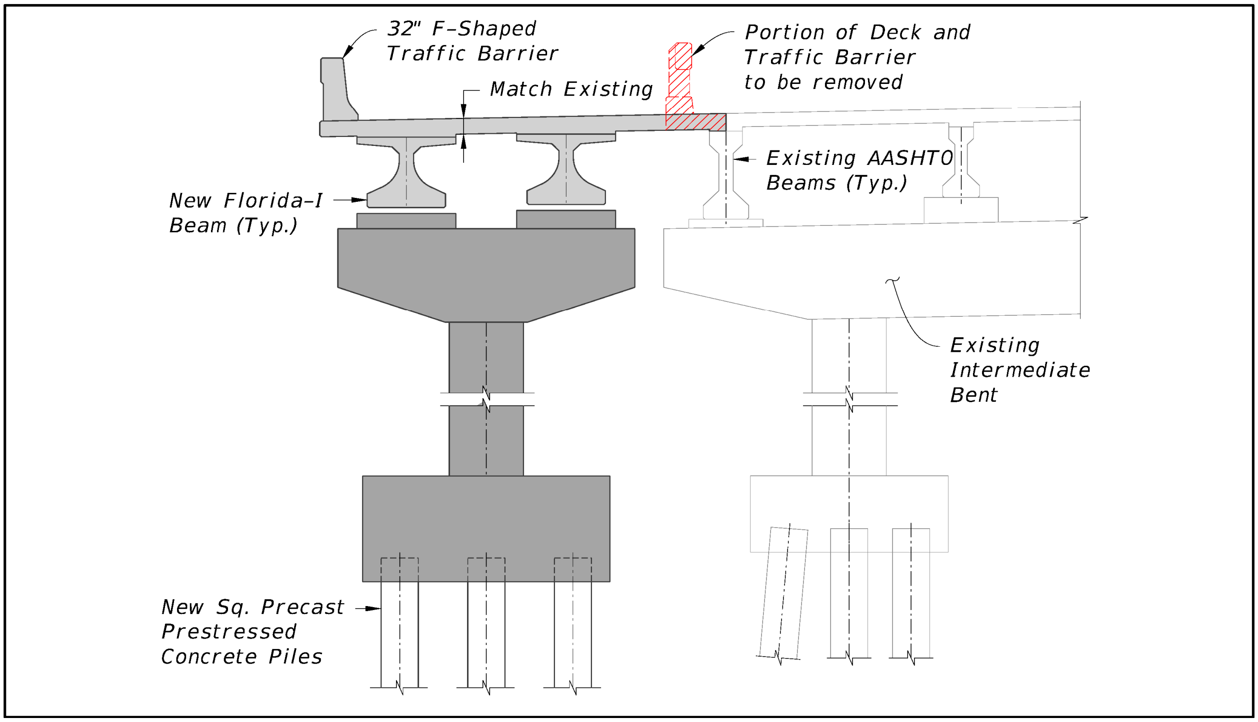


Figure 5.16 – Typical Widening at Intermediate Bent

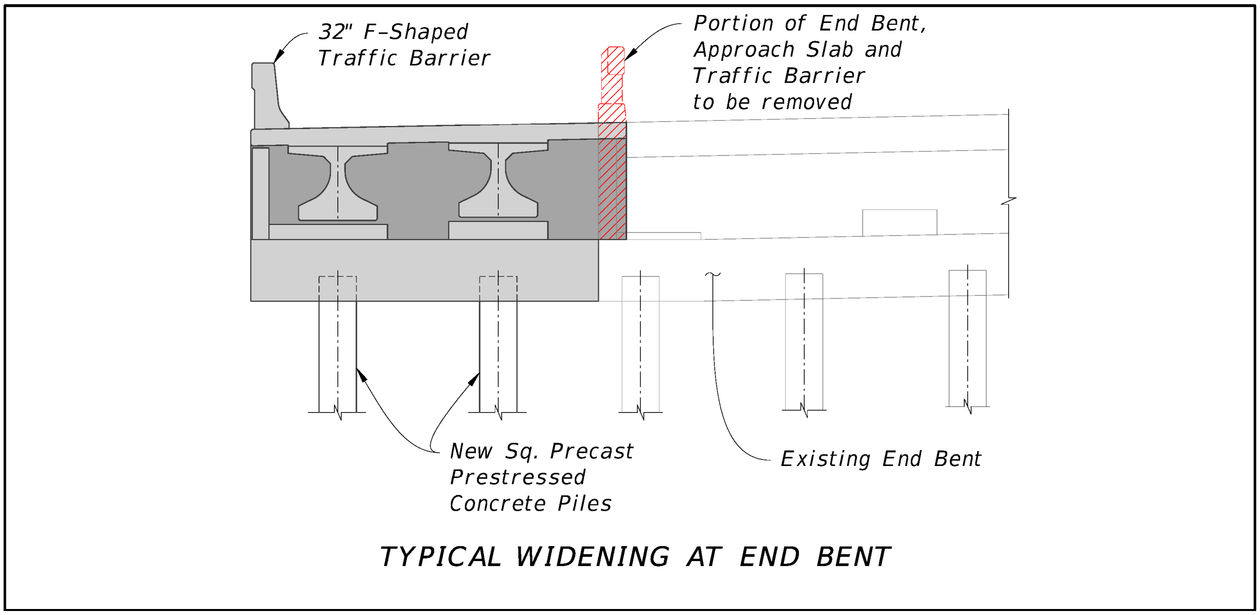


Figure 5.17 – Typical Widening at End Bent

5.4.17 INTERCHANGE AND INTERSECTION LAYOUTS

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements.

This PD&E study focused on providing improvements (Build Alternative) along the I-95 mainline only by evaluating the implementation of two tolled express lanes along the center of the corridor. Interchange improvements were not included in the scope of work of this study. The FDOT District Four programmed a future Interchange Improvements Master Plan Study that will evaluate short term and long term interchange improvements that could be implemented within the project limits to improve the access to and from the interstate corridor.

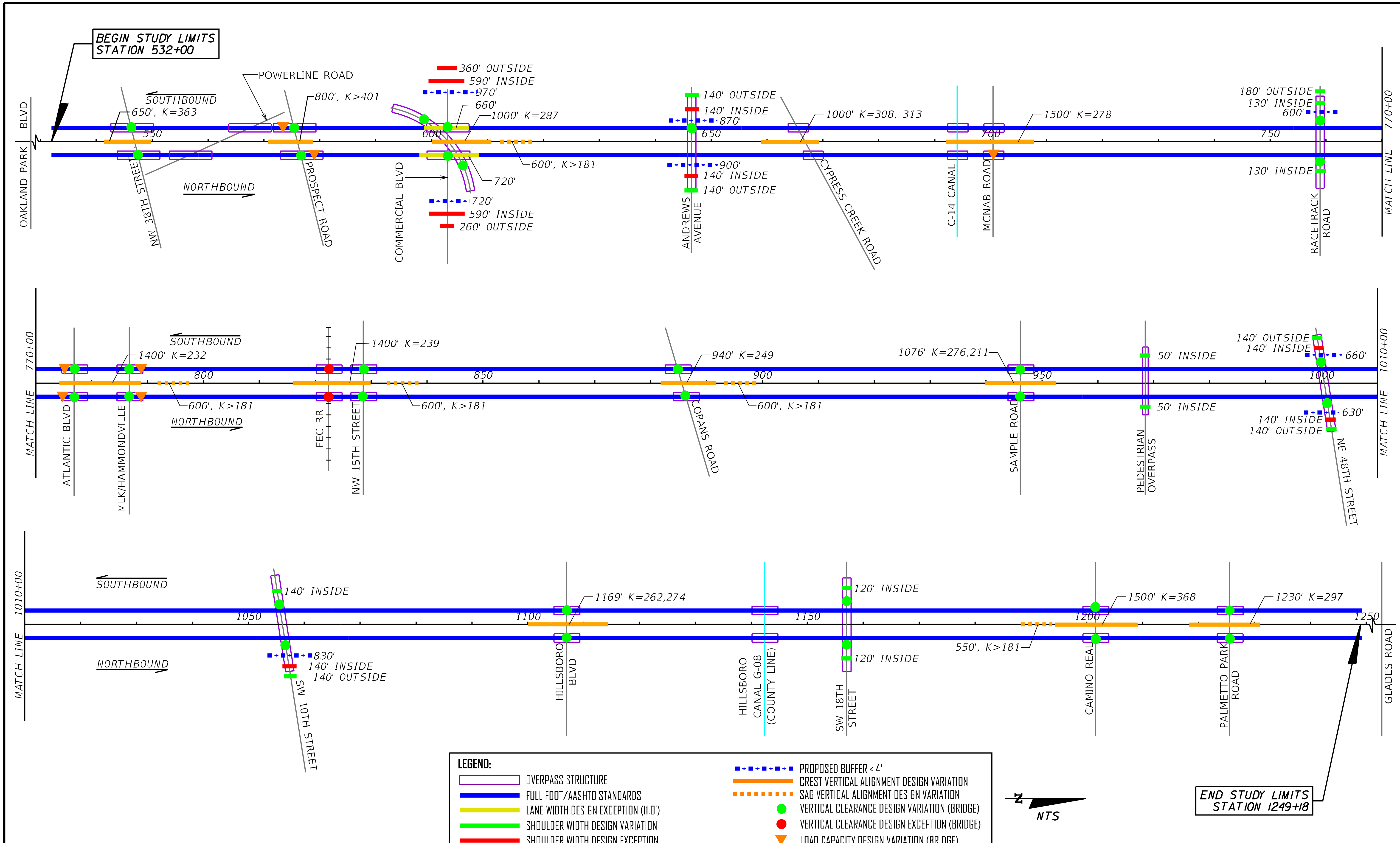
However, this study did evaluate if the existing off-ramp queues were anticipated to spill over the mainline corridor. The traffic operational analysis found that the northbound off-ramp to Commercial Boulevard and the southbound off-ramp to Palmetto Park Road needed additional storage to accommodate the future queues within the ramp limits in order to avoid queuing along the mainline corridor. Therefore, the following ramp improvements were recommended as part of this study:

- **Northbound off-ramp to Commercial Boulevard –** Widen the ramp from one to two lanes. The northbound outside mainline general purpose lane will be stripped to operate as a choice lane at the off-ramp exit point. The lane will provide the opportunity to exit to Commercial Boulevard or to continue northbound along the general purpose lanes (see ***Appendix L, Sheet #3***).
- **Southbound off-ramp to Palmetto Park Road –** Extend the exclusive right-turn lane approximately 1,000 feet (see ***Appendix L, Sheets #24 and 25***).

5.4.18 DESIGN EXCEPTIONS AND VARIATIONS

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future without improvements.

The Build Alternative proposes to widen the existing corridor typical section approximately 14 feet on each side within the existing right of way. Based on the preliminary design developed for this PD&E study, it was determined that design exceptions and variations will be required in order to implement the Build Alternative typical section. ***Figure 5.18*** and ***Tables 5.27 – 5.30*** summarize the design exceptions and variations within the project limits including each design element, criteria, proposed design and location. For details about the design exceptions and variations see **Appendix Q**.



FLORIDA DEPARTMENT OF TRANSPORTATION
BROWARD AND PALM BEACH COUNTIES

March 2013

I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)
ETDM: 3330

BUILD ALTERNATIVE
DESIGN EXCEPTIONS AND DESIGN VARIATIONS SUMMARY

FIGURE 5.18

5.4.18.1 *Design Exceptions*

A design exception is required when a proposed design element does not meet the FDOT and AASHTO new construction criteria. A design exception will be required for the following elements:

- Vertical Clearance
- Shoulder Width
- Lane Width

Vertical Clearance – According to *Volume I, Chapter 2, Section 2.10, Table 2.10.1 of the PPM,* the required minimum vertical clearance for bridges over a railroad is 23'-6". According to *Chapter 8 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Page 522,* it is required to provide a minimum vertical of 23 feet for bridges over a railroad.

A total of two bridges will require a vertical clearance design exception (see ***Table 5.27*** and ***Figure 5.18***).

The vertical clearance design exceptions are required in order to maintain the existing bridges and avoid the reconstruction of the I-95 corridor. Replacing and/or jacking up the bridges to meet the vertical clearance requirements would require a change in the I-95 profile grade line upstream and downstream from the subject bridges. Both bridges currently have a substandard vertical clearance. The Build Alternative proposes to maintain the existing vertical clearance of these bridges.

Shoulder Width – According to *Volume I, Chapter 2 , Table 2.3.1 of the PPM,* the required minimum inside and outside shoulder width is 12 feet for freeways with six or more lanes without shoulder gutter. According to *Chapter 8 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Page 505 and 814,* it is required to provide a minimum inside and outside shoulder width of 10 feet for freeways with six or more lanes. Where auxiliary lanes are provided along the freeway segment, the adjacent shoulder minimum width is 6 feet.

A total of four locations throughout the corridor will require shoulder width design exceptions (see ***Table 5.27*** and ***Figure 5.18***). The shoulder width design exceptions (a total of 9) are required in order to avoid reconstructing the

Commercial Boulevard Interchange, Andrews Avenue Overpass, NE 48th Street Overpass and SW 10th Street Interchange. The existing footprint under these structures over I-95 cannot accommodate the proposed roadway typical section.

Lane Width – According to _Volume I, Chapter 2, Table 2.1.1 of the PPM,_ the required lane width is 12 feet for through or travel lanes on an urban freeway. According to _Chapter 8 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Pages 504 and 814,_ it is required to provide a minimum travel lane width of 12 feet for freeways.

A total of two locations will require a lane width design exception (see ***Table 5.27*** and ***Figure 5.18***). The design exceptions are required in order to avoid reconstructing the Commercial Boulevard Interchange. The existing footprint under the westbound Commercial Boulevard to southbound I-95 flyover structure over I-95 cannot accommodate the proposed roadway typical section.

Table 5.27
Design Exceptions Summary

Design Element	Existing-to-Remain	Proposed	AASHTO Criteria	Comments
Design Exception				
Vertical Clearance	2		Over Railroad: 23 feet	Bridge Structures: FEC Railroad NB: 22'-0" FEC Railroad SB: 22'-6"
Shoulder Width	2	7	10 feet	Inside Shoulders Commercial Boulevard NB: 6' Commercial Boulevard SB: 2.5' Andrews Avenue NB: 8' Andrews Avenue SB: 8' NE 48th Street NB: 8' NE 48th Street SB: 8' SW 10th Street NB: 8' Outside Shoulders Commercial Boulevard NB: 8' Commercial Boulevard SB: 4.5'
Lane Width		2	12 feet	Express Lanes only over Commercial Boulevard NB: 11' Express Lanes only over Commercial Boulevard SB: 11'

Note: Northbound lanes and southbound lanes counted separately.
FDOT standards are more conservative when compared to AASHTO standards.
NB - Northbound
SB – Southbound

5.4.18.2 *Design Variations*

A design variation is required when a proposed design element does not meet the FDOT criteria, but does meet the AASHTO new construction criteria. A design variation will be required for the following elements:

- Border Width
- Vertical Alignment
- Vertical Clearance
- Shoulder Width
- Structural Load Capacity

Border Width – According to *Volume I, Chapter 2, Table 2.5.3 of the PPM,* the required border width is 94 feet for freeways and interchange ramps. AASHTO does not provide border width criteria for freeways.

There are multiple locations that will require a border width design variation (see ***Table 5.28***, ***Table 5.29 and Table 5.30***), therefore, this PD&E study prepared a corridor-wide design variation. Border width is measured from the edge of the outside traffic lane to the right of way line. The design variation is required in order to avoid negatively impacting the existing communities adjacent to the corridor, the corridor interchanges, and to avoid right of way acquisition. Border width is intended to accommodate roadside design components such as signing, lighting, drainage features, guardrail, fencing and clear zone. Border width also provides space for construction, corridor maintenance, permitted public utilities and noise walls.

The proposed restricted border width will not affect the ability to provide adequate signing, noise walls, drainage and lighting, and will provide ample space for construction and maintenance access. Barrier wall and guardrail systems will be utilized for the areas of reduced border width to provide adequate protection where proper clear zone widths cannot be obtained. Therefore, this design variation will not adversely affect the safety and operation characteristics of this facility.

Table 5.28 Summary of Proposed Border Width - Mainline				
Roadway Section	Border Width (feet)		Border Width Required	
	Northbound	Southbound		
Oakland Park Boulevard - NW 39th Street/ NW 38th Street	77-81	27-114	94	**DV**
NW 39th Street/ NW 38th Street - Powerline Road	82	98	94	**DV***
Powerline Road - Prospect Road	82	99	94	**DV***
Prospect Road - Commercial Boulevard	34-82	28-102	94	**DV**
Commercial Boulevard - Andrews Avenue	20-114	58-112	94	**DV**
Andrews Avenue - Cypress Creek Road	48-86	62-186	94	**DV**
Cypress Creek Road - McNab Road	125-186	108-111	94	✓
McNab Road - SW 3rd Street	76-128	61-170	94	**DV**
SW 3rd Street - NW 15th Street	31-76	69-112	94	**DV**
NW 15th Street - Copans Road	40-99	50-80	94	**DV**
Copans Road - Sample Road	59-119	37-81	94	**DV**
Sample Road - NW 48th Street	73-92	33-96	94	**DV**
NE 48th Street - SW 10th Street	71-73	27-41	94	**DV**
SW 10th Street - Hillsboro Boulevard	56-86	40-42	94	**DV**
Hillsboro Boulevard - Palmetto Park Road	72-108	31-132	94	**DV**
Palmetto Park Road- Glades Road	67-136	54-60	94	**DV**

Source: Project Survey
DV = Design Variation
✓ = Meets required criteria
* = Northbound Only

Table 5.29
Summary of Proposed Border Width - Interchanges

Interchange	Border Width (feet)				Border Width Required	
	NW[1]	NE[1]	SW[1]	SE[1]		
Commercial Boulevard	69-73	29-117	77-105	33-94	94	**DV**
Cypress Creek Road	89-214	98-231	18-91	40-93	94	**DV***
Atlantic Boulevard	30-129	33-81	30-51	39-84	94	**DV**
Copans Road	48-50	48-118	50-89	79-112	94	**DV**
Sample Road	40-58	80-88	57-99	37-118	94	**DV**
SW 10th Street	30-72	-	21-103	17-159	94	**DV**
Hillsboro Boulevard	27-49	45-103	41-51	44-78	94	**DV**
Palmetto Park Road	46-169	45-81	75-91	57-72	94	**DV**

Source: Project Survey,
Note: [1]Interchange Quadrant
DV = Design Variation
***** = Excludes NE quadrant

Vertical Alignment – According to *Volume I, Chapter 2, Table 2.8.5, Page 2-48 and Table 2.8.6, Page 2-49 of the PPM,* the required K-value for crest vertical curves is 401 for interstates with a design speed of 65 MPH, the minimum crest vertical curve length is 1,000 feet for open highway and 1,800 feet within interchanges on an interstate facility. Also, the required K-value for sag vertical curves is 181 and the minimum sag vertical curve length is 800 for an interstate facility. Each vertical curve must satisfy the K-value and minimum lengths. According to *Chapter 3 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Page 272 and 277* it is required to provide a minimum K-value for crest vertical curves of 193 and a minimum K-value for sag vertical curves of 157 for interstates with a design speed of 65 MPH. AASHTO does not provide vertical curve length criteria for freeways.

Some of the vertical curves throughout the corridor will not meet the vertical alignment minimum requirements in accordance with the PPM (see ***Table 5.30*** and ***Figure 5.18***).

- 22 crest curves (11 northbound and 11 southbound) will not meet the minimum FDOT K-value.
- 18 crest curves (9 northbound and 9 southbound) will not meet the minimum FDOT crest curve length.

- 10 sag curves (5 northbound and 5 southbound) will not meet the minimum FDOT sag curve length.

The design variations are required in order to maintain the existing corridor vertical profile and avoid the reconstruction of the I-95 corridor. Reconstructing the corridor to meet the vertical alignment requirements would require raising the existing bridge structures and a change in the I-95 profile grade line upstream and downstream from the subject bridges. All listed deficiencies currently exist along the corridor. The Build Alternative proposes to maintain the existing vertical alignment of the corridor except for the three locations shown on ***Figures 5.6-5.8.*** These three locations are planned to be reconstructed as part of the corridor improvements.

Vertical Clearance – According to *Volume I, Chapter 2, Section 2.10, Table 2.10.1 of the PPM,* the required minimum vertical clearance for bridges over roadways is 16'-6". According to *Chapters 8 and 10 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Pages 506, 507, 763 and 764,* it is required to provide a minimum vertical clearance of 16 feet for bridges over roadways. In highly developed urban areas, a minimum clearance of 14 feet is acceptable if there is an alternate route with a minimum vertical clearance of 16 feet.

Data collected from survey field work and as-built bridge plans indicated that a total of 20 bridges will not meet the FDOT and AASHTO minimum vertical clearance criteria and 8 bridges will not meet the FDOT minimum vertical clearance criteria (see ***Table 5.30*** and ***Figure 5.18***). Based on the proposed alternative, these bridges will be maintained with the existing vertical clearances. Vertical clearance design variations are required in order to preserve the existing bridges and avoid the reconstruction of the I-95 corridor. Replacing and/or jacking up the bridges to meet the vertical clearance requirements will require a change in the I-95 profile grade line upstream and downstream from the subject bridges. All of these bridges currently have a substandard vertical clearance. The proposed alternative proposes to widen most of these bridges while maintaining the existing vertical clearance by utilizing a shallower beam girder design.

An evaluation of potential alternate routes determined that the 20 bridges not meeting the FDOT and AASHTO minimum vertical clearance criteria have potential alternate routes between 0.35 and 2 miles away from the subject bridge. Therefore, a design exception for these bridges is not needed.

Shoulder Width – According to _Volume I, Chapter 2, Table 2.3.1 of the PPM,_ the required minimum inside and outside shoulder width is 12 feet for freeways with six or more lanes without shoulder gutter. According to _Chapter 8 of the 2004 AASHTO, A Policy on Geometric Design of Highways and Streets, Page 505 and 814,_ it is required to provide a minimum inside and outside shoulder width of 10 feet for freeways with six or more lanes. Where auxiliary lanes are provided along the freeway segment, the adjacent shoulder minimum width is 6 feet.

A total of 13 locations (seven inside and six outside) will require a shoulder width design variation (see ***Table 5.30*** and ***Figure 5.18***). All seven inside shoulder locations currently have a substandard shoulder width and are located where center bridge piers exist. The existing footprint under these structures over I-95, in most cases, cannot accommodate the proposed typical section. Shoulder width design variations are required in order to avoid reconstructing these bridges and/or to avoid deflecting the mainline corridor for short distances at these selected locations. Multiple short deflections along an interstate facility will impact the flow of traffic creating turbulence that will increase the possibility of sideswipe crashes. The Build Alternative proposes to keep these shoulder width variations in order to avoid reconstructing the bridges and to avoid short distance deflections along the corridor.

Structural Load Capacity – According to the FDOT _Structures Design Guidelines, Volume I, Chapter 7 of the Structures Manual_, the required Inventory Rating (IR) factor shall be greater than or equal to 1.0 before approving a bridge widening project. This evaluation requires a reanalysis of the bridges to verify the accuracy of the reported load rating values. If the required IR≥1.0 is not met by the methods described in the structures manual, a load capacity variation will be required to approve the bridge widening. Although AASHTO has the _Manual for Bridge Evaluation MBE_ publication, FDOT uses the _Bridge Load Rating Manual_ which has made modifications to the MBE criteria. According to the _FDOT Bridge Load Rating Manual, Chapter 2, Figure 2.2.1-1_, the load rating factor should be greater than or equal to 1.0 for the structures along the corridor.

A total of seven bridges will require a structural load capacity design variation (see ***Table 5.30*** and ***Figure 5.18***). The structural load capacity design variations are required in order to maintain the existing bridges.

Table 5.30
Design Variations Summary

Design Element	Existing-to-Remain	Proposed	FDOT Criteria	Comments
Design Variation				
Border Width	1		94 feet	Multiple Locations, Corridor-Wide Design Variation
Vertical Alignment	22		K = 401	I-95 at NW 38th Street: 363 I-95 at Commercial Boulevard: 287 I-95 at Cypress Creek Road: 308 and 313 I-95 at McNab Road: 278 I-95 at Atlantic Boulevard: 246 I-95 at NW 15th Street: 239 I-95 at Copans Road: 249 I-95 at Sample Road: 276 and 211 I-95 at Hillsboro Boulevard: 262 and 274 I-95 at Camino Real: 368 I-95 at Palmetto Park Road: 297
	18		Crest Curve Length $L_{\text{Open Highway}}$ = 1,000' $L_{\text{Within Interchange}}$ = 1,800'	Open Highway I-95 at NW 38th Street: 650' I-95 at Prospect Road: 800' Within Interchange I-95 at Commercial Boulevard: 1,000' I-95 at Cypress Creek Road: 1,000' I-95 at Copans Road: 940' I-95 at Sample Road: 1,263' I-95 at Atlantic Boulevard: 1,200' I-95 at Hillsboro Boulevard: 1,400' I-95 at Palmetto Park Road: 1,230'
	10		Sag Curve Length L = 800'	I-95 at Commercial Boulevard: 600' I-95 at Atlantic Boulevard: 600' I-95 at NW 15th Street: 600' I-95 at Copans Road: 600' I-95 at Camino Real: 607'
Vertical Clearance	12	1	Over Roadway: 16'-6"	Locations: Commercial Boulevard Flyover: 16'-5" Andrews Avenue SB: 16'-0" Racetrack Road: 16'-1" MLK/Hammondville Road NB: 16'-4" MLK/Hammondville Road SB: 16'-4" NE 48th Street: 16'-2" SW 10th Street: 16'-2" SW 18th Street: 16'-4"
	20		Over Roadway: 14 feet with alternate routes with 16 feet	Bridge Structures: NW 38th Street NB: 15'-11" NW 38th Street SB: 15'-11" Prospect Road NB: 15'-11" Prospect Road SB: 15'-11" Commercial Boulevard NB: 15'-7" Commercial Boulevard SB: 15'-7" Atlantic Boulevard NB: 15'-2" Atlantic Boulevard SB: 15'-2" NW 15th Street NB: 15'-11" NW 15th Street SB: 15'-11" Copans Road NB: 15'-6" Copans Road SB: 15'-6" Sample Road NB: 15'-0" Sample Road SB: 15'-0" Hillsboro Boulevard NB: 14'-9" Hillsboro Boulevard SB: 14'-8" Camino Real NB: 15'-0" Camino Real SB: 15'-0" Palmetto Park Road NB: 15'-2" Palmetto Park Road SB: 15'-2"
Shoulder Width	7	6	12 feet	These are located along the I-95 median where bridge piers exist: Racetrack Road NB: 10.5' Racetrack Road SB: 10' Pedestrian Overpass NB: 10' Pedestrian Overpass SB: 10' SW 10th Street SB: 10.5' SW 18th Street NB: 10' SW 18th Street SB: 10' Outside Shoulder: Racetrack Road SB: 10' Andrews Avenue NB: 8' Andrews Avenue SB: 8' NE 48th Street NB: 8' NE 48th Street SB: 8' SW 10th Street NB: 8'
Structural Load Capacity		7	IR ≥ 1 OR ≥ 1	Prospect Road NB: 0.84 Prospect Road SB: 0.84 McNab Road NB: 0.92 Atlantic Boulevard NB: 0.70 Atlantic Boulevard SB: 0.70 Hammondville Road NB: 0.83 Hammondville Road SB: 0.83

Notes: Northbound lanes and southbound lanes counted separately.
FDOT standards are more conservative when compared to AASHTO standards.
NB - Northbound
SB - Southbound

5.4.19 SAFETY

The No-Build Alternative proposes to keep the existing configuration of the corridor facility into the future.

Safety along the corridor will be enhanced with the construction of the Build Alternative. Implementing express lanes will improve mobility, reduce congestion and will provide additional travel options along the corridor. Implementing express lanes along I-95 will play a significant factor in improving safety and reducing crash collisions along the general purpose lanes. The express lanes will improve safety based on the following:

- Future traffic volumes will be redistributed between the express lanes and the general purpose lanes providing more gaps along the general purpose lanes for vehicles entering and exiting at the interchanges. By providing more gaps and improving traffic flow, drivers will be less likely to perform unsafe and unpredictable movements, reducing weaving movements and speed differentials.
- Reducing congestion will result in less tailgating, improving traffic flow along the general purpose lanes during peak hours and reducing rear-end crashes.
- The express lanes will separate the long distance trips from the local trips which will reduce weaving maneuvers and sideswipe crashes.
- Through traffic using the express lanes will avoid the turbulence at the interchange junctions reducing the number of vehicles performing weaving maneuvers and/or passing slower vehicles ahead of them.
- The express lanes will enhance interstate capacity and interchange access helping the corridor operate more efficiently during any future evacuation events.

5.5 RESULTS OF THE PUBLIC INVOLVEMENT PROGRAM

A public involvement program was developed and implemented for the I-95 PD&E Study. The program is documented in the *Public Involvement Program* (PIP), a companion document to this PD&E study. The PIP was updated and amended throughout the project development process to incorporate the latest public involvement policies and techniques as they evolved during the life of the study. The purpose of the program is to outline the public involvement approach to be taken with the project, provide and share project information with people living and working in the area, listen to ideas and concerns and to solicit and incorporate input received during the study process. For this project, the PIP focused on the ETDM process, elected official and agency meetings, a series of public informational meetings and several community outreach techniques including a project website and project newsletters. These elements are described herein and ***Appendix O*** includes documents from selected meetings.

Public information meetings began in the winter of 2011 and have continued throughout the study process. Exhibits and project information were provided for public review and comment at each meeting. FDOT representatives were available at each meeting to discuss the project and answer questions, as were members of the consultant team.

<u>Kick-Off Meeting</u>
Two Public Kick-Off Meetings were held in December 2011 in Broward and Palm Beach Counties. The purpose of these meetings was to provide the community a forum through which to learn about the improvements being studied as well as the PD&E process in general, and to provide the FDOT with initial concerns and areas to look into as part of the study. Numerous exhibits and project information were provided for public review. A project newsletter describing the I-95 PD&E Study was distributed to all the attendees. The following is a summary of the items discussed in the meeting:

- PD&E Process
- Project Location
- Existing and Potential Future Roadway Typical Sections
- Project Issues Map
- Preliminary Project Schedule

The Broward County meeting was held on Tuesday, December 6, 2011 at the Florida Department of Transportation District Four Auditorium from 5:30 p.m. to 7:30 p.m. A total of nine written comments were received at this meeting. Approximately 25 people attended the meeting.

The Palm Beach County meeting was held on Thursday, December 8, 2011 at the Florida Atlantic University Marleen & Harold Forkas Alumni Center in Boca

Raton from 5:30 p.m. to 7:30 p.m. A total of 11 written comments were received at this meeting. Approximately 25 people attended the meeting.

The following are some of the comment topics provided at the meetings:

- Interchange Improvements
- Noise Walls
- Transit Improvements
- Pedestrian Overpass Improvements
- Number of Express Lanes
- Construction Hours
- Project Schedule
- Toll Collection
- Lane Width Design
- Air Quality

Alternatives Public Workshop

Two Alternatives Public Workshops were held in October 2012 in Broward and Palm Beach Counties. The purpose of these workshops was to present alternative highway improvement concepts along I-95. Numerous exhibits and project information were provided for review. A project newsletter describing the I-95 PD&E Study was distributed to all the attendees. The following is a summary of the items discussed in the meeting:

- PD&E Process
- Project Location
- Previous Planning Corridor Studies along I-95
- Existing Roadway Typical Sections
- Scope of the Project
- Considered Future Roadway Typical Sections
- Considered Future Roadway Typical Sections Evaluation Matrix
- Existing and Future Traffic Volumes
- Express Lanes Tolling Information
- Adjacent I-95 Express Lanes Projects
- Preliminary Project Schedule
- Potential Express Lanes Access Point Locations
- South Florida Express Lanes Network

The Broward County meeting was held on Tuesday, October 16, 2012 at the Florida Department of Transportation District Four Auditorium from 6:00 p.m. to 8:00 p.m. A total of ten written comments were received at this meeting. Approximately 25 people attended the meeting.

The Palm Beach County meeting was held on Thursday, October 18, 2012 at the Florida Atlantic University Marleen & Harold Forkas Alumni Center in Boca Raton from 6:00 p.m. to 8:00 p.m. A total of four written comments were received at this meeting. Approximately 31 people attended the meeting.

The following are some of the comment topics provided at the meetings:

- Interchange Improvements
- Noise Walls
- Lane Width Design
- Separation between the Express Lanes and the General Purpose Lanes
- Express Lanes Access Point Locations
- Landscaping
- I-95 Corridor Planning Study
- Drainage Design
- Construction Noise

Public Hearing

A Public Hearing was held in April 2013 in Broward County. The purpose of this hearing was to present the proposed alternative and afford all interested persons the opportunity to express their views concerning the location, conceptual design, social, economic and environmental effects of the proposed corridor improvements. Numerous exhibits and project information were provided for public review. A project newsletter describing the I-95 PD&E Study was distributed to all the attendees. The following is a summary of the items discussed in the meeting:

- PD&E Process
- Project Location
- Existing Roadway Typical Sections
- Proposed Roadway Typical Sections
- Proposed Structures Information
- Existing and Future Traffic Volumes

- Environmental Impacts
- Express Lanes Tolling Information
- Potential Express Lanes Access Point Locations
- Preliminary Construction Costs
- Preliminary Project Schedule
- Proposed Corridor Improvements
- Summary of Improvements
- Draft Engineering and Environmental Documents
- Adjacent I-95 Express Lanes Projects
- South Florida Express Lanes Network

The Public Hearing was held on Tuesday, April 30, 2013 at the DoubleTree by Hilton Hotel in Deerfield Beach from 6:00 p.m. to 8:00 p.m. A total of 15 comments were received at the hearing and a total of 13 comments were received within the 10-day comment period after the hearing. Approximately 52 people attended the hearing.

The attendees were able to provide comments concerning the project in any of the following five ways:

1. Completing a speaker card and making an oral statement at the microphone after the formal presentation.
2. Making an oral statement to the court reporter.
3. Completing a comment form and dropping it in the comment box provided at the hearing.
4. Emailing the comments to the FDOT Project Manager or by visiting the project website within the 10-day comment period following the hearing.
5. Mailing all written comments to the FDOT Project Manager within the 10-day comment period following the hearing.

The formal presentation was followed by a public testimony period. Ten people made statements for the public record. The following are some of the most common comments expressed during the hearing and/or the comment period:

- Proposed express lanes access point locations
- Access to the express lanes system
- Opposition to toll the I-95 corridor
- Request for additional noise barrier walls

- Right of way acquisition
- Maintenance of the existing noise barrier walls

The content of the hearing was transcribed and the transcript is part of the official public record for the project. The Public Hearing Transcript is included in ***Appendix O.***

5.6 EVALUATION MATRIX

Evaluation of transportation projects to select the most desirable alternative is often based on a wide range of performance criteria that reflect the concerns of all the key stakeholders. The No-Build and Build Alternatives were evaluated based on a selected criteria and was given a rating value of 5, 4, 3, 2 or 1 based on the effect the alternative under consideration would have.

5- Substantially positive effect or best alternative
4- Generally positive effect or good alternative
3- Generally no effect or moderate alternative
2- Generally negative effect or inferior alternative
1- Substantial negative effect or worst alternative

The various criteria used in the evaluation are summarized in ***Table 5.31.*** The evaluation methodology used in this study involves a two-step process using both comparative (qualitative) and multi-criteria (quantitative) analyses to determine the proposed alternative. These results are presented in ***Tables 5.32 and 5.33.***

The comparison results summarized in the evaluation matrices (***Tables 5.32 and 5.33***) clearly show the Build Alternative as the best alternative over the No-Build Alternative.

Table 5.31 Performance Evaluation Criteria
Engineering
Geometric Compliance to Design Criteria: Assesses the compliance of the alternatives with FDOT and AASHTO design standards.
Multimodal Facilities: Measures the availability of multi-modal facilities and their amenities and how each alternative enhances the ability to promote other transportation modes.
Mobility: Measures the ability of an alternative to provide adequate capacity and minimize travel time delay through the corridor.
Safety Improvements: Provides consideration for an alternative's physical, geometric and operational features identifying to what extent they would minimize actual or potential safety hazards.
Utility Impacts: Measures the utility impacts of the alternatives. This includes potential conflicts and relocation of the utility lines that are located within the FDOT right of way.
Maintenance of Traffic: Measures the effectiveness of the proposed traffic control schemes during construction to minimize effects on the local residents, business, and traveling public and emergency management services.
Purpose and Need: Measures the ability of an alternative to comply with the purpose and need of the project.
Socio-Economic
Displacement Residences/ Businesses: This criterion identifies the level and type of any residential and/or business disruptions associated with an alternative.
Social and Neighborhood Impacts: This criterion identifies whether an alternative has impacts on social and neighborhood issues, including visual and aesthetic concerns.
Economic and Employment Impacts: The criterion identifies whether an alternative impacts economic issues along the corridor.
Community Services/Features: This criterion measures the effect and/or compatibility of an alternative to meet the surrounding visual environment needs from both the roadway user and the supporting community. Also provides a degree of impact to the community's services (Fire, Police, Parks, etc.)
Public Comments: This criterion incorporates the comments and feedback from the public for each alternative. A Public and Agency Kick-off Meetings were held on December 6, 2011 and December 8, 2011. Alternatives Public Workshops were held on October 16, 2012 and October 18, 2012. Stakeholders voiced their opinions and concerns during these outreach efforts. A summary of the public involvement effort is included.
Environmental
Noise Impacts: Measures the ability of an alternative to meet pre-established noise standards.
Air Quality: Measures the ability of an alternative to meet pre-established air quality standards.
Contamination: Measures the potential impact on existing or potential hazardous material sites and or generators.
Biological/Wetland Impacts: Identifies the degree of potential effect of Threatened and Endangered Species and potential impacts to wetland habitat.
Water Quality: Measures the alternative's potential effect on water quality for any surface or subsurface water resource within the project limits.
Cultural/Historic/Archaeological: Measures the degree of impact associated with historic structures or archaeological sites that may be caused by the development of specific corridor or concept.
Project Cost
Engineering, CEI and Construction: Compares each alternative based on design and construction costs.
Right of Way/Business Damages: Addresses variations in right of way costs between alternatives.

Table 5.32
Evaluation Matrix – Qualitative Comparison

Variables		No-Build Alternative	Build Alternative
Engineering	**Geometric Compliance to Design Criteria**	The No-Build Alternative has similar deficiencies as the Build Alternative. However, the Build Alternative will improve some of these deficiencies.	Design Variations: Border Width, Vertical Alignment, Vertical Clearance and Shoulder Width at selected locations. Design Exceptions: Vertical Clearance, Shoulder Width and Lane Width at selected locations. Eliminates existing Stopping Site Distance deficiencies
	Multimodal Facilities	No impact	Provides the ability to incorporate regional express bus service
	Mobility	Increased congestion	Adds capacity with express lanes Provides travel time reliability Improves the operations of the general purpose lanes
	Safety Improvements	No safety improvements	Reduces crashes related to heavy congestion, weaving maneuvers, speed differentials and interstate access
	Utility Impacts	No impact	Moderate impacts at interchanges and I-95 mainline bridges
	Maintenance of Traffic	No impact	Moderate impacts during construction
	Purpose and Need	Does not meet	Meets
Socio-Economic	**Displacement of Residences/Businesses**	None	None All improvements can be accommodated within the existing right of way
	Social and Neighborhood Impacts	None	Provides the ability to incorporate regional express bus service which offers an alternative to auto travel and addresses needs of low-income users and disadvantage groups
	Economic and Employment Impacts	No impact	Improves mobility, throughput, travel speeds and travel time reliability for this important SIS facility. Supports economic development and reduces congestion Improves access to businesses, freight activity centers, local distribution facilities and freight corridors
	Community Services/Features	No impact	No impact
	Public Comments	Public generally understand the need for improvements to I-95.	Generally in favor
Environment	**Noise Impacts**	No effect Does not have the ability to add noise abatement.	Recommends noise walls at selected locations
	Air Quality	Potential impacts from increased congestion	Air quality analysis shows no adverse impacts from the project
	Contamination	No Impact	Potential impact due to work adjacent to construction, including drainage, adjacent to high and medium risk sites
	Biological/Wetland Impacts	No Impact	Direct wetland impacts =1.92 acres Indirect wetland impacts = 0.96 acres Surface water impacts = 17.36 acres Stormwater/Drainage Features = 32.15 acres
	Water Quality	No Impact	Equivalent water quality treatment will be provided
	Cultural/Historic/Archaeological	No Impact	Historic resources will be avoided
Cost	**Engineering, CEI and Construction**	No construction, no cost involved = $0	$240,000,000 However, the express lanes tolls will provides a revenue source to pay for the improvements and maintain the system
	Right of Way/Business Damages	None = $0	All improvements can be accommodated within the existing right of way

Table 5.33
Evaluation Matrix - Quantitative Comparison

Legend

- **5** Substantial Positive Effect or Best Alternative
- **4** Generally Positive Effect or Good Alternative
- **3** Generally Positive Effect or Moderate Alternative
- **2** Generally Positive Effect or Inferior Alternative
- **1** Substantial Negative Effect or Worst Alternative

	Engineering							Socio-Economic					Environment						Cost			
Alternative	Geometric Compliance to Design Criteria	Multimodal Facilities	Mobility	Safety Improvements	Utility Impacts	Maintenance of Traffic	Meets Purpose and Need	Displacement of Residences/Businesses	Social and Neighborhood Impacts	Economic and Employment Impacts	Community Services/Features	Public Comments	Noise Impacts	Air Quality	Contamination	Biological/Wetland Impacts	Water Quality	Cultural/Historic/Archaeological	Engineering, CEI and Construction	Right of Way/Business Damages	**Score**	**Rank**
No-Build	4	2	1	2	5	5	1	5	2	2	3	2	3	2	3	3	2	3	5	5	**60**	**2**
Build	3	5	5	4	3	2	5	5	3	3	3	4	3	3	2	3	3	3	4	5	**71**	**1**

5.7 RECOMMENDED ALTERNATIVE

The recommended alternative for the I-95 corridor is the Build Alternative. The Build Alternative was selected based on the alternative alignment analysis, public input and the evaluation results summarized in the evaluation matrix. The Build Alternative will add the capacity improvements necessary to improve traffic operations, safety, transit, regional connectivity and interstate access. The Build Alternative is the most prudent when compared with the No-Build Alternative for the following reasons:

- **I-95 Corridor Consistency** – The Build Alternative will match the proposed alternative for the adjacent projects south and north of the project limits. These projects are recommending two tolled express lanes per direction within their respective project limits. The Build Alternative will provide a seamless express lanes system connection between SR 836 in Miami-Dade County and Linton Boulevard in Palm Beach County, making the use of the express lanes more attractive across counties.

- **Regional Connectivity** – The Build Alternative is consistent with the FDOT Regional Managed Lanes Concept vision of having a series of express lanes systems along I-95, I-75, I-595, SR 826, SR 836 and Florida's Turnpike.

- **Transit Envelope** – The Build Alternative will create an opportunity for a Bus Rapid Transit service that could operate within the express lanes system. This transit service could have potential scheduled stops to the park-and-ride lots along the corridor and could include transit express routes between counties within the tri-county area.

- **Evacuation Route** – In case of an evacuation event, I-95 will have a total of five travel lanes each way with the Build Alternative. The No-Build Alternative will maintain the existing four travel lanes. The Build Alternative will make the corridor more effective during emergency evacuation events.

- **Safety** – The Build Alternative will be able to separate long trips (especially across counties) from short trips with the use of the express lanes. Separating traffic from the general purpose lanes will alleviate traffic congestion approaching the interchanges, reduce weaving maneuvers within interchange segments and maximize throughput along the corridor. The

Build Alternative is anticipated to reduce crashes related to heavy congestion, weaving maneuvers, speed differentials and interstate access.

- **Express Lanes** – Express lanes will provide superior, consistent and dependable travel times, particularly during peak travel periods. Express lanes will service more vehicles than the existing HOV lanes. More efficient use of the existing facility is accomplished by encouraging transit and carpools to use the express lanes. Encouraging transit and carpools will reduce the number of cars in the road during peak travel periods.

- **Fast, reliable travel** – Through the use of dynamic pricing, FDOT can manage the amount of traffic in the express lanes and maintain free-flowing speeds even when the general purpose lanes are congested. Motorists who choose to use the express lanes will benefit from reliable travel times. With more reliable travel speeds, transit agencies can enhance transit service along the corridor. Long trip motorists that commute daily between counties will benefit from using the express lanes by improving their travel time during peak travel periods.

- **Revenue** – The express lanes in the Build Alternative can generate a new source of revenue which can be used to offset their implementation costs and support other transportation improvements.

Based on the evaluation conducted and documented in this report, it is clear that the Build Alternative will meet the purpose and need of the project and the overall project objectives of this PD&E study. Some of these objectives are:

- Design a transportation system that will offer new commuting choices and more reliable travel times during congested periods with the implementation of an express lanes system that can be constructed within the existing right-of-way resulting in a feasible and cost effective project.
- Advance the region's emerging express lanes network to provide immediate congestion relief with minimal impacts to the existing facility.
- Evaluate future mainline improvements in terms of safety, capacity, operations and interstate access that can be constructed and open to traffic in a short term.
- Improve the overall mobility of the I-95 daily users, especially the longer trips.

The No-Build Alternative HOV lanes will continue to operate, depending on the location, either near capacity or under capacity, offering little time savings to carpools/vanpools on I-95. The under capacity issue is related to the restrictions that only two passenger per vehicle can only use the HOV lanes. As a result of the corridor being over capacity, travel demand is shifting vehicles onto less appropriate facilities. This, in turn, is negatively impacting the quality of life in local neighborhoods, as well as increasing driver frustration, reducing safety and increasing trip travel time. Without improvements, the project corridor will continue to experience high delays and will continue to operate at LOS F by the design year of 2040. Driving conditions for residents and commuters along the adjacent corridors connecting with I-95 will also deteriorate well below acceptable LOS standards.

The Build Alternative proposed improvements will increase mobility, capacity, and enhance overall safety within the project study area while minimizing environmental and socio-economic impacts. The Build Alternative will provide the needed capacity to accommodate future traffic growth into the design year 2040. The needs addressed through the Build Alternative cannot be addressed through maintenance efforts and/or TSM strategies. The implementation of the Build Alternative was found feasible and presents a balance in providing the needed improvements for this area.

6.0 RECOMMENDED ALTERNATIVE

The recommended alternative for the I-95 corridor is the Build Alternative (Concept #3). The recommended alternative was selected based on the alternative alignment analysis, public input and the evaluation results summarized in the evaluation matrix. The recommended alternative proposes to add two tolled express lanes in each direction with access points at selected locations along the corridor to enter and exit the express lanes system while maintaining the existing number of general purpose lanes throughout the corridor. The express lanes will be separated from the general purpose lanes with tubular markers and a four-foot (4') wide buffer.

6.1 TYPICAL SECTION

The recommended alternative typical section will consist of the following roadway elements:

- Four 12-foot (12') wide express lanes (two in each direction)
- Six 12-foot (12') wide general purpose lanes (three in each direction)
- Four-foot (4') wide buffer with tubular markers separating the general purpose lanes from the express lanes
- A 12-foot (12') wide paved inside shoulder
- A 12-foot (12') wide outside shoulder (ten-feet (10') paved and two-feet (2') unpaved)
- A two and a half-foot (2.5') wide center barrier wall
- Twelve-foot (12') wide auxiliary lanes at selected locations

Figure 6.1 shows the recommended alternative typical section. The recommended alternative typical section will need to be reduced (express lanes, roadway shoulders and/or buffer widths) at the following five locations in order to avoid reconstructing these cross streets (roadway and structure). The existing footprint under these structures cannot accommodate the recommended roadway typical section (***see Figure 6.2***).

- Commercial Boulevard Interchange
  - Express lanes width from 12' to 11'
  - Buffer width from 4' to 2'
  - Northbound inside shoulder from 12' to 6'

- Andrews Avenue Overpass
    - Buffer width from 4’ to 2’
    - Inside and outside shoulder width from 12’ to 8’
- Racetrack Road Overpass
    - Northbound inside shoulder from 12’ to 10.5’
    - Southbound inside shoulder from 12’ to 10’
    - Southbound buffer width from 4’ to 2.5’
    - Southbound outside shoulder from 12’ to 10’
- SW 10th Street Interchange
    - Northbound buffer width from 4’ to 2’
    - Northbound inside shoulder from 12’ to 8’
    - Northbound outside shoulder from 12’ to 8’
    - Southbound inside shoulder from 12’ to 10.5’
- NE 48th Street Overpass
    - Buffer width from 4’ to 2’
    - Inside and outside shoulder width from 12’ to 8’

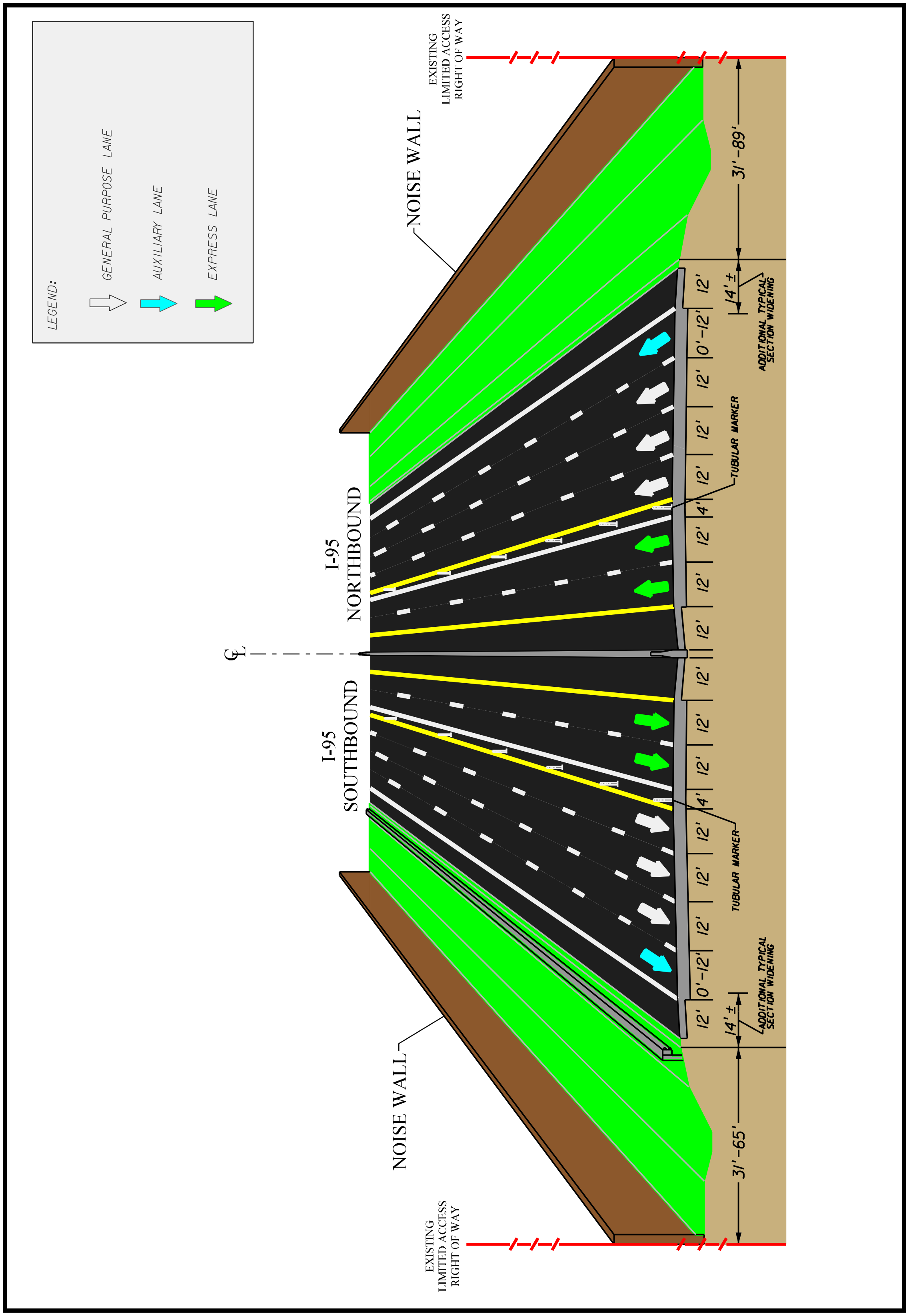
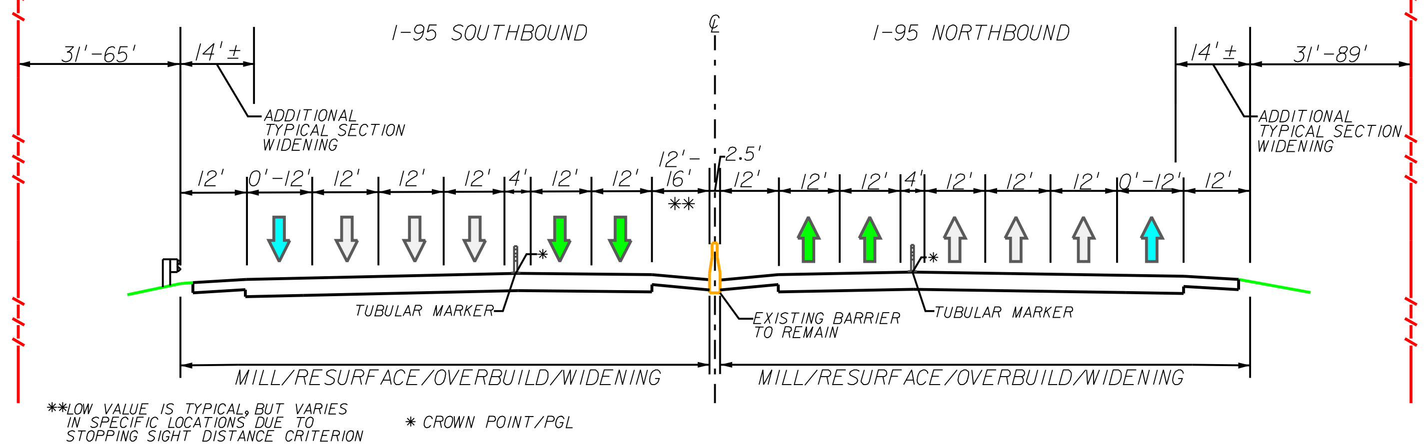


Figure 6.1 – Recommended Alternative Typical Section between Oakland Park Boulevard and Glades Road

CONCEPT #3 TYPICAL SECTION

FROM STA: 532+00 TO STA: 597+90,
FROM STA: 607+30 TO STA: 642+15,
FROM STA: 651+20 TO STA: 755+95,
FROM STA: 761+95 TO STA: 996+50,
FROM STA: 1004+30 TO STA: 1052+10
AND FROM STA: 1060+40 TO STA: 1249+18

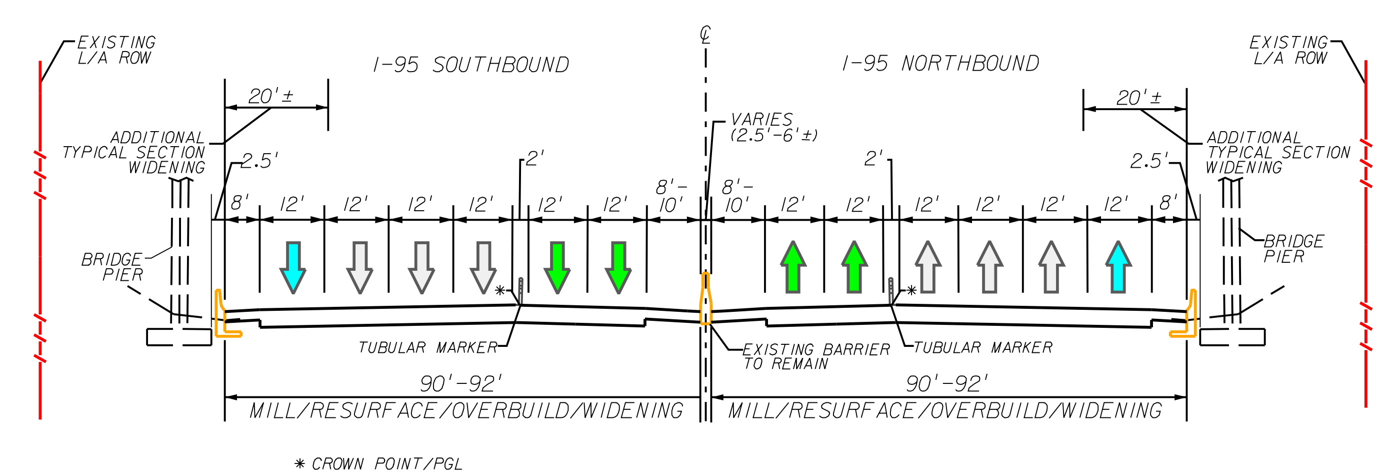


**LOW VALUE IS TYPICAL, BUT VARIES IN SPECIFIC LOCATIONS DUE TO STOPPING SIGHT DISTANCE CRITERION

* CROWN POINT/PGL

TYPICAL SECTION IN CONSTRAINED AREA

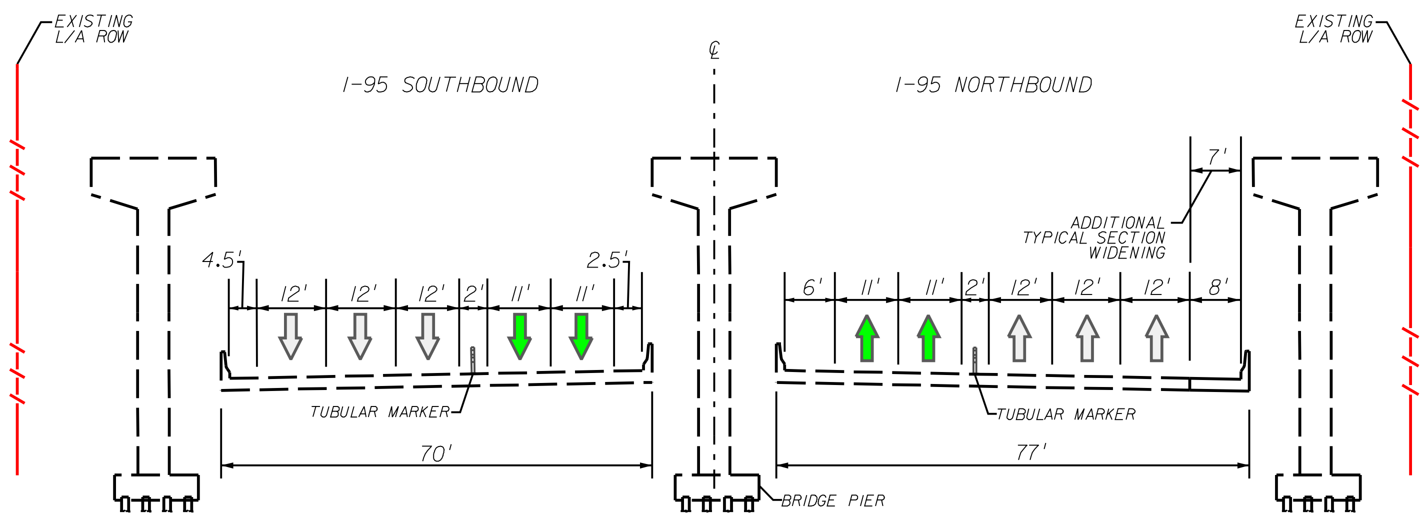
FROM STA: 996+50 TO STA: 1004+30
(NE 48TH STREET)



* CROWN POINT/PGL

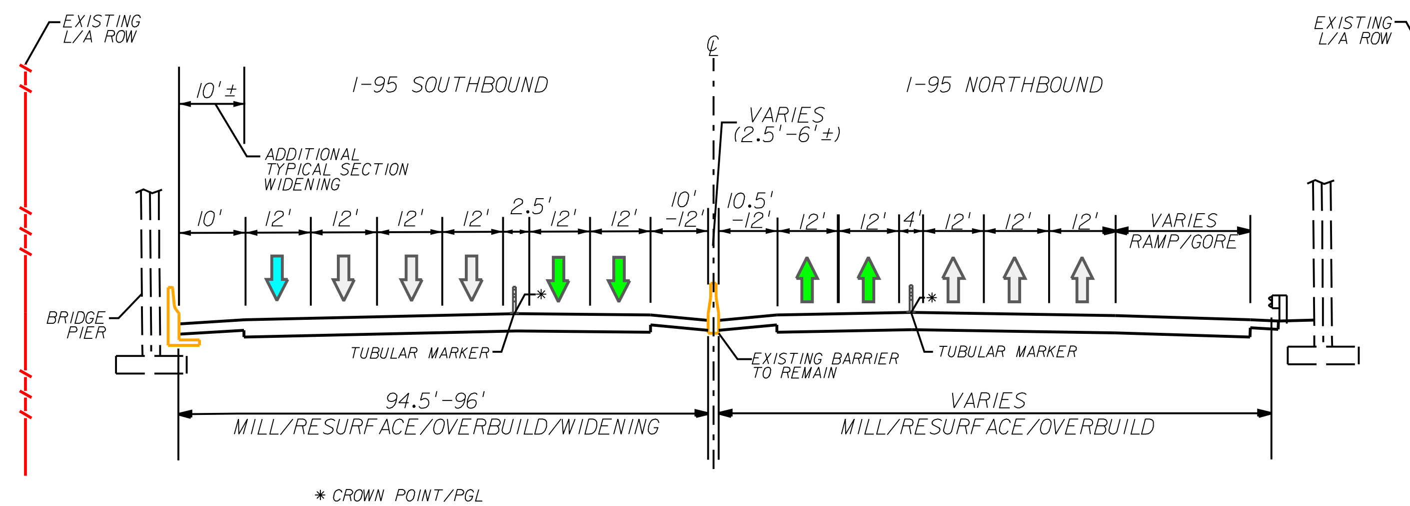
TYPICAL SECTION IN CONSTRAINED AREA

FROM STA: 597+90 TO STA: 607+30
(COMMERCIAL BOULEVARD)



TYPICAL SECTION IN CONSTRAINED AREA

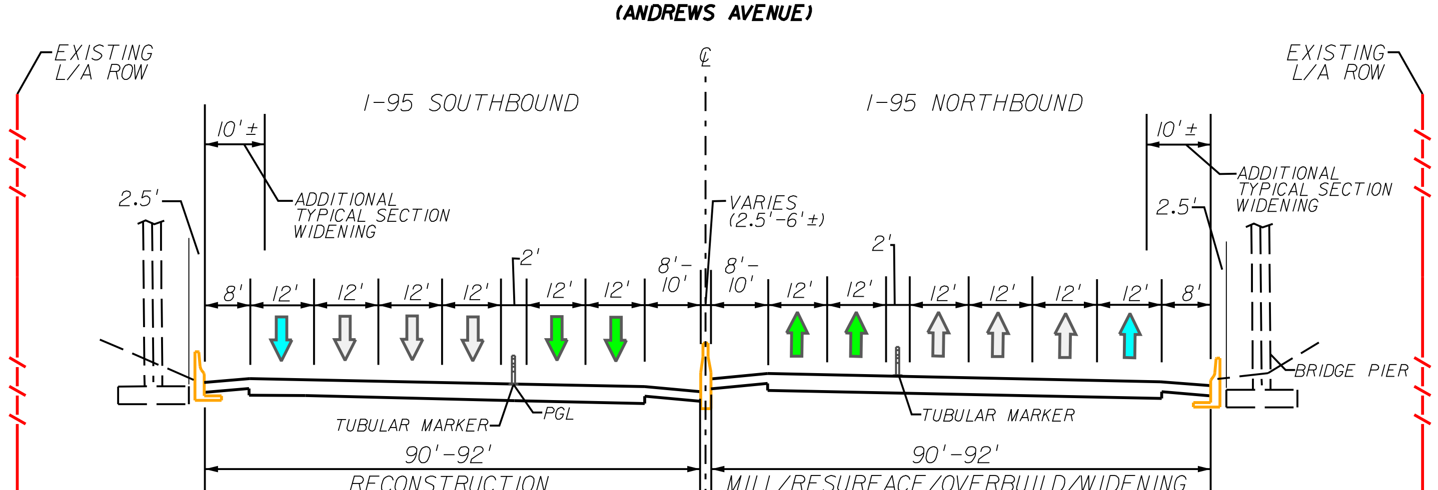
FROM STA: 755+95 TO STA: 761+95
(RACE TRACK ROAD)



* CROWN POINT/PGL

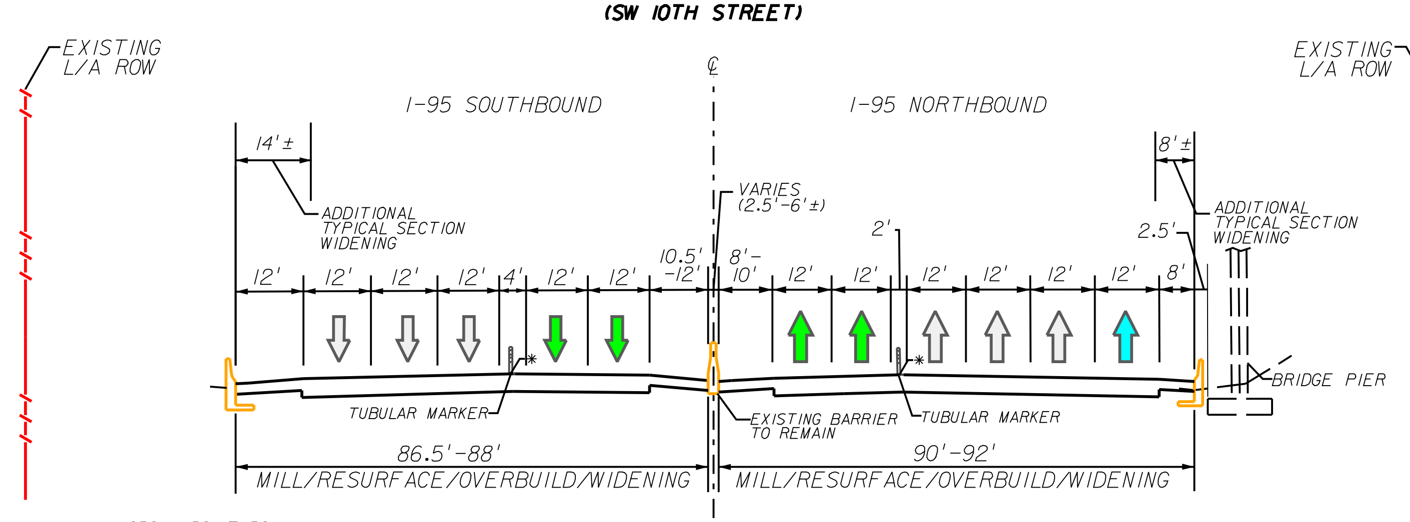
TYPICAL SECTION IN CONSTRAINED AREA

FROM STA: 642+15 TO STA: 651+20
(ANDREWS AVENUE)



TYPICAL SECTION IN CONSTRAINED AREA

FROM STA: 1052+10 TO STA: 1060+40
(SW 10TH STREET)



* CROWN POINT/PGL

NOTES/LEGEND:

GENERAL PURPOSE LANE
EXPRESS LANE
AUXILIARY LANE

DESIGN SPEED = 65 mph
STATION RANGES FOR CONSTRAINED AREAS INCLUDE TRANSITIONS
L/A ROW = LIMITED ACCESS RIGHT OF WAY

6.1.1 Typical Section Package

The approved typical section package is included in ***Appendix P***. The typical section package includes the PD&E recommended alternative typical section within the project limits. The typical section also includes the auxiliary lanes improvements recommended as part of the SW 10th Street Interchange Improvements Project in order to show a typical section continuity and the total widening design for the area.

6.2 Intersection Concept and Signal Analysis

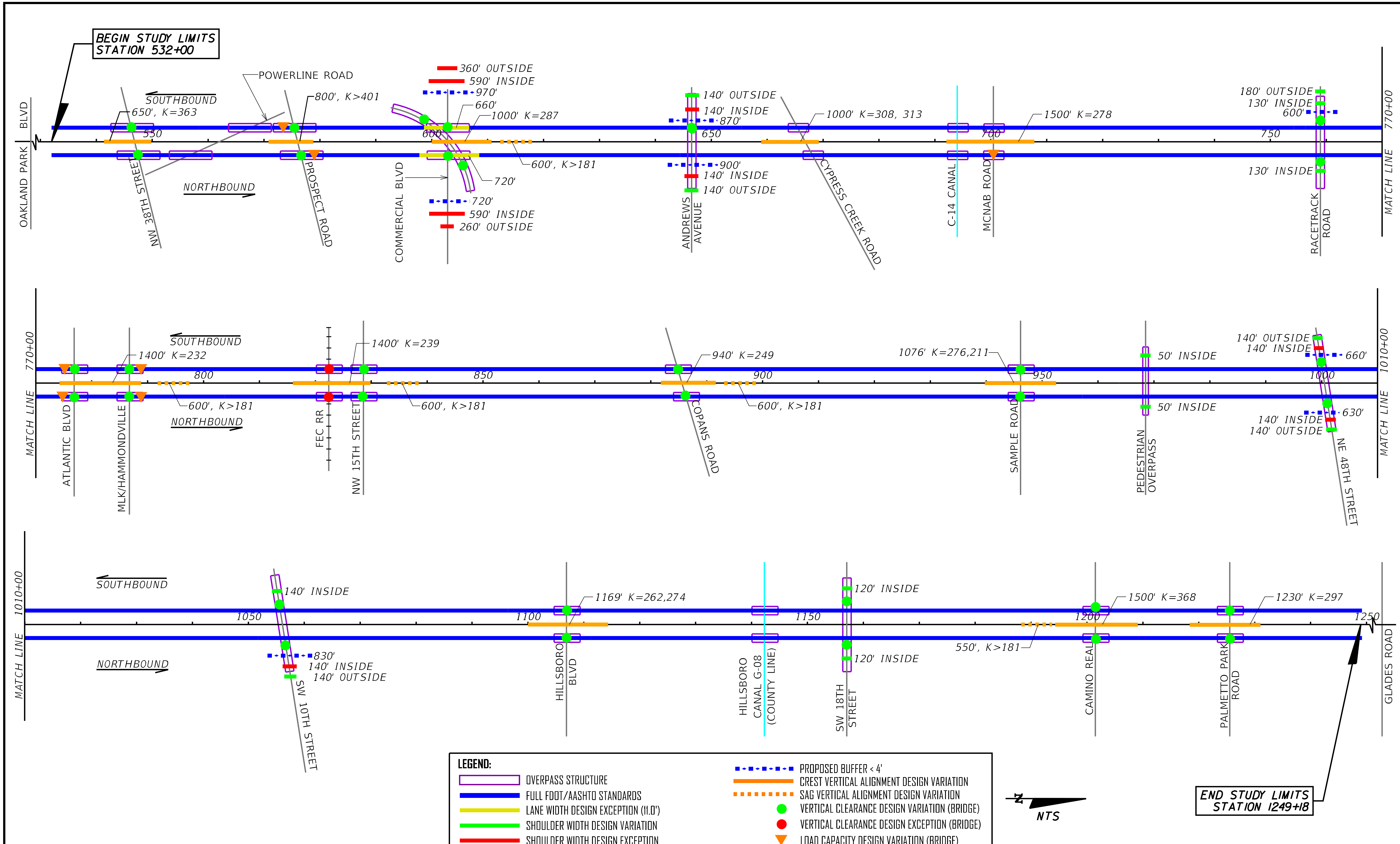
The traffic operational analysis found that the northbound off-ramp to Commercial Boulevard and the southbound off-ramp to Palmetto Park Road needed additional storage to accommodate the future queues within the ramp limits in order to avoid queuing onto the mainline corridor. Therefore, the following ramp improvements were recommended as part of this study:

- **Northbound off-ramp to Commercial Boulevard –** Widen the ramp from one to two lanes. The northbound outside mainline general purpose lane will be striped to operate as a choice lane at the off-ramp exit point. The lane will provide the opportunity to exit to Commercial Boulevard or to continue northbound along the general purpose lanes (***see Appendix L, Sheet #3***).

- **Southbound off-ramp to Palmetto Park Road –** Extend the exclusive right-turn lane approximately 1,000 feet (***see Appendix L, Sheets #24 and 25***).

6.3 Design Exceptions and Variations

The recommended alternative proposes to widen the existing corridor typical section approximately 14 feet on each side within the existing right of way. Based on the preliminary design developed for this PD&E study, it was determined that design exceptions and variations will be required in order to implement the recommended alternative typical section. ***Figure 6.3*** and ***Tables 6.1-6.4*** summarize the design exceptions and variations including each design element, criteria, proposed design and location.



FLORIDA DEPARTMENT OF TRANSPORTATION
BROWARD AND PALM BEACH COUNTIES

March 2013

I-95 (SR 9) PD&E STUDY
FPID: 409359-1-22-01 (BROWARD COUNTY)
FPID: 409355-1-22-01 (PALM BEACH COUNTY)
ETDM: 3330

RECOMMENDED ALTERNATIVE
DESIGN EXCEPTIONS AND DESIGN VARIATIONS SUMMARY

FIGURE 6.3

A design exception will be required for the following elements (see ***Table 6.1***):

Vertical Clearance – A total of two bridges will require a vertical clearance design exception. The vertical clearance design exceptions are required in order to maintain the existing bridges and avoid the reconstruction of the I-95 corridor. Replacing and/or jacking up the bridges to meet the vertical clearance requirements will require a change in the I-95 profile grade line upstream and downstream from the subject bridges. Both bridges currently have a substandard vertical clearance. The recommended alternative recommends maintaining the existing vertical clearance of these bridges.

Shoulder Width – A total of four locations throughout the corridor will require a shoulder width design exception. The shoulder width design exceptions (a total of nine) are required in order to avoid reconstructing the Commercial Boulevard Interchange, Andrews Avenue Overpass, NE 48th Street Overpass and SW 10th Street Interchange. The existing footprint under these structures over I-95 cannot accommodate the proposed roadway typical section.

Lane Width – A total of two locations will require a lane width design exception. The design exceptions are required in order to avoid reconstructing the Commercial Boulevard Interchange. The existing footprint under the westbound Commercial Boulevard to southbound I-95 flyover structure over I-95 cannot accommodate the proposed roadway typical section.

Table 6.1
Design Exceptions Summary

Design Element	Existing-to-Remain	Proposed	AASHTO Criteria	Comments
Design Exception				
Vertical Clearance	2		Over Railroad: 23 feet	Bridge Structures: FEC Railroad NB: 22'-0" FEC Railroad SB: 22'-6"
Shoulder Width	2	7	10 feet	Inside Shoulders Commercial Boulevard NB: 6' Commercial Boulevard SB: 2.5' Andrews Avenue NB: 8' Andrews Avenue SB: 8' NE 48th Street NB: 8' NE 48th Street SB: 8' SW 10th Street NB: 8' Outside Shoulders Commercial Boulevard NB: 8' Commercial Boulevard SB: 4.5'
Lane Width		2	12 feet	Express Lanes only over Commercial Boulevard NB: 11' Express Lanes only over Commercial Boulevard SB: 11'

Note: Northbound lanes and southbound lanes counted separately.
FDOT standards are more conservative when compared to AASHTO standards.

A design variation will be required for the following elements (see ***Table 6.2***):

Vertical Alignment – Some of the vertical curves throughout the corridor will not meet the vertical alignment minimum requirements in accordance with the PPM.

- 22 crest curves (11 northbound and 11 southbound) will not meet the minimum FDOT K-value.
- 18 crest curves (9 northbound and 9 southbound) will not meet the minimum FDOT crest curve length.
- 10 sag curves (5 northbound and 5 southbound) will not meet the minimum FDOT sag curve length.

The design variations are required in order to maintain the existing corridor vertical profile and avoid the reconstruction of the I-95 corridor. Reconstructing the corridor to meet the vertical alignment requirements would require raising the existing bridge structures and a change in the I-95 profile grade line upstream and downstream from the subject bridges. All listed deficiencies currently exist along the corridor. The recommended alternative proposes to maintain the existing vertical alignment of the corridor.

Vertical Clearance – Data collected from survey field work and as-built bridge plans indicated that a total of 20 bridges will not meet FDOT and AASHTO minimum vertical clearance criteria and 8 bridges will not meet the FDOT minimum vertical clearance criteria. Based on the recommended alternative, these bridges will be maintained with the existing vertical clearances. Vertical clearance design variations are required in order to preserve the existing bridges and avoid the reconstruction of the I-95 corridor. Replacing and/or jacking up the bridges to meet the vertical clearance requirements will require a change in the I-95 profile grade line upstream and downstream from the subject bridges. All of these bridges currently have a substandard vertical clearance. The recommended alternative proposes to widen most of these bridges while maintaining the existing vertical clearance by utilizing a shallower beam girder design. An evaluation of potential alternate routes determined that 20 bridges not meeting the FDOT and AASHTO minimum vertical clearance criteria have potential alternate routes between 0.35 and 2 miles away from the subject bridge. Therefore, a design exception for these bridges is not needed.

Shoulder Width – A total of 13 locations (seven inside and six outside) will require a shoulder width design variation. All seven inside shoulder locations currently have a substandard shoulder width and are located where center bridge piers exist. The shoulder width design variations are required in order to avoid reconstructing these bridges and/or to avoid deflecting the mainline corridor for short distances at selected locations. The existing footprint under these structures over I-95, in most cases, cannot accommodate the proposed typical section. The recommended alternative proposes to keep these shoulder width variations in order to avoid reconstructing the bridges and to avoid short distance deflections along the corridor. Multiple short deflections along an interstate facility will impact the flow of traffic creating turbulence that will increase the possibility of sideswipe crashes.

Structural Load Capacity – A total of seven locations will require a structural load capacity design variation. The structural load capacity design variations are required in order to maintain existing bridges.

Table 6.2 Design Variations Summary				
Design Element	**Existing-to-Remain**	**Proposed**	**FDOT Criteria**	**Comments**
Design Variation				
Border Width	1		94 feet	Multiple Locations, Corridor-Wide Design Variation
Vertical Alignment	22		K = 401	I-95 at NW 38th Street: 363 I-95 at Commercial Boulevard: 287 I-95 at Cypress Creek Road: 308 and 313 I-95 at McNab Road: 278 I-95 at Atlantic Boulevard: 246 I-95 at NW 15th Street: 239 I-95 at Copans Road: 249 I-95 at Sample Road: 276 and 211 I-95 at Hillsboro Boulevard: 262 and 274 I-95 at Camino Real: 368 I-95 at Palmetto Park Road: 297
	18		<u>Crest Curve Length</u> $L_{Open\ Highway}$ = 1,000' $L_{Within\ Interchange}$ = 1,800'	<u>Open Highway</u> I-95 at NW 38th Street: 650' I-95 at Prospect Road: 800' <u>Within Interchange</u> I-95 at Commercial Boulevard: 1,000' I-95 at Cypress Creek Road: 1,000' I-95 at Copans Road: 940' I-95 at Sample Road: 1,263' I-95 at Atlantic Boulevard: 1,200' I-95 at Hillsboro Boulevard: 1,400' I-95 at Palmetto Park Road: 1,230'
	10		<u>Sag Curve Length</u> L = 800'	I-95 at Commercial Boulevard: 600' I-95 at Atlantic Boulevard: 600' I-95 at NW 15th Street: 600' I-95 at Copans Road: 600' I-95 at Camino Real: 607'
Vertical Clearance	12	1	Over Roadway: 16'-6"	<u>Locations:</u> Commercial Boulevard Flyover: 16'-5" Andrews Avenue SB: 16'-0" Racetrack Road: 16'-1" MLK/Hammondville Road NB: 16'-4" MLK/Hammondville Road SB: 16'-4" NE 48th Street: 16'-2" SW 10th Street: 16'-2" SW 18th Street: 16'-4"
	20		Over Roadway: 14 feet with alternate routes with 16 feet	<u>Bridge Structures:</u> NW 38th Street NB: 15'-11" NW 38th Street SB: 15'-11" Prospect Road NB: 15'-11" Prospect Road SB: 15'-11" Commercial Boulevard NB: 15'-7" Commercial Boulevard SB: 15'-7" Atlantic Boulevard NB: 15'-2" Atlantic Boulevard SB: 15'-2" NW 15th Street NB: 15'-11" NW 15th Street SB: 15'-11" Copans Road NB: 15'-6" Copans Road SB: 15'-6" Sample Road NB: 15'-0" Sample Road SB: 15'-0" Hillsboro Boulevard NB: 14'-9" Hillsboro Boulevard SB: 14'-8" Camino Real NB: 15'-0" Camino Real SB: 15'-0" Palmetto Park Road NB: 15'-2" Palmetto Park Road SB: 15'-2"
Shoulder Width	7	6	12 feet	<u>These are located along the I-95 median where bridge piers exist:</u> Racetrack Road NB: 10.5' Racetrack Road SB: 10' Pedestrian Overpass NB: 10' Pedestrian Overpass SB: 10' SW 10th Street SB: 10.5' SW 18th Street NB: 10' SW 18th Street SB: 10' <u>Outside Shoulder:</u> Racetrack Road SB: 10' Andrews Avenue NB: 8' Andrews Avenue SB: 8' NE 48th Street NB: 8' NE 48th Street SB: 8' SW 10th Street NB: 8'
Structural Load Capacity		7	IR ≥ 1 OR ≥ 1	Prospect Road NB: 0.84 Prospect Road SB: 0.84 McNab Road NB: 0.92 Atlantic Boulevard NB: 0.70 Atlantic Boulevard SB: 0.70 Hammondville Road NB: 0.83 Hammondville Road SB: 0.83

Notes: Northbound lanes and southbound lanes counted separately.
FDOT standards are more conservative when compared to AASHTO standards.
NB - Northbound
SB - Southbound

Border Width – There are multiple locations that will require a border width design variation (see ***Tables 6.3 and 6.4***), therefore, this PD&E study prepared a corridor-wide design variation. Border width is measured from the edge of the outside traffic lane to the right of way line. The design variation is required in order to avoid negatively impacting the existing communities adjacent to the corridor, the corridor interchanges, and to avoid right of way acquisition. Border width is intended to accommodate roadside design components such as signing, lighting, drainage features, guardrail, fencing and clear zone. Border width also provides space for construction, corridor maintenance, permitted public utilities, and noise walls.

The proposed restricted border width will not affect the ability to provide adequate signing, noise walls, drainage and lighting, and will provide ample space for construction and maintenance access. Barrier wall and guardrail systems will be utilized for the areas of reduced border width to provide adequate protection where proper clear zone widths cannot be obtained. Therefore, this design variation will not adversely affect the safety and operation characteristics of this facility.

Table 6.3 Summary of Proposed Border Width - Mainline				
Roadway Section	Border Width (feet)		Border Width Required	
	Northbound	Southbound		
Oakland Park Boulevard - NW 39th Street/ NW 38th Street	77-81	27-114	94	**DV**
NW 39th Street/ NW 38th Street - Powerline Road	82	98	94	**DV***
Powerline Road - Prospect Road	82	99	94	**DV***
Prospect Road - Commercial Boulevard	34-82	28-102	94	**DV**
Commercial Boulevard - Andrews Avenue	20-114	58-112	94	**DV**
Andrews Avenue - Cypress Creek Road	48-86	62-186	94	**DV**
Cypress Creek Road - McNab Road	125-186	108-111	94	✓
McNab Road - SW 3rd Street	76-128	61-170	94	**DV**
SW 3rd Street - NW 15th Street	31-76	69-112	94	**DV**
NW 15th Street - Copans Road	40-99	50-80	94	**DV**
Copans Road - Sample Road	59-119	37-81	94	**DV**
Sample Road - NW 48th Street	73-92	33-96	94	**DV**
NE 48th Street - SW 10th Street	71-73	27-41	94	**DV**
SW 10th Street - Hillsboro Boulevard	56-86	40-42	94	**DV**
Hillsboro Boulevard - Palmetto Park Road	72-108	31-132	94	**DV**
Palmetto Park Road- Glades Road	67-136	54-60	94	**DV**

Source: Project Survey
DV = Design Variation
✓ = Meets required criteria
* = Northbound Only

Table 6.4 Summary of Proposed Border Width - Interchanges						
Interchange	Border Width (feet)				Border Width Required	
	NW[1]	NE[1]	SW[1]	SE[1]		
Commercial Boulevard	69-73	29-117	77-105	33-94	94	**DV**
Cypress Creek Road	89-214	98-231	18-91	40-93	94	**DV***
Atlantic Boulevard	30-129	33-81	30-51	39-84	94	**DV**
Copans Road	48-50	48-118	50-89	79-112	94	**DV**
Sample Road	40-58	80-88	57-99	37-118	94	**DV**
SW 10th Street	30-72	-	21-103	17-159	94	**DV**
Hillsboro Boulevard	27-49	45-103	41-51	44-78	94	**DV**
Palmetto Park Road	46-169	45-81	75-91	57-72	94	**DV**

Source: Project Survey,
Note: [1]Interchange Quadrant
DV = Design Variation
***** = Excludes NE quadrant

The approved design exceptions and variation packages are included in ***Appendix Q***. Preliminary bridge structure load ratings were completed during the PD&E study resulting in seven potential structural load capacity design variations. The final bridge structure load ratings evaluation and design variation packages (if necessary) will be completed during the design phase of the project.

6.4 Design Traffic Volume and Operational Analysis

This section presents the analysis results for the future proposed lane configuration under projected traffic conditions. This analysis followed the same process and methodology as the existing traffic operational analysis. The future analysis years for this study are as follows:

- Opening Year – 2020 Build Alternative
- Interim Year – 2030 Build Alternative
- Design Year – 2040 Build Alternative

The development of future traffic volumes for the project was based on the approved FDOT and MPO Southeast Regional Planning Model Version 6.5 (SERPM). SERPM is a multimodal travel demand model which covers the three urban counties of Southeast Florida – Palm Beach, Broward and Miami-Dade.

Tables 6.5, 6.6A, 6.6B and ***Appendix F*** summarize the future operational analysis results as well as link-by-link traffic volumes. ***Appendix F*** also depicts the future geometric configuration including the number of lanes, interchange layouts and intersection configurations.

Table 6.5
Future Traffic Operational Analysis Results
Ramp Terminal Intersections

Synchro Report Number	Location	2040 Build		2030 Build		2020 Build	
		DELAY AM (PM)	LOS AM(PM)	DELAY AM (PM)	LOS AM(PM)	DELAY AM (PM)	LOS AM(PM)
Commercial Boulevard Interchange							
1	West Ramp Terminal	9.2 (10.7)	A (B)	11.1 (11.4)	B (B)	11.3 (12.1)	B (B)
2	East Ramp Terminal	42.8 (38.7)	D (D)	49.9 (34.4)	D (C)	52.3 (34.3)	D (C)
Cypress Creek Road Interchange							
1	West Ramp Terminal	75.4 (100.2)	E (F)	71.6 (70.2)	E (E)	57.9 (58.2)	E (E)
2	East Ramp Terminal	13.5 (20.4)	B (C)	15.6 (17.2)	B (B)	9.5 (11.6)	A (B)
Atlantic Boulevard Interchange							
1	West Ramp Terminal	34.7 (33.2)	C (C)	37.2 (34.4)	D (C)	35.4 (34.8)	D (C)
2	East Ramp Terminal	18.6 (21.5)	B (C)	16.1 (12.0)	B (B)	22.6 (21.6)	C (C)
Copans Road Interchange							
1	East Ramp Terminal	26.5 (21.3)	C (C)	28.2 (21.3)	C (C)	19.1 (18.4)	B (B)
Sample Road Interchange							
1	West Ramp Terminal	15.4 (18.4)	B (B)	14.6 (18.0)	B (B)	13.8 (20.0)	B (B)
2	East Ramp Terminal	21.8 (30.7)	C (C)	20.2 (27.1)	C (C)	19.3 (21.5)	B (C)
SW 10th Street Interchange							
1	West Ramp Terminal, On-Ramp	11.3 (25.3)	B (C)	8.7 (34.4)	A (C)	7.5 (17.8)	A (B)
2	West Ramp Terminal, Off-Ramp	14.8 (20.5)	B (C)	12.6 (17.2)	B (B)	12.4 (15.1)	B (B)
3	East Ramp Terminal	39.3 (47.2)	D (D)	33.9 (37.7)	C (D)	31.4 (34.6)	C (C)
Hillsboro Boulevard Interchange							
1	West Ramp Terminal	20.5 (28.7)	C (C)	18.5 (24.4)	B (C)	20.7 (21.6)	C (C)
Palmetto Park Road Interchange							
1	West Ramp Terminal	23.3 (18.7)	C (B)	15.0 (18.3)	B (B)	15.3 (16.3)	B (B)
2	East Ramp Terminal	33.3 (45.7)	C (D)	28.2 (45.6)	C (D)	27.3 (43.5)	C (D)

Table 6.6A
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)			Density Range AM(PM)			V/C AM(PM)			LOS AM(PM)		
			2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build
I-95 Northbound														
Between Oakland Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Commercial Boulevard EB & WB Off-Ramp	Mainline	1	8,173 (7,830)	7,977 (7,914)	7,374 (7,324)	26.1 (26.1)	26.1 (26.1)	26.1 (26.1)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)
I-95 NB to Commercial Boulevard EB & WB	Off-Ramp (Major Diverge)*	2	2,398 (1,954)	2,379 (1,876)	2,310 (1,785)	22.2 (21.3)*	21.7 (21.6)*	20.1 (20.0)*	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	C (B)*	C (C)*	C (B)*
Between I-95 NB to Commercial Boulevard EB & WB Off-Ramp and Commeracial Boulevard EB & WB to I-95 NB On-Ramp	Mainline													
Between I-95 NB to Commercial Boulevard EB & WB Off-Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Boulevard	Mainline	3	5,739 (5,876)	5,598 (6,038)	5,064 (5,539)	33.9 (35.3)	34.5 (40.0)	35.6 (38.3)	0.89 (0.91)	0.90 (0.96)	0.91 (0.94)	D (E)	D (E)	E (E)
I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Boulevard	On-Ramp (Merge)	4	791 (660)	736 (281)	632 (405)	42.0 (42.2)	39.4 (39.4)	33.6 (35.4)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (E)	E (E)	D (E)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes at Commercial Blvd and Commercial Boulevard EB & WB to I-95 NB On-Ramp	Mainline	5	6,530 (6,536)	6,334 (6,319)	5,696 (5,944)	30.4 (30.8)	30.6 (31.6)	30.6 (31.0)	0.83 (0.84)	0.84 (0.85)	0.84 (0.84)	D (D)	D (D)	D (D)
Commercial Boulevard EB & WB to I-95 NB	On-Ramp (Merge)	6	1,202 (1,135)	1,157 (1,038)	1,152 (1,113)	70.0 (67.2)	59.4 (54.6)	46.4 (49.5)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between Commeracial Boulevard EB & WB to I-95 NB On-Ramp and I-95 NB to Cypress Creek Road EB & Park/Ride Lot Off-Ramp	Mainline	7	7,732 (7,671)	7,491 (7,357)	6,848 (7,057)	29.3 (29.1)	28.5 (28.2)	27.6 (27.8)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)
I-95 NB to Cypress Creek Road EB and Park & Ride Lot	Off-Ramp (Diverge)	8	647 (557)	570 (574)	633 (589)	42.3 (41.9)	40.9 (40.1)	37.2 (38.4)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Cypress Creek Road EB & Park/Ride Lot Off-Ramp and I-95 NB to Cypress Creek Road WB Off-Ramp	Mainline	9	7,085 (7,114)	6,921 (6,783)	6,215 (6,468)	45.0 (45.0)	45.0 (45.0)	45.0 (45.0)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	F (F)	F (F)	F (F)
I-95 NB to Cypress Creek Road WB	Off-Ramp (Diverge)	10	1,030 (593)	975 (582)	926 (541)	38.0 (38.2)	37.1 (36.3)	33.0 (34.5)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (F)	E (E)	D (D)
Between I-95 NB to Cypress Creek Road WB Off-Ramp and Cypress Creek Road EB & WB to I-95 NB On-Ramp	Mainline	11	6,055 (6,521)	5,946 (6,201)	5,289 (5,927)	30.4 (30.4)	30.4 (30.4)	30.4 (30.4)	0.83 (0.83)	0.83 (0.83)	0.83 (0.83)	D (D)	D (D)	D (D)
Cypress Creek Road EB & WB to I-95 NB	On-Ramp (Merge)	12	1,635 (1,810)	1,497 (1,595)	1,299 (1,499)	53.3 (69.5)	51.1 (56.7)	41.3 (50.8)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between Cypress Creek Road EB & WB to I-95 NB On-Ramp and I-95 NB to Atlantic Boulevard EB & WB Off-Ramp	Mainline													
Between Cypress Creek Road EB & WB to I-95 NB On-Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes at Atlantic Blvd	Mainline	13	7,690 (8,331)	7,443 (7,796)	6,588 (7,426)	27.5 (28.3)	27.4 (27.7)	26.9 (27.4)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)
I-95 NB GP Lanes to I-95 NB HOT Lanes before Atlantic Boulevard	Off-Ramp (Diverge)	14	892 (634)	793 (459)	200 (132)	30.3 (33.0)	29.3 (30.7)	25.8 (29.2)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	C (D)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes at Atlantic Blvd and I-95 NB to Atlantic Boulevard EB & WB Off-Ramp	Mainline	15	6,798 (7,697)	6,650 (7,337)	6,388 (7,294)	26.5 (26.5)	26.5 (26.5)	26.5 (26.5)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)
I-95 NB to Atlantic Boulevard EB & WB	Off-Ramp (Diverge)	16	1,291 (1,599)	1,234 (1,430)	1,302 (1,483)	37.0 (42.4)	36.1 (40.2)	34.6 (40.0)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Atlantic Boulevard EB & WB Off-Ramp and Atlantic Boulevard EB to I-95 NB On-Ramp	Mainline	17	5,507 (6,098)	5,416 (5,907)	5,086 (5,811)	35.7 (33.6)	35.1 (34.3)	34.6 (34.2)	0.91 (0.88)	0.90 (0.89)	0.90 (0.89)	E (D)	E (D)	D (D)
Atlantic Boulevard EB to I-95 NB	On-Ramp (Merge)	18	628 (823)	676 (754)	728 (761)	36.2 (44.9)	35.9 (41.3)	33.8 (40.3)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	E (E)	E (E)	D (E)
Between Atlantic Boulevard EB to I-95 NB On-Ramp and Atlantic Boulevard WB to I-95 NB On-Ramp	Mainline	19	6,135 (6,921)	6,092 (6,661)	5,814 (6,572)	35.4 (36.2)	36.0 (36.9)	36.0 (36.7)	0.91 (0.92)	0.92 (0.93)	0.92 (0.92)	E (E)	E (E)	E (E)
Atlantic Boulevard WB to I-95 NB	On-Ramp (Merge)	20	653 (576)	595 (516)	594 (538)	43.1 (58.0)	41.7 (48.8)	38.9 (47.4)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between Atlantic Boulevard WB to I-95 NB On-Ramp and I-95 NB to Copans Road EB & WB Off-Ramp	Mainline	21	6,788 (7,497)	6,687 (7,177)	6,408 (7,110)	26.5 (26.5)	26.5 (26.5)	26.5 (26.5)	0.75 (0.75)	0.75 (0.75)	0.75 (0.75)	D (D)	D (D)	D (D)
I-95 NB to Copans Road EB & WB	Off-Ramp (Diverge)	22	1,799 (1,739)	1,790 (1,652)	1,521 (1,437)	36.9 (41.2)	36.4 (39.2)	34.7 (38.8)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Copans Road EB & WB Off-Ramp and Copans Road EB to I-95 NB On-Ramp	Mainline	23	4,989 (5,758)	4,897 (5,525)	4,887 (5,673)	37.3 (38.3)	38.1 (39.1)	38.1 (39.2)	0.93 (0.94)	0.94 (0.95)	0.94 (0.95)	E (E)	E (E)	E (E)
Copans Road EB to I-95 NB	On-Ramp (Merge)	24	484 (402)	424 (345)	420 (339)	31.3 (36.3)	30.3 (34.1)	30.2 (35.1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	D (E)	D (D)	D (E)
Between Copans Road EB to I-95 NB On-Ramp and Copans Road WB to I-95 NB On-Ramp	Mainline	1	5,473 (6,160)	5,321 (5,870)	5,307 (6,012)	27.5 (34.8)	26.5 (32.1)	26.4 (33.4)	0.77 (0.87)	0.75 (0.83)	0.75 (0.85)	D (D)	D (D)	D (D)
Between Copans Road WB to I-95 NB On-Ramp and I-95 NB to Sample Road EB & WB Off-Ramp	Weaving (Type A)	2	5,947 (6,566)	5,686 (6,269)	5,669 (6,402)	28.8 (32.0)	26.5 (29.8)	26.4 (29.9)	0.76 (0.82)	0.70 (0.77)	0.70 (0.76)	D (D)	C (D)	C (D)
Between I-95 NB to Sample Road EB & WB Off-Ramp and Sample Road EB to I-95 NB On-Ramp	Mainline	3	4,326 (4,803)	4,201 (4,673)	4,191 (4,883)	31.1 (24.7)	29.1 (24.0)	28.9 (25.2)	0.84 (0.68)	0.80 (0.66)	0.80 (0.69)	D (C)	D (C)	D (C)
Sample Road EB to I-95 NB	On-Ramp (Merge)	4	560 (471)	559 (468)	550 (465)	27.7 (28.0)	26.9 (27.3)	26.8 (28.5)	0.92 (0.74)	0.88 (0.72)	0.88 (0.75)	C (D)	C (C)	C (D)
Between Sample Road EB to I-95 NB On-Ramp and Sample Road WB to I-95 NB On-Ramp	Mainline	5	4,886 (5,274)	4,760 (5,141)	4,741 (5,348)	36.7 (27.8)	33.9 (27.1)	33.6 (28.2)	0.92 (0.74)	0.88 (0.72)	0.88 (0.75)	E (D)	D (D)	D (D)
Sample Road WB to I-95 NB	On-Ramp (Merge)	6	492 (396)	488 (392)	360 (340)	30.7 (28.5)	29.8 (27.7)	28.8 (28.7)	0.99 (0.80)	0.95 (0.78)	0.93 (0.80)	OK (OK)	OK (OK)	OK (OK)
Between Sample Road WB to I-95 NB On-Ramp and I-95 NB to SW 10th Street EB & WB Off-Ramp	Mainline													
Between Sample Road WB to I-95 NB On-Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes before SW 10th Street	Mainline	7	5,378 (5,670)	5,248 (5,533)	5,101 (5,688)	26.1 (21.7)	24.9 (21.2)	24.2 (21.8)	0.83 (0.80)	0.71 (0.59)	0.70 (0.60)	D (C)	C (C)	C (C)
I-95 NB HOT Lanes to I-95 NB GP Lanes before SW 10th Street	On-Ramp (Merge)	8	1,511 (883)	1,537 (895)	1,819 (784)	30.0 (36.5)	29.5 (35.7)	30.6 (35.8)	1.00 (0.92)	0.87 (0.68)	0.89 (0.68)	D (E)	D (E)	D (E)

Table 6.6A HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments														
Location	Roadway	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)			Density Range AM(PM)			V/C AM(PM)			LOS AM(PM)		
			2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build
I-95 Northbound														
Between I-95 NB HOT Lanes to I-95 NB GP Lanes at SW 10th St and I-95 NB to SW 10th Street EB & WB Off-Ramp	Mainline	9	6,889 (6,553)	6,785 (6,428)	6,920 (6,472)	26.2 (25.7)	26.1 (25.1)	26.3 (25.3)	1.00 (0.92)	0.75 (0.68)	0.75 (0.68)	D (C)	D (C)	D (C)
I-95 NB to SW 10th Street EB & WB	Off-Ramp (Major Diverge)*	10	1,395 (1,343)	1,146 (1,202)	1,008 (1,122)	18.8 (17.9)*	5.5 (3.5)*	5.9 (3.1)*	1.00 (0.92)	1.00 (0.91)	1.00 (0.91)	B (B)*	A (A)*	A (A)*
Between I-95 NB to SW 10th Street EB & WB Off-Ramp and SW 10th Street EB & WB to I-95 NB On-Ramp	Mainline	11												
Between I-95 NB to SW 10th Street EB & WB Off-Ramp and SW 10th Street EB to I-95 NB On-Ramp	Mainline	11	5,494 (5,210)	5,639 (5,226)	5,912 (5,350)	35.0 (27.2)	37.0 (27.3)	37.1 (28.1)	0.83 (0.73)	0.93 (0.74)	0.93 (0.75)	D (D)	E (D)	E (D)
SW 10th Street EB & WB to I-95 NB	On-Ramp (Merge)													
SW 10th Street EB to I-95 NB	On-Ramp (Merge)	12	690 (923)	514 (796)	501 (732)	37.6 (34.6)	37.1 (34.0)	39.5 (34.4)	1.00 (0.91)	1.00 (0.85)	1.00 (0.86)	OK (OK)	OK (OK)	OK (OK)
Between SW 10th Street EB & WB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard EB Off-Ramp	Mainline													
SW 10th Street WB to I-95 NB	On-Ramp (Merge)	13	743 (316)	599 (228)	584 (276)	28.4 (37.1)	28.4 (35.7)	28.5 (36.5)	1.00 (0.91)	0.75 (0.66)	0.75 (0.67)	D (E)	D (E)	D (E)
I-95 NB to Hillsboro Boulevard EB	Off-Ramp (Diverge)	14	765 (441)	702 (444)	716 (391)	37.1 (30.2)	36.1 (29.0)	37.5 (29.7)	1.00 (0.91)	1.00 (0.88)	1.00 (0.90)	OK (OK)	OK (OK)	OK (OK)
Between I-95 NB to Hillsboro Boulevard EB Off-Ramp and Hillsboro Boulevard EB to I-95 NB On-Ramp	Mainline	15	6,162 (6,008)	6,050 (5,806)	6,281 (5,967)	45.0 (33.3)	41.6 (31.6)	45.0 (33.0)	1.00 (0.85)	0.98 (0.82)	1.00 (0.84)	F (D)	E (D)	F (D)
Between Hillsboro Boulevard EB to I-95 NB On-Ramp and I-95 NB to Hillsboro Boulevard WB Off-Ramp	Weaving (Type A)	16	6,943 (6,382)	6,932 (6,102)	7,005 (6,342)	34.4 (29.3)	35.7 (27.3)	35.2 (28.5)	0.88 (0.76)	0.90 (0.72)	0.88 (0.75)	D (D)	F (C)	F (D)
Between I-95 NB to Hillsboro Boulevard WB Off-Ramp and Hillsboro Boulevard WB to I-95 NB On-Ramp	Mainline	17	6,521 (5,945)	6,354 (5,693)	6,429 (6,024)	31.0 (33.0)	31.2 (30.9)	33.5 (33.7)	0.85 (0.84)	0.85 (0.81)	0.88 (0.85)	D (D)	D (D)	D (D)
Hillsboro Boulevard WB to I-95 NB	On-Ramp (Merge)	18	1,086 (714)	1,063 (706)	818 (658)	67.4 (36.0)	58.5 (34.4)	52.9 (36.2)	1.00 (0.94)	1.00 (0.91)	1.00 (0.95)	F (E)	F (D)	F (E)
Between Hillsboro Boulevard WB to I-95 NB On-Ramp and I-95 NB to Palmetto Park Road EB & WB Off-Ramp	Mainline													
Between Hillsboro Boulevard WB to I-95 NB On-Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes at Palmetto Park Rd	Mainline	19	7,607 (6,659)	7,417 (6,399)	7,247 (6,682)	45.0 (41.0)	45.0 (37.7)	45.0 (41.3)	1.00 (0.94)	1.00 (0.91)	1.00 (0.95)	F (E)	F (E)	F (E)
I-95 NB GP Lanes to I-95 NB HOT Lanes before Palmetto Park Road	Off-Ramp (Diverge)	20	509 (282)	409 (336)	200 (120)	41.0 (35.6)	39.9 (34.1)	38.9 (35.8)	1.00 (0.94)	1.00 (0.91)	1.00 (0.95)	F (E)	F (D)	F (E)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes at Palmetto Park Rd and I-95 NB to Palmetto Park Road EB & WB Off-Ramp	Mainline	21	7,098 (6,377)	7,008 (6,063)	7,047 (6,562)	45.0 (37.4)	45.0 (34.1)	45.0 (39.7)	1.00 (0.90)	1.00 (0.86)	1.00 (0.93)	F (E)	F (D)	F (E)
I-95 NB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	22	1,414 (1,115)	1,306 (1,169)	1,294 (1,227)	38.8 (37.2)	38.3 (35.4)	38.5 (38.3)	1.00 (0.90)	1.00 (0.86)	1.00 (0.93)	F (E)	E (E)	E (E)
Between I-95 NB to Palmetto Park Road EB & WB Off-Ramp and Palmettto Park Road EB & WB to I-95 NB On-Ramp	Mainline	23	5,684 (5,262)	5,702 (4,894)	5,753 (5,335)	30.4 (27.5)	30.4 (25.2)	30.4 (28.0)	0.83 (0.74)	0.83 (0.69)	0.83 (0.75)	D (D)	D (C)	D (D)
Palmetto Park Road EB & WB to I-95 NB	On-Ramp (Merge)	24	1,626 (1,394)	1,672 (1,364)	1,359 (1,190)	46.8 (32.6)	47.1 (31.5)	47.9 (33.1)	1.00 (0.94)	1.00 (0.88)	1.00 (0.92)	OK (OK)	OK (OK)	OK (OK)
Between Palmetto Park Road EB & WB to I-95 NB On-Ramp and I-95 NB to Glades Road EB & WB Off-Ramp	Mainline	25	7,310 (6,656)	7,374 (6,258)	7,112 (6,525)	27.8 (27.0)	27.8 (25.4)	27.9 (26.6)	0.75 (0.70)	0.75 (0.66)	0.75 (0.69)	D (D)	D (C)	D (D)
I-95 Northbound - HOT Lanes														
South of Commercial Boulevard	Mainline	1	3,495 (2,892)	1,893 (1,319)	2,791 (1,809)	26.9 (21.8)	14.2 (9.9)	21.0 (13.6)	0.73 (0.60)	0.39 (0.27)	0.58 (0.38)	D (C)	B (A)	C (B)
I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp Between N of Commercial Boulevard and S of Cypress Creek Road	Off-Ramp (Diverge)	2	791 (660)	736 (281)	632 (405)	28.7 (23.2)	14.2 (9.0)	22.3 (13.4)	0.73 (0.60)	0.39 (0.27)	0.58 (0.38)	D (C)	B (A)	C (B)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp	Mainline	3	2,704 (2,232)	1,157 (1,038)	2,159 (1,404)	20.3 (16.8)	8.7 (7.8)	16.2 (10.6)	0.56 (0.47)	0.24 (0.22)	0.45 (0.29)	C (B)	A (A)	B (A)
I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp Between N of Cypress Creek Road and S of Atlantic Boulevard	On-Ramp (Merge)	4	892 (634)	793 (459)	200 (132)	25.2 (19.3)	11.7 (8.1)	15.3 (8.6)	0.75 (0.60)	0.41 (0.31)	0.49 (0.32)	C (B)	B (A)	B (A)
Between I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp and I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp	Mainline	5	3,596 (2,866)	1,950 (1,497)	2,359 (1,536)	27.9 (21.6)	14.7 (11.3)	17.7 (11.5)	0.75 (0.60)	0.41 (0.31)	0.49 (0.32)	D (C)	B (B)	B (B)
I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp Between N of Sample Road and S of SW 10th Street	Off-Ramp (Diverge)	6	1,511 (883)	1,537 (895)	1,819 (784)	31.4 (24.8)	16.5 (12.4)	20.2 (12.8)	0.75 (0.60)	0.41 (0.31)	0.49 (0.32)	D (C)	B (B)	C (B)
Between I-95 NB HOT Lanes to I-95 NB GP Lanes Ramp and I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp	Mainline	7	2,085 (1,983)	413 (602)	540 (752)	15.7 (14.9)	3.1 (4.5)	4.1 (5.7)	0.43 (0.41)	0.09 (0.13)	0.11 (0.16)	B (B)	A (A)	A (A)
I-95 NB GP Lanes to I-95 NB HOT Lanes Ramp Between N of Hillsboro Boulevard and S of Palmetto Park Road	On-Ramp (Merge)	8	509 (282)	409 (336)	200 (120)	17.1 (14.5)	2.6 (3.6)	2.0 (3.2)	0.54 (0.47)	0.17 (0.20)	0.15 (0.18)	B (B)	A (A)	A (A)
North of Palmetto Park Road	Mainline	9	2,594 (2,265)	822 (938)	740 (872)	19.5 (17.0)	6.2 (7.1)	5.6 (6.6)	0.54 (0.47)	0.17 (0.20)	0.15 (0.18)	C (B)	A (A)	A (A)

Table 6.6B
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)			Density Range AM(PM)			V/C AM(PM)			LOS AM(PM)		
			2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build
I-95 Southbound														
Between Glades Road EB to I-95 SB On-Ramp and I-95 SB to Palmetto Park Road Off-Ramp	Mainline	1	6,561 (7,556)	6,217 (7,433)	5,596 (6,679)	25.4 (26.1)	23.9 (26.1)	21.4 (25.9)	0.69 (0.75)	0.66 (0.75)	0.59 (0.71)	C (D)	C (D)	C (C)
I-95 SB to Palmetto Park Road EB & WB	Off-Ramp (Diverge)	2	1,306 (1,510)	1,134 (1,475)	955 (1,385)	30.9 (41.5)	28.8 (40.8)	25.3 (31.6)	0.92 (1.00)	0.88 (1.00)	0.79 (0.94)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Palmetto Park Road Off-Ramp and Palmetto Road WB to I-95 SB On-Ramp	Mainline	3	5,255 (6,046)	5,083 (5,958)	4,641 (5,294)	27.5 (35.3)	26.4 (35.7)	23.8 (27.7)	0.74 (0.91)	0.72 (0.91)	0.65 (0.75)	D (E)	D (E)	C (D)
Palmetto Park Road WB to I-95 SB	On-Ramp (Merge)	4	554 (625)	576 (593)	539 (610)	30.9 (42.1)	30.0 (40.6)	27.2 (31.5)	0.82 (1.00)	0.80 (1.00)	0.73 (0.84)	D (E)	D (E)	C (D)
Between Palmetto Park Road WB to I-95 SB On-Ramp and Palmetto Park Road EB to I-95 SB On-Ramp	Mainline	5	5,809 (6,671)	5,659 (6,551)	5,180 (5,904)	31.8 (37.5)	30.6 (37.8)	27.2 (32.7)	0.82 (0.94)	0.80 (0.94)	0.73 (0.84)	D (E)	D (E)	D (D)
Palmetto Park Road EB to I-95 SB	On-Ramp (Merge)	6	863 (455)	670 (427)	971 (380)	37.9 (50.5)	36.0 (47.5)	34.7 (35.9)	0.95 (1.00)	0.90 (1.00)	0.87 (0.89)	E (F)	E (E)	D (E)
Between Palmetto Park Road EB to I-95 SB On-Ramp and I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp	Mainline													
Between Palmetto Park Road EB to I-95 SB On-Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Boulevard	Mainline	7	6,672 (7,126)	6,329 (6,978)	6,151 (6,284)	41.1 (41.6)	36.9 (39.7)	35.0 (36.4)	0.95 (0.98)	0.90 (0.96)	0.87 (0.89)	E (E)	E (E)	D (E)
I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Boulevard	On-Ramp (Merge)	8	202 (156)	200 (284)	200 (200)	35.6 (78.6)	33.7 (74.7)	32.7 (33.5)	0.97 (1.00)	0.92 (1.00)	0.90 (0.92)	E (F)	D (F)	D (D)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes before Hillsboro Blvd and I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp	Mainline	9	6,874 (7,282)	6,529 (7,262)	6,351 (6,484)	44.2 (45.0)	39.3 (45.0)	37.1 (38.7)	0.97 (1.00)	0.92 (1.00)	0.90 (0.92)	E (F)	E (F)	E (E)
I-95 SB to Hillsboro Boulevard EB & WB	Off-Ramp (Diverge)	10	1,062 (1,601)	871 (1,291)	957 (1,200)	32.8 (39.9)	30.7 (39.8)	29.7 (30.5)	0.97 (1.00)	0.92 (1.00)	0.90 (0.92)	D (F)	D (F)	D (D)
Between I-95 SB to Hillsboro Boulevard EB & WB Off-Ramp and Hillsboro Boulevard WB to I-95 SB On-Ramp	Mainline	11	5,812 (5,681)	5,658 (5,971)	5,394 (5,284)	31.9 (37.2)	30.6 (37.6)	28.6 (27.9)	0.82 (0.93)	0.80 (0.94)	0.76 (0.75)	D (E)	D (E)	D (D)
Hillsboro Boulevard WB to I-95 SB	On-Ramp (Merge)	12	360 (511)	333 (483)	297 (418)	33.8 (37.2)	32.7 (39.5)	30.8 (30.8)	0.87 (1.00)	0.84 (1.00)	0.80 (0.80)	D (E)	D (E)	D (D)
Between Hillsboro Boulevard WB to I-95 SB On-Ramp and Hillsboro Boulevard EB to I-95 SB On-Ramp	Mainline	13	6,172 (6,192)	5,991 (6,454)	5,691 (5,702)	34.9 (45.0)	33.2 (45.0)	30.6 (30.7)	0.87 (1.00)	0.84 (1.00)	0.80 (0.80)	D (F)	D (F)	D (D)
Hillsboro Boulevard EB to I-95 SB	On-Ramp (Merge)													
I-95 SB to SW 10th Street EB & WB	Off-Ramp (Diverge)													
Between Hillsboro Boulevard EB to I-95 SB On-Ramp and I-95 SB to SW 10th Street EB & WB On-Ramp	Weaving (Type B)	14	6,889 (6,741)	6,667 (7,029)	6,311 (6,141)	29.4 (27.2)	27.8 (28.5)	26.0 (24.4)	0.75 (0.76)	0.72 (0.76)	0.69 (0.66)	D (C)	C (D)	C (C)
Between I-95 SB to SW 10th Street EB & WB Off-Ramp and SW 10th Street WB & EB to I-95 SB On-Ramp	Mainline	15	5,525 (5,710)	5,475 (5,986)	5,203 (5,181)	29.4 (30.4)	29.0 (30.4)	27.1 (27.0)	0.78 (0.83)	0.77 (0.83)	0.73 (0.73)	D (D)	D (D)	D (D)
SW 10th Street WB & EB to I-95 SB	On-Ramp (Merge)	16	1,368 (1,193)	1,276 (1,213)	1,168 (1,139)	35.0 (47.1)	33.7 (52.0)	32.1 (31.8)	0.97 (1.00)	0.95 (1.00)	0.90 (0.89)	OK (OK)	OK (OK)	OK (OK)
Between SW 10th Street WB & EB to I-95 SB On-Ramp and I-95 SB to Sample Road EB & WB Off-Ramp	Mainline													
Between SW 10th Street WB & EB to I-95 SB On-Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road	Mainline	17	6,893 (6,903)	6,751 (7,199)	6,371 (6,320)	27.6 (26.9)	26.8 (27.1)	25.1 (24.9)	0.73 (0.75)	0.71 (0.75)	0.67 (0.67)	D (D)	D (D)	C (C)
I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road	Off-Ramp (Diverge)	18	667 (908)	565 (1,239)	546 (932)	37.8 (37.5)	36.7 (39.2)	34.7 (34.5)	0.97 (1.00)	0.95 (1.00)	0.90 (0.89)	E (E)	E (F)	D (D)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes before Sample Road and I-95 SB to Sample Road EB & WB Off-Ramp	Mainline	19	6,226 (5,995)	6,186 (5,960)	5,825 (5,388)	23.9 (26.5)	23.8 (26.5)	22.3 (20.6)	0.66 (0.75)	0.65 (0.75)	0.62 (0.57)	C (D)	C (D)	C (C)
I-95 SB to Sample Road EB & WB	Off-Ramp (Diverge)	20	1,011 (976)	924 (973)	848 (970)	28.9 (32.4)	28.7 (32.2)	26.6 (24.1)	0.88 (1.00)	0.87 (1.00)	0.82 (0.76)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Sample Road EB & WB Off-Ramp and Sample Road WB to I-95 SB On-Ramp	Mainline	21	5,215 (5,019)	5,262 (4,987)	4,977 (4,418)	27.2 (34.9)	27.5 (35.1)	25.7 (22.7)	0.74 (0.90)	0.74 (0.90)	0.70 (0.62)	D (D)	D (E)	C (C)
Sample Road WB to I-95 SB	On-Ramp (Merge)	22	870 (694)	747 (682)	670 (585)	31.9 (33.2)	31.5 (32.9)	29.4 (25.7)	0.86 (1.00)	0.85 (1.00)	0.80 (0.71)	D (D)	D (D)	D (C)
Between Sample Road WB to I-95 SB On-Ramp and Sample Road EB to I-95 SB On-Ramp	Mainline	23	6,085 (5,713)	6,009 (5,669)	5,647 (5,003)	34.0 (45.0)	33.3 (45.0)	30.3 (26.1)	0.86 (1.00)	0.85 (1.00)	0.80 (0.71)	D (F)	D (F)	D (D)
Between Sample Road EB to I-95 SB On-Ramp and I-95 SB to Copans Road WB Off-Ramp	Weaving (Type A)	24	6,909 (6,527)	6,831 (6,357)	6,463 (5,647)	30.0 (28.1)	29.5 (26.4)	27.5 (22.9)	0.77 (0.89)	0.76 (0.86)	0.72 (0.62)	D (D)	D (C)	C (C)
Between I-95 SB to Copans Road WB Off-Ramp and Copans Road WB to I-95 SB On-Ramp	Mainline	1	6,208 (5,872)	6,172 (5,860)	5,913 (5,245)	33.5 (30.5)	33.1 (30.4)	32.5 (27.4)	0.88 (0.83)	0.87 (0.83)	0.83 (0.74)	D (D)	D (D)	D (D)
Between Copans Road WB to I-95 SB On-Ramp and I-95 SB to Copans Road EB Off-Ramp	Weaving (Type A)	2	6,734 (6,515)	6,695 (6,483)	6,373 (5,758)	31.2 (30.7)	30.9 (30.3)	28.9 (25.9)	0.80 (0.79)	0.79 (0.78)	0.75 (0.69)	D (D)	D (D)	D (C)
Between I-95 SB to Copans Road EB Off-Ramp and Copans Road EB to I-95 SB On-Ramp	Mainline	3	6,391 (6,144)	6,354 (6,141)	6,033 (5,416)	30.4 (32.6)	30.8 (33.1)	33.6 (28.6)	0.83 (0.87)	0.84 (0.88)	0.85 (0.76)	D (D)	D (D)	D (D)
Copans Road EB to I-95 SB	On-Ramp (Merge)	4	1,217 (926)	1,133 (876)	937 (776)	62.2 (48.2)	58.8 (47.1)	35.6 (31.1)	1.00 (1.00)	1.00 (1.00)	0.98 (0.87)	OK (OK)	OK (OK)	OK (OK)
Between Copans Road EB to I-95 SB On-Ramp and I-95 SB to Atlantic Boulevard WB Off-Ramp	Mainline	5	7,608 (7,070)	7,487 (7,017)	6,970 (6,192)	26.5 (26.5)	26.5 (26.5)	27.3 (23.8)	0.75 (0.75)	0.75 (0.75)	0.74 (0.65)	D (D)	D (D)	D (C)
I-95 SB to Atlantic Boulevard WB	Off-Ramp (Diverge)	6	856 (807)	774 (817)	831 (853)	41.9 (38.6)	41.1 (38.3)	33.3 (28.7)	1.00 (1.00)	1.00 (1.00)	0.98 (0.87)	OK (OK)	OK (OK)	OK (OK)
Between I-95 SB to Atlantic Boulevard WB Off-Ramp and I-95 SB to Atlantic Boulevard EB Off-Ramp	Mainline	7	6,752 (6,263)	6,713 (6,200)	6,139 (5,339)	45.0 (45.0)	45.0 (45.0)	34.6 (28.1)	1.00 (1.00)	1.00 (1.00)	0.87 (0.75)	F (F)	F (F)	D (D)
I-95 SB to Atlantic Boulevard EB	Off-Ramp (Diverge)	8	450 (538)	410 (575)	462 (568)	36.7 (33.9)	36.5 (33.5)	30.7 (26.1)	1.00 (1.00)	1.00 (1.00)	0.87 (0.75)	E (D)	E (D)	D (C)

Table 6.6B
HCM Future Traffic Operational Analysis Results - Basic Freeway Segments, Ramp Merge/Diverge and Weaving Segments

Location	Roadway	Build 2040/2030/2020 HCS Segment #	DDHV AM (PM)			Density Range AM(PM)			V/C AM(PM)			LOS AM(PM)		
			2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build	2040 Build	2030 Build	2020 Build
I-95 Southbound														
Between I-95 SB to Atlantic Boulevard EB Off-Ramp and Atlantic Boulevard WB & EB to I-95 SB On-Ramp	Mainline	9	6,302 (5,725)	6,303 (5,625)	5,677 (4,771)	32.0 (31.3)	31.1 (30.8)	30.5 (24.5)	0.86 (0.85)	0.85 (0.84)	0.80 (0.67)	D (D)	D (D)	D (C)
Atlantic Boulevard WB & EB to I-95 SB	On-Ramp (Merge)	10	994 (1,072)	1,093 (1,130)	1,104 (1,081)	52.0 (42.7)	55.1 (42.3)	34.7 (29.2)	1.00 (1.00)	1.00 (1.00)	0.96 (0.82)	OK (OK)	OK (OK)	OK (OK)
Between Atlantic Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB to Cypress Creek Road EB & WB Off-Ramp	Mainline													
Between Atlantic Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes at Cypress Creek Rd	Mainline	11	7,296 (6,797)	7,396 (6,755)	6,781 (5,852)	27.2 (26.7)	27.4 (26.7)	26.9 (22.9)	0.75 (0.75)	0.75 (0.75)	0.72 (0.62)	D (D)	D (D)	D (C)
I-95 SB HOT Lanes to I-95 SB GP Lanes before Cypress Creek Road	On-Ramp (Merge)	12	418 (461)	318 (404)	200 (201)	36.1 (32.6)	36.7 (32.1)	36.6 (31.3)	0.79 (0.80)	0.78 (0.79)	0.74 (0.64)	E (D)	E (D)	E (D)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes at Cypress Creek Rd and I-95 SB to Cypress Creek Road EB & WB Off-Ramp	Mainline	13	7,714 (7,258)	7,714 (7,159)	6,981 (6,053)	28.7 (28.9)	28.1 (28.6)	27.4 (23.2)	0.79 (0.80)	0.78 (0.79)	0.74 (0.64)	D (D)	D (D)	D (C)
I-95 SB to Cypress Creek Road EB & WB	Off-Ramp (Diverge)	14	2,085 (2,269)	1,940 (1,933)	1,788 (1,791)	26.5 (26.4)	26.5 (26.4)	27.0 (21.2)	0.75 (0.75)	0.75 (0.75)	0.74 (0.64)	C (C)	C (C)	C (C)
Between I-95 SB to Cypress Creek Road EB & WB Off-Ramp and Cypress Creek Road WB to I-95 SB On-Ramp	Mainline	15	5,629 (4,989)	5,774 (5,226)	5,193 (4,262)	36.3 (36.5)	36.3 (36.5)	27.1 (21.9)	0.92 (0.92)	0.92 (0.92)	0.73 (0.60)	E (E)	E (E)	D (C)
Cypress Creek Road WB to I-95 SB	On-Ramp (Merge)	16	570 (553)	570 (551)	513 (521)	36.6 (31.7)	37.9 (33.4)	29.1 (23.7)	1.00 (1.00)	1.00 (1.00)	0.80 (0.67)	E (D)	E (D)	D (C)
Between Cypress Creek Road WB to I-95 SB On-Ramp and Park & Ride Lot Exit to I-95 SB On-Ramp	Mainline	17	6,199 (5,542)	6,344 (5,777)	5,706 (4,783)	43.8 (41.9)	43.8 (41.9)	30.8 (24.8)	1.00 (0.98)	1.00 (0.98)	0.80 (0.67)	E (E)	E (E)	D (C)
Park & Ride Lot Exit to I-95 SB	On-Ramp (Merge)	18	30 (150)	30 (150)	30 (150)	38.6 (35.8)	39.7 (36.2)	31.7 (27.0)	0.96 (0.92)	0.98 (0.92)	0.81 (0.70)	E (E)	E (E)	D (C)
Between Andrews Avenue SB to I-95 SB On-Ramp and I-95 SB to Commercial Boulevard EB & WB Off-Ramp	Weaving (Type A)*	19	7,472 (7,435)	7,460 (7,476)	6,615 (6,376)	21.0 (19.8)*	21.0 (19.5)*	19.0 (16.5)*	0.91 (0.96)	0.90 (0.96)	0.84 (0.86)	C (B)*	C (B)*	B (B)*
Between I-95 SB to Commercial Boulevard EB & WB Off-Ramp and Commercial Boulevard EB to I-95 SB On-Ramp	Mainline	20	6,342 (6,175)	6,292 (6,208)	5,478 (5,288)	35.2 (30.4)	33.9 (30.4)	29.0 (27.7)	0.91 (0.83)	0.89 (0.83)	0.77 (0.75)	E (D)	D (D)	D (D)
Commercial Boulevard EB to I-95 SB	On-Ramp (Merge)	21	671 (1,177)	792 (1,379)	840 (1,273)	46.3 (56.1)	47.9 (57.1)	32.1 (33.3)	1.00 (1.00)	1.00 (1.00)	0.89 (0.92)	OK (OK)	OK (OK)	OK (OK)
Commercial Boulevard WB to I-95 SB	On-Ramp (Merge)	22	1,035 (1,132)	1,005 (1,109)	798 (1,028)	35.7 (38.3)	36.2 (41.2)	45.5 (49.2)	0.86 (0.87)	0.86 (0.89)	0.75 (0.80)	E (E)	E (E)	E (E)
Between Commercial Boulevard WB to I-95 SB On-Ramp and I-95 SB to Oakland Park Boulevard EB & WB Off-Ramp	Mainline													
Between Commercial Boulevard WB & EB to I-95 SB On-Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard	Mainline	23	8,048 (8,484)	8,089 (8,696)	7,116 (7,589)	32.4 (33.1)	32.2 (34.4)	28.2 (30.6)	0.86 (0.87)	0.86 (0.89)	0.75 (0.80)	D (D)	D (D)	D (D)
I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard	Off-Ramp (Diverge)	24	707 (799)	588 (754)	449 (777)	30.9 (32.7)	31.1 (33.6)	38.3 (40.9)	0.85 (0.86)	0.84 (0.88)	0.74 (0.79)	D (D)	D (D)	E (E)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes before Oakland Park Boulevard and I-95 SB to Oakland Park Boulevard EB & WB Off-Ramp	Mainline	25	7,341 (7,685)	7,501 (7,942)	6,667 (6,812)	31.6 (32.3)	31.5 (33.5)	24.4 (25.0)	0.85 (0.86)	0.84 (0.88)	0.69 (0.71)	D (D)	D (D)	C (C)
I-95 Southbound - HOT Lanes														
North of Palmetto Park Road	Mainline	1	1,620 (2,353)	911 (1,629)	691 (981)	12.2 (17.7)	6.8 (12.2)	5.2 (7.4)	0.34 (0.49)	0.19 (0.34)	0.14 (0.20)	B (B)	A (B)	A (A)
I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp Between S of Palmetto Park Road and N of Hillsboro Boulevard	Off-Ramp (Diverge)	2	202 (156)	200 (284)	200 (200)	11.7 (18.4)	5.3 (11.8)	3.3 (5.9)	0.34 (0.49)	0.19 (0.34)	0.14 (0.20)	B (B)	A (B)	A (A)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp	Mainline	3	1,418 (2,197)	711 (1,345)	491 (781)	10.7 (16.5)	5.3 (10.1)	3.7 (5.9)	0.30 (0.46)	0.15 (0.28)	0.10 (0.16)	A (B)	A (A)	A (A)
I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp Between S of SW 10th Street and N of Sample Road	On-Ramp (Merge)	4	667 (908)	565 (1,239)	546 (932)	12.9 (21.1)	6.3 (16.7)	4.3 (9.7)	0.43 (0.65)	0.27 (0.54)	0.22 (0.36)	B (C)	A (B)	A (A)
Between I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp and I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp	Mainline	5	2,085 (3,105)	1,276 (2,584)	1,037 (1,713)	15.7 (23.5)	9.6 (19.4)	7.8 (12.9)	0.43 (0.65)	0.27 (0.54)	0.22 (0.36)	B (C)	A (C)	A (B)
I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp Between S of Atlantic Boulevard and N of Cypress Creek Road	Off-Ramp (Diverge)	6	418 (461)	318 (404)	200 (201)	15.9 (25.2)	8.6 (20.4)	6.4 (12.6)	0.43 (0.65)	0.27 (0.54)	0.22 (0.36)	B (C)	A (C)	A (B)
Between I-95 SB HOT Lanes to I-95 SB GP Lanes Ramp and I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp	Mainline	7	1,667 (2,644)	958 (2,180)	837 (1,512)	12.5 (19.9)	7.2 (16.4)	6.3 (11.4)	0.35 (0.55)	0.20 (0.45)	0.17 (0.31)	B (C)	A (B)	A (B)
I-95 SB GP Lanes to I-95 SB HOT Lanes Ramp Between S of Commercial Boulevard and N of Oakland Park Boulevard	On-Ramp (Merge)	8	707 (799)	588 (754)	449 (777)	15.2 (24.0)	8.5 (19.8)	6.4 (14.5)	0.49 (0.72)	0.32 (0.61)	0.27 (0.48)	B (C)	A (B)	A (B)
South of Commercial Boulevard	Mainline	9	2,374 (3,443)	1,546 (2,934)	1,286 (2,289)	17.8 (26.4)	11.6 (22.1)	9.7 (17.2)	0.49 (0.72)	0.32 (0.61)	0.27 (0.48)	B (D)	B (C)	A (B)

A summary of the future operational analysis results is as follows:

Basic Freeway Analysis – The capacity analysis shows that the following numbers of basic freeway segments will operate at an unacceptable LOS:

- 2020 Build Alternative
  - Northbound four LOS E and four LOS F
  - Southbound two LOS E
- 2030 Build Alternative
  - Northbound six LOS E and three LOS F
  - Southbound seven LOS E and four LOS F
- 2040 Build Alternative
  - Northbound five LOS E and four LOS F
  - Southbound seven LOS E and four LOS F

Ramp Merge/Diverge Analysis – The capacity analysis shows that the following numbers of ramps will operate at an unacceptable LOS:

- 2020 Build Alternative
  - Northbound six LOS E and two LOS F
  - Southbound four LOS E
- 2030 Build Alternative
  - Northbound six LOS E and two LOS F
  - Southbound eight LOS E and three LOS F
- 2040 Build Alternative
  - Northbound five LOS E and four LOS F
  - Southbound eight LOS E and three LOS F

Weaving Analysis – The capacity analysis shows that the following numbers of weaving segments will operate at an unacceptable LOS:

- 2020 Build Alternative
  - Northbound one LOS F
- 2030 Build Alternative
  - Northbound one LOS F

Intersection Analysis – The capacity analysis shows that the following intersections will operate at an unacceptable LOS (worst peak period LOS):

- 2020 Build Alternative
  - Cypress Creek Road West Ramp Terminal (LOS E-AM/PM)
- 2030 Build Alternative
  - Cypress Creek Road West Ramp Terminal (LOS E-AM/PM)
- 2040 Build Alternative
  - Cypress Creek Road West Ramp Terminal (LOS F-PM)

A summary of the micro-simulation future operational analysis results is as follows:

Network Performance Statistics – A network performance evaluation is an important step when comparing the overall traffic conditions of the study area as a system. A comparison was made between the No-Build and Build Alternatives. The results are summarized in ***Table 6.6C.***

Table 6.6C
Network Performance Statistics

Statistics	No-Build		Build	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Total travel time [h], All Vehicle Types	66,771	77,866	48,614	42,805
Total delay time [h], All Vehicle Types	54,159	66,381	24,199	17,875
Number of vehicles that have left the network, All Vehicle Types	112,657	107,010	259,260	267,662
Number of vehicles in the network, All Vehicle Types	23,249	25,231	17,428	13,022

As shown in ***Table 6.6C***, in terms of the number of vehicles exiting the network, that figure is twice as high for the Build Alternative when comparing it to the No-Build Alternative, which indicates that the Build Alternative can process extensively more traffic than the No-Build Alternative. In terms of total travel time and delay time, the results for the No-Build Alternative are also significantly higher than those for the Build Alternative, which indicates congestion is much severer for the No-Build Alternative than for the Build Alternative.

VISSIM Simulation – A summary of the micro-simulation results is listed below:

- The No-Build Alternative will not be able to accommodate the future demand.
- The Build Alternative is superior to the No-Build Alternative in terms of projected traffic operations.
- The express lanes in the Build Alternative are anticipated to operate satisfactorily throughout the study area.
- The network statistics indicate that congestion is anticipated to be more severe for the No-Build Alternative when compared to the Build Alternative.
- The Build Alternative is anticipated to process twice as much traffic when compared to the No-Build Alternative.
- The total travel time and delay for the No-Build Alternative is anticipated to be significantly higher when compared to the Build Alternative.
- For the Build Alternative during the AM peak hour, the speed range on the general purpose lanes is from 8 MPH to 64 MPH.
- The speed range on the express lanes is from 44 MPH to 72 MPH.
- During the PM peak hour, the speed range on the general purpose lanes is from 10 MPH to 64 MPH.
- The speed on the express lanes is from 67 MPH to 72 MPH.

The recommended alternative 2040 traffic projections are anticipated to increase an average of 6% during the peak periods when compared to the No-Build Alternative. The recommended alternative will provide the needed capacity to accommodate future traffic growth into the design year 2040.

The recommended alternative express lanes are anticipated to operate at an acceptable LOS throughout the entire corridor, within the study limits. The express lanes will provide superior, consistent and dependable travel times, particularly during peak travel periods. Express lanes will service more vehicles than the existing HOV lanes. Through the use of dynamic pricing, FDOT will be able to manage the amount of traffic in the express lanes and maintain free-flowing speeds even when the general purpose lanes are congested. Motorists who choose to use the express lanes will benefit from reliable travel times. Long trip motorists that commute daily between counties will benefit from using the express lanes by improving their travel time during peak travel periods.

The operational analysis results show that almost every interchange will need some type of interchange improvement (short term and/or long term) in order to achieve an acceptable LOS. This PD&E study focused on providing improvements along the I-95 mainline only by evaluating the implementation of two tolled express lanes along the center of the corridor. Interchange improvements were not included in the scope of work of this study. The FDOT District Four programmed a future Interchange Improvements Master Plan Study that will evaluate short term and long term interchange improvements that could be implemented within the project limits to improve the access to and from the interstate corridor.

6.5 RIGHT OF WAY NEEDS AND RELOCATION

No right of way acquisition or relocations are anticipated to accommodate the roadway improvements required to implement the recommended alternative.

6.6 Preliminary Cost Estimates

Table 6.7
Cost Estimate

Financial Project Identification Number	Project Limit	Cost
Construction Cost Estimate		
409359-2	From Oakland Park Boulevard to Atlantic Boulevard	$48,894,000
409359-3	From Atlantic Boulevard to Sample Road	$45,123,000
409359-4	From Sample Road to the Broward/Palm Beach County Line	$56,807,000
409355-2	From the Broward/Palm Beach County Line to Glades Road	$27,393,000
Total Construction Cost		**$178,217,000**
Total Cost Estimate		
Cost Category		
Maintenance of Traffic (10%)		$17,821,700
Mobilization (8%)		$15,683,096
Design Build (12%)		$25,406,616
Non-Bid Components		$1,359,100
Construction Engineering and Inspection (6%)		$10,063,020
Total Cost Estimate		**$249,180,532**

6.7 SCHEDULE AND FUNDING

This project is included in the 2035 LRTP, TIP and STIP. The design and construction phases are funded in the FDOT Work Program under four Financial Project Identification (FPID) numbers (see ***Table 6.8***).

Table 6.8
Project Schedule and Funding Plan

Financial Project Identification Number	Project Limit	Design		Construction	
		Fiscal Year	Funds	Fiscal Year	Funds
409359-2	From Oakland Park Boulevard to Atlantic Boulevard	2015	$1,700,000	2022	$85,600,000
409359-3	From Atlantic Boulevard to Sample Road	2015	$1,500,000	2024	$72,500,000
409359-4	From Sample Road to the Broward/Palm Beach County Line	2015	$1,100,000	2024	$82,700,000
409355-2	From the Broward/Palm Beach County Line to Glades Road	2015	$900,000	2024	$46,800,000

Source: FDOT Work Program

The design and construction of the proposed improvements from north of Oakland Park Boulevard to south of Glades Road are currently federally funded. Design is funded in the 1st five years of the FDOT Work Program (FY 2015) and construction is funded in the 2nd five years of the SIS Plan (FY 2022 and 2024). The 2nd five years of the SIS Plan is comprised of SIS projects that are scheduled to be funded in the five years (2019-2023) following the 1st five years of the FDOT Work Program (FY 2014-2018). Construction funding and delivery methods will be evaluated by the FDOT to determine the final construction funding plan for this segment and the entire next phase of 95 Express from Stirling Road (SR 848) to Linton Boulevard. Work Program Public Hearings will be held in November of this year (2013). During these annual hearings, the public will be informed of the federal funding associated with this project.

6.8 PEDESTRIAN AND BICYCLE FACILITIES

I-95 is a limited access facility with no designated pedestrian or bicycle accommodations along the corridor. Therefore, no pedestrian or bicycle facilities are planned for the I-95 corridor.

6.9 UTILITY IMPACTS

Nine utility companies could potentially be impacted by the proposed improvements. ***Table 6.9*** shows an approximate number of potential impacts for each utility company.

Table 6.9
Summary of Potential Utility Impacts

Utility	Number of Impacts
AT&T	14
Broward County OES[1,2]	23
City of Boca Raton	13
City of Deerfield Beach	8
City of Fort Lauderdale	5
City of Pompano Beach	4
FDOT[2]	4
FPL	25
Peoples Gas/TECO	6

1 Two force main facilities are abandoned
2 One communication facility is co-located between Broward County OES and FDOT

Coordination with the utility companies will continue during and after the PD&E transportation phase. Further refinement of the proposed design and utility field verification will be carried out during the final Design transportation phase. Special construction equipment and techniques may be utilized to avoid utility conflicts. In unique locations, where the special construction equipment and techniques cannot avoid utility relocations, the need for relocation of the particular utility and the cost will be determined during the Design transportation phase.

6.10 Preliminary Traffic Control Plan

The recommended alternative traffic control plan proposes to keep all travel lanes open at all times during construction, except at the southbound section under the Andrews Avenue overpass. This section may require a lane closure as part of one of the MOT phases due to the narrow footprint under the overpass structure. Short lane closures may be necessary during off-peaks to change construction phases. Advance notice of any lane closure will be given to minimize disruption to roadway users. ***Figures* 6.4-6.7** show the typical sections during construction. ***Appendix M*** shows the detailed MOT phases at selected locations along the corridor, including the bridge structures. The roadway mainline will consist of two MOT phases (see ***Figures* 6.4-6.6**).

- **Phase I –** Shift traffic to the inside
  - Remove the HOV lane designation. The HOV lane will become a general purpose lane.
  - Reduce the inside shoulder width to 10'.
  - Reduce the travel lanes width to 11' (except for the center lane).
  - Overbuild the pavement corridor approximately 0.25' to move the crown point to the outside so it is temporarily located between the second and third travel lane.
  - Construct the proposed outside widening section.
- **Phase II –** Shift travel lanes to final location
  - Overbuild the pavement corridor approximately 0.25' to move the crown point to the outside to the final location between the express lanes and the general purpose lanes (4' buffer).
  - Resurface the remaining pavement corridor.

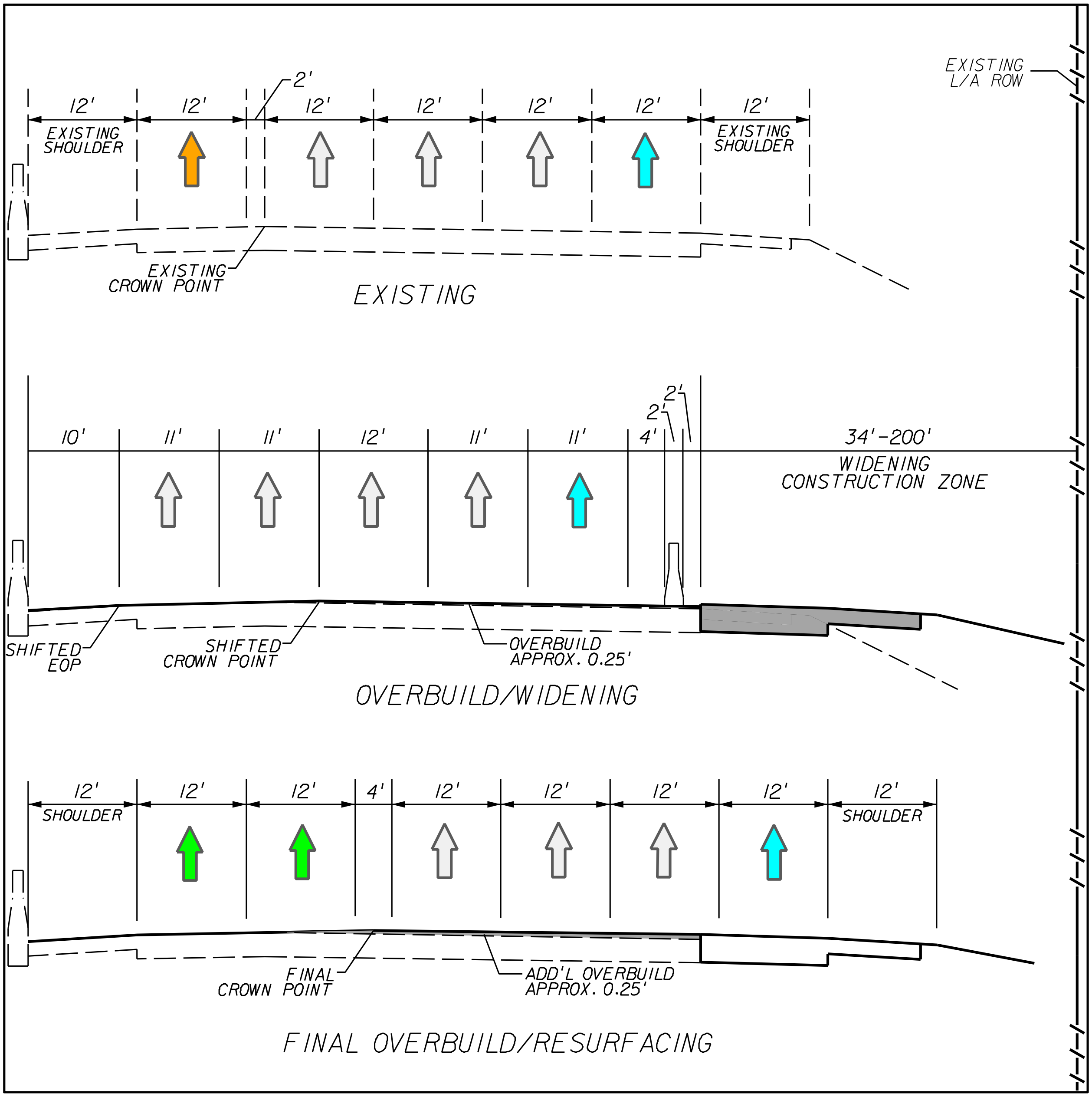


Figure 6.4 – Maintenance of Traffic Typical Section (Mainline Widening with Existing Auxiliary Lane)

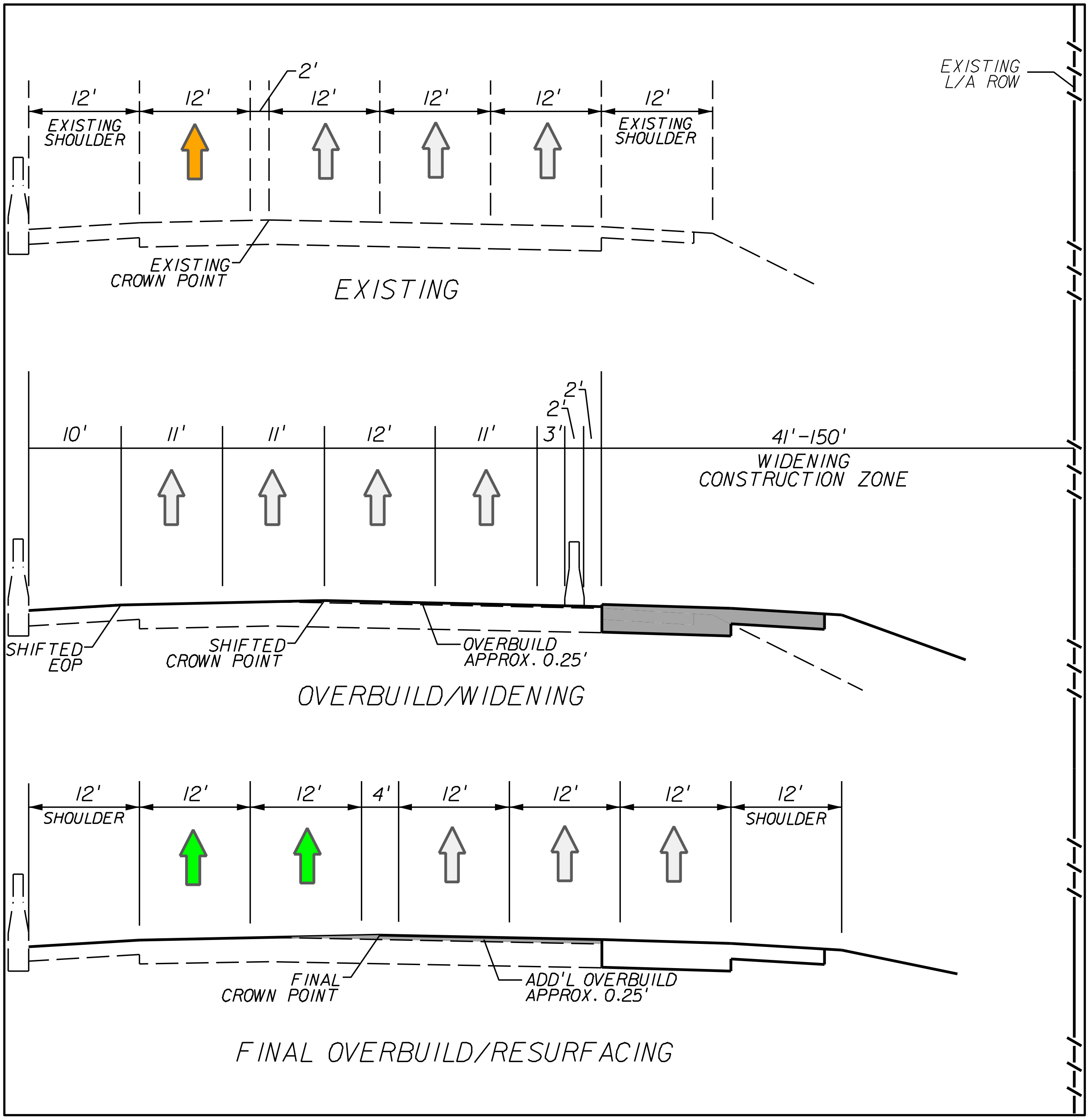


Figure 6.5 – Maintenance of Traffic Typical Section (Mainline Widening without Existing Auxiliary Lane)

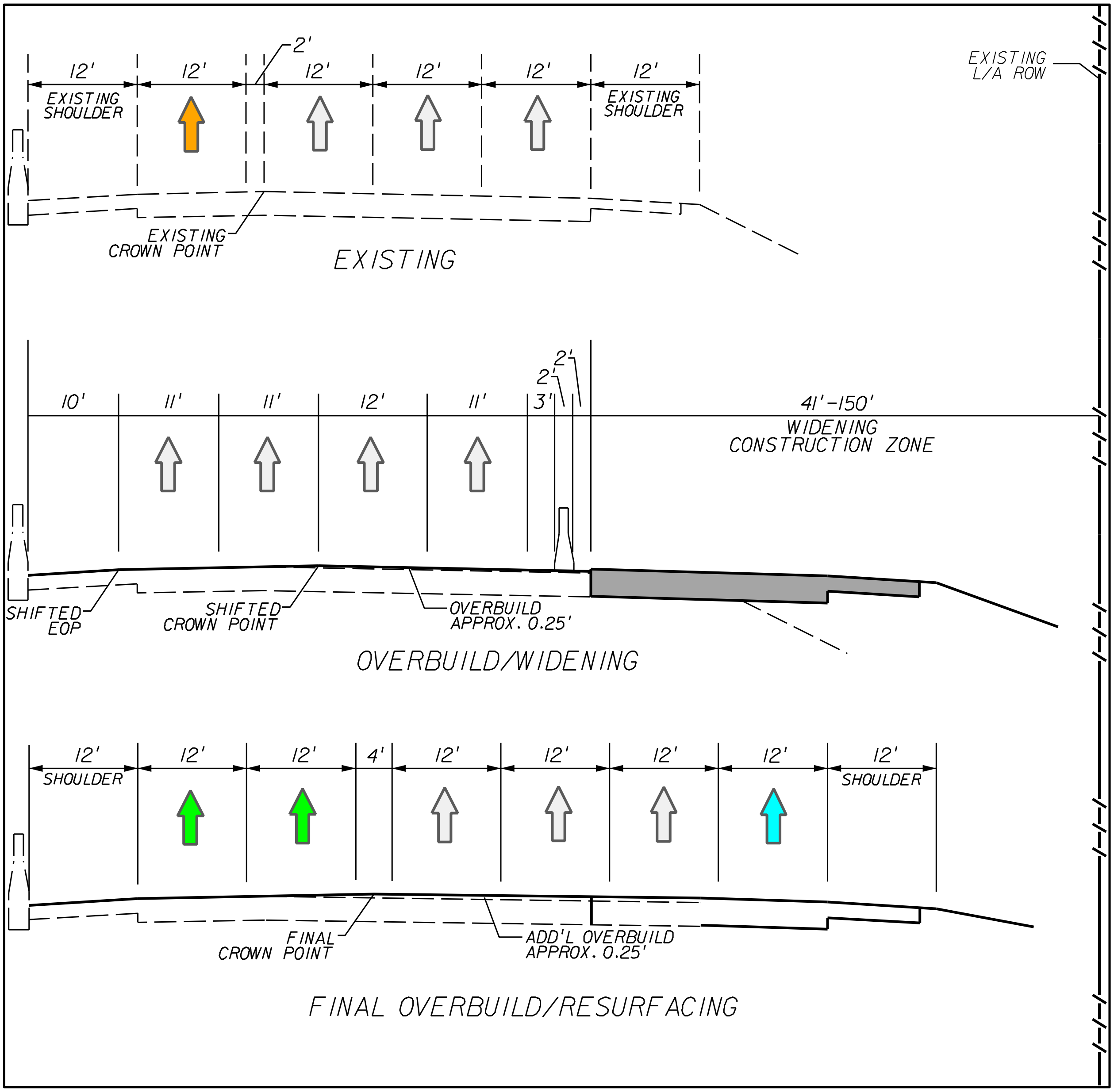


Figure 6.6 – Maintenance of Traffic Typical Section (Mainline Widening including New Auxiliary Lane)

The roadway mainline under the bridge overpasses will consist of three MOT phases (see ***Figure 6.7***).

- **Phase I –** Shift traffic to the inside
  - Remove the HOV lane designation. The HOV lane will become a general purpose lane.
  - Reduce the inside shoulder width.
  - Reduce the travel lanes width to 11' (except for the center lane).
  - Overbuild the pavement corridor approximately 0.25' to move the crown point to the outside so it is temporarily located between the second and third travel lane.
  - Construct the proposed outside widening section.
- **Phase II –** Shift traffic to the outside
  - Reduce the outside shoulder width.
  - Maintain all travel lanes at 11' (except for the center lane).
  - Reconstruct the inside to lower the pavement in order to maintain the existing vertical clearance.
- **Phase III –** Shift travel lanes to final location
  - Mill and Resurface the remaining pavement corridor and move the crown point to the outside to the final location between the express lanes and the general purpose lanes (4' buffer).

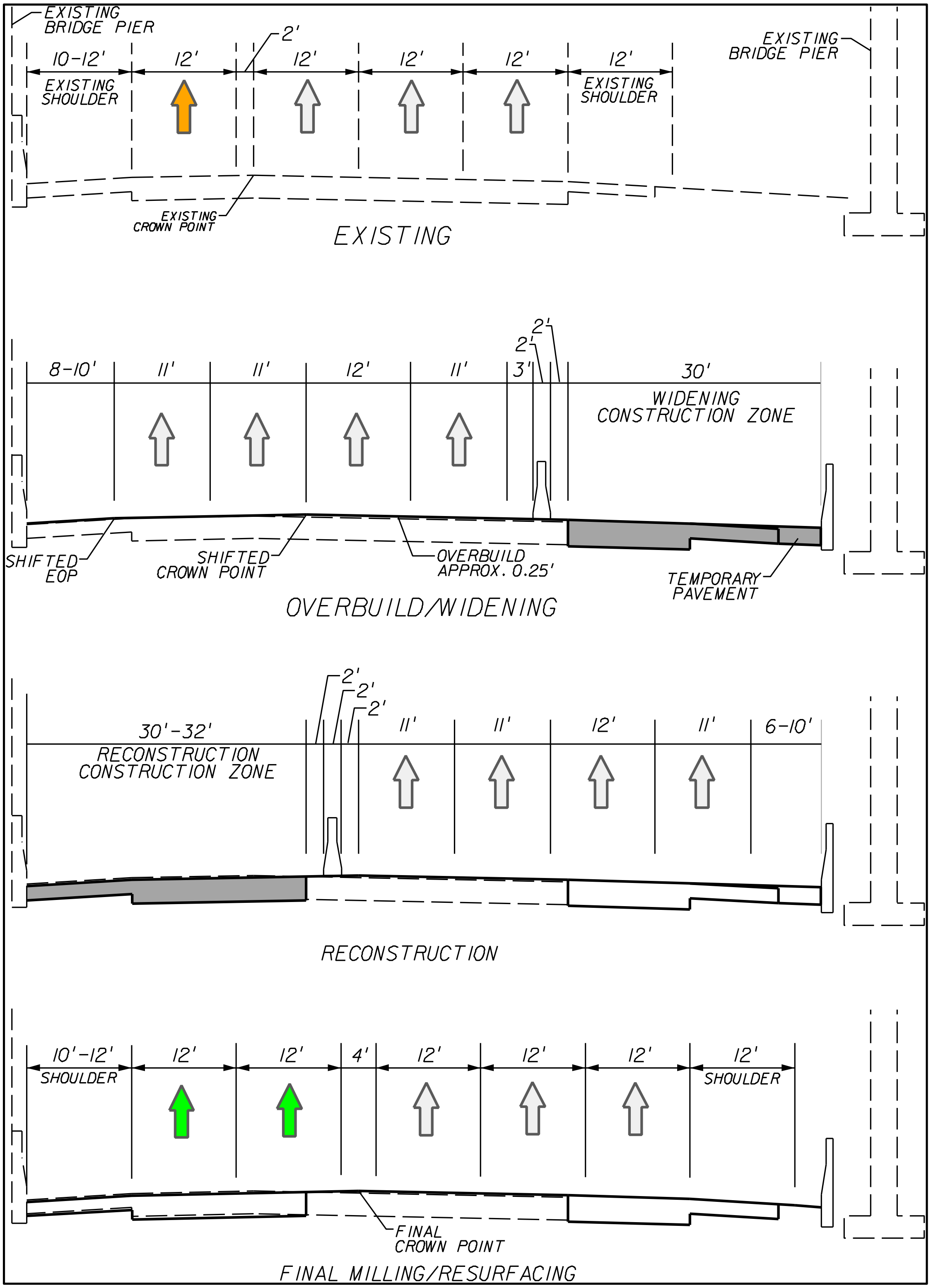


Figure 6.7 – Maintenance of Traffic Typical Section (Mainline Widening under the Overpasses)

6.11 DRAINAGE

Stormwater treatment of the project runoff will be provided as required by the SFWMD Environmental Resource Permit (ERP). The Stormwater management systems proposed as part of the recommended alternative meet existing water quality standards set forth in Chapter 62-302 of the Florida Administrative Code. Water quality will be provided for the increase in impervious area. The post-development discharge volume will be attenuated so that it is not greater than the pre-development discharge. The project area outfalls to water bodies identified by the Florida Department of Environmental Protection (FDEP) as impaired waters. Nutrient loading calculations were performed based on the modified Harper methodology where the pre-development condition is the existing condition. The proposed stormwater management system will not require acquisition of right of way.

The proposed drainage designs for the four basins are described below and summarized in ***Appendix D***.

Basin 1 – The limits for Basin 1 are from the begin project, located just north of Oakland Park Boulevard, to Commercial Boulevard. Stormwater runoff is routed via storm sewers and drainage swales into a wet pond located in the northwest quadrant of the I-95 interchange with Oakland Park Boulevard. The recommended alternative widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by re-working the eastbound swales of I-95, thus increasing the storage capacity of these swales.

Basin 2 – The limits for Basin 2 are from Commercial Boulevard to McNab Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into the C-14 Canal. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating four of the interchange infield areas within the I-95 interchange with Cypress Creek Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

Basin 3 – The limits for Basin 3 are from McNab Road to Copans Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into a tributary canal of the Pompano Canal located along the east side of I-95 just north of the interchange with Atlantic Boulevard. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating four of the interchange infield areas within the I-95 interchange with Atlantic Boulevard as well as four of the interchange infield areas within the I-95 interchange with Copans Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

Basin 4 – The limits for Basin 4 are from Copans Road to the end project, located just north of the I-95 interchange with Palmetto Park Road. Stormwater runoff is routed via storm sewers, interchange infield areas, and drainage swales into a tributary canal of the Hillsboro Canal located along the west side of I-95. The proposed widening of I-95 will increase the amount of impervious area and thus, the amount of stormwater runoff. This increase in runoff will be compensated for by excavating two of the interchange infield areas within the I-95 interchange with Copans Road, four of the interchange infield areas within the I-95 interchange with Sample Road, one of the interchange infield areas within the I-95 interchange with SW 10th Street, four of the interchange infield areas within the I-95 interchange with Hillsboro Boulevard, and two of the interchange infield areas within the I-95 interchange with Palmetto Park Road an additional one foot. This increase in available interchange infield storage volume will be able to provide for the additional required water quality detention requirements, as well as the required pre-post attenuation volumes. These interchange infield areas will become a water feature that could later be landscaped by the FDOT and/or the local municipality.

6.12 Environmental Impacts

6.12.1 Social and Economic

All of the proposed roadway improvements associated with the recommended alternative will occur within the existing FDOT right of way. Since the I-95 corridor is located along a highly urbanized area, which currently experiences impacts typical of a highly travelled expressway, no long term adverse impacts to community service facilities are anticipated as a result of the project implementation.

6.12.2 Cultural

6.12.2.1 *Section 4(f)*

All of the proposed roadway improvements associated with the recommended alternative will occur within the existing FDOT right of way. Therefore, no impacts to Section 4(f) are anticipated.

A *Section 4(f) Determination of Applicability* Report was prepared for the nine park/recreational Section 4(f) sites. The project would not acquire land from any of the Section 4(f) resources, and there would be no short-term or long term impacts to the resources by the proposed project. Access to all Section 4(f) resources would be maintained during construction because all of the Section 4(f) sites have local street access (no access from I-95). In addition, none of the sites were sensitive to proximity impacts, including noise. The FDOT and FHWA have determined that there will be no Section 4(f) involvement with these resources.

6.12.2.2 *Historic Sites/Districts*

All of the proposed roadway improvements associated with the recommended alternative will occur within the existing FDOT right of way. Therefore, no impacts to historic/archeological resources are anticipated.

A request for review letter and a copy of the CRAS were transmitted to the FHWA on March 5, 2013. The FHWA approved the CRAS on April 4, 2013, and provided the following comments:

> *FHWA concurs with the CRAS recommendations re NRHP-eligibility but finds no basis in the report for a determination of no impacts to 8BD3229 and 8PB10311 and 8BD4087. Please cc: Lynn Kelley, FDOT D4; Mark Clasgens, FHWA; and Roy Jackson, FDOT CEMO.*

The FHWA forwarded the request for review letter and a copy of the CRAS to the SHPO for review and concurrence on April 4, 2013. The SHPO concurred with the recommendations and findings in the letter on April 16, 2013.

A determination of effects letter and a copy of the CRAS were transmitted to the FHWA on August 13, 2013. The letter stated:

> *The FEC Railway and Hillsboro Canal have been determined eligible for listing in the NRHP. Based on the project information provided […] which discusses the improvements that will bridge over the resources but within the [right of way], the FDOT finds that the project will have no adverse effect on the significant railroad or canal or the characteristics that determine their National Register eligibility.*

The FHWA approved the recommendations and findings in the letter and forwarded the letter and a copy of the CRAS to the SHPO for review and concurrence. The SHPO concurred with the recommendations and findings in the letter.

6.12.2.3 *Archaeological Sites*

No newly or previously recorded archaeological sites have been identified within the archaeological APE. A reconnaissance survey confirmed that the APE has been altered by berming and ditching and the construction of the roadway. No subsurface testing was feasible, and the APE is considered to have a low probability for archaeological sites. Therefore, no impacts to archeological sites are anticipated as a result of the recommended alternative.

6.12.2.4 *Recreational Areas*

All of the proposed roadway improvements associated with the recommended alternative will occur within the existing FDOT right of way. Since the I-95 corridor is located along a highly urbanized area, which currently experiences impacts typical of a highly travelled expressway, no long term adverse impacts to recreational areas are anticipated as a result of the project implementation.

6.12.3 NATURAL

6.12.3.1 Wetlands

Direct and Indirect Impacts

The recommended alternative for the I-95 project was evaluated for potential impacts to wetlands, stormwater management/drainage features, and surface waters. Based on the footprint of the proposed roadway improvements, the recommended alternative would result in 1.92 acres of direct impacts to wetlands, 32.15 acres of direct impacts to stormwater management/drainage features dominated by hydrophytic vegetation, and 17.36 acres of direct impacts to surface waters, as shown in ***Table 6.10***.

For the two wetland areas with direct impacts (W-1 and W-2), indirect impacts are anticipated because a suitable upland buffer does not exist between the remaining portion of the wetland and the proposed roadway construction. Therefore, indirect impacts were calculated to an average distance of 50 feet beyond the direct impact. This 50-foot distance was determined using best scientific judgment in analyzing what type of indirect impacts will be expected during and following construction and how far into a wetland area those affects will be experienced per agency criteria. Items considered include construction activities, sedimentation resulting from increased turbidity associated with soil disturbance (water quality impacts), interruption to surface water flow, alterations to vegetative communities outside the final roadway footprint, and effects to wildlife in the vicinity of the corridor. Based on these criteria, 0.96 acres of indirect impacts are anticipated as a result of the Build Alternative, as shown in ***Table 6.10***.

Table 6.10 Potential Impacts (Direct and Indirect)		
Assessment Area	**Direct Impacts (Acres)**	**Indirect Impacts (Acres)**
Wetlands		
W-1	1.76	0.55
W-2	0.16	0.41
Total	**1.92**	**0.96**
Stormwater Management/Drainage Features		
Stormwater Retention Swales[1]	12.59	N/A
Stormwater Retention Basins[2]	14.44	N/A
Emergent Wetland Fringe[3]	0.22	N/A
D-13A	2.14	N/A
D-13B	2.14	N/A
D-13C	0.62	N/A
Total	**32.15**	**N/A**
Surface Waters		
Surface Waters	17.36	N/A

N/A = Not applicable
[1] Stormwater Retention Swales include D-1 – D-8, D-18, D-21, D-29 – D-36, D-38 – D-41, D-54 – D-55, D-57 – D-59, D-61 – D-64, D-68 – D-71, D-73 – D-78, and D-81 – D-82.
[2] Stormwater Retention Basins include D-10 – D-12, D-14, D-16 – D-17, D-37, D-42 – D-43, D-45 – D-51, D-56, D-66, D-72, and D-79 – D-80.
[3] Emergent Wetland Fringe includes D-9, D-15, D-19 – D-20, D-44, D-52, D-65, and D-67.

UMAM Assessment

The total UMAM functional loss as a result of construction of the recommended alternative was calculated to be approximately 1.16 UMAM credits (1.09 credits necessary to compensate for direct impacts and 0.07 credits necessary to compensate for indirect impacts). A summary of the results of the UMAM assessment on the proposed wetland impact areas is provided in ***Table 6.11***.

Table 6.11 UMAM Impact Assessment Results													
Assessment Area	FLUCFCS	UMAM SCORE (Current)				UMAM SCORE (with Impact)				Impact Delta	Impact Acreage	Functional Loss	Mitigation Credits
		Location and Landscape Support	Water Environment	Community Structure	RAW Score	Location and Landscape Support	Water Environment	Community Structure	Raw Score				
Direct Impacts													
W-1	630	5	7	5	0.57	0	0	0	0.00	-0.57	1.76	-1.00	1.00
W-2	630	5	7	5	0.57	0	0	0	0.00	-0.57	0.16	-0.09	0.09
Total											**1.92**	**-1.09**	**1.09**
Indirect (Secondary) Impacts													
W-1	630	5	7	5	0.57	4	6	5	0.50	-0.07	0.55	-0.04	0.04
W-2	630	5	7	5	0.57	4	6	5	0.50	-0.07	0.41	-0.03	0.03
Total											**0.96**	**-0.07**	**0.07**

Cumulative Impacts

From a regional watershed perspective, the proposed project is located within the Southern Florida Watershed [Hydrologic Unit Code (HUC) 030902] and within the Florida Southeast Coast Cataloging Unit (HUC 03090206). The limits and area covered by the Southern Florida Watershed Unit closely resemble those of the SFWMD's C-100 mitigation basin, therefore the cumulative impact discussion satisfies the requirements of both the USACE and the SFWMD. The recommended alternative direct wetland impacts consist of approximately 1.92 acres, which represents a small fraction of the total wetlands within the basin (0.0002%). Therefore, the cumulative wetland impacts resulting from the recommended alternative are anticipated to be considered negligible within the Florida Southeast Coast Cataloging Unit as well as the greater Southern Florida Watershed. Additionally, the recommended alternative impacts will be offset via mitigation, thereby resulting in a zero net loss of wetland function.

6.12.3.2 *Wildlife and Habitat*

The footprint of the build alternative is contained entirely within the existing FDOT right-of-way, designated as Urban and Built-Up/Residential/Transportation, Communication, and Utilities/Roads and Highways (FLUCFCS 100, 800, and 814). These areas are regularly maintained (i.e., vegetation is mowed, trimmed, and/or treated with herbicide) by the FDOT for safety. No impacts to the other upland habitats identified adjacent to the project corridor are anticipated as a result of the proposed project, including Pine Flatwoods (FLUFCS 411), Sand Pine (FLUFCS 413), Xeric Oak (FLUFCS 421), Xeric Oak Disturbed (FLUFCS 4211), Brazilian Pepper (FLUCFCS 422), Upland Scrub, Pine and Hardwoods (FLUCFCS 436), Upland Scrub, Pine and Hardwoods – Highly Disturbed (FLUCFCS 4361), and Mixed Hardwoods (FLUCFCS 438).

Based on the assessment of the protected species identified, wildlife agency correspondence, and the field investigations, no long-term unmitigated adverse impacts are anticipated to occur to protected wildlife or plant species or designated habitats within the project corridor. The FDOT and the FHWA have made a determination of "*may affect, not likely to adversely affect*" for the Florida mouse, Florida manatee, black skimmer, brown pelican, least tern, limpkin, little blue heron, roseate spoonbill, snowy egret, southeastern American kestrel, tricolored heron, white ibis, wood stork, American alligator, eastern indigo snake, Florida pine snake, gopher frog, and gopher tortoise, and a determination of "*no effect*" for the Sherman's fox squirrel, bald eagle, Florida burrowing owl, and Florida scrub-jay. The USFWS issued a concurrence letter for this project on April 24, 2013, concurring with the federally-listed species determinations made by the FDOT and the FHWA (a copy of the concurrence letter issued by the USFWS is provided in the ESBA prepared for this project).

There is no Critical Habitat located within the project corridor; therefore, no impacts are anticipated. No areas beyond the existing FDOT right of way are proposed to be impacted by the recommended alternative. Therefore, no impacts to SHCAs are anticipated as a result of the proposed project.

Essential Fish Habitat

Per the NOAA Habitat Conservation and Protection web-site there are no HAPC or EFH identified within close proximity of the proposed project. Furthermore, a benthic resource site assessment was conducted at the I-95 low-span bridge over the Hillsboro (C-4) Canal to identify the presence of protected benthic resources. No protected or regulated resources, such as mangroves, corals, seagrasses or oysters were identified within or along the banks of the Hillsboro Canal within the survey area. In addition, all BMPs typically associated with construction projects will be properly implemented and maintained throughout all construction activities, including temporary erosion control measures, minimizing the potential for short-term secondary downstream impacts during construction. Therefore, no EFH impacts are anticipated as a result of this project.

6.12.4 PHYSICAL

6.12.4.1 *Noise*

FDOT policy requires that the feasibility and reasonableness of noise abatement be considered when the FHWA NAC is approached or exceeded. In accordance with traffic noise study requirements set forth by both the FHWA and FDOT, noise barriers were considered for all noise sensitive receptor sites where design-year traffic noise levels were predicted to equal or exceed the NAC.

A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures. Feasibility primarily concerns engineering considerations including the ability to construct a noise barrier using standard construction methods and techniques. Feasibility also concerns the ability to provide a noise level reduction of at least 5 dB(A) for two or more impacted receivers given certain access, drainage, utility, safety, or maintenance requirements. Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. Reasonableness includes the consideration of the cost of providing noise abatement. To be deemed reasonable, a noise barrier or other noise abatement measure must not exceed the FDOT's reasonable cost criteria of $42,000 per benefited receptor site and must attain the FDOT noise reduction design goal of 7 dB(A) at one or more impacted receptor sites. In addition, once the noise abatement measure has been determined to be reasonable and feasible, the viewpoint of the benefited property owners must be considered.

To facilitate the noise barrier analysis, contiguous noise sensitive areas were grouped together into one of 14 Common Noise Environments (CNE). A CNE represents a group of impacted receptor sites that would benefit from the same noise barrier or barrier system (i.e., overlapping/continuous barriers) and are exposed to similar noise sources and levels, traffic volumes, traffic mix, speeds and topographic features. Generally, CNEs occur between two secondary noise sources, such as interchanges, intersections and/or cross-roads. In addition, the primary method for determining the cost of noise abatement involves a review of the cost per benefited receptor site for the construction of a noise barrier benefiting a single location or CNE (e.g., a subdivision or contiguous impact area). Several of the locations where noise impacts are predicted to occur are near existing noise barriers. In these cases, alternatives such as increasing the length of an existing noise barrier or filling in gaps in noise barrier coverage were selected, since increasing the height of an existing noise barrier is not possible without completely replacing the noise barrier with a new taller noise barrier. (Please refer to NSR for detailed tables and figures, summarizing the results of the noise barrier analyses and recommendations for each of the locations where noise barriers were evaluated, as well as figures of locations where noise barriers were evaluated or planned.)

Table 6.12 summarizes the results of the noise barrier analyses and recommendations for each of the 14 locations where noise barriers were evaluated. The locations where barriers were evaluated or planned are depicted in the figures in ***Appendix N***. Noise barriers meet all of the FDOT's noise barrier feasibility and reasonableness requirements listed above for the following eight CNEs and are recommended for further consideration and public input:

- CNE-E1 – Unnamed Neighborhood, Powerline Road to Commercial Boulevard;
- CNE-E2 – Laguna Pointe Apartments, McNabb Road to SW 13th Court;
- CNE-E3 – Avondale Park, Oaks at Pompano Apartments, Unnamed Neighborhood, SW 3rd Street to Atlantic Boulevard;
- CNE-E6South – Unnamed Neighborhood, NW 15th Street to NW 17th Street;
- CNE-W1 – Olive Glen Apartments and Whispering Pines Apartments, NW 29th Court to NW 33rd Street;
- CNE-E8 – Parkway United Methodist Church, NE 42nd Street to NE 44th Street;
- CNE-E10 – Tivoli Park and Natura Neighborhoods, SW 10th Street to Hillsboro Boulevard; and,
- CNE-W2 – Mizner Forest, SW 18th Street to SW 13th Place.

These noise barriers are expected to benefit approximately 357 residences, 248 of which are predicted to be impacted by this project. Also, the exterior area of one church will benefit from a noise barrier along this project. The FDOT is committed to the construction of feasible noise abatement measures at the locations where noise barriers have been recommended for further consideration during the final design phase, contingent upon the following conditions:

- *Detailed noise analyses during the final design process support the need for abatement;*
- *Reasonable cost analyses indicate that the economic cost of the barrier(s) will not exceed the cost reasonable criterion;*
- *Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved;*
- *Community input regarding desires, types, heights and locations of barriers has been solicited by the FDOT; and*
- *Any other mitigating circumstances found in Section 17-4.6.1 of FDOT's PD&E Manual have been analyzed.*

It is likely that the noise abatement measures for these locations will be constructed if found feasible based on the contingencies listed above. If, during the Final Design phase, any of the contingency conditions listed above cause abatement to no longer be considered reasonable or feasible for a given location(s), such determination(s) will be made prior to requesting approval for construction advertisement. Commitments regarding the exact abatement measure locations, heights, and type (or approved alternatives) will be made during project reevaluation and at a time before the construction advertisement is approved.

The estimated cost to provide noise abatement for the following residential neighborhoods exceeded FDOT's reasonable cost criteria of $42,000 per benefited site:

- CNE-E6North – Unnamed Neighborhood, NW 18th Court to NW 21st Court ($161,588 per benefited site);

- CNE-E9 – Unnamed Neighborhood, SW 15th Street to SW 10th Street ($128,143 per benefited site); and,
- CNE-E11 - Unnamed neighborhood, SW 18th Street to Royal Palm Boulevard ($52,500 per benefited site).

The estimated cost to provide noise abatement for the following non-residential sites exceeded FDODT's reasonable cost criteria for special land use sites:

- CNE-E5 - Mitchell Moore Park; and
- CNE-E6Park – Weaver Community Park.

It was not possible to provide a noise level reduction of at least 7.0 dB(A) for at least one site in the following CNEs:

- CNE-E4 – Unnamed Neighborhood, Atlantic Boulevard to Martin Luther King Boulevard [5.6 dB(A) maximum noise level reduction];
- CNE-E7 – Leisureville Apartments, Copans Road to NW 26th Street [6.8 dB(A) maximum noise level reduction]; and,
- CNE-W3 – Blazing Star Preserve, West Camino Real to Palmetto Park Road [4.2 dB(A) maximum noise level reduction].

Therefore, noise barriers are not recommended for further consideration or construction at these locations. Based on the noise analyses performed to date, there are no apparent solutions available to mitigate the noise impacts at 174 residences and five special land use sites. The traffic noise impacts to these noise sensitive sites are considered to be an unavoidable consequence of the project. At locations where existing shoulder-mounted noise barriers will be physically impacted by this project and it was determined to not be feasible and/or reasonable to replace them with new noise barriers, the existing noise barriers will be replaced in kind during project construction in order to maintain the FDOT's previous noise abatement commitments.

Table 6.12
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Oakland Park Boulevard to Commercial Boulevard	East of I-95	Unnamed	Residential (Activity Category B) Church Interior (Activity Category D)	CD2-E1	Structure	8	960	577+00	586+40	57 Res. and Church Interior	2.7 (8.4)	23	5	28 Res	6.9 (8.4)	$1,129,200	$40,329	Yes	Yes
					Shoulder	14	1,160	586+40	597+80										
					Shoulder	8	1,715	585+00	602+00										
Cypress Creek to Atlantic Boulevard	East of I-95	Laguna Pointe Apartments	Residential (Activity Category B)	CD3-E2	Structure	8	900	699+30	708+30	65	4.5 (8.6)	22	0	22	6.4 (8.6)	$434,400	$19,745	Yes	Yes
					Shoulder	14	520	708+30	713+40										
	East of I-95	Avondale Park, Oaks at Pompano Apartments, Unnamed neighborhood	Residential (Activity Category B) Pool (Activity Category C) Park (Activity Category C)	CD2-E3	Ground	20	1,945	759+60	776+30	31 Res, pool and park	6.2 (8.8)	27 Res and park	8	35 Res and park	7.7 (8.8)	$1,167,000	$33,343	Yes	Yes

Table 6.12
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Atlantic Boulevard to Copans Road	East of I-95	Unnamed	Residential (Activity Category B)	CD2-E4	Shoulder	14	430	777+20	780+33	5	5.6 (5.6)	5	0	5	5.6 (5.6)	$821,400	$164,280	No	No
					Shoulder	14	850	785+51	794+00										
					Structure	8	290	778+00	780+90										
					Shoulder	14	510	780+90	786+00										
	East of I-95	Mitchell Moore Park	Park (Activity Category C)	CD3-E5	Shoulder	14	1,560	798+00	813+60	Park	7.0 (7.0)	Park	0	Park	7.0 (7.0)	$2,239,800	See Appendix D of the NSR	No	Yes
					Structure	8	1,240	813+60	826+00										
					Ground	20	1,950	802+79	822+30										
	East of I-95	Unnamed	Residential (Activity Category B)	CD3-E6South	Structure	8	900	826+00	835+00	22	4.1 (7.2)	22	0	22	6.1 (7.2)	$909,000	$41,318	Yes	Yes
					Ground	20	1,155	831+00	842+55										
	East of I-95	Weaver Community Park	Park (Activity Category C)	CD1-E6Park	Ground	22	3,360	834+00	868+00	Park	6.5 (7.0)	Park	0	Park	6.5 (7.0)	$1,707,600	See Appendix D of the NSR	No	Yes
	East of I-95	Unnamed	Residential (Activity Category B)	CD3-E6North	Shoulder	14	1,690	857+00	874+70	8	7.0 (7.0)	8	0	8	7.0 (7.0)	$1,292,700	$161,588	No	Yes
					Ground	20	780	860+00	868+00										
					Ground	22	610	868+00	874+60										
Copans Road to Sample Road	East of I-95	Leisureville Apartments	Residential (Activity Category B)	CD3-E7	Structure	8	1,220	888+00	900+20	56	4.4 (6.8)	14	0	14	6.8 (6.8)	$743,400	$53,100	No	No
					Ground	22	350	891+00	892+40										
	West of I-95	Olive Glen Apartments and Pool, Whispering Pines Apartments	Residential (Activity Category B) Pool (Activity Category C)	CD3-W1	Shoulder	14	1,935	915+00	935+00	58 Res. and pool	7.7 (10.1)	58 Res. and pool	60 Res.	118 Res. and pool	6.8 (10.1)	$1,341,900	$11,372	Yes	Yes
					Shoulder	14	1,260	932+20	945+00										

Table 6.12
Noise Barrier Evaluation Summary and Recommendations

General Location (Cross Streets)	Relative Location	Community/Site Name	Type of Noise Sensitive Site (Noise Abatement Criteria Activity Category)	Recommended Noise Barrier Conceptual Design	Barrier Type	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptors	Average (Maximum) Noise Reduction for Impacted Receptors [dB(A)]	Number of Impacted and Benefited Receptors	Number of Not Impacted But Benefited Receptors	Total Number of Benefited Receptors	Average(Maximum) Noise Reduction for all Benefited Receptors [dB(A)]	Estimated Cost	Estimated Cost/Site Benefited	Optimal Noise Barrier Design Meets FDOT's Reasonable Noise Abatement Cost Criteria of $42,000 per Benefited Receptor Site	Noise Barrier Recommended for Further Consideration and Community Input
Sample Road to SW 10th Street	East of I-95	Parkway United Methodist Church	Church (Activity Category C)	CD1-E8	Ground	16	559	978+00	983+59	Play-ground	7.0 (7.0)	Play-ground	0	Play-ground	7.0 (7.0)	$268,320	N/A	N/A	Yes
	East of I-95	Unnamed	Residential (Activity Category B)	CD1-E9	Ground	20	1,495	1044+00	1053+40	9	6.3 (7.5)	7	0	7	6.8 (8.1)	$897,000	$128,143	No	Yes
SW 10th Street to Hillsboro Boulevard	East of I-95	Tivoli Park, Natura	Residential (Activity Category B)	CD3-E10	Ground	20	4,335	1060+50	1101+00	96	7.3 (9.8)	87	32 Res. and pool	119 Res. and pool	7.3 (9.8)	$2,601,000	$21,857	Yes	Yes
Hillsboro Boulevard to Palmetto Park Road	East of I-95	Unnamed	Residential (Activity Category B)	CD4-E11	Shoulder	14	1,725	1206+40	1223+30	6	5.2 (5.2)	6	15	21	6.2 (7.0)	$1,102,500	$52,500	No	Yes
					Shoulder	14	900	1215+60	1224+60										
	West of I-95	Mizner Forest	Residential (Activity Category B)	CD2-W2	Ground	14	1,285	1158+40	1171+09	9	7.2 (8.4)	9	4	13	6.7 (8.4)	$539,700	$41,515	Yes	Yes
	West of I-95	Blazing Star Preserve	Park (Activity Category C)	CD1-W3	Shoulder	14	500	1196+00	1201+00	Park	4.2 (4.2)	0	0	0	N/A	$1,160,100	N/A	No	No
					Structure	8	100	1201+00	1202+00										
					Shoulder	14	2,205	1202+00	1224+00										

Note: SLU = Special Land Use Site

6.12.4.2 *Air Quality*

The project's No-Build and Build alternatives were assessed for potential air quality impacts at the project level using the FDOT's PC based CO Florida 2012 screening model.

Output from the CO Florida 2012 model includes the estimated one-hour and eight-hour CO level, in PPM, at the default receptor locations and a report stating whether the project passes or fails the screening analysis. A project alternative that passes the CO Florida 2012 model is not expected to result in any violations of the NAAQS for CO and is not likely to have any impact on the air quality of the surrounding area.

The location within the project study area considered to have the greatest potential for traffic generated air quality impacts is the I-95 interchange at Atlantic Boulevard. This location was selected for the CO screening analysis.

The CO screening analysis for this project indicates that the worst-case one-hour CO level is 9.7 PPM for the Build Alternative during the opening year (2040) and 9.0 PPM during the design year (2040). The predicted worst-case eight-hour CO level is estimated to be 5.8 PPM for the Build Alternative during the opening year (2040) and 5.4 PPM during the design year (2040). The results of the CO screening analysis indicate the proposed project is not expected to cause any exceedances of the one-hour or eight-hour NAAQS for CO. Thus, the project passes the CO screening analysis, and air quality impacts resulting from the proposed project are not expected.

Agency coordination to obtain air quality related information occurred through the ETDM Planning and Program Screening and the Advanced Notification process. The ETDM review occurred between May 21, 2004, and July 5, 2004, and the ETDM Programming Screen Summary Report was published on September 29, 2005. No comments were received regarding air quality impacts and no Summary Degree of Effect was assigned for the Air Quality category. Based on the air quality analysis conducted for this project, air quality impacts are not expected to occur as a result of this project.

Construction activities for the proposed action may potentially have short-term air quality impacts within the immediate vicinity of the project. Construction activities may generate temporary increases in air pollutant emissions in the form of dust from earthwork and unpaved roads and smoke from open burning. Such emissions and potential impacts will be minimized by adherence to all applicable state and local regulations and to the latest edition of the FDOT *Standard Specifications for Road and Bridge Construction*.

6.12.4.3 *Contamination*

After a review of all available data, such as agency file reviews at Broward and Palm Beach counties and FDEP, the EDR database report, aerial photography, and the site reconnaissance, 61 sites of potential environmental concern were identified for the I-95 project corridor; of these, 21 sites are rated as High risk, 25 sites are rated as Medium risk and 15 sites are rated as Low risk. Remaining sites identified are not considered to pose potential contamination concerns either because of the current regulatory status of the site, the site's location/distance from the project corridor, and/or the direction with reference to the I-95 project corridor (down-gradient/cross-gradient).

The District Four Planning and Environmental Management Office will utilize the information contained in this report to determine the need for additional investigation during the design phase of the project. The Level II Contamination Assessment investigation may be conducted prior to any right of way acquisition and/or prior to the design phase, should any become necessary. Based on the findings of updated future review and Level II investigation, the design engineers may be instructed to avoid the areas of concern or to include special provisions with the plans to require that the construction activities performed in the areas of concern be performed by a contamination assessment and remediation contractor specified by the FDOT.

It must be recognized that the possibility exists that some hazardous substances, petroleum products, or environmental contamination not identified during this assessment may exist on or in the immediate vicinity of the project. This is because regulatory agency records are not always complete; not all leaks, spills, and discharges are reported; not all USTs and ASTs are registered. It is unknown if any registered substances were illegally dumped or were deposited during past construction activities.

Asbestos Surveys

The sample details for all the bridges are provided in ***Table 6.13***. Individual reports for the 27 bridges are available for review at the FDOT Four office in Fort Lauderdale, Florida for further details.

Of the 27 bridges where samples were collected for investigating the presence of ACM, four bridges were found to contain less than 10% regulated ACM (RACM) by PLM analysis:

- Bridge # 860236 – I-95 (northbound) over Hammondville Road
- Bridge # 860235 – I-95 (southbound) over Hammondville Road
- Bridge# 860232 – I-95 (northbound) over Atlantic Boulevard
- Bridge# 860231 – I-95 (southbound) over Atlantic Boulevard

Individual reports for the 27 bridges are available for review at FDOT IV offices in Fort Lauderdale, Florida for further details.

Table 6.13
Summary of Asbestos Presence

#	MP	Direction	Bridge#	Bridge Name	ACM Detected
1	25.28	Northbound	860195	I-95 over Hillsboro Canal	No
2	25.28	Southbound	860125	I-95 over Hillsboro Canal	No
3	24.618	Northbound	860194	I-95 over Hillsboro Boulevard	No
4	24.617	Southbound	860124	I-95 over Hillsboro Boulevard	No
5	22.016	East/West	869002	Pedestrian Overpass over I-95	No
6	20.407	Northbound	860220	I-95 over Copans Road	No
7	20.405	Southbound	860120	I-95 over Copans Road	No
8	19.335	Northbound	860219	I-95 over Northwest 15th Street	No
9	19.35	Southbound	860119	I-95 over Northwest 15th Street	No
10	19.236	Northbound	860218	I-95 over FEC Railroad	No
11	19.223	Southbound	860118	I-95 over FEC Railroad	No

Table 6.13
Summary of Asbestos Presence

#	MP	Direction	Bridge#	Bridge Name	ACM Detected
12	**18.544**	**Northbound**	**860236**	**I-95 over Hammondville Road**	**YES**
13	**18.544**	**Southbound**	**860235**	**I-95 over Hammondville Road**	**YES**
14	**18.355**	**Northbound**	**860232**	**I-95 over Atlantic Boulevard**	**YES**
15	**18.355**	**Southbound**	**860231**	**I-95 over Atlantic Boulevard**	**YES**
16	16.903	Northbound	860242	I-95 over McNab Road	No
17	16.892	Southbound	860241	I-95 over McNab Road	No
18	14.014	Northbound	860197	I-95 over NW 38th Street	No
19	13.999	Southbound	860127	I-95 over NW 38th Street	No
20	13.442	Northbound	860217	I-95 over Oakland Park Boulevard	No
21	1.795	East/West	860122	Northeast 48th St over I-95	No
22	1.54	Southbound	930198	I-95 over Palmetto Park Road	No
23	1.54	Northbound	930199	I-95 over Palmetto Park Road	No
24	1.087	Northbound	930198	I-95 over West Camino Real	No
25	1.087	Southbound	930197	I-95 over West Camino Real	No
26	0.7	East/West	930197	Southwest 18th St over SB and NB I-95	No
27	0.168	Westbound	860131	Commercial Boulevard Ramp to SB 1-95 over Commercial Boulevard	No

Bridge # 860236:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860235:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860232: Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Intermediate Bent Caps, and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to commencing with any activities that might disturb this material.

Bridge # 860231:
Asbestos containing materials were identified (Class 5 Finish) on the End Bent, Back Wall, Beam Span and Columns. It was recommended by GLE Associates that this material be properly removed and disposed of by a State of Florida licensed asbestos abatement contractor prior to carrying out any activities that might disturb this material.

Toxicity Characteristic Leaching Procedure (TCLP) Sampling and Paint Screening Surveys
The paint samples were analyzed for total metals by EPA method SW846 3050B/6010C for cadmium, chromium, lead, and zinc, with concentrations reported as milligrams per kilogram (mg/Kg) to determine applicability of OSHA regulations in 29 CFR 1926 (***Table 6.14***).

Table 6.14
Summary of Paint Chip Analytical Results (Total Metals)

Bridge#	**Sample ID**	**Metals Concentrations (mg/Kg)**			
		Cadmium	Chromium	Lead	Zinc
860128	860128	<20	40	110	83,000
860198	860198	91	88	510	410,000

As shown in the above table, chromium, lead and zinc were detected above the in both the samples. Cadmium was detected in one (860198).

The paint samples were also analyzed by TCLP metals by EPA method SW846 1311/3010B/6010C cadmium, chromium, and lead. The TCLP concentrations were reported as milligrams per liter (mg/L), and compared with the EPA established hazardous waste limits (40 CFR 261.24 Toxicity Characteristic) (see ***Table 6.15***).

Table 6.15 Summary of Paint Chip Analytical Results (TCLP Metals)				
Bridge#	Sample ID	Metals Concentrations (mg/L)		
		Cadmium	Chromium	Lead
EPA Limit*		**1.0**	**5.0**	**5.0**
860128	860128	<0.050	<0.050	0.067
860198	860198	<0.050	0.063	0.22

- EPA Limits are based on Maximum Concentration of Contaminants for the Toxicity Characteristic- Table 1 of 40 CFR-261.24

As shown in the above table, cadmium was not detected above the reporting limit in either of the two samples. Chromium was detected above the laboratory reporting limit in one of the samples (860198), but below the EPA limit. Lead was detected above the laboratory reporting limit in both the samples, but below the EPA limit. Based on the laboratory analytical results of the TCLP testing, the waste stream associated with the above two samples is considered “non-hazardous” relative to cadmium, chromium, or lead.

6.13 Bridge Analysis

A total of 42 bridges exist within the study limits. As part of the recommended alternative, 28 bridges are anticipated to be widened and two are anticipated to be replaced. The proposed widening of each bridge structure along the corridor is summarized in ***Table 6.16*** and ***Appendix H.*** ***Appendix H*** details each proposed bridge structure widening approach.

Table 6.16
PROPOSED WIDENING OF BRIDGES

BRIDGE ID	LOCATION	VERTICAL CLEARANCE	OVERHEAD BRIDGE HITS	WIDENING	CROSS SLOPE	DROP DUE TO WIDENING (ft)	EXISTING SUPERST.	LOAD RATINGS			SHEAR OR MOMENT	RATING CHECK	PROPOSED SUPERST.	NET HEIGHT GAIN (in)	DESIGN EXCEPTION/VARIATION	
								Design Truck		FL120					Vertical Clearance	Load Capacity
								OR	IR	OR						
860127	NW 38th Street - SB	15'-11"	No	26.9583	-0.0208	-0.6545	Typ. IV Sp. 52"	1.25	1.06	1	M	OK	FIB 36"	8 2/16	*Exception	None
860197	NW 38th Street - NB	15'-11"	No	17.1667	-0.0208	-0.4509	Typ. IV Sp. 52"	1.25	1.06	1	M	OK	FIB 36"	10 9/16	*Exception	None
860128	Powerline Rd (SR-845) - SB	17'-2"	No	17.1667	-0.0208	-0.4509	Steel Gd. 62"	1.42	1.09	1.46	M	OK	Steel Gd. 60"	2	None	None
860198	Powerline Rd (SR-845) - NB	17'-2"	No	17.1667	-0.0208	-0.4509	Steel Gd. 62"	1.42	1.09	1.46	M	OK	Steel Gd. 60"	2	None	None
860129	Prospect Road (NW 44st) - SB	15'-11"	No	13.5448	-0.021	-0.3779	Typ. IV Sp. 50"	1.13	0.88	0.84	V	NG	FIB 36"	9 7/16	*Exception	Variation
860199	Prospect Road (NW 44st) - NB	15'-11"	No	20.3168	0.0173	0.4505	Typ. IV	1.21	0.88	0.84	V	NG	FIB 36"	19 6/16	*Exception	Variation
860131	Commercial Blvd Flyover	16'-5"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860130	Commercial Blvd (SR-870) - SB	15'-7" Over / 15'-0" Under	Yes	0.0000	-0.0208	0.0000	Typ. IV	NA	NA	NA	NA	NA	No Widening		*Exception	None
860196	Commercial Blvd (SR-870) - NB	15'-7" Over / 15'-0" Under	No	9.1875	-0.0208	-0.2849	Typ. IV	1.2	1.09	1.32	M	OK	FIB 36"	14 9/16	*Exception	None
860237	N. Andrews Ave over I-95	16'-0"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860239	Cypress Creek Road - SB	18'-5"	No	16.3125	-0.0208	-0.4331	Typ. IV	1.27	1.14	1.23	M	OK	FIB 45"	3 13/16	None	None
860240	Cypress Creek Road - NB	18'-5"	No	16.3125	-0.0208	-0.4331	Typ. IV	1.32	1.19	1.21	M	OK	FIB 45"	3 13/16	None	None
860243	Cypress Creek Canal - SB	13'-9"	No	17.0833	-0.058	-1.0288	Typ. IV	1.32	1.2	1.25	M	OK	FIB 36"	5 10/16	None	None
860244	Cypress Creek Canal - NB	13'-9"	No	0.0000	0.058	0.0380	Typ. IV	NA	NA	NA	NA	NA	No Widening		None	None
860241	Mcnab Road - SB	19'-0"	No	16.4167	-0.0208	-0.4353	Typ. IV	1.12	1	1	M	OK	FIB 45"	3 12/16	None	None
860242	Mcnab Road - NB	19'-0"	No	12.2293	0.0208	0.3482	Typ. IV	1.13	1.02	0.92	M	NG	FIB 45"	13 3/16	None	Variation
860233	SW 3rd St over I-95	16'-1"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860231	Atlantic Blvd (SR-814) - SB	15'-2"	Yes	16.3125	-0.0208	-0.4331	Type III	1.06	0.82	0.7	M	NG	FIB 36"	3 13/16	*Exception	Variation
860232	Atlantic Blvd (SR-814) - NB	15'-2"	No	16.3125	-0.0208	-0.4331	Type III	1.06	0.82	0.7	M	NG	FIB 36"	3 13/16	*Exception	Variation
860235	Hammondville Road - SB	16'-4"	No	0.0000	-0.0208	0.0000	Typ. IV	1.12	0.91	0.83	V	NG	No Widening		Variation	Variation
860236	Hammondville Road - NB	16'-4"	No	0.0000	-0.0208	0.0000	Typ. IV	1.07	1	0.83	M	NG	No Widening		Variation	Variation
860118	FEC Railroad - SB	22'-0"	No	16.4167	-0.0208	-0.4353	Type II	1.12	1.03	1	M	OK	FIB Mod. 30"	12/16	None	None
860218	FEC Railroad - NB	22'-6"	No	16.4167	-0.0208	-0.4353	Type II	1.12	1.03	1	M	OK	FIB Mod. 30"	12/16	None	None
860119	NW 15th Street - SB	15'-11"	Yes	16.4167	-0.0208	-0.4353	Typ. IV	1.21	1.09	1	M	OK	FIB 36"	12 12/16	*Exception	None
860219	NW 15th Street - NB	15'-11"	No	16.4167	-0.0208	-0.4353	Typ. IV	1.21	1.09	1	M	OK	FIB 36"	12 12/16	*Exception	None
860120	Copans Road - SB	15'-6"	Yes	22.4167	-0.0208	-0.5601	Typ. IV	1.53	1.36	1.33	M	OK	FIB 45"	2 4/16	*Exception	None
860220	Copans Road - NB	15'-6"	Yes	22.4167	-0.0208	-0.5601	Typ. IV	1.53	1.36	1.33	M	OK	FIB 45"	2 4/16	*Exception	None
860121	Sample Road (SR-834) - SB	15'-0"	Yes	16.4167	-0.0208	-0.4353	Type III	1.3	1.07	1.05	M	OK	FIB 36"	3 12/16	*Exception	None
860178	Sample Road (SR-834) - NB	15'-0"	Yes	16.4167	-0.0208	-0.4353	Type III	1.3	1.07	1.05	M	OK	FIB 36"	3 12/16	*Exception	None
869002	Pedestrian Bridge over I-95	8'-0" Over / 17'-6" Under	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		None	None
860122	NW 48th St over I-95	16'-2"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860123	SW 10th St over I-95	16'-2"	Yes	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
860564	I-95 South off-ramp	—	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		None	None
860124	Hillsboro Blvd (SR-810) - SB	14'-8"	No	20.3646	-0.03	-0.6909	Type III	1.33	1.03	1	M	OK	FIB 36"	11/16	*Exception	None
860194	Hillsboro Blvd (SR-810) - NB	14'-9"	No	20.3646	0.03	0.6909	Type III	1.33	1.03	1	M	OK	FIB 36"	17 5/16	*Exception	None
860125	Hillsboro Canal - SB	4'-10"	No	13.9167	-0.02	-0.3733	Prest.Slab 18"	NA	NA	NA	NA	NA	FIB 36"	0	Bridge Replacement	
860195	Hillsboro Canal - NB	4'-10"	No	9.9167	-0.02	-0.2933	Prest.Slab 18"	NA	NA	NA	NA	NA	FIB 36"	0	Bridge Replacement	
930197	SW 18th St over I-95	16'-4"	No	16'-4"	NA	NA	NA	NA	NA	NA	NA	NA	No Widening		Variation	None
930187	Camino Real - SB	15'-0"	No	12.6667	-0.0208	-0.3573	Typ. IV	1.09	1	NA	M	OK	FIB 36"	13 11/16	*Exception	None
930198	Camino Real - NB	15'-0"	No	12.6667	-0.0208	-0.3573	Typ. IV	1.09	1	NA	M	OK	FIB 36"	13 11/16	*Exception	None
930188	Palmetto Park Road - SB	15'-2"	Yes	16.4167	-0.039	-0.7068	Typ. IV	1.23	1.11	1.43	M	OK	FIB 45"	8/16	*Exception	None
930199	Palmetto Park Road - NB	15'-2"	No	12.4167	0.039	0.5508	Typ. IV	1.3	1.18	1.45	M	OK	FIB 45"	15 10/16	*Exception	None

**Design exceptions based on not meeting the AASHTO minimum 16 feet vertical clearance criteria. However, alternate routes with vertical clearance of 16 feet were identified, therefore a Design Variation may be requested for approval.*

6.14 SPECIAL FEATURES

6.14.1 INTELLIGENT TRANSPORTATION SYSTEMS

The tolling strategy considered for the recommended alternative is a segmental system with gantry points located right after each ingress point in order to capture existing traffic traveling on the express lane and new traffic entering the express lane system. ***Appendix C*** graphically shows the proposed system within the study limits.

The proposed ITS network plans depicted in ***Appendix C*** shows the existing ITS devices that will remain and the ones that will be replaced. Additional Closed Circuit Television (CCTV) and Microwave Vehicle Detection System (MVDS) will be necessary to provide 100% coverage and traffic detection for the general purpose lanes and express lanes. Incidental items to the ITS devices such as, pull and splice boxes are not depicted in the proposed preliminary plans. The existing Highway Advisory Radio (HAR) signs are shown to be relocated. The final location will be determined during the Design phase.

The following is a description of the proposed ITS components:

- **Fiber Optic Conduit System –** The Fiber Optic conduit trunks proposed for this project shall consist of four, two inch (4-2") HDPE conduits. A typical conduit system will be placed using the open cut trench method. Conduits shall also be placed using directional bore method when crossing an existing pavement, railroad, and other conflicts as required by FDOT standards. Conduits shall be bridge attached when crossing canals or at locations where underground conduit installation is not possible. The permanent conduit trunk has been proposed within the FDOT right of way limits and accessible by the FDOT maintenance personnel and vehicles.

- **Pull Boxes –** New pull boxes are proposed along the new conduit backbone and conduit laterals from the conduit backbone to ITS devices. Pull boxes are to be installed beside each ITS field device and spaced at a maximum of 1,000 feet. Separate pull boxes shall be installed for fiber optic cable communications and for power conductors.

- **Splice Boxes –** Splice boxes are proposed along the fiber optic conduit backbone at maximum length of 2,500 feet and where the conduit laterals interconnect with main fiber optic conduit backbone.

- **Proposed Structures –** The proposed project will include seven structures consisting of one Dynamic Message Sign (DMS), three Dual Toll Rate Signs (DTRS) and three Status Lane Signs (SLS) placed upstream of each ingress point over the general purpose lanes. At each egress point a DMS and DTRS structure will be placed to provide upstream information and advice the motorist of any upcoming event in the express lanes, including toll price information for the next segment with enough distance to make a decision to exit or remain in the express lanes. There are a total of 36 ITS sign structures proposed for this project.

- **Proposed Gantry Equipment Buildings –** The proposed project will include three equipment toll buildings, located directly beside the toll gantry, adjacent to the shoulder pavement and right after each ingress point, Each equipment building location will include the following:
  - Access driveway
  - Parking area
  - Above ground diesel fuel tank
  - Emergency diesel generator
  - Diesel fuel control/monitor panel
  - Toll equipment structure
  - Toll equipment structure foundation
  - Condensate drywell
  - Concrete median barrier wall
  - Concrete bumper guard
  - 12" reinforced concrete slab
  - 6" concrete sidewalk
  - 4" diameter galvanized permanent pipe bollards
  - Anchor pipe bollard to top of spread footer
  - Electrical service meter
  - Gravel
  - ITS interface pull boxes

The location of the toll gantries and buildings are listed in **Table 6.17** and depicted in ***Appendix L.***

Table 6.17 Proposed Gantry Equipment Building				
#	**Type**	**Description**	**Station**	**Location**
1	Gantry	Northbound I-95 south of Race Track Road	755+00	swale
2	Gantry	Northbound I-95 south of Camino Real	1189+50	swale
3	Gantry	Southbound I-95 south of NE 48th Street	967+00	swale

- **Closed Circuit Television (CCTV) Cameras –** CCTV cameras proposed shall provide complete 100% coverage of all I-95 lanes and all connector ramps. The CCTV cameras shall be used to monitor, detect and verify incidents during and after reconstruction of the express lanes. Besides general surveillance cameras, additional separate confirmation cameras shall be installed upstream approximately 350 feet to view and confirm the messages displayed for each of the DMS, CMS and TRS signs proposed along the I-95 corridor.

  The CCTV cameras shall be managed with command and control from an FDOT SunGuide TMC operator. The CCTV cameras shall be located outside the clear zone or shall be protected with guard rail and pole mounted at a minimum of 40 feet above roadway level.

- **Dynamic Message Signs (DMS) –** The DMS shall be placed upstream of high accident areas, bottlenecks and major decision points like ramps. The vertical and horizontal curvatures of the roadway shall be analyzed before the final locations of the DMS are determined. Separate DMS shall also be provided for the express lanes as deemed necessary.

- **Microwave Vehicle Detection System (MVDS) –** A Microwave Vehicle Detection System (MVDS) shall be installed along I-95 for traffic monitoring and incident detection. Microwave vehicle detectors shall be provided to cover traffic volume, vehicle type and speed information for all the general purpose and express lanes in both the northbound and southbound directions. The detectors shall be auto calibrating, IP addressable and capable of detecting vehicles at a minimum distance of 200 feet. The detector assemblies shall be placed at an average interval of approximately one-third mile on new concrete poles. Detectors must be placed away from lane drops, acceleration lanes and other similar conditions.

- **Highway Advisory Radio (HAR) System:** The corridor HAR system includes TMC equipment which is connected to each transmitter site over a fiber optic communications link. This allows complete remote control of each transmitter from the TMC, via downloading of messages in digital form.

6.14.2 EXPRESS LANES ACCESS POINTS

The recommended alternative proposes eight potential access points at selected locations along the corridor to enter and exit the express lanes system. Access points along I-95 will be constructed at the following locations:

1. **Northbound egress at Commercial Boulevard** – This access point will service vehicles wanting to exit the express lanes system from I-95 northbound to the following I-95 downstream interchanges:
    - Cypress Creek Road
    - Atlantic Boulevard
    - Copans Road
    - Sample Road

    This access point will also service vehicles and transit buses with the Cypress Creek Road park-and-ride lot and Tri-Rail station as their destination.
2. **Northbound ingress just south of Atlantic Boulevard** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
    - Hallandale Beach Boulevard
    - Hollywood Boulevard
    - Sheridan Street
    - Stirling Road
    - Griffin Road
    - I-595
    - SR 84
    - Davie Boulevard
    - Broward Boulevard
    - Sunrise Boulevard
    - Oakland Park Boulevard

- Commercial Boulevard
- Cypress Creek Road

This access point will also service vehicles and transit buses coming from the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot.

3. **Northbound egress just south of SW 10th Street** – This access point will service vehicles wanting to exit the express lanes system from I-95 northbound to the following I-95 downstream interchanges:
   - SW 10th Street – Direct access to the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Hillsboro Boulevard
   - Palmetto Park Road
   - Glades Road
   - Spanish River Boulevard – Proposed new interchange
   - Yamato Road
4. **Northbound ingress just south of Palmetto Park Road** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Atlantic Boulevard
   - Copans Road
   - Sample Road
   - SW 10th Street – Direct access from the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Hillsboro Boulevard

   This access point will also service vehicles and transit buses coming from the Deerfield Beach park-and-ride lot and Tri-Rail station.
5. **Southbound egress just south of Palmetto Park Road** – This access point will service vehicles wanting to exit the express lanes system from I-95 southbound to the following I-95 downstream interchanges:
   - Hillsboro Boulevard
   - SW 10th Street – Direct access from the Sawgrass Expressway (SR 869) is provided via SW 10th Street
   - Sample Road
   - Copans Road
   - Atlantic Boulevard

   This access point will also service vehicles and transit buses with the Deerfield Beach park-and-ride lot and Tri-Rail station as their destination.

6. **Southbound ingress south of SW 10th Street** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Yamato Road
   - Spanish River Boulevard – Proposed new interchange
   - Glades Road
   - Palmetto Park Road
   - Hillsboro Boulevard
   - SW 10th Street – Direct access to the Sawgrass Expressway (SR 869) is provided via SW 10th Street

   This access point will also service vehicles and transit buses coming from the Deerfield Beach park-and-ride lot and Tri-Rail station.
7. **Southbound egress just south of Atlantic Boulevard** – This access point will service vehicles wanting to exit the express lanes system to the following I-95 downstream interchanges:
   - Cypress Creek Road
   - Commercial Boulevard
   - Oakland Park Boulevard
   - Sunrise Boulevard
   - Broward Boulevard
   - Davie Boulevard
   - SR 84
   - I-595
   - Griffin Road
   - Stirling Road
   - Sheridan Street
   - Hollywood Boulevard
   - Hallandale Beach Boulevard

   This access point will also service vehicles and transit buses with the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot as their destination.
8. **Southbound ingress south of Commercial Boulevard** – This access point will service vehicles wanting to enter the express lanes system from the following I-95 upstream interchanges:
   - Sample Road
   - Copans Road
   - Atlantic Boulevard
   - Cypress Creek Road

- Commercial Boulevard

This access point will also service vehicles and transit buses coming from the Cypress Creek Road park-and-ride lot and Tri-Rail station and the Commercial Boulevard park-and-ride lot.

Appendix L depicts the locations of the express lanes access points.

6.14.3 Landscaping

The following four interchanges have a landscaped area that is maintained by the local municipalities:

- Copans Road – City of Pompano Beach
- Atlantic Boulevard – City of Pompano Beach
- SW 10th Street – City of Deerfield Beach
- Hillsboro Boulevard – City of Deerfield Beach

Modifications or impacts to these landscape features will require coordination with Broward County and the local municipalities.

6.15 Access Management

I-95 is a limited access facility with an Access Class 1, Area Type 1, under the FDOT Access Management Classification System. Based on the access and type, the minimum interchange spacing allowed is one mile. There are eight interchanges within the study limits. The interchange spacing complies with the FDOT Access Management Guideline Rule 14.97. No access management modifications are proposed as part of the recommended alternative.

6.16 Value Engineering

The information presented in this section is a summary of the Draft *Value Engineering Study Report* a companion document to this PD&E study. A Value Engineering (VE) Team studied the I-95 PD&E Study recommended alternative during the week of November 5, 2012. The VE Team developed and recommended eight VE Recommendations.

Recommendation #1 - Value Engineering Recommendation No.1 combines the Managed Lanes Project with the Hillsboro Bridge Deck Replacement Project. If the recommendation can be implemented, there is a potential cost increase of $262,000 with a 15% improvement in performance.

- **Response:** This VE Recommendation was evaluated and accepted by the PD&E Team. Both projects are within the same project limits and include similar scopes to replace both bridges. Construction cost would be significantly reduced to administer one contract rather than two. The bridges currently do not meet vertical clearance requirements. The bridges cross over the Hillsboro Canal, which is considered a navigable waterway. Due to a recently constructed marina that is in close proximity of the bridges, the U.S. Coast Guard is requesting modifications to the bridges to raise the vertical clearance. As part of this PD&E study, these bridges are anticipated to be replaced due to the poor conditions of the bridges and recommendations given by the U.S. Coast Guard. The replacement would require a 5.17' rise in the profile. The recommended bridge replacement is a typical beam and slab bridge using the new Florida I-Beams. The Hillsboro Bridge Deck Replacement Project was scheduled for construction under FM# 430612-1 in Fiscal Year 2016/2017, but it was removed from the FDOT Work Program and the scope of work was added to this PD&E Study.

Recommendation #2 - Value Engineering Recommendation No.2 reduces the express lanes from 12 feet to 11 feet. If this recommendation can be implemented, there is a possible cost savings of $2,790,000.

- **Response:** This VE Recommendation was not accepted by the PD&E Team. Based on the FDOT and AASHTO criteria, all freeway lanes should be 12' wide, therefore, 11' wide lanes will not meet FDOT and AASHTO lane width criteria. The recommended alternative meets lane width criteria for approximately 96% of the corridor. The exception is at the Commercial Boulevard Interchange, where the express lanes were reduced to 11' wide in order to avoid the reconstruction of the flyover from Commercial Boulevard westbound to I-95 southbound.

Recommendation #3 - Value Engineering Recommendation No.3 closes the southbound on-ramp from the Cypress Creek Road Park and Ride Lot.
If this recommendation can be implemented, there is a possible savings of $21,654.

- **Response:** This VE Recommendation was evaluated by the PD&E Team but will not be implemented at this time and can be further analyzed during the design phase. Implementing this recommendation would eliminate this location as a constrained area. However, this park and ride lot is currently leased to a private developer with potential plans to have a joint development project with a mixed-use. This long term lease agreement could pose an issue with the closure of this on-ramp. A design exception and variation for shoulder width is required to reduce the typical section under the overpass.

Recommendation #4 - Value Engineering Recommendation No.4 reduces the inside shoulder width from twelve feet (12') wide to ten feet (10') wide. If the recommendation can be implemented, there is a possible savings of $2,420,000.

- **Response:** This VE Recommendation is not accepted by the PD&E Team. Based on the FDOT criteria, all freeways with three or more lanes in one direction should have 12' wide shoulders, therefore, 10' wide shoulders will not meet FDOT shoulder width criteria. A standard 12' wide inside shoulder along an express lanes system is desirable by the FDOT and the FHWA in order to improve run-off conveyance, horizontal sight distance, law enforcement operations and accident recovery efforts. A wider shoulder will also provide a safer area for vehicle breakdowns and roadway maintenance operations.

Recommendation #5 - Value Engineering Recommendation No.5 incorporates the SW 10th Street reconstruction into the Managed Lanes Project. The VE Team determined that the cost savings associated with this recommendation were not quantifiable based on the given information.

- **Response:** This VE Recommendation was evaluated by the PD&E Team but will not be implemented at this time and can be further analyzed during the design phase. Both projects are within the same project limits. The SW 10th Street Interchange project is anticipated to be in-place prior to the express lanes project. Therefore, the PD&E study design files were provided to the SW 10th Street Interchange project team to take into consideration when finalizing the interchange improvements design. The refinement of the interchange design will include the footprint from the ultimate mainline typical section as part of the express lanes project in order to minimize construction throwaway.

This approach will provide cost savings on both projects and will minimize maintenance of traffic within the interchange area.

Combining the two projects during the PD&E study phase may impact the express lanes overall project schedule. Two areas that could delay the overall express lanes project schedule are:

- Type of interchange modification report required and its approval process.
- Construction schedule of the interchange improvements.

The SW 10th Street Interchange Improvements Project is scheduled for construction as a Design/Build project under FM# 430932-1 in Fiscal Year 2014.

Recommendation #6 - Value Engineering Recommendation No.6 proposes bus stops along the mainline of I-95 connecting to any adjacent park and ride facility or development to a bus service running on the freeway. If this recommendation can be implemented, there is a possible increase in cost of approximately $220,000.

- **Response:** This VE Recommendation was evaluated by the PD&E Team but will not be implemented at this time and can be further analyzed during the design phase. As mentioned by the VE Team, the Broward Metropolitan Planning Organization Long Range Transportation Plan is transit oriented. Therefore, including this proposed feature in the study would solidify their acceptance of the project. Public transportation is becoming a priority for the region as congestion increases and this treatment would lay the foundation for implementing transit along I-95 in the future.

  However, the objective of the study is to evaluate the implementation of an express lanes system along the center of the corridor within the existing right of way. The study is focused on mainline improvements only and is not anticipating acquiring right of way to accommodate the proposed improvements.

  The new proposed typical section recommended as part of the PD&E study is taking most of the available right of way along the corridor, leaving limited space for drainage conveyance and storage. Constructing bus stops along the I-95 corridor may require acquiring limited access right of way along the interstate and local right of way from the local streets in order to convey the passengers from I-95 to the park and ride facilities and/or developments in the area.

The bus service being considered in this study is a Bus Rapid Transit (BRT) system that will allow express bus services to travel along the express lanes system, not the general purpose lanes. BRT will service short trips, not long trips. Long trip services will compete with the existing Tri-Rail service and this is not the intention of this project.

In order to safely provide this type of bus stop service on a 65 MPH interstate, the bus ramp access would have to be separated from the mainline with a crash tested barrier wall and standard shoulders to protect pedestrians and bus pull out areas. Having pedestrians along the I-95 corridor and having buses entering and exiting the mainline will create safety issues.

Recommendation #7 - Value Engineering Recommendation No.7 combines overhead signage where possible in order to minimize the number of structures along the corridor. If this recommendation can be implemented, there is a possible savings of $450,000.

- **Response: This VE Recommendation will be evaluated and implemented where possible.** The PD&E Team will take this recommendation into consideration during the development of the Signing Master Plan efforts.

Recommendation #8 - Value Engineering Recommendation No.8 combines the Northbound and Southbound Toll Gantries where possible in order to potentially eliminate ITS maintenance buildings along the corridor. If this recommendation can be implemented, there is a possible savings of $250,000.

- **Response: This VE Recommendation will be evaluated and implemented where possible.** The PD&E Team will consider this recommendation once FDOT and Florida's Turnpike Enterprise agree on a tolling collection plan and based on the results and recommendations from the Traffic and Revenue Study. The final decision will have potential impacts on revenue and software development.

Additional Recommendation (From the VE Workshop for the section between Stirling Road and North of Oakland Park Boulevard) - This Value Engineering Recommendation suggests leaving the profile pivot point (break point) at its current location. If the recommendation can be implemented, there is a possible savings of $9,640,000.

- **Response:** This VE Recommendation is not accepted by the PD&E Team. The VE typical section configuration would not comply with the FDOT requirement for the number of lanes sloping in the same direction. Having this many lanes sloping to the outside may increase the possibility of crashes from drivers losing control of their vehicles due to hydroplaning. The PD&E proposed typical section cross sectional features were designed to meet the FDOT standards per the PPM. Sloping the express lanes toward the median is consistent with the proposed typical section of the I-95 Express Phase 2, approved by the FDOT and currently under construction. The PD&E typical section maintains uniformity and provides consistency between the various I-95 segments to ensure driver expectancy. This approach will not require a significant amount of overbuild as suggested by the VE Team. The vertical clearance of the underpasses will not be an issue impeding the implementation of the PD&E typical section. In addition, based on the preliminary drainage evaluation, no drainage issues in the median due to additional flow are expected. Therefore, the project is not anticipating problems from spread if the two express lanes are sloped toward the median.

6.17 COST RISK ANALYSIS

The information presented in this section is a summary of the *Cost Risk Analysis Report*, a companion document to this PD&E study. During the PD&E process, a Cost Risk Analysis (CRA) was performed to identify risks and opportunities associated with this project. A risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on the project's objectives. If the risk has a positive effect, then is considered an opportunity. As part of the CRA process, a risk register was developed for the project. Once the risk register was completed, a selected cost risk team reviewed, prioritized and condensed the risk register prior to evaluate in detail each risk independently. In order to complete the review process, two workshops were held during the PD&E phase:

- Base Cost Workshop – This workshop was held on September 24, 2012. This workshop included the development of a model to estimate a risk-based cost and scheduled outcomes. Based on this model a cost/schedule risk analysis was generated.
- CRA Workshop – This workshop was held on September 25-27, 2012. This workshop covered the following efforts:
  - Discussed the objectives of the CRA
  - Discussed the assumptions that will be used in the CRA
  - Evaluated in detail each risk and opportunity
  - Updated the project base cost and schedule
  - Ran the model with the updated information
  - Identified the top project cost risk factors
  - Identified the top project schedule risk factors

The objectives of the CRA are summarized below:

- Assess overall project schedule
- Evaluate project cost
- Evaluate risks exposure
- How best to construct the project
- Building confidence and credibility in the project's plans and estimates
- Maximizing the likelihood of meeting on time, on-budget goals

The key assumptions used in the CRA are summarized below:

- Funding is available for all phases.
- Corridor is treated as one project between Stirling Road and Linton Boulevard. Issues across the various projects tend to have some similarities.
- The base schedule was established assuming that the corridor will be let as one major project once the PD&E studies obtain Location Design Concept Approval.
- Base Cost is the sum of all projects' construction costs

During the CRA process, **85** risks were identified. From these risks, **66** were assessed and quantified. Most of these risks fall under the functional areas of Drainage, Right of Way, Structures, Permitting, ITS and Tolling Strategies. The final risk register was then used during the PD&E process as an additional guide to focus energies and resources in the areas of greater impacts to cost and schedule. Finding mitigating strategies may eliminate and/or reduce the probability of risks taking place or may reduce their impacts to schedule if they do occur.

The top risk factors on cost and schedule identified for the recommended alternative throughout the entire corridor are shown in ***Figure 6.8*** and ***Figure 6.9***.

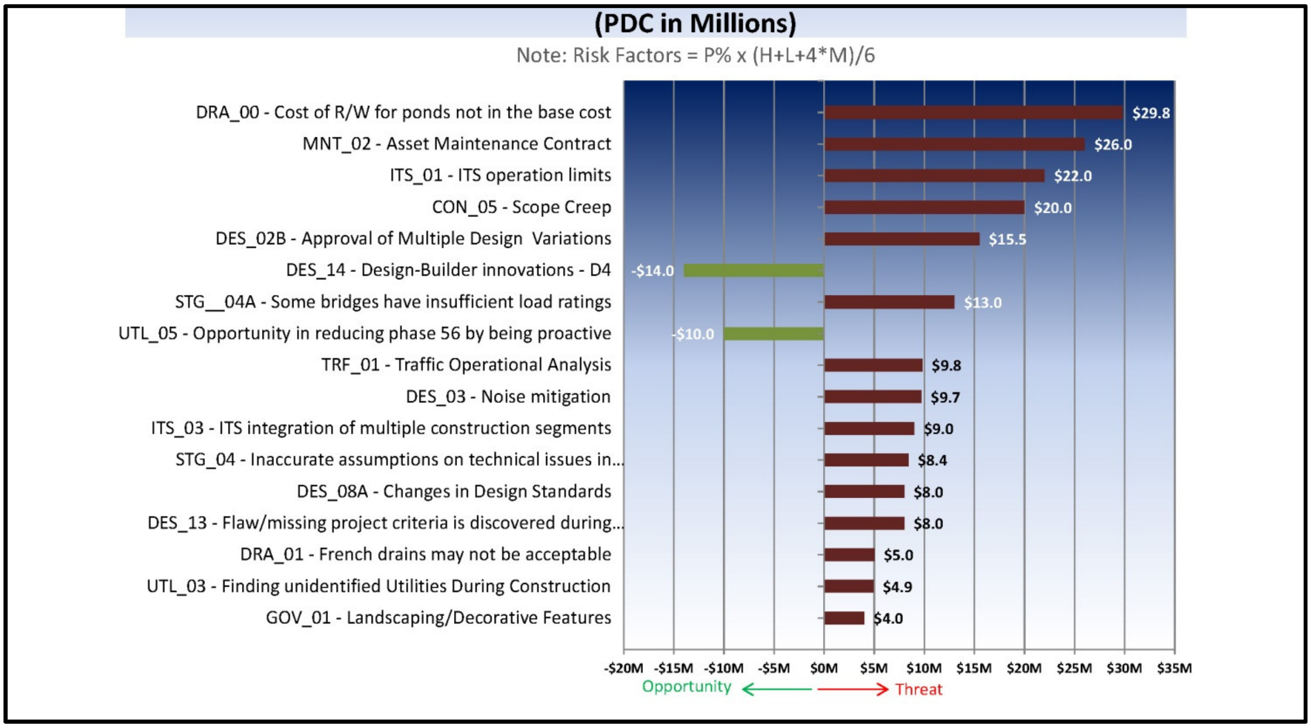


Figure 6.8 – Top Project Cost Risk Factors

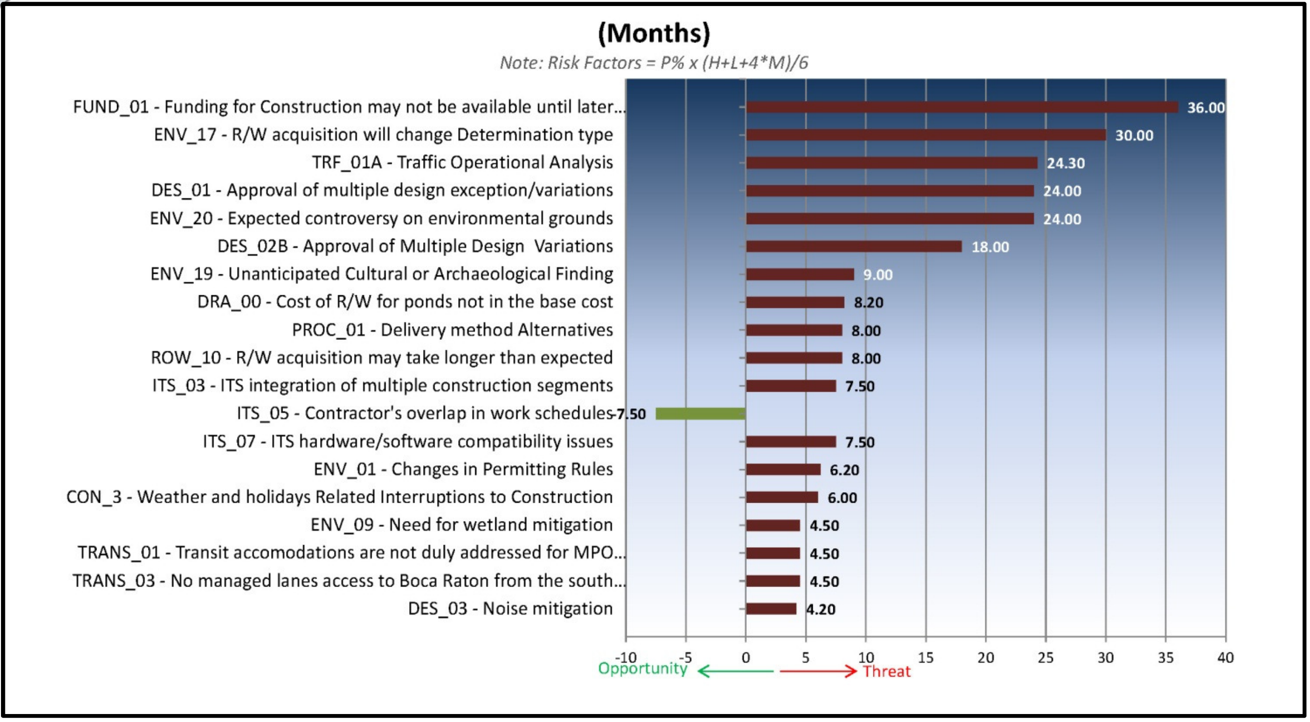


Figure 6.9 – Top Project Schedule Risk Factors

Figure 6.10 provides a comparative cost summary between the pre-mitigated plan and the mitigated plan for the entire corridor. The differences between the median base cost of $428.2 million and the 50% probability that the project will not exceed $519.9 million is $91.7 million (21%), while compared with the 80% confidence the difference is $119.2 million (28%). At the targeted 80% confidence level the non-mitigated plan was estimated at $547 million. Therefore, if the mitigation strategies are implemented, the cost could be reduced by 28%.

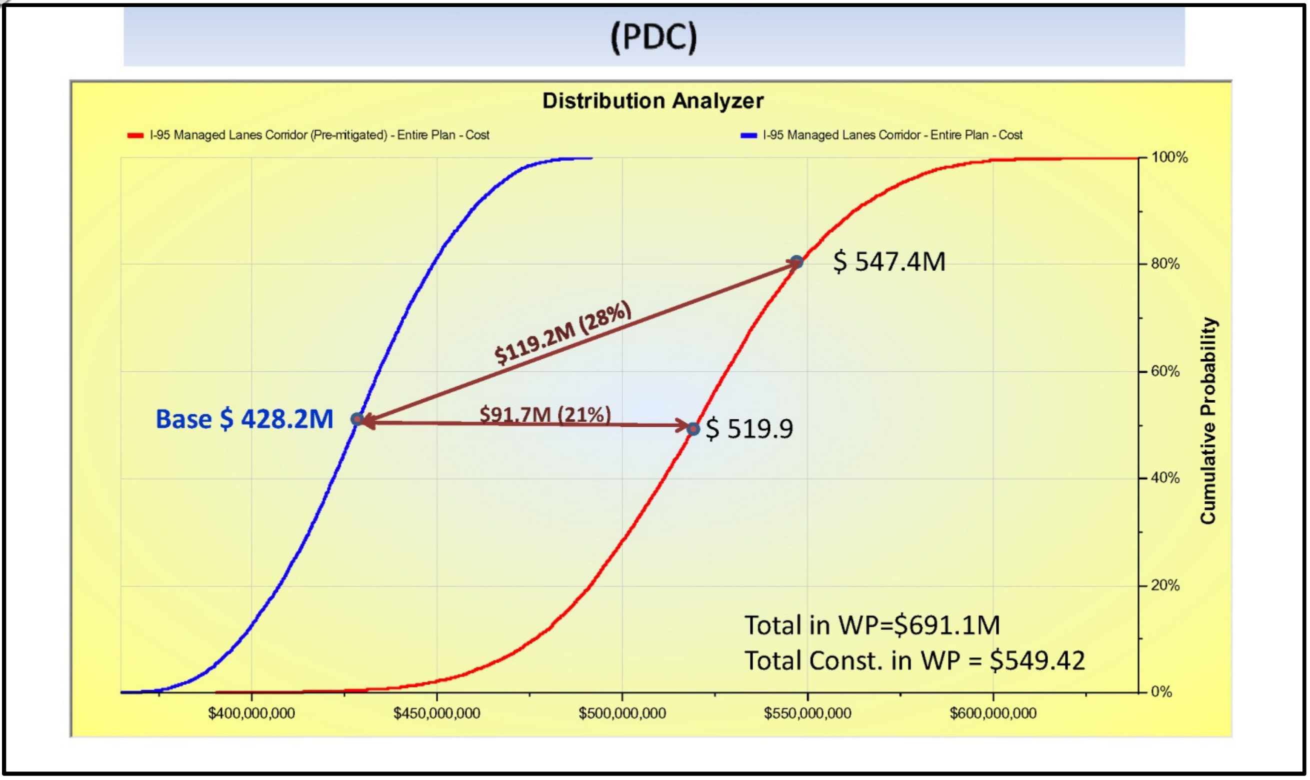


Figure 6.10 – Comparative Project Cost

Some of the mitigation strategies were started and/or implemented during the PD&E phase. Some of these mitigation strategies may continue through the next transportation phases and/or may be implemented prior to construction. Some of the mitigation strategies implemented during the PD&E phase are listed below.

- Approval of design exceptions and variations
- Avoided right of way acquisition
- Conducted a proactive public outreach
- Established an ITS infrastructure and potential location of gantries
- Performed a detailed noise modeling and listened to public reactions
- Prepared a detailed traffic operational analysis methodology
- Eliminated the use of French drains
- Performed a detailed wetland delineation and researched available mitigation credits
- Researched canal jurisdictions
- Performed a bridge asbestos assessment
- Requested preliminary utility relocation costs

7.0 CONCEPTUAL DESIGN PLANS

The Conceptual Design Plans are shown in ***Appendix L,*** which include, but not limited to, the following elements:

- Project corridor study limits
- Existing limited access right of way
- Existing right of way
- Existing centerline of construction
- Existing bridge structures
- Proposed new/widened bridge structures
- Proposed roadway design
- Proposed edge of shoulder pavement
- Existing barrier walls
- Proposed barrier walls
- Proposed retaining walls
- Roadway cross sections (at selected locations)

8.0 LIST OF TECHNICAL REPORTS COMPLETED FOR THE PROJECT

The reports listed below have been prepared under a separate cover. These reports are supporting documents to this Preliminary Engineering Report (PER) and the Categorical Exclusion Type 2 (CAT-EX 2) prepared for this Project Development and Environment Study (PD&E).

<u>Engineering Reports</u>

- Traffic Methodology Memorandum
- Traffic Data Collection Report
- 2011 AADT and Peak Hour Volume Memorandum
- Corridor Design Traffic Report
- Traffic Analysis Technical Memorandum
- Geotechnical Report
- Location Hydraulics Report
- Preliminary Drainage Report
- Value Engineering Study Report
- Cost Risk Assessment Workshop Report

<u>Environmental Reports</u>

- Air Quality Technical Memorandum
- Contamination Screening Evaluation Report
- Cultural Resource Assessment Survey
- Endangered Species Biological Assessment
- Noise Study Report
- Wetland Evaluation Report
- Sociocultural Effects Evaluation Report
- Section 4(f) Determination of Applicability
- Categorical Exclusion Type 2 Document

<u>Public Involvement Reports</u>

- Public Involvement Plan

All project related reports are available for review at the FDOT District Four Office in Fort Lauderdale, Florida.

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