US 27 MULTIMODAL PLANNING AND CONCEPTUAL ENGINEERING (PACE) STUDY

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Prepared by: TY·LIN INTERNATIONAL

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TABLE OF CONTENTS

SECTION PAGE

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

In 2008, the Florida State Legislature authorized the use of funds under Specific Appropriation 2077 and directed the Florida Department of Transportation (FDOT) to conduct a study to determine the feasibility of a rail corridor along U.S. Highway 27. The Phase 1 rail feasibility study was completed in March 2010 and provided a macroscopic, qualitative evaluation of the feasibility of a rail line generally following the US-27 corridor. The information gathered during the course of the study was used to develop 10 corridor alternatives that were considered for general fatal flaws. The Phase 1 analysis did not include development of conceptual engineering alternatives, cost estimates, identification of funding sources, or evaluation of environmental impacts.

The US 27 Multimodal Planning and Conceptual Engineering (PACE) Study examined the feasibility of the rail corridor through development of additional information which included a forecast of highway traffic demand and freight traffic for a new rail bypass, development of conceptual engineering alternatives, an environmental screening of the rail alignments, cost estimates and coordination with resource agencies and key stakeholders.

PROJECT PURPOSE

The overarching purpose of a rail corridor along US 27 is to meet South Florida's growing transportation needs for freight and passenger movement. The intended purpose of the project is to connect the Port of Miami by rail with inland logistics centers around Lake Okeechobee in western Palm Beach County, to remove freight traffic from congested coastal corridors and enhance proposed opportunities for facilitate the restoration of passenger rail service along South Florida East Coast.

The purpose of the project is to redevelop US 27 as a multimodal corridor to accommodate rail and highway modes of transportation.

PROJECT SETTING

The study corridor consists of approximately 72 miles of roadway on SR-5/US 27, extending from the Homestead Extension of Florida's Turnpike (HEFT) in Miami-Dade County to the Palm Beach/Hendry County line. The project corridor begins in the Lake Belt area of western Miami-Dade County; it runs along the fringe of the western urbanized areas of Broward County and through the middle of the water conservation areas in the Everglades. The corridor bisects the Everglades Agricultural Area in western Palm Beach County and passes through the RACEC communities along the southern rim of Lake Okeechobee.

FINDINGS

- *Travel Demand*

  - Highway Traffic Only Alternative: This analysis considered the development of three Intermodal Logistics Centers located in Palm Beach County, Glades County and St. Lucie County; with operations beginning in 2016 and full build out in 2035. The trip generation estimate was based in the development of approximately 50 million square feet of warehouse space, high-cube warehouse space and rail terminal facilities.

  - The multimodal traffic forecast shows that by 2035 the ILC developments will add between 20,400 to 34,500 trips to US-27, north of I-75 and that truck traffic along US-27 is anticipated to increase most significantly from 21% to 27%, between I-75 and SR-80. This ILC-related traffic combined with the growth of background traffic would require widening of US 27 from four to six lanes, between I-75 and Old US 27; as well as, widening from four to eight lanes between Old US 27 and the Hendry County line.

From	To	2010 AADT	2035 AADT (Background)	2035 AADT (ILC Traffic)	Total 2035 AADT
NW 138th Street	Homestead Extension (HEFT)	33,000	49,592	3,246	52,838
Homestead Extension (HEFT)	Pines Boulevard	19,800	40,576	4,090	44,666
Pines Boulevard	Sheridan Street	17,900	37,148	4,090	41,238
Sheridan Street	Stirling Road	17,200	33,911	4,090	38,001
Stirling Road	Griffin Road	14,100	27,892	4,090	31,982
Griffin Road	I-75 (Alligator Alley)	18,200	37,009	4,090	41,099
I-75 (Alligator Alley)	SR-80 (South Bay)	9,600	26,352	20,419	46,771
SR-80 (South Bay)	Levee Road	16,500	29,862	31,488	61,350
Levee Road	Mutt Thomas Road	14,600	27,672	31,488	59,160
Mutt Thomas Road	Old US-27	14,600	27,575	34,548	62,123
Old US-27	Palm Beach County Line	14,600	27,575	34,548	62,123

- *Multimodal Alternative:* The multi-modal traffic alternative assumes the co-location of highway and rail infrastructure within the existing US 27 corridor. The rail traffic forecasts consist of three elements:

  - Rail to Rail Diversion. This traffic element consists of an estimate of the amount of existing FEC and CSX service that would move from their existing corridors to the new rail corridor.

- New Port-Related Intermodal Rail Traffic. This traffic element consists of an estimate of the amount of new Port Miami intermodal rail traffic that would use the new rail corridor versus the existing rail corridor.

- Truck to Rail Diversion. This traffic element consists of an estimate of the volume of long haul truck traffic that would divert to the new rail corridor.

- *Assessment of Rail Alignments*

  - *Southern End:* At the south end of the corridor, the simplest and most logical connection for the new railroad is South Alternative 1 (S-ALT-1), which connects to the existing FEC Railroad where its track ends near the HEFT and US 27. This provides the most direct connection of a western rail corridor to the Port of Miami with the least cost and least environmental impact.

  - *Mainline:* Along the mainline rail corridor from Krome Avenue to South Bay near Lake Okeechobee, a rail alignment along the west side of US 27 was deemed more appropriate since it had the fewest grade crossings, a wider area to construct the railroad, and the least overall conflicts with the highway and other features such as the Sawgrass Recreation area and the L-38 Canal running along the east side of US 27.

  - *Northern End:* At the north end of the corridor, the most practical connection to existing rail is a variation of North Alternative 2A (N-ALT-2A) based on it having the lowest environmental impacts score and the least cost. This alternative provides the first available connection to existing rail at the north end and avoids running a new railroad through South Bay.

- *Conceptual Engineering Alternatives*

  - A multimodal US 27 corridor would include utilizing the existing 4-lane divided highway from the HEFT to Griffin Road just south of I-75. The highway would then expand to a 6-lane divided highway from Griffin Road north to Old US 27 in Palm Beach County. North of Old US 27 the highway would expand to an 8-lane section. The proposed railroad is a single-track with five 2-mile siding tracks to accommodate passing trains.

  - Major challenges include reconfiguration and reconstruction of the I-75/US 27 interchange, and the avoidance of adjacent waterways, water conservation areas, and other critical environmental resources. The I-75 interchange would require reconstruction to elevate the existing bridges to expand the current 16’ highway clearance to a 23’-6” railroad clearance.

  - Another challenge is crossing the C-6 Canal in Miami-Dade County to get the railroad from the south side of the canal to the north side. One alignment alternative studied was to continue the railroad along the south side of the canal and loop the track west to north and bring it alongside Krome Avenue, then cross the C-6 Canal perpendicularly. The track would then run along the west side of Krome Avenue and turn north as it approached US 27. This is shown in the Concept plans in Appendix N beginning at Sheet 18. A simpler alignment was determined that curves the track from west to north and crosses the C-6 Canal at a skew and aligns the track directly with US 27. This alignment has fewer impacts to surrounding lands and has less right of way impacts.

  - Extending the railroad from the end of the FEC tracks in Medley near the HEFT and continuing westward along the C-6 Canal bank requires approximately 16 acres of right of way acquisition. This acquisition would occur south where the railroad would cross the C-6 Canal near Krome Avenue. This right of way acquisition would increase significantly if the track were to loop around towards Krome Avenue as mentioned above.

  - One complex intersection of the study is at Griffin Road and US 27, which has the C-11 Canal running east-west just north of Griffin Road and a major truck stop on the east side of US 27 just north of the C-11 Canal. This is area is shown on concept plan Sheet 35 in Appendix N. There were many constraints induced by adding a railroad, maintaining frontage roads for the truck stop access, and providing adequate connections to Everglades Holiday Park residential community. Therefore, it was determined to elevate US 27 above the ingress/egress to the truck stop so that trucks could safely access southbound US 27 without stopping in an at-grade median opening in the current condition.

  - Another major challenge of the project is to provide safe access to the Sawgrass Recreation Area and the boat ramp on the west side of US 27. The current concept proposes a full median opening at the park and the northern entrance way to the boat ramp, and to elevate the southbound lanes over the southern outlet of the boat ramp.

  - The major opportunity for the highway-only and multimodal alternatives is the right of way width for most of US 27 (approximately 53 miles) ranging from 221 feet to 481 feet, which provides sufficient room to accommodate a widened roadway and a double-track railroad. The wide right of way is also an opportunity to allow linear stormwater retention ponds within the corridor, and assists greatly with maintenance of traffic during construction. The right of widths along the corridor are generally:

- 481’ south of I-75 in Broward County
- 237’ – 343’ north of I-75 in Broward County to the Palm Beach County line
- 221’ from the Palm Beach County line to south of South Bay
- 100’ through South Bay
- 162’ from South Bay to the Hendry County Line

- A significant constraint to the corridor are the portions of US 27 with constrained right of way widths (100’) through South Bay that would require right of way acquisition to construct even a typical 6-lane roadway.

- *Project Costs*

  - Highway-Only Alternative ($763 million) - 321 mainline lane miles of roadway, 11 new or widened bridges, 15 intersection improvements, two (2) interchanges and three (3) turnarounds.

  - Multimodal alternative ($1.3 billion) 75 track miles of rail, 10 rail bridges, 382 mainline lane miles of roadway (widening and reconstruction), 23 bridges, 20 intersection improvements, two (2) interchanges, and three (3) turnarounds.

  - Estimated annual maintenance cost for rail is $5.25 million for the total of 70 track miles at $75,000 per mile.

AGENCY AND STAKEHOLDER COORDINATION

Various stakeholders were interviewed for the PACE Study to obtain information and possible concerns regarding a potential railroad corridor parallel to US 27. These stakeholders are representatives of industries, shippers, railroads, Metropolitan Planning Organizations, Florida Department of Transportation, environmental agencies, and community groups who might have an interest in or could be directly impacted by the development of a new rail corridor.

The stakeholders interviewed are:

- Florida East Coast Railway (FEC)
- CSX Railroad
- South Central Florida Express (SCFE) Railroad (owned and operated by U.S. Sugar)
- Lykes Bros. and Duda
- U.S. Sugar
- Florida Crystals Corporation (South Florida Regional Logistics Center)
- Palm Beach County, Broward County, and Miami-Dade County MPOs
- Greater Miami Chamber of Commerce
- Port Everglades, Port of Palm Beach and Port of Miami
- South Florida Regional Planning Council
- Treasure Coast Regional Planning Council
- Economic Council of Palm Beach County, Inc.
- Flagler Development Group (South Florida Logistics Center)

The general consensus from the stakeholders was that the project would benefit transportation and freight movement in Florida.

BENEFITS AND COSTS

There are direct and indirect benefits and costs of creating a new railroad along US-27. Considerations for a detailed B/C analysis are:

Benefits of a new rail corridor:

- Potential for attracting new businesses and creating jobs (economic development);
- By potentially reducing train traffic and occurrences of train crossings on the east coast rail corridor, traffic conflicts, congestion, air pollution, and fuel consumption could be reduced in the dense eastern urban core of the region;
- Capacity for future passenger rail service and freight trains on the east coast could be increased;
- Creating additional rail capacity could assist in providing a strategic advantage for capturing new global trade.
- Redundancy of north-south rail corridors to move people and/or freight and goods from Miami-Dade County to and from the Lake Okeechobee region provides a good alternative option in cases of emergency in which one rail corridor is shut down.
- Some existing truck traffic could shift from the existing US-27 highway to the US-27 railroad, which would expend less energy and fewer emissions to move freight and goods.

Costs related to a new rail corridor:

- Initial investment in capital cost;
- Ongoing operations and maintenance of the new railroad;
- Environmental mitigation cost.

RECOMMENDATIONS FOR FUTURE STUDY

The US 27 PACE Study provides significant data for the US 27 corridor including information from previous studies, information from recent studies, and projections of future conditions along the corridor including the timing of and magnitude of the planned ILCs. In as much as the data is deemed accurate and useful for determining a long-term strategy for US 27 rail and highway transportation modes, the data is current and has a limited shelf-life. This is mainly due to the dynamic nature of freight movement and transportation in South Florida and the anticipated trends described in the PACE study and other reports on freight movement throughout Florida and the western hemisphere.

Therefore, the PACE study itself does not determine a “Preferred Alternative”, but rather sets the stage for future studies and refinement of the data provided in the PACE Study. The conclusion of the PACE Study includes key points that future studies may want to focus on to assist with determining the final railroad location (if rail is part of the preferred alternative) and the ultimate US 27 highway geometry.

If and when the ILCs are developed, and depending on their actual traffic impacts, that is when the FDOT should initiate Project Development & Environment (PD&E) studies to focus on conceptual design and location approval for the new railroad and potential highway improvements. The new railroad should be studied as a whole, and could then be broken into smaller design and construction segments. In addition, future PD&E studies should address US 27 widening and new railroad construction once one or more of the ILCs begin to develop; or when the need for additional rail capacity on the east coast rail corridor is so great that additional railroad capacity is needed.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 1.0
PROJECT LOCATION

1.0 PROJECT LOCATION

The study corridor consists of approximately 72 miles of roadway on SR-5/US-27, extending from the FEC Railway south of HEFT in Miami-Dade County, to the Palm Beach/Hendry County line. The FEC's Hialeah Rail Yard is also part of the Flagler Development Group's South Florida Logistics Center (SFLC) identified by the blue circle in Figure 1 on page 1-2. The red, green and black circles on Figure 1.1 identify the locations of three other proposed Intermodal Logistics Centers (ILCS) in South Florida near Lake Okeechobee.

The southwestern portion of the project corridor begins in the Lake Belt mining area of western Miami-Dade County. North of the Lake Belt area and the SFLC the US 27 corridor runs along the fringe of the western urbanized areas of Broward County through the middle of the water conservation areas in the Everglades. The corridor bisects the Everglades Agricultural Area (EAA) in western Palm Beach County and passes through the Rural Areas of Critical Economic Concern (RACEC) communities along the southern rim of Lake Okeechobee. The project corridor continues along US 27 from the southern end of Lake Okeechobee northwesterly to the Hendry County line.

The main study corridor is along US 27; however, there are ten additional railroad alignment alternatives that were previously studied in Phase 1 that are part of the PACE Study. These alignments are:

SOUTHERN ALTERNATIVES

In general, all of the southern alternatives connect to the main corridor in northwestern Miami-Dade County. They provide access to one or both railroads operating in Miami-Dade County.

• **Southern Alternative 1 (S-ALT-1)** connects to the existing FEC Railway spur terminating northwest of the Homestead Extension of Florida's Turnpike (HEFT) interchange at US 27 (Okeechobee Road). The FEC Railway runs parallel to US 27 on the west side of the corridor and connects to the Hialeah Intermodal Rail Yard in Miami-Dade County, as well as South Florida's three seaports. The proposed corridor falls within or along the existing US 27 right of way.

• **Southern Alternative 2 (S-ALT-2)** connects the existing CSX railroad spur north of North Kendall Drive and west of Krome Avenue, which currently serves an established aggregate mine. The proposed rail line runs parallel to Krome Avenue and connects with the main line at the intersection of Krome Avenue at US 27 in Miami-Dade County. The CSX spur connects to the rest of CSX's network, including the South Florida Rail Corridor. The proposed corridor falls within or along the existing Krome Avenue right of way.

• **Southern Alternative 3A (S-ALT-3A)** is the combination of Southern Alternatives 1 and 2. This alternative connects the existing FEC Railway rail line north of the HEFT at US-27, which runs parallel to US 27, and the spur located north of North Kendall Drive and west of Krome Avenue. This alternative would provide southern connections to the entire South Florida rail network.

• **Southern Alternative 3B (S-ALT-3B)** is the combination of Alternatives 1 and 2 plus the SR 836 Spur connecting the existing FEC Railway spur northwest of the HEFT interchange at US 27 and the CSX spur north of Tamiami Trail and west of SR 836 (Dolphin Expressway). An east/west connection west of Krome Avenue would connect with the Southern Alternative 2 link, and ultimately to the main line at the intersection of Krome Avenue at US 27 in Miami-Dade County.

NORTHERN ALTERNATIVES

Branching off the central section of the US-27 corridor in western Palm Beach County are several alignments, identified as the Northern Alternatives. They provide access to one or more railroads tying in directly to current infrastructure at various locations.

• **Northern Alternative 1 (N-ALT-1)** connects to the existing South Central Florida Express (SCFE) spur serving the Okeelanta facility south of South Bay. The spur then travels west before turning north and connecting with the SCFE mainline. From the mainline, traffic could be routed either northwest to CSX in Sebring or northeast to FEC in Fort Pierce.

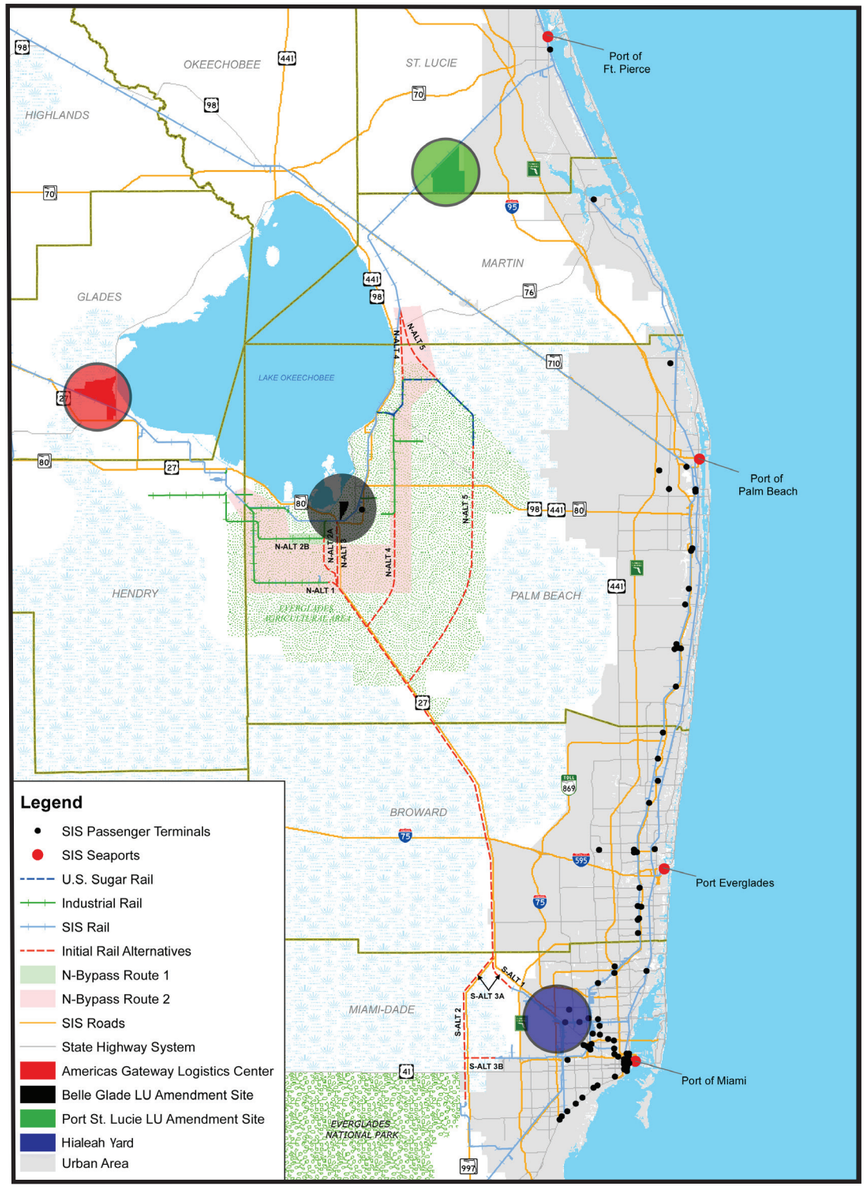
• **Northern Alternative 2 (A and B) (N-ALT-2A and N-ALT-2B)** connect to the existing industrial rail line serving the US Sugar Corporation via a new rail connection from the US 27 mainline through land owned by Florida Crystals. Alternative 2A, a slight variation on this general alignment, proceeds due north along an old rail bed and intersects with the SCFE mainline. The alignment for Alternative 2B; however, is located due west along an existing industrial rail connecting with the SCFE mainline further west. From the SCFE mainline, railroad traffic could be routed either northwest to CSX in Sebring or northeast to FEC in Fort Pierce.

• **Northern Alternative 3 (N-ALT-3)** directly connects to the existing SCFE main line located just west of the City of South Bay and represents the true US 27 mainline alternative, remaining within the existing US 27 right of way until connecting with the SCFE. From the SCFE mainline, rail traffic could be routed either northwest to CSX in Sebring or northeast to FEC in Fort Pierce.

• **Northern Alternative 4 (N-ALT-4)** has an alignment that connects to the existing industrial US Sugar rail line east of cities of South Bay and Belle Glade. It would require a new rail corridor and the acquisition of rights of way to connect the US 27 mainline to the industrial spur. From this industrial spur, the alignment would connect to the SCFE mainline via additional new track.

• **Northern Alternative 5 (N-ALT-5)** would connect to the existing industrial US Sugar rail line through the Everglades area east of the cities of South Bay and Belle Glade. Similar to Northern Alternative 4, this alternative would require a new rail corridor and acquiring rights of way to connect the US 27 mainline to the industrial spur, eventually linking with the SCFE mainline via additional new track. In addition, railroad traffic could be routed to CSX in Sebring or to FEC in Fort Pierce.

Figure 1.1 - US 27 PACE Study Area



US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 2.0
PURPOSE AND NEED

2.0 PURPOSE AND NEED

The purpose of a rail bypass along US 27 is to assist the movement of anticipated increases in freight and container cargo between the Port of Miami and inland distribution centers located around Lake Okeechobee in South Florida. A new railroad bypass could potentially divert 15 to 22 freight trains per day from existing rail services along the coastal routes (CSX and FEC) including port-related intermodal rail cargo. Presently, the FEC runs an average of ten freight trains per day and CSX runs an average of five trains per day. The ability to move freight trains along a western bypass route would enhance proposed opportunities for restoring commuter rail on the eastern seaboard and alleviate congestion at the multiple railroad crossings in Southeast Florida.

The US 27 Rail Corridor Feasibility Study of March 2010 was the first phase (precursor to this study) of the feasibility study that was authorized in Specific Appropriation 2077 by the 2008 Florida Legislative Session. As stated in the Phase 1 Feasibility Study:

> *"The development of a new rail corridor along US 27 has the potential to significantly affect freight and passenger transportation in South Florida. Provided it is cost effective, safe, and reliable, this corridor could attract freight traffic from existing lines, creating new opportunities for passenger service along the eastern routes. It also has the potential to support industrial development in the Glades region particularly the proposed South Florida Intermodal Logistics Center."*

The Florida Rail System Plan of December 2010 by FDOT identifies 235 projects that are proposed for development in the near term (1-5 years) to long term (20+ years) with a cost of nearly $51 billion. The US 27 Rail Link study is included in the 2010 Rail System Plan as part of the strategic transportation planning as a mid-term project (6-10 years) and is described as follows:

> *"The project consists of the construction of a railroad connecting the Hialeah Rail Yard to the Intermodal Logistics Center in the vicinity of the south end of Lake Okeechobee. The rail will connect the three southern most east coast deep water ports to the ILC removing truck and rail traffic from the congested east coast corridors to the center of the State. The goal of this project is to move freight off the congested coastal areas."*

In a White Paper published by Cambridge Systematics in January 2012, the connection of the Port of Miami to an Intermodal Logistics Center (ILC) by means of a rail line along US 27 was characterized as follows:

> *"Port of Miami has indicated that the corridor is critical to serve future markets; including the Asian market after the Panama Canal expansion, emerging markets of Latin America (Brazil) and Africa, and the projected increases in discretionary cargo. The corridor would connect with the proposed inland port facility in Hialeah that POM is developing with FEC to help manage its container operations. The US 27 rail corridor would be justified if the connection is reliable and timely for freight operations."*

In addition, the 2012 Market Analysis prepared by Martin Associates indicated that the combination of a South Florida Port and a South Florida Distribution Center is considered a key factor for the creation of a new logistics supply chain that would attract imported cargo from Asia for consumption in the Florida market.

The overarching purpose of the PACE Study is to address Florida's growing transportation needs for freight and passenger movement.

The following is a list of initiatives and potential developments that contribute to the need for this study:

1. Future construction of one or more Intermodal Logistics Centers around Lake Okeechobee and in northwest Miami that would generate a need to move large volumes of freight within Florida and outside of Florida.
2. Reinstating passenger rail service on the FEC railroad that could require an alternative corridor for freight trains.
3. Capital improvements programs at the three South Florida seaports and their projections of increased freight movement to and from these seaports.
4. Projected population increases in South Florida that translates into a demand for more goods, more transportation, and more congestion. As populations increase along the eastern seaboard, this drives a demand to shift inter-regional traffic (passenger and freight) to less-used western corridors of Florida's east coast.
5. Panama Canal widening and larger Post-Panamax ships coming to the Port of Miami. This would coincide with the Port of Miami's expected growth and need to distribute freight northward over long distances.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 3.0
DATA COLLECTION

3.0 DATA COLLECTION

The project corridor is comprised of five basic segments (see Figure 3.1). The recognition of the segments is based on distinctive or unique characteristics of the highway corridor and surrounding environment. The section number limits and lengths of the segments are:

- 87090-000 from Broward/Miami-Dade County Line to S. of HEFT Interchange; 5.5 mi
- 86060-000 from Broward/Miami-Dade County Line to I-75; 13 mi
- 86060-000 from I-75 to Broward/Palm Beach County Line; 14.5 mi
- 93160-000 from Broward/Palm Beach County Line to SR 80 in South Bay; 26 mi
- 93100-000 from Hendry/Palm Beach County Line to SR 80 in South Bay; 12.5mi

Relevant data has been collected that defines the roadway characteristics, traffic data, and environmental characteristics of the US 27 corridor. Much of this data was retrieved from the Straight Line Diagrams, which are included in Appendix A.

Figure 3.1 - US 27 PACE Study Area Segments

3.1 EXISTING ROADWAY CONDITIONS

3.1.1 FUNCTIONAL CLASSIFICATION

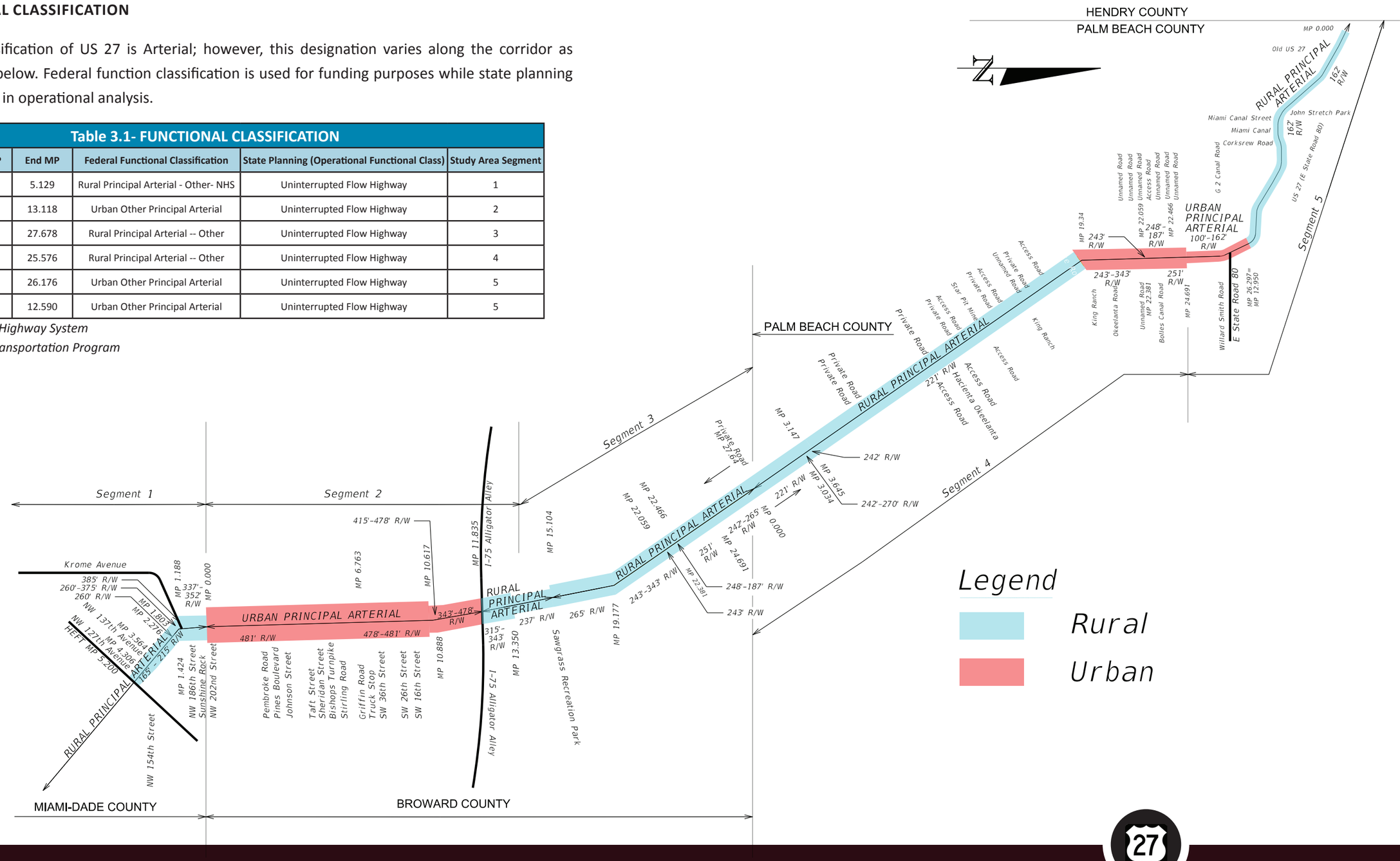
The functional classification of US 27 is Arterial; however, this designation varies along the corridor as shown in Table 3.1 below. Federal function classification is used for funding purposes while state planning classification is used in operational analysis.

Table 3.1- FUNCTIONAL CLASSIFICATION

County	Begin MP	End MP	Federal Functional Classification	State Planning (Operational Functional Class)	Study Area Segment
Miami-Dade	0.000	5.129	Rural Principal Arterial - Other- NHS	Uninterrupted Flow Highway	1
Broward	0.000	13.118	Urban Other Principal Arterial	Uninterrupted Flow Highway	2
Broward	13.118	27.678	Rural Principal Arterial -- Other	Uninterrupted Flow Highway	3
Palm Beach	0.000	25.576	Rural Principal Arterial -- Other	Uninterrupted Flow Highway	4
Palm Beach	25.576	26.176	Urban Other Principal Arterial	Uninterrupted Flow Highway	5
Palm Beach	0.000	12.590	Urban Other Principal Arterial	Uninterrupted Flow Highway	5

Legend: NHS - National Highway System
STP - Surface Transportation Program

Figure 3.2- US 27 Characteristics Map



3.1.2 TYPICAL SECTIONS

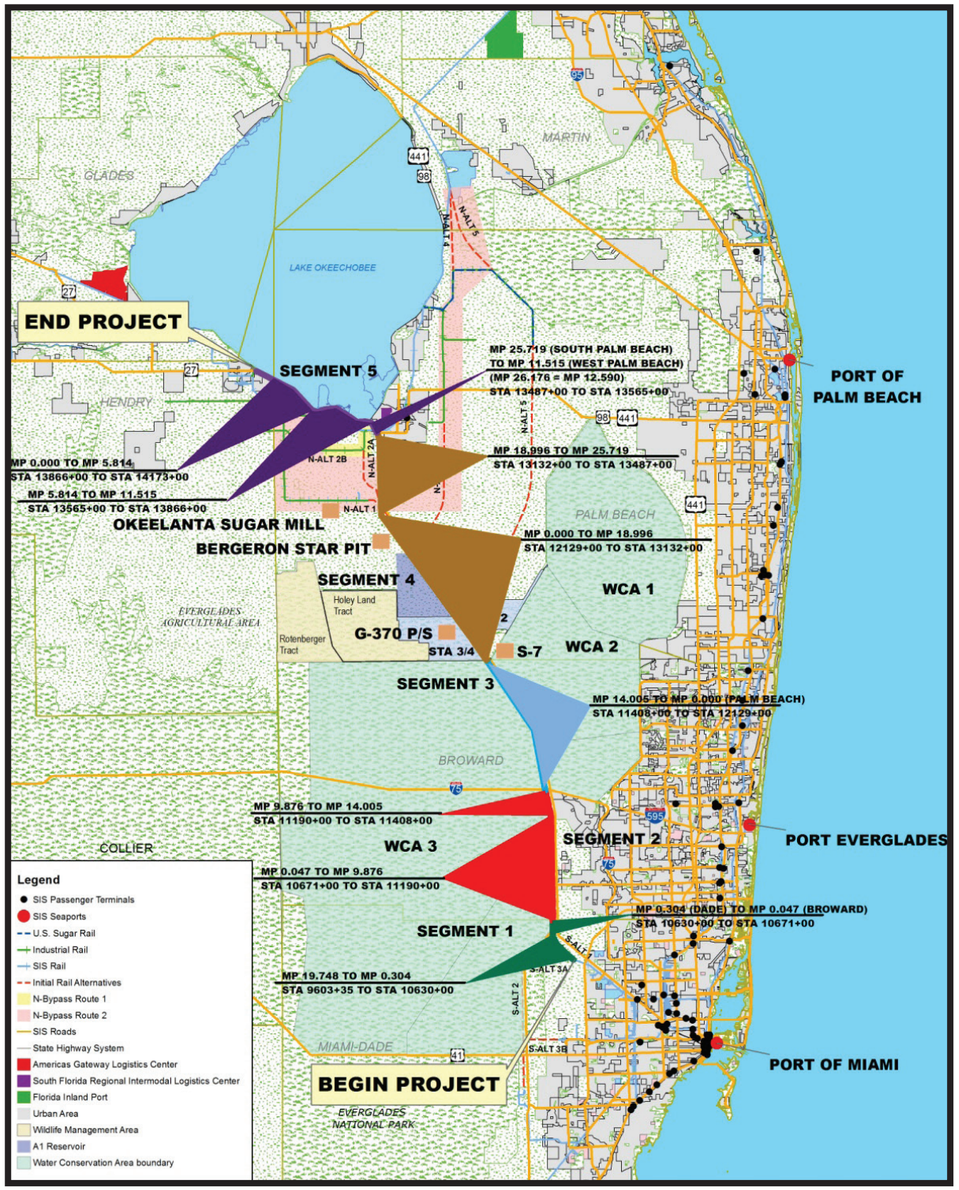
Various typical sections for the existing conditions along the US 27 corridor are shown in Appendix B. A typical section key map is provided in Figure 3-3. The purpose of the typical section key map is to define the station limits for each of the five segments along the project corridor and to serve as quick reference between the typical sections and the project mainline. Segment 1 is an approximate 5.5-mile section in Miami-Dade County extending north from the Homestead Extension of Florida's Turnpike (HEFT) to just north of the US 27/Krome Avenue intersection at approximately the Broward County line. Segment 2 is a 13-mile section extending from just north of the Miami-Dade/Broward County line to just north of the I-75 interchange with US 27. Segment 3 continues north from Segment 2 to the Broward/Palm Beach County line approximately 14.5 miles long. Segment 4 extends from the Broward/Palm Beach County line to the south city limits of South Bay in Palm Beach County for approximately 26 miles. Segment 5 is approximately 12.5 miles long. This section is initially an urban section that runs north through the city of South Bay for a couple of miles, and then continues west as a rural section to the Palm Beach/Hendry County line.

These existing typical sections were compiled from existing plans along this 75-mile stretch of US 27. The corridor has two distinct typical sections; from the Hialeah Rail Yard (near the Palmetto Expressway) to the HEFT, US 27 is a six-lane divided arterial roadway with several major signalized intersections. Between the HEFT and the Palm Beach/Hendry County line, the roadway generally consists of a four lane highway with a wide, depressed grass median. The cross sections are within the total right of way envelope extending approximately 481 feet at its widest point in Broward County to approximately 100 feet at its narrowest point in South Bay, Palm Beach County (See Table 3.2 on page 3-4).

The travel lanes are eleven and twelve foot lanes, ten-foot outside shoulders and eight-foot inside shoulders throughout all segments. Segment 1 has approximate median widths of 65 feet. Segment 2 has 125 foot median widths until 2.25 miles south of the I-75 interchange where the median narrows to 65 feet. Segments 3, 4, and 5 generally have a 65 foot median width with the notable exception of the existing urban section in South Bay which has a 22 foot median.

Side slope conditions in Segments 1 and 2 are primarily 1:6 to the Clear Zone when no guardrail exists. The C-6 Canal runs along Segment 1 on the west side for approximately four miles with and existing guardrail for protection. Segments 3 and 4 have canal hazards and guardrail is used for protection and when no guardrail exists the existing slopes are 1:6 to the Clear Zone. Segment 5 has a two mile urban section with existing ground at approximately the back of sidewalk elevation for the first two miles; after that the section has a significant amount of guardrail alternating from the left side the right side of the roadway with its curvature.

Figure 3.3 - Typical Section Key Map



3.1.3 HORIZONTAL AND VERTICAL ALIGNMENTS

Existing plans from FDOT Districts Four and Six were reviewed. These plans show that US 27 generally has long tangent sections in Segment 1 through 4. Segment 5 is the exception with a more curvilinear alignment along the southern rim of Lake Okeechobee (See Existing Curve Data in Table 3.2). The few curves along the corridor range from approximately 4° 02' to 1° 0' (1,432 foot radius to 5,729 foot radius). Most of US 27 has a 70 mph design speed with a posted speed of 65 mph. However, sections in Segment 1 (North Miami-Dade County) and Segment 5 (South Bay) have 45-50 mph design speeds.

The roadway vertical profile is mostly level throughout the corridor with an overall slope from north to south. US 27 remains at grade the entire length of Segment 1 through 5; however, the roadway does have a significant number of canal crossings where slight vertical grades may exists. At the interchange with I-75, the roadway remains at grade as I-75 crosses overhead with all ramps passing over and then diverging or converging with US 27. The existing curve data and its relative segment is shown on Table 3.2.

Table 3.2 - Existing Curve Data

Delta	D	PC (Mi)	PI (Mi)	PT (Mi)	COUNTY	Segment
08°00'00.00"			11.73		Miami-Dade	
00°00'39.00"			10.883		Miami-Dade	
00°03'00.00"			9.571		Miami-Dade	
00°01'53.00"			8.913		Miami-Dade	
00°02'00.00"			8.394		Miami-Dade	
00°02'33.00"			7.947		Miami-Dade	
00°01'40.00"			7.567		Miami-Dade	
00°03'10.00"			7.051		Miami-Dade	
00°04'03.00"			6.596		Miami-Dade	
01°02'00.00"			6.233		Miami-Dade	
00°03'05.00"			5.795		Miami-Dade	
00°02'27.00"			5.397		Miami-Dade	
00°01'24.00"			4.902		Miami-Dade	1
00°04'29.00"			4.378		Miami-Dade	1
00°00'40.00"			3.818		Miami-Dade	1
00°06'53.00"			3.377		Miami-Dade	1
00°03'21.00"			3.163		Miami-Dade	1
00°00'45.00"			2.812		Miami-Dade	1
48°06'13.00"	04°02'00.00"	1.469	1.578	1.698	Miami-Dade	1
00°00'57.00"			2.468		Miami-Dade	1
00°02'20.00"			2.179		Miami-Dade	1
00°05'58.00"			6.04		Broward	2
10°03'54.00"	01°00'00.00"	10.616	10.716	10.816	Broward	2

Table 3.2 - Existing Curve Data *Cont.*

Delta	D	PC (Mi)	PI (Mi)	PT (Mi)	COUNTY	Segment
01°00'00.00"			10.816		Broward	2
00°09'32.00"			15.857		Broward	3
00°08'06.00"			17.126		Broward	3
23°05'00.00"	02°05'00.00"	19.350	19.464	19.574	Broward	3
00°01'44.00"			22.142		Broward	3
00°03'03.00"			22.996		Broward	3
00°00'32.00"			9.42		Broward	3
00°00'39.00"			3.025		Palm Beach	4
00°08'57.00"			6.676		Palm Beach	4
00°04'36.00"			8.605		Palm Beach	4
00°00'20.00"			10.081		Palm Beach	4
00°00'28.00"			11.169		Palm Beach	4
00°02'24.00"			14.24		Palm Beach	4
01°06'56.00"	00°09'00.00"	17.948	18.04	18.133	Palm Beach	4
36°02'37.00"	03°04'00.00"	18.599	18.705	18.803	Palm Beach	4
01°08'20.00"	01°07'00.00"	19.329	19.421	19.513	Palm Beach	4
00°09'40.00"			20.859		Palm Beach	4
27°04'00.00"	01°05'21.00"	11.822	12.037	12.243	Palm Beach	5
04°01'00.00"	01°00'00.00"	10.282	10.320	10.358	Palm Beach	5
28°04'20.00"	02°00'00.00"	9.540	9.676	9.808	Palm Beach	5
20°00'00.00"	03°00'00.00"	8.703	8.767	8.830	Palm Beach	5
20°04'26.00"	03°00'00.00"	8.314	8.380	8.445	Palm Beach	5
48°04'00.00"	01°00'00.00"	4.964	5.293	5.582	Palm Beach	5
09°03'13.00"	01°00'00.00"	2.617	2.675	2.734	Palm Beach	5
09°06'16.00"	01°00'00.00"	2.376	2.438	2.498	Palm Beach	5
00°00'00.00"	03°09'00.00"	0,754	0.820	0.886	Palm Beach	5

Table 3.3 on page 3-5 provides existing posted speed limits along US 27 throughout the study area.

Table 3.3 - US 27 Existing Speed Limits				
INTERSECTION	COUNTY	MILE POST	EXISTING SPEED LIMIT (MPH)	SEGMENT
HEFT	MIAMI-DADE	5.000	50	1
NW 154 ST	MIAMI-DADE	3.866	55	1
NW 127 AVE	MIAMI-DADE	3.542	55	1
NW 137 AVE	MIAMI-DADE	2.333	55	1
FRONTAGE RD	MIAMI-DADE	1.893	55	1
NW 186 ST	MIAMI-DADE	1.003	55	1
SR-99/KROME AVE	MIAMI-DADE	0.435	55	1
		0.236	65	
HONEY HILL RD/NW 202 ST	MIAMI-DADE	0.038	65	1
PEMBROKE RD	BROWARD	2.542	65	2
SR-820/PINES BLVD	BROWARD	3.544	55	2
JOHNSON ST	BROWARD	4.043	50	2
TAFT ST	BROWARD	4.529	50	2
FRONAGE RD	BROWARD	4.920	50	2
SHERIDAN ST	BROWARD	5.046	50	2
BISHOPS TURNPIKE	BROWARD	5.565	55	2
STIRLING RD	BROWARD	6.040	55	2
GRIFFIN RD	BROWARD	7.102	55	2
SW 36 ST	BROWARD	8.042	55	2
SW 26 ST	BROWARD	9.045	65	2
SW 16 ST	BROWARD	9.793	65	2
I-75	BROWARD	12.971	65	2
WILLARD SMITH RD	PALM BEACH	18.265	65	3
OKEELANTA RD	PALM BEACH	20.355	65	3
CR-827/BOLLES CANAL RD	PALM BEACH	22.339	55	4
G2 CANAL RD	PALM BEACH	25.289	45	5
WILLARD SMITH RD	PALM BEACH	25.314	30	5
SR 80	PALM BEACH	12.590=26.176	30	5
CORK SCREW BLVD	PALM BEACH	11.670	30	5
LEVEE ROAD	PALM BEACH	11.050	55	5
CORK SCREW BLVD	PALM BEACH	10.278	65	5
CORK SCREW BLVD	PALM BEACH	9.835	65	5
MIAMI CANAL ST.	PALM BEACH	6.058	65	5
CORK SCREW ROAD	PALM BEACH	6.291	65	5
JOHN STRETCH ROAD	PALM BEACH	6.058	65	5
OLD US 27	PALM BEACH	2.491	65	5

3.1.4 INTERSECTIONS AND SIGNALIZATION CONDITIONS

Intersections of US 27 with major roads and interstate highways are located along the 75-mile corridor. Some intersections, such as SR-80 in South Bay, could potentially be constraint points for any proposed improvements. Segment 2 has the highest density of signalized intersections with five signalized intersections within 3.5 miles.

Table 3.4 on page 3-6 summarizes the existing intersections and Table 3.5 on page 3-6 lists the major driveways.

Table 3.4 - Existing Intersections

INTERSECTION	COUNTY	MILE POST	INTERSECTION TYPE	EXISTING SPACING (FT)	SEGMENT
HEFT	MIAMI-DADE	5.000	FULL SIGNALIZED		1
NW 154 ST	MIAMI-DADE	3.866	SIGNALIZED TEE	5280	1
NW 127 AVE	MIAMI-DADE	3.542	TEE	1710	1
NW 137 AVE	MIAMI-DADE	2.333	TEE	6383	1
FRONTAGE RD	MIAMI-DADE	1.893	TEE	2323	1
NW 186 ST	MIAMI-DADE	1.003	TEE	4699	1
SR-99/KROME AVE	MIAMI-DADE	0.435	SIGNALIZED DIRECTIONAL	2999	1
HONEY HILL RD/NW 202 ST	MIAMI-DADE	0.038	DIRECTIONAL TEE	2096	1
PEMBROKE RD	BROWARD	2.542	DIRECTIONAL TEE	13622	2
SR-820/PINES BLVD	BROWARD	3.544	SIGNALIZED TEE	5290	2
JOHNSON ST	BROWARD	4.043	FULL SIGNALIZED	2634	2
TAFT ST	BROWARD	4.529	DIRECTIONAL TEE	2566	2
FRONAGE RD	BROWARD	4.920	DIRECTIONAL TEE	2064	2
SHERIDAN ST	BROWARD	5.046	SIGNALIZED TEE	665	2
BISHOPS TURNPIKE	BROWARD	5.565	DIRECTIONAL TEE	2740	2
STIRLING RD	BROWARD	6.040	DIRECTIONAL TEE	2508	2
GRIFFIN RD	BROWARD	7.102	FULL SIGNALIZED	5607	2
SW 36 ST	BROWARD	8.042	DIRECTIONAL TEE	4963	2
SW 26 ST	BROWARD	9.045	DIRECTIONAL TEE	5295	2
SW 16 ST	BROWARD	9.793	TEE	3949	2
I-75	BROWARD	12.971	INTERCHANGE	16779	2
WILLARD SMITH RD	PALM BEACH	18.265	TEE	174092	3
OKEELANTA RD	PALM BEACH	20.355	TEE	11035	3
CR-827/BOLLES CANAL RD	PALM BEACH	22.339	FULL	10475	4
G2 CANAL RD	PALM BEACH	25.289	DIRECTION TEE	15576	5
WILLARD SMITH RD	PALM BEACH	25.314	TEE	132	5
SR 80	PALM BEACH	12.590=26.176	SIGNALIZED TEE	4551	5
CORK SCREW BLVD	PALM BEACH	11.670	TEE	4858	5
LEVEE ROAD	PALM BEACH	11.050	TEE	3273	5
CORK SCREW BLVD	PALM BEACH	10.278	TEE	4076	5
CORK SCREW BLVD	PALM BEACH	9.835	TEE	2339	5
MIAMI CANAL ST.	PALM BEACH	6.058	TEE	19942	5
CORK SCREW ROAD	PALM BEACH	6.291	TEE	1230	5
JOHN STRETCH ROAD	PALM BEACH	6.058	TEE	1230	5
OLD US 27	PALM BEACH	2.491	TEE	18833	5

Table 3.5- Major Driveways

DRIVE	COUNTY	MILE POST	SIDE	SEGMENT
FRONTAGE RD	MIAMI-DADE	4.591	RT	1
FRONTAGE RD	MIAMI-DADE	1.893	RT	1
SUNSHINE ROCK ENT.	MIAMI-DADE	0.017	RT	1
SUNOCO SERVICE STATION	BROWARD	4.92	RT	2
TRUCK STOP	BROWARD	7.362	RT	2
RECREATIONAL RD	BROWARD	11.984	RT/LT	2
SAWGRASS RECREATION PARK	BROWARD	15.214	RT	3
ACCESS ROAD	PALM BEACH	0.375	LT	4
PRIVATE ROAD	PALM BEACH	6.728	LT	4
PRIVATE ROAD	PALM BEACH	6.76	LT	4
ACCESS ROAD	PALM BEACH	10.269	RT	4
PRIVATE ROAD	PALM BEACH	10.43	LT	4
HACIENTA OKEELANTA	PALM BEACH	11.472	RT	4
ACCESS ROAD	PALM BEACH	12.608	RT	4
PRIVATE ROAD	PALM BEACH	12.608	LT	4
ACCESS ROAD	PALM BEACH	13.055	LT	4
STAR RANCH ENTRANCE	PALM BEACH	13.678	LT	4
STAR PIT MINE	PALM BEACH	14.303	LT	4
ACCESS ROAD	PALM BEACH	14.802	RT	4
PRIVATE ROAD	PALM BEACH	15.466	LT	4
ACCESS ROAD	PALM BEACH	15.64	LT	4
KING RANCH	PALM BEACH	17.012	RT	4
UNNAMED	PALM BEACH	17.012	LT	4
PRIVATE ROAD	PALM BEACH	17.365	LT	4
ACCESS ROAD	PALM BEACH	17.996	LT	4
PRIVATE ROAD	PALM BEACH	19.279	LT	4
KING RANCH	PALM BEACH	19.772	RT	4
UNNAMED	PALM BEACH	20.305	LT	4
UNNAMED	PALM BEACH	21.282	RT/LT	4
UNNAMED	PALM BEACH	21.805	LT	4
ACCESS ROAD	PALM BEACH	22.145	LT	4
UNNAMED	PALM BEACH	22.81	LT	4
UNNAMED	PALM BEACH	23.301	LT	4
UNNAMED	PALM BEACH	24.306	LT	5
CROOKED HOOK RESORT	PALM BEACH	0.551	RT	5
UNAMED	PALM BEACH	8.304	RT	5
TRAILER PARK	PALM BEACH	11.450	RT	5

3.1.5 ACCESS MANAGEMENT CLASSIFICATION

The access management classification in Miami-Dade County is Class 02; Broward County is Class 02 from the Miami-Dade County line to MP 12.924 where it changes to Class 03 up to the Broward/Palm Beach County line; Palm Beach County alternates between Class 03 and 05. Many median opening spaces are ½-mile with some spacing greater than the minimum ¼-mile spacing; therefore, US 27 appears to comply with the current access management classifications.

3.1.6 RIGHT OF WAY

The right of way varies along the corridor. The right of way in Miami-Dade County ranges from 165 feet to 385 feet; Broward County between 187 feet to 481 feet; and Palm Beach County from 100 feet to 343 feet. Right of way dimensions were obtained from historic FDOT Right of Way Maps and County Property Appraiser GIS Maps. Table 3.6 summarizes the right of way along the project corridor.

3.1.7 PAVEMENT CONDITION AND SURVEYS

Segments of US 27 in Palm Beach County were resurfaced in 2011 and a Broward County segment is being designed in 2012 for resurfacing. Since preliminary engineering and final design are far in the future, a detailed pavement review is not provided in this report.

3.1.8 DRAINAGE

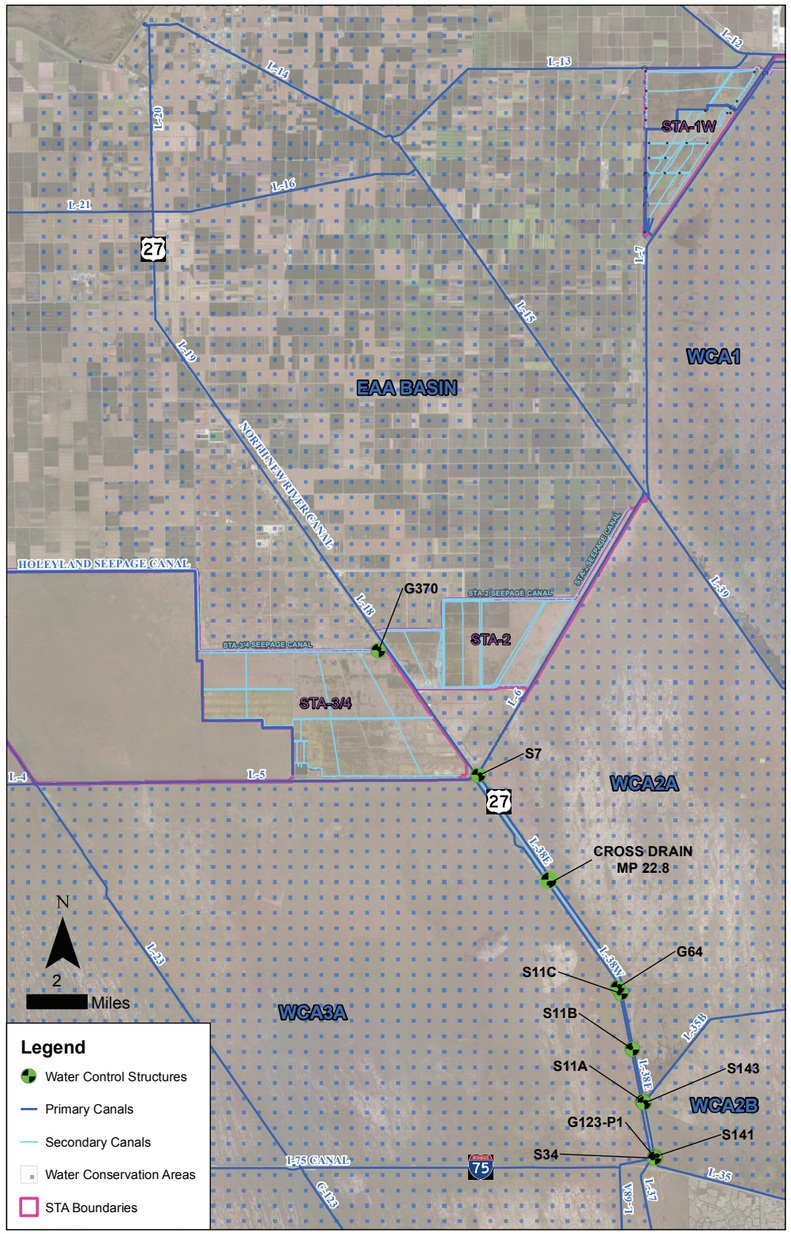
The existing plans, straight line diagrams, and field reviews indicate that the drainage system along the project corridor consists of roadside swales; cross drains, and box culverts discharging to Canal C-9, the South New River Canal (Canal C-11), and the North New River Canal (Canal L-38). In Broward County south of I-75, the corridor lies on the west fringe of the western urbanized areas. North of I-75 in Broward County, the corridor runs through the middle of Water Conservation Areas (WCA) 2A and 3A. In Palm Beach County and Broward County north of I-75, the North New River Canal runs parallel and adjacent to the study corridor. See Figure 3.4 on page 3-8 for the drainage basins. Figure 3.4 on page 3-8 shows SFWMD's primary water management structures including Water Conservation Areas (WCA) and Stormwater Treatment Areas (STA). Distinct drainage areas are described on page 3-9.

Table 3.6- Right of Way

Milepost		R/W Width (ft)	County	Segment
From	To			
4.928	5.685	190-225	Miami-Dade	1
4.587	4.928	250	Miami-Dade	1
3.564	4.587	165	Miami-Dade	1
2.276	3.564	215	Miami-Dade	1
1.803	2.276	260	Miami-Dade	1
1.424	1.803	260-375	Miami-Dade	1
1.188	1.424	385	Miami-Dade	1
0	1.188	337-352	Miami-Dade	1
0	6.763	481	Broward	2
6.763	10.617	478-481	Broward	2
10617	10.888	415-478	Broward	2
10.888	11.835	343-478	Broward	2
11.835	13.35	315-343	Broward	2
13.35	15.104	237	Broward	2
15.104	19.177	265	Broward	3
19.177	22.059	243-343	Broward	3
22.059	22.381	243	Broward	3
22.381	22.466	187-248	Broward	3
22.466	24.691	251	Broward	3
24.691	27.64	242-265	Broward	3
0	3.034	221	Palm Beach	4
3.034	3.147	242-270	Palm Beach	4
3.147	3.645	242	Palm Beach	4
3.645	19.34	221	Palm Beach	4
19.34	22.059	243-343	Palm Beach	4
22.059	22.381	243	Palm Beach	4
22.381	22.466	248-187	Palm Beach	4
22.466	24.691	251	Palm Beach	4
24.691	26.297	100-200	Palm Beach	5
12.590	0.000	100-216	Palm Beach	5

Figure 3.4 - Drainage Basin Maps

North Drainage Map



South Drainage Map

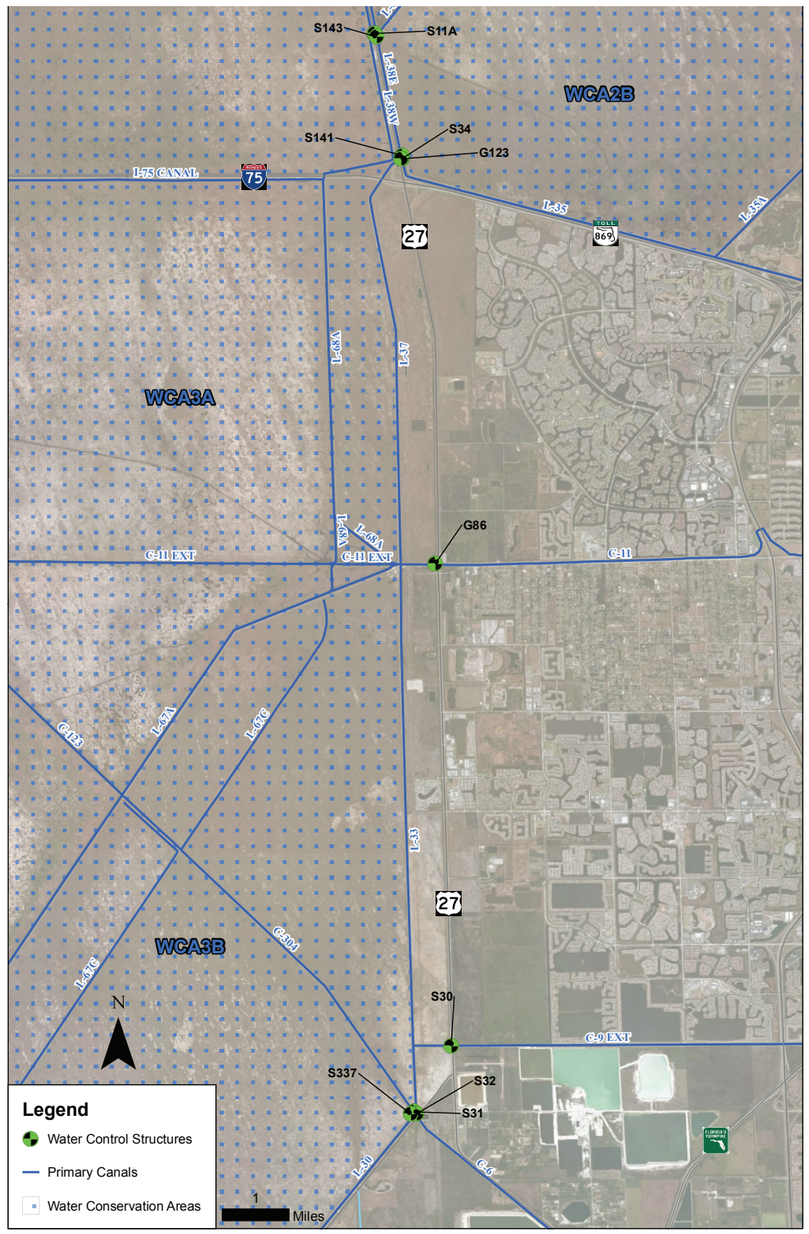
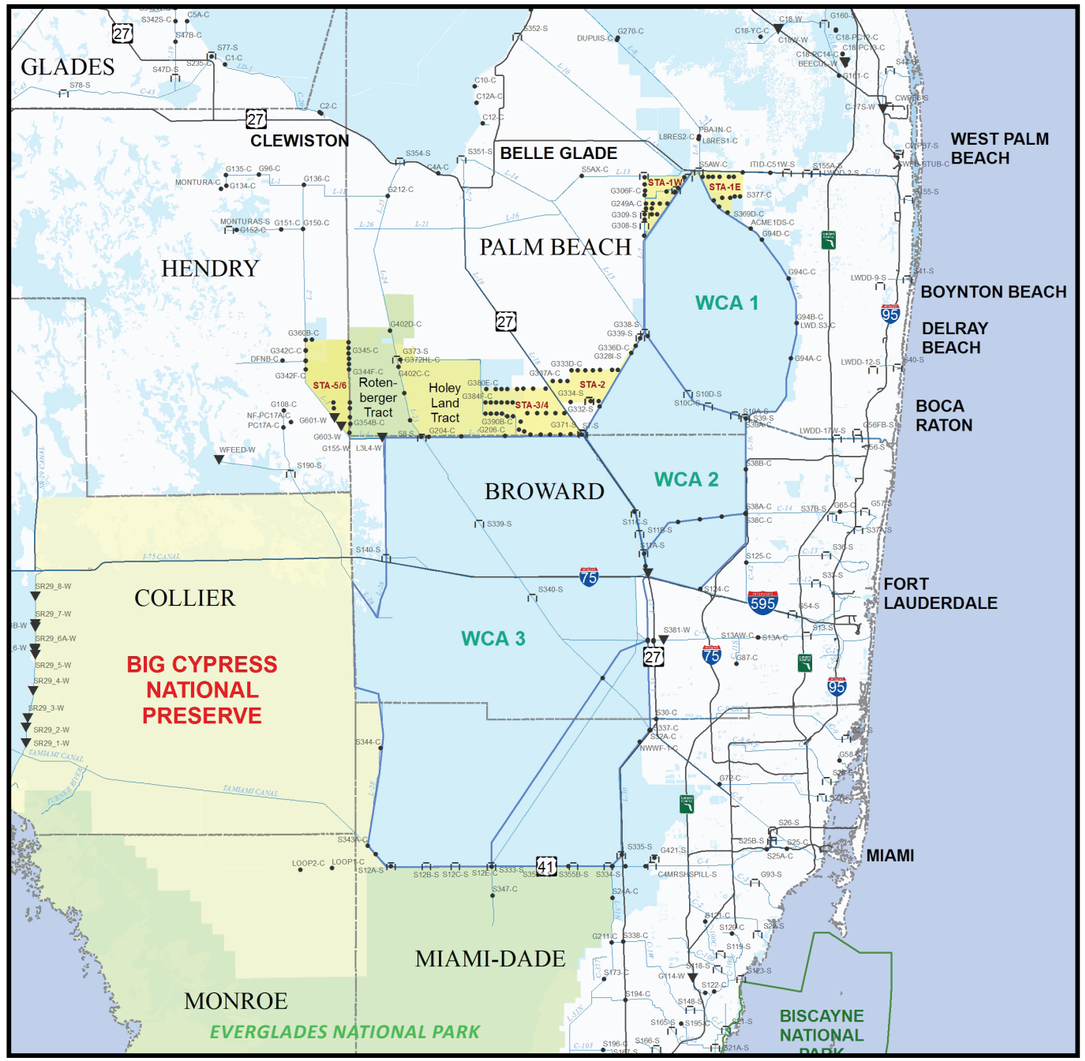


Figure 3.5 - SFWMD Water Management Features



Source: Canals in South Florida Appendix C: Description of SFWMD Primary Water Management Features

• **From Krome Avenue (MP 0.400) to West Pines Boulevard (MP 3.544) – Basin C-9 West.** Surface runoff drains directly to a roadside swale on the west side and to natural ground on the east side. Basin flow is generally to the south to Canal C-9 and then east to the coast. There are no cross drains in this segment. SFWMD control structure S-30 is located at MP 0.334. It consists of three 84" pipes crossing the roadway with control gates on the west side of the road. A canal runs parallel to the road on the west side, but does not seem to be connected to the roadside swale.

• **From West Pines Boulevard (MP 3.544) to I-75 (MP 12.934) – Basin C-11 West. Drainage is to a swale on the west side and natural ground on the east side.** Surface runoff drains to a swale on the west side and natural ground on the east side. Basin flow is generally toward Canal C-11 (MP 7.218) and then east to the coast (Dania Cutoff Canal). Two bridges span the C-11 Canal (a.k.a. South New River Canal). A large ditch runs parallel to US 27 on the east side from I-75 south for approximately 2.9 miles where it turns east. Between MP 10.045 and MP 10.375, there is a linear wetland habitat area created in 2008 on the west side of the road. The area is approximately 1,600 feet long and 40 feet wide. Beginning just north of the habitat area, a canal runs parallel to the road on the west side, but does not seem to be connected to the roadside swale. SFWMD control structure G-86 controls the parallel canal north of the C-11 Canal. The parallel canal south of C-11 Canal is directly connected to Canal C-11.

• **I-75 (MP 13.026) to Broward / Palm Beach County Line (MP 27.678) – Basins WCA-2A & WCA-2B to the east and WCA-3A to the west.** The North New River Canal (L-18, L-19, L-20, L-38E, L-38W, and L-35 Canals) runs parallel and adjacent to the project. Between the Palm Beach/Broward County line and I-75, the canal splits and runs parallel to the project on both sides (L-38E & L-38W). Canal L-38W includes a series of spreader canals at ¼ mile intervals projecting west into WCA-3A. At I-75, the east canal turns east southeast along the north side of I-75 until it reaches the New River in eastern Broward County. At I-75, the west canal jogs west and passes under I-75. On the south side of I-75, the west canal (L-68A Canal) continues south parallel and approximately 1.5 miles west of US 27. Three bridges span interconnections between the east and west branches of the canal. Each interconnecting canal is controlled by SFWMD water control gates (SFWMD structure numbers S-11A [MP 15.225], S-11B [MP 17.049], and S-11C [MP 18.938]). All three gate structures are on the east side of the road very close to the bridges.

• **North of MP 18.938 the east canal (L-38E) jogs slightly further east and a third canal (the Old North New River Channel) runs between it and US 27.** The canal on the west (L-38W) also jogs further away from the road leaving a strip of land approximately 240 feet wide between the roadway and the canal. SFWMD structure G-64 is near MP 10.3 on the west side of the road. A concrete box culvert (CBC) cross drain (not shown on the SLD) connects the Old North New River Channel and the west canal (L-38W) at this location.

• **North of the rest area (MP 19.299).** The 240 foot wide strip runs continuously to the Broward/Palm Beach County Line. A CBC cross drain near MP 22.800 connects this strip to the center canal. The north end of the west canal is controlled by SFWMD structure S-150. The north end of the center canal is controlled by SFWMD structure S-7W. The north end of the east canal is controlled by SFWMD pump station S-7. Control Structures S-150, S-7W, and S-7 are all located just north of the Broward/Palm Beach County line. Roadway runoff south of MP 18.938 is directly to the east and west canals. North of MP 18.938, discharge is to the 240 foot wide strip and the center canal.

• **From Broward/Palm Beach County Line (MP 0.000) to SR-80 in South Bay (MP 26.176) –Everglades Agricultural Area Basins S-2 and S-7.** All three of the canal segments (west, center, and east) running parallel to the road south of the county line meet at a large canal intersection with Canals L-5 and L-6. The North New River Canal continues to the north as a single canal on the east side of the roadway. A bridge spans the L-5 Canal at MP 0.102. As mentioned above, a large SFWMD pump station (S-7) is situated on the east side of the roadway at the bridge. Just south of Bergeron's Star Pit there is a 7-mile length of seepage canal that was blasted around year 2007.

On the west side of the roadway, between MP 0.102 and MP 5.237, is SFWMD Stormwater Treatment Area 3/4. A second bridge begins at MP 5.237 and spans the G-370 Inflow Canal. The SFWMD Pump Station G-370 is just west of the bridge. Further north, a third bridge (MP 22.284) spans the L-16/L-21 Canal. The majority of this segment has a swale on the west side. Numerous cross drains allow water from the swale and the numerous east-west canals to connect to the North New River Canal on the east side of the roadway.

• **From SR-80 in South Bay (MP 26.176, MP 12.59) to Hendry County Line (MP 0.00).** US 27 separates from the North New River Canal (Canal L-19 / L-20) near SW 1st Ave (approximately ½ mile south of SR-80). The roadway turns west on the north side of South Bay and runs parallel to the Herbert Hoover Dike all the way to the Hendry County line. Runoff is predominantly to roadside swales with discharge south into the Everglades Agricultural Area system of canals. Numerous cross drains and median drains exist along this segment. Bridges exist near MP 2.35 and MP 6.10. The bridge near MP 2.35 appears to be two short bridges instead of the single bridge shown on the SLD. The bridge near MP 6.10 crosses the Miami canal where it is released from Lake Okeechobee.

3.1.9 GEOTECHNICAL

Existing geotechnical conditions were obtained from the various record drawings for US 27 and most of the soil borings indicate unsuitable materials below natural ground. Disposition of unsuitable material will be determined in a future preliminary engineering phase which could be complete removal or engineered methods of stabilizing the soil for roadway and railroad construction. This report provides only a contingency cost for addressing the unsuitable material.

3.1.10 STRUCTURES

Structural plans at major intersections such as I-75 have been collected and will be evaluated for the potential improvements along the corridor. Also, box culverts and minor structures will be considered for improvement, particularly for the new railroad condition and its additional loads. Table 3.7 summarizes the existing bridges along the corridor.

Table 3.7 - Existing Bridges

COUNTY	SPANNING	MILE POSTING	LENGTH (ft)	FDOT BRIDGE #
BROWARD	C-11 CANAL/S. NEW RIVER CANAL	7.218-7.244	137	860302/860303
BROWARD	WESTBOUND I-75 OVERPASS	12.988-19.995	36	860333(3),(5)
BROWARD	EASTBOUND I-75 OVERPASS	12.964-12.7-972	42	860334(4),(6)
BROWARD	ON/OFF RAMP US-27/I-75	13.013-13.026	68	860335(1)
BROWARD	ON/OFF RAMP US-27/I-76	12.934-12.944	52	860336(2)
BROWARD	CANAL S-11A	15.250-15.273	121	860247/860019
BROWARD	CANAL S-11B	17.049-14.071	116	860248/860030
BROWARD	CANAL S-11C	18.938-18.960	116	860249
BROWARD	CANAL S-11C	18.936-18.986	121	860940
PALM BEACH	L-5 CANAL	0.102-0.126	126	930352/930353
PALM BEACH	G-370 EAST INFLOW CANAL	5.237-5.262	132	930512/930513
PALM BEACH	L-21 BOLLES CANAL	22.284-22.330	242	930342
PALM BEACH	MIAMI CANAL	6.063-6.090	142	930538

Table Notes:

1. Bridge 860335 carries semi directional ramp G and loop ramp H on NW side over US 27
2. Bridge 860336 carries semi directional ramp E and loop ramp F on SE side, over US 27
3. Bridge 860333 carries I-75 main lanes westbound over US 27
4. Bridge 860334 carries I-75 main lane eastbound over US 27
5. Vertical Clearance at the point of minimum vertical curvature on the mainline Bridge 860333 (Westbound) = 16.27 feet
6. Vertical Clearnace at the point of minimum vertical curvature on the mainline Bridge 860334 (Eastbound) = 16.15 feet

As shown in Table 3.8 and Figure 3.4, several pump stations are also near the project.

Table 3.8 - Existing Pump Stations

PUMP STATION	COUNTY	MP	SIDE
S7 SOUTH F	PALM BEACH	0.071	Rt
S8	PALM BEACH	0.162	Lt
G434, G436	PALM BEACH	2.962	Rt
G370	PALM BEACH	5.379	Lt
G434 G436	PALM BEACH	7.855	Rt

3.1.11 INTELLIGENT TRANSPORTATION SYSTEM (ITS)

The FDOT has planned Contracts E4M33, FM 42844915201 & 42845115201 for US 27 ITS deployment. The US 27 project consists of three Dynamic Message Signs (DMS), Microwave Vehicle Detector System (MVDS) and Closed Circuit Camera System (CCTV) on a wireless communication network. The project limits extend from the Broward/Miami-Dade County Line to just north of South Bay in Palm Beach County. The purpose of this project is to provide real-time traffic and advisory information to motorists and for the FDOT to observe traffic conditions via CCTV.

Additionally, a wireless, variable speed limit system is also under construction (FM 42581615201) on US 27 from Pines Boulevard to Griffin Road. This project should be complete by the end of 2012. The current project schedule includes letting for a design-build contract on June 1, 2012.

3.2 EXISTING TRAFFIC CONDITIONS AND CRASH DATA

The level of service (LOS) "D" capacity of the study segment of US 27 ranges from 4,790 vehicles per hour (north of Interstate 75) to 6,040 vehicles per hour (primarily within the urbanized areas of Broward County). The segment located within Miami-Dade County (Okeechobee Road) has a LOS "D" capacity of 5,360 vehicles per hour. The segment located between Hialeah and Florida's Turnpike has traffic signals, and the section from Florida's Turnpike and Krome Avenue is uninterrupted (no traffic signals). Hence, this clarifies the difference between the LOS "D" capacity threshold of 5,360 and 6,040 vehicles per hour, respectively.

Table 3.9 documents the existing traffic conditions along US 27. As shown in the table, the existing LOS along US 27 is "B." Current traffic levels range from as low as 773 vehicles per hour (just north of I-75) to as high as 3,285 vehicles per hour (between the Palmetto Expressway and the HEFT).

The LOS documented in Table 3.9 is based on the Generalized Peak Hour Two-Way Volumes for Florida's Urbanized/Rural Areas tables published by the Florida Department of Transportation in the 2009 FDOT Quality/Level of Service Handbook. Three different LOS threshold tables were used depending on the number of lanes, area type (urban or rural), and the roadway type (interrupted or interrupted). For the "interrupted" roadway type, the number of signals per mile corresponded to Group 1 (0.00 to 1.00 signalized intersections per mile).

Table 3.9 - Existing Traffic Conditions

US 27 Multimodal Planning and Conceptual Engineering (PACE) Study
Existing Traffic Conditions

Roadway Segment			Area	Roadway	Peak Hour	Existing Conditions	
From	To	Lanes	Type	Type	LOS "D" Capacity	Volume	Level of Service
Hialeah Rail Yard	Florida's Turnpike	6	Urban	SSA-1	5,360	3,285	B
Florida's Turnpike	Krome Avenue	4	Urban	UFH	6,040	1,772	B
Krome Avenue	Pines Boulevard	4	Urban	UFH	6,040	1,778	B
Pines Boulevard	Griffin Road	4	Urban	UFH	6,040	1,631	B
Griffin Road	I-75	4	Urban	UFH	6,040	1,659	B
I-75	North of I-75	4	Rural	UFH	4,790	773	B
South of CR 827	CR 827	4	Rural	UFH	4,790	832	B
CR 827	SR 80/South Bay	4	Rural	UFH	4,790	1,365	B
SR 80/South Bay	Hendry County	4	Rural	UFH	4,790	1,226	B

Source: Florida Department of Transportation

LEGEND: SSA-1 (State Signalized Arterials Class 1 (0.00 to 1.99 signalized intersections per mile)
UFH (Uninterrupted Flow Highway)

The existing traffic volumes along the different roadway segments of US 27 were obtained from FDOT's 2010 Florida Traffic Information & Highway Data CD. Traffic count stations that had two or three days' worth of data collection were averaged in order to obtain an average existing traffic count. Additional traffic related information for the corridor is presented in Table 3.10 and provided in detail in Appendix C.

The forecast traffic volumes documented in the FDOT's 2010 Florida Traffic Information & Highway Data CD are presented in Table 3.10 below. Projected 2020 traffic volumes are provided in Appendix D and summarized in Table 3.11. These future volumes reflect no major changes to the roadway network and do not include any potential Intermodal Logistics Centers.

Table 3.10 - US 27 AADT 2010 Florida Traffic Information

US 27 AADT
2010 Florida Traffic Information

PALM BEACH COUNTY								
County	93	93	93	93	93	93	93	
Site	0502	0148	0132	5169	0268	0421	9935	

Table 3.10 - US 27 AADT 2010 Florida Traffic Information *Cont.*

US 27 AADT 2010 Florida Traffic Information								
Road ID	93100000	93100000	93100000	93160000	93160000	93160000	93160000	
Milepoint	0.200	9.624	11.573	25.715	22.813	22.027	12.31	
AADT	13100	14600	16500	8200	7533	7100	7300	
K 30	9.63	9.63	9.63	9.63	11.07	9.63	10.25	
D 30	53.63	53.63	53.63	53.63	63.84	53.63	62.67	
T 24 (Daily)	28.43	25.66	20.31	42.46	20.31	42.46	29.6	
Site Type	Portable	Portable	Portable	Portable	TM	Portable	TM	
Class Data	Yes	Yes	Yes	Yes	No	No	No	
Location	Palm Bch/ Hendry CO Line	W of Road to Bean City	NW of SR 80 in South Bay	S of SR 80 in South Bay	0.46 mi N of CR 827	S of CR 827	1.9 mi N of Talisman Sugar Mill Road	
BROWARD COUNTY								
County	86	86	86	86	86	86	86	86
Site	0119	0345	5337	5240	5336	0083	5312	0584
Road ID	86060000	86060000	86060000	86060000	86060000	86060000	86060000	86060000
Milepoint	13.536	12.261	7.374	6.900	5.800	3.800	3.300	0.100
AADT	9,600	13,500	18,200	14,100	17,200	17,900	19,800	17,100
K 30	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60
D 30	57.92	57.92	57.92	57.92	57.92	57.92	57.92	57.92
T 24 (Daily)	20.78	17.20	8.77	19.80	14.29	16.38	17.20	14.93
Site Type	Portable	Portable	Portable	Portable	Portable	Portable	Portable	Portable
Class Data	Yes	No	Yes	No	Yes	No	Yes	No
Location	N of I-75	S of I-75	N of Griffin Rd.	S of Griffin Rd.	S of Stirling Rd.	N of Pines Blvd.	S of Pines Blvd.	Broward MD CL
MIAMI-DADE COUNTY								
County	87	87	87	87	87			
Site	0584	0585	0007	2536	9947			
Road ID	87090000	87090000	87090000	87090000	87090000			
Milepoint	0.038	0.596	5.126	5.428	8.100			
AADT	19,200	16,700	22,500	33,000	32,611			
K 30	8.98	7.59	8.98	8.98	9.79			
D 30	54.08	54.58	54.08	54.08	63.74			
T 24 (Daily)	12.23	18.85	22.80	15.5	14.12			
Site Type	Portable	Portable	Portable	Portable	TM			
Class Data	Yes	Yes	Yes	Yes	Yes			
Location	200' S of Brwd/ M-D CL	1000' SE of Krome Ave.	200' NW of SR 821/ HEFT	1000' S of NB Ramp to HEFT	0.7 mi NW of SR 932			

Crash Data

The detailed crash data and summary is included in Appendix E. According to the CARS System (FDOT's crash database), three state sections encompass the study area; 1) State Section 86060000 from MP 0.000 (Palm Beach/Broward County Line) to MP 27.678 (Broward/Miami-Dade County Line), 2) state section 93160000 from MP 0.000 (State Road 80) to MP 26.176 (Palm Beach/Broward County Line), and 3) state section 93100000 from MP 0.000 (Hendry/Palm Beach County Line) to MP 12.59 (State Road 80).

State Section 86060000

This 27.678-mile stretch of US 27 had 238 crashes within the 3-year period from 2008 and 2010 (an average of approximately 80 crashes per year). Safety ratios greater than 1.0 are considered to be high crash locations. The safety ratio for all three study years were 0.226 or less; therefore, US 27 within Broward County is not considered a high crash location. Additionally, there were seven (7) fatalities during the 3-year study period (two in 2008, three in 2009, and two in 2010).

State Section 93160000

This 26.176-mile stretch of US 27 had 106 crashes within the 3-year period from 2008 and 2010 (an average of approximately 36 crashes per year). The safety ratio for all three study years were 0.170 or less; therefore, US 27 within south Palm Beach County is not considered a high crash location. Moreover, there were nine fatalities during the 3-year study period (seven in 2008, two in 2009, and zero in 2010). Further evaluations of these crashes and any particular trends or patterns will be investigated in a future study.

State Section 93100000

This 12.590-mile stretch of US 27 had 119 crashes within the 3-year period from 2008 and 2010 (an average of approximately 40 crashes per year). The Safety Ratio for all three study years were 0.240 or less and therefore, US 27 within north Palm Beach County is not considered a high crash location. Moreover, there were four (4) fatalities during the 3-year study period (four in 2008, and zero in both 2009 and 2010).

3.3 EXISTING RAIL CONDITIONS

3.3.1 FEC RAILWAY

The FEC Railway is a class 2 freight railroad with the mainline running along the east coast parallel to I-95 from the Port of Miami to Jacksonville, Florida. In 2011, the FEC railroad restored its track connection from the Port of Miami to its yard in Hialeah. From the Hialeah Yard, a single track extends northwest along US 27 to the Rinker Concrete Plant in Medley, Florida. Where the existing track ends in Medley would be the logical continuation of a new railroad along US 27.

FEC's freight movement is made up of 80%-85% intermodal since aggregate hauling is down and more containers are being shipped by rail. Most of what comes out of Port of Miami (POM) is from Tropical Shipping. FEC is currently running about 22 trains per day between Miami and Jacksonville (11 northbound and 11 southbound). Each unit train moves over 60 cars and most FEC unit trains accomodate 100-cars.

Specific information about the FEC Railroad in South Florida is:

- over 200 at-grade crossings in South Florida;
- Typical travel times for an FEC freight train between Jacksonville and Miami is 9 to 10 hours;
- Average speed is approximately 39 mph;
- Typical travel times for trains between Miami and Fort Pierce is 3 to 4 hours with an average speed of approximately 36 miles per hour;
- Track is generally designed to allow freight trains to operate at maximum allowable speed of 60 mph.

3.3.2 CSX RAILROAD

The CSX Railroad is a Class 1 railroad hauling freight on a mainline running from south Miami to Jacksonville and outside of Florida. Freight hauled includes rock, automobiles, and intermodal containers, but no bulk cargo. The mainline track between West Palm Beach and Miami International Airport is owned by the FDOT and passenger train service is operated by the South Florida Regional Transportation Authority for the service known as Tri-Rail. Along the CSX corridor, Amtrak runs eight passenger trains daily, Tri-Rail runs fifty-two passenger trains daily, and CSX runs approximately ten freight trains daily.

The CSX system includes two existing spur tracks that begin near the west end of Miami International Airport. One spur heads west along the NW 12th Street and terminates at NW 147th Avenue. The second spur heads south and bifurcates in the vicinity of SW 144th Street (Sterling Junction), where one alignment runs west and terminates at Kendall Drive and Krome Avenue while the other alignment runs south and terminates at SW 4th Street in the City of Homestead. The spurs along NW 12th Street and in the vicinity of Krome Avenue and Kendall Drive locations will be presented in the next technical memorandum as consideration for continuing northward possibly along Krome Avenue to US 27. The main CSX track runs northwest to southeast along the northeast quadrant of Lake Okeechobee in St. Lucie County which continues south along the eastern seaboard to Miami.

3.3.3 SOUTH CENTRAL FLORIDA EXPRESS (SCFE)

The SCFE is a class 3 freight railroad owned and operated by U.S. Sugar and has a main track running around the southern and eastern perimeter of Lake Okeechobee from a connection with the CSX RR at Sebring on the west side to an interchange on the eastside with the FEC railroad at Fort Pierce. There are many rail spurs/sidings along the main track that pick up crops/sugar cane produced in the farm lands adjacent to Lake Okeechobee. This railroad transports up to 1,300 railroad cars each day of sugar cane and other products such as fertilizer, farm equipment, and products for lumber, paper and citrus industries.

The above railroad alignments are shown in Section 1 Figure 1-1.

3.4 ENVIRONMENTAL DATA

In Miami-Dade County, the existing land use is primarily mixed use consisting of residential, commercial and industrial uses with some agricultural and public uses adjacent to the corridor. Existing land uses in Broward County north of I-75 are primarily wetlands with some open land and canals adjacent to the study corridor. The existing land use south of I-75 is a mixture of agriculture, commercial/service uses, residential, industrial, open land and public uses adjacent to the corridor. In Palm Beach County, the existing land use is primarily agricultural with some wetlands, minor residential and commercial/service uses, and public uses adjacent to the study corridor. Land Use in Martin County along the proposed corridors includes primarily agriculture uses, transportation utilities as well as some residential, wetlands and upland habitat.

An environmental screening of potential impacts for the US 27 study corridor using Geographic Information Systems (GIS) data from the Florida Geographic Data Library (FGDL), the Florida Department of Environmental Protection (FDEP) GIS website, and the South Florida Water Management District (SFWMD) GIS website was completed. The purpose of the environmental element was to identify potential environmental threats and "fatal flaws" that may limit or foreclose on the proposed project. Copies of corresponding GIS maps are included as follows: Appendix F: Potential Contamination Sites Map; Appendix G: Cultural Resources Map; Appendix H: Land Use/Cover Map; Appendix I: Public Conservation Lands Map; Appendix J: Wildlife and Habitat Map.

In order to perform the environmental screening for the US 27 study corridor, a buffer width of 500 feet from the centerline of US 27 and the proposed rail alternatives was established. The following issues were considered: Physical/Natural Environmental Impacts, Land Use, Cultural Impacts, Community Impacts and Recreational Resources.

As a part of the screening process, a search of potential contamination sites from the following databases was performed for the study corridor: Brownfield Areas, Gasoline Service Stations, Hazardous Material Sites, and Petroleum Tanks. A total of 75 potential contaminated sites have been identified within the 500 foot buffer along the study corridor.

The screening process also included an identification of potential impacts to Threatened and Endangered (T&E) plant and animal species and their critical habitat which includes Conservation lands occurring within or near the study corridor. Databases identified critical habitat for the snail kite, wood stork core forging areas, crested caracara consultation areas Florida panther focus areas, and the Okeechobee gourd consultation area. Potential impacts to wetlands in Miami-Dade County total approximately 2,799 acres. In Broward County, there are approximately 2,784 acres of wetlands that could potentially be impacted. In Palm Beach County there are approximately 1,240 acres of wetlands and in Martin County there are approximately 87 acres that could potentially be impacted.

The Florida Division of Historical Resources and Florida Master Site File search identified that there are 12 recorded archaeological sites, 13 historic structures, 8 historic bridges, and 28 historic resources groups within the 500 foot buffer along the study corridor.

The screening process also included an identification of potential Community Impacts. There are four religious facilities, one fire station, one police station, one school and seven recreational resources located within the 500 foot buffer of the study corridor. Table 3.11 lists the identified Recreational Resources existing in the study corridor:

Table 3.11 - Recreational Areas

NAME	COUNTY	MP	SIDE	NOTES
SUNSHINE ROCK ENTRANCE	MIAMI-DADE	0.017	RT	
SUNCO SERVICE STATION	BROWARD	4.92	RT	
REST AREA	BROWARD	14.016	LT	SITE HAS BOAT RAMP
REST AREA	BROWARD	14.817	LT	SITE HAS BOAT RAMP
SAWGRASS RECREATION PARK	BROWARD	15.214	RT	
EVERGLADES & FRANCIS TAYLOR WILDLIFE MANAGEMENT AREA - WEASEL TRAIL	BROWARD	19.035	RT	SITE HAS BOAT RAMP
EVERGLADES & FRANCIS TAYLOR WILDLIFE MANAGEMENT AREA - WEASEL TRAIL	BROWARD	19.299	LT	SITE HAS BOAT RAMP

3.5 PROGRAMS, PLANS AND STUDIES

The following relevant plans and studies were obtained and reviewed.

- 2004 Hialeah Rail Yard (HRY) Master Plan Final Report
- 2004 US 27 Action Plan, from Krome Avenue to I-75
- 2005 US 27 Action Plan, from Krome Avenue to Hialeah Rail Yard (HRY)
- 2006 Florida Freight and Passenger Rail Plan
- 2006 South Florida East Coast Corridor (SFECC) Study
- 2006 SFECC Study (Phase 1) Freight Integration Analysis
- 2006 SFRTA Strategic Regional Transit Plan or latest version
- 2007 SFILC Feasibility Study
- 2008 US 27 Multimodal Needs Assessment from HRY to Glades County
- 2008 Broward County Urban Freight/Intermodal Mobility Study
- 2009 Florida Rail System Plan
- 2010 US 27 Rail Corridor Feasibility Study (Phase I)
- 2010 Regional Freight Plan
- 2010 BCT Unfunded Multimodal Surface Transportation Priorities FY 10-11
- 2010 Florida Rail System Plan
- 2010 Florida Seaport System Plan
- 2010 Statewide Trade Flow Study
- 2010 Statewide Seaports Plan
- 2011 Interregional Transportation Infrastructure Needs (ITIN) Study
- 2035 Seaports and Airports Master Plans and Projects
- 2035 Long Range Transportation Plans
- 2035 LRTP Cost Feasible ITS Projects/Technologies
- 2035 SIS Cost Feasible Plan
- 2030/2040 SIS Unfunded Needs Plan

The documents and reports listed above are excellent resources for the US 27 PACE Study, and have varying degrees of influence on the study. The major findings and conclusions from some of the key reports are:

2011 Interregional Transportation Infrastructure Needs (ITIN) Study: This study addressed the future needs of the Strategic Intermodal System (SIS) corridors in South Florida considering the various potential freight impacts from projects such as:

- Palm Beach County ILC (850 acres)
- St. Lucie County/Treasure Coast ILC (7,139 acres)
- Glades County ILC (3,500 acres)

The ITINS evaluated 5 Scenarios:

- Scenario 1: Only Palm Beach County ILC Develops
- Scenario 2: Only St. Lucie County/Treasure Coast ILC Develops
- Scenario 3: Only Glades County ILC Develops
- Scenario 4: All three ILCs Develop at 100% Cumulative Scenario
- Scenario 5: All three ILCs Develop at 50% of Cumulative Scenario

The key areas of focus were the areas surrounding Lake Okeechobee and the Strategic Intermodal System (SIS) facilities connecting to and from that area. The ITIN study also addressed the SIS impacts considering various scenarios of single and multiple ILC development along with a no-ILC alternative. There was no single conclusion of development from the ITIN Study; however, an analytical tool was developed to allow input of various ILC scenarios and land uses that will allow the FDOT to determine which SIS corridors would require improvement based on developed ILCs.

Port of Miami Master Plan Update – 2011: The key findings are:

1. The Port is on a 20-year growth track to double its cargo throughput from 955,000 to over two million TEUs (20 foot equivalent units) with channel deepening and new cranes.

2. The plan creates a controlled land use program structure that facilitates traffic segregation of cruise and cargo, phases a circulation system that expands access and accommodates trip growth and trip peaks, develops a flexible general cargo area that can accommodate open and covered break-bulk cargo storage which can be scaled to market conditions, and structures land allocation to cargo which provides expansion of the container cargo areas, gate and security facilities.

3. A review of the cargo capacity over the term of the Plan confirms that the port must increase current capacity to meet the volume forecast for 2020. The capacity elements of the Port; including berth capacity, vessel unloading capacity, transfer of the cargo into storage, storage capacity, gate capacity etc., confirms that the Port's throughput capacity can be effectively increased to accommodate the cargo forecast.

4. The traffic circulation concept section of the Plan, presents an analysis of the island with specific goals to segregate passenger uses from cargo uses and address the physical needs of the new port tunnel, which will connect the Port to the mainland with expressway access.

5. The Plan includes over 50 projects which will upgrade cruise and cargo infrastructure within the next four years and has moved into aggressive implementation of the projects identified.

2006 Port Everglades Master Plan and 2009 Master/Vision Plan Update Report: The key findings are:

1. Key parameters of the Port's development were identified for containerized cargo, non-containerized cargo, and petroleum, which included increased yard utilization, additional gantry and post-Panamax cranes, increased receiving-system efficiencies, and deepening and widening of the Port's approach channel and inner harbor.

2. At the conclusion of the market assessment for each of the four core businesses at the Port, the forecasts of containerized cargo and dry bulk cargo resulted in the consideration of potential development and utilization of an ICTF.

3. Port infrastructure must keep pace with global market changes to remain competitive. Improvements including expansion of harbor facilities and Foreign-Trade Zone No.25 non-contiguous sites, and ancillary landside assets upgrades, were indicated as key success factors for the Port's 2005-2010 Business Plan.

Port of Palm Beach Master Plan 2005-2015: The key findings are:

1. There are five different Port operations that will continue to impact transportation requirements in the future including cruise ships, container shipping, breakbulk, bulk cargo, and employee traffic. The cruise industry at the Port attracts a significant amount of automobile traffic. The container, breakbulk, and bulk cargo industries at the Port are projected to increase 3.5 percent per year in shipping tonnage over the next five to six years. At the time of the document, there were an estimated 1,468 persons employed full-time at the Port, with the number expected to increase to 1,700 by 2009, and 2,100 by 2019.

2. The implementation of the transportation improvements suggested within the Plan depend upon orderly programming and funding within the Palm Beach County Transportation Improvement Program (TIP) and other funding sources. Other funding sources such as State and Federal grants as well as Port revenues will be important in carrying out the improvement program. The construction and alteration of the internal circulation system for improved movement within the Port property must undergo ongoing review to accommodate the Port's expansion.

3. Recommendations for traffic circulation improvement for the regional transportation network include extension of SR 710 from Old Dixie Highway to US 1, an interchange of I-95 and SR 710 and Florida Turnpike, coordination of internal traffic movements within the Port, support for improved switching facilities between FEC and CSX, work with municipalities and FDOT to maintain truck friendly connecting corridors between the Port and primary cargo transportation highways, and coordination to begin the planning and funding process to develop an elevated crossing of the FEC railroad.

4. Long-term growth of container and bulk cargo business at the Port will require major improvements to add berth space, address navigational deficiencies, and increase efficiency of intermodal connectivity.

South Florida Inland Logistics Center Preliminary Market Analysis Final Technical Memorandum - May 2008: The key factors of a successful ILC were found to be land price, labor availability, port of entry drayage costs, rail and highway access to key consumption markets, and appropriate timing (near, mid, or long-term). Key findings of the report relating to transportation infrastructure improvements include:

1. Due to draft limitations and terminal capacity constraints it is unlikely that the Port of Palm Beach will participate in the growing Asian import container trade in the foreseeable future.

2. The ability to use a South Florida ILC for export Caribbean/Latin America cargo appears limited, at least in the near term, due to established cultural and business relationships in the Miami area, proximity to the Miami-Dade County International Airport (which provides significant cargo lift capacity to serve the Caribbean/Latin America markets), and adequate warehouse space.

3. Having the option of a remote container facility does not appear to enhance the competitiveness of the Port of Palm Beach for container handling.

4. Effective use of an ILC by bulk and break bulk shippers is limited.

2009 US 27 Rail Feasibility Study: Studied the feasibility of placing a rail corridor along US 27. This report is one of the major references for the PACE Study as it provided the basis for further review of the physical, environmental and stakeholder conditions. The report's main determinations were:

1. The 10 alternatives (2 at the south end and 8 at the north end) are feasible based on a qualitative assessment.

2. Stakeholders stated that moving freight from the east coast railroads to US 27 could be cost effective, safe and reliable while creating new opportunities for the development of passenger service along the eastern routes.

3. Developing a new rail corridor along US 27 from western Miami-Dade County to western Palm Beach County would have a significant impact on freight transportation in South Florida.

4. A US 27 rail corridor would provide South Florida with additional north/south connections to Florida's rail system and the nationwide rail system.

5. The most significant concerns were related to environmental impacts on the Everglades Restoration.

SR 5/US 27 Corridor Multi-Modal Needs Assessment from Hialeah Rail Yard to Highlands County Line – 2008: The purpose of the project was to develop a scope of services for the SR 25/US 27 Corridor Multi-modal needs assessment, based on the major data collection and information. The study corridor of US 27 begins from the Hialeah Yard located at the south end of the South Florida Rail Corridor and ends at the northern boundary of Glades County. The study corridor crosses three Florida Department of Transportation Districts (1, 4, and 6), five counties, three MPOs, and several municipalities. The Corridor Multimodal Needs Assessment study serves as a preliminary concept screening and data collection phase for the US 27 Corridor and documented the following:

- Preliminary corridor capacity analysis
- Existing safety analysis using latest crash data
- Freight assessment
- Existing land use, access management, environmental and right of way information
- Conceptual corridor improvement strategies

Findings and conclusions are:

1. The study corridor is operating at an acceptable level of service under existing conditions (2008). However, most portions of the study corridor will operate at unacceptable level of service by 2035.

2. Currently, there is no transit facility provided along the study corridor. Also, there are no bicycle and pedestrian facilities provided along the study corridor, except for the small portion within Hendry County.

3. The land use within the study Corridor varies from wetland to agricultural, mix of commercial/services, residential use, and public use. Total 541.4 acres of farmlands along US 27 corridor could potentially be impacted.

4. There are no capacity improvement projects scheduled within the study corridor for the next 5 fiscal years (2009-2014) within the FDOT District 1, 4, and 6.

2004 US 27 Action Plan from Krome Avenue to I-75 recommends improvements to US 27 based on the 2030 Long Range Transportation Plan. The preferred alternative includes:

1. Construct two lanes in the existing grass median to become the new northbound lanes. Convert the existing northbound lanes to a two-lane, two-way frontage road along the east side of US 27 from Krome Avenue to I-75.

2. Construct a Turbo-T intersection at Sheridan Street, Stirling Road, Pines Boulevard, and Pembroke Road. The Turbo-T elevates the northbound lanes of US 27 above the cross street and provides for Texas U-turns beneath the US 27 bridge. At Griffin Road, construct a diamond interchange with all lanes of US 27 elevated above Griffin Road.

2035 Long Range Transportation Plan (LRTP) - There are no roadway improvement plans documented in the cost-feasible plans from Broward County or Palm Beach County. In Miami-Dade County, the cost-feasible plan calls for signal timing improvements along Okeechobee Road between NW 138th Avenue and NW 79th Avenue in order to provide better traffic flow along Okeechobee Road. This project is also intended to improve access from side streets in order to enhance access by trucks to and from the City of Medley.

Florida Trade and Logistics Study – 2011 provides a general assessment of growth in commodity movements in the state of Florida through the year 2035, including a review of the factors influencing the forecast growth; such as, the growth in South and Central American trade, growth in containers from Asia, and the deepening of the shipping channel at the Port of Miami to accommodate the Super Max container ships. The report also advances several critical recommendations for constructing the highway, seaport, rail and air infrastructure needed to move the increased level of freight.

Florida Inland Logistics Center Market Analysis Update – 2012 updates earlier market analyses that did not fully incorporate the impact of the global economic downturn in order to assess the ability for state facilities to accommodate the 35% of all trade to and from Florida that is distributed from locations outside the state. Two scenarios were evaluated: 1) feasibility of an inland logistics center in Florida, and 2) and combination of port and distribution center development to compete with similar distribution centers in other states. An important finding is that commodity growth in the state of Florida could result in the need for as much as 145 million square feet for industrial, manufacturing and warehouse space.

An assessment of the demand for retail consumption in Florida indicates that there is potential for an additional 145 million square feet of distribution center space in Florida by 2030. This represents a 27% growth over the current 540 million square feet of space in Florida. It is expected that the South Florida market could absorb 30%-35% of the projected demand. This suggests that by 2030, demand for distribution center space in South Florida will range between 44 and 50 million square feet, assuming current space is fully utilized. The process of the location of distribution centers should be driven by the private sector.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 4.0
MULTIMODAL TRAFFIC FORECASTS

4.1 INTRODUCTION

4.1.1 STUDY PURPOSE

The purpose of the US-27 PACE study is to investigate the feasibility of a potential rail bypass along the US 27 corridor to accommodate the increasing freight demand in the region, to identify conceptual engineering alternatives, and to conduct a preliminary assessment of the potential impact of the alternatives upon the surrounding environment. Given that US 27 is a Strategic Intermodal System (SIS) highway, the study will also address the ultimate development of US 27 to accommodate future regional travel demand meeting the SIS standard. The objective of the US 27 PACE Study Multimodal Traffic Forecast task is to develop 2035 future year corridor demand estimates for truck and rail modes for the US 27 Corridor. For each of these modes, multiple data sources were used to develop forecasts that represent the best estimation of future market conditions based on defined service characteristics for the proposed rail corridor.

4.1.2 SCENARIOS

Two scenarios were evaluated in this study, including:

- Highway only scenario. Under this scenario, no rail component was added to the US 27 corridor, and no highway capacity was added. In addition, two 2035 sensitivity test cases were evaluated assuming (1) rural areas along US 27 will be changed to urban transitioning areas in 2035; (2) rural areas along US 27 will be changed to urban transitioning areas, and US 27 corridor in the study area will be widened to 6 lanes for the entire length; and
- Multimodal Corridor Scenario. Under this scenario, a rail component was added to the US-27 corridor. There were no changes (no area type change or number of lanes change) to the highway component.

4.1.3 STUDY APPROACH

One of the key challenges in this study is the disparate traffic data available for the corridor. Roadway traffic estimates are available from multiple sources, each reflecting specific growth rates with underlying assumptions. Development patterns, key origin/destination pairs, possible shifts in existing traffic patterns based on degraded level of service on preferred routes, and finally, the diversion impact associated with a new rail corridor all impact the various growth estimates.

For the rail traffic estimates, there is no current service on US 27 corridor to grow. Estimates for future service are based on a defined level of service and capacity; volumes are based on three specific components: relocation of established FEC and CSX rail traffic; new rail traffic developed from Port Miami's estimate of rail cars/containers; and potential diversion of long haul truck traffic to rail.

Key assumptions are summarized below:

- Assuming approximately 50 million square feet of warehouse, high-cube warehouse and rail terminal facilities of the three Intermodal Logistics Centers (Palm Beach County ILC, Glades County ILC, and Treasure Coast ILC) will start operations in 2016 and will be developed at the maximum absorbable land use intensity in 2035. Traffic generated by other land use types are not considered in the ILC traffic forecasts. ILC traffic is assumed to be phased in over a twenty year period at 5% per year of total 2035 traffic ;
- Relocation of rail traffic from FEC and CSX traffic will be based on 2009 Waybill data as existing rail tonnage, projected using a simple growth rate established from the 2010 Florida Trade and Logistics Study;
- Only long haul truck traffic destined for Jacksonville and the US East and US West will be considered as the market for diversion to rail; and
- The corridor was segmented as defined in Table 4.1.

Table 4.1 - Corridor Segmentation

US-27		
FROM	TO	COUNT STATIONS
NW 138th Street	Homestead Extension (HEFT)	872536
Homestead Extension (HEFT)	Pines Boulevard	865312
Pines Boulevard	Sheridan Street	860083
Sheridan Street	Stirling Road	865336
Stirling Road	Griffin Road	865240
Griffin Road	I-75 (Alligator Alley)	865337
I-75 (Alligator Alley)	SR-80 (South Bay)	860119
SR-80 (South Bay)	Levee Road	930132
Levee Road	Mutt Thomas Road	930148
Mutt Thomas Road	Old US-27	930148
Old US-27	Palm Beach County Line	930148

4.2 FUTURE HIGHWAY ONLY TRAFFIC FORECASTS

4.2.1 BASIC STEPS

The following steps were followed to develop US 27 2035 future year corridor demand estimates for highway only scenario:

a. Develop future traffic forecasts from 2010 to 2035 without traffic generated by the ILCs

   i. Reviewed and compared traffic forecasts used in previous studies for US 27 corridor;

   ii. Identified other data sources that can be used for traffic projections for US 27 corridor;

   iii. Established methodologies for projections of future US 27 background AADT and truck AADT; and

   iv. Developed US-27 background AADT and truck AADT - future traffic without ILC traffic.

b. Developed traffic forecasts from 2010 to 2035 with traffic generated by the ILCs traffic

   i. ILCs traffic established in the Interregional Transportation Infrastructure Needs Study will be added to the future traffic established in step a.

c. Sensitivity analysis were conducted for the highway only scenario assuming (1) rural areas along US 27 will be changed to urban transitioning areas in 2035; (2) rural areas along US 27 will be changed to urban transitioning areas, and US 27 corridor in the study are will be widened to 6 lanes for the entire length.

4.2.2 OVERVIEW OF AVAILABLE DATA SOURCES

In its effort to establish a traffic forecast methodology along the US 27 corridor, a number of data sources were reviewed that could potentially be used to establish future traffic projections for the US-27 corridor, including the Interregional Transportation Infrastructure Needs Study (ITIN) 2010 and 2035 AADT for US-27; US 27 Transportation Alternatives Study (US 27 TAS) 2010 and 2035 AADT; population and employment data from the 2035 SERPM model; and the freight component of the Integrated Florida Statewide Model (SWM). After a thorough review of these data sources, three main data sources were selected to support the development of the future highway conditions: ITIN 2010 and 2035 AADT; US 27 TAS 2010 and 2035 AADT; and the Integrated SWM.

ITIN Traffic Forecasts

The ITIN Study background traffic forecasts were based upon a variety of data sources and assumptions:

- 2010 AADT used in the ITIN Study were obtained from 2010 Florida Traffic Information (FTI) DVD.
- For FDOT Districts 4, 5, and 6, 2035 approved AADT were obtained[1]. Where 2010 AADT were greater than 2035 AADT, historical growth rates were used to project AADT from 2010 to 2035. If historical growth rates were less than or equal to 0, 0.5% was used as the growth rate.
- For FDOT District 1, 2030 approved AADT were obtained. If 2030 AADT were greater than 2010 AADT, historical growth rates were used to project AADT from 2030 to 2035. If historical growth rates were less than or equal to 0, 0.5% was used as the growth rate. If 2030 AADT were less than or equal to 2010 AADT, 0.5% was used to project AADT from 2010 to 2035.

Table 4.2 shows the count stations selected in ITIN study to represent the 11 segments in our study area. For the 11 segments of the study area, seven count stations were selected: 872536, 865312, 860083, 860119, 865337, 930132, and 930148:

Table 4.2 - ITIN Selected Count Stations

From	To	ITIN Count Station
NW 138th Street	Homestead Extension (HEFT)	872536
Homestead Extension (HEFT)	Pines Boulevard	865312
Pines Boulevard	Sheridan Street	860083
Sheridan Street	Stirling Road	860083
Stirling Road	Griffin Road	860083
Griffin Road	I-75 (Alligator Alley)	865337
I-75 (Alligator Alley)	SR-80 (South Bay)	860119
SR-80 (South Bay)	Levee Road	930132
Levee Road	Mutt Thomas Road	930148
Mutt Thomas Road	Old US-27	930148
Old US-27	Palm Beach County Line	930148

[1] The “approved” data sets reflect AADT based on PD&E, DRI and corridor study data; they represent approved forecasts for individual studies.

Figure 4.1 shows the 2010 and 2035 background traffic used in ITIN. Figure 4.2 shows the compound growth rates developed based on the growth between 2010 and 2035 background AADT.

Figure 4.1 - 2010 and 2035 Background AADT Projections from ITIN

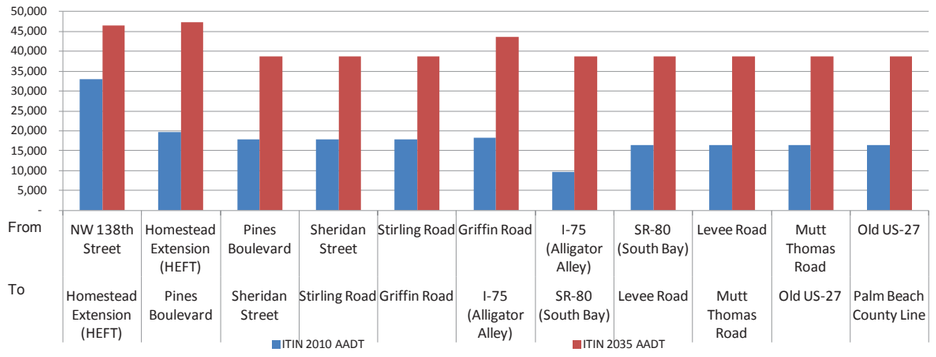
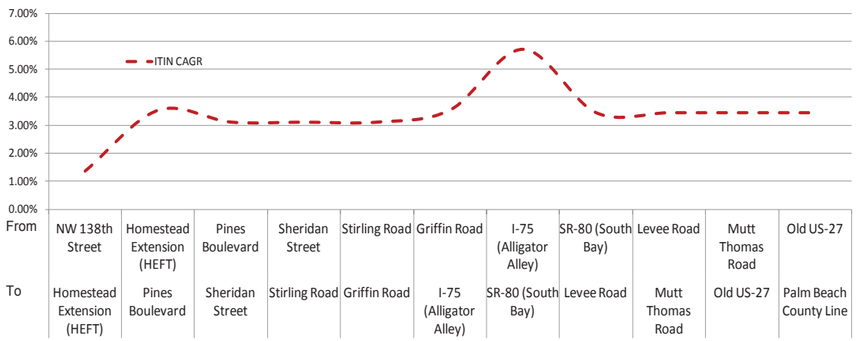


Figure 4.2 - ITIN Traffic Compound Growth Rates between 2010 and 2035



US 27 TAS Traffic Forecasts

As with the ITIN Study, the US 27 Transportation Alternatives Study traffic forecasts were based upon a variety of data sources and assumptions:

- 2010 AADT used in this study were obtained from 2010 FTI DVD.
- 2035 AADT were determined by averaging three projections: FDOT Central Office TranStat 2035 projections, regional model 2035 projections, and 2035 projections calculated based on simple growth rates developed from historical trend analysis. If a historical growth rate was less than 1%, a 1% growth rate was used.

Table 4.3 shows the count stations selected in the US 27 TAS to represent the 11 segments in the study area. Of the 11 segments of the study area, six count stations were selected: 877007, 860584, 865336, 860119, 960268, and 930502. It is worth mentioning that the six selected count sites in US 27 TAS are different than the seven selected count sites in ITIN. There is only one common site between the two studies: 860119.

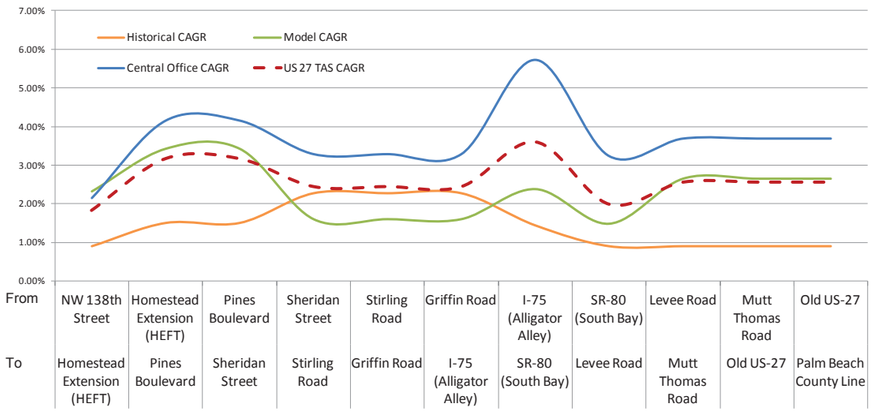
Table 4.3 - US 27 TAS Selected Count Stations

From	To	US 27 TAS Count Station
NW 138th Street	Homestead Extension (HEFT)	870007
Homestead Extension (HEFT)	Pines Boulevard	860584
Pines Boulevard	Sheridan Street	860584
Sheridan Street	Stirling Road	865336
Stirling Road	Griffin Road	865336
Griffin Road	I-75 (Alligator Alley)	860119
I-75 (Alligator Alley)	SR-80 (South Bay)	860119
SR-80 (South Bay)	Levee Road	930268
Levee Road	Mutt Thomas Road	930502
Mutt Thomas Road	Old US-27	930502
Old US-27	Palm Beach County Line	930502

Figure 4.3 shows the comparison of 2035 AADT from each of the three data sources and the average AADT used in US 27 TAS. Figure 4.4 compares the compound annual growth rates calculated based on 2010 AADT and the 2035 AADT used in US 27 TAS.

Figure 4.3 - 2010 AADT and Different 2035 AADT Projections from US 27 TAS

Figure 4.4 - Comparison of 2010 to 2035 Growth Rates Used in US 27 TAS



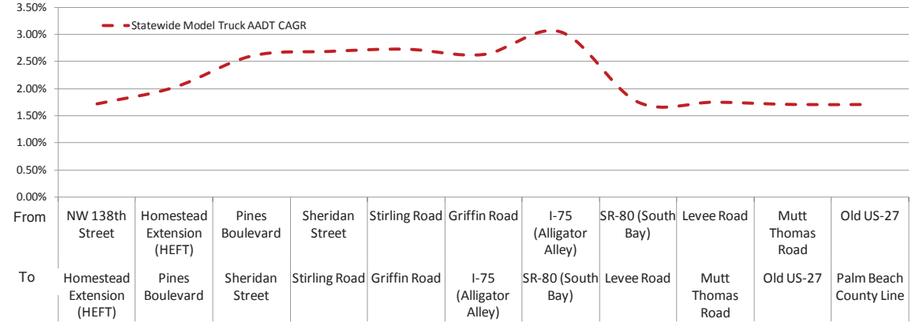
Freight Component of the Integrated Florida Statewide Model

The Integrated Statewide Model (SWM) includes two components: statewide passenger and statewide freight. The trip generation module of the freight model is divided into two sub-components; freight and non-freight. The freight component generates a freight tonnage production and attraction database based on commodity flows of fourteen commodity groups while the non-freight component utilizes the Quick Response Freight Manual to generate trip rates by vehicle classification[2]. Since the freight component of the Integrated SWM is the only model that considers truck traffic from both commodity flow and socio-economic data, it was utilized to derive the inter-regional truck trip growth rates along the US-27 corridor.

The latest Integrated SWM uses 2005 for the existing year condition and 2030 for the future year condition. Therefore, only 2005 and 2030 truck AADT are available for the study area. Figure 4.5 shows the freight truck traffic compound growth rates between 2005 and 2030 for the 11 segments in the study area.

[2] *2005 Florida Statewide Model- Model Development Documentation, BCC Engineering, Inc., Prepared for FDOT System Planning Office, May 2011.*

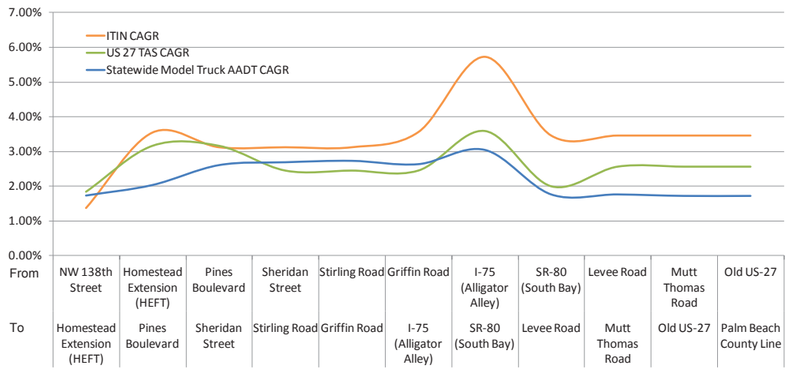
Figure 4.5 - Truck Traffic Compound Growth Rate between 2005 and 2030



4.2.3 COMPARISON OF DATA SOURCES

As discussed in Section 4.1, three different data sources used three different traffic forecasts methods. The ITIN Study and US 27 TAS use the same 2010 AADT data source; however, they focused on different sets of count sites. Only one common site exists between the two studies. The Integrated Statewide Model has 2005 as existing year and 2030 as future year. As a result, the compound growth rates were used to compare these three different sources. Figure 4.6 compares the growth rates at the 11 segments in the study area.

Figure 4.6 - Comparison of Compound Growth Rates Developed from ITIN, US 27 TAS, and Integrated Statewide Model



In comparing the growth rates from these three data sources, it is observed that growth rates used in the ITIN are mostly higher than those from US 27 TAS and the Statewide Model. In addition, growth rates used in the ITIN show greater variation between adjacent sites; the growth rates from US 27 TAS and Statewide Model are more even throughout the study area, with mild changes from segment to segment.

4.2.4 DEVELOPMENT OF FUTURE BACKGROUND AADT AND TRUCK AADT BETWEEN 2010 AND 2035

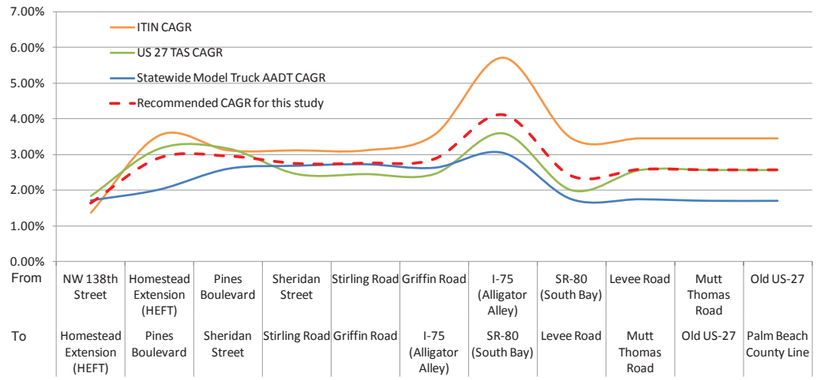
Development of Recommended Compound Growth Rates between 2010 and 2035

Considering the differences existing between the methodologies used in the three data sources, and the differences in the resulting compound growth rates, it is reasonable to use an average growth rate of the three as the recommended growth rate for this study. Table 4.4 and Figure 4.7 show the development of the recommended compound growth rates for this study.

Table 4.4 - Development of Recommended Compound Growth Rate between 2010 and 2035

From	To	ITIN CAGR	US 27 TAS CAGR	SWM CAGR	Recommended CAGR for This Study
NW 138th Street	Homestead Extension (HEFT)	1.37%	1.84%	1.72%	1.64%
Homestead Extension (HEFT)	Pines Boulevard	3.54%	3.16%	2.03%	2.91%
Pines Boulevard	Sheridan Street	3.12%	3.16%	2.60%	2.96%
Sheridan Street	Stirling Road	3.12%	2.45%	2.69%	2.75%
Stirling Road	Griffin Road	3.12%	2.45%	2.73%	2.77%
Griffin Road	I-75 (Alligator Alley)	3.56%	2.45%	2.63%	2.88%
I-75 (Alligator Alley)	SR-80 (South Bay)	5.72%	3.59%	3.05%	4.12%
SR-80 (South Bay)	Levee Road	3.46%	1.99%	1.75%	2.40%
Levee Road	Mutt Thomas Road	3.46%	2.56%	1.75%	2.59%
Mutt Thomas Road	Old US-27	3.46%	2.56%	1.71%	2.58%
Old US-27	Palm Beach County Line	3.46%	2.56%	1.71%	2.58%

Figure 4.7 - Development of Recommended Growth Rates for the Study Corridor



Development of Future Background AADT and Truck AADT between 2010 and 2035

The recommended compound growth rates for the study area were applied to the 2010 count data to develop estimates of future background AADT from 2010 through 2035. Future background truck AADT

from 2010 through 2035 was calculated by applying the truck traffic compound growth rates developed from the Integrated SWM to the 2010 truck counts. The resulting 2035 background AADT, truck AADT, and truck percentage are shown in Table 4.5.

Table 4.5 - 2010 and 2035 AADT, Truck AADT, and Truck Percentages

From	To	Count Site	2010 AADT	2035 AADT	2010 Truck AADT	2035 Truck AADT	2010 Truck %	2035 Truck %
NW 138th Street	Homestead Extension (HEFT)	87,2536	33,000	49,592	5,117	7,838	15.51%	15.80%
Homestead Extension (HEFT)	Pines Boulevard	86,5312	19,800	40,576	3,407	5,626	17.21%	13.86%
Pines Boulevard	Sheridan Street	86,0083	17,900	37,148	2,932	5,577	16.38%	15.01%
Sheridan Street	Stirling Road	86,5336	17,200	33,911	2,456	4,768	14.28%	14.06%
Stirling Road	Griffin Road	86,5240	14,100	27,892	2,792	5,475	19.80%	19.63%
Griffin Road	I-75 (Alligator Alley)	86,5337	18,200	37,009	1,598	3,060	8.78%	8.27%
I-75 (Alligator Alley)	SR-80 (South Bay)	86,0119	9,600	26,352	1,994	4,224	20.77%	16.03%
SR-80 (South Bay)	Levee Road	93,0132	16,500	26,352	3,352	5,175	20.32%	17.33%
Levee Road	Mutt Thomas Road	9,30148	14,600	29,862	3,749	5,788	25.68%	20.92%
Mutt Thomas Road	Old US-27	93,0148	14,600	27,575	3,749	5,727	25.68%	20.77%
Old US-27	Palm Beach County Line	93,0148	14,600	27,575	3,749	5,727	25.68%	20.77%

4.2.5 HIGHWAY ONLY TRAFFIC FORECAST

As described in Section 4.2, the future highway only traffic forecast includes both the base traffic shown in Table 2.4 and the traffic generated by the three ILCs. The ILC-related traffic (general traffic and truck traffic generated by approximately 50 million square feet of warehouse, high-cube warehouse, and rail terminal facilities) and the assignment of this traffic to the roadway network were provided by the ITIN Study.

It is assumed that approximately 50 million square feet of warehouse, high-cube warehouse and rail terminal facilities of the three Intermodal Logistics Centers (Palm Beach County ILC, Glades County ILC, and Treasure Coast ILC) will start operations in 2016 and will be developed at the maximum absorbable land use intensity in 2035. Traffic generated by other land use types are not considered in the ILC traffic forecasts. ILC traffic is assumed to be phased in over a twenty year period at 5% per year of total 2035 traffic. The traffic added to the 11 segments in the study area on US-27 is shown in Table 4.6. As illustrated, traffic north of I-75 will increase significantly due to the ILC-related traffic.

Table 4.6 - ILCs Traffic Assigned to US-27 in 2035

US-27		2016 ILC	2016 ILC	2035 ILC	2035 ILC
From	To	Truck AADT	AADT	Truck AADT	AADT
NW 138th Street	Homestead Extension (HEFT)	55	162	1,090	3,246
Homestead Extension (HEFT)	Pines Boulevard	55	205	1,090	4,090
Pines Boulevard	Sheridan Street	55	205	1,090	4,090
Sheridan Street	Stirling Road	55	205	1,090	4,090
Stirling Road	Griffin Road	55	205	1,090	4,090
Griffin Road	I-75 (Alligator Alley)	55	205	1,090	4,090
I-75 (Alligator Alley)	SR-80 (South Bay)	424	1,021	8,482	20,419
SR-80 (South Bay)	Levee Road	350	1,574	6,991	31,488
Levee Road	Mutt Thomas Road	350	1,574	6,991	31,488
Mutt Thomas Road	Old US-27	503	1,727	10,051	34,548
Old US-27	Palm Beach County Line	503	1,727	10,051	34,548

Table 4.7 shows the total traffic on the 11 segments in the study area after including the ILC traffic. The service volumes for each segment are provided in the table to illustrate which segments will fail to meet their LOS standards in the future. If a segment fails before 2035, the year when it fails is also identified and shown in Table 4.6. It is also indicated in the table the number of lanes needed for each segment in 2035 to meet its LOS standard. It is also indicated in the table the number of lanes needed for each segment in 2035 to meet its LOS standard. According to the analysis, if there are no changes to area types or number of lanes, the segments north of the I-75 in the study area will all fail before 2035, with some segments failing as early as 2026. The segment between Old US-27 and the Palm Beach County line will experience the most significant impact and exceed the service volume by over 20,000 in 2035. In order to meet LOS standards, all the segments between I-75 and the Old US-27 will need to be widened to 6 lanes, and the segment between Old-US-27 and the Palm Beach County Line will need to be widened to 8 lanes.

4.2.6 HIGHWAY ONLY TRAFFIC FORECAST SENSITIVITY ANALYSIS

While the above analysis defines the number of lanes needed based on existing area type, positive overall traffic growth, incorporation of ILC traffic, and application of current FDOT LOS standards (C and D), additional sensitivity analyses were completed to test the impact of area type changes increased number of lanes, as described below.

Among the 11 segments in the study corridor, one segment between I-75 and SR-80 is currently designated as “rural developed area”, and one segment between Old US-27 and the Palm Beach County line is designed as “rural undeveloped area”. In addition, 10 segments out of the 11 are four-lane divided highway in this study corridor. It is reasonable to consider the possibility that area type or number of lanes could change in the future. The two test cases were developed to evaluate these changes:

- Assume the “rural developed area” and “rural undeveloped area” along the corridor will be changed to transitioning area in the future as this corridor continues to develop. As a result, the service volume for the segments between I-75 and SR-80 and between Old US-27 and the Palm Beach County line will be increased to 45,400.

- Assume the whole study corridor will be widened to six-lane divided highway in the future. The service volume between Homestead Extension (HEFT) to I-75 will be increased to 96,400, and between I-75 and the Palm Beach County Line will be increased to 68,100.

Table 4.8 and Table 4.9 present the results of the two test cases in the sensitivity analysis.

As indicated by Table 4.8, if the area types for segments between I-75 and SR 80 and between Old US 27 and Palm Beach County line are changed to “transitioning area”, the years when these two segments fail to meet their LOS standard will be delayed from 2030 to 2034 and 2026 to 2027 respectively. No changes are observed for the other segments. As indicated by Table 4.9, none of the 11 segments along the study corridor will exceed LOS standards by 2035 with both area type change and number of lanes widened to six lanes.

Table 4.7 - Failure Year and Number of Lanes Needed from AADT ILC Traffic

US-27		Area Type & Roadway Classification	LOS Standard	Max. Service Vol	2035 Background AADT	ILC Daily Traffic	Total AADT with ILC	Existing Number of Lanes	Fail Year	Number of Lanes Needed
From	To									
NW 138th Street	Homestead Extension (HEFT)	Urban - Arterial Class I	D	55300	49,592	3,246	52,838	6	**>2035**	6
Homestead Extension (HEFT)	Pines Boulevard	Urban - Uninterrupted Flow Hwy	D	64300	40,576	4,090	44,666	4	**>2035**	4
Pines Boulevard	Sheridan Street	Urban - Uninterrupted Flow Hwy	D	64300	37,148	4,090	41,238	4	**>2035**	4
Sheridan Street	Stirling Road	Urban - Uninterrupted Flow Hwy	D	64300	33,911	4,090	38,001	4	**>2035**	4
Stirling Road	Griffin Road	Urban - Uninterrupted Flow Hwy	D	64300	27,892	4,090	31,982	4	**>2035**	4
Griffin Road	I-75 (Alligator Alley)	Urban - Uninterrupted Flow Hwy	D	64300	37,009	4,090	44,683	4	**>2035**	4
I-75 (Alligator Alley)	SR-80 (South Bay)	Rural Developed - Uninterrupted Flow Hwy	C	37200	26,352	20,419	46,771	4	**2030**	6
SR-80 (South Bay)	Levee Road	Transitioning - Uninterrupted Flow Hwy	C	45400	29,862	31,488	61,350	4	**2027**	6
Levee Road	Mutt Thomas Road	Transitioning - Uninterrupted Flow Hwy	C	45400	27,672	31,488	59,160	4	**2028**	6
Mutt Thomas Road	Old US-27	Transitioning - Uninterrupted Flow Hwy	C	45400	27,575	34,548	62,123	4	**2027**	6
Old US-27	Palm Beach County Line	Rural Undeveloped - Uninterrupted Flow Multi-lane	C	41100	27,575	34,548	62,123	4	**2026**	8

Table 4.8 - Failure Year from Future AADT with ILC Traffic with Redefined Area Type

US-27		Count Station	2010 Truck	2010 AADT	2010 Truck %	2035 Background Truck	2035 Background AADT	2035 Background Truck %	ILC Truck	ILC AADT	Total 2035 Truck with ILC	Total 2035 AADT with ILC	2035 Truck % (with ILC)	Existing Number of Lanes	Service Vol	Fail Year
From	To															
NW 138th Street	Homestead Extension (HEFT)	872536	5,117	33,000	16%	7,838	49,592	16%	1,090	3,246	8,928	52,838	17%	6	55300	**>2035**
Homestead Extension (HEFT)	Pines Boulevard	865312	3,407	19,800	17%	5,626	40,576	14%	1,090	4,090	6,716	44,666	15%	4	64300	**>2035**
Pines Boulevard	Sheridan Street	860083	2,932	17,900	16%	5,577	37,148	15%	1,090	4,090	6,667	41,238	16%	4	64300	**>2035**
Sheridan Street	Stirling Road	865336	2,456	17,200	14%	4,768	33,911	14%	1,090	4,090	5,858	38,001	15%	4	64300	**>2035**
Stirling Road	Griffin Road	865240	2,792	14,100	20%	5,475	27,892	20%	1,090	4,090	6,565	31,982	21%	4	64300	**>2035**
Griffin Road	I-75 (Alligator Alley)	865337	1,598	18,200	9%	3,060	37,009	8%	1,090	4,090	4,150	41,099	10%	4	64300	**>2035**
I-75 (Alligator Alley)	SR-80 (South Bay)	860119	1,994	9,600	21%	4,224	26,352	16%	8,482	20,419	12,706	46,771	27%	4	45400	**2034**
SR-80 (South Bay)	Levee Road	930132	3,352	16,500	20%	5,175	29,862	17%	6,991	31,488	12,166	61,350	20%	4	45400	**2027**
Levee Road	Mutt Thomas Road	930148	3,749	14,600	26%	5,788	27,672	21%	6,991	31,488	12,779	59,160	22%	4	45400	**2028**
Mutt Thomas Road	Old US-27	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	15,778	62,123	25%	4	45400	**2027**
Old US-27	Palm Beach County Line	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	15,778	62,123	25%	4	45400	**2027**

Table 4.9- Failure Year from Future AADT with ILC Traffic with Refined Area Type and Number of Lanes

US-27		Count Station	2010 Truck	2010 AADT	2010 Truck %	2035 Background Truck	2035 Background AADT	2035 Background Truck %	ILC Truck	ILC AADT	Total 2035 Truck with ILC	Total 2035 AADT with ILC	2035 Truck % (with ILC)	Proposed Number of Lanes	Service Vol	Fail Year
From	To															
NW 138th Street	Homestead Extension (HEFT)	872536	5,117	33,000	16%	7,838	49,592	16%	1,090	3,246	8,928	52,838	17%	6	55300	**>2035**
Homestead Extension (HEFT)	Pines Boulevard	865312	3,407	19,800	17%	5,626	40,576	14%	1,090	4,090	6,716	44,666	15%	6	96400	**>2035**
Pines Boulevard	Sheridan Street	860083	2,932	17,900	16%	5,577	37,148	15%	1,090	4,090	6,667	41,238	16%	6	96400	**>2035**
Sheridan Street	Stirling Road	865336	2,456	17,200	14%	4,768	33,911	14%	1,090	4,090	5,858	38,001	15%	6	96400	**>2035**
Stirling Road	Griffin Road	865240	2,792	14,100	20%	5,475	27,892	20%	1,090	4,090	6,565	31,982	21%	6	96400	**>2035**
Griffin Road	I-75 (Alligator Alley)	865337	1,598	18,200	9%	3,060	37,009	8%	1,090	4,090	4,150	41,099	10%	6	96400	**>2035**
I-75 (Alligator Alley)	SR-80 (South Bay)	860119	1,994	9,600	21%	4,224	26,352	16%	8,482	20,419	12,706	46,771	27%	6	68100	**>2035**
SR-80 (South Bay)	Levee Road	930132	3,352	16,500	20%	5,175	29,862	17%	6,991	31,488	12,166	61,350	20%	6	68100	**>2035**
Levee Road	Mutt Thomas Road	930148	3,749	14,600	26%	5,788	27,672	21%	6,991	31,488	12,779	59,160	22%	6	68100	**>2035**
Mutt Thomas Road	Old US-27	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	15,778	62,123	25%	6	68100	**>2035**
Old US-27	Palm Beach County Line	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	15,778	62,123	25%	6	68100	**>2035**

4.2.7 SUMMARY FINDINGS OF FUTURE HIGHWAY ONLY TRAFFIC FORECASTS

The objective of this Section was to establish future highway only traffic and evaluate the traffic conditions of the 11 segments along the study corridor. In order to establish the growth pattern of future traffic, three main data sources were reviewed and evaluated and used to develop blended compound growth rates. The blended compound growth rates were then applied to 2010 AADT and 2010 truck AADT to project future background AADT and truck AADT up to 2035 for the study corridor.

Two major assumptions used for this forecast are: 1) approximately 50 million square feet of warehouse, high-cube warehouse, and rail terminal facilities of the three ILCs will start operations in 2016 and will be developed at the maximum absorbable land use intensity in 2035; and 2) the traffic generated by these ILC components was assumed to be phased in over a twenty year period at 5% per year of total 2035 traffic. The ILC traffic assigned to the 11 segments along the study corridor was established in the ITIN Study and applied to the future background AADT and truck AADT. A sensitivity analysis was also conducted to test the impact of area type changes and the number of lane changes to the study corridor. The findings are summarized in Table 4.10.

Table 4.10 - Findings of Future Highway Only Scenario

Cases	Findings
Future highway only with no area type or number of lane changes	All the segments north of I-75 will fail before 2035, with the northern most segment failing as early as 2026. In order to meet the LOS standards, all the segments between I-75 and Old US-27 will need to be widened to 6 lanes, and the segment between Old US-27 and Palm Beach County Line will need to be widened to 8 lanes.
Future highway only with area type changes from “rural” to “transitioning area” at segments between I-75 and SR 80, and between Old US-27 and Palm Beach County line.	All the segments north of I-75 will fail before 2035; the failure year of the segment between I-75 and SR 80 will be delayed from 2030 to 2034, and that of the segment between Old US-27 to Palm Beach County line will be delayed from 2026 to 2027.
Future highway only with area type changes from “rural” to “transitioning”, and corridor widened to six lanes.	None of the segments will fail before 2035

4.3 FUTURE MULTI-MODAL TRAFFIC FORECASTS

4.3.1 OVERVIEW

The multi-modal traffic alternative assumes the co-location of highway and rail infrastructure within the existing US-27 corridor. The rail traffic forecasts consist of three elements:

- Rail to Rail Diversion. This traffic element consists of an estimate of the amount of existing FEC and CSX service that would move from their existing corridors to the new rail corridor.
- New Port-Related Intermodal Rail Traffic. This traffic element consists of an estimate of the amount of new Port Miami intermodal rail traffic that would use the new rail corridor versus the existing rail corridor.
- Truck to Rail Diversion. This traffic element consists of an estimate of the volume of long haul truck traffic that would divert to the new rail corridor.

Each of these traffic estimates is described in detail below. It should be acknowledged that the US-27 PACE Study does not define a future level of rail service on a new corridor. As such, the traffic estimates presented in this section are based on several assumptions. The most general assumption is that the new rail corridor must be equal to or better than the existing service. This relates to route mileage, travel time, reliability, joint operating authority, and cost.

4.3.2 RAIL TO RAIL DIVERSION

Today, South Florida is served by three freight railroads, two of which penetrate the urbanized areas of Miami-Dade, Broward and Palm Beach Counties. CSX shares the SFRC with Tri-Rail and Amtrak, providing carload and general merchandise service to local customers. FEC provides carload, general merchandise, and intermodal service to the region, including direct service to the three seaports – service currently being expanded to provide on-port ICTFs at both Port Everglades and Port Miami. The FEC corridor also is being evaluated for commuter and intercity passenger rail service.

The development of a new rail corridor along US-27 would connect with the SCFE, providing service that would interchange with CSX in Sebring and FEC in Fort Pierce, ultimately providing a bypass around the coastal routes. There are a few key factors that impact the potential for any rail to rail diversion from the coastal routes to the new corridor. First, any local customer receiving local carload shipments via sidings will still rely on the existing corridors. Second, the level of access that the existing railroads will have to the new corridor will significantly impact diversion potential. Operating authority is a key consideration for a railroad. The new corridor could be operated by an independent shortline line, by one of the existing railroads, or have a joint access agreement. Any situation that precludes FEC or CSX from having access will limit diversion opportunities as long as their existing corridors remain available. Finally, the new corridor must provide a competitive service; that is, one that is equal to or faster than the existing service, equal to or cheaper than the existing service, and as or more reliable than the existing service. Finally, crew

availability and necessary infrastructure that accommodates the existing traffic would need to be in place in the new corridor.

In order to calculate the potential shift of cargo, the following assumptions and characteristics were considered:

- Port Everglades and Port of Palm Beach rail traffic, based on interviews, have been excluded from consideration due the competitive disadvantage of traveling south to access the new corridor;
- Route distances and travel times were calculated for existing and new service routes (FEC – Hialeah to Fort Pierce via Coastal Route vs FEC Hialeah to Fort Pierce via US-27 Corridor; CSX Hialeah to Sebring via Coastal Route vs CSX Hialeah to Sebring via US-27 Corridor);
- Rail tonnage moving into and out of Miami-Dade County was used as the total potential rail traffic eligible for diversion (2009 STB Waybill Sample data were analyzed to used as rail demand for traffic in and out of Miami; 2009 Waybill data were grown to 2010 and 2035 based on growth rates from the Florida Trade and Logistic Study);
- Average tonnage per train was estimated by dividing total tonnage for each railroad by the average number of loaded trains, as provided by stakeholder interviews;
- Travel time estimates for existing CSX and FEC services were penalized by 10 and 15 percent respectively to reflect the potential impact of the significantly larger number of at grade rail crossings;
- Low and high diversion potential was calculated; the low estimates were based on a comparison of travel times; a high estimate was set at 75 percent;
- Number of trains per day for the new corridor was estimated.

Tables 4.11 and 4.12 summarize the data, assumptions and estimated rail to rail shifts.

- FEC related traffic is estimated to range from 6.4 to 8.9 loaded trains per day on the US-27 corridor; and
- CSX related traffic is estimated to range from 3.1 to 4.5 loaded trains per day on the US-27 corridor.

Table 4.11 - Key Data Characteristics, Rail to Rail Diversion

Operating Characteristics	Metric	Unit
Rail Demand 2010 - T&L In and Out of Miami	14,690,000	tons
Rail Demand 2035 - T&L In and Out Miami	17,370,000	tons
Linear Growth Rate (based on 2010)	0.73%	
FEC Existing Daily Services	10	loaded trains
CSX Existing Daily Services	5	loaded trains
Avg Tonnage per Train - FEC	2,441	ton per train
Avg Tonnage per Train - CSX	2,446	ton per train
2009 Waybill - In and Out Miami	9,480,181	tons
2009 Waybill CSX - In and Out Miami	3,179,923	tons
2009 Waybill FEC - In and Out Miami	6,300,258	tons
2010 - In and Out Miami	9,549,362	tons
2010 CSX - In and Out Miami	3,203,128	tons
2010 FEC In and Out Miami	6,346,234	tons
2035 - In and Out Miami	11,291,520	tons
2035 CSX - In and Out Miami	3,787,498	tons
2035 FEC - In and Out Miami	7,504,022	tons
High Rail Diversion Split	75%	
Days of Operation Per Annum	260	
Average Tonnage per Train	2,440	

Source: 2009 STB Waybill Sample; 2010 Florida Trade and Logistics Study; stakeholder interviews; Cambridge Systematics analysis.

Table 4.12 - Rail to Rail Diversion Estimate

2035 Rail Divertion	distance (mi)	travel time (min)	avg spd (mph)	grade crossing penalty	adjusted TT (min)	TT saving (min)	Rail Tonnage before diversion	Rail Tonnage after diversion - (Low)	Rail Tonnage after diversion - (High)	Train per day - (Low)	Train per day - (High)
FEC Hialeah to Fort Pierce via Coastal Route	126	221	34	15%	254	-	7,504,022	3,451,174	1,876,006	5.4	3.0
FEC Hialeah to Fort Pierce via US-27	131	217	36	0%	217	38	-	4,052,848	5,628,017	6.4	8.9
CSX Hialeah to Sebring via Coastal Route	167	239	42	10%	263	-	3,787,498	1,851,674	946,874	2.9	1.5
CSX Hialeah to Sebring via US-27	155	252	37	0%	252	11	-	1,935,824	2,840,623	3.1	4.5

Source: 2009 STB Waybill Sample; 2010 Florida Trade and Logistics Study; stakeholder interviews; Cambridge Systematics analysis.

4.3.3 NEW PORT-RELATED INTERMODAL RAIL TRAFFIC

South Florida is positioning itself for new global trade opportunities, including expansion of the Panama Canal, shifts in global manufacturing centers, and the anticipated opening of trade with Cuba. Each of these events will create a growing demand for port capacity on the Atlantic Coast. Port Everglades and Port Miami both are investing significantly to ensure they are capable of competing for this traffic. On-port ICTFs are major elements for each port as they work to extend the reach of their markets. Port Everglades and Port of Palm Beach plan to maintain use of FEC's eastern route as it provides the most direct and competitive service. Access to a new US-27 rail corridor would require southern and western moves via Hialeah; this would not be competitive. As such, the potential new port-related traffic for a US-27 rail corridor will be generated by Port Miami. Port Miami and FEC proposals to date have focused on building trains at the on-port ICTF for direct northern service as well as shuttle trains to the Hialeah facility. The potential traffic for the US-27rail corridor will consist of a portion of the long haul traffic.

As with the rail to rail service discussed above, the development of a new rail corridor along US-27 would connect with the SCFE, providing service to FEC in Fort Pierce, ultimately providing a bypass around the coastal route. Operating authority remains a key consideration. The new corridor could be operated by an independent shortline line, by one of the existing railroads, or have a joint access agreement. Any situation that precludes FEC from having access will limit diversion opportunities as long as its existing corridor remains available. Finally, the new corridor must provide a competitive service; that is, one that is equal to or faster than the existing service, equal to or cheaper than the existing service, and as or more reliable than the existing service.

In order to calculate the potential shift of cargo, the following assumptions and characteristics were considered:

- Port Everglades and Port of Palm Beach rail traffic, based on interviews, have been excluded from consideration due to the competitive disadvantage of traveling south to access the new corridor;
- CSX was excluded from this elements as it does not provide direct service to Port Miami and does not provide intermodal service to/from South Florida; however, it is assumed to factor in to operating authority assumptions;
- Port Miami's Master Plan defines its high growth forecast (aggressive penetration + intermodal), was used;
- Route distances and travel times were calculated for existing and new service routes (FEC – Port Miami to Fort Pierce via Coastal Route vs FEC Port Miami to Fort Pierce via US-27 Corridor);
- Average tonnage per train was estimated by dividing total tonnage for the FEC by the average number of loaded trains, as provided by stakeholder interviews;
- Travel time estimates for existing services were penalized by 15 percent to reflect the potential impact of the significantly larger number of at grade rail crossings;
- Low and high diversion potential was calculated; the low estimates were based on a comparison of travel times; a high estimate was set at 75 percent;
- Number of trains per day for the new corridor was estimated.

Tables 4.12 and 4.13 summarize the data, assumptions and estimated rail traffic resulting from Port Miami growth.

- FEC's port-related traffic is estimated to range from 4.8 to 7.2 loaded trains per day on the US-27 corridor.

Table 4.13 - Key Data Characteristics, New Port-Related Rail Diversion

Data Characteristic	Metric	Unit
2035 Aggressive Penetration	3,380,000	TEU
Rail Share	18%	
2035 Intermodel Total	608,400	TEU
Aveage Tons per TEU	10	tons/TEU
2035 Intermodal Tons	6,084,000	tons
FEC Existing Daily Services	10	loaded trains per day
High Rail Diversion Split	75%	
Days of Operation per Annum	260	
Average Tonnage per Train	2,440	

Source: Port of Miami Master Plan; Cambridge Systematics Analysis.

Table 4.14- New Port-Related Intermodal Rail Traffic Diversion Estimate

2035 New Inermodal Rail Cargo	distance (mi)	travel time (min)	avg spd	grade crossing penalty	adjusted TT	TT saving	Rail Tonnage before diversion	Rail Tonnage after diversion - (Low)	Rail Tonnage after diversion - (High)	Train per day - (Low)	Train per day - (High)
POM to Fort Pierce via Coastal route	124	217	34	15%	250	-	6,084,000	3,037,782	1,521,000	4.8	2.4
POM to Fort Pierce via US-27	145	249	35	0%	249	1	-	3,046,218	4,563,000	4.8	7.2

Source: Port of Miami Master Plan; Cambridge Systematics Analysis.

4.3.4 TRUCK TO RAIL DIVERSION

The most difficult challenge for the new US-27 rail corridor will be to attract existing truck traffic. Truck to rail diversion has been a major policy focus of transportation planning agencies for more than a decade, particularly as communities work to find ways to reduce the impact of truck traffic. In South Florida, the market for potential diversion includes long haul trucks traveling to the Jacksonville region (about 350 miles away; home of a growing warehouse and distribution market) and points north. Key corridors include I-95 (serving the Atlantic coast) and I-75 (serving the Midwest and points west). Florida's Turnpike and US-27 provide secondary routes, ultimately connecting with I-95 or I-75 for long haul truck moves.

Several factors impact mode choice. Each mode has set characteristics, such as capacity; trip time; reliability; equipment; and handling quality. Freight itself has characteristics, including shipment size; value; density; and shelf life. Logistics costs include order and handling costs; transportation charges; carrying costs; inventory costs; loss and damage costs; and service reliability costs. Not all shippers have access to multiple modes. And shippers have various lengths of haul to access their markets; shipment frequency; and sustainability goals.

From a truck to rail perspective, the best option for diversion is for intermodal shipments; that is, containers and/or trailers being shifted to rail intermodal service as COFC, TOFC, or double stack service. Intermodal traffic covering distances greater than 500 miles provides the most attractive market for a truck-to-rail mode shift. There is less of an opportunity for bulk products, given that any bulk product moving by truck today likely has a unique reason for doing so. Regardless of distance, service, or rail technology, there are certain types of commodities that the railroads have not been, and will not be, competitive for. Certain automakers, for example, insist on trucking even for long-haul moves because of special handling requirements; shippers of live animals and other sensitive freight require the flexibility that trucking provides; bulk commodities may need to move in smaller quantities than can be handled efficiently by rail, or to places not served by rail. In addition, infrastructure improvements might be necessary to make rail more competitive with truck movements along some corridors.

In order to estimate the potential diversion, it is important to understand what is changing in the transportation network to initiate the shift. In South Florida, rail service is already available from Miami to Jacksonville from both CSX and FEC. The creation of a new rail corridor along US-27 will have to exceed the level of service currently available to generate a modal shift. A new level of service for a US-27 rail corridor has not been defined as part of this study. In order to estimate a possible level of diversion, available data has been used.

In order to calculate the potential shift of cargo, the following characteristics and calculations were used:

- Based on the rail to rail analysis presented above, it is assumed that the new rail corridor along US-27 will be able to provide service better than the existing rail service;
- Three super zones were defined within the statewide model representing long haul truck trips consisting of Jacksonville, U.S. East, and U.S. West;
- Truck trips were extracted from the model using desire lines for Miami-Dade, Broward and Palm Beach counties to each of the three super zones;
- The truck traffic from the model was grown from 2005/2030 to 2010/2035;
- The percent of truck trips eligible for diversion were identified by using FAF3 data to calculate the percent of long haul truck movements represented by divertible commodities;
- Penalties were applied to reduce the population of divertible truck traffic to reflect the anti-rail sentiment of some shippers and to address the service limitations of rail;
- An estimate of divertible truck trips was developed for each origin/destination pair based on a 25 percent diversion of adjusted divertible truck trips;
- The diverted truck trips were assigned to I-95, I-75, US-27, and Florida's Turnpike;
- A sensitivity analysis was conducted to measure the potential impact along the US-27 highway corridor; and
- Diverted truck trips were converted into tonnage and ultimately an estimate of the number of trains to move on the US-27 rail corridor.

Tables 4.15 and 4.16 summarize the data, assumptions, and estimated diversion.

- 175 trucks on US-27 in 2035 are estimated to be diverted from truck to rail, representing 1.2 loaded trains per day.

Table 4.15 - Key Data Characteristics, Truck to Rail Diversion

Inputs	Metric
2005 truck traffic desire line from southFL to Jax, and out of state	12,976
2030 truck traffic desire line from southFL to Jax, and out of state	20,783
Growth per year	312
2010 truck traffic desire line from southFL to Jax, and out of state	14,538
2035 truck traffic desire line from southFL to Jax, and out of state	22,345
Commodity factor	84%
Anti-Rail Penalty	15%
Rail Service Penalty	10%
US east split	59%
US west split	41%
US East - I-95 split	90%
US East - Tpk split	5%
US East - US27 split	5%
US West - I-75 split	80%
US West - Tpk split	15%
US West - US27 split	5%
truck to rail diversion %	25%
acerage truck load (tons)	17
averge tons per train (tons)	2,440

Source: Statewide Model; Cambridge Systematics Analysis

Table 4.16 - Truck to Rail Diversion Estimate

2035 US-27 truck to rail diverstion	
Total long haul trips	22,345
Trucks with eligible to divert	14,007
Trucks to and from US east on US-27	416
Trucks to and from US west on US-27	284
Diverted trucks	175
Diverted tons	2,976
Equivalent number of Trains per day	1.2

Source: Statewide Model; Cambridge Systematics Analysis

4.3.5 SUMMARY FINDINGS

The three elements of the potential rail demand suggest that 15 to 22 loaded trains per day could travel on the new US-27 rail corridor under the right conditions. These estimates consists of approximately 50 to 75 percent of the existing rail service (rail to rail) and potential new rail service (new port-related intermodal), and 100 percent of truck to rail diversion. Table 4.17 summarizes the market potential for each element.

These 16 to 22 loaded trains ultimately would result in 32 to 44 total trains per day by 2035 moving along the new corridor, and 14 to 26 total trains (loaded and unloaded) remaining on the existing eastern routes. The impact these trains would have on travel time delays at at-grade crossings has not been calculated as part of this project; however, the delay is assumed to be significantly reduced due to the much smaller number of at-grade crossings along the proposed new corridor.

The truck to rail diversion estimate was also evaluated to determine the potential impact on the US-27 highway corridor. This analysis is summarized in Table 3.8 below. The 175 potentially divertible daily truck trips are not anticipated to impact the LOS under any condition.

Table 4.17 - Total US 27 Rail Corridor Traffic Estimate

Market	2035 Rail Diversion	Rail Tonnage after Diversion - Low	Rail Tonnage	Trains/ Day-Low	Trains/Day-High
Rail to Rail	FEC Hialeah to Fort Pierce via Coastal Route	3,451,174	1,876,006	5.4	3
Rail to Rail	FEC Hialeah to Fort Pierce via US-27	4,052,848	5,628,017	6.4	8.9
Rail to Rail	CSX Hialeah to Sebring via Coastal Route	1,851,674	946,874	2.9	1.5
Rail to Rail	CSX Hialeah to Sebring via US-27	1,935,824	2,840,623	3.1	4.5
New Port-Related Intermod	POM to Fort Pierce via Coastal Route	3,037,782	1,521,000	4.8	2.4
New Port-Related Intermod	POM to Fort Pierce via US-27	3,046,218	4,563,000	4.8	7.2
Truck to Rail	Shift from Truck to Rail along US-27	2,976	2,976	1.2	1.2
Total Diversion	US-27 Rail Corridor Traffic	9,037,866	13,034,616	15.5	21.8
Total Not Diverted	Remaining Existing Traffic	8,340,630	4,343,880	13.1	6.8

Source: Cambridge Systematics Analysis

Table 4.18 - Fail Year from Future AADT with ILC Traffic and Truck to Rail Diversion

US-27		Count Station	2010	2010	2010 Truck	2035 Background	2035 Background	2035 Background	ILC	ILC	Truck to Rail	Total	Total	2035 Truck	Existing	Service Vol	Fail Year
From	To		Truck	AADT	%	Truck	AADT	Truck %	Truck	AADT	Diversion	2035 Truck with ILC	2035 AADT with ILC	% (with ILC)	of Lanes		
NW 138th Street	Homestead Extension (HEFT)	872536	5,117	33,000	16%	7,838	49,592	16%	1,090	3,246	175	8,753	52,663	17%	6	55300	**>2035**
Homestead Extension (HEFT)	Pines Boulevard	865312	3,407	19,800	17%	5,626	40,576	14%	1,090	4,090	175	6,540	44,491	15%	4	64300	**>2035**
Pines Boulevard	Sheridan Street	860083	2,932	17,900	16%	5,577	37,148	15%	1,090	4,090	175	6,491	41,063	16%	4	64300	**>2035**
Sheridan Street	Stirling Road	865336	2,456	17,200	14%	4,768	33,911	14%	1,090	4,090	175	5,682	37,826	15%	4	64300	**>2035**
Stirling Road	Griffin Road	865240	2,792	14,100	20%	5,475	27,892	20%	1,090	4,090	175	6,389	31,807	20%	4	64300	**>2035**
Griffin Road	I-75 (Alligator Alley)	865337	1,598	18,200	9%	3,060	37,009	8%	1,090	4,090	175	3,975	40,924	10%	4	64300	**>2035**
I-75 (Alligator Alley)	SR-80 (South Bay)	860119	1,994	9,600	21%	4,224	26,352	16%	8,482	20,419	175	12,531	46,596	27%	4	37200	**2030**
SR-80 (South Bay)	Levee Road	930132	3,352	16,500	20%	5,175	29,862	17%	6,991	31,488	175	11,991	61,175	20%	4	45400	**2027**
Levee Road	Mutt Thomas Road	930148	3,749	14,600	26%	5,788	27,672	21%	6,991	31,488	175	12,604	58,985	21%	4	45400	**2028**
Mutt Thomas Road	Old US-27	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	175	15,603	61,948	25%	4	45400	**2027**
Old US-27	Palm Beach County Line	*930148	3,749	14,600	26%	5,727	27,575	21%	10,051	34,548	175	15,603	61,948	25%	4	41100	**2026**

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 5.0
ANALYSIS OF RAIL CORRIDOR ALIGNMENT ALTERNATIVES

5.0 ANALYSIS OF RAIL CORRIDOR ALIGNMENT ALTERNATIVES

The ten potential rail alignments identified in the US 27 Rail Feasibility Study (Phase I) were reduced to one or two feasible alternatives using a corridor analysis tool for the environmental impacts. Physical constraints and construction/operation costs were factored into determining the more feasible alternatives. The US 27 PACE Study area and alternative alignments are shown in Figure 5.1 on the right.

5.1 ENVIRONMENTAL ANALYSIS

This section compares the potential environmental effects of the ten potential rail corridor alignment alternatives shown in Figure 5.1 to the right (six north alternatives and four south alternatives), and two US 27 mainline alternatives (one west alternative and one east alternative). It is a snap shot of the distinguishable potential effects of the alternatives on the various environmental factors within the respective study area. It is intended to provide a framework for comparing the alternatives in terms of the relative – not absolute - potential for adverse environmental effects, and is not intended to quantify the impacts to natural or social/man-made resources.

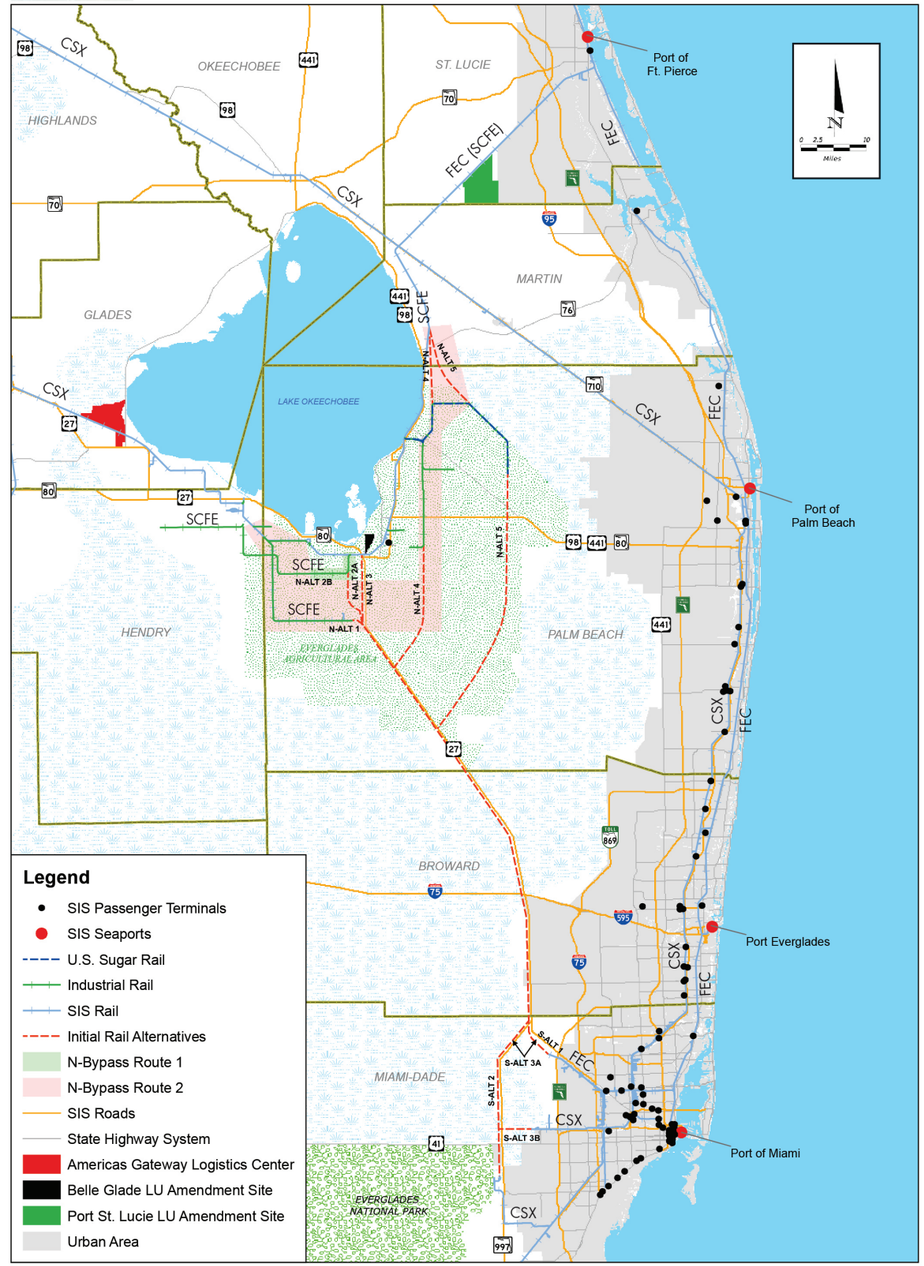
The environmental screening process/model (ESM) is a GIS-based, workflow model developed specifically for this project as a tool to assist in the alternatives decision-making process. The ESM was developed utilizing Environmental Systems Research Institute, Inc. (ESRI) ArcGIS© Desktop version 10 and its ModelBuilder© extension. The ultimate goal of the ESM is to rank or compare the alternatives described in Section 5.1.4. This environmental screening was conducted to assist in identifying, early in the planning process, significant environmental issues that may arise with the proposed transportation improvements.

5.1.1 AFFECTED ENVIRONMENT

In order to perform the environmental screening for the proposed alternatives, a buffer width of 1,000 feet (or 500 feet on either side of the centerline of the alternative) was established. This buffer distance was developed for each proposed alternative to identify and quantify any potential environmental resources/issues that could be affected by the various alternatives. Maps depicting the key environmental resources or baseline conditions are included in Appendices F-J.

In the section of US-27 in Miami-Dade County, the existing land use is primarily mixed use consisting of residential, commercial and industrial uses with some agricultural and public uses adjacent to the corridor. Existing land uses in Broward County north of I-75 are primarily wetlands with some open land and canals adjacent to the study corridor. The existing land use south of I-75 is a mixture of agriculture, commercial/service uses, residential, industrial, open land and public uses adjacent to the corridor. In Palm Beach County, the existing land use is primarily agricultural with some wetlands, minor residential and commercial/service uses, and public uses adjacent to the study corridor. Land Use in Martin County along the proposed corridors includes primarily agriculture uses, transportation utilities as well as some residential, wetlands and upland habitat.

Figure 5.1 - US 27 PACE Study Area



The key environmental factors examined in the environmental screening were:

- Noise
- Vibration
- Historical & Archaeological
- Wetlands
- Parks, Recreation, & Other Public Lands
- Wildlife & Habitat
- Water Quality/Resources
- Floodplains
- Community Resources
- Environmental Justice
- Land Use
- Contamination/Hazardous Waste

Cultural resource screening identified four religious facilities, one fire station, one police station, one school and seven recreational resources located within the 500 foot buffer of the study corridor. All but one of the recreational areas lie in Broward County and four have boat ramps.

The Florida Division of Historical Resources and Florida Master Site File search identified 12 recorded archaeological sites, 13 historic structures, 8 historic bridges, and 28 historic resources groups within the 500 foot buffer along the study corridor.

Natural resource screening identified potential Threatened and Endangered (T&E) plant and animal species and their critical habitat, which includes conservation lands occurring within or near the study corridor. Databases identified critical habitat for the snail kite, wood stork core forging areas, crested caracara consultation areas, Florida panther focus areas, and the Okeechobee gourd consultation area. Wetlands within the 500 foot buffer total approximately 2,799 acres in Miami-Dade County, approximately 2,784 acres in Broward County, approximately 1,240 acres in Palm Beach County, and approximately 87 acres in Martin County.

A search of potential contamination sites from the following databases was performed for the study corridor: Brownfield Areas, Gasoline Service Stations, Hazardous Material Sites, and Petroleum Tanks. A total of 75 potential contaminated sites have been identified within the 500 foot buffer along the study corridor.

5.1.2 METHODOLOGY

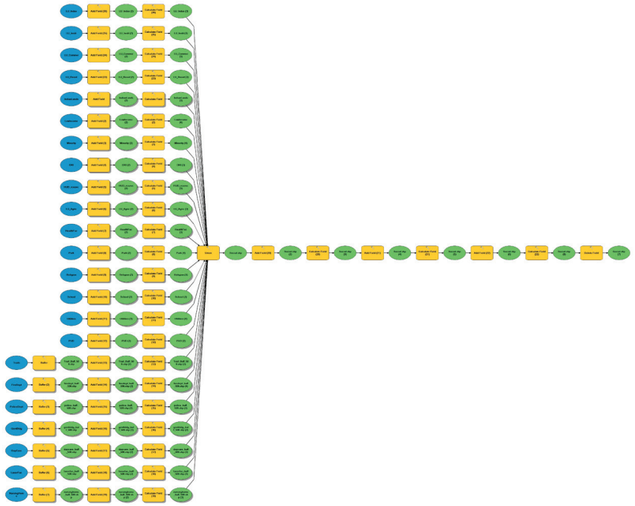
GIS spatial analysis is a process for examining locations, attributes, and relationships of features through overlay of areas of potential impact with natural, cultural or social features to create extracts of data for evaluation. The process involves generating an overlay area, or "buffers," around existing geographic features and then identifying or selecting pertinent features based on whether they fall inside or outside the boundary of these buffers.

In order to perform the environmental screening for the proposed alternatives, a buffer width of 500 feet on either side of the centerline of the alternative was established. This buffer distance was developed for each proposed alternative to identify and quantify any potential environmental resources/issues that could be affected by the various alternatives.

The most current GIS datasets were acquired from the Florida Geographic Data Library (FGDL), an internet-based data clearinghouse for Florida, as well as from federal, state, and local regulatory agencies. This spatial data was organized into a single repository for use on this project. Appendix F contains a comprehensive list of all social, cultural, natural, and physical GIS datasets that were acquired for use in the environmental screening process. Data was verified in the most efficient, consistent, and effective manner including using methods such as aerial photography interpretation, researching available information through the internet, and field verification or "ground truthing." Validation or verification of the data was considered both temporally (appropriate up to date information used at the time of decision-making) and spatially (geographic resolution or accuracy). Temporal verification of GIS spatial datasets is periodically updated by the agency or office that originated the data. The time lapse between data updates may range from several months to several years based on the type of data and need for modification. Subsequently, individual GIS data records require they be periodically verified to ensure important or significant environmental resources are correctly identified within a given study area. Lastly, new data collected through office or field verification efforts were added to the GIS project database.

The next step in the environmental screening process (ESM), involved the development of a GIS-based ESM to create a visual interface between database and GIS analysis. In general, the ESM represents a workflow model, which is a depiction of a sequence of operations that represent exploratory project work similar to a flow chart. An example is presented on Figure 5.2 on page 5-3. The ESM also quantifies and compares resources that may be affected by the proposed improvements. The ESM and the logic it contains is the critical portion of the assessment. Key features of the ESM are its transparency and its ability to describe and execute a reliably repeatable sequence of geo-processing operations.

Figure 5.2 - Workflow Model



The ESM describes the following:

- GIS datasets used in the environmental screening process.
- The relative importance/weight each resource has on the overall decision.
- The areas of potential effect, described by proposed alternatives and their respective buffer distances.
- The mechanism for testing the sensitivity of each geo-processing operation (e.g., numerical weights assigned to each GIS dataset).

5.1.2.1 WEIGHTING OF THE AFFECTED ENVIRONMENT

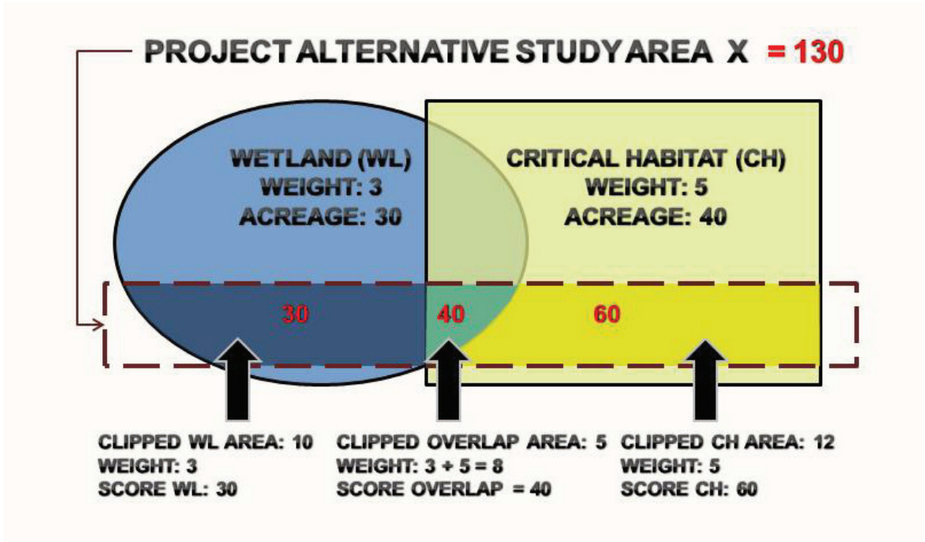
Relative numerical weights/values were assigned to GIS datasets making up the affected environment and incorporated into ESM to formulate the logic for an evaluation of each proposed alternative. Natural, physical and social resources were assigned a weighted value of one (1), three (3), or five (5) based on various factors including legislative importance of the resource(s), environmental importance, and community concerns. This weighted logic, which implies that a greater weighted value suggests a larger avoidance measure, was devised to better differentiate the proposed alternatives from one another. Table 5.1 to the right presents the list of the numerical weights and weighting criteria, which were developed with stakeholder coordination (SFWMD, USACE, FDOT, etc.).

Table 5.1 – US 27 Weighting Criteria

Environmental Classification	Weighted Value
Social/Cultural	
Cultural/Historic/Arcical (Section 106), National Register of Historic Places (NRHP)	
NRHP-Listed/Eligible/Potentially Eligible & Archaeological Sensitive	5
Locally-Listed/Recognized	3
Previously Recorded/Ineligible	1
Public Parks/Recreation (Section 4(f))	5
Utilities	3
Low Income/Minority populations	5
Displacement	5
Economic Opportunity	-5
Community Facilities/Services	3
Land Use	
Residential	5
Agricultural/Institutional	3
Commercial/Industrial	1
Farmlands	1
Natural	
Wetlands (Section 404 of the Clean Water Act)	
High Quality (Undisturbed)	5
Average Quality (moderate disturbance)	3
Low Quality (Disturbed/Exotics)	1
Special Designated Waters (OFW)	5
Stormwater Management Areas/Drainage canals	1
Endangered & Threatened Species (Endangered Species Act of 1973)	5
Critical Habitat (Endangered Species Act of 1973)	5
Comprehensive Everglades Restoration Program (CERP) projects	
Constructed/Funded	5
Planned / Unfunded	3
Stormwater Treatment Areas (STAs)	5
SFWMD US Sugar Lands	1
Floodplains -100 Year (Executive Order 11988)	1
Physical	
Noise/Vibration Sensitive Receptors	
Noise Sensitive Receptors (400 foot Buffer)	
(Land Use Category 2/Category 3)	5/3
Vibration Sensitive Receptors (200 and 120 foot Buffer)	
(Land Use Category 2 [200ft Buffer]/Category 3 [120 foot Buffer])	5/3
Potentially Contaminated Sites	
High/Medium/Low	5/3/1

Another major component of the ESM is its ability to take into consideration the overlapping of the environmental resource datasets. This is accomplished using geo-processing tools embedded in the ESM. For instance, many resources, such as wetlands and critical habitat overlap one another. If resources such as these two features overlap or are a "one-in-the-same" feature, then the combination of the two criteria creates a higher level of avoidance; more than the sum of the individual areas (Figure 5.3 below). Therefore, the ESM can evaluate the presence of one or more resources, reflect those occurrences when they are present, and return a higher level of avoidance when resources overlap one another.

Figure 5.3 – Sample Scenario (Overlap of Two Environmental Features)



The final processing step of the ESM calculates and summates a numerical score for each proposed alternative based on the weighted value of the resource(s) and the area (i.e., acres) the resource(s) represent within its respective buffer. In all cases, a normalized score is presented to reflect a comparable score among alternatives with differing corridor lengths. For instance, the proposed North and South Rail Corridor Alignment Alternatives vary by alignment length based on their respective geographic extent, therefore, normalizing allows for a fairer comparison between alternatives.

5.1.3 RESULTS

The normalized scores and potential degrees of effect for the various proposed alternatives are presented in Table 5.2 above.

Table 5.2 - US 27 PACE Environmental Screening Model Results - Tabular Form

NAME	ALIAS	ALTERNATIVE ACREAGE	SOCIAL SCORE	CULTURAL SCORE	NATURAL SCORE	PHYSICAL SCORE	FINAL SCORE
NORTH ALTERNATIVE 1	N-ALT-1	403	0.5	0.01	1.5	0.02	2.0
NORTH ALTERNATIVE 2A	N-ALT-2A	1155	3.3	0.06	6.1	0.02	9.6
NORTH ALTERNATIVE 2B	N-ALT-2B	1908	5.8	0.06	9.6	0.07	15.7
NORTH ALTERNATIVE 3	N-ALT-3	978	2.0	0.25	4.2	0.15	6.6
NORTH ALTERNATIVE 4	N-ALT-4	2693	9.8	0.05	14.4	0.04	28.1
NORTH ALTERNATIVE 5	N-ALT-5	4785	12.7	0.10	44.4	0.51	66.9
US-27 MAINLINE ALTERNATIVE (EAST)	-	2976	1.4	0.6	24.6	0.30	26.9
US-27 MAINLINE ALTERNATIVE (WEST)	-	2976	2.2	0.1	31.3	0.28	34.0
SOUTH ALTERNATIVE 1	S-ALT-1	652	1.7	0.09	9.1	0.08	11.1
SOUTH ALTERNATIVE 2	S-ALT-2	2214	6.8	0.02	40.0	0.18	45.4
SOUTH ALTERNATIVE 3A	S-ALT-3A	2839	8.5	0.11	46.7	0.25	56.0
SOUTH ALTERNATIVE 3B	S-ALT-3B	3253	10.9	0.12	53.5	0.25	65.2

DEGREE OF EFFECT

LEAST

SOME

MORE

MOST

A lower numerical score is preferable when comparing alternatives as this indicates a lesser potential degree of effect on their respective baseline conditions. Conversely, an alternative with a higher numerical score may potentially affect more environmental resources and/or have a greater involvement with sensitive issues, such as Section 4(f) resources, Section 404/408 resources, Section 106 resources, noise/vibration, etc. In addition, the normalized scores for each alternative were classified into a "potential degree of effect" using a four-class natural breaks scheme . The purpose for this classification is to group and easily compare the potential effect a particular alternative may have on its respective baseline conditions.

The results of the data model can be expressed in tabular form or graphically. Appendix K includes the "hot spot" schema for the various environmental classifications for each group of alternatives where the lighter colors such as yellow or green indicate few or no environmental resources that may be affected by proposed improvements. While the darker red and orange colors indicate potentially sensitive environmental resources that would require a greater level of avoidance measures where practical.

5.1.4 DISCUSSION

In summary, the key environmental resources within the 500 ft. buffer of each alternative are as follows:

• S-ALT-1 bisects primarily industrial land uses, disturbed areas, and sporadic wetland/upland habitats. In addition, there are four CERP boundaries, a conservation land, three potential contamination sites, two historic resources, and listed species habitat for the wood stork and Everglades snail kite within 500 feet of this alternative alignment. **This alternative alignment had the least potential degree of effect when compared to the remaining southern alternatives.**

• S-ALT-2 bisects primarily undisturbed natural habitat (wetlands), publicly owned lands, conservation lands (Everglades and Francis S. Taylor Wildlife Management Area; Water Conservation Areas 3B), and recreational facilities (Milton E. Thompson Park; Trail Glades Range). In addition, there are seven CERP boundaries, a utility easement, six historic resources, two archaeological zones, eight potential contamination sites, and listed species habitat for the wood stork and Everglades snail kite.

• S-ALT-3A and 3B have similar land use and environmental resource quantities as S-ALT-2, with S-ALT-3B also traversing the SFWMD Pennsuco Wetlands mitigation area.

• N-ALT-1 traverses wetland habitat and a mix of predominantly agricultural land uses, such as sugar cane cropland. In addition, there is one historic resource and listed species habitat for the crested caracara and Everglades snail kite. **This alternative alignment had the least potential degree of effect when compared to the remaining northern alternatives.**

[1] Natural Breaks is based on an algorithm produced by Jenks that is an optimization procedure which minimizes within class variance and maximizes between class variance in an iterative series of calculations.

• N-ALT-2A traverses wetland habitat and a mix of predominantly agricultural land uses, such as sugar cane cropland. In addition, there are three wellfields, three potential contamination sites, four historic resources, two CERP boundaries, and listed species habitat for the crested caracara, Everglades snail kite, and Okeechobee gourd.

• N-ALT-2B traverses wetland habitat and a mix of predominantly agricultural land uses, such as sugar cane cropland. In addition, there are three wellfields, six potential contamination sites, four historic resources, two CERP boundaries, and listed species habitat for the crested caracara, and Everglades snail kite.

• N-ALT-3 traverses wetland habitat, a mix of urban/suburban land use (City of South Bay) and agricultural lands, such as sugar cane field crops. In addition, there are 10 potential contamination sites, 18 historic resources, one archeological zone, five community facilities, a utility corridor, several noise/vibration sensitive receivers, three CERP boundaries, and listed species habitat for the crested caracara, Everglades snail kite, and Okeechobee gourd.

• N-ALT-4 traverses wetland habitat and a mix predominantly agricultural land uses, such as sugar cane cropland. In addition, there are two planned unit developments (Lake Point Ranches and Port Macaya Yacht Club), six potential contamination sites, five historic resources, five CERP boundaries, a utility corridor, and listed species habitat for the crested caracara, and Everglades snail kite, Okeechobee gourd, and West Indian manatee.

• N-ALT-5 traverses wetland habitat, public owned conservation lands (Stormwater Treatment Areas), and a mix predominantly agricultural land uses, such as sugar cane cropland. In addition, there are three planned unit developments (Lake Point Ranches; Port Macaya Yacht Club; and Stewart Mining Industries), 14 potential contamination sites, five historic resources, four archaeological zones, three CERP boundaries, a utility corridor, and listed species habitat for the wood stork, crested caracara, Everglades snail kite, Okeechobee gourd, and West Indian manatee.

• US-27 Mainline Alternatives (East vs. West) have similar land uses and impacts between the two alternatives along the majority of the corridor; however, there are a significantly more SFWMD lands, high-quality wetlands, and a utility corridors on the west side particularly south of I-75 in Segment 2. Although significantly less noise/vibration sensitive receivers are located along the western edge of the US-27 right-of-way, the US-27 East Alternative Corridor has the least potential degree of effect throughout the three segments (2, 3, and 4) when comparing it to the US-27 West Alternative Corridor. **Therefore, the US-27 East Alternative Corridor has the least potential degree of effect when comparing it to the US-27 West Alternative Corridor.**

The primary goal of the US 27 PACE environmental screening was to help make informed decisions regarding the alternative elements so as to avoid or minimize potential future impacts to social, natural, and physical environmental resources and steer improvements to areas that are less likely to impact these resources. The ESM provides decision-makers with a visual representation of the environmentally or culturally sensitive areas. The environmental screening results are not used to quantify impacts of environmental resources as may be done in project-level NEPA studies such as Environmental Impact Statements, but rather serve as an assessment of potentially affected environmental resources for comparing alternative elements in this planning-level screening.

The ESM offers the flexibility of easily varying the assessment methodology at any time during the alternatives screening to allow the inclusion of additional features or modifying weighted values based on agency and/or public input, discussions, or suggestions. This allows the model to adjust as the project development evolves.

Lastly, the ESM is only one aspect of how these alternatives are being evaluated. However, the results produced by the ESM may be used in combination with other factors in decision-making matrices to compare and select alternative(s). These other factors are also being evaluated to recommend the proposed alternatives.

5.2 RAILROAD ALIGNMENTS

The multiple alternatives presented in the Phase 1 US 27 Rail Corridor Feasibility Study were evaluated in the environmental section above. These alignments are shown in Figure 5.4 to the right and Figure 5.5 (page 5-7). There are distinct advantages for some of the alternatives that lead to a logical choice of where the rail should connect at the north and south ends of the corridor. The conclusions on consolidating these alternatives to one or two viable options are presented at the end of this section and in more detail in Section 6 of this report.

5.2.1 MAINLINE RAILROAD ALONG US 27

For the main railroad alignment within the US 27 right of way from the Homestead Extension of Florida's Turnpike (HEFT) to South Bay, this study considered an east rail alignment, center rail alignment (median), and a west rail alignment. Each rail alignment is plotted on the concept plans provided in Appendix N. An in-depth physical and economic analysis was not performed on each alignment for the full corridor length, but engineering judgment was used to determine which alignment would be best for a new railroad.

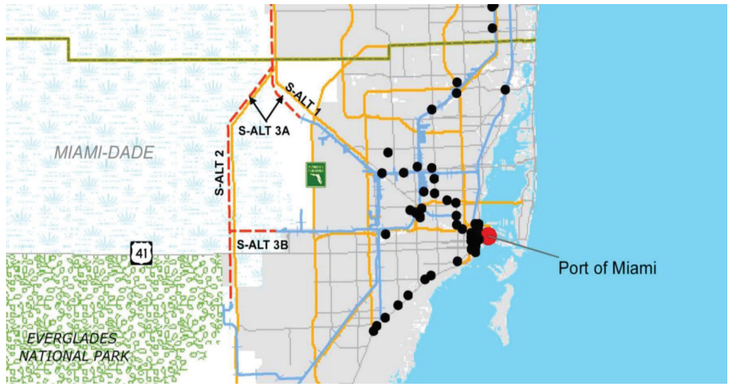
The eastern alignment could work within the right of way; however, it had significantly more challenges north of I-75 where there was insufficient space between the existing highway and the adjacent North New River Canal. Acquiring right of way east of the canal was not considered an option since this is very close to the overhead powerlines and the SFWMD levee along the canal. Also, the eastern alignment had the most intersections with highways approaching US 27 from the east, particularly in Broward County. This would require many more grade crossings and possibly grade separations for safety reasons.

The median rail alignment was the least desirable due to higher risks with having both highway segments of US 27 being parallel to the railroad. This alternative would likely require crash barriers in areas with reduced median widths and guardrail along both inside shoulders in the wider median areas. Additionally, the railroads objected to this alternative for safety, operations, and maintenance reasons.

The western rail alignment was deemed more appropriate since it had the fewest grade crossings, a wider area to construct the railroad, and the fewest overall conflicts with the highway and other features along US 27. This alignment is identified as Alternative 1 in the concept plans shown in Appendix D.

The main rail corridor from the HEFT to South Bay is feasible based on its physical location being west of the existing US 27 highway. At the north end of the corridor, the most practical connection to existing rail is a variation of North Alternative 2A (N-ALT-2A) based on it having the lowest environmental impacts score and the least cost. This alternative provides the first available connection to existing rail at the north end and avoids running a new railroad through South Bay.

Figure 5.4 - Southern Alternative Railroad Connections



5.2.2 SOUTHERN RAILROAD CONNECTIONS

At the south end of the corridor, the simplest and most logical connection is South Alternative 1 (S-ALT-1), which connects to the existing FEC Railroad where its track ends near the HEFT and US 27. This provides the most direct connection of a western rail corridor to the Port of Miami with the least cost and least environmental impact. Although S-ALT-1 is the higher scoring alternative, South Alternative 2 (S-ALT-2) is not precluded although it has a higher environmental impact score and potentially higher cost. This alternative provides a connection to the CSX Railroad, which could be the future preferred alternative depending on discussions between the FDOT and the railroads as to the better alignment. A determination may be made that both S-ALT-1 and S-ALT-2 connections be made, which is referred to as S-ALT-3.

5.2.3 NORTHERN RAILROAD CONNECTIONS

The northern railroad connection was determined by minimizing impacts to South Bay be connecting to the SCFE railroad at the first practical location to minimize impacts to adjacent properties and nearby communities. Of the various rail locations shown in Phase 1 of the US 27 Rail Feasibility Study, North Alternative 2A (N-ALT-2A) is the least disruptive and the earliest connection to the SCFE. The connection is to the SCFE spur line that runs east-west approximately 1 mile south of Willard Smith Road.

5.2.4 RAIL LOCATION DETERMINATION

The matrix in Table 5.4 is a broad overview of potential impacts that could be expected from constructing a railroad at various locations within the US 27 right of way. This is not a detailed analysis of each impact, but more of a quantitative review of impacts to determine the severity of each rail alignment alternative (right, left, center). Based on this analysis, it was determined that running the railroad along the west side of US 27 would have the least physical impacts to improvements within the corridor. Of particular interest is the reduced number of grade crossings, particularly from a safety standpoint. Note that this determination is not final and a future study may determine a different location for the railroad.

Figure 5.5 - Northern Alternative Railroad Connections

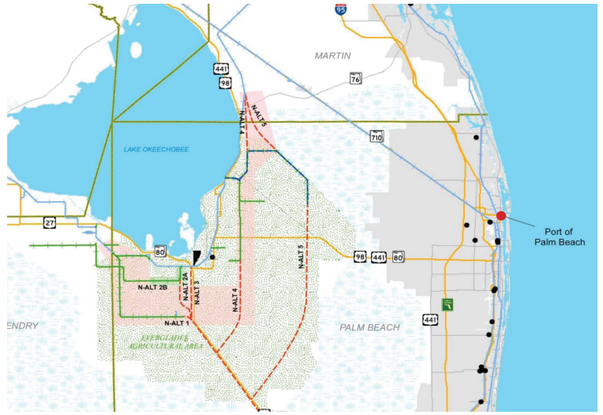


Figure 5.6 - Rail Alternative Selective Matrix

Evaluation Criteria	Miami-Dade County Rail Alternatives Within US 27 Right of Way		
	West	Median	East
Physical (Design) Constraints			
Canals, levees, and spillways of the Southern Florida Flood Control Project		+	+
Number of At-Grade Crossings	+		
Traffic Impacts (Delays)	+		
Community Impact	+		
Right of Way Acquisition	+	+	
Existing Rail Infrastructure	+		
Capital and O&M Cost	+		
Subtotal	6	2	1

Evaluation Criteria	Broward County Rail Alternatives Within US 27 Right of Way		
	West	Median	East
Physical (Design) Constraints			
Canals, levees, and spillways of the Southern Florida Flood Control Project		+	
Recreation Areas		+	
Number of At-Grade Crossings	+		
Interstate Bridges		+	
Interstate Ramps		+	
Traffic Impacts (Delays)	+	+	
Community Impact	+		
Right of way Acquisition	+	+	
Existing Rail Infrastructure	N/A	N/A	N/A
Capital and O&M Cost	+		
Subtotal	5	6	0

Evaluation Criteria	Palm Beach County Rail Alternatives Within US 27 Right of Way		
	West	Median	East
Physical (Design) Constraints			
Canals, levees, and spillways of the Southern Florida Flood Control Project		+	
Recreation Areas		+	
Number of At-Grade Crossings	+	+	
Traffic Impacts (Delays)	+		
Community Impact			+
Right of way Acquisition	+		
Existing Rail Infrastructure	N/A	N/A	N/A
Capital and O&M Cost	+		
Subtotal	4	3	1

Total Mainline	16	11	3

Evaluation Criteria	Northern Rail Connection Alternatives Outside of Right of Way					
	N-Alt1	N-Alt2A	N-Alt2B	N-Alt3	N-Alt4	N-Alt5
Physical (Design) Constraints						
Canals, levees, and spillways of the Southern Florida Flood Control Project	+	+	+			
Number of At-Grade Crossings	+	+	+			
Traffic Impacts (Delays)					+	+
Community Impact					+	+
Right of way Acquisition	+	+				
Existing Rail Infrastructure	+	+	+			
Access to potential (freight) markets				+		
Capital and O&M Cost		+				
Total	4	5	3	1	2	2

Note "+" indicates least amount of impacts or least costs associated to the alternative

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 6.0
CONCEPTUAL ENGINEERING ALTERNATIVES

6.0 DEVELOPMENT OF CONCEPTUAL ENGINEERING ALTERNATIVES

INTRODUCTION

Based on the analyses in Section 4.0 alternatives will be developed to accommodate both the highway and railroad needs in the project corridor. Two build alternatives will be investigated: the highway-only alternative, and the multimodal alternative, which is the combination of railroad and highway improvements. Specific issues to be addressed are:

- Efficient and safe movement of vehicles, trucks, buses, and freight trains along the corridor.
- Constraints and opportunities for each alternative along US 27.
- Identify design criteria and standards.
- Develop horizontal and vertical alignments.
- Develop typical sections for multimodal alternatives, including highway and railroad.
- Identify any need for grade separation between highways and highway/railroad.
- Identify railroad alignment alternatives and terminals.

The study area and project corridor are identified by five distinct segments as shown in Figure 6.1 on page 6-2. The definition of each segment is based on distinct or unique characteristics of the highway corridor and the surrounding environment.

Three corridor alternatives were considered as part of the project scope, which are:

1. Converting US 27 to an expressway with frontage roads as described in the 2004 SR 5/US 27 FIHS Action Plan;
2. Reconstruct US 27 to an eight-lane divided expressway with a parallel rail corridor within the 300 feet of right of way as shown in the 2008 US-27 Corridor Multimodal Needs Assessment;
3. Develop other conceptual engineering alternatives as appropriate for US 27 with rail. This component includes considering the outcomes of the Interregional Transportation Infrastructure Needs (ITIN) Study and specific traffic analysis results from Section 4.0.

However, rather than considering the three development scenarios of the project scope as individual applications over the entire corridor, the analysis combined features of each scenario and applied them appropriately to the specific highway segments of Figure 6.1 on page 6-2. For example, the 2004 US-27 Action Plan limits are identical to segment 2 shown in Figure 6.1 on page 6-2. The 2004 Action Plan is eight years old; therefore, the PACE study re-analyzed the expressway with frontage road scenario to determine if it would still be applicable in 2035 based on the traffic and design conditions.

The ITIN Study determined a specific number of lanes on US 27 considering various rail scenarios of the Intermodal Logistics Centers (ILCs). These lane numbers are referenced in Tables 6.1 and 6.2 below for comparison to the PACE Study results. There are similarities and differences in the lane configurations between the ITIN Study and the PACE Study for various segments of US 27. For consistency in the PACE report, it was determined to use the lane determinations from Section 4.0 and to use the lower number of lanes. This approach was selected since there are so many variables and “drivers” that could affect the final lane determination, that this determination would be best addressed in a future study if and when these drivers are realized. Therefore, the number of lanes identified in the Concept Plans in Appendix N are per Tables 6.1 and 6.2.

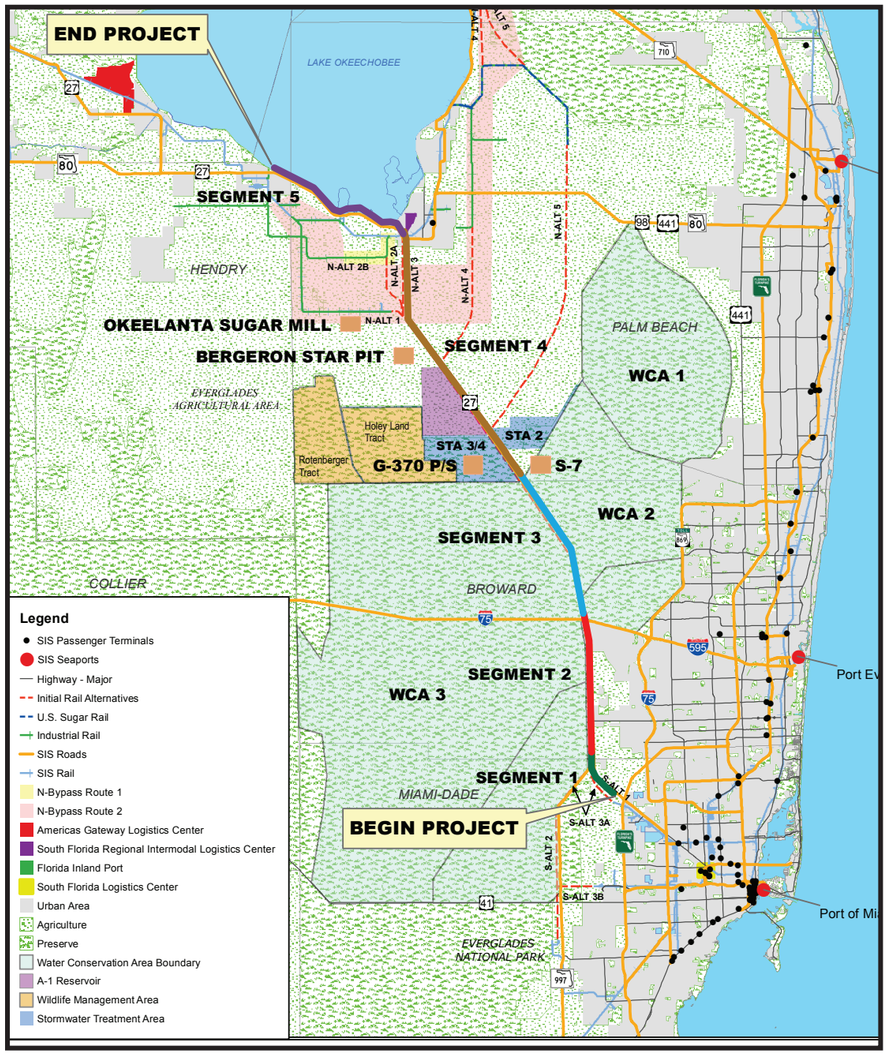
The overall goal in developing a conceptual highway and railroad plan is to provide safe and efficient movement of vehicles and freight. In some instances, the concepts are very conservative in their design to accommodate safety and efficiency. As an example, there are grade separations for highway intersections and for railroad crossings to eliminate conflict points. These grade separations are at the truck stop north of Griffin Road, the braided ramps with the railroad north and south of the I-75/US27 interchange, the Sawgrass Recreation Area and several emergency turnarounds as required per AASHTO at approximately 5 mile spacing between the Sawgrass Recreation Area and South Bay. Turnarounds should be included in final design and actual locations have not been determined. A number of turnarounds was developed for cost purposes.

A detailed analysis of each crossing was not performed at this level of study; however, conservative engineering judgment was applied in determining where a grade separation might be warranted. These highway and railroad grade separations are identified in the cost estimate.

6.1 ALTERNATIVES CONSIDERED

The three alternatives considered in the US 27 PACE study are the No Build Alternative, Baseline (highway only) Alternative, and Multimodal (railroad & highway) Alternative. A single travel demand forecast scenario is being used to evaluate all three alternatives. This travel demand forecast scenario consists mainly of the

Figure 6.1 - US 27 Pace Study Area Segments



potential three ILCs that may develop around Lake Okeechobee, plus the population and employment growth projected within the 2035 LRTPs for the basis of future socioeconomic conditions. Further, the travel demand forecast scenario includes transportation network per the 2035 LRTP Cost Feasible Plans. Additionally, the traffic analysis and lane requirement discussed in Section 4 informed the alternatives development process.

6.1.1 NO BUILD ALTERNATIVE

The No Build alternative includes improvements identified in the 2035 Cost Feasible Long Range Transportation Plans (LRTP) of Palm Beach, Broward and Miami-Dade Counties to meet regional travel demand in 2035. Per Miami-Dade County's 2035 LRTP, US 27 is a six lane divided (6LD) facility in Miami-Dade County south of Homestead Extension of Florida's Turnpike (HEFT) while it is a four lane divided (4LD) highway between HEFT and Miami-Dade County/Broward County Line. The 2035 LRTP anticipates US 27 to be a 4LD facility in Broward and Palm Beach Counties. In essence, the 2035 LRTPs do not call for adding capacity on US 27 beyond existing (2012) capacity. (See existing US 27 typical Sections in Appendix B)

6.1.2 HIGHWAY ONLY ALTERNATIVE

This alternative includes highway improvements only. Highway only alternative provides the number of lanes required per the traffic impact analysis discussed in Section 4 that can be reasonably accommodated within the existing right of way (see Table 6.1 on page 6-3).

Table 6.1 identifies the number of lanes needed for different highway segments for highway only alternative. It should be noted that the concept plans and typical sections for the segment between Old US 27 and Palm Beach/Hendry County line reflect eight-lane configuration per the traffic impact analysis for the corridor. The rationale for developing a six-lane configuration is that the development of ILCs around Lake Okeechobee will spur additional residential and commercial development in the region. It is anticipated that there will be significant more local traffic on the roads as a result of development around the ILCs. Such land use changes and travel demand are highly like to trigger policy level change in terms of area type and level of service standard. Such policy changes will not warrant eight-lane configuration in the 2.5 mile section between Old US 27 and Palm Beach/Hendry County line. FDOT District Six is currently conducting a PD&E Study on US 27 from NW 79th Avenue to SR 997 (Krome Ave.) that may determine different lanes needs than shown in Table 6.1 below. The highway only proposed typical sections are shown in Appendix L.

Table 6.1 - Highway Improvements, Highway Only Alternative

Highway Segment				Existing Number of Lanes	Number of Lanes Needed per PACE Study [1]		Existing Right of Way Width	SIS Typical Right of Way Width
#	From	To	Length (miles)		With Existing Area Type	With New Area Type		
1, 2	HEFT	Pines Boulevard	8.79	4LD	4LD	6LD	202-480	_ _
2	Pines Boulevard	Sheridan Street	1.42	4LD	4LD	6LD	480	212
	Sheridan Street	Stirling Road	1.06	4LD	4LD	6LD	480	212
	Stirling Road	Griffin Road	1.00	4LD	4LD	6LD	480	212
	Griffin Road	I-75 (Alligator Alley)	5.93	4LD	4LD	6LD	320-520	212
3	I-75 (Alligator Alley)	SR 80 (South Bay)	40.49	4LD	6LD	6LD	221-520	284
4	SR 80 (South Bay)	Levee Road	1.21	4LD	6LD	6LD	100-162	160
	Levee Road	Mutt Thomas Road	5.42	4LD	6LD	6LD	162	236
	Mutt Thomas Road	Old US 27	3.79	4LD	6LD	6LD	162	236
5	Old US 27	Palm Beach County/ Hendry County Line	2.52	4LD	8LD	6LD	162	284

1 Per Section 4.0 the PACE background traffic is based on a blended growth rate of various studies which produces a background traffic that is lower than the ITIN Study traffic volumes.

6.1.3 MULTIMODAL (HIGHWAY AND RAILROAD) ALTERNATIVE

The Multimodal Alternative includes a new railroad along the west side of US 27 and highway improvements within the US 27 Corridor. The railroad component includes a single mainline track from Miami to South Bay with five 2-mile siding tracks for passing maneuvers. The highway improvements include additional lanes needed to meet future (2035) travel demand within the existing right of way and environmental constraints. These improvements are shown in the concept plans in Appendix N and the typical sections in Appendix M.

As shown in Figure 6.3 on page 6-8, the southern railroad connections have two main options as described below. On rail alignment would begin at the Cemex Concrete Plant in Medley, Florida, which is the north end of FEC's single track running northwest from the Hialeah Rail Yard along US 27. The second option would begin the railroad by connecting to one of the two CSX spur tracks described below. The main railroad alignment would extend approximately 75 miles to the north in the US 27 corridor from near Krome Avenue to a connection with the South Central Florida Express (SCFE) railroad south of Lake Okeechobee.

The concept alignment would connect with the following three railroads:

- South Central Florida Express (SFCE): The SCFE has a main track running around the southern and eastern perimeter of Lake Okeechobee connecting to the CSX Railroad on the west side and the FEC Railroad on the east side. A new railroad along US 27 would connect to the SCFE approximately 2 miles south of South Bay and 1 mile west of US 27 at a SCFE spur track. This is shown on sheets 115-123 of the Concept Plans in Appendix N.
- Florida East Coast Railway (FEC): The railroad along US 27 would connect to the FEC railroad in Medley where FEC's existing mainline track terminates at the CEMEX facility. This is shown on Figure 6.3 on page 6-8.
- CSX Railroad: In Miami-Dade County the CSX tracks generally run west of canal C-6 and Krome Avenue. The CSX rail alignment alternatives for Segment 1 are described in Section 2.4.5 and Figure 6.3 on page 6-8.

Table 6.1 on the left identifies the number of lanes needed for various highway segments per Section 4.0 of this study. The number of lanes is a function of the background traffic plus the ILC related traffic. The 50 million square feet does not represent the full build out condition of the three ILC sites.

Table 6.2 - Highway and Rail Improvements, Multimodal Alternative

Highway Segment				2035 Number of Highway Lanes	Number of Lanes Needed per PACE Study[2]		Multimodal Scenario		Exisiting Right of Way Width	SIS Typical Right of Way Width
#	From	To	Length (miles)		With Existing Area Type	With New Area Type	Railroad Improvement	Maximum Number of Lamnes within Existing Right of Way		
1	HEFT	Miami-Dade County Line	4.92	4LD	4LD	6LD	Single-Track	4LD	165-480	212
2	Miami-Dade County	I-75 (Alligator Alley)	12.97	4LD	4LD	6LD	Single-Track	4LD	320-520	212
3 & 4	I-75 (Alligator Alley)	SR 80 (South Bay)	40.49	4LD	6LD	6LD	Single-Track	8LD	221-520	260
5	SR 80 (South Bay)	Levee Road	1.21	4LD	6LD	6LD	_ _	6LD	100-162	160
	Levee Road	Mutt Thomas Road	5.42	4LD	6LD	6LD	_ _	6LD	162	236
	Mutt Thomas Road	Old US 27	3.79	4LD	6LD	6LD	_ _	6LD	162	236
	Old US 27	Palm Beach/ Hendry County Line	2.52	4LD	8LD	6LD	_ _	10LD	162	236

2 Per Section 4.0 the PACE background traffic is based on a blended growth rate of various studies which produces a background traffic that is lower than the ITIN Study traffic volumes. In addition, PACE uses traffic volumes for a transitioning area, which allows higher volumes for LOS C.

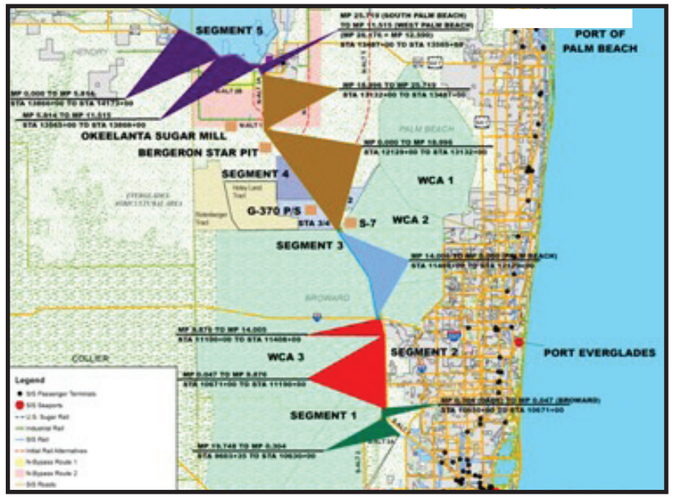
The multimodal alternative will require reconstruction of both the southbound and the northbound lanes on a shifted alignment to accommodate the railroad and the highway within the existing right of way to the maximum extent practicable. Furthermore, to bring US 27 up to Strategic Intermodal System (SIS) standards and 70 miles per hour design speed, highway improvements such as intersections improvements or interchanges are needed. These would especially be needed between Krome Avenue and I-75 where there are major intersecting roadways such as Pines Boulevard, Sheridan Street and Griffin Road.

6.2 TYPICAL SECTIONS

Proposed typical sections vary throughout the corridor segments. These proposed typical sections are shown in Appendix L, (Highway Only) and Appendix M (Multimodal). A typical section key map is provided in Figure 6.2 below that breaks down the project corridor to coincide with the five corridor segments.

A median barrier is proposed north of the I-75 interchange due to the limited right of way and the less than required 60 foot median width for the SIS arterial roadway having a 70 MPH design speed.

Figure 6.2 – US 27 Typical Section Key Map



6.3 DESIGN CRITERIA

Table 6.3 below outlines design criteria for US 27 as an arterial roadway with a 70 mph design speed. Table 6.3 also includes basic railroad design criteria from the American Railway and Maintenance of Way Association (AREMA) standards.

Table 6.3 - Highway and Railroad Design Criteria			
AASHTO Design Element		**Criteria**	**Source**
Functional Classification		Rural and Urban Principal Arterials (FIHS-SIS)	(1)
Level of Service Standard		LOS C in transitioning and rural areas LOS D in urbanized areas	(8)
Basic number of travel lanes		4 Miami-Dade 4, 8 and 10 Broward 6, 8, and 10 Palm Beach	(2)
Design traffic volumes		See Studies	(2)
Access classification		Class 2	(3) Chapter 1 SIS Highway Standards and Criteria (Topic 525-030-260)
Standard spacing, for V > 45 mph		1320’ Directional 2640’ Full 2640’ Signal	(3) Chapter 1
	Design Vehicle	WB-62 FL / WB-67D	(3) Chapter 1.12
1	Design Speed	70 MPH	(3) Table 1.9.2
2	Lane Widths	12 feet	(3) Table 2.1.1
	Transitions & Tapers	L = WS V> 45mph	(3) Table 10.2 TCP (4) Index 526
	Ramps Widths	15’ and 24’	(3) Table 2.1.3
	Ramp Acceleration Length	1620’ 0 MPH to 70 MPH	(6) Exhibit 10-70
	Ramp Deceleration Length	615’ 70 MPH to 0 MPH	(6) Exhibit 10-73
	Median width, for V> 60 mph	60’ Without Barrier	(3) Table 2.1.2
	Median width, for V≤ 45mph	22’ (desirable)	(3) Table 2.1.2 (3) Std. Index 301 & 302
	Traffic Separator	4’ minimum width	(3) Section 2.1.6
	Curb & gutter	Type E, F, Shoulder	(4) Index 300
3	Shoulder Widths	10’ paved (Min), 12’ overall	(3) tables 2.3.1 and 2.3.2
4	Bridge Widths	Approach Highway Width	(3) Table 23.9.4
5	Structural Capacity	AASHTO LRFD	(3) Table 23.9.5
6	Cross Slope	0.02 ft/ft Varies With Number of Lanes	(3) Figure 2.1.1
7	Superelevation “e”	0.10 max (rural) 0.05 max (urban)	(3) Section 2.9.1 Rural (3) Table 2.9.2 Urban (4) Index 510 & 511
8	Horizontal Clearance	Roadside features	(3) Section 2.11

Table 6.3 - Highway and Railroad Design Criteria			
AASHTO Design Element		**Criteria**	**Source**
	Clear Zone urban Clear Zone rural Drop off Hazards > 6’ urban Horizontal Clearances Canal Hazard	4’ from face of curb 36’ edge of Travel Lane 22’ edge of Travel Lane 1:6 slopes to Edge to Clear Zone 60 ft > 50 MPH	(3) Chapter 4 (3) Chapter 4 (3) Chapter 4 (3) Chapter 4 (3) Chapter 4
	Roadside slopes	<1:3 must have guardrail	(6) Section 3.7
9	Vertical Clearance	16’6” Bridge 17’6” –Signal Clearance 19’-6”Overhead Truss Sign 23’-6” Railroad 12’ - Clearance over MHW	(3) Figure 2.10.1 (3) Table2.10.1 (3) Section 2.10.1
10	Horizontal Alignment		
	Deflection through intersection Deflection w/o horizontal curve w Curb & Gutter w/o Curb & Gutter	3°00’00” for V≤ 45mph 1° 00’ 00” for V≤ 45mph 0^45’00’ for V≤ 45mph	(3) Table. 2.8.1b: (3) Table 2.8.1a
	Minimum curve radius Normal cross-slope / max “e”	22,918’ / 1432’’ (rural) 2865’/ 649’ (urban)	(3) Section 2.8.1
	Curb Radius	50’ min, Arterial	(6) AASHTO Exhibit 2-15 &2-17
	Minimum Length of Curve	30V Freeway 15V Arterial	(3) Table 2.8.2a
11	Vertical Alignment		(3) Sec. 2.8
	Grades	5% High Speed Urban 10% Rural Arterial	(3) Table 2.6.1
	Max change without VC	0.20 @ 70 MPH	(3)Table 2.6.2
	Driveway profile	10% max, Commercial	(4) Index 515
	Minimum length of vertical curves	Kcrest ≥ 401 @ 70 MPH Ksag ≥ 181 @ 70 MPH	(3) Table 2.8..2 (3) Table 2.8..2
Design High Water		3 ft. base clearance	(3)Table 2.6.3
12	Stopping Sight Distance	730’ @ 70 MPH	(3) Table 2.7.1
13	Railroad		American Railway Engineering and Maintenance of Way Association (AREMA)

Table 6.3 - Highway and Railroad Design Criteria			
AASHTO Design Element		**Criteria**	**Source**
	Railroad Curvature	Maximum 10° Curve (573.69 radius)	(7) CSX and FEC Guidelines and Standards
	Railroad Grades	0.10% max	(7) CSX and FEC Guidelines and Standards
	Clearance to Railroad	22' w/ Crash Wall & Equipment 25' w/o Crash Walls	(3) Table 6.3.3 (3) Table 6.3.3
	Curve Compensation	0.04% per Degree of Curvature	(7) CSX and FEC Guidelines and Standards
	Design Speed	Class 4 – 60 mph freight; 80 mph passenger	Federal Railroad Administration
	Track Spacing	15 feet - Center-to-Center	(7) CSX and FEC Guidelines and Standards
	Structural Capacity	Cooper E-80 live loading	American Railway Engineering and Maintenance-of-Way Association
	Turnouts	Number 10 or larger	(7) CSX and FEC Guidelines and Standards

1. *FDOT Straight Line Diagrams*
2. *ITIN Study and PACE Multimodal Forecast (Tech Memo 2)*
3. *FDOT Plans Preparation Manual 2012*
4. *FDOT Design Standards 2012*
5. *Florida Intersection Design Guide, FDOT 2007*
6. *AASHTO, A policy on Geometric Design of Highways and Streets 2004*
7. *CSX and FEC Guidelines and Standards; and American Railway Engineering and Maintenance of Way Association (AREMA)*
8. *FDOT Quality/Level of Service Handbook*

6.4 GENERAL ENVIRONMENTAL CONSIDERATIONS FOR ALL SEGMENTS

6.4.1 SOCIAL ENVIRONMENT

All alternatives will be developed in a manner sensitive to adjacent land uses. During future project-level environmental studies, consideration will be given to how alternatives will be developed and coordination with local government planning entities will take place to preserve or enhance existing land uses, where possible.

Visual assessments will be conducted to present and document changes to the viewshed from both user and viewer perspectives. Alternatives will be developed with aesthetics as a means to minimize any potential negative impacts resulting from elevated structures and other structures that are erected that substantially impact the viewshed within the corridor. Visual impacts of an area are determined by identifying key views, analyzing the resources and community responses to the resources, depicting the project appearance, assessing the visual impacts, and then developing alternatives that minimizes impacts. Sensitive viewsheds within the project area include residential areas, parks and recreation areas, natural areas, water bodies, and entries to urban areas.

Due to the presence of several public use areas along Segments 3 and 5, greater consideration to Section 4(f) impacts will be required. Impacts to Section 4(f) resources can be avoided best through early identification. Indirect effects due to proximity effects of locating facilities adjacent to Section 4(f) resources will need to be assessed in future project-level studies for constructive use issues as part of Section 4(f) Determination of Applicability or Section 4(f) Evaluations. Proposed mitigation measures for Section 4(f) properties, if necessary, may include coordinating with federal, state, and local entities for Section 4(f) resource avoidance, minimization, preservation; avoiding construction closures during large public events; maintaining access during construction; applying best management practices to reduce construction related impacts such as dust, noise, debris removal, etc.

Prime and Unique Farmlands identified in Segments 4 and 5 are protected under the Farmland Protection Policy Act of 1981 in order to minimize the extent that federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. Project-related potential impacts to farmlands and other protected farmlands will be considered during subsequent project-level detailed environmental review process. This review process will entail an assessment to identify soils showing areas of Prime and Unique Farmland and state and locally important soil types, a field survey of land use, and an evaluation of impacts to Prime and Unique Farmland. Coordination will occur with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

6.4.2 NATURAL ENVIRONMENT

It is anticipated that potential impacts to listed species may be greatest where alternatives are developed outside the existing US-27 road right of way. Future project-level studies, detailing analysis of potential impacts to listed species and/or their habitat, including avoidance, minimization and mitigation considerations, would be required.

Alternatives developed will also require detailed analysis to ensure avoidance and minimization measures are taken into consideration during design phase(s) and mitigate for any unavoidable impacts to wetlands. Mitigation options for unavoidable impacts to state and federal jurisdictional wetlands would include on- or off-site restoration, creation, enhancement, and/or mitigation banking. All mitigation planning would be performed in close coordination with the state and federal permitting agencies.

The proposed stormwater facility designs will include, at a minimum, the water quantity requirements as required by Miami-Dade County code in Segment 1, Broward County code in Segments 2 and 3, and Palm Beach County code in Segments 4 and 5. Coordination with the South Florida Water Management District (SFWMD) will take place in accordance with the Florida Administrative Code (FAC) and the Environmental Resource Permit (ERP) Basis of Review Manual. Coordination with other local entities such as water control districts would also be considered. Where local, state or federal permits will be required, the need for a Clean Water Act, Section 401 Water Quality Certification will be considered during future studies. Therefore, it is anticipated that there will be no negative impact to water quality within each segment.

Due to the presence of existing canals, rivers, and drainage basins throughout the project, it is probable that all proposed alternatives will cross or impact these resources. Executive Order (EO) 11988 requires Federal agencies to avoid the direct or indirect support of floodplain development whenever there is a practicable alternative; therefore the coordination will be conducted with the Federal Emergency Management Agency (FEMA) and will incorporate the objectives of EO 11988 in future studies.

Several of the canals within the project corridor were constructed as part of the USACE Central and South Florida (C&SF) federal flood control project. As such, any proposed improvements which may impact these C&SF facilities would require review and approval by the USACE under 33 C.S.C. Section 408. Depending on the intensity of the proposed work on a C&SF facility, either a minor or major engineering review may be required. Typically a minor review would be required for O&M or other similar type work and a major review would be required for any canal re-alignments, changes in levee dimensions, etc. Minor reviews usually are permitted by the District Engineer; however, major reviews require approval by the Chief of Engineers or the Secretary of the Army. There are no statutory guidelines for the duration of the review process, but they can be lengthy and should be started as early in the planning and design process as possible to avoid project delays.

6.4.3 PHYSICAL ENVIRONMENT

Future studies are anticipated to include Contamination Screening Evaluation Reports or Technical Memoranda to identify any potential contamination that may exist and rank the sites based on a rating of No, Low, Medium or High. Sites identified as High or Medium would be avoided to the greatest extent possible. Mitigation for impacts related to hazardous materials and wastes is dependent on detailed site-specific investigations/Environmental Site Assessments (ESA), which were not performed as part of this study.

Construction activities for the proposed improvements will generally have temporary air, noise, vibration, water quality, vegetation, utility, traffic flow, public safety, and visual impacts for those residents and travelers within the immediate vicinity of the project area. These temporary impacts will vary along the corridor as proposed improvements are implemented. With proper planning and sequencing, construction related impacts to sensitive natural resources such as wetlands, floodplains, and habitats and to cultural resources would be avoided to the greatest extent practical. All construction activities would involve complete coordination with FDOT and other regulatory agencies.

6.5 SEGMENT 1

Segment 1 is an approximate 5-mile section in Miami-Dade County extending north from the Homestead Extension of Florida's Turnpike (HEFT) to just north of the US 27/Krome Avenue intersection at approximately the Broward County line. The study limits begin at the Hialeah Rail Yard; however, since the rail connection would begin just north of the HEFT, Segment 1 begins where the rail makes a connection.

6.5.1 CONSTRAINTS AND OPPORTUNITIES (SEGMENT 1)

The main constraint in this segment is the C-6 Canal that runs parallel along the west side of US 27. What appears to be an opportunity in this segment is the vacant land along the adjacent rock mine (owned by CEMEX) that could be acquired for a railroad corridor.

6.5.2 TYPICAL SECTIONS (SEGMENT 1)

For the multimodal alternative, there are two main typical sections in this segment and both have a 4-lane divided highway that is essentially the current condition. Since the railroad fits well on the south side of the C-6 Canal it would have no impact on US 27.

For the highway-only alternative, the typical sections in Segment 1 are shown in Appendix L are as follows:

- Sta. 10391+00 to Sta. 10630+00 (HEFT to S. of Krome Ave.) 4-lane divided with 64' median.
- Sta. 10630+00 to Sta. 10671+00 (S. of Krome Ave. to County Line) 4-lane divided with 135' median.

6.5.3 HORIZONTAL AND VERTICAL ALIGNMENTS (HIGHWAY AND RAILROAD) (SEGMENT 1)

The highway horizontal alignment along this segment is mainly on tangent with one curve to the right about 3.5 miles north of the HEFT where the highway turns and heads on a due-north alignment. The proposed railroad would run parallel to US 27 on the west side for the entire length of this segment as shown on Sheets 13-22 of the concept plans in Appendix N. The double track railroad requires approximately 700,000

sf of right of way acquisition from the FEC's Hialeah Rail Yard north to the US 27/Krome Avenue intersection along the west side of the C-6 Canal.

6.5.4 INTERSECTIONS AND GRADE CROSSINGS (SEGMENT 1)

In this segment there are multiple intersections with US 27 that will be addressed in the District Six PD&E Study. The railroad would have only two grade crossings in this segment; one at NW 185th Street in the big curve and one at Krome Avenue. For the purposes of this study, all grade crossings are assumed to be fully gated and signaled for safety.

6.5.5 RAILROAD (SEGMENT 1)

The major constraint for the new railroad (S-ALT-1) that would connect to the FEC railroad is the C-6 Canal that parallels the west side of US 27. Since the existing FEC spur track also runs parallel to the west side of US 27 it was more practical to not cross the C-6 canal to have the tracks within the highway right of way.

For S-ALT-2 rail connection to the CSX tracks along Krome Avenue, the constraint would be the proposed widening of Krome Avenue from 2 lanes to 4 lanes and the existing canal along the west side of Krome Avenue. The southern alternative connections are shown in Figure 6.3 to the right and are shown in more detail on Sheets 308-334 and 501-511 of the concept plans in Appendix N.

6.5.6 DRAINAGE (SEGMENT 1)

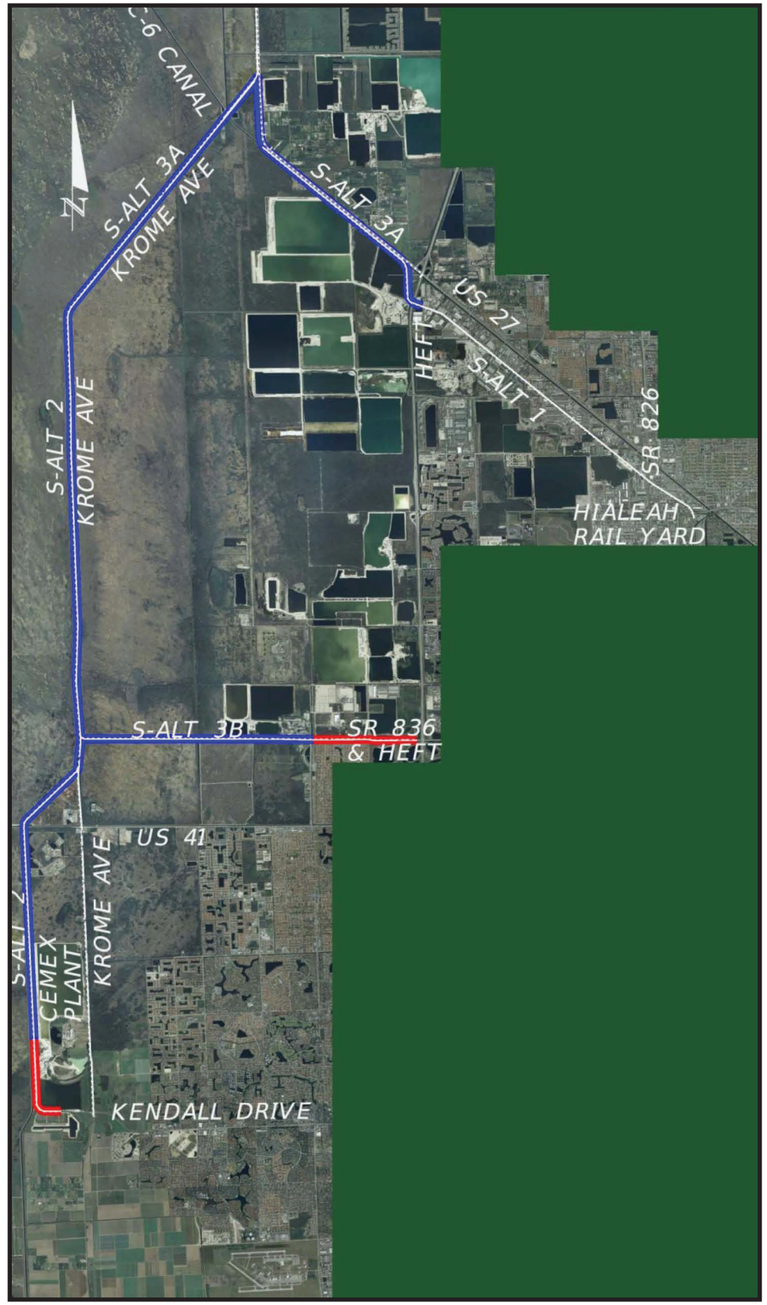
The railroad drainage could be accommodated in swales adjacent to the tracks and the railroad service road. These would be designed to address stormwater quality treatment and the pre-versus- post runoff condition.

6.5.7 ENVIRONMENTAL IMPACTS

Social Environment (Segment 1)

This segment is adjacent to or in close proximity to a mix of predominantly industrial land uses; including rock quarries (Florida Land Use Cover and Classification System [FLUCCS] 163), holding ponds (FLUCCS 166), and fill areas (FLUCCS 740). Other land uses adjacent to or in close proximity to Segment 1 include, low-density residential housing (FLUCCS 110), commercial/retail establishments (FLUCCS 140), mixed rangeland (FLUCCS 330), improved pastures (FLUCCS 211), wetlands (FLUCCS 641), invasive/exotic vegetative habitat (FLUCCS 619), and open/vacant land (FLUCCS 190). The community resources of note along this segment

Figure 6.3 – Southern Rail Alternatives



include the County Line Dragway (formerly the Opa Locka West Airport); and Woodlawn Cemetery (14001 NW 178th Street).

Historic & Archaeological Resources (Segment 1)

According to a review of the Florida Master Site File (FMSF) database and the Florida Geographic Data Library (FGDL) GIS data clearinghouse, there are three previously recorded historic resources adjacent to or in close proximity to Segment 1. These linear historic resources are the Miami Canal (C-6), which is eligible for listing on the National Register of Historic Places (NRHP); and the Golden Glades Canal and Snapper Creek Canal (C-9), both of which are ineligible for listing on the NRHP. In future project-level studies a Cultural Resource Assessment Survey (CRAS) would be required.

Natural Environment (Segment 1)

This segment is adjacent to several natural resources, including Water Conservation Area (WCA) 3, the Comprehensive Everglades Restoration Project (CERP) Central and North Lake Belt Storage Areas, and numerous publicly-owned conservation lands. In addition, several sensitive ecosystems/habitats are bisected or are in close proximity to Segment 1, including Wood Stork Core Foraging Area, high-quality wetlands, and the Everglades and Francis S. Taylor Wildlife Management Area.

There is a potential to impact habitat of the Florida panther, wood stork, and West Indian manatee. West Indian manatee habitat would most likely be impacted in areas that may require new bridge construction, bridge replacements, or bridge widening.

Physical Environment (Segment 1)

There are approximately 11 petroleum storage tank facilities located adjacent to or in close proximity to this segment. The majority of these facilities are located in the southern termini of Segment 1, where there are a multitude of industrial facilities. Alternatives along this segment will be developed in a manner sensitive to adjacent land uses in regards to noise and vibration impacts. Residential community coordination may be required regarding noise and noise abatement.

6.5.8 OTHER CONSIDERATIONS (SEGMENT 1)

Since this section of highway is currently under a PD&E study by FDOT District Six, and the fact that the ITIN Study indicates a 4-lane highway is sufficient for year 2035 traffic volumes, there are no highway improvements shown in this segment.

However, as part of the PD&E Study for US 27, consideration should be made for the railroad to possibly be part of the highway corridor study to determine if it may be more feasible to include with the highway and not acquire right of way for the new railroad west of Canal C-6.

6.6 SEGMENT 2

Segment 2 is an approximate 14-mile section extending from just north of the Miami-Dade/Broward County line to just north of the I-75 interchange with US 27. There are thirteen intersections with US 27 and other highways in this segment.

6.6.1 CONSTRAINTS AND OPPORTUNITIES (SEGMENT 2)

The main constraints within this segment are the intersections and crossovers that induce conflict points with US 27 traffic. Major constraints are the Water Conservation Area No. 3 to the west, the I-75 interchange with US 27, and development that directly abuts US 27. There is also is tremendous opportunity within this segment due to the 480-foot right of way width that allows for the railroad corridor and intersection improvements on US 27.

6.6.2 TYPICAL SECTIONS (SEGMENT 2)

For the multimodal alternative, there are two main typical sections in this segment that are the 4-lane and 6-lane highways. The railroad corridor, medians, shoulders, borders, etc. are identical for both sections. These sections follow District Four's SIS typical sections for a rural 4-lane and 6-lane 65 mph condition.

For the highway-only alternative, the typical section in Segment 2 as shown in Appendix L is follows:

- Sta. 10671+00 to Sta. 11345+00 (N. of Krome Ave. to I-75): 4-lane divided with 119'-219' median.

6.6.3 HORIZONTAL AND VERTICAL ALIGNMENTS (HIGHWAY AND RAILROAD) (SEGMENT 2)

The highway horizontal alignment along this segment is mostly on tangent except for the alternative that runs the railroad along the median of US 27 to cross beneath I-75. With this condition, the southbound US 27 lanes braid with the proposed railroad and the highway has a slight curvature through the braid. The highway is shown with full reconstruction for two main reasons: (1) defines the highway section per the SIS typical section standard and, (2) shifts the highway further east to separate as much as practical from the railroad. This eastern shift also allows future interchange ramps to be constructed within the confines of the section. See Sheets 22-44B of the concept plans in Appendix N.

The railroad horizontal alignment is mainly on tangent except at the braided condition with the southbound US 27 lanes. The railroad location is set close to the existing canal to maintain as much clearance from the highway as practical.

The vertical alignment for both US 27 and the railroad is fairly flat with no significant grade changes from the existing US 27 profile. However, there will be two elevated sections of the US 27 southbound lanes where they braid over the proposed railroad as the railroad shifts from west of US 27 to the median of US 27 then back to the west. This condition requires bridges on US 27 over the railroad with an approximate 30-foot elevation difference.

6.6.4 INTERSECTIONS AND GRADE CROSSINGS (SEGMENT 2)

There are thirteen highway intersections with US 27 and side streets in Segment 2. The proposed improvements at these intersections are based on the anticipated 2035 traffic, geometric conditions, and safety. Segment 2 also has 10 railroad grade crossings at driveways and side streets. For the purposes of this study, all grade crossings are assumed to be fully gated and signaled for safety.

On Sheet 35 of Appendix N a grade separation is proposed for the truck stop just north of Griffin Road. This grade separation require shifting the southbound lanes towards the northbound lanes and reducing the existing median to a standard 60 foot median so that on/off ramps for US 27 can be accommodated within the existing right of way. This also allows the new railroad to be constructed on the old southbound US 27 lanes.

As described above, the railroad shifts its alignment to the median where it crosses beneath I-75, which will require reconstruction of the I-75 bridges and ramp bridges over US 27. This is shown on Sheet 44B of the concept plans in Appendix N.

6.6.5 RAILROAD (SEGMENT 2)

The railroad in Segment 2 will be a standard typical railroad section allowing for a double-track or single track with sidings. This section has 15’ separation between tracks, an 11-foot unpaved service road, and a shared swale with southbound US 27 on the east side of the tracks for stormwater treatment (see Figure 6.4 below).

6.6.6 DRAINAGE (SEGMENT 2)

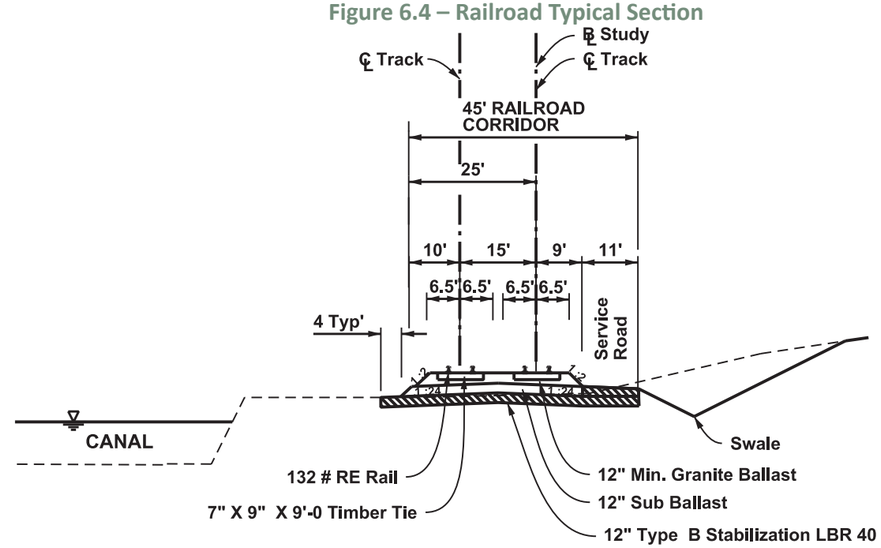
Drainage in Segment 2 can be accomplished in median and roadside swales for pretreatment and detention. Cross drains can be added as needed to provide overflow into the borrow canal on the west side of the railroad. Any existing culverts that connect to the canal will have a new inlet within the swale between the highway and the railroad. The pipe section from the new inlet to the canal must be upgraded to at least Class IV reinforced concrete pipe as required by railroad criteria.

6.6.7 ENVIRONMENTAL IMPACTS

Social Environment (Segment 2)

This segment is adjacent to or in close proximity to a mix of predominantly conservation or publicly-owned wetlands (FLUCCS 641), a recreational area (FLUCCS 180), fragmented upland communities (FLUCCS 420), and wetland habitats (FLUCCS 600). Other land uses adjacent to or in close proximity to Segment 2 include, a school (FLUCCS 171), a high-density residential community (FLUCCS 130), and sporadic commercial/ industrial land uses (FLUCCS 140; 150). The community resources of note along this segment include the West Broward High School (500 NW 209th Avenue) and Everglades Holiday Park located along Griffin Road

Figure 6.4 – Railroad Typical Section



MATERIALS	THICKNESS
Rail (132 RE)	(7 7/16")
Tie Plate	(15/16")
Cross - Tie (7"X9"), 9'-0	(7")
Ballast	(12")
Sub- Ballast	(12")
Track Section	(39 3/8")

CROSS TIE SPACING	
Cross Tie Spacing	19"

DESIGN SPEED (TRACK CLASS IV)	
Design Speed (Maximum for Freight)	60 MPH
Operation Speed	60 MPH

approximately ½ mile west of US-27. Access to these public lands, as well as to SFWMD control structures (C-9, C-11, and L-37) need to be maintained.

Historic & Archaeological Resources (Segment 2)

According to a review of the FMSF database and the FGDL GIS data clearinghouse, there are five previously recorded historic resources adjacent to or in close proximity to Segment 2. These linear historic resources are the Snapper Creek Canal (C-9), which is ineligible for listing on the NRHP; the South New River Canal, which is eligible for listing on the NRHP; Griffin Road, which has insufficient evaluation information; Alligator Alley/Everglades Parkway, which is eligible for listing on the NRHP; and the North New River Canal, which is eligible for listing on the NRHP. In addition, there are several archaeological resources located in close proximity to the intersection of I-75 and US-27.

Natural Environment (Segment 2)

This segment is adjacent to several natural resources, including WCA 3, the CERP Broward Water Preserve Areas, and numerous publicly-owned conservation lands. In addition, several sensitive ecosystems/habitats are bisected or are in close proximity to Segment 2, including Wood Stork Core Foraging Area, Crested Caracara Consultation Area, Everglades Snail Kite Critical Habitat, the Everglades and Francis S. Taylor Wildlife Management Area and other high-quality wetlands.

There is a potential to impact designated critical habitat for the Everglades snail kite, and preferred habitat of the crested caracara, wood stork, and West Indian manatee. West Indian manatee habitat would most likely be impacted in areas that may require new bridge construction, bridge replacements, or bridge widening.

Physical Environment (Segment 2)

There are approximately 20 petroleum storage tank facilities located adjacent to or in close proximity to this segment. These storage tanks sites are associated with a mix of retail and non-retail facilities, and previous fuel spills.

Alternatives along this segment will also be developed in a manner sensitive to adjacent land uses in regards to noise and vibration impacts. Residential community coordination may be required regarding noise and noise abatement.

6.7 SEGMENT 3

Segment 3 continues north from I-75 to the Broward/Palm Beach County line approximately 14 miles away.

6.7.1 CONSTRAINTS AND OPPORTUNITIES (SEGMENT 3)

There are many constraints within Segment 3 that do not necessarily impede the proposed highway and railroad typical section, but these constraints do require unique designs to avoid impacts and allow both highway and railroad traffic to flow within these constraints. The constraints are identified as:

a. The L-38 North New River Canal running parallel along the east side of the highway.

b. The existing highway right of way width of 221’ to 265’.

c. The Sawgrass Recreational Area with offset tee intersections on both sides of US 27.

d. Control structures and pump stations adjacent to US 27.

The most significant opportunity is that the railroad and a 6-lane highway section fit within the existing right of way, which minimizes or eliminates the need for right of way acquisition.

6.7.2 TYPICAL SECTIONS (SEGMENT 3)

For the multimodal alternative, the main typical section for this segment is a 6-lane divided highway with the railroad corridor on the west side for the entire segment. This section follows District Four’s SIS typical section for a rural 6-lane 65 mph condition.

For the highway-only alternative, the main typical section for Segment 3 as shown in Appendix L is as follows:

- Sta. 11354+00 to Sta. 12129+00 (I-75 to Broward/Palm Beach County Line): 10-lane divided with 60’ median.

There are two unique typical sections for the elevated portions of US 27 near the Sawgrass Recreational Area between stations 11450+00 and 11480+00. These are described below under the intersections paragraph.

6.7.3 HORIZONTAL AND VERTICAL ALIGNMENTS (HIGHWAY AND RAILROAD) (SEGMENT 3)

The highway horizontal alignment along this segment is mainly on tangent with one curve to the left about 6.5 miles north of I-75. The proposed railroad would parallel the highway alignment for the entire length of this segment. Roadway and railroad layout is shown on Sheets 44B to 72 on the concept plans in Appendix D.

6.7.4 INTERSECTIONS AND GRADE CROSSINGS (SEGMENT 3)

Prior to the I-75 Interchange with US 27 the railroad will be braided beneath the southbound lanes as shown on Sheet 41 of the concept plans in Appendix N. At the interchange the eastbound, westbound and auxiliary bridges will have to be raised to accommodate the railroad vertical clearance requirements. North of the interchange, but south of the Sawgrass Recreational Area the railroad will cross under the southbound lanes to be located on the west side of the alignment for the remainder of the project.

At the Sawgrass Recreation Area the typical sections include retaining walls to elevate US 27 above the access drives that serve the rest area on the west side of US 27 and the Sawgrass Recreational Area driveway on the east side of US 27. For the crossing at the rest area driveway, only the southbound lanes of US 27 are elevated to allow the driveway to connect to the northbound lanes of US 27 at grade. At the main driveway to the Sawgrass Recreation Area, the entire US 27 must be elevated to allow access between the recreation area and the rest area. The bridge over the recreation area driveway would continue to span over the USACE Control Structure S-11A just north of the Sawgrass Recreational Area.

Since the proposed highway fills in the existing US 27 median, the existing crossovers are eliminated. In accordance with AASHTO criteria, turnaround points are placed a minimum of five miles apart, and these can be spaced consistent with recreational area access drive to reduce costs and other impacts if elevated sections are required.

In this segment there would be 11 grade crossings with the driveways to rest areas and the SFWMD sites. For the purposes of this study, all grade crossings are assumed to be fully gated and signaled for safety.

6.7.5 RAILROAD (SEGMENT 3)

The railroad in Segment 3 will be a standard typical railroad section allowing for a double-track or single track with sidings. This section has 15’ separation between tracks, an 11-foot unpaved service road on the east side of the tracks, and a shared swale between the tracks and southbound US 27 for stormwater treatment.

6.7.6 DRAINAGE (SEGMENT 3)

Drainage in Segment 3 can be accomplished in median and roadside swales for pretreatment and detention. Cross drains can be added as needed to provide overflow into the borrow canal on the west side of the railroad. Any existing culverts that connect to the canal will have a new inlet within the swale between the highway and the railroad. The pipe section from the new inlet to the canal must be upgraded to at least Class IV reinforced concrete pipe as required by railroad criteria.

6.7.7 ENVIRONMENTAL IMPACTS

Social Environment (Segment 3)

This segment is adjacent to or in close proximity to a mix of predominantly conservation or publicly-owned wetlands (FLUCCS 641). Other land uses adjacent to Segment 3 include, several roadside rest areas/ recreation areas (FLUCCS 180). The community resource of note along this segment includes Sawgrass Recreation Park (located along US-27 just north of the I-75 interchange). Access to these public lands, as well as to SFWMD control structures (L-38E, L38W and North New River) need to be maintained.

Historical & Archaeological Resources (Segment 3)

According to a review of the FMSF database and the FGDL GIS data clearinghouse, there are two previously recorded historic resources adjacent to or in close proximity to Segment 3. These linear historic resources are the North New River Canal, which is eligible for listing on the NRHP; and the Pompano Canal, which is ineligible for NRHP. In future project-level studies a CRAS would be required.

Natural Environment (Segment 3)

This segment is adjacent to several natural resources, including water WCAs 2 and 3, the CERP Everglades Agricultural Area (EAA) Storage Reservoirs, stormwater treatment areas (STAs), and associated seepage canals and spillways. In addition, several sensitive ecosystems/habitats are bisected or are in close proximity to Segment 3, including Wood Stork Core Foraging Area, Florida Panther Focus Area, Crested Caracara Consultation Area, Everglades Snail Kite Critical Habitat, the Everglades and Francis S. Taylor Wildlife Management Area, and other high-quality wetlands.

There is a potential to impact designated critical habitat for the Everglades snail kite, crested caracara, Florida panther, wood stork, and West Indian manatee. West Indian manatee habitat would most likely be impacted in areas that may require new bridge construction, bridge replacements, or bridge widening.

Physical Environment (Segment 3)

There is limited contamination concerns associated with Segment 3 as there are approximately only four recorded petroleum storage tank facilities adjacent to US-27 in this area. These storage tanks sites are associated with non-retail facilities and previous fuel spills.

6.8 SEGMENT 4

Segment 4 extends approximately 26 miles from the Broward/Palm Beach County line to the south city limits of South Bay at Willard Smith Road in Palm Beach County. This segment is shown on Sheets 72 to 123 of the concept plans in Appendix N.

6.8.1 CONSTRAINTS AND OPPORTUNITIES (SEGMENT 4)

There are many constraints within Segment 4 that do not necessarily impede the proposed highway and railroad typical section, but these constraints do require unique designs to avoid impacts and allow both highway and railroad traffic to flow within these constraints. The constraints are identified as:

a. The L-38E North New River Canal running parallel along the east side of the highway.

b. The existing highway right of way width of 221' to 269'.

c. Adjacent facilities requiring access to and from US 27.

The most significant opportunity is that the railroad and highway improvements fit within the existing right of way with the use of innovative split profile designs, which minimizes or eliminates the need for right of way acquisition.

6.8.2 TYPICAL SECTIONS (SEGMENT 4)

For the multimodal alternative, there is one main typical section for this segment that provides an 8-lane highway with the railroad corridor on the west side up to station 13393+00 north of Bolles Canal where the railroad diverges to the west. The highway section follows District Four's SIS typical section for a rural 8-lane 65 mph condition.

There is a second typical section for only US 27 after the railroad drops off north of Bolles Canal. This is also an 6-lane rural SIS typical that has a short retaining wall on the east right of way line to not impact the adjacent canal.

For the highway-only alternative, the main typical section for Segment 4 as shown in Appendix L is as follows:

- Sta. 12129+00 to Sta. 13487+00 (Broward/Palm Beach County Line to 2 miles S. of SR 80): 6-lane divided with median barrier wall and 12' inside paved shoulders.

6.8.3 HORIZONTAL AND VERTICAL ALIGNMENTS (HIGHWAY AND RAILROAD) (SEGMENT 4)

The highway horizontal alignment along this segment is mainly on tangent continuing northwest from Segment 4. There is one curve to the right at station 13112+00 then a short curve to the left as US 27 enters South Bay. The proposed railroad parallels the highway alignment up to station 13393+00 where the railroad makes a 90° turn to the west to connect to the existing SCFE spur track.

6.8.4 INTERSECTIONS AND GRADE CROSSINGS (SEGMENT 4)

There are over forty intersections with US 27 and various access roads and driveways in Segment 4. Most of these driveways will simply reconnect to US 27 with a right turn in and right turn out condition. This segment will also have new crossovers spaced at a maximum of 5 miles apart as shown on the concept plans in Appendix N.

In this segment there will be 20 grade crossings with the driveways to SFWMD sites and side streets. For the purposes of this study, all grade crossings are assumed to be fully gated and signaled for safety.

6.8.5 RAILROAD (SEGMENT 4)

The railroad in Segment 4 will be a standard typical railroad section allowing for a double-track or single track with sidings. This section has 15' separation between tracks, an 11-foot unpaved service road on the east side of the tracks, and a shared swale between the tracks and southbound US 27 for stormwater treatment.

The intent of this railroad concept is to connect the railroad at a convenient location with the SCFE to minimize impacts to adjacent properties and nearby communities. The preference is to not run the railroad along US 27 through South Bay. Of the various rail locations shown in Phase 1 of the US 27 Rail Feasibility Study, North Alternative 1 (N-ALT-12) is the least disruptive and the earliest connection to the SCFE. The connection is to the SCFE spur line that runs east-west approximately 1 mile south of Willard Smith Road.

6.8.6 DRAINAGE (SEGMENT 4)

Drainage in Segment 4 can be accomplished in median and roadside swales for pretreatment and detention. Cross drains can be added as needed to provide overflow into the L-38E Canal on the east side of US 27.

6.8.7 ENVIRONMENTAL IMPACTS

Social Environment (Segment 4)

This segment bisects the Everglades Agricultural Area, which is currently a mix of predominantly agricultural land uses (FLUCCS 200), such as field crops (FLUCCS 215) and ranching (FLUCCS 211), and mining (FLUCCS 161). In addition, there are conservation or publicly-owned wetland habitats (FLUCCS 641) in which this segment traverses. There are no community resources of note along this segment. Access to these public lands, as well as to SFWMD facilities (L-38E spillway, STA 3/4, and L-5) need to be maintained.

Historic & Archaeological Resources (Segment 4)

According to a review of the FMSF database and the FGDL GIS data clearinghouse, there are two previously recorded historic structures (pump houses) adjacent to or in close proximity to Segment 4. In addition, there are four historic bridges and one historic culvert that this segment traverses, all of which are ineligible for listing on the NRHP or require further historic evaluation. Furthermore, there are two linear historic resources in close proximity to Segment 4, which include the Bolles Canal (eligible for listing on the NRHP) and North New River Canal (potentially eligible for listing on the NRHP). Additionally, there is one archaeological resource in close proximity to Segment 4, which is ineligible for listing on the NRHP. In future project-level studies a CRAS would be required.

Natural Environment (Segment 4)

This segment is adjacent to and transverses several natural resources, including WCAs 2 and 3, the CERP EAA Storage Reservoirs, Lake Okeechobee Aquifer Storage and Recovery (ASR) Area, STAs, and associated seepage canals and spillways. In addition, there are sensitive ecosystems/habitats, which are bisected or are in close proximity to Segment 4, including, Wood Stork Core Foraging Area, Florida Panther Focus Area, and Crested Caracara Consultation Area and other high-quality wetlands.

There is a potential to impact habitat for crested caracara, Florida panther, wood stork, and West Indian manatee. West Indian manatee habitat would most likely be impacted in areas that may require new bridge construction, bridge replacements, or bridge widening.

Physical Environment (Segment 4)

There are approximately 33 petroleum storage tank facilities in close proximity or adjacent to Segment 4. These storage tanks sites are associated with agricultural facilities, non-retail and retail facilities, government facilities, and previous fuel spills.

6.9 SEGMENT 5

Segment 5 of US 27 begins as an urban section at Willard Smith Road at the south city limits of South Bay. US 27 then runs north through South Bay for a couple of miles and continues west from Corkscrew Road as a rural section to the Palm Beach/ Hendry County line approximately 13 miles away. The layout is shown on Sheets 123-144H of the concept plans in Appendix N.

6.9.1 CONSTRAINTS AND OPPORTUNITIES (SEGMENT 5)

The major constraint within this segment is the right of way width, which varies from 100 feet to 216 feet.

6.9.2 TYPICAL SECTIONS (SEGMENT 5)

For the multimodal alternative, there are three main typical sections for this segment that have right of way widths of 100 feet and 162 feet. The proposed US 27 continues from Segment 4 as a 6-lane rural highway and transitions to a 6- lane high-speed urban arterial as it comes into South Bay. This 6-lane typical section does not fit within the existing 100-foot right of way and requires additional 11 feet right of way on each side while maintaining a 22-foot median. This section continues approximately 1.5 miles through South Bay.

The next typical section begins north of South Bay and immediately widens to 162 feet of right of way. The proposed 6-lane highway fits well within this amount of right of way including a 60-foot median to match the existing median. This section continues westward approximately 11.5 miles to the Hendry County Line.

For the highway-only alternative, the typical sections for Segment 5 as shown in Appendix B are as follows:

- Sta. 13487+00 to Sta. 13565+00 (South Bay): 6-lane divided urban typical (45 mph design speed) with a 22’ median.
- Sta. 13565+00 to Sta. 14042+00 (South Bay to Old US 27): 6-lane divided with 60’ median.
- Sta. 14042+00 to Sta. 14174+00 (Old US 27 to Palm Beach/Hendry County Line): 10-lane divided with median barrier wall and 12’ inside paved shoulders.

6.9.3 HORIZONTAL AND VERTICAL ALIGNMENTS (HIGHWAY) (SEGMENT 5)

The horizontal highway alignment will follow the existing US 27 alignment throughout Segment 5. The vertical profile should remain close to existing so that a widening and resurfacing can be done instead of full reconstruction.

6.9.4 INTERSECTIONS AND GRADE CROSSINGS (SEGMENT 5)

There are numerous intersections with US 27 from connecting highways, side streets, access roads and driveways. Most of these connections can remain in the current locations subject to access management being addressed in future studies. North of South Bay the existing crossovers can remain.

6.9.5 RAILROAD (SEGMENT 5)

There is no new railroad component in Segment 5, since the SCFE would be the railroad utilized to continue service with connections to the FEC Railroad to the east and the CSX Railroad to the west. No improvements are presented in this report as this will be part of a future study if the rail corridor is determined to be feasible.

6.9.6 DRAINAGE (SEGMENT 5)

Drainage in Segment 5 can be accomplished in median and roadside swales for pretreatment and detention. The need for drainage ponds would be determined in a future study. The drainage system may utilize existing outfalls, which may need upsizing depending on the final highway configuration.

6.9.7 ENVIRONMENTAL IMPACTS

Social Environment (Segment 5)

This segment traverses a mix of suburban (FLUCCS 110) and agricultural land uses (FLUCCS 200). The southern termini of Segment 5 traverses the City of South Bay, FL, which contains a mix of low-income, fixed single family units (FLUCCS 121), commercial (FLUCCS 140), institutional (FLUCCS 170), and industrial land uses (FLUCCS 150). The community resources of note along this segment include South Bay City Hall, (335 SW 2nd Avenue); Clarence Anthony Library (375 SW 2nd Avenue); South Bay US Post Office (190 US-27 North), South Bay Head Start Facility (990 US-27); and a Recreational Vehicle (RV) Campground located at the northern limits of the City of South Bay. As Segment 5 turns west-northwest along US-27 toward Lake Harbor, FL and the Hendry County/Palm Beach County line, it passes a mix of recreational (FLUCCS 180) (John Stretch Memorial Park), lake (FLUCCS 520) (Lake Okeechobee), and agricultural land uses (FLUCCS 200), such as sugar cane field crops (FLUCCS 215). Access to these public lands, as well as to SFWMD facilities (Lake Okeechobee Rim Gate and L-25 spillway) need to be maintained.

Historic & Archaeological Resources (Segment 5)

According to a review of the FMSF database and the FGDL GIS data clearinghouse, there are numerous previously recorded historic structures (pump house and private residences) in the City of South Bay, FL. In addition, there are two historic bridges (one of which is potentially eligible for listing on the NRHP) in the City of South Bay. Furthermore, there are two linear historic resources in the City of South Bay, which include the FEC Railroad Corridor, (ineligible for listing on the NRHP), and the North New River Canal (potentially eligible for listing on the NRHP).

In addition, there are numerous previously recorded historic structures (water control structures and private residences) in the Lake Harbor, FL neighborhood. Furthermore, there is one linear historic resource in the Lake Harbor neighborhood (Miami Canal Resource Group [potentially eligible for listing on the NRHP]). Lastly, there are two historic districts in the Lake Harbor neighborhood, which include the Herbert Hoover Dike (potentially eligible for listing on the NRHP), and Lake Harbor Historic District (requires further historic evaluation). In future project-level studies a CRAS would be required.

Natural Environment (Segment 5)

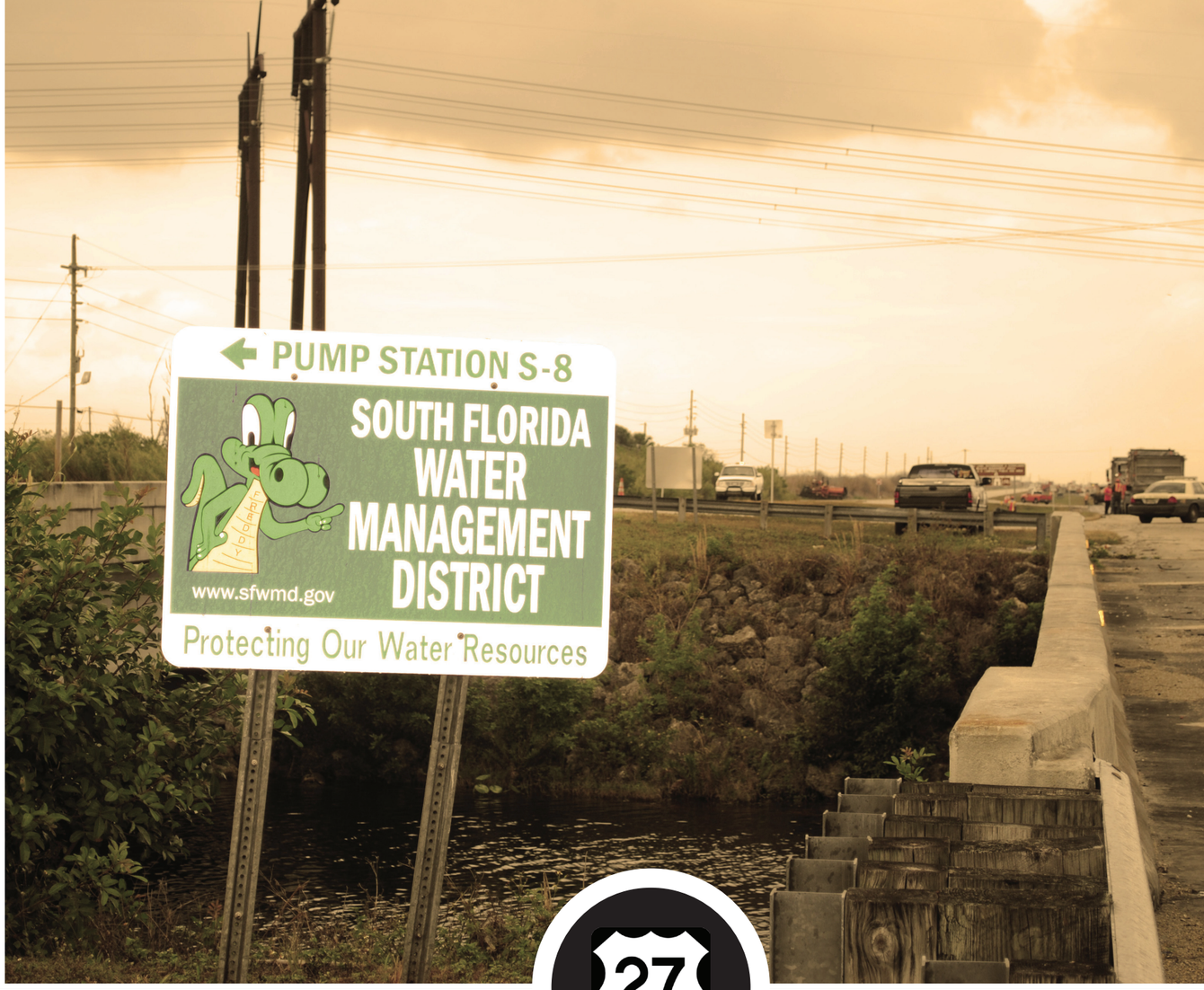
This segment is adjacent to several natural resources, including the CERP Lake Okeechobee ASR Area and Lake Okeechobee. In addition, there are sensitive ecosystems/habitats, which are bisected or are in close proximity to Segment 5, including, Crested Caracara Consultation Area, Okeechobee Gourd Consultation Area, Manatee Consultation Area and other high-quality wetlands.

There is a potential to impact habitat for crested caracara, wood stork, and West Indian manatee. West Indian manatee habitat would most likely be impacted in areas (near Lake Okeechobee) that may require new bridge construction, bridge replacements, or bridge widening.

Physical Environment (Segment 5)

There are approximately 24 petroleum storage tank facilities in close proximity or adjacent to Segment 5. These storage tanks are associated with agricultural facilities, non-retail facilities, and government facilities.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY



SECTION 7.0

AGENCY AND STAKEHOLDER COORDINATION

7.0 AGENCY AND STAKEHOLDER COORDINATION

Various stakeholders were interviewed during this PACE Study to obtain information and possible concerns regarding a potential railroad corridor parallel to US 27. These stakeholders are representatives of industries, shippers, railroads, Metropolitan Planning Organizations, Florida Department of Transportation, environmental agencies, and community groups who might have an interest in or could be directly impacted by the development of a new rail corridor.

The general consensus from the stakeholders was that the project would benefit transportation and freight movement in Florida. Pertinent information, general comments, and perceptions obtained from stakeholders are noted below.

7.1 FEC RAILWAY

- Freight is now 80%-85% intermodal since aggregate hauling is down and more containers are being shipped by rail.
- The Lake Belt mining in southwest Miami is suspended and with a weak economy, rock hauling has decreased.
- FEC will have on-dock intermodal facilities at Port Everglades and Port of Miami by 2014. FEC also has direct access to the Port of Palm Beach.
- FEC's Hialeah Yard will be modified as an ILC. Trucks can pick up cargo from the ILC rather than going into the Port of Miami.

7.2 CSX RAILROAD

- Could use another short line railroad to haul on US 27 corridor and connect to the CSX and FEC railroads.
- Mostly automobiles and intermodal cargo will be shipped from Winter Haven ILC; no bulk cargo. Winter Haven ILC should be open by mid 2014.
- CSX views the US 27 rail as an opportunity to connect to Winter Haven ILC.
- CSX would not want rail in the median. Prefers rail to be as far from highway as possible. Would be willing to share US 27 rail corridor with other railroads.

7.3 LYKES BROS. AND DUDA

- Lykes and Duda are developing the South Florida Inland Logistics Center near the SCFE railroad and US 27 in northeast Moore Haven. This would be an export facility.
- Lykes performed an analysis of the logistics supply chain of Florida. They spoke with investors about the Moore Haven site.
- Lykes' main focus is on exporting. There is a proposed forwarding facility in Latin America that would receive goods from the United States. Goods would shipped from Canada and northern U.S., brought to Moore Haven facility, relabeled, transloaded and shipped to south Florida ports for export.
- ILC is 4,000 acres, $30m facility. Should break ground by 2012 and expand to 1,000,000 square feet by 2013.
- If there is rail on US 27 corridor, the goods will be shipped by train to Port of Miami or Port Everglades.
- Population along the I-4 corridor has a large consumer population. CSX can ship from Chicago to Winter Haven then by truck along the I-4 corridor. CSX can also ship to Port Manatee and Tampa. However, shippers are subject to one provider and one rate.
- Latin America and Africa may become large manufacturing locations, which would drive the need for deeper ports on the eastern seaboard.

7.4 FLORIDA CRYSTALS CORPORATION (FCC) [SOUTH FLORIDA REGIONAL LOGISTICS CENTER]

- In addition to packaged crystal sugar, FCC ships liquid sugar and molasses from its facility. FCC exports its products to the U.S. with much going to Chicago.
- The only bulk shipping is molasses in tank cars.
- FCC uses the SCFE railroad and transfers cars to FEC Railway at Fort Pierce for shipping to Jacksonville, where the cars are transferred to Norfolk Southern Railroad (NS) to ship to final destination.
- FCC has no set timeframe to develop its ILC, but wants to do this as soon as possible.
- FCC ships by truck to local vendors such as Publix, Albertson's, and Kroger.

- FCC is starting to do more intermodal via FEC-NS to Chicago. This is for Domino Sugar and other private labels. They backhaul a lot out of Florida.
- FCC receives freight from the north – mostly fuel and fertilizer.
- FCC could ship more by rail and would use double-stack containers out of its Okeelanta site, but requires a ramp. Then haul by SCFE to Fort Pierce.
- FCC's take on the ILC marketplace is that the Florida market has potential for 20m square feet of warehouse area. A facility with 2m-3m sq. ft. is the point of needing rail service.

7.5 U.S. SUGAR (USS)

- U.S. Sugar owns and operates the South Central Florida Railroad (SCFE). SCFE operates by trackage rights on FEC's track from Lake Haven to Fort Pierce. They also have internal track west of US 27 that serves their facilities and hauling from the mills.
- In addition to sugar, USS ships fertilizer, timber, pulp, paper and chemicals on the SCFE.
- USS moves approximately 10,000 carloads annually of refined sugar and molasses. They also haul about 200 carloads annually for Florida Crystals and the local sugar co-op.
- USS ships mostly by rail. Their bulk cargo is molasses, which ships across the United States. Sugar is shipped by SCFE who owns the rail cars.
- USS currently ships some sugar by truck along US 27. This is mainly to serve local markets.
- Inbound freight is chemicals – almost no backhaul.
- No projections on future shipping, but expects to expand as the Post Panamax freight gets moved through the region.
- A few years ago, Stuart Mines, Rinker and Bergeron had plans to haul rock from this region, but with the downturn in construction, this plan went away.
- USS ships by SCFE to FEC Railway, then on to Jacksonville where transferred to CSX and NS.
- USS believes that rail on US 27 would not be a direct benefit to their current operations; however, with a significant increase in freight movement, post Panamax, USS would benefit since they own the rail between Lake Harbor and Sebring which would be used to haul freight.
- A few years ago, General Motors talked about a central distribution plant in this area rather than having multiple DCs along the coast.
- USS is positioned to receive increased rail traffic from any of the proposed ILCs (Treasure Coast, FL Crystals, Moore Haven).

7.6 PALM BEACH COUNTY MPO

- PBMPO favors development of an intermodal system to shift freight movements from over the road to rail and free up the eastern FEC rail corridor for passenger trains.
- PBMPO favors economic development in the Glades area to create jobs. The current unemployment rate is high at around 40%.
- There are about 100 railroad crossings along the FEC corridor in Palm Beach County alone. Gates at railroad crossings could be closed 10 – 15 minutes to allow passing of a freight train with 150 cars; whereas, commuter trains would clear the crossing within three to five minutes.
- Good idea to develop a rail corridor away from the congested downtowns along the coast.
- The potential impact of the ILC sites on the transportation network has not yet been formally and in a concrete manner accounted for in the LRTP.
- Palm Beach County provided a "blanket" approval to develop ILCs within the county, but no specific sites were identified.
- PBMPO did a regional freight study about 3 years ago and the MPO is looking to update the plan in 2012 to look at 2024 forecasts. The MPO wants to have a better idea of truck routes, travel time, and other issue.

7.7 BROWARD COUNTY MPO

- The Broward MPO is interested in all projects that improve the efficient movement of freight and goods. This will facilitate the growth of the local and regional economy. Negative impacts would be on the western developments in Broward, such as Weston and Holiday Park mobile home community.
- If rail traffic becomes heavy on the eastern part of the county, then property values become impacted and cross street congestion would worsen.
- The development of an additional freight rail would help alleviate current congestion, reduce vehicular emissions/pollution, and improve safety for all motorists.
- Transporting freight and goods by rail is extremely cost and energy efficient. It is the most environmentally friendly option for transporting freight and goods.
- Providing a freight rail in a corridor already identified as a major truck route, will increase your freight movement efficiency for current users as well as attract other freight carriers currently utilizing other highways in the urban area.
- No ILCs are planned in Broward County
- The Broward MPO staff believes freight rail on US 27, the western part of the county, away from the urban area is an excellent idea. However, additional information is still needed to fully support the project to ensure acceptance by the MPO board.

7.8 MIAMI-DADE COUNTY MPO

- MDMPO is interested in freight rail and envisions freight rail as complementing county-wide transportation. This is particularly true in light of the FEC Railway upgrades from Port of Miami and redevelopment of the FEC's Hialeah Yard.
- MDMPO is familiar with the various proposed Intermodal Logistics Centers (ILCs). The State of Florida should look at the big picture in terms of ILC locations and how they would serve the entire state in terms of freight movement.
- 70% of Port of Miami freight ships within 50 miles of Miami.
- The MPO's Freight Technical Advisory Committee (FTAC) has discussed ILCs extensively and working on a warehouse study now for Miami.

7.9 GREATER MIAMI CHAMBER OF COMMERCE (GMCC)

- GMCC does not endorse individual projects, but promotes transportation improvements as they relate to a regional vision for transportation. GMCC could provide a letter of support for the US 27 project as it relates to this regional vision.
- GMCC supported the trade agreements between Florida and Korea, Panama and Colombia.
- A potential CSX railroad extension parallels Krome Avenue which is proposed to be widened in 2014. There are environmental concerns that must be addressed as part of a rail extension.
- GMCC stressed the need to look at the overall picture when analyzing US 27. This should include a future and ongoing projects such as the Port of Miami Tunnel and the FEC Port of Miami lead track.

7.10 PORT EVERGLADES (PEV)

- PEV intends to expand its hinterland to Atlanta and Memphis.
- PEV is supportive of the US 27 PACE Study.
- In year 2010, PEV had fewer than 800,000 TEUs. Less than 5% of this cargo is moved by rail on the FEC.
- Between 13% and 15% of all future container cargo received at the docks will be transported by rail.
- PEV 2009 master plan forecasts cargo (international and domestic) of 2.4 million TEUs by year 2029.
- PEV's Intermodal Container Transfer Facility (ICTF) study shows 8,000 to 9,000 foot unit trains. Year 2014 projections are 7 trains per week out of PEV. Year 2029 anticipates 21 trains per week.

7.11 PORT OF MIAMI (POM)

- POM's Master Plan was updated and made public on December 7, 2011.
- POM received a TIGER III grant for $23m to upgrade the railroad tracks from the port and repair the railroad bascule bridge. This is part of the FEC Port of Miami lead track.

- POM moves "clean" cargo, meaning everything is shipped in containers. There is very little bulk cargo and no fuel.
- POM moves just under 900,000 TEUs annually. This is expected to increase by 250,000-300,000 with the dredging to 50-feet deep by 2014.
- POM expects to double or triple its capacity by 2035.
- POM believes that rail on US 27 could benefit the region for freight movement and would be a logical alternative to relieve congestion on the eastern seaboard.

7.12 SOUTH FLORIDA REGIONAL PLANNING COUNCIL (SFRPC)

- SFRPC has an interest in freight rail. SFRPC envisions freight rail as complementing county-wide transportation and is critical to Florida commerce.
- SFRPC is familiar with the various proposed ILCs and believes that timing is important to the overall planning of ILCs. There does not appear to be any conflicts between the ILCs and the SFRPC plans.
- SFRPC is preparing a 7-county planning study sponsored by HUD and EPA. This is the SCI that is a joint effort of South Florida RPC and Treasure Coast RPC.
- SFRPC and TCRPC are preparing an update to the Comprehensive Economic Development Strategies (CEDS) by March 2012. This is in conjunction with the FDOT Office of Economic Opportunities.

7.13 TREASURE COAST REGIONAL PLANNING COUNCIL (TCRPC)

- A St. Lucie County Commissioner and State Representative generally representing Brevard, Indian River, St. Lucie and Martin Counties are very interested in Freight, ILCs and the US 27 project.
- City of Port St. Lucie recently approved five DRIs near the Treasure Coast ILC.
- The MPO Director has doubts about how many Post-Panama freighters will come to Miami given other port competition and the peninsular nature of Florida. Fuel oil prices will have a major impact on whether shipping as many goods to the east (US) especially from Asian and other western ports will remain financially feasible. Other factors affecting this equation are the trends identified in a recent study done by the Boston Consulting Group which suggests that manufacturing industry expansion is slowing down in China and picking up in the US, which could have an impact on shipping to and from the US.
- TCRPC is working with the SFRPC on a 7-county planning study sponsored by HUD and EPA. This is to address sustainability for the South Florida region.
- TCRPC is also updating its Comprehensive Economic Development Strategy. The current version is 2007-2012. All RPCs are Economic Development Districts.
- An ILC facility located in the Treasure Coast Region is consistent with the current CEDS plan.
- TCRPC has an interest in improving the capacity of freight rail as a competitive advantage for Florida and from an economic development standpoint. The US 27 Corridor Study as an opportunity to free up coastal railways for moving people/passengers on the eastern seaboard and eliminating conflicts with freight trains while providing more capacity to move import/export freight through Florida.
- The Treasure Coast ILC could have issues with highway access since CR 714 in the western part of St. Lucie County is a 2-lane "scenic" highway that could generate opposition to widening this corridor.
- TCRPC recommended FDOT initiate a freight/goods and freight movement forum to provide updated trends and forecasts for projected freight/goods demand and consumption with updated economic and demographic data, household size, and livability trends.

7.14 ECONOMIC COUNCIL OF PALM BEACH COUNTY, INC. (ECPBC)

- ECPBC is interested in freight rail as it pertains to the overall improvement to transportation in Palm Beach County and creating new jobs.
- The ILC in Palm Beach County would not conflict with any ECPBC plans.
- Market St. Company of Atlanta compiled previous economic development studies into a consolidated Research Review and Assessment report dated October 21, 2008 that is on the ECPBC website at http://www.economiccouncilpbc.org . The thesis of this assessment is that Florida as a peninsula should have more distribution centers. The report identifies four opportunity areas and one area is logistics.
- With the Port of Miami receiving post-Panamax ships, other ports such as Port of Palm Beach could capture more of the smaller ships that would be displaced from Miami.

7.15 FLAGLER DEVELOPMENT GROUP (FDG)

- FDG is proposing a South Florida Logistics Center (SFLC) that is south of the FEC Railway's Hialeah Rail Yard. The ILC comprises approximately 67 acres north of NW 36 Street in Miami, and approximately 40 acres south of 36 Street.
- Miami-Dade County is creating a new Foreign Trade Zone (FTZ) which will include the entire north half of the county north of SW 8 Street. Currently the County has two private FTZ's in Homestead and Doral.
- There are currently 250,000 annual TEUs (lifts) at the SFLC. Tonnage forecasts are difficult to predict since it depends on overall trade flow.
- Concerning proposed ILCs in Florida, their locations will depend on Beneficial Cargo Owners (BCOs) and how they want to function.
- South Florida volumes will increase in both imports and exports. BCOs want alternatives to the west coast (Long Beach/Los Angeles) and there may be some competitive advantages on the east coast. FEC is just one of the players influencing decisions. If the captured market is around 8 million people, would the BCO look at this market? National retailers are all about Cost to Market and Time to Market.
- FDG believes it may be more logical for Jacksonville to be a distribution hub as the infrastructure is already in place and as the one day truck trip reaches a greater southeast US population as compared to central Florida. Goods would be shipped to Miami by water and then shipped Jacksonville by rail and then distribute to the Southeast US.
- There are three items that would drive freight movement in South Florida:
- Greater import/export on ocean vessels.
- Population growth brings that would bring more regional distribution.
- More southeastern or eastern growth. Example would be Caterpillar shipping heavy equipment from South Florida to Africa or South America.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 8.0
PROJECT COSTS

8.0 PROJECT COSTS

8.1 CONSTRUCTION COSTS

Construction costs were determined for the concept plan considering the Multimodal Alternative with the railroad on the west side of US 27. These costs include highway improvements for the future traffic conditions and the mainline railroad from the HEFT (FEC connection) to the SCFE connection at South Bay. Capital cost estimateion methodology, assumption, and a summary of the US 27 highway and railroad probable construction costs follow. Appendix O includes detailed cost estimates for both the highway only and multimodal alternatives.

Methodology and Assumptions

- Major roadway cost components are based on the FDOT's Long Range Estimate (LRE) model.
- Unit costs were developed for more than 15 roadway components and 10 rail components.
- Unit costs were developed using area-wide cost estimates based on typical roadway and railroad cross sections.
- Construction cost includes mobilization (10%) and maintenance of traffic (10%)
- Scope contingency (20%) accounts for project unknowns including sub-soil conditions and utility relocations.
- Soft costs include engineering design (10%) and CEI (10%)
- Multimodal alternative cost estimates are for the western rail alignment and do not include costs for alternate design options at US 27/I-75 interchange.
- Project cost does not include environmental mitigation costs.

A summary of the highway only costs is provided in Table 8.1 below:

Table 8.1 - Highway Only Project Costs

Category	Total Cost (2012 $)
Roadway	$396,142,962
Rail	$0
Utility Relocation	**$20,607,510**
Mobilization (10%)	$41,675,047
MOT (10%)	$41,675,047
Sub-total Construction Cost	$500,100,566
Scope Contingency (20%)	$100,020,113
Total Construction Cost	**$600,120,068**
Right of Way	**$42,540,000**
Engineering Design (10%)	$60,012,068
CEI (10%)	$60,012,068
Total Project Cost	**$762,684,816**

The highway only alternative has major improvements such as:

- 321 mainline lane miles of roadway (widening and resurfacing)
- 11 new or widened bridges (8 at canals and 3 at U-turn movements)
- 15 Intersection improvements
- 2 Interchanges and 3 AASHTO required turnarounds

A summary of the multimodal costs is provided in Table 8.2 below:

Table 8.2 - Multimodal Project Costs

Category	Total Cost (2012 $)
Roadway	$493,055,554
Rail	$156,236,786
Utility Relocation	**$36,186,200**
Mobilization (10%)	$68,547,854
MOT	$68,547,854
Sub-total Construction Cost	$822,574,248
Scope Contingency (20%)	$164,514,850
Total Construction Cost	**$987,089,097**
Right of Way	**$87,392,000**
Engineering Design (10%)	$98,708,910
CEI (10%)	$98,708,910
Total Project Cost	**$1,271,898,917**

The multimodal alternative has major improvements such as:

- 75 Track-miles of rail
- 10 Rail bridges
- 386 Mainline lane miles of roadway (widening and reconstruction)
- 23 bridges (6 at Grittin, 4 I-75, 8 at 4 canals, 3 at U-turn movements, 2 for Braided section)
- 20 Intersection improvements
- 2 Interchanges and 3 AASHTO required turnarounds

Tables 8.3 and 8.4 on page 8-3 include segment wise detailed breakdown of project cost for both the highway only and multimodal alternatives.

Table 8.3 Summary of Cost Estimate by Segment, Highway Only Alternative

Segment	Work Description	From	To	Length (MI)	Roadway Cost	Utilities	Mobilization 10%	MOT 10%	Contigency 20%	Segment Total Construction Cost	ROW Purchase	Engineering 10%	CEI 10 %	Segment Total Cost
1	Intersection Improvements	10391+00	10671+00	5.3	$ 2,071,140	$ 210,000	$ 228,114	$ 228,114	$ 547,474	$ 3,284,842	$ -	$ 328,484	$ 328,484	$ 3,941,810
2	Intersection Improvements	10671+00	11354+00	12.9	$ 7,296,370	$ 280,000	$ 757,637	$ 757,637	$ 1,818,329	$ 10,909,973	$ -	$ 1,090,997	$ 1,090,997	$ 13,091,967
3	Widen 4 to 6 lanes	11354+00	12129+00	14.7	$ 112,929,847	$ 5,693,310	$ 11,862,316	$ 11,862,316	$ 28,469,558	$ 170,817,346	$ -	$ 17,081,735	$ 17,081,735	$ 204,980,815
4	Widen 4 to 6 lanes	12129+00	13487+00	25.7	$ 186,878,288	$ 9,506,000	$ 19,638,429	$ 19,638,429	$ 47,132,229	$ 282,793,375	$ -	$ 28,279,337	$ 28,279,337	$ 339,352,050
5a	Widen 4 to 6 lanes (Urban)	13487+00	13565+00	1.5	$ 12,056,989	$ 655,200	$ 1,271,219	$ 1,271,219	$ 3,050,925	$ 18,305,552	$ 3,780,000	$ 1,830,555	$ 1,830,555	$ 25,746,663
5b	Widen 4 to 6 lanes (Rural)	13565+00	14042+00	9.0	$ 52,570,926	$ 3,339,000	$ 5,590,993	$ 5,590,993	$ 13,418,382	$ 80,510,293	$ 28,200,000	$ 8,051,029	$ 8,051,029	$ 124,812,352
5c	Widen 4 to 8 lanes	14042+00	14174+00	2.5	$ 22,339,403	$ 924,000	$ 2,326,340	$ 2,326,340	$ 5,583,217	$ 33,499,300	$ 10,560,000	$ 3,349,930	$ 3,349,930	$ 50,759,160
Total				**71.6**	**$ 396,142,963**	**$ 20,607,510**	**$ 41,675,047**	**$ 41,675,047**	**$ 100,020,114**	**$ 600,120,681**	**$ 42,540,000**	**$ 60,012,068**	**$ 60,012,068**	**$ 762,684,817**

Table 8.4 Summary of Cost Estimate by Segment, Multimodal Alternative

Segment	Work Description	From	To	Highway Length (MI)	Roadway Cost	Rail Cost (Includes Utlitily Relocates)	Mobilization 10%	MOT 10%	Contigency 20%	Segment Total Construction Cost	ROW Purchase	Engineering 10%	CEI 10 %	Segment Total Cost
1	Shift SB lanes rebuild NB, Add tracks	10391+00	10671+00	5.3	$ 4,308,673	$ 26,403,786	$ 3,071,246	$ 3,071,246	$ 7,370,990	$ 44,225,941	$ 32,480,000	$ 4,422,594	$ 4,422,594	$ 85,551,129
2	Shift SB lanes rebuild NB, Add tracks (includes braided section with rail in the median)	10671+00	11354+00	12.9	$ 70,942,016	$ 38,060,000	$ 10,900,202	$ 10,900,202	$ 26,160,484	$ 156,962,903	$ -	$ 15,696,290	$ 15,696,290	$ 188,355,484
3	Widen 4 to 6 lanes and add tracks	11354+00	12129+00	14.7	$ 140,881,160	$ 46,180,000	$ 18,706,116	$ 18,706,116	$ 44,894,678	$ 269,368,070	$ -	$ 26,936,807	$ 26,936,807	$ 323,241,684
4	Widen 4 to 6 lanes and add tracks	12129+00	13400+00	24.1	$ 178,112,697	$ 66,736,000	$ 24,484,870	$ 24,484,870	$ 58,763,687	$ 352,582,124	$ -	$ 35,258,212	$ 35,258,212	$ 423,098,548
5a	Add tracks only	-	-	0.0	$ -	$ 9,080,000	$ 908,000	$ 908,000	$ 2,179,200	$ 13,075,200	$ 11,952,000	$ 1,307,520	$ 1,307,520	$ 27,642,240
5b	Widen 4 to 6 lanes (Rural)	13400+00	13487+00	1.6	$ 11,843,710	$ 870,000	$ 1,271,371	$ 1,271,371	$ 3,051,290	$ 18,307,742	$ -	$ 1,830,774	$ 1,830,774	$ 21,969,291
5c	Widen 4 to 6 lanes (Urban)	13487+00	13565+00	1.5	$ 12,056,969	$ 830,200	$ 1,288,717	$ 1,288,717	$ 3,092,921	$ 18,557,523	$ 3,780,000	$ 1,855,752	$ 1,855,752	$ 26,049,028
5d	Widen 4 to 6 lanes (Rural)	13565+00	14042+00	9.0	$ 52,570,926	$ 3,339,000	$ 5,590,993	$ 5,590,993	$ 13,418,382	$ 80,510,293	$ 28,620,000	$ 8,051,029	$ 8,051,029	$ 125,232,352
5a	Widen 4 to 8 lanes (Rural)	14042+00	14174+00	2.5	$ 22,339,403	$ 924,000	$ 2,326,340	$ 2,326,340	$ 5,583,217	$ 33,499,300	$ 10,560,000	$ 3,349,930	$ 3,349,930	$ 50,759,160
Total				**71.6**	**$ 406,088,256**	**$ 192,422,986**	**$ 68,547,854**	**$ 68,547,854**	**$ 164,514,850**	**$ 854,521,980**	**$ 87,392,000**	**$ 98,708,910**	**$ 98,708,910**	**$ 1,271,898,917**

If railroad alignment in S-ALT-2 from the Cemex Plant north of Kendall Drive to US 27 Milepost 5 in Miami-Dade County is included in the project, then an additional 32,266 track-feet of railroad track at approximately $330 per track-foot ($10,650,000) would be added to the estimate. Other costs for the multimodal estimate would include right of way, bridges, signalization, at grade rail crossing protection, engineering and other soft costs associated with the construction.

8.2 RAILROAD MAINTENANCE COSTS

An approximate maintenance cost for the railroad is based on an industry figure of $75,000 per track mile annually. Based on an approximate 70-mile railroad corridor plus five sidings (75 track miles), the annual maintenance costs would be approximately $5.6 million. The annual maintenance cost for the section S-ALT-2 from the Cemex Plant north of Kendall Drive to US 27 Milepost 5 in Miami-Dade County would be approximately $460,000.

8.3 BENEFIT / COST CONSIDERATIONS

Freight rail service in the US 27 corridor could potentially divert 15-22 train trips per week carrying 32,977 tons of commodity goods from the east coast FEC and/or CSX railroads. Without rail service, over 2,806 trucks per week would be needed to move the same amount of goods . This truck traffic would generate higher user costs, higher fuel consumption, and increased emissions; particularly, greenhouse gases. Moving these commodities by truck, however, would generate more jobs than moving them by train.

Although a railroad in the US 27 corridor would provide a wide range of direct benefits over trucks, the cost to construct a new multimodal corridor must be considered in determining the ultimate advantage of rail vs. trucks. While trucks would not provide the reduced fuel consumption and emissions production and other operational efficiencies obtained with trains, trucks would not require any new infrastructure (i.e., no new costs) to move those commodities, and could actually generate a larger number of jobs than would train service, resulting in an economic benefit of spending power in the region.

A benefit/cost analysis should also consider other benefits, such as the direct and indirect benefits and deferred cost of creating more capacity on the east coast FEC and/or CSX alignments, or the primary and secondary economic benefits of higher employment levels associated with moving those goods by truck. Considerations for a detailed B/C analysis are:

Benefits of a new rail corridor:

- Creates a new supply chain and opportunities for direct jobs in the freight and rail industry;
- Potential for attracting new businesses and creating jobs (economic development);
- Relieve traffic congestion in the dense eastern core of the region;
- Reduced air pollution and GHG emissions;
- Reduced fuel consumption;
- Provide capacity for future passenger rail service on the east coast;
- Reduced O&M cost depending on the agreement with the rail operator(s);
- Strategic advantage for capturing new global trade.

Cost related to a new rail corridor:

- Initial investment in capital cost;
- Environmental mitigation cost;
- Uncertainty of the success of the corridor.

US 27 MULTIMODAL PLANNING AND
CONCEPTUAL ENGINEERING (PACE) STUDY

SECTION 9.0

RECOMMENDATIONS FOR FURTHER STUDY

9.0 RECOMMENDATIONS FOR FURTHER STUDY

9.1 BACKGROUND

The US 27 PACE Study provides significant data for the US 27 corridor including information from previous studies, information from recent studies, and projections of future conditions along the corridor. Inasmuch as the data is deemed accurate and useful for determining a long-term strategy for US 27 rail and highway transportation modes, the data is current and has a limited shelf-life. This is mainly due to the dynamic nature of freight movement and transportation in South Florida and the anticipated trends described in the PACE study and other reports on freight movement throughout Florida and the western hemisphere.

Therefore, the PACE study itself does not determine a "Preferred Alternative", but rather sets the stage for future studies and refinement of the data include in the PACE Study. The conclusion of the PACE Study includes key points that future studies may want to focus on to assist with determining the final railroad location (if rail is part of the preferred alternative) and the ultimate US 27 highway configuration.

Also, since the studied railroad along the US 27 corridor is not a traditional transportation mode that the FDOT develops as an owner, but rather assists other rail agencies, any suggestions given are from the standpoint of the FDOT being in that support role and not as the primary developer of the rail corridor. However, this does not preclude the FDOT from potentially being the railroad developer and operator if it so chooses.

Lastly, the recommendations below are mainly given from the standpoint of a Project Development and Environment (PD&E) Study, which is the anticipated means of studying future development to address NEPA policies for transportation and determining a preferred alternative. These criteria would apply whether the FDOT or a private railroad company developed the corridor for rail.

9.2 ENVIRONMENTAL

9.2.1 Determine environmental Class of Action (i.e., EIS, EA, or SEIR/CE–II level studies).

9.2.2 Continue inter-agency coordination to identify status of state and federal funded restoration projects (i.e., Comprehensive Everglades Restoration Program, Central and South Florida projects).

9.2.3 Recommend a methodology for addressing potentially historic resources based on continued coordination with the Florida SHPO.

9.2.4 Conduct a detailed evaluation of the direct, indirect and cumulative effects of each alternative on social, cultural, and environmental resources, including Sociocultural Effects, Noise Study Report, Wetland Evaluation Report, and Endangered Species Biological Assessment.

9.2.5 Identify local, State and Federal permits required, with any associated requirements, following the most current statutory regulations. The permits will likely include, but not be limited to: Section 404 USACE Dredge and Fill permits; Section 408 USACE permits; SFWMD Environmental Resource Permits and Right-of-Way Occupancy Permits; a determination for a Clean Water Act, Section 401 Water Quality Certification; and FDEP NPDES Permits.

9.2.6 Develop avoidance and minimization measures for environmental issues related to railway crossings of highways and waterways and specific mitigation measures for any unavoidable impacts on Federal- and State-regulated resources.

9.2.7 Evaluate right-of-way acquisitions, including assessments for advance acquisition, hardship acquisition and protective buying of individual parcels, associated relocations (if any), and environmental effects related to such acquisitions.

9.2.8 Address aesthetic considerations applicable to new railway infrastructure (maintenance facilities, bridges) through the development of project-specific design criteria in coordination with local community programs and preferences.

9.3 RAILROAD ENGINEERING

9.3.1 Table 5.4 provides a broad overview of impacts from the railroad at three locations within the US 27 right of way, mostly based on current conditions. The study of these impacts should be refined to provide a conclusive argument for where the rail would best fit within the corridor, including future development, land use changes, and where the ILCs develop.

9.3.2 The railroad intersecting I-75 is a major study in itself and will require much analysis. The main objections to the outer looped railroad alignments that would bypass the roadway interchange were the environmental impacts to wetlands and crossing the FPL transmission lines on the western route. Also, detoured track alignments with tight curves restrict railroad operations and increase maintenance costs. However, as shown in the concept plans, running the railroad directly through the interchange have significant impact to the both US 27 and I -75 which warrant particular attention from a future study.

9.4 HIGHWAY ENGINEERING

9.4.1 TBD

9.5 RAIL AND TRUCK DEMAND FORECASTS

Wherever possible, rail and truck demand forecasts should be supported by both quantitative and qualitative information and presented in a series of scenarios.

9.5.1 Quantitative Data - With regard to truck demand, the most useful resources include the Florida Statewide Truck Model, SERPM and other MPO forecast model output of truck volume, truck classification counts, the FHWA Commodity Flow Forecast, and the ITE Trip Generation Report. Desirable data for rail forecasts include rail traffic demand data from the STB Weigh Bill, FHWA Commodity Flow Forecast (CFS), and other publically available datasets. The U.S. Coast Guard, U.S. Army Corps of Engineers, MARAD, and trade groups keep good data on ship and barge visits (i.e., cargo types, tonnages, ship types), and the FAA and individual airports often keep data about air cargo. Trade groups provide highly aggregated data for pipeline movements. Again, the FHWA CFS provides data ever five years for each metropolitan region breaking down commodity movements by mode, tonnage levels, and generalized origin0destinationb (i.e., trips through a region, entirely within a region, with an origin but no destination in a region, and with a destination but no origin within a region)trips, internal trips.

While the CFS and other generalized data may not be directly utilized for sub area and corridor studies, cordon counts and data provided at weigh stations/port of entry facilities, etc., can help in developing a supportable data base from the more aggregate data sets.

9.5.2 Qualitative Data – It is essential to review any quantitative data with shippers, ports, and the various carriers (i.e., motor carrier, rail, marine, air cargo and pipeline companies) in order to provide not only a check of the data but also whether or not there were particular events – such as new contracts, corporate initiatives, etc. – which may be responsible for changes from year to year in freight movements. For example, recent trends may be temporary because of a change in the supply chain with a shipper, or currency fluctuations or new shipment technologies or construction of a new distribution center, etc. In addition, through interviews with ports, carriers, and shippers, it may be possible to begin to calibrate some of the quantitative data based on information provided in annual reports.

Another essential outcome of these interviews is to determine whether those entities who move, store, assemble and carry goods believe that they have the capacity to meet a preliminary forecast. There may be regulatory or land, water, etc., constraints that limit the ability to feasible move the amount of cargo identified in preliminary forecasts. Interviews with these stakeholders can help avoid development of forecasts that are not believed to be credible by industry.

9.5.3 Forecasts - The US 27 corridor growth for rail and highway may not be based on traditional factors that determine transportation needs such as land use, population growth, densities, employment, etc. Transportation needs for this corridor must factor in potential ILC developments, global shipping practices (port projections), private shipping practices, logistics and supply chain operators, beneficial cargo owners (BCOs), railroads, and others who contribute to freight movement within and through Florida. Because of the direct relationship between freight movement and economic trends, it is critical that all forecasts be characterized in terms of potential future scenarios. For example, scenarios could be based on economic trends expected for the region being analyzed by the Bureau of Economic Analysis as well as corresponding information on employment, imports and exports for those industrial classifications that are more highly dependent on goods movement (e.g., wholesale and retail trade, manufacturing, construction). Other forecasts could be as simply as using an average annual increase in productivity – with 2.5% as an average baseline, 4% being very high, etc. In other official forecasts, analysts have tied the number of truck, rail, etc., trips to the number of employees at a particular land use of certain sizes and produced a ratio of freight trips to employees for their analyses.

9.6 ECONOMIC STUDY

A portion of the economic benefit of having rail on this corridor would be determined by those who use rail to ship freight and they may be the determining factor in bringing a rail project to fruition. Therefore, in addition to the typical benefit/cost factors such as fuel savings, delay reduction, and time savings used to determine benefits for the public user, the railroad benefits should be factored in to the overall benefit/cost analysis.

T·Y·LIN INTERNATIONAL

1501 NW 49 Street, Suite 203
Fort Lauderdale, Florida 33309

www.tylin.com

Florida Department of Transportation District Four

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION