South Florida East Coast Rail Corridor Transit Analysis

Technical Memorandum
Task 2.12: Existing FEC Facilities & Operations
March 9, 2006

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Florida Department of Transportation

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SOUTH FLORIDA EAST COAST RAIL CORRIDOR TRANSIT ANALYSIS
TASK 2.12
EXISTING FEC RAILROAD FACILITIES AND OPERATIONS

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INTRODUCTION

This memorandum describes the present facilities and operations of the Florida East Coast Railway within the study corridor stretching 96 route miles from Jupiter in Palm Beach County to two termini: downtown Miami and FEC's Hialeah Yard in Dade County. The memorandum describes the operations and traffic volumes of the railway within the study area limits. It also provides speed profiles and stringlines reflecting current conditions and services.

Railroad infrastructure information presented includes: right-of-way width, grade crossings, ownership, maximum allowable speeds, number of tracks, track conditions, signal technology, interlockings, sidings and turnouts, dispatching and control, terminals and yards, bottlenecks and deficiencies, and forecasts of future traffic.

The memorandum also provides an overview of historic operations and facilities. The data are assembled to provide the physical and operational information necessary to discern the conflicts, constraints, and opportunities present in the infrastructure, and the operational details of the railway.

The information presented in this report was developed with considerable assistance and cooperation from the management of the Florida East Coast Railway. Their contributions, essential to the success of the project, are gratefully acknowledged. This report also reflects substantial contributions by Zeta-Tech Associates of Cherry Hill, New Jersey.

This memorandum is organized in three main chapters.

- **Chapter One** provides a general overview of the FEC and study corridor.

- **Chapter Two** divides the railway into eight major segments based on traffic density, the physical nature and character of the line, and method of operations.

Table S.1
Analysis Segments on the Florida East Coast Railway

Segment	Southern Limit	Northern Limit	Length (miles)	Grade Crossings
1	Port of Miami	Little River Junction	6.9	18
2	Hialeah Yard	Little River Junction	9.0	22
3	Little River Junction	North Miami	3.3	8
4	North Miami	Airport Interlocking	12.4	33
5	Airport Interlocking	South Pompano Beach	12.7	37
6	South Pompano Beach	South Villa Rica	10.8	18
7	South Villa Rica	West Palm Beach	22.6	71
8	West Palm Beach	Jupiter	15.7	23

The characteristics of each segment are described including current freight operations: trains; schedules; typical train delays and frequency of delays; local customers; and physical plant details: maximum allowable speeds, track configuration and sidings, track construction, signaling, interlockings and turnouts, grade crossings.

- **Chapter Three** provides a more detailed review of FEC operations in the 102 mile corridor between Port Sewall and Miami. This review provides the basic information that will be necessary to determine how any potential passenger operation would interact with day-to-day operations of the Florida East Coast Railway.

CHAPTER ONE: OVERVIEW

The South Florida East Coast rail corridor is the southernmost of 93 route miles of a 368 mile freight rail corridor extending between Miami and Jacksonville. The corridor is owned and operated by the Florida East Coast Railway (FEC) based in Saint Augustine. Overall the FEC operates a freight only rail operation focusing on four principal markets in South Florida:

1. the movement of intermodal containers and trailers to serve local markets or through movement to/from ports in South Florida,

2. the movement of rock and stone used for construction from quarries in Dade County to concrete plants and construction depots along the east coast of the state,

3. the delivery of automobiles for local use or export to southern destinations, and

4. the provision of carload freight service to a limited number of local customer warehousing facilities along the line.

Physical Plant

Ownership and Control

Florida East Coast Railway, L.L.C. (FEC) is the current owner and operator of the railway as part of its overall 368 mile system running between the Port of Miami and Hialeah Yard in Dade County and Bowden Yard in Jacksonville, Florida. The railroad has been in continuous operation in the study corridor for at least 110 years when the first trains ran to Miami in 1896. There have been no regularly scheduled passenger trains on the line for last 38 years. The FEC

abandoned its passenger service in 1968. Since that time the FEC has been a freight only railroad.

Headquartered in Saint Augustine, Florida, the FEC today is one of a handful of independently owned and operated regional railroads in the United States. Train dispatchers based in Saint Augustine monitor and control all mainline operations. All physical plant maintenance and operations are provided by employees of the FEC.

Right of Way - Within the limits of the study area, Jupiter and downtown Miami, the corridor generally consists of a 100 foot wide railway right of way[1]. The vertical profile of the line is very gentle with mainline grades seldom exceeding 0.3%.[2]

Track and Signal - The present track configuration of the SFECC is primarily a single track FRA Class[3] 4 railway. There are seven stretches (totaling approximately 31 route miles) of signalized double track used for opposing trains to pass and for local trains to serve online customers without impacting road operations. The average distance between controlled sidings in the study area is 7.5 miles with a minimum of 4.3 miles and maximum of 10.2 miles between passing opportunities.

Table 1.1
Passing Sidings and Signalized Double Track in Study Area

South Limit	North Limit	Name (Vicinity)	Length (Miles)
368.0	357.6	Hialeah/N. Miami	10.5
353.3	351.1	Ojus	2.3
345.1	338.8	Fort Lauderdale	6.4
332.4	330.4	Pompano	2.1
321.6	319.6	Villa Rica	2.1
310.3	309.2	Hypoluxo	1.2
299.0	292.6	West Palm Beach	6.5

Most of the railway (77 miles in the study area) is equipped with a sophisticated cab signal technology – Automatic Train Control (ATC). FEC's installation of ATC includes cab signaling

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[1] Field inspection of the railway showed that portions of the right of way had been leased to abutters and other interests but no evidence was discerned to suggest that the rail right of way was not in fact at least 100 feet wide for its entire length within the study area.
[2] There are several short segments in vicinity of Little River and Hialeah Yard with grades in the range of 0.75% to 1.22%. North of these locations, grades never exceed 0.3%.
3 FRA Track Class represents a track construction and maintenance standard that governs the maximum allowable speeds for segment of track. The most common track classes are listed below

FRA Track Class	Maximum Allowable Speed	
	Freight	Passenger
One	10	15
Two	25	30
Three	40	60
Four	60	80
Five	80	90

with automatic enforcement of speed limits and signal aspects[4]. Under ATC rules, all tracks are bidirectional allowing trains to operate at maximum allowable speeds in both directions on the line. A cab signal system, such as ATC, is federally required for operations where passenger train speeds exceed 79 mph. The maximum allowable freight speed in the corridor is 60 mph with substantial stretches where speeds are limited to 45 mph or below.

All study area mainline track in the ATC territory is constructed with continuous welded rail (CWR) using relatively heavyweight rail in the general range of 115 to 136 pounds per linear yard of rail. Nearly all mainline ties are fabricated with concrete.

ATC control of the railway terminates at North Miami (MP 357.6). For the nine miles between North Miami and Hialeah Yard the railway is double tracked and controlled with an Automatic Block Signal (ABS) system[5]. Tracks controlled with ABS are uni-directional. Trains cannot operate on the "wrong track" without explicit formal authority from the train dispatcher. Operations on the "wrong track" are limited to a maximum speed not to exceed 20 mph. The double track railway between North Miami and Hialeah is constructed with CWR and concrete cross ties.

For the seven miles of single track railway extending north from the Port Miami and downtown to Little River interlocking at MP 360.7, the railroad has been downgraded to yard limits due to low traffic density. There is no signal control system. Instead operations are controlled based on verbal authority from the yardmaster. Under rules governing operations within yard limits, trains are limited to a maximum speed that cannot exceed 20 mph. The present density of railroad operations on the so-called Port Branch is very light. The Port is the only customer on the branch and occasionally uses the railway to move cargos that are too bulky to move on the roadway. The frequency of service is reported in the vicinity of once each month. As appropriate for the level of traffic, the single track branch is constructed with jointed rail (rolled in first half of the 20th century) mounted on wooden cross ties.

A speed profile for the corridor is found in Figure 1.1. For the purposes of developing a passenger service competitive with automobile travel it is very notable that the current maximum allowable speed along the line is often 45 miles per hour or less[6]. It is especially notable that speeds along the potentially critical 24 mile segment between Fort Lauderdale and Downtown

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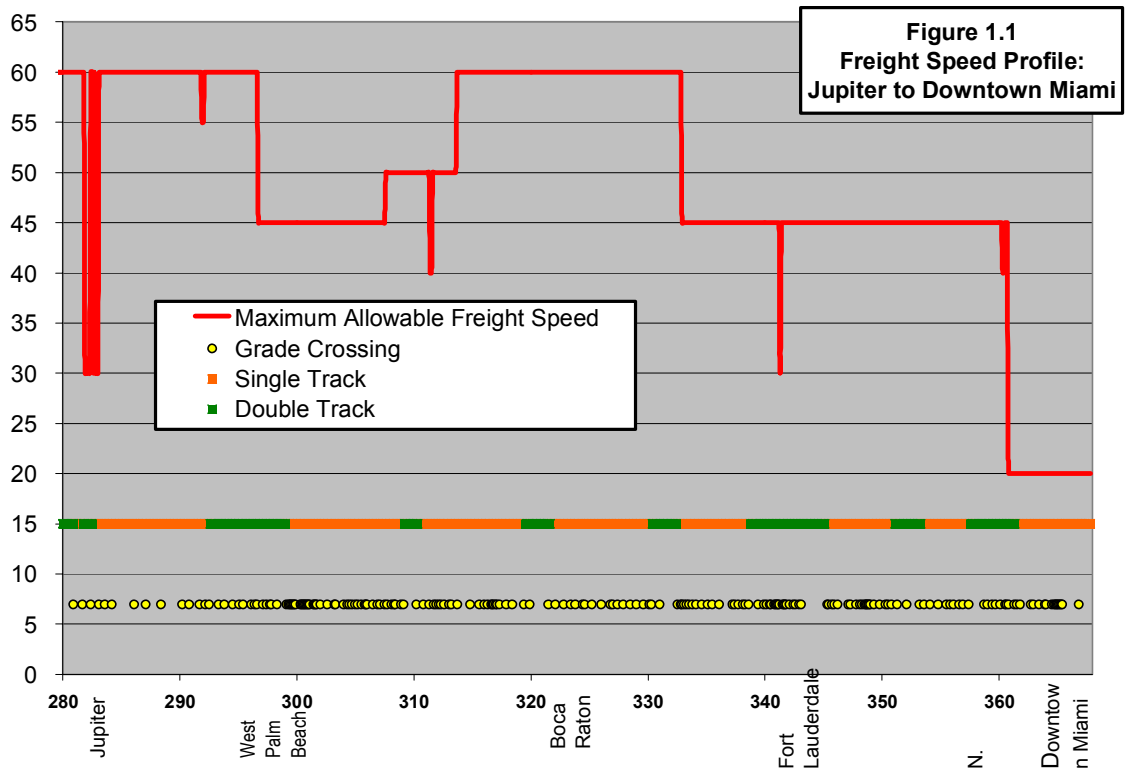
[4] Cab signals display information on the maximum allowable speed at the train operator's console in the locomotive cab. The information is continuously updated via automatic means to reflect current conditions ahead on the line. Failure to respond to the limits shown on the cab console results in the automatic application of brakes to reduce speeds and prevent collisions on trains proceeding ahead on the same route.

[5] ABS requires the train operator to observe and respect signal indications displayed on wayside posts to know any limits on speed imposed by traffic ahead on the line. There is no automatic override in the case of failure to observe and heed limits on train speeds.

[6] It should be noted that under federal guidelines relating to maximum train speeds, maximum allowable speeds for passenger trains are generally 10 to 20 mph higher than freight speeds for the same Class of track. Nonetheless, crossing and signal improvements would likely be required to allow any trains to operate at speeds above the currently operated maximums.

Miami never rise above 45 mph. For many passenger service options that may be considered in this study, track, signal and crossing improvements may be required to raise the maximum allowable speeds for passenger trains.



The horizontal profile of the track is generally tangent with no mainline curve exceeding six degrees.[7]

Bridges – There are 16 bridges in the study area where the railway passes over waterways.

- Two of these bridges are moveable drawbridges that allow marine traffic on the New River (Fort Lauderdale) and the Jupiter River (Jupiter) to pass without height limits. The resting position of the moveable bridges is open for marine traffic. Each bridge must be closed and locked in the down position each time a train crosses the waterway.
- The remaining 14 bridges are fixed bridges generally of through-girder construction with wooden decking.

Grade Crossings – There are 230 locations where highways or paths cross the railway at grade. Overall, the density of grade crossings is 2.5 crossings per mile. The density of crossings is generally greatest in the more built up urbanized areas. The greatest density of crossings is found in West Palm Beach where ten crossings are found along less than one mile of railway.

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[7] The very limited number of mainline track curves exceeding 2 degrees appear to be at locations where track has been shifted to accommodate relatively recent changes in operations.

Table 1.2
Summary of Grade Crossings

Segment	Southern Limit	Northern Limit	Length (Miles)	Grade Crossings	Average Crossing Density (per Mile)
1	Port of Miami	Little River Junction	6.9	18	2.6
2	Hialeah Yard	Little River Junction	9.0	22	2.4
3	Little River Junction	North Miami	3.3	8	2.4
4	North Miami	Airport Interlocking	12.4	33	2.7
5	Airport Interlocking	South Pompano	12.7	37	2.9
6	South Pompano	South Villa Rica	10.8	18	1.7
7	South Villa Rica	West Palm Beach	22.6	71	3.1
8	West Palm Beach	Jupiter	15.7	23	1.5
		Totals	**93.4**	**230**	**2.5**

Grade crossings provide opportunities for conflict between railroad operations and other traffic. A review of grade crossing accidents for the eleven year period between 1995 and 2005 indicates there have been 149 reported collisions at the 230 crossings that resulting in 50 injuries and 30 fatalities. Four of 30 fatalities were ruled suicides.

Over the 4,017 days in the reporting period, the study area rail corridor has experienced a crossing collision an average of every 27 days with an accidental injury every 87 days and an accidental fatality every 155 days. Increasing the density of trains on the rail corridor without reducing the number of crossings, taking measures to modify motorist behavior or improving crossing safety would likely increase the frequency of collisions, accidental injuries and fatalities.

Leases

As would be expected for a 96 mile linear facility in a densely settled urban area, the FEC rail right-of-way is subject to many leases. Most of these leases are relatively minor. As with most rail rights of way the leases fall into four major classes.

1. Utility crossings
2. Land leases to abutters
3. Longitudinal occupations by telecommunications line and other utility facilities
4. Signboards

The most common leases provide for utility crossings (~2,000). Leases to abutters and other interests are the next most common uses (~300). There are a substantial number (~50) of lengthy longitudinal occupations of the right of way by fiber optic cables, overhead power lines and buried municipal utilties (water, sewer and drainage.) There are also a substantial number (~40) of billboards on the right of way. It is reported that most of leases, except the various utility leases, can be easily terminated at the convenience of the railway.[8]

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[8] For more information on leases see Appendix A of this memorandum.

FEC Customers and Interchange in the Study Area
During the course of the February 2006 field inspection the study team had the opportunity to assess the nature and extent of on-line local traffic and potential interchange on the FEC between Downtown Miami and Jupiter. Information from this inspection was correlated with information from study team interviews and data provided by the FEC.[9]

FEC's customer base in South Florida includes three intermodal operations, three industrial warehousing districts, 26 local online customers or team tracks and four locations for the potential interchange of traffic with CSXT operations on the SFRC line.

- The intermodal operations include a major facility at Hialeah used for the local use and Miami port traffic, a ramp at Fort Lauderdale for local use and the service of Port Everglade traffic and the Port of Palm Beach which serves overseas traffic.

- The three industrial warehousing districts include the vicinity of Hialeah, the Pompano Market north of Fort Lauderdale and the Lewis Terminal district in the vicinity of West Palm Beach.

- The 26 local online customers and team tracks included 14 locations which were observed to be actively engaged in the shipment of building materials (10), food products (3) and paper (1). The remaining 12 sites were observed and reported to be inactive at the time of the inspection trip.

- The four potential locations for possible interchange of traffic with CSXT operations on the SRFC lines include Iris in Miami (diamond crossing with SFRC), Pompano Market in Broward County, Northwood, north of downtown West Palm Beach (an active interchange track), and the Lewis Terminals (although severe curvature restricts the utility of this connection.)

Current and Future Train Operations
Road Trains – Information for a typical week in December 2005, indicates that the FEC operates an average of 23 road freight trains[10] in the study area on a typical weekday.[11] Most of these trains (21) run through to FEC's Miami terminal (Hialeah). Four road trains are based in Fort Lauderdale. On a typical weekday the road trains include a variety of intermodal, general purpose freight, and rock trains as summarized in Table 1.3. Most trains on the FEC run the railroad end-to-end from Jacksonville to Miami. With the exception of the rock trains that carry loads of construction material northward from Dade County to locations along the FEC, most FEC trains originate or terminate in Jacksonville. Nearly all FEC road trains originate or terminate in Dade County.

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[9] For more information on local customers see Appendix B of this memorandum.
[10] "Road Trains" transport freight cars between cities. They contrast with "Local Trains" that pick-up and deliver rail cars at customer sidings. "Yard Switchers" move cars within yards getting cars ready for local delivery and making up road trains for remote destinations.
[11] Ranging between 21 and 25 trains on any particular day.

Table 1.3
FEC Study Area Road Trains by Type

Train Type	Number Operated on Typical Weekday		Range of Typical Lengths (feet)
	Southbound	Northbound	
Intermodal	6	6	7,000 – 8,000
General Purpose Freight	1	0	8,000
Automobile	0.5	0.5	8,500
Rock	4	4	4,500 – 5,000
Total	11.5	11.5	

Despite the general designations listed above, the majority of FEC trains operate with a mix of traffic. General merchandise cars carrying commodities such as building materials, food products or paper are often added to trains that are predominately carrying intermodal flat cars, autoracks and/or empty gravel hoppers. It is not uncommon to see empty rock cars running south with a mix of intermodal flats and general freight cars.

The FEC operates road trains in the study area during all portions of the day but the density of operations is generally greatest after 4:00pm each afternoon until 9:00am the following morning. The reduced density of road operations in the midday period appears to provide the FEC with an opportunity to serve local customers and perform maintenance of way work with reduced interference by long distance freight trains. Table 1.4 reports typical mainline freight traffic densities by time of day along the most heavily used portion of the study corridor in the vicinity of Fort Lauderdale.[12]

Table 1.4
Fort Lauderdale
Freight Traffic Densities by Time of Day
(December 14-16, 2005)

Time period	Average Road Trains per Hour	Average Local Trains On Main
Midnight to 6am	1.8	0
6am to 9am	1.3	0.7
9am to 4pm	0.5	1.0
4pm to 7pm	1.0	0.3
7pm to Midnight	1.0	0

Overall in 2005 the FEC carried 550,000 carloads of traffic. Forecasts indicate that traffic could increase by 56,000 to 86,000 carloads in the next five years[13]. With such a growth in traffic it is likely that FEC could add up to four trains to their current average lineup of 23 daily trains in the 2007-2009 time frame.

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[12] Airport Interlocking (MP 345.1) north to South Pompano Beach (MP 332.4)
[13] This represents a 10% to 16% traffic increase.

Local Trains - The FEC maintains three principal yards in the study area, Hialeah (in Miami), Fort Lauderdale and West Palm Beach. Each yard has local trains which serve online customers with carloads of various commodities including building materials, food stuffs, and beer and wine. On a typical weekday one or two local trains serve customers on the mainline in the vicinity of Fort Lauderdale. Further north, one local train serves customers on the main in the vicinity of West Palm Beach. One local train also reportedly serves local customers along the main line in the vicinity of Miami. (However, operation of the Miami local train was not observed in the December 2005 operations data provided by FEC.)

Local trains tend to operate on the mainline during the midday period between 9:00am and 4:00pm.

Delays

The study team evaluated data from the FEC Morning Reports to develop information on patterns of train delay in the corridor. Of all trains analyzed, 23% operated with no delays in the study area. On average, each train was delayed by 33 minutes in the study area, and experience 1.7 delay events.

The most common delays were meets and passes constituting 43% of all delay events and 65% of delay minutes. The average delay for a meet and pass was almost 30 minutes.[14] Slow orders were the next most common cause of delays constituting 38% of all delay events but a smaller fraction of delay minutes since the duration of each delay was low. Local work by road trains, picking-up and setting-out cars was the next most common contributor to delay minutes, with an average of 45 minutes of delay per event.

Table 1.5
Common Study Area Train Delays by Type

	Delay Events	Delay Minutes	Average Duration (Minutes)
Meets and Passes	43%	65%	28.7
Slow Order – Disturbed Track	38%	12%	6
Set-out and Pick-up Cars	3%	7%	45
Crew Change [15]	7%	4%	12.4

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[14] It is understood that some of FEC's trains are operated as "meet me" trains, where a train swaps crew with its opposite number during a train-meet approximately half-way between the origin and the destination. A crew swap often consumed more time than a simple train meet, but enabled the engine crew to return home the same day. {Stagl, Jeff. "Florida East Coast and Beyond", *Progressive Railroading* interview with Charles R. Lynch, September 2004, p.42.}

[15] That do not coincide with a train meet.

Bottlenecks and Deficiencies

The consultant team inspected the railway via high rail vehicle on February 14, 2006. The team was impressed with the condition of the right of way and track. No substantial deficiencies were observed[16]. The single railway is well-designed and maintained for its current use as a freight operation with mostly point to point operation of intermodal, rock and automobile trains. The density of local online customers with carload business was observed to be generally light with concentrations of local traffic along a few double track segments.

Interviews with FEC officials did not reveal many pressing concerns about operations and infrastructure in the study area. Among the concerns that were elicited were matters related to

- grade crossing safety,
- terminal capacity at Hialeah and Fort Lauderdale to respond to growing traffic levels, and
- line capacity south of south of West Palm Beach to allow for an overall increase in density of road trains while allowing time for local operations and maintenance of way operations.

In March 2004, the FEC submitted a report at the request of the Florida Department of Transportation describing six capital investment projects in the study area (and 14 projects outside the study area) for consideration in developing Florida's Strategic Intermodal System (SIS). Projects identified in the study area included:

Table 1.6
Study Area Projects Identified in FEC's Strategic Intermodal System Project Needs Report
(March 1, 2004)

Project	Description and Justification
Upgrade Speed through West Palm Beach	Increase maximum allowable speed for 2.7 miles through West Palm Beach from 45 mph to an unspecified higher limit to increase operational efficiency and reduce delay time. Work would entail improvements to the signal system and 25 grade crossings.
Upgrade Speed though Lake Worth	Increase maximum allowable speed for 5.7 miles through Lake Worth from 45 mph to an unspecified higher limit to increase operational efficiency and reduce delay time. Work would entail improvements to the signal system and 26 grade crossings.
Combine Hypoluxo and Villa Rica Sidings	Combine two passing sidings into a single longer passing siding by constructing 9.3 miles of new track to reduce delays to trains at these commonly used sidings and to reduce delay to motorists at the 22 grade crossings on the existing Hypoluxo and Villa Rica sidings.
Port Everglades Intermodal Facility	Build two new side tracks to store and service up to 26 additional intermodal cars in the vicinity of Port Everglades in Fort Lauderdale.

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[16] The field inspection followed the coldest night of year (44 degrees Fahrenheit). As could be expected under such extreme temperatures a pull-apart in the welded rail had been detected and was being repaired in Dade County.

Table 1.6 **Study Area Projects Identified in FEC's Strategic Intermodal System Project Needs Report** (March 1, 2004)	
Project	**Description and Justification**
Double Track from South Ojus to North Miami	Extend the double track from North Miami by a total of 4.3 miles to the southern limit of Ojus siding. The project would entail track, signal, crossing and bridge improvements to provide for more efficient railroad operations and reduce traffic delays at crossings.
Close Grade Crossings in West Palm Beach, Lake Worth, Fort Lauderdale and Miami	Work with FDOT and localities to close an unspecified number of grade crossings in high density areas to reduce railway/roadway conflicts, increase safety, reduce noise, and reduce maintenance costs.

It is understood from FEC officials that none of the study area projects listed above have received state funding, while some FEC projects north of the study area have in fact been designated for state funding in cooperation with the FEC.

CHAPTER TWO: DETAILED ANALYSIS BY SEGMENT

The study team divided the study area into eight major segments based on traffic density, the physical nature and character of the line, and the observed nature of operations. The eight segments are delimited in Table 2.1.

Table 2.1
Study Segments on the South Florida East Coast Rail Corridor

Study Segment	Southern Limit	Northern Limit	Length (miles)	Grade Crossings
1	Port of Miami	Little River Junction	6.9	18
2	Hialeah Yard	Little River Junction	9.0	22
3	Little River Junction	North Miami	3.3	8
4	North Miami	Airport Interlocking	12.4	33
5	Airport Interlocking	South Pompano Beach	12.7	37
6	South Pompano Beach	South Villa Rica	10.8	18
7	South Villa Rica	West Palm Beach	22.6	71
8	West Palm Beach	Jupiter	15.7	23

The characteristics of each segment are described below, discussing current freight operations: typical delays and frequency of delays; and physical plant details: maximum allowable speeds, track configuration and sidings, Track Construction, signalling and train control, interlockings and turnouts, and grade crossings.

The description of Florida East Coast (FEC) operations is based on data from nine consecutive representative days of operations reports provided by the FEC for the period Friday, December 09, 2005 to Monday December 19, 2005. The operations data included:

- ten daily screenshots[17] showing "stringlines" from the FEC's Digicon system;
- a series of eight "Morning Reports" for the same period[18] designed for use by the senior management; and
- eight pages of paper records entitled "Report for local and work trains" that recorded partial local train activity for the period.[19]

KKO also used supplemental information including the FEC Railway Rule Book, FEC System Timetable No.37, FEC Engineering Department Condensed Track Chart and Crossing Guide (Jan. 1, 2004), Meeting Minutes from meetings with FEC, and several e-mails from Charles R.

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[17] The track occupancy data is derived directly from the signal system. There was one seven-hour gap on the early hours of Tuesday, December 13, 2005.
[18] covering the period Sunday, December 11, 2005 to Sunday, December 18, 2005.
[19] covering part of all activities occurred over the period Sunday, December 11 to Sunday, December 18, 2005.

Lynch.[20] Information from two rail enthusiast websites, the "Florida East Coast Railway Society", [21] and the "FEC Page 2", [22] were also used to inform the analysis.

Historical Overview

Over all the segments described below, Florida East Coast Railway, L.L.C. (FEC) is the current owner and operator of the route running between the Port of Miami and Bowden Yard in Jacksonville via Fort Lauderdale, West Palm Beach, Fort Pierce, Saint Augustine, and City Point, Florida. The FEC is a Class II railroad[23] operating in the US state of Florida, totaling 368 route miles in length; in the past, it was a Class I railroad.

The earliest predecessor of the FEC was the Saint John's Railway, incorporated in 1858. In 1883, Henry M. Flagler, a recently retired businessman from Standard Oil, moved to Saint Augustine and purchased several hotels. The Florida's eastern coast was relatively undeveloped at that time, and Flagler found it difficult to obtain the necessary construction materials for hotel development and improvement. Consequently in 1885, Flagler purchased the Jacksonville, Saint Augustine & Halifax River Railway (a successor to Saint John's) with plans to improve railroad service to Florida. As the railroad expanded southward, the company was eventually re-named "Florida East Coast Railway Company" on September 7, 1895.

The railroad in the study area was constructed in phases. Flagler began his railroad building in 1892. Under Florida's generous land-grant laws passed in 1893, 8,000 acres could be claimed from the state for every mile built. Flagler would eventually claim more than two million acres. Land development and trading would become one of his most profitable endeavors. Significantly, Flagler reserved a wide right-of-way on either side of his railroad for future expansion – a fact that may prove helpful in establishing new passenger rail services on the southern FEC corridor.

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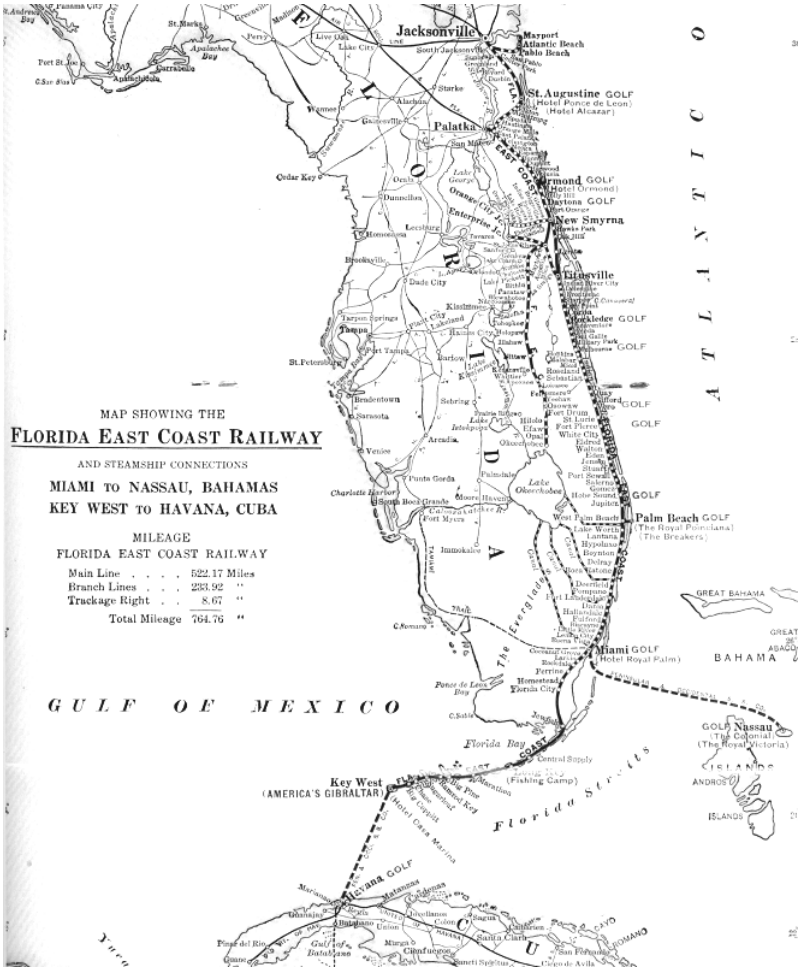
[20] Vice President, Transportation, at the Florida East Coast Railway. All operating patterns inferred herein are based on KKO analysis of the available data and relate to the railroad operations as observed. It does not represent any official FEC position on how the railroad is, or should be, operated.

[21] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site, updated October 13, 2005 at *http://www.fecrs.com/svc_plan.html*

[22] Source: "Florida East Coast Railway – Jacksonville to Riviera Beach" fan site, *http://www.trainweb.org/brettrw/fec/fec.html#schedule*

[23] US freight railroads are categorized into three classes based on size. Class I railroads are the largest. Class III railroads are the smallest. There are 31 Class II (Regional Railroads) in the United States.

Before it became the FEC, the Jacksonville, Saint Augustine & Indian River Railway[24] had began constructing a line southwards from Daytona Beach. The railroad reached Fort Pierce on January 29, 1894 and West Palm Beach in March of the same year. Further extension southwards did not begin until June of 1895, when a favorable deal was signed with Miami-area business interests.[25] Construction extended to Fort Lauderdale in March 1896. By April, the construction had extended southward 20+ additional miles reaching Biscayne Bay, the largest and most accessible harbor on Florida's east coast. To further develop the area surrounding the Miami railroad station, Flagler dredged a channel, built streets, instituted the first water and power systems, and financed Miami's first newspaper, the Metropolis. When the town incorporated in 1896, its citizens wanted to honor the man responsible for the city's development by naming it, "Flagler." He declined the honor, persuading them to keep the city's old Indian name, "Miami."[26]



Flagler announced in 1905 that the FEC would be extended 128 miles from Miami to Key West over the ocean. The "Overseas Extension" was completed in 1912.

It is not evident that a daily commuter service ever operated on the South Florida East Coast rail corridor. However, extensive intercity passenger service was certainly a key feature of the FEC's operation. In 1926, the railroad operated 24 weekday passenger trains between West Palm Beach and Miami. All of these trains ran the entire length of the railroad from Jacksonville to Miami. Most (20) were express or limited trains with many making connections to points further north. However four trains were all-stop locals that ran between Jacksonville and Miami. The 368 mile journey from Jacksonville to Miami took approximately 12 hours 45 minutes on the express trains, and 15 hours on the local passenger trains.

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[24] The successor to Jacksonville, Saint Augustine & Halifax River Railway, incorporated 1892.
[25] Primarily the Tuttle and the Brickell families, early settlers representing Miami commercial interests.
[26] Seth H. Bramson, "Speedway to Sunshine: The Story of the Florida East Coast Railway" (2002).

In the study area the 16 daily express passenger trains served four stations: West Palm Beach, Fort Lauderdale, Hollywood, and Miami. Two daily limiteds served Jupiter, Lake Worth, Delray in addition to the express stops. The local trains made 26 stops in the study area serving Monet, Kelsey City, Riviera, Southboro, Lantana, Hypoluxo, Boynton, Yamato, Boca Raton, Deerfield, Pompano, Dania, Hallandale, Ojus, Arch Creek, Biscayne, Little River, Lemon City, Buena Vista in addition the seven stations served by the Limiteds. The running time between West Palm Beach and Miami ranged between 2 hours 15 minutes on the *Florida Special* express and three hours on the local trains making 16 more station stops than the express services.

The stock market crash of 1929 was particularly harsh on the FEC. The railroad was in receivership by September 1931, a short 18 years after Flagler's death in 1913.[27] Substitute bus service to replace passenger trains began on FEC branches in 1932. The Key West service was abandoned north to Homestead[28] in 1935 after a disastrous hurricane. However, long distance passenger service streamliners terminating in Miami plied the rails during the era between 1939 and 1968.

The railroad operated in receivership for 30 years before it finally emerged from bankruptcy in 1961. Within a few months, relations between the management and labor of the railway soured, eventually leading to a prolonged strike beginning in January 1963. The railway continued to operate throughout the strike. Daily freight trains were operated between Jacksonville and Miami with non-Union and supervisory crews.[29] However no passenger service was operated during the strike.[30]

With the encouragement of local civic leaders, the FEC's wooden downtown passenger terminal was demolished in November 1963. Some passenger trains were eventually reinstated in 1965 between Jacksonville and Little River (NE 79th Street), with a single diesel and two passenger cars. The limited passenger service operated six days a week until service was discontinued for the last time on July 31, 1968.

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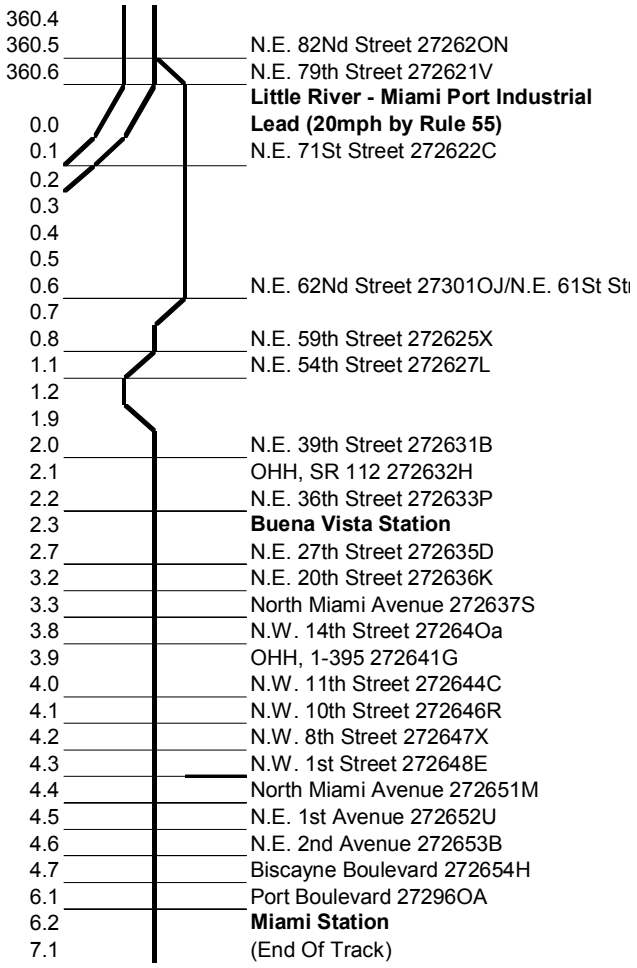
[27] However, the FEC Industries controlled the hotel and real estate interests until at least the 1970s.
[28] The right-of-way and all facilities south of that point were sold to the State of Florida for $640,000 the same year. The state re-used the foundations for the railroad to construct the old U.S. Route 1 through the Florida Keys.
[29] A single freight train operated once a week on the remaining portion of the Key West Extension to Homestead.
[30] The ICC granted special permission allowing the passenger services to cease temporarily. When the passenger trains returned, timetables warned that passengers used trains and facilities "at their own risk" due to possible sabotage.

With labor troubles behind it, FEC became a true pioneer of two-person train operation for freight trains in North America. Today, the FEC remains one of a handful of independently owned and operated regional railroads. Train dispatchers headquartered in Saint Augustine govern operations on the FEC. The line has Automatic Train Control between North Miami Interlocking (MP.357.6) and Sunbeam Interlocking (MP 9.7). The southernmost section of the FEC mainline in the study area lies outside the ATC control system. FEC's installation of ATC includes cab signaling with automatic enforcement of speed limits and signal aspects. From Hialeah to North Miami the railroad is a double-track railway with Automatic Block Signaling (ABS). From the Port of Miami to Little River Junction the line has been downgraded to an unsignaled branch line status under the control of the Hialeah yardmaster.

Segment 1: The Port of Miami to Little River Junction

The segment between Little River Junction (FEC MP 360.7) and the end of track at the Port of Miami (FEC Little River Branch, MP 7.1) is a slow 7.1-mile section of industrial single track railroad. All regularly scheduled traffic on the FEC continues along the mainline at Little River Junction, through Iris Interlocking to Hialeah Yard and beyond. Traffic on the port branch is restricted to occasional movements of specialized (oversize) loads to or from the Port of Miami (Dodge Island) that cannot travel on the highway network.[31] There are no other active shippers on the branch.[32] [33]



Track Configuration and Sidings - At Little River Junction, it is only possible to access the branch from the northbound main tracks. The branch line is single track with no passing sidings. No industrial leads are shown in the Timetable.

Interlockings and Turnouts - The segment has one interlocking at Little River Junction, and only one turnout north of the Port, at Little River, to permit access to the branch from the mainline.

Traffic and Operations – The only train that works this branch is reportedly a "Downtown Miami" yard job.[34] The local reportedly works Little River belt line industries, and occasionally runs to the Port of Miami on Dodge Island.[35]

Maximum Allowable Speeds – FEC Rule 55 limits the maximum allowable speed on the Little River branch to 20mph "restricted speed."[36]

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[31] Source: KKO Interview with the Port of Miami, December 2005.
[32] Source: E&K Interview with Florida East Coast Personnel, February 14, 2006.
[33] For more information on local customers see Appendix B of this memorandum.
[34] The train never leaves yard limits, thus is technically not a local and no train number is assigned.
[35] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site.
[36] "Restricted speed" is defined on the F.E.C. by Rule 55 as "20 mph or the speed at which stopping is possible within one-half the range of vision, whichever the lower, except where main track is cleared by signal indication."

Track Construction – The track in this branch is built with 115 lb jointed rail installed in 1950 up to approximately MP 2.6. From MP 2.6 to MP 4.4, the rail is 90 lb jointed rail laid in 1925. No information on the type of rail laid is provided south of MP 4.4.

Signaling and Train Control – This branch is dark, except for the interlocking at Little River Junction. Rule 55 governs movements at restricted speed.

Grade Crossings – There are 18 grade crossings in this segment, only 8 of which are shown in FEC's "Crossing Guide".[37] Twelve are equipped with the standard flashers, bells, and gates. One also has cantilevers over the roadway. The six remaining crossings at N.W. 1st Street, North Miami Avenue, N.E. 1st Street, N.E. 2nd Street, Biscayne Boulevard, and Port Boulevard, are not shown in the Engineering Department Track Charts and therefore the crossing type is unknown.

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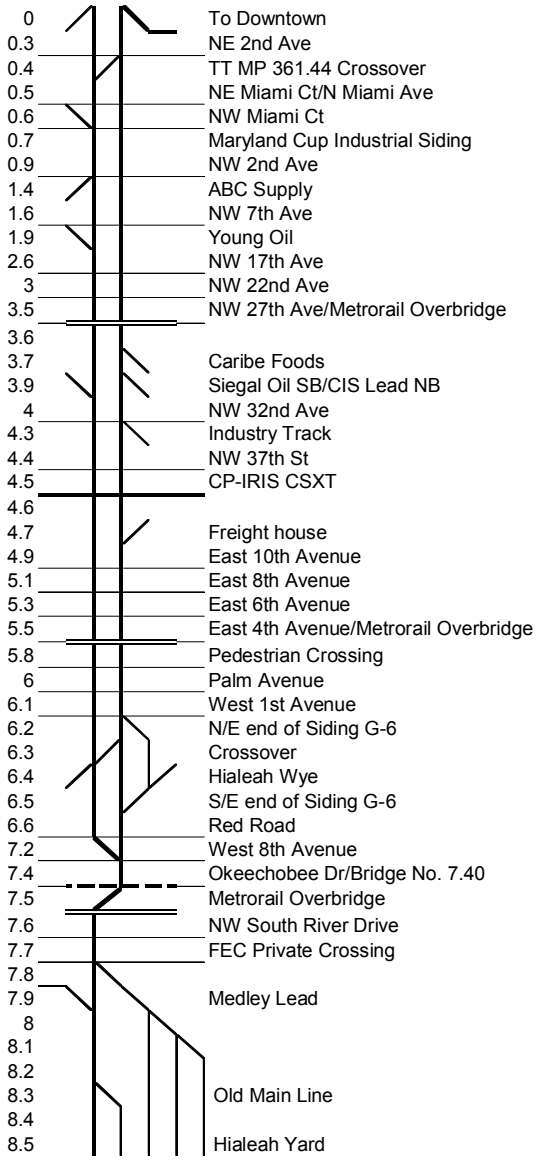
[37] A part of the FEC Office of Director-Engineering's track chart book.

Segment 2: Little River Junction to Hialeah Yard

The segment between Little River Junction (FEC MP 360.7) and Hialeah Yard is a 9.0-mile double track section of automatic block mainline railroad with a diamond crossing of South Florida Regional Transportation Authority (SFRTA)'s South Florida Rail Corridor (SFRC – formerly owned by CSX Transportation) at Iris Interlocking. Virtually all of the road trains on the FEC continue along this route at Little River Junction. A total of 18-22 trains a day arrive or depart from Hialeah via Iris, depending on whether unscheduled extras were operated on a given day.



Track Configuration and Sidings - This 8.5 mile section is largely double tracked and controlled under automatic block signal (ABS) operating rules. There are a number of industrial access points in this area, all of them are accessible via only one of the two tracks, but there are crossovers at either end of the segment. There is one siding between MP 6.2 and MP 6.5 (Siding G-6).

Interlockings and Turnouts - The segment has one interlocking at Little River Junction, nine turnouts on the southbound main, and ten turnouts on the northbound main. There is a short stretch of single track at the entrance to Hialeah Yard. There is a diamond crossing and interlocking at Iris with the single-track SFRTA/CSX main line. SFRTA's South Florida Rail Corridor crosses the FEC at CP-IRIS (MP 4.5). The SFRTA crosses the FEC to serve passenger stations at Hialeah Market and Miami Airport. CSX crosses the FEC on the SFRTA line to serve customers south of CSX's Hialeah Yard.

Traffic and Operations - Hialeah Yard is serviced daily by three intermodal train pairs: Trains 101/206, Trains 107/226, and Trains 121/222. On some days a fourth intermodal train pair services Hialeah (Trains 105 and 202). It also sees four rock-train pairs, including the aggregate unit trainset (Trains 335 and 336), and other rock trains (Trains 191/290, 193/292, and 195/294). In addition to these trains, there is a once-daily southbound general purpose freight train, Train 125, and a once-daily loaded northbound rock train, Train 208. The yard services a pair of automobile trains (Trains 141 and 240). Observed arrival and departure windows for these trains, based on the study week data, are shown in the table below:

Table 2.2
Arrival/Departure Times and Variability at Miami/Hialeah Yard

SOUTHBOUND Arrivals			NORTHBOUND Departures		
Train	**Time**	**Range** (hours)	**Train**	**Time**	**Range** (hours)
101	10:45 pm	± 1.5	202	9:00 am	± 0.5
105	11:15 pm	± 1.0	206	3:15 pm	± 1.0
107	1:45 am	± 0.5	208	3:15 pm	± 1.0
119	10:30 am	± 2.5	220	11:30 pm	± 0.5
121	7:30 am	± 0.5	222	7:30 pm	± 1.0
125	4:30 pm	± 1.5	226	10:15 pm	± 1.0
141	1:45 pm	± 2.5	240	7:30 pm	± 1.0
143	4:45 am	N/A	242	3:15 pm	N/A
191	7:30 pm	± 0.5	290	5:15 pm	± 0.5
193	7:45 am	± 1.0	292	10:00 pm	± 0.5
195	7:45 am	± 0.5	294	11:45 pm	Ontime
335	9:45 am	± 1.0	336	2:45 am	± 0.5

No local trains were observed in the data, although a "Downtown Miami" yard job reportedly operates. The local reportedly works "Little River belt line industries", [38] although field observations in February 2006 suggested that very few of these industries remain. FEC confirmed that a train occasionally runs to the Port of Miami on Dodge Island.

Maximum Allowable Speeds - The maximum allowable freight speed on this segment is 40mph (Class 3 track), except for two speed restrictions: 30mph at MP 0.10-0.37 for a curve, and 25mph at Iris for the CSXT diamond. South of Bings Terminal Spring Switch (MP. 7.20) where FEC Rule 63 applies, trains and engines using tracks other than main track must proceed at restricted speed.[39]

Track Construction - The track in this segment is built with 112 lb continuously welded rail (CWR) installed in 1978 up to approximately MP 7.2. From MP 7.2 southwards and into the yard, a mixture of 112 lb CWR and jointed rail is reported, laid in 1974 and 1964 respectively.

Signalling and Train Control - This segment is under automatic block signal control.

Grade Crossings - There are 22 grade crossings in this segment. All 22 are equipped with the standard flashers, bells, and gates. Thirteen also have cantilevers over the roadway.

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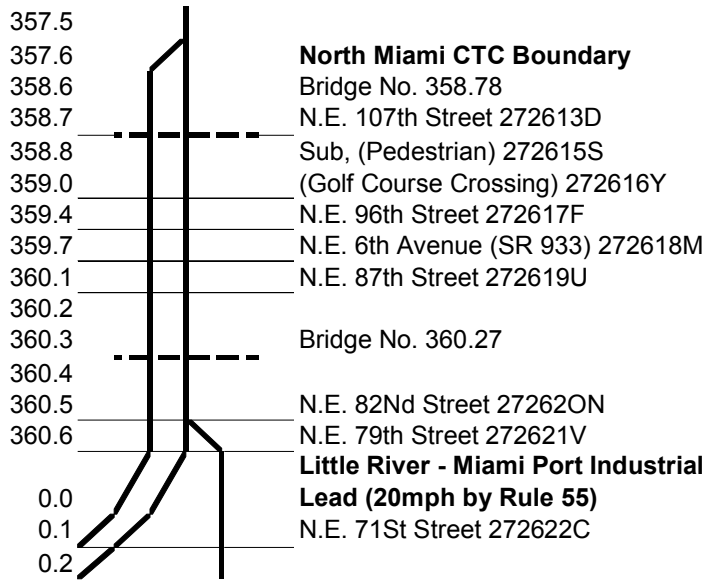
[38] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site.
[39] The definition of "restricted speed" is the same as that under FEC Rule 55, "20 mph or the speed at which stopping is possible within one-half the range of vision, whichever the lower, except where main track is cleared by signal indication."

Segment 3: Little River Junction to North Miami
This is a short three mile segment between Little River Junction (FEC MP 360.7) and the Southern boundary of Automatic Train Control (ATC) at North Miami. Approximately 18-22 road trains use this segment each day.

Track Configuration and Sidings - This segment is entirely double-tracked and controlled with an automatic block signal system. The FEC mainline has ATC except for the few miles between North Miami and Hialeah Yard. There are no industrial sidings, and two bridges in this segment.

Interlockings and Turnouts - The segment has two interlockings at Little River Junction and at North Miami. It also has two bridges, and one speed-restricted curve. The northbound main has two turnouts, and the southbound main has one turnout.



Traffic and Operations - All FEC trains destined for and originating from Miami use this segment. The trains include three intermodal train pairs: Train 101/Train 206, Train 107/Train 226, Train 121/Train 222; on some days a fourth intermodal train pair (Trains 105 and 202) is observed. Four rock-train pairs, including the rock unit Trains 335 and 336, and Train pairs 191/290, 193/292, 195/294 also use this segment. A once-daily inbound general freight (Train 125), and a once-daily outbound rock train (Train 208), and on some days a pair of finished auto extras (Trains 141 and 240) use this segment as well. For more details, refer to Table 2.2. No local trains were observed on this segment during the study period.

Maximum Allowable Speeds - The maximum allowable freight speed on this segment is 45mph (Class 4 track), except for one speed restriction: 40mph at MP 360.30-360.50 due to curvature.

Track Construction - The track in this segment is built with 132 lb CWR installed in 1977.

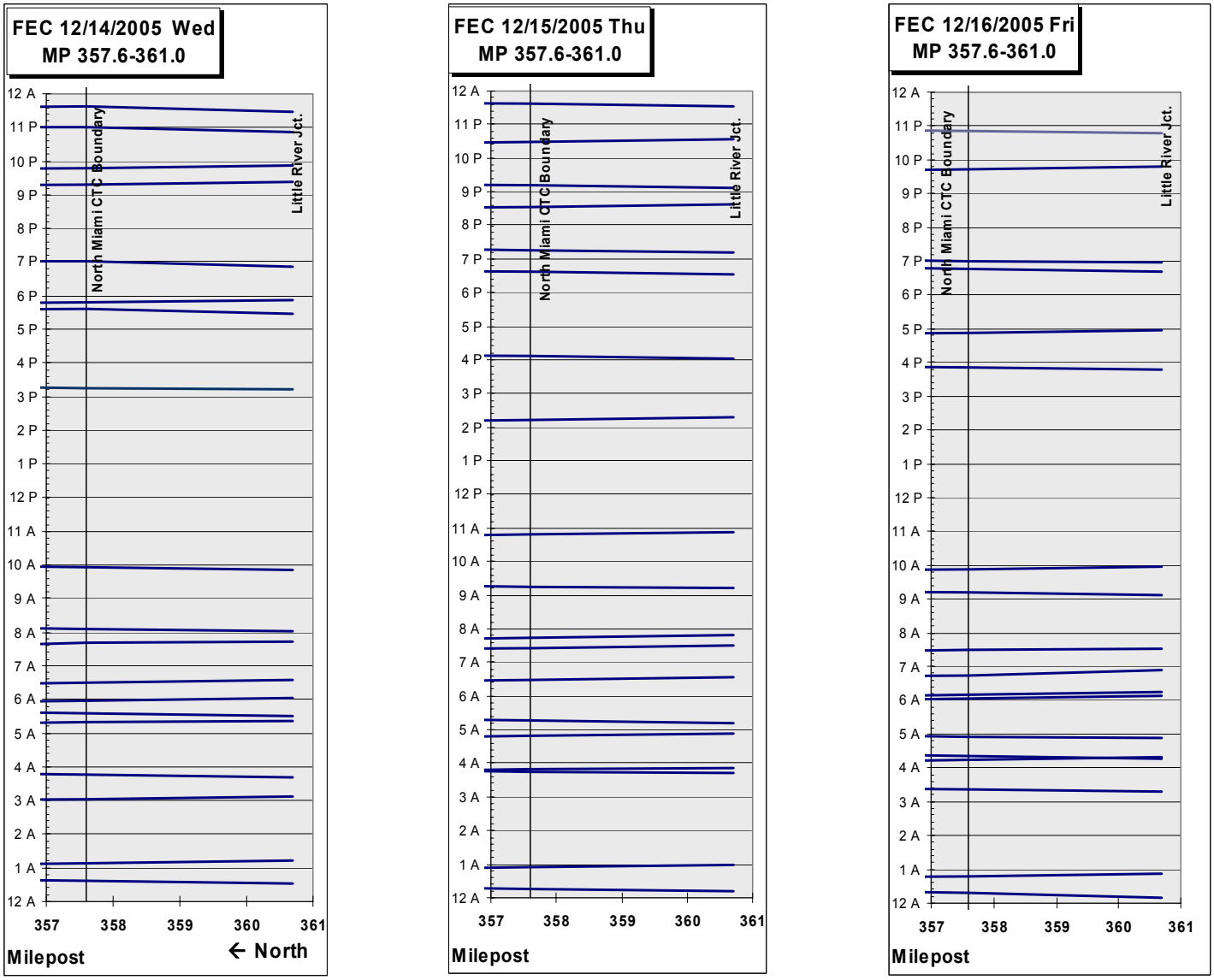
Signaling and Train Control - This segment is under automatic block signal control.

Grade Crossings - There are seven grade crossings in this segment. Six are equipped with the standard flashers, bells, and gates. Two also have cantilevers over the roadway. One crossing (at 60 feet south of Milepost 359) is a Golf Course Crossing. The type of protection equipment at this crossing is not indicated in the data provided by the FEC.

Traffic Patterns - Figure 2.1 illustrates traffic patterns on three representative days. Road trains are shown in blue. Local trains shown in red. The solid vertical lines mark the northern ends of

sidings. Dotted vertical lines mark the southern ends of sidings. Mileposts and major locations are shown.

Figure 2.1
String Lines for Segment 3



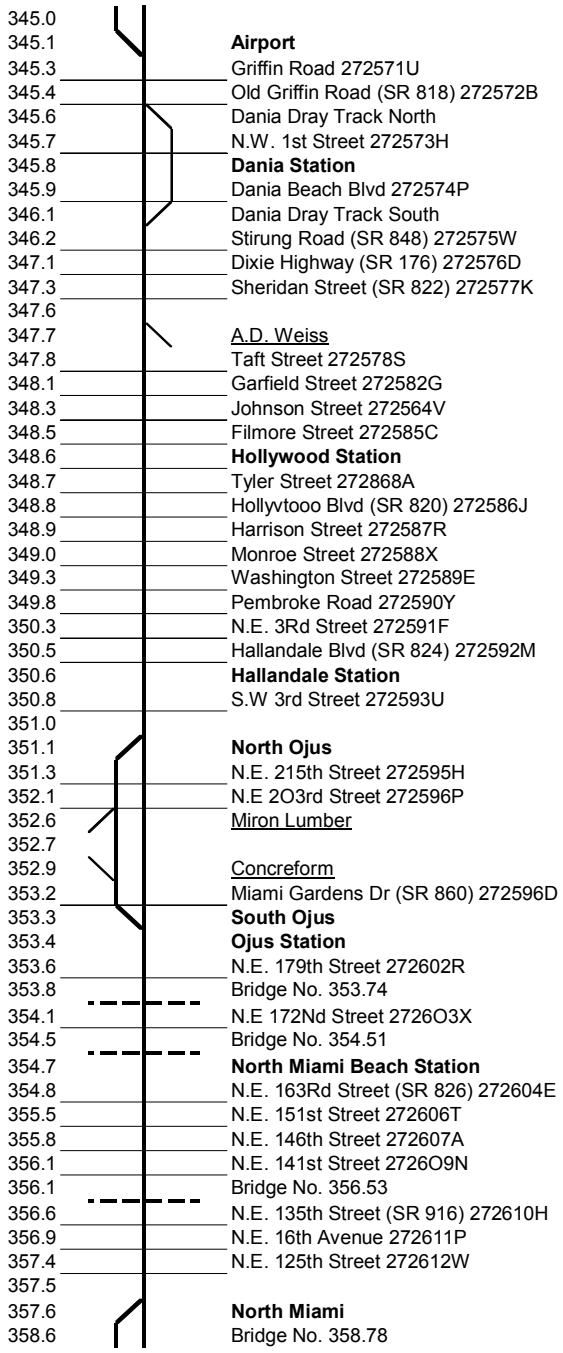
The charts show no local train activity at all, while road trains tended to operate most frequently between 6:00pm and 8:00am. The overall traffic pattern is fairly consistent throughout the study period. An average of six trains per day operated over the segment between midnight and 6:00am.

Table 2.3
Typical Freight Traffic Densities by Time of Day (December 14-16, 2005)

Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.0	18	9	9	0
6am to 9am	3	1.0	9	1	8	0
9am to 4pm	7	0.4	8	5	3	0
4pm to 7pm	3	0.9	8	6	2	0
7pm to Midnight	5	0.9	13	8	5	0

Segment 4: North Miami to Airport Interlocking

The segment between North Miami (FEC MP 357.6) and Airport Interlocking (FEC MP 345.10) is a busy 12.4-mile section of single track railroad with a 2.3-mile long passing siding at Ojus, a short double-ended dray track at Dania and a number of industrial access points. Most traffic on the FEC passes through this segment while moving to and from FEC's Miami facilities. Two local trains are based in Fort Lauderdale, one of which serves customers from Airport to Ojus.



Track Configuration and Sidings - Starting with this segment north to Jupiter and beyond, the railway is single tracked with an Automatic Train Control (ATC) signal system. A 2.3-mile siding is maintained at Ojus between MP 351.1 and MP 353.3, and regularly used for train meets and as a run-around for the Airport-Ojus local.
There are two industrial customers on the Ojus siding: Miron Lumber (MP 352.6) and Concreform (MP 352.9). Miron Lumber is not a frequent user of FEC service at this location. The Concreform siding is out of service. At MP 347.7, A.D. Weiss is directly connected to the mainline with a switch trailing in the northbound direction. A.D. Weiss is a frequent receiver of small shipments of lumber. One customer on the Dania siding regularly receives substantial shipments of corn syrup in tank cars. Approximately five cars were observed in the siding on February 14, 2006. [40]
There are three bridges in this segment.

Interlockings and Turnouts - The segment has four interlockings at North Miami, South Ojus, North Ojus, and Airport. The main track has 6 turnouts, including entry and exit to Ojus Siding and Dania Dray Track.

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[40] For more information on local customers see Appendix B of this memorandum.

Traffic and Operations - All FEC trains destined for and originating from Miami use this segment. For more details, see Table 2.4. This segment also hosts one local train based in Fort Lauderdale.

Maximum Allowable Speeds - The maximum allowable freight speed on this segment is 45mph (Class 4 track), with no permanent speed restrictions.

Track Construction - The mainline track in this segment is built with 132 lb CWR installed in 1977. Ojus Siding is built with 115 lb CWR installed in 1979, except for the turnout at South Ojus which features 136 lb rail replaced in 2003. The tracks are maintained to FRA class 4 standards.

Signaling and Train Control - This segment is equipped and dispatched with Automatic Train Control (ATC).

Grade Crossings - There are 33 grade crossings in this segment. All 33 are equipped with the standard flashers, bells, and gates. Fifteen also have cantilevers over the roadway.

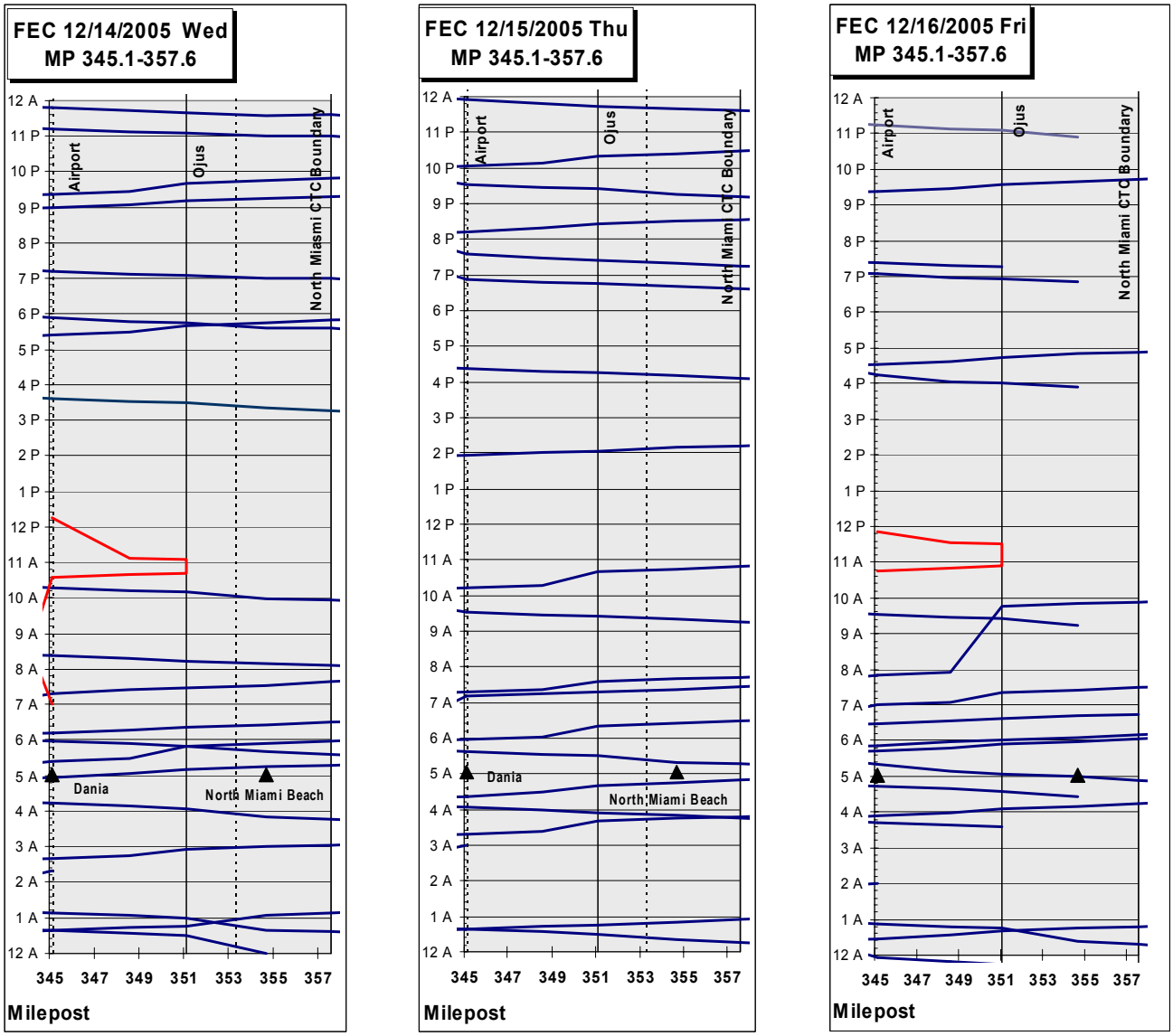
Traffic Patterns - Figure 2.2 illustrates traffic patterns on Segment 4 for three representative days. Road trains are shown in blue. Local trains shown in red.

The charts show local train activity on Wednesday and Friday, but not Thursday. Road train traffic density tended to be greatest between 6:00pm and 8:00am. This pattern is fairly consistent throughout the study period. On the three representative days, the density of road train traffic was greatest during the overnight period. An average of 8 trains per day operated over the segment between midnight and 6:00am.

Table 2.4
Typical Freight Traffic Densities by Time of Day (December 14-16, 2005)

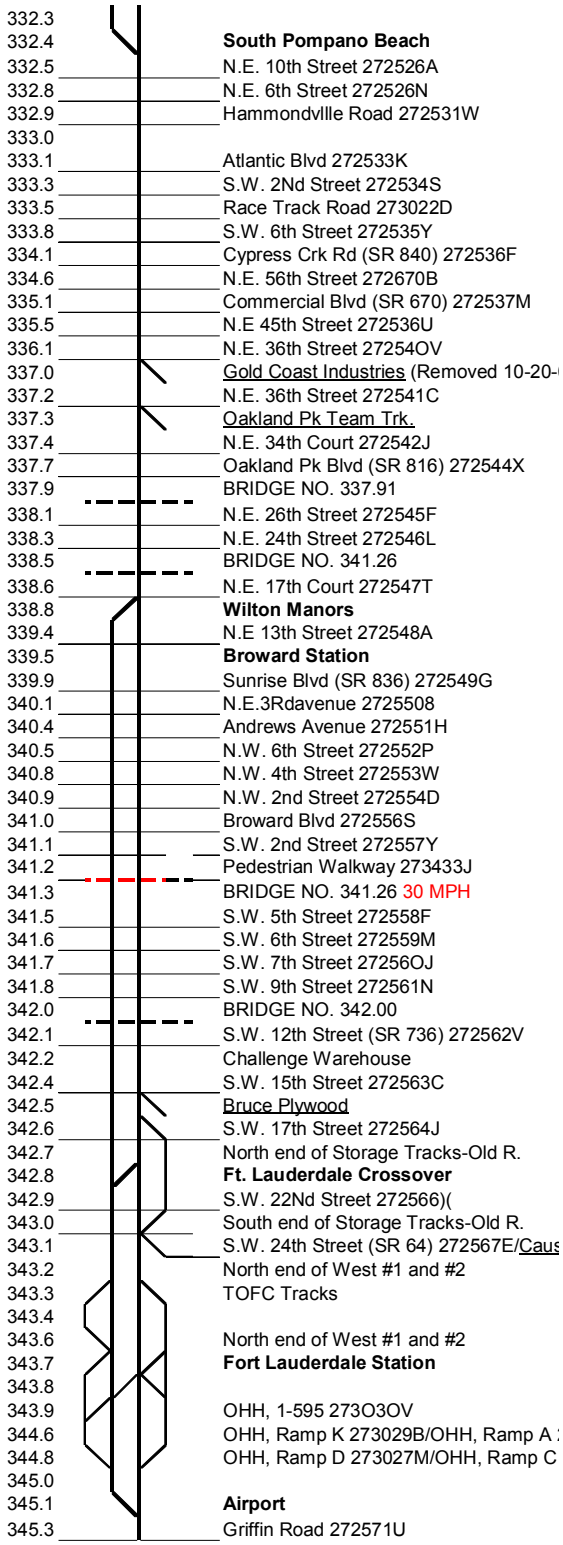
Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.3	24	12	12	0
6am to 9am	3	1.1	10	2	8	0
9am to 4pm	7	0.4	8	5	3	2
4pm to 7pm	3	0.9	8	6	2	0
7pm to Midnight	5	1.0	15	10	5	0

Figure 2.2
String Lines for Segment 4



Segment 5: Airport Interlocking to South Pompano Beach

The segment between Airport Interlocking (MP 345.10) and the south end of Pompano Beach siding (MP 332.40) is a busy 12.7-mile section of single track railroad with an extended siding passing through Fort Lauderdale Yard with numerous crossovers. Most traffic on the FEC passes through Fort Lauderdale, to and from FEC's Miami facilities. However, several predominantly intermodal (also carrying express and general merchandise) trains a day terminate or originate at Fort Lauderdale. Two local trains are based in Fort Lauderdale. Fort Lauderdale yard includes the turnout for Port Everglades to the east. The facilities at Fort Lauderdale include a TOFC ramp and numerous yard tracks for train make up and switching.



Track Configuration and Sidings - The single track railway has a long 6.3-mile siding that functions almost as a second main track in the busy section between Airport (MP 345.1) and Wilton Manors (MP 338.8). There is a single crossover known as Fort Lauderdale Crossover in the siding at MP 342.8, at the north end of the yard.

There are other, shorter sidings off the main tracks in the Fort Lauderdale area. There are sidings on both sides of main tracks between MP 344.8 and 343.2. On the east side, the sidings are reportedly used for storage, train make up and loading/unloading TOFC cars. FEC documentation is less precise on the uses of the sidings to the west. Between MP 342.9 and MP 342.6, there is an 'old storage track' to the east of the main track.

There are no other sidings in the area, but there are industrial leads at MP 343.1 leading to Causeway Lumber, MP 342.4 (Bruce Plywood), MP 337.3 (Oakland Park Team Track), and MP 337.0 (Gold Coast Industries). During a February 2006 field trip, a single tank car was observed at the Oakland Park Team Track. The siding for Gold Coast

Industries is reportedly inactive at this time as the owner seeks a new tenant for this property.[41]

Interlockings and Turnouts - The segment has three interlockings at Airport, Fort Lauderdale Crossover, and Wilton Manors. The main track has 12 turnouts, including entry and exit to double track sections; the main siding has nine turnouts. The single-track section has two turnouts, both trailing northbound moves.

Traffic and Operations - Fort Lauderdale Yard is serviced daily by two train pairs (Trains 117 and 218, and Trains 123 and 224). Train 117 was generally observed to arrive at Fort Lauderdale at about 2:15am (± 0.5 hours). Train 218 generally left northbound at about 5:45pm (± 1.0 hour). Train 123 arrived at about 9:30am (± 2.0 hours), while Train 224 usually left Fort Lauderdale reliably at about 11:15pm. All trains serving Fort Lauderdale carry a mix of intermodal and general merchandise traffic. Intermodal traffic appears to account for 70% of traffic on the Fort Lauderdale trains.

FEC's "Report for local and work trains"[42] shows that three local jobs are based in Fort Lauderdale. Two were observed to operate on the main line, one for the north side (Train 960) and the other for the south side (Train 965). According to an enthusiast website, Train 970 is the intermodal ramp switcher and never leaves the yard.[43]

- **Train 960 –** The north side local, usually Train 960, was observed to serve on-line customers north to Pompano, sometimes extending further north to Villa Rica. The operating window for Train 960 was quite variable, but tended to operate on the main line between 8:00am and 4:00pm. FEC's report showed the on-duty time at 5:00am every weekday, 3:30am on Saturdays, and between 8:00am and 9:00am on Sundays, while off-duty time varied between 3:00pm and 4:55pm (1:00pm on Saturday, 17 December). During the study period, it was observed typically to depart Fort Lauderdale or Airport at about 9:00am (range: 7:00am to 10:15am). The local reached its run-around point at about 11:00am (range: 9:00am to 2:45pm), and began the return trip at 2:00pm (range: 10:00am to 4:30pm), returning to base at 3:30pm (range: 11:00am to 6:00pm). On average, the train took 2½ hours to reach its destination (range: ¼ to 5¼ hours), occupied the siding there for 3¼ hours (range: ¾ to 5¼ hours), and returned in 1¼ hours (range: ¼ to 4 hours). On Saturday, 17th of December, it was not observed on the mainline. Train 960 was observed to operate on the main line on seven of ten days sampled. In addition, on one day out of ten, Train 965 fulfilled this tour of duty.

- **Train 965 –** The south side local, usually Train 965, serves customers south to Ojus. The job is worked six days a week (Sundays through Fridays), but operated on the mainline less frequently. The data showed that it operated on the main line on Wednesday and Friday. Train 965 typically departed from Airport at about 10:45am (range: 10:30am to

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[41] For more information on local customers see Appendix B of this memorandum.
[42] Paper records titled "Report for local and work trains", revised October 31, 2005, was provided to us by the FEC on December 23, 2005 by McPherson. The data recorded partial local train activity for the period Sunday, December 11, to Sunday, December 18, 2005.
[43] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site.

11:15am). It reached Ojus at about 11:00am, and began the return trip at 11:45am, returning to base at 12:30pm (range: 12:00 noon to 1:00pm). The timing of this local tended to be less variable than the north side local. The customers served likely include Miron Lumber at Ojus, and A.D. Weiss in Hollywood. This local was observed to operate on the mainline on three of eight days.

All trains to and from Miami pass through Fort Lauderdale. Ten intermodal trains, eight rock trains, and six other trains were typically observed using this segment each weekday.

Maximum Allowable Speeds – North from the Airport Interlocking (MP 345.1) to MP 332.9, the maximum allowable speed for freight trains is 45 mph. From MP 332.9 to the north, it is 60 mph and continues at that level well beyond Pompano Beach. There is one 30mph permanent speed restriction at MP 341.26 for Bridge No. 341.26.

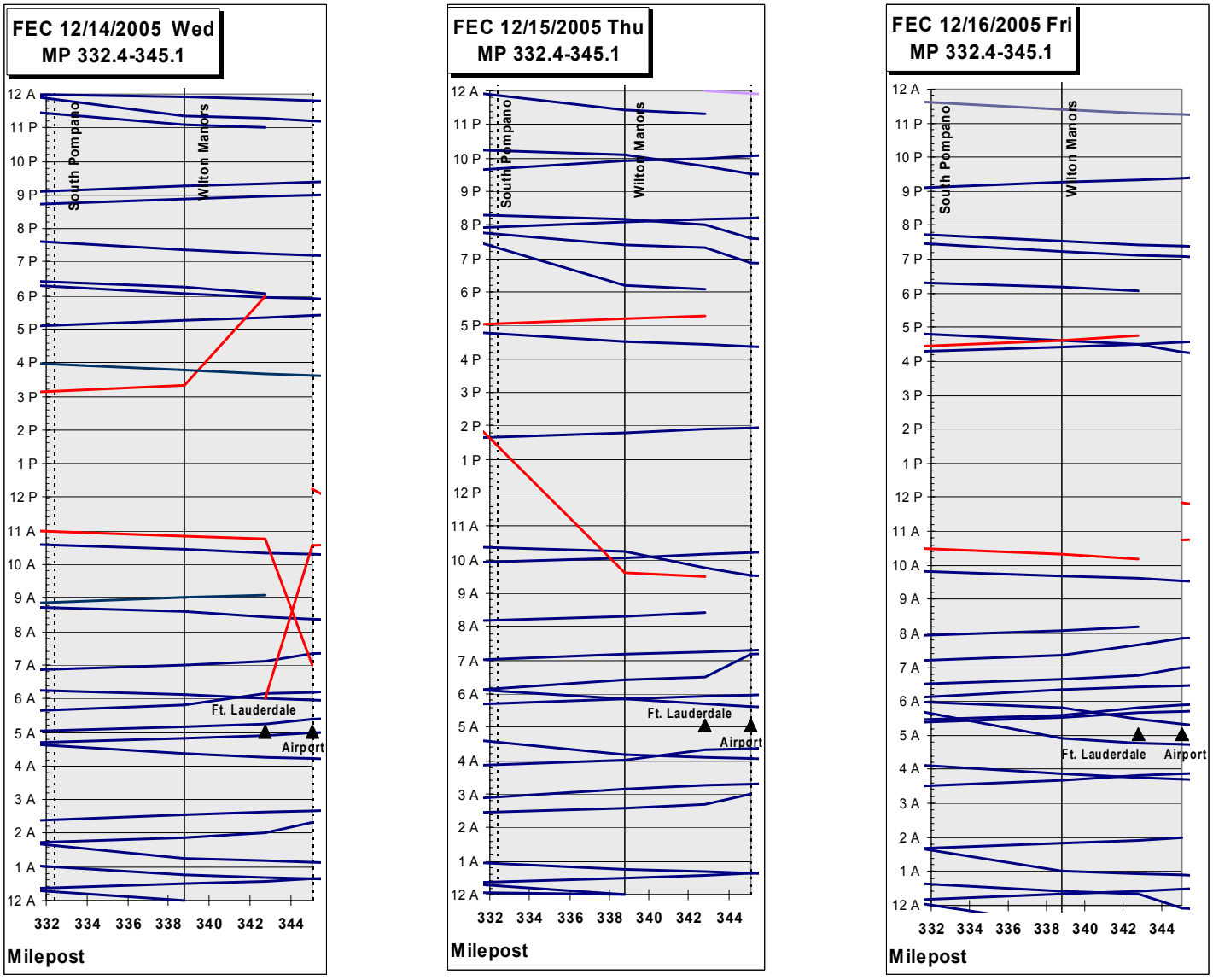
Track Construction – The mainline track in this segment consists of 132 lb continuously welded rail (CWR) installed in 1977. The tracks are apparently maintained to FRA class 4 standards, although the section through Fort Lauderdale has a 45 mph speed restriction.

Signaling and Train Control – This segment is equipped and dispatched with Automatic Train Control (ATC).

Grade Crossings – There are 37 grade crossings in this segment. Of these, 36 are equipped with the standard flashers, bells, and gates. Nineteen crossings also have cantilevers over the roadway. One crossing at NE 33th St. in Oakland Park is a pedestrian crossing. The type of protection equipment at this crossing is not indicated in FEC records reviewed by the study team.

Traffic Patterns – Figure 2.3 illustrates traffic patterns on three representative days (December 14, 2005 to December 16, 2005). Road trains are shown in blue. Local trains shown in red. The vertical line at MP 338.8 (Wilton Manors) indicates the north end of double track. North of Wilton Manors the railway is single track.

Figure 2.3
String Lines for Segment 5



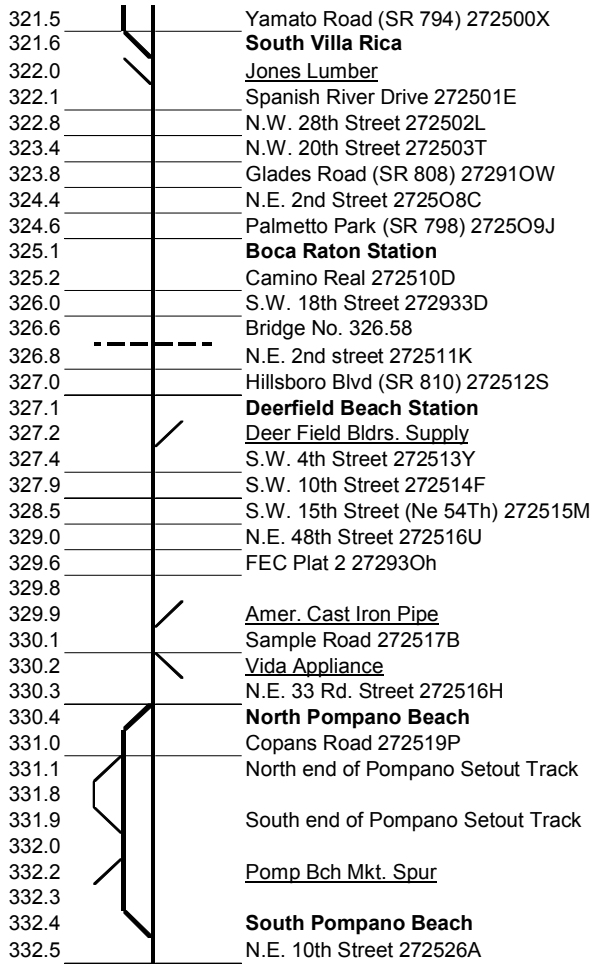
On the three representative days shown in Figure 2.3, the density of road train traffic was greatest during the overnight period. An average of 10 trains per day operated over the segment between midnight and 6:00am. Traffic density was lowest in the midday period.

Table 2.5
Typical Freight Traffic Densities by Time of Day (Dec 14-16, 2005)

Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.7	30	15	15	0
6am to 9am	3	1.4	13	11	2	2
9am to 4pm	7	0.3	6	6	0	3
4pm to 7pm	3	1.3	12	7	5	1
7pm to Midnight	5	0.9	14	10	4	0

Segment 6: South Pompano Beach to South Villa Rica

The segment between South Pompano (FEC MP 332.4) and the South Villa Rica (FEC MP 321.6) is a 10.8-mile section of single track railroad with a passing siding at Pompano. Most traffic on the FEC passes through this section to and from FEC's Miami and Fort Lauderdale facilities.



Track Configuration and Sidings - This section is single track with one passing siding at Pompano (2.0 miles long) and regularly used for train meets and run-around for local trains.

There are many industrial customers in this segment at MP 330.2 (Vida Appliance), 329.9 (American Cast Iron Pipe), 327.2 (Deerfield Builders Supply), and 332.0 (Jones Lumber). The Pompano Beach Market Spur is reportedly very active with freight customers. During a February 2006 field trip, five cars were observed in transit to the market; no cars were observed at Visa Appliances, 5+ cars were observed at American Pipe, one car was observed at the Builder's Supply, and one car was observed at Jones Lumber. A Rinker's Plant that is not a current customer at this location was observed at Glades Road. [44]

There is one bridge in this segment.

Interlockings and Turnouts - The segment has three interlockings at South Pompano Beach, North Pompano Beach, and South Villa Rica. The main track has seven turnouts. The siding at Pompano has five turnouts.

Traffic and Operations - All FEC trains destined for and originating from Miami and Fort Lauderdale use this segment. This segment also hosts one local train based in Fort Lauderdale.

Maximum Allowable Speeds - The maximum allowable freight speed on this segment is 60mph (Class 4 track), with no permanent speed restrictions.

0.1 _____

[44] For more information on local customers see Appendix B of this memorandum.

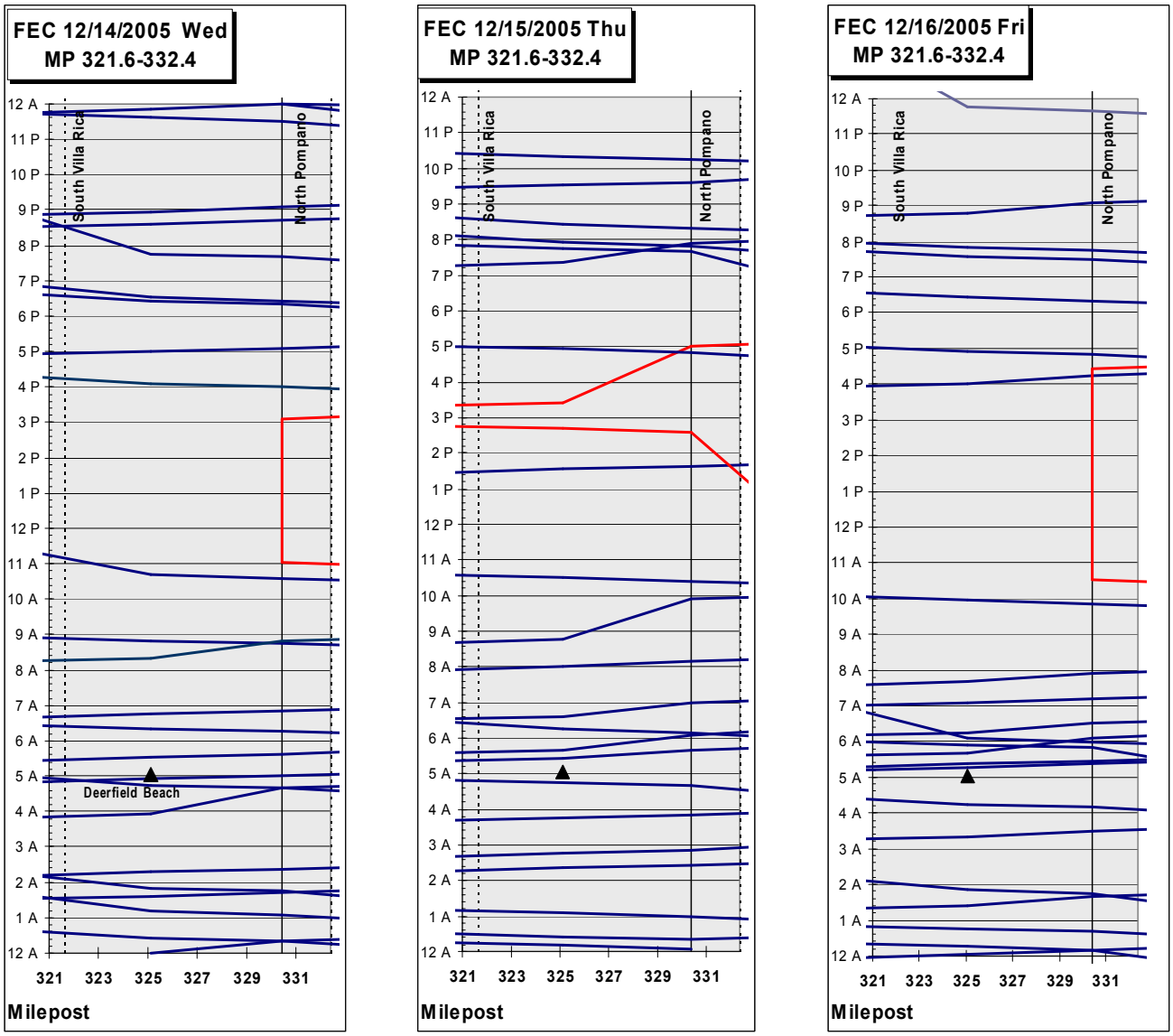
Track Construction - The mainline track in this segment is built with 132 lb CWR installed in 1977. Pompano Siding is built with 115 lb CWR installed in 1977, except for both turnouts which features 136 lb rail replaced in 2001.

Signaling and Train Control - This segment is equipped and dispatched with Automatic Train Control (ATC).

Grade Crossings - There are 18 grade crossings in this segment. All 18 are equipped with the standard flashers, bells, and gates. Of these, 14 also have cantilevers over the roadway.

Traffic Patterns - Figure 2.4 illustrates traffic patterns on three representative days. Road trains are shown in blue. Local trains are shown in red.

Figure 2.4
String Lines for Segment 6



On the three representative days, the density of road train traffic was greatest during the overnight period. An average of ten trains per day operated over the segment between midnight and 6:00am. Traffic density was lightest during the midday period.

Table 2.6
Typical Freight Traffic Densities by Time of Day

Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.6	29	13	16	0
6am to 9am	3	1.3	12	4	8	2
9am to 4pm	7	0.3	6	4	2	3
4pm to 7pm	3	0.9	8	6	2	1
7pm to Midnight	5	1.0	15	9	6	0

Segment 7: South Villa Rica to West Palm Beach

The 22.6-mile segment between South Villa Rica (MP 321.6) and West Palm Beach (MP 299.0) is a single track railroad with passing sidings at Villa Rica and Hypoluxo.

299.0	**West Palm Beach**
299.1	3rd Street 27242OE
299.3	Banydn Street 272421L/Clematis Street
299.4	Datura Street 272423A
299.5	Evernia Street 272424G/Fern Street 272
299.6	Gardenia Street 272426V
299.7	Hibiscus Street 272427C
299.8	Okeechobee West 272429R
299.9	Qkeechobee East (SR 704) 272430K
300.3	Palm Avenue 272431S
300.4	Park Place 272432Y
300.5	Flamingo Drive 272433F
300.6	Claremore 272434M
300.7	Ardmore Road 272435U
300.8	Westwood Road 272436B
300.9	Belvedere Road 272437H
301.0	(Hamilton Street) 272438P
301.1	Palm Beach Papers/Monceaux Road 27
301.4	Avenida Hermosa 272441X
301.5	El Vedado 272442E
301.6	Monroe Drive 272443L
301.7	Roseland Drive 272445A
301.9	OHH, Southern Blvd (SR 80) 272446G
302.0	Nottingham Blvd 272447N
302.5	Bunker Siding
302.6	Bunker Road 272449C
302.7	**Bunker Road Station**
303.2	Hunter Avenue 27245OW
303.3	Forest Hill Blvd (SR 802) 272451D
304.0	Gregory Road 272452K
304.1	Bridge No. 304.05
304.3	Oorthmore Avenue 272454Y
304.5	19th Avenue North 272455F
304.7	17th Avenue North 272456M
305.0	13th Avenue North 272457U
305.2	10th Avenue North 272458B
305.5	7th Avenue North 272459H
305.8	3rd Avenue North 27246OC
305.9	2nd Avenue North 272461J
306.0	Lucerne Avenue (SR 802) 272462R/Lak
306.1	William Thies
306.2	**Lake Worth Station**
306.5	6th Avenue South 272465L
306.9	10th Avenue South 272488T
307.1	12th Avenue South 272467A
307.5	Washington Avenue 272468G
307.6	Florida Public Utilities
307.7	Florida Public Utilities 272469N
308.1	Lantana Road (SR 812) 27247OH
308.3	West Ocean Avenue 272471P
308.4	Pine Street 272472W
308.9	Central Blvd 272473D
309.0	
309.1	Hypoluxo Road 272474K
309.2	**North Hypoluxo**
310.2	Miner Road 272475B
310.3	**South Hypoluxo**
310.8	N.E. 22nd Avenue (SR 5) 272476Y
311.3	N.E. 15th Avenue 272477F
311.6	Bridge No. 311.45
311.7	M. L. King Blvd 272478M
311.9	N.E. 6th Avenue 272479U
312.0	Petrolane
312.1	Boynton Bch Blvd (SR 804) 27248ON
312.2	**Boynton Beach Station**/Team Trk
312.3	East Ocean Avenue 272481V
312.6	S.E. 5th Avenue 272482C
313.0	S.E. 12th Avenue 272483.1
313.2	S.E. 15th Avenue 272484R
313.7	S.E. 23Rd Avenue 272485X
314.8	S.E. 36th Avenue 272488E
315.6	N.E. 14th Street 272487L
316.0	N.E. 8th Street 272488T
316.3	N.E. 4th Street 272489A
316.6	N.E. 2nd Street 272490U
316.7	N.E. 1st Street 272491B
316.8	Atlantic Blvd (SR 606) 272492H
316.9	**Delray Beach Station**
317.0	S.E. 1St Street 272669G
317.1	S.E. 2Nd Street 272493P
317.2	
317.3	S.E. 4th Street 272494W
317.9	S.E. 10th Street 272495D
318.0	Tarmac
318.4	Unton Blvd 272497S
319.4	Undell Blvd 272498Y
319.5	Bridge No. 319.55
319.6	**North Villa Rica**
319.9	Hidden Valley Blvd 272499F
320.0	
320.1	North Villa Rica setout track
320.2	
321.1	South Villa Rica setout track
321.5	Yamato Road (SR 794) 272500X
321.6	**South Villa Rica**

Track Configuration and Sidings – This section is single track with two passing sidings at Villa Rica and Hypoluxo. There are seven industrial customers in this segment. North from Villa Rica, the customers were: Tarmac at MP 318.0, Boynton Beach Team Track and Petrolane near Boynton Beach Station, Gator Culvert at Florida Public Utilities (MP 307.6), William Thies near Lake Worth Station, Bunker Siding near Bunker Road Station, and Palm Beach Papers on Monceaux Road at MP 301.1.[45] There are three bridges in this segment.

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[45] For more information on local customers see Appendix B of this memorandum.

Interlockings and Turnouts – The segment has five interlockings at North and South Villa Rica, North and South Hypoluxo, and at West Palm Beach. The main track has twelve turnouts, and the siding at Villa Rica includes a separate setout track.

Traffic and Operations – All FEC trains destined for and originating from Miami and Fort Lauderdale use this segment. This segment also hosts one daily local train based in Fort Lauderdale, and a second daily local train operates southwards from West Palm Beach. During a February 2006 field trip, five cars were observed at Tarmac. No cars were observed at the Boynton Beach Team Track. The Petrolane siding is actively maintained but reportedly seldom takes shipments by rail. The Florida Public Utilities siding also serves Gator Culvert. The Culvert is a regular rail user while the Utility is not at this time. William Thiess receives large (10+ cars) shipments of beer and wine. No cars were observed on the Bunker Road Siding. One car was observed at Palm Beach Papers.

West Palm Beach Local Trains – According to FEC data for the study week, the West Palm Beach switcher jobs are invariably worked with the same engine and three different crews. The second shift is annulled on days when traffic is light. The three shifts are numbered Train 945, 955, and 950 respectively. Typically, the crew shifts for the local switcher Train 945 runs from 2:00am to 10:00am; Train 955 from 10:00am to 6:00pm, and Train 950 from 5:00pm to 1:00am.

On most days during one of the three shifts, the yard switcher worked as a local train south to Villa Rica on the main line for pick-up and set-outs. The local will also work north to Camp Murphy as required, typically on a Saturday when Train 925 (Savannah South local) is annulled. On both Saturdays, the West Palm Beach local job was not observed to serve customers to the south.

The Palm Beach local was observed to operate on the main line on seven of eight days. It generally departed from West Palm at about 12:30pm (range: 11:00am to 3:15pm). It reached Villa Rica siding at about 1:00pm, and began the return trip at 1:45pm, returning to base at 3:15pm (range: 1:45pm to 5:00pm). The customers served likely include Palm Beach Papers, William Thies, Gator Culvert, Petrolane, Tarmac, as well as local customers on team tracks at Boynton Beach and Bunker Road.

Maximum Allowable Speeds - The maximum allowable freight speed on this segment is 60mph (Class 4 track) from MP 313.7 to MP 321.6; 50mph from MP 307.6 to MP 313.7; and 45mph from West Palm Beach to MP 307.6. There are two permanent speed restrictions at MP 311.4-311.5 and 311.5-311.6, which are associated with the curvature there.

Track Construction - The mainline track in this segment is built with 132 lb CWR installed in 1976 and 1977. Villa Rica siding is built with 115 lb CWR installed in 1949, with its north end turnout having been replaced with 136 lb rail in 2001. Both turnouts at Hypoluxo and the turnout at Boynton Beach Team Track was replaced with 136 lb rail in 2001-2003. Some sections of rail between West Palm Beach and North Hypoluxo have been replaced starting in 1989 until as recently as 2003. The tracks are maintained to FRA class 4 standards.

Signalling and Train Control - This segment is equipped and dispatched with Automatic Train Control (ATC).

Grade Crossings - There are 71 grade crossings in this segment. All 71 crossings are equipped with the standard flashers, bells, and gates. Of these, 32 also have cantilevers over the roadway.

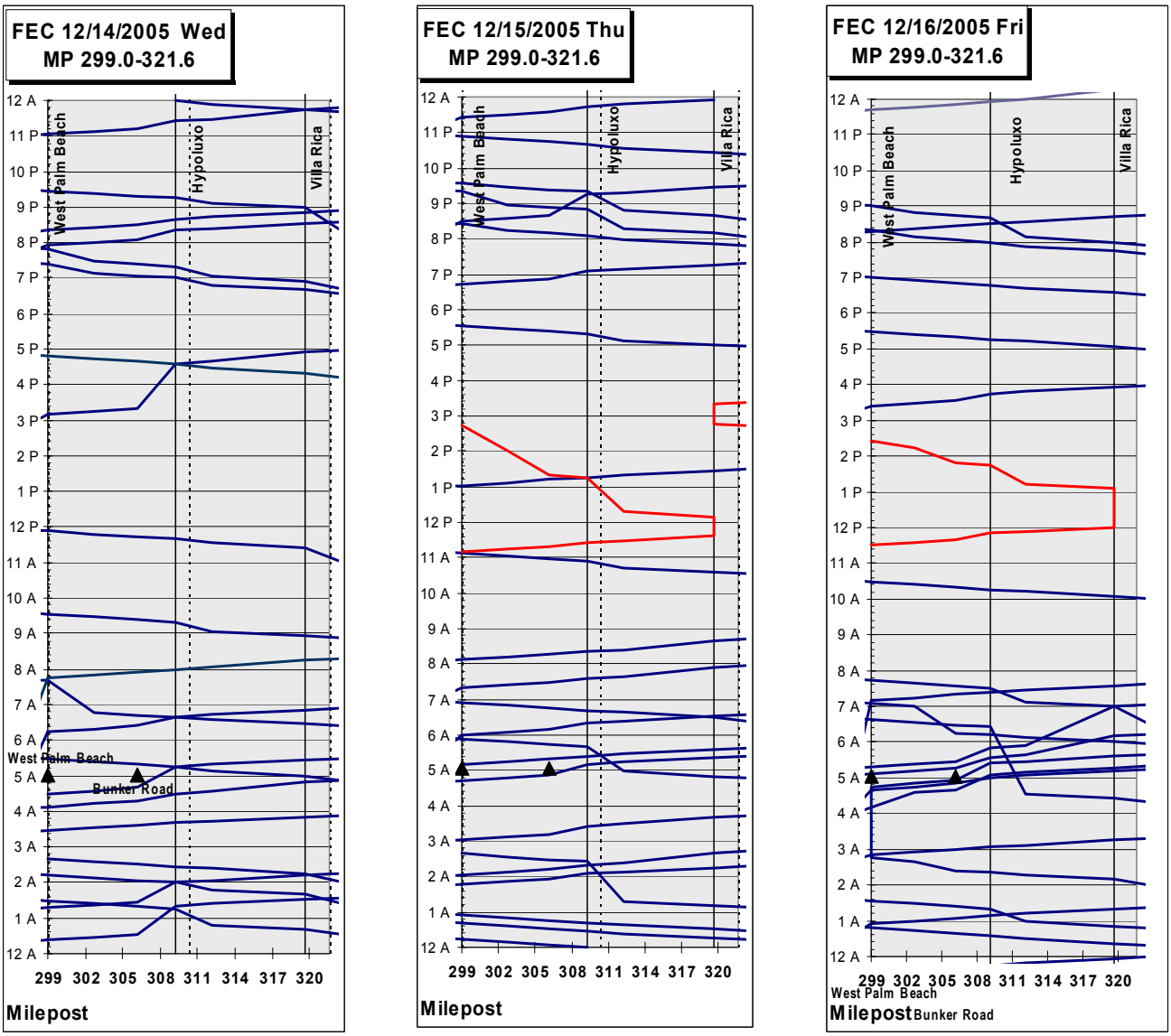
Traffic Patterns - Figure 2.5 illustrates traffic patterns on three representative days. Road trains are shown in blue. Local trains are shown in red.

On the three representative days, the density of road train traffic was greatest during the overnight period. An average of 10 trains per day operated over the segment between midnight and 6:00am. Traffic was lightest during the midday period.

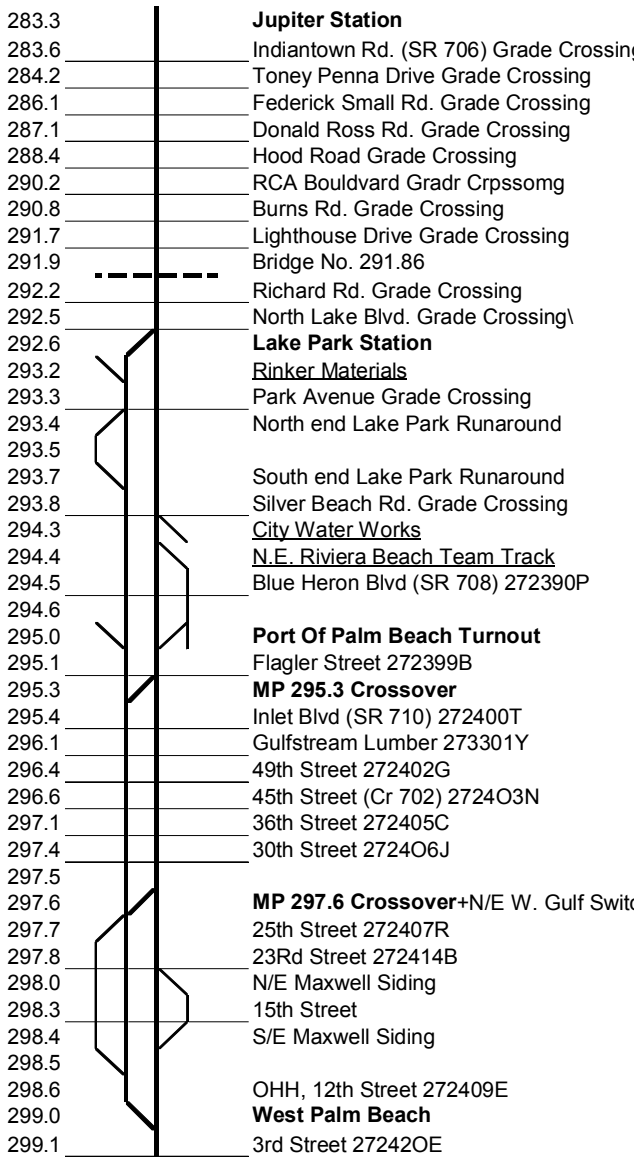
Table 2.7
Typical Freight Traffic Densities by Time of Day

Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.7	30	14	16	0
6am to 9am	3	1.4	13	6	7	0
9am to 4pm	7	0.3	7	4	3	3
4pm to 7pm	3	0.9	8	6	2	0
7pm to Midnight	5	1.3	19	11	8	0

Figure 2.5
String Lines for Segment 7



Segment 8: West Palm Beach to Jupiter
The segment between West Palm Beach (MP 299.0) and Jupiter (MP 283.3) is a 15.7-mile section of single track railroad with a 6.4-mile long passing siding between West Palm Beach and Lake Park. This is a busy section of the FEC with the siding functioning like a second main track. Most traffic on the FEC passes through this section to and from FEC's Miami and Fort Lauderdale facilities. This section is also host to three local trains.



Track Configuration and Sidings – This section is single track with one passing siding between West Palm Beach and Lake Park. There is a turnout for Port of Palm Beach at MP 295.0. Three industrial customers with dedicated sidings are found along the 6.4-mile siding section. The customers from south to north are: Lewis Terminals near the Port of Palm Beach turnout, City Water Works at MP 294.3, and Rinker Materials near the north end of the siding. [46]

Interlockings and Turnouts – The segment has four interlockings at West Palm Beach, MP 297.6 Crossover, MP 295.3 Crossover, and at Lake Park. The main track has nine turnouts. The siding has ten turnouts. There are four subsidiary sidings in this segment: Gulf Switch Lead and Lake Park Runaround on the West side of the alignment (connected to the siding), and Maxwell Siding and Riviera Beach Team Track on the East side of the alignment (accessed from the main track).

Traffic and Operations – All FEC trains destined for and originating from Miami and Fort Lauderdale use this segment. This segment also hosts three local trains based in West Palm Beach. All trains to and from Miami pass through West Palm Beach. Fourteen intermodal trains, eight rock trains, and six different extras were typically observed using this segment on a weekday.

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[46] For more information on local customers see Appendix B of this memorandum.

Maximum Allowable Speeds – The maximum allowable freight speed on the main track through the yard at West Palm Beach is 45mph. North of the yard, at MP 296.60, the speed limit is raised to 60mph. There is a permanent speed restriction of 55mph at MP 291.9-292.1 due to line curvature.

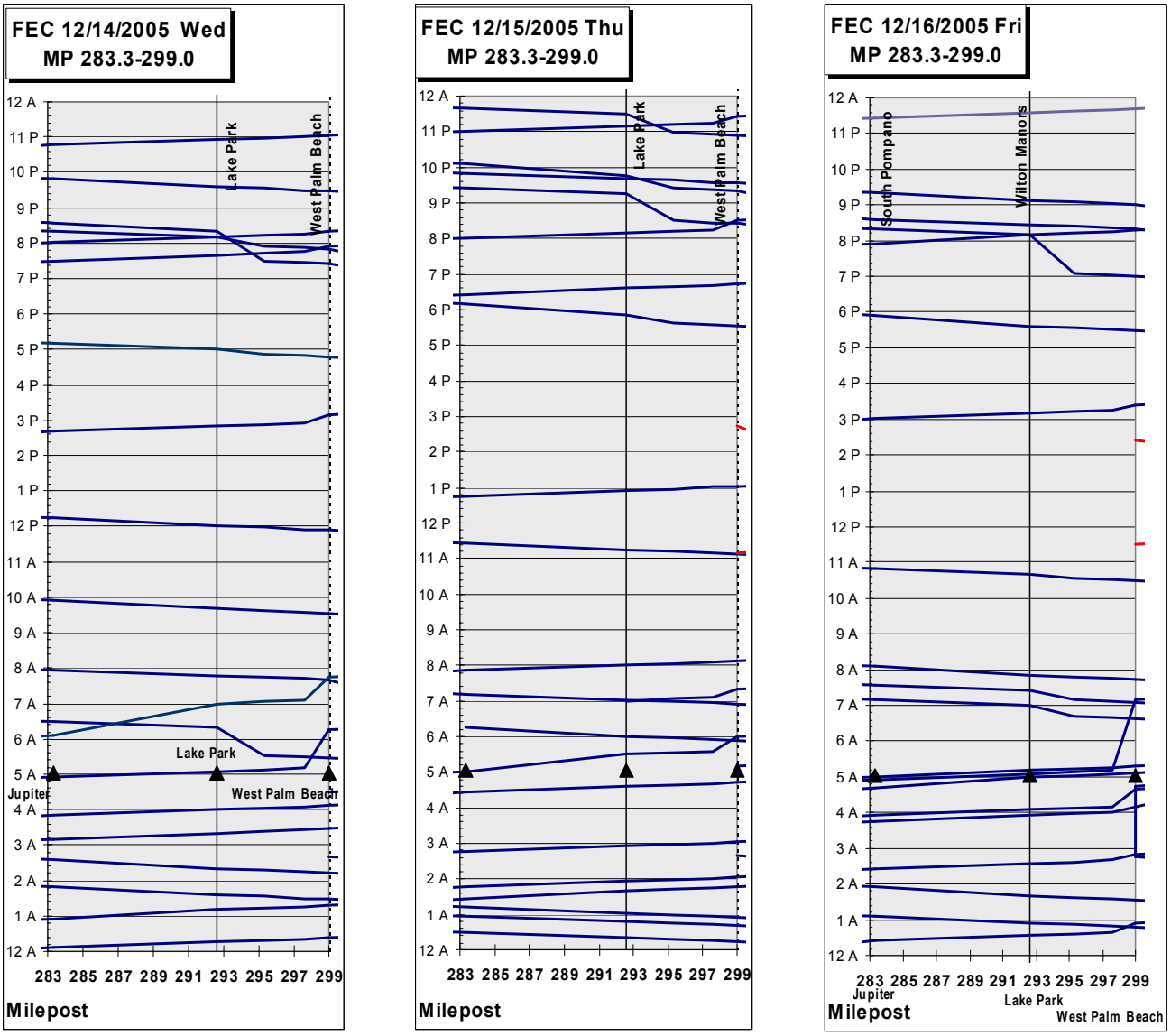
Track Construction – The mainline track in this segment between Lake Park and West Palm Beach is built with 132 lb CWR installed in 1976. The long siding at West Palm Beach was also constructed in 1976 with 112 lb rail. The turnout at West Palm Beach was renewed in 1996 and 2001. North of Lake Park, the rail consists mostly of 112 lb rail laid in 1968 and 1975 with spots where renewals have been carried out in 1989-1996 with 132 lb and 136 lb rails. Some of these renewals seem to be associated with curvature. Near Jupiter, 132 and 136 lb rails have been inserted in 2002-2003. All tracks are maintained to FRA class four standards.

Signaling and Train Control – This segment is equipped and dispatched with Automatic Traffic Control (ATC).

Grade Crossings – There are 23 grade crossings in this segment. Of the 23 crossings, 14 feature cantilevers in addition to the standard flashers, bells, and gates provided on the nine remaining crossings.

Traffic Patterns - Figure 2.6 illustrates traffic patterns on three representative days. Road trains are shown in blue.

Figure 2.6
String Lines for Segment 8



The charts show no local train activity. On the three representative days, the density of road train traffic was greatest during the overnight period. An average of 8.3 trains per day operated over the segment between midnight and 6:00am. Road traffic was also high during the morning commuter peak between 6:00am and 9:00am.

Table 2.8
Typical Freight Traffic Densities by Time of Day

Time period	Hours	Avg. Road Trains per Hour	Total Road Trains	NB Road Trains	SB Road Trains	Local Train Movements
Midnight to 6am	6	1.4	25	8	17	0
6am to 9am	3	1.2	11	7	4	0
9am to 4pm	7	0.3	7	4	3	0
4pm to 7pm	3	0.4	4	3	1	0
7pm to Midnight	5	1.1	16	9	7	0

CHAPTER THREE: DETAILED ANALYSIS OF STUDY AREA TRAIN OPERATIONS

This description of Florida East Coast (FEC) operations is based on data from nine consecutive representative days of operations reports provided by the FEC for the period Friday, December 09, 2005 to Monday December 19, 2005. The operations data included:

- daily screenshots[47] showing "stringlines" from the FEC's Digicon system; and
- a series of eight "Morning Reports" for the same period[48] designed for use by the senior management;
- eight pages of paper records entitled "REPORT FOR LOCALS AND WORK TRAINS" that recorded partial local train activity for the period.[49]

KKO also used supplemental information including the FEC Railway Rule Book, FEC System Timetable No.37, FEC Engineering Department Condensed Track Chart and Crossing Guide (Jan. 1, 2004), Meeting Minutes from meetings with FEC, and several e-mails from Charles R. Lynch.[50] Information from two rail enthusiast websites, the "Florida East Coast Railway Society", [51] and the "FEC Page 2", [52] were also used to inform the analysis.

The study area for this portion of the analysis is defined as the FEC mainline between the north end of Port Sewall siding (FEC location North Port Sewall) at MP 263.2 and the entry point of Hialeah Yard (West of Miami) at MP 369.2, totaling 106 miles of predominantly single-track railroad.[53] One option for the proposed commuter rail service would leave the FEC mainline alignment at Little River Jct. (MP 360.7) and proceed 6.2 miles into downtown Miami and 7.1 miles to the Port of Miami.

Road Trains

In December of 2005, the available data indicates that on a typical weekday the FEC operated 12 to 13 northbound and 11 to 14 southbound road trains. One train in each direction did not

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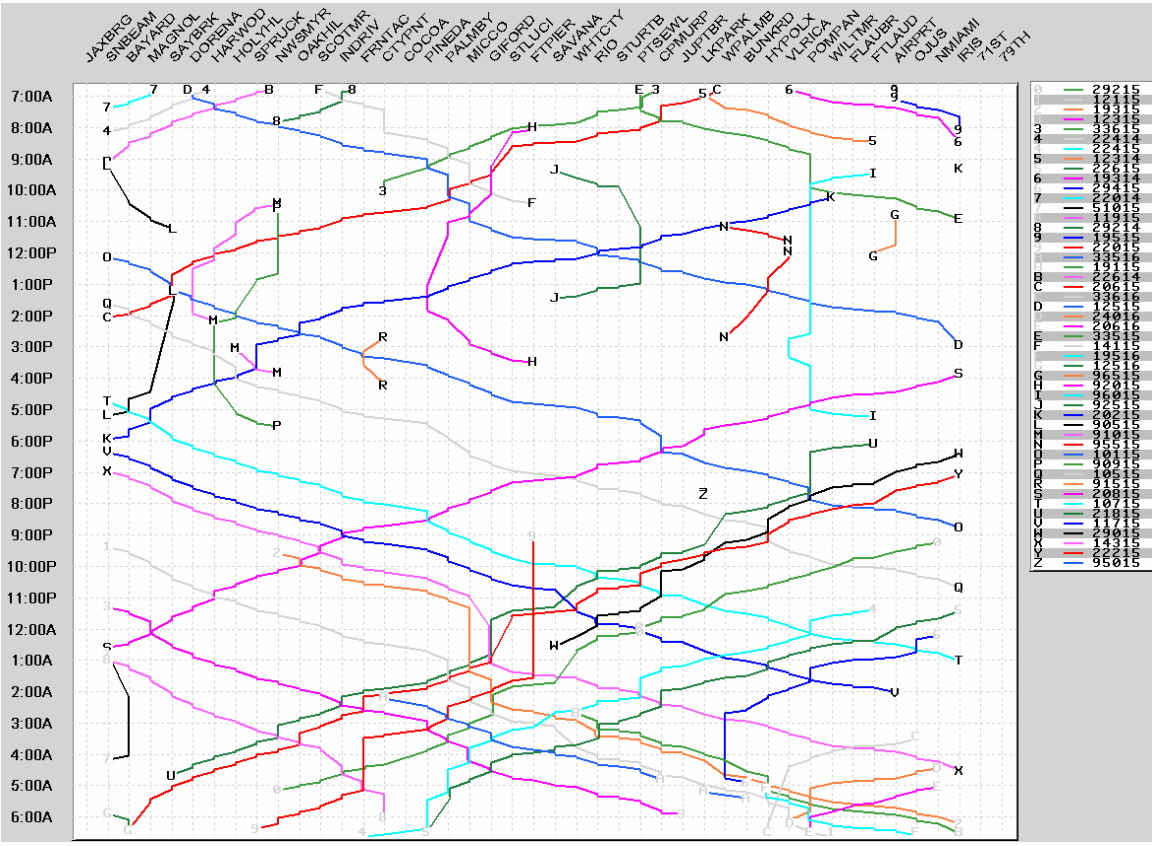
[47] The track occupancy data is derived directly from the signal system. There was one seven-hour gap on the early hours of Tuesday, December 13, 2005.
[48] covering the period Sunday, December 11, 2005 to Sunday, December 18, 2005.
[49] covering part of all activities occurred over the period Sunday, December 11, to Sunday, December 18, 2005.
[50] Vice President, Transportation, at the Florida East Coast Railway. All operating patterns inferred herein are based on KKO analysis of the available data and relate to the railroad operations as observed. It does not represent any official FEC position on how the railroad is, or should be, operated.
[51] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site, updated October 13, 2005 at *http://www.fecrs.com/svc_plan.html*
[52] Source: "Florida East Coast Railway – Jacksonville to Riviera Beach" fan site, *http://www.trainweb.org/brettrw/fec/fec.html#schedule*
[53] The proposed commuter rail service under study extends northward only to Jupiter Station (MP 283.3).

operate in the study area.[54] Of the 27 possible trains operated, 13 trains were observed to be operating on a daily basis.[55] Operations of the remaining 14 trains were more sporadic.

Figure 2.1
Sample FEC Dispatcher's Console screenshot
(Thursday-Friday, December 15-16, 2005)



Among the regularly scheduled trains, the car type data indicated that five southbound trains and four northbound trains carried intermodal and express cargo. Four southbound and five northbound trains are in consistent, but not daily, service, engaged wholly in the local transport of aggregates (rock) and associated empty equipment movements. The remaining nine trains were of a generally mixed nature, carrying multiple types of traffic including intermodal and express, merchandise, automobiles, and rock.

The trains that did not operate daily mostly appeared to operate on a regular weekly schedule. Some trains operated daily except Sundays; some operated Mondays thru Fridays. Most empty southbound rock trains operated Wednesdays thru Saturdays. Four times during the study

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[54] Train 119 originates in Bowden and terminates at Fort Pierce, north of the study area. Vice-versa, its opposite number (Train 220) originates at Fort Pierce.

[55] The study period consists of data from eight consecutive Morning Reports (covering ten days' operations including incomplete days). A train is considered to have operated "daily" if it was observed to operate seven or more times during the study period.

period, a southbound autorack train carrying finished autos to market in Miami (and the northbound opposite number conveying empty equipment) operated with irregular departure days and times. It appears that most merchandise movements are southbound with empty equipment ferried northward in mixed consists with intermodal traffic and empty autoracks. A summary of road trains operated is presented in Table 3.1.

Table 3.1
Study Area Road Trains in the Study Area

Southbound				
Type of train	**Trains operated per typical day**	**Train Numbers**	**Schedule Variability[56]**	**Average Train Length (feet)**
Daily Intermodal [57]	5	101, 107, 117, 121, 123	Low to Medium	8,000
Relief Intermodal	1	105 (Mo-Th)	Low	7,000
General Purpose Freight Train [58]	1	125	Medium	8,000
Automobile	0.5	141, 143 (Extras)	High	8,500
Empty Rock [59]	3	191, 193, 195 (We-Sa)	Low to Medium	4,500
Unit Empty Rock	1	335	Medium	5,000
Total	**11.5**			
Northbound				
Type of train	**Trains operated per typical day**	**Train Numbers**	**Schedule Variability**	**Average Train Length (feet)**
Daily Intermodal	4	206, 218, 222, 226	Medium	7,000
Relief Intermodal	2	202, 224 (Tu-Sa)	Low to Medium	8,000
Daily Rock	1	208	Low	6,500
Empty Automobile	0.5	240, 242 (Extras)	Medium to High	8,500
Rock	3	290, 292, 294	Medium	4,500
Unit Rock Train	1	336	Medium	5,000
Total	**11.5**			

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[56] Schedule variability is defined as follows: if the standard deviation of the train's arrival time (in hours) at Port Sewall is less than one hour, it has a low schedule variability. If it is more than an hour but less than two hours, the train has a medium schedule variability. If it is more than two hours, the train has a high schedule variability.
[57] Defined as having greater than 50% by car count of intermodal and express traffic.
[58] A train was deemed to be a general purpose freight train if it carried less than 33% of intermodal traffic, and more than 10% of traffic in every other category (auto racks, rock cars, and others types of cars).
[59] A train was defined as a rock train if it carries more than 80% of rock cars on average.

FEC Train Numbering

Florida East Coast assigns odd numbers to trains in the southbound direction, and even numbers to trains in the northbound direction.[60] Southbound road trains carrying intermodal or general merchandise are generally numbered in the 10x, 11x, and 12x number range. Corresponding northbound trains are numbered in the 20x, 21x, 22x number range. The sole unit rock train operated on the FEC is numbered 335 (southbound empty)/336 (northbound loaded). Non-unit train rock trains (or empties) are numbered in the 19x/29x range. Work trains are numbered in the 4xx series, and local trains are numbered in the 9xx series.

Southbound extra trains are numbered beginning with 141 incremented by two for each additional extra job that day; e.g. 141 is the first extra of the day after midnight, 143 the second extra, and so on. The only extra trains observed in the data were the automobile trains. Trains carrying other goods reportedly exist.[61] The corresponding northbound trains are numbered in the 24x range, beginning with 240. Train dispatching priority does not seem to correspond with train numbers, although express (UPS) cargoes tend to be carried on trains numbered 12x/22x and below.

Patterns in Train Delay

The data from the FEC's Morning Report[62] was analyzed for information on typical train delays. The reports show all events that impeded a train's progress *after* it left its initial terminal.

Of all trains analyzed in the study period, 23% operated with no delays south of Port Sewall. On average, each train was delayed by 33 minutes in the study area, and encountered 1.7 delay events. The maximum delay minutes suffered by a single train was 269 minutes from 5 delay events, while the maximum number of delay events suffered by a single train was 6 events costing a total of 209 minutes.

The most common delays were meets and passes constituting 43% of all delay events and 65% of delay minutes. The average delay for a meet and pass was almost 30 minutes.[63] Slow orders were the next most common cause of delays constituting 38% of all delay events but a smaller fraction of delay minutes since the duration of each delay was low. Local work by road trains, picking-up and setting-out cars was the next most common contributor to delay minutes, with an average of 45 minutes of delay per event. A total of 19 crew change delays were reported but the crew changes were generally well executed each averaging only 12 minutes of delay.

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[60] FEC also appends the date of origination to the train number for reporting purposes. Thus, FEC train 10106 is Train 101 originated on the sixth of the current month.
[61] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site.
[62] The observations presented in this section is based on the official delays reported in the Morning Report between December 9, 2005, and December 19, 2005.
[63] It is understood that some of FEC's trains are operated as "meet me" trains, where a train swaps crew with its opposite number during a train-meet approximately half-way between the origin and the destination. A crew swap often consumed more time than a simple train meet, but enabled the engine crew to return home the same day. {Stagl, Jeff. "Florida East Coast and Beyond", *Progressive Railroading* interview with Charles R. Lynch, September 2004, p.42.}

Table 3.2
Observed Delays by Type of Delay in Study Area

Delay Type	Delay Events		Delay Minutes		Average Duration (Minutes)
	Number	Percent of Total	Number	Percent of Total	
Meets and Passes	125	43%	3,588	65%	28.7
Slow Order – Disturbed Track	108	38%	648	12%	6
Set-out and Pick-up Cars	8	3%	360	7%	45
Crew Change [64]	19	7%	235	4%	12.4
Terminal Delay	9	3%	235	4%	26.1
Form T – Grade Crossings	11	4%	110	2%	10
Auto on Tracks	1	0%	95	2%	95
Detector Stops	2	1%	85	2%	42.5
Track Light – Form S	2	1%	85	2%	42.5
Mechanical Train Defect	1	0%	35	1%	35
Yarding Train	1	0%	25	0%	25
Other[65]	1	0%	25	0%	25
Totals	**288**	**100%**	**5,526**	**100%**	**19.2**

Of all trains operated, Train 125 was least likely to be delayed in the study area, followed by Train 117 and Train 101. These trains typically operated over the study area during the day when the opposing (northbound) traffic is light. It appears that the FEC dispatchers typically gave higher priority to southbound traffic. The trains that are most likely to be delayed were Trains 218, 292, 224, 202, and 335. Trains 218, 292, and 202 showed pick-up and set-out delays during the study period. Train 224 had many meet-pass delays, and Train 335 appeared to have had low dispatching priority.

Grade Crossings

Although FEC has a high number of grade crossings, only 19 grade-crossing related delay events[66] throughout the FEC were noted for the 168 trains observed on the entire FEC during the nine-day study period. The 168 trains made more than 80,000 grade crossings in this time. Eighteen of the crossing delays were Form T events – where the dispatchers issued a warning to engineers because the crossing gates may not be correctly operative. The remaining delay event (95 minutes in duration) was due to a report of an automobile on the tracks.[67] There were no grade crossing accidents during the study period to the best of our knowledge.[68]

Local Trains

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[64] That do not coincide with a train meet.
[65] Train 121 on December 12, 2005 apparently had an accident near Lake Park in the early hours of the morning; follow-on delays are shown.
[66] Twelve of which were inside the study area boundaries.
[67] A total of 50,000 train miles were operated during the sample period and 19 grade crossing incidents. The rate of grade-crossing related delays can be estimated at one delay per 2,600 train miles, or one delay every 4,200 times that a train must traverse across a highway alignment.
[68] The nature of the Train 121 accident on December 12, 2005 is not indicated in the material provided by FEC.

The Florida East Coast Railway typically operates two daily local trains in the study area on the main line. Although there are six scheduled local 'jobs' in the study area, only two of the jobs regularly venture out onto the main line, away from the immediate vicinity of their originating yards and branch lines. A seventh local job reportedly operates in Hialeah Yard but was not observed to occupy the main line during the study period. On the Southern end of FEC, road trains were typically observed to operate at night. Local and work trains tended to operate during the midday period, when potential interference with road trains would be minimized. Local trains generally make round-trips to and from the yard where they are based. In some cases, however, trains numbered in the 9xx (local) range were observed to move locally, but did not appear to return to the originating yard. Some local trains were operated on Saturdays or Sundays, but often on an abbreviated schedule. The one work train (Train 404) observed in the study period operated on Sunday, December 12th.

FEC's "Report for local and work trains"[69] shows three local jobs based in Fort Lauderdale, and three local jobs based in West Palm Beach. Two of the Fort Lauderdale jobs were observed on the mainline, one for the north side (Train 960) and the other for the south side (Train 965). At West Palm Beach, only one daily local train was generally observed.[70] Local trains observed that operated on the main line are listed in Table 3.3. Train 925 is a local train based in Savannah (MP 243.6, near Fort Pierce) that worked south to Camp Murphy (MP 280.9) most days, and may potentially interfere with trains operating in the study area.

Table 3.3
Local Trains Observed During the Study Period

Local Train	Train	Days operated [71]	Depart time	Outbound duration [72]	Arrive time	Run-around location	Siding duration	Leave time	In-bound duration	Tie-up time
Fort Lauderdale No	960	8 of 8	08:30	2:30	11:00	Pompano	3:15	14:15	1:15	15:30
Fort Lauderdale So	965	7 of 8	10:45	0:10	11:00	Ojus	0:45	11:45	0:45	12:30
Fort Lauderdale work	404	1 of 8	10:15	2:00	12:15	Pompano	1:00	13:15	1:15	13:30
West Palm	945[73]	6 of 6	12:30	0:30	13:00	Villa Rica	0:30	13:45	1:45	15:15
Savannah Local	925	6 of 6	09:15	3:15	12:30	Camp Murphy	2:30	14:45	1:45	16:30

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[69] Paper records titled "Report for locals and work trains", revised October 31, 2005, was provided to us by the FEC on December 23, 2005 by McPherson. The data recorded partial local train activity for the period Sunday, December 11, to Sunday, December 18, 2005.
[70] With the exception of December 15, when Train 950 worked from West Palm Beach to Lake Park and back, while Train 955 worked from West Palm Beach to Villa Rica and back later on that day.
[71] On some days the reports were incomplete. The "days operated" column shows the number of times the local train operated out of the number of times when the report was correctly filed. If the train was annulled, a correctly filed report will read "annulled". The train may or may not have been observed on the mainline on days when it was known to have operated.
[72] The average time the train took to move from the originating yard to the location where the train runs around. May include dwell time in intermediate sidings or customer premises.
[73] Some are numbered Train 950 or Train 955 depending upon time of day. Explained in text.

Fort Lauderdale North Side Local (Train 960) – The north side local at Fort Lauderdale, Train 960,[74] was observed on eight days to serve on-line customers north to Pompano, sometimes extending further north to Villa Rica. The operating window for Train 960 was quite variable, but tended to operate on the main line between 8:00am and 4:00pm. FEC reports show the on-duty time at 5:00am every weekday, 3:30am on Saturdays, and between 8:00am and 9:00am on Sundays, while off-duty time varied between 3:00pm and 4:55pm.[75] Train 960 was observed to operate on the main line on eight of ten days sampled. During the study period it typically departed Fort Lauderdale or Airport at about 9:00am (range: 7:00am to 10:15am). The local reached its run-around point at about 11:00am (range: 9:00am to 2:45pm), and began the return trip at 2:00pm (range: 10:00am to 4:30pm), returning to base at 3:30pm (range: 11:00am to 6:00pm). On average, the train took 2½ hours to reach its destination (range: ¼ to 5¼ hours), occupied the siding there for 3¼ hours (range: ¾ to 5¼ hours), and returned in 1¼ hours (range: ¼ to 4 hours). Based on this data, it would appear that there are active customer sidings in this segment facing both directions, and that none of the sidings have a daily switch.

Fort Lauderdale South Side Local (Train 965) – The south side local at Fort Lauderdale, Train 965, serves customers south to Ojus. The job is scheduled six days a week (Sundays through Fridays), but operated on the mainline less frequently. The data showed it operating on the main line on three days.[76] Train 965 departed from Airport at about 10:45am (range: 10:30am to 11:15am). It reached Ojus at about 11am, and began the return trip at 11:45am, returning to base at 12:30pm (range: 12:00 noon to 1:00pm).

Fort Lauderdale Intermodal Switcher (Train 970) – The FEC records indicated Train 970 operated Mondays through Fridays only, with consistent on-duty times of 2:30pm and off-duty times of between 12:00 midnight and 12:15am. It never registered a track occupancy on the main line.[77] According to one enthusiast website, Train 970 is the intermodal switcher and never leaves Fort Lauderdale yard. However, all of the locals are reportedly involved in some switching work.[78]

FEC indicated that six road trains (Trains 119, 220, 193, 292, 218, and 202) have regularly scheduled pick-ups and/or set-outs.[79] However, only three road trains (Trains 123, 218, 292) were observed to have picked-up or set-out cars en-route in the study area during the study period.

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[74] Except for Sunday, December 18, when Train 965 fulfilled this tour of duty.
[75] Except for Saturday, December 17 when the job went off duty at 1:00pm. On this day, and on Sunday, December 11, the job did not leave the yard and was thence not recorded on the track occupancy data.
[76] Friday, December 9, Wednesday, December 14, and Friday, December 16.
[77] Except on Tuesday, December 13, when it allegedly went to Villa Rica, never to return. This appeared to be a data reporting error as the string continued as Train 224 at Hypoluxo. Train 224 usually started at Fort Lauderdale.
[78] Source: "Florida East Coast Railway Society - F.E.C. Service Plan" fan site.
[79] Charles R. Lynch, e-mail correspondence "RE: String Lines and Morning Reports", Friday, December 23, 2005 at 7:48am.

West Palm Beach Yard/Switcher Jobs (Trains 945, 950, and 955) – According to FEC data from the study week, the West Palm Beach local jobs are always worked with the same engine and three different crews. The three shifts were numbered Train 945, 955, and 950 respectively. Train 955 is annulled on days when traffic is light. Typically, the first shift ran from 2:00am to 10:00am; 2nd shift from 10:00am to 6:00pm, and third shift from 5:00pm to 1:00am.

On most days, during one of the three shifts, the yard switcher worked south to Villa Rica to serve local customers. The local will also work north to Camp Murphy as required, typically on a Saturday when Train 925 (based at Savannah, Fla.) is annulled. On Saturdays, the West Palm Beach local job was not observed to serve customers to the south.

The West Palm Beach local was observed to operate on the main line on seven of eight days. The local generally departed from West Palm on the 2nd shift at about 12:30pm (range: 11:00am to 3:15pm). It reached Villa Rica siding at about 1:00pm, and began the return trip at 1:45pm, and returned to base at 3:15pm (range: 1:45pm to 5:00pm).

Table 3.4 Detailed Descriptions of Southbound Trains

Train	**Train 101**	**Train 105**	**Train 107**	**Train 117**	**Train 121**
Days of Operation	Daily	Less than Daily	Daily	Less than Daily	Daily
Train Type	Intermodal	Intermodal	Intermodal	Intermodal	Intermodal
Days Operated [80]	8	4	8	7	9
Origin	Bowden	Bowden	Bowden	Bowden	Bowden
Destination	Miami	Miami	Miami	Fort Lauderdale	Miami
Typical Time at Origin	13:25	14:01	16:50	18:05	21:17
Typical Time at Destination	22:42	23:07	1:43	2:15	7:32
Typical Trip Time Jupiter-Destination	2:18	2:36	2:17	1:38	2:37
At Port Sewall: Earliest Arrival Time	17:20	19:10	21:50	23:40	3:10
Average Arrival Time	19:49	19:56	22:51	0:02	4:20
Latest Arrival Time	23:40	21:00	0:55	0:55	6:30
Minimum Delay Minutes	0	0	6	0	6
Typical Delay Minutes	16	37	23	13	33
Maximum Delay Minutes	59	84	85	24	111

Descriptions of Individual Road Trains

In this section, characteristics of individual trains including days of operation, train type, number of days operated during the study period, origin, destination, typical time of origination and arrival at final destination, earliest/average/latest time of arrival and departure from the study area, maximum/minimum/typical delays observed are described. This information is gathered mainly from the daily reports, and is reported in summary form in Tables 3.4 and 3.6.

Table 3.4 (Continued) Detailed Descriptions of Southbound Trains

Southbound

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[80] Out of nine whole operating days over a ten day period.

Train	**Train 123**	**Train 125**	**Train 141**	**Train 143**	**Train 191**
Days of Operation	Less than Daily	Less than Daily	Less than Daily	Less than Daily	Less than Daily
Train Type	Intermodal	General Purpose Freight	Auto	Auto	Empty Rock
Days Operated	7	7	5	1	5
Origin	Bowden	Bowden	Bowden	Bowden	Fort Pierce
Destination	Miami/Fort Lauderdale	Miami	Miami	Miami	Miami
Typical Time at Origin	23:13	12:08	22:47	1:45	0:40
Typical Time at Destination	9:26	16:26	13:51	11:15	5:30
Typical Trip Time Jupiter-Destination	2:31	2:45	2:11	2:00	3:35
At Port Sewall: Earliest Arrival Time	5:15	9:40	1:10	N/A	23:00
Average Arrival Time	6:20	13:06	5:59	8:40	1:20
Latest Arrival Time	7:45	15:15	11:05	N/A	3:15
Minimum Delay Minutes	0	0	0	6	0
Typical Delay Minutes	38	9	11	6	30
Maximum Delay Minutes	87	36	27	6	67

Southbound

Train	**Train 193**	**Train 195**	**Train 335**
Days of Operation	Less than Daily	Less than Daily	Daily
Train Type	Empty Rock	Empty Rock	Empty Rock
Days Operated	5	5	9
Origin	New Smyrna	West Palm	City Point
Destination	Miami	Miami	Miami
Typical Time at Origin	22:40	6:18	1:57
Typical Time at Destination	7:41	9:00	9:49
Typical Trip Time Jupiter-Destination	3:29	N/A	4:12
At Port Sewall: Earliest Arrival Time	2:20	N/A	3:25
Average Arrival Time	3:37	N/A	5:02
Latest Arrival Time	4:40	N/A	7:00
Minimum Delay Minutes	6	6	10
Typical Delay Minutes	36	23	99
Maximum Delay Minutes	70	35	209

Train 101 - is an exclusively intermodal train, which generally left Bowden (MP 7.2, about 10 miles south of Jacksonville) at about 1:30pm (± 1.5 hours). It was observed to arrive at Miami at an average time of 10:45pm (± 3.0 hours). The average journey time from Bowden to Miami was observed as 9 hours and 30 minutes. It usually passed Port Sewall at about 8:00pm (± 3.0 hours) and sustained between 0 and 60 minutes (average 15 minutes) of delay in the study area. The delays resulted from 0 to 3 events (with an average of 1 event). The most common circumstances delaying Train 101 included meeting and passing other trains, and slow orders.

Train 105 - is an intermodal train generally carrying 60% intermodal traffic, which left Bowden at about 2:00pm (± 1.0 hours). It was observed to arrive at Miami at an average time of 11:15pm (± 1.5 hours). The average journey time from Bowden to Miami was observed as 9 hours. It usually passed Port Sewall at about 8:00pm (± 1.0 hours), and sustained between 0 and 90 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 3 events (with an average of 2 events). The most common circumstances delaying Train 105 included meeting and passing other trains, and slow orders.

Train 107 – is an exclusively intermodal train, which generally left Bowden at about 4:45pm (± 0.5 hours). It was observed to arrive at Miami at an average time of 1:45am (± 1.0 hours). The average journey time from Bowden to Miami was observed as 9 hours. It usually passed Port Sewall at about 11:00pm (± 1.5 hours), and sustained between 0 and 90 minutes (average 30 minutes) of delay in the study area. The delays resulted from 1 to 3 events (with an average of 2 events). The most common circumstances delaying Train 107 included meeting and passing other trains, and slow orders.

Train 117 – is an intermodal train (78% intermodal traffic), which generally left Bowden at about 6:00pm (± 0.5 hours). It was observated to arrive at Fort Lauderdale at an average time of 2:15am (± 0.5 hours). The average journey time from Bowden to Fort Lauderdale was observed as 8 hours. It usually passed Port Sewall at about 12:00 midnight (± 0.5 hours), and sustained between 0 and 30 minutes (average 15 minutes) of delay in the study area. The delays resulted from 0 to 2 events (with an average of 1 event). The most common circumstances delaying Train 117 included meeting and passing other trains, and slow orders.

Train 121 – Train 121 is an intermodal train (82% intermodal traffic), which generally left Bowden at about 9:15pm (± 0.5 hours). It was observed to arrive at Miami at an average time of 7:30am (± 1.5 hours). The average journey time from Bowden to Miami was observed as 10 hours and 30 minutes. It usually passed Port Sewall at about 4:30am (± 1.5 hours), and sustained between 0 and 105 minutes (average 30 minutes) of delay in the study area. The delays resulted from 1 to 4 events (with an average of 2 events). The most common circumstances delaying Train 121 included meeting and passing other trains, and slow orders.

Train 123 – is an intermodal train (88% intermodal traffic), which generally left Bowden at about 11:15pm (± 1.0 hours). It was observed to arrive at Miami or Fort Lauderdale at an average time of 9:30am (± 2.0 hours). The average journey time from Bowden to Miami or Fort Lauderdale was observed as 10 hours. It usually passed Port Sewall at about 6:30am (± 1.5 hours), and sustained between 0 and 90 minutes (average 45 minutes) of delay in the study area. The delays resulted from 0 to 2 events (with an average of 1 event). The most common circumstances delaying Train 123 included meeting and passing other trains, and slow orders.

Train 125 – is a general purpose freight train, carrying a mix of auto racks, empty rock cars, intermodal freight and general cargos, which generally left Bowden at about 5:30am (± 2.0 hours). It was observed to arrive at Miami at an average time of 4:30pm (± 2.5 hours). The average journey time from Bowden to Miami was observed as 11 hours. It usually passed Port Sewall at about 1:00pm (± 3.0 hours), and sustained between 0 and 30 minutes (average 15 minutes) of delay in the study area. The delays resulted from 0 to 2 events (with an average of 1

event). The most common circumstances delaying Train 125 included meeting and passing other trains, and slow orders.

Train 141/Train 143 – Extra Automobile Train - There were six southbound extra trains indicated in the study data, five of which were autorack unit trains. Of the automobile trains, four were numbered Train 141, and one was numbered Train 143. Southbound automobile extras operated on December 12, 14, 15,[81] 16, 17. All five extras were made up of exclusively automobile cars. The southbound automobile extras generally left Bowden at about 6:30pm.[82] It was observed to arrive at Miami at about 5:00am if it left ontime from Bowden. The average journey time observed was 12 hours. Typically, the train was observed to pass Port Sewall in the early hours of the morning, and sustain very little delays in the study area. The delays resulted from an average of 1 event. The most common circumstances delaying the southbound automobile extras included meeting and passing other trains, and slow orders.

Table 3.5
Unofficial List of Common Extras on the F.E.C.

Train	Origin Time	Origin Station	Arrive Time	Arrive Station	Description	Days Operated
14x	18:30	Bowden		Hialeah	monthly CSX coal train to Medley; CSX & NYC/Conrail coal hoppers from W.Va. coal region	Thursday or Friday
14x	00:01	Bowden	10:00	Hialeah	auto racks	as needed
14x	01:45	Bowden	11:45	Fort Pierce	intermodal and merchandise	replaces Train 119 on his off day [83]
24x	00:01	Hialeah	10:00	Bowden	Empty auto racks	as needed

Source: Florida East Coast Railway Society - F.E.C. Service Plan, updated October 13, 2005 at *http://www.fecrs.com/svc_plan.html*

Train 191 – is a rock train ferrying empty equipment, which generally left Fort Pierce (MP 241.5) at about 12:45am (± 1.0 hours). It was observed to arrive at Miami at an average time of 7:30am (± 1.5 hours). The average journey time from Fort Pierce to Miami was observed as 7 hours. It usually passed Port Sewall at about 1:30am (± 2.0 hours), and sustained between 0 and 60 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 5 events (with an average of 2 events). The most common circumstances delaying Train 191 included meeting and passing other trains, and slow orders.

Train 193 – is an empty rock train, which generally left New Smyrna (MP 124.6) at about 10:45pm (± 1.5 hours). It was observed to arrive at Miami at an average time of 7:45am (± 1.5 hours). The average journey time from New Smyrna to Miami was observed as 9 hours. It usually passed Port Sewall at about 3:30am (± 1.0 hours), and sustained between 0 and 75

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[81] Train 143.
[82] On December 12th and 17th, it left after midnight.
[83] Source: "Florida East Coast Railway – Jacksonville to Riviera Beach" fan site, *http://www.trainweb.org/brettrw/fec/fec.html#schedule*. Cargoes reportedly include juice, mixed freight, and finished automobiles.

minutes (average 30 minutes) of delay in the study area. The delays resulted from 1 to 3 events (with an average of 2 events). The most common circumstances delaying Train 193 included meeting and passing other trains, and slow orders.

Train 195 – is an empty rock train, which generally left West Palm Beach (MP 299.0) at about 6:15am (± 0.5 hours). It was observed to arrive at Miami at an average time of 9:00am (± 0.5 hours). The average journey time from West Palm Beach to Miami was observed as 2 hours 30 minutes. It usually sustained between 0 and 30 minutes (average 30 minutes) of delay in the study area. The delays resulted from 1 to 2 events (with an average of 2 events). The most common circumstances delaying Train 195 included meeting and passing other trains, and slow orders.

Train 335 – Train 335 is an empty rock unit train, which generally left City Point (MP 170.2) at about 2:00am (± 1.5 hours). It was observed to arrive at Miami at an average time of 10:00am (± 1.5 hours). The average journey time from City Point to Miami was observed as 8 hours. It usually passed Port Sewall at about 5:00am (± 2.0 hours), and sustained between 0 and 60 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 335 included meeting and passing other trains, crew changes with Train 336, and slow orders.

Northbound Trains

Train 202 – is an intermodal train (averaging 57% intermodal cars), which generally left Miami at about 9:00am (± 0.5 hours). It was observed to arrive at Bowden at an average time of 8:00pm (± 2.0 hours). The average journey time from Miami to Bowden was observed as 11 hours It usually passed Port Sewall at about 12:30pm (± 1.5 hours), and sustained between 0 and 45 minutes (average 15 minutes) of delay in the study area. The delays resulted from 0 to 3 events (with an average of 1 event). The most common circumstances delaying Train 202 included meeting and passing other trains, and slow orders.

Train 206 – is an intermodal train (averaging 88% intermodal traffic), which generally left Miami at about 5:15am (± 2.0 hours). It was observed to arrive at Bowden at an average time of 4:30pm (± 4.0 hours). The average journey time from Miami to Bowden was observed as 11 hours. It usually passed Port Sewall at about 8:30am (± 2.5 hours), and sustained between 0 and 75 minutes (average 45 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 3 events). The most common circumstances delaying Train 206 included meeting and passing other trains, and slow orders.

Table 3.6
Detailed Train Descriptions, Northbound

Train	**Train 202**	**Train 206**	**Train 208**	**Train 218**	**Train 222**
Days of Operation	Less than Daily	Less than Daily	Daily	Less than Daily	Daily
Train Type	Intermodal	Intermodal	Rock	Intermodal	Intermodal
Days Operated [84]	6	7	8	6	8

0.1

[84] Out of nine whole operating days over a ten day period.

Origin	Miami	Miami	Miami	Fort Lauderdale	Miami
Destination	Bowden	Bowden	Bowden	Bowden	Bowden
Typical Time at Origin	8:54	5:30	15:10	17:40	19:33
Typical Time at Destination	20:03	16:26	0:55	0:25	7:00
Typical Trip Time Origin-Jupiter	2:48	2:21	2:36	2:44	3:03
At Port Sewall: Earliest Arrival Time	11:25	6:10	17:25	18:55	21:40
Average Arrival Time	12:17	8:26	18:21	20:59	23:11
Latest Arrival Time	14:20	11:00	20:55	22:00	2:00
Minimum Delay Minutes	0	0	0	0	6
Typical Delay Minutes	19	44	22	81	50
Maximum Delay Minutes	41	72	51	269	209
Northbound					
Train	**Train 224**	**Train 226**	**Train 240**	**Train 290**	**Train 292**
Days of Operation	Less than Daily	Less than Daily	Less than Daily	Less than Daily	Less than Daily
Train Type	Intermodal	Intermodal	Empty Autoracks	Rock	Rock
Days Operated	5	7	4	5	5
Origin	Fort Lauderdale	Miami	Miami	Miami	Miami
Destination	Bowden	Bowden	Bowden	Fort Pierce	New Smyrna
Typical Time at Origin	23:12	22:22	4:45	17:09	21:54
Typical Time at Destination	9:06	12:14	15:46	22:39	7:18
Typical Trip Time Origin-Jupiter	2:07	3:03	3:33	3:21	3:42
At Port Sewall: Earliest Arrival Time	1:25	22:25	7:00	19:40	0:01
Average Arrival Time	1:54	2:00	8:53	21:05	2:11
Latest Arrival Time	2:25	3:30	11:40	23:25	4:15
Minimum Delay Minutes	0	0	6	6	0
Typical Delay Minutes	42	31	37	50	42
Maximum Delay Minutes	82	81	92	209	82

Northbound		
Train	**Train 294**	**Train 336**
Days of Operation	Less than Daily	Daily
Train Type	Rock	Rock
Days Operated	5	8
Origin	Miami	Miami
Destination	West Palm	City Point
Typical Time at Origin	23:39	2:39
Typical Time at Destination	2:54	10:13
Typical Trip Time Origin-Jupiter	N/A	3:50
At Port Sewall: Earliest Arrival Time	N/A	5:35
Average Arrival Time	N/A	7:04
Latest Arrival Time	N/A	8:45
Minimum Delay Minutes	0	6
Typical Delay Minutes	31	37
Maximum Delay Minutes	81	92

Train 208 – is a rock train (85% loaded rock cars), which generally left Miami at about 3:15pm (± 2.0 hours). It was observed to arrive at Bowden at an average time of 1:00am (± 2.5 hours). The average journey time from Miami to Bowden was observed as 10 hours. It usually passed Port Sewall at about 6:30pm (± 2.0 hours), and sustained between 0 and 45 minutes (average 15 minutes) of delay in the study area. The delays resulted from 0 to 2 events (with an average of 1 event). The most common circumstances delaying Train 208 included meeting and passing other trains, and slow orders.

Train 218 – is an intermodal train (averaging 71% intermodal traffic), which generally left Fort Lauderdale at about 5:45pm (± 1.0 hours). It was observed to arrive at Bowden at an average time of 12:30am (± 2.5 hours). The average journey time from Fort Lauderdale to Bowden was observed as 7 hours. It usually passed Port Sewall at about 9:00pm (± 1.5 hours), and sustained between 0 and 270 minutes (average 75 minutes) of delay in the study area. The delays resulted from 0 to 5 events (with an average of 2 events). The most common circumstances delaying Train 218 included meeting and passing other trains, and slow orders.

Train 222 – is an intermodal train (averaging 82% intermodal traffic), which generally left Miami at about 7:30pm (± 2.0 hours). It was observed to arrive at Bowden at an average time of 7:00am (± 3.5 hours). The average journey time from Miami to Bowden was observed as 11 hours 30 minutes. It usually passed Port Sewall at about 11:00pm (± 2.0 hours), and sustained between 0 and 210 minutes (average 45 minutes) of delay in the study area. The delays resulted from 1 to 6 events (with an average of 3 events). The most common circumstances delaying Train 222 included meeting and passing other trains, and slow orders.

Train 224 – is an exclusively intermodal train, which generally left Fort Lauderdale on-time at about 11:15pm. It was observed to arrive at Bowden at an average time of 9:00am (± 1.0 hours). The average journey time from Fort Lauderdale to Bowden was observed as 10 hours. It usually

passed Port Sewall at about 2:00am (± 0.5 hours), and sustained between 0 and 75 minutes (average 45 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 224 included meeting and passing other trains, and slow orders.

Train 226 – is an exclusively intermodal train, which generally left Miami at about 10:15pm (± 1.5 hours). It was observed to arrive at Bowden at an average time of 9:15am (± 3.5 hours). The average journey time from Miami to Bowden was observed as 10 hours. It usually passed Port Sewall at about 2:00am (± 2.5 hours), and sustained between 0 and 75 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 226 included meeting and passing other trains, and slow orders.

Train 240 – Extra Auto Carrier Train – There were five empty northbound autorack extra trains indicated in the study data, all of which were numbered Train 240. The northbound automobile empty equipment extras generally left Miami at about 4:00am or 7:00am. It was observed to arrive at Bowden in the afternoon. The average journey time observed was 13 hours. Typically, the train was observed to pass Port Sewall in late morning, and sustained between 0 and 90 minutes (average 45 minutes) of delay in the study area. The delays resulted from an average of 2 events. The most common circumstances delaying the southbound automobile extras included meeting and passing other trains, and slow orders.

Train 290 – is a rock train, generally carrying a small fraction of other car types, which left Miami at about 5:15pm (± 1.0 hours). It was observed to arrive at Fort Pierce at an average time of 10:45pm (± 1.5 hours). The average journey time from Miami to Fort Pierce was observed as 5 hours 30 minutes. It usually passed Port Sewall at about 9:00pm (± 2.0 hours), and sustained between 0 and 90 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 290 included meeting and passing other trains, and slow orders.

Train 292 – is a rock train, carrying nearly all rock with very few other car types, which generally left Miami at about 10:00pm (± 1.5 hours). It was observed to arrive at New Smyrna at an average time of 7:15am (± 1.5 hours). The average journey time from Miami to New Symrna was observed as 9 hours 30 minutes. It usually passed Port Sewall at about 2:00am (± 2.0 hours), and sustained between 0 and 135 minutes (average 60 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 3 events). The most common circumstances delaying Train 292 included meeting and passing other trains, and slow orders.

Train 294 - is a rock train, carrying nearly all rock with very few cars of other types, which generally left Miami at about 11:45pm (± 0.5 hours). It was observed to arrive at West Palm Beach at an average time of 3:00am (± 0.5 hours). The average journey time from Miami to West Palm Beach was observed as 3 hours. It does not leave the study area, and sustained between 0 and 60 minutes (average 30 minutes) of delay. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 294 included meeting and passing other trains, and slow orders.

Train 336 – is a unit rock train (with 100% loaded rock cars), which generally left Miami at about 2:45am (± 1.0 hours). It was observed to arrive at City Point at an average time of 10:15am (± 2.0 hours). The average journey time from Miami to City Point was observed as 7 hours 30 minutes. It usually passed Port Sewall at about 7:00am (± 1.5 hours), and sustained between 0 and 105 minutes (average 30 minutes) of delay in the study area. The delays resulted from 0 to 4 events (with an average of 2 events). The most common circumstances delaying Train 336 included meeting and passing other trains, scheduled crew changes with Train 335, and slow orders.

APPENDIX A: LEASES ON THE SOUTH FLORIDA EAST COAST CORRIDOR

As would be expected for a 96 mile linear facility in a densely settled urban area, the FEC rail right-of-way is subject to many leases. Most of these leases are relatively minor. As with most rail rights of way the leases fall into four major classes.

1. Utility crossings
2. Land leases to abutters
3. Longitudinal occupations by telecommunications line and other utility facilities
4. Signboards

The most common leases provide for utility crossings (~2,000). Leases to abutters and other interests are the next most common uses (~300). There are a substantial number (~50) of lengthy longitudinal occupations of the right of way by fiber optic cables, overhead power lines and buried municipal utilties (water, sewer and drainage.) There are also a substantial number (~40) of billboards on the right of way. It is reported that most of leases, except the various utility leases, can be easily terminated at the convenience of the railway.

1. Utility Crossings - Based on information provided by the FEC, there are nearly 2,000 instances where the right-of-way is crossed by utility lines. Most (76%) of the crossings are subterranean crossings by sewer lines, water pipes, buried electric lines, and buried telecommunication crossings. The balance of the utility crossings are overhead wires except for ten isolated instances where the railroad has granted permission for the utility to anchor a guy wire stabilizing a utility pole to a point within the right-of-way.

Table A.1
Utility Leases on the Florida East Coast Railway Right-of-way in the Study Area

10..3 Type	Total		Main Line (77 Miles)		Port Branch (7 miles)		Little River (9 miles)	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Sub-grade	1,475	76%	1,167	73%	179	89%	129	94%
Overhead	449	23%	418	26%	23	11%	8	6%
Other	10	1%	10	1%	0	0%	0	0%
Total	**1,934**	**100%**	**1,595**	**100%**	**202**	**100%**	**137**	**100%**

According the FEC, the vast majority (but not all) of these crossing are under agreements that can be terminated on short notice. Others require relocation at the expense of the utility if necessary for transportation purposes[85]. Presumably since the crossings were installed to provide a clear envelope for FEC freight operations, few, if any, would pose a problem for other transportation services developed on the right-of-way.

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[85] E-mail correspondence from Heidi Eddins, General Counsel of Florida East Coast Railway Wednesday 2/1/2006 5:16 PM

Not all of the utility leases are short crossings. Approximately 40 are longitudinal occupations of the right-of-way for distances of more than 1,000 feet. Most of the long sub-grade utility leases are for fiber optic cables, but some municipal water, sewer and drainage lines occupy portions of the right of way for distances in excess of 1,000 feet. Nearly all of the long overhead utility leases are for power lines.

Table A.2
Utility Leases by Length on the Florida East Coast Railway

Length (feet)	Total	Percent of Total	Overhead	Sub-grade	Guy Wire	Not Available
> 5,000	8	0%	3	4		1
2,000-4,999	15	1%	9	6		
1,000-1,999	16	1%	5	11		
500-999	17	1%	3	14		
200-499	81	4%	17	63		1
100-199	1,272	66%	197	1,073		2
< 100	242	13%	15	227		
Not Available	283	15%	200	73	10	
Total	1,934	100%	449	1,471	10	4

Leases to Abutters and Other Interests – With a one (or two) track railway occupying a right-of-way with a 100+ foot basic width there have been, and remain, numerous reasons and opportunities for the FEC to lease strips of excess land to abutters and other interests for the mutual convenience and advantage of the railway and its neighbors. FEC reports 164 such leases along the 93 miles of railway between Jupiter, Hialeah and the Port of Miami on the FEC. According to the FEC, all of these leases may be cancelled by the railway on short notice[86].

Table A.3
Land Leases on the Florida East Coast Railway Right-of-way in the Study Area

	Total		Main Line (77 Miles)		Port Branch (7 miles)		Little River (9 miles)	
Purpose	**Number**	**% of Total**	**Number**	**% of Total**	**Number**	**% of Total**	**Number**	**% of Total**
Parking & Storage	167	54%	134	56%	18	82%	15	32%
Structures	40	13%	27	11%	1	5%	12	26%
Access	38	12%	33	14%	1	5%	4	9%
Track	32	10%	19	8%	0	0%	13	28%
Beautification & Fencing	22	7%	17	7%	2	9%	3	6%
Utility	5	2%	5	2%	0	0%	0	0%
Not Specified	3	1%	3	1%	0	0%	0	0%
Total	**307**	**100%**	**238**	**100%**	**22**	**100%**	**47**	**100%**

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[86] Ibid. Wed 2/1/2006 5:29 PM

The purposes of the various leases are summarized in Table B. The purpose categories were developed by the study team based on the very short summaries of lease purpose provided by the FEC. Leases for parking and surface storage are the most common, constituting 54% of all leases. The next most common leases (13%) are for various structures in the right way predominately platforms presumably for servicing rail cars. Twelve percent provide the abutter with an alternate access to his property via the railway right of way. Ten percent of the leases provide for the construction of customer owned side tracks on FEC land. Seven percent of the leases are for beautification or fencing.

Other Longitudinal Occupations – It is not uncommon for railways to lease longitudinal portions of their right of way to utility firms for communication lines, electric lines or pipelines. According to a separate summary of leases provided by the FEC, there are eleven additional leases in the study area for buried ducts carrying fiber optic lines. Seven of these leases span long distances along the corridor including four that run from Jacksonville through to Miami. Four of the leases appear to be limited to relatively short occupancies confined with a single municipality.

Unlike the land leases, the leases for fiber optic cable cannot be easily cancelled at the railroad's convenience. Each lease would need to be reviewed separately if relocation became an issue[87]. With respect to potential relocation, the FEC has aggregated all of its sub-grade fiber optic leases on the western(?) margin of the right-of-way to avoid encumbering the eastern portion of the right-of-way with such uses.

Signboards – The FEC maintains a separate inventory of signboard leases which indicates there are approximately 40 billboards erected along the right of way. The sign dimensions range between 6'x12' and 12'x48'. It is presumed that each of these leases can be terminated on relatively short notice at the convenience of the railway.

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[87] Ibid. Wednesday 2/1/2006 5:16 PM

APPENDIX B: FEC CUSTOMERS AND INTERCHANGE IN THE STUDY AREA

During the course of the February 2006 field inspection the study team had the opportunity to assess the nature and extent of on-line local traffic and potential interchange on the FEC between Downtown Miami and Jupiter. Information from this inspection was correlated with information from study team interviews and data provided by the FEC to develop this summary assessment. Findings are reported on segment-by-segment basis.

Segment 1: Port Branch (Miami to Little River) – The only active local customer on this seven-mile branch is the Port of Miami. The Port is reportedly served on an occasional basis for movement of oversize loads that cannot move on local streets to and from the Port. The frequency of service is estimated in the range of one switch each month. It is reported that substantial daily volumes of container traffic are drayed via roadway truck between the Port and the FEC's Hialeah intermodal yard. Two inactive sidings for aggregate plants were observed on the branch.

Near the north end (Little River) of the "port lead", there is a run-around track apparently used by the local freight that works out of Hialeah. This is the only double-ended siding on the port lead.

Segment 2: Hialeah to Little River – The study team did not have the opportunity to inspect this nine-mile segment of the railway. It is understood that Hialeah Yard is the FEC's most active facility in South Florida including:

- a substantial intermodal operation serving local needs and container traffic drayed to and from the Port of Miami,
- an autoramp where automobiles are shipped, both for consumption in the region and export via the port, and
- an unknown number of local customers with warehouse operations receiving and shipping carload traffic.

This segment crosses the SFRC line at CP-Iris, which provides an opportunity for interchange with CSXT in this vicinity. There is at present no connection between the two railroads at Iris.

Segment 3: Little River to North Miami - No local customers were observed on this short three mile segment.

Segment 4: North Miami to Fort Lauderdale Airport – Three or four active local customers were observed in this 12-mile stretch of railway. Most of the customers were lumber yards receiving small one and two car shipments of building material. One customer was transloading food products.

Segment 5: Fort Lauderdale Airport to South Pompano – This very active 13-mile stretch includes Fort Lauderdale Yard, Port Everglades, FEC's Fort Lauderdale Intermodal Ramp and several local on-line carload customers. The intermodal ramp receives daily service by road trains based in Fort Lauderdale or Miami. These trains carry traffic from the nearby port, the intermodal ramp and local online customers.

There is no on-dock rail at the Port Everglades container port, although there is rail access to the North Port, which handles break-bulk and bulk commodities. At present, all containers for the

FEC are drayed a few blocks to FEC's Andrews Yard. From observation, Andrews Yard appeared extremely crowded and small. The port advises they have funding from Florida DOT to construct an on-port intermodal container terminal facility freeing up some capacity at Andrews Yard.[88]

Only four local customers were noted on this segment. The three active customers were receiving building supplies and food products. One siding leading to a large FEC-owned commercial warehouse was presently inactive.

Segment 6: South Pompano to South Villa Rica – Four turnouts to local customers were noted in this 11-mile segment. One of the turnouts leads to the Pompano Beach Market off the Pompano siding. The market area is reportedly home to several active rail customers. The market area offers a potential (but inactive) connection to CSXT operations on the SFRC line. Numerous stored cars were noted in the vicinity of the Market. Of the remaining three turnouts only one appeared to be an active shipper, receiving building supplies.

Segment 7: South Villa Rica to West Palm Beach – Nine turnouts to local customers and team tracks were noted along this 23-mile segment. Of these nine locations, five were clearly active rail shippers. No activity was noted at the remaining four sites. The active shippers were receiving building materials, food products and paper.

Along the Villa Rica siding (north of Boca Raton) is a set out track that was once part of a larger yard at this location. The FEC reports it is considering restoring this yard to operation as an intermodal terminal.

Segment 8: West Palm Beach to Jupiter - Six turnouts to local customers, industrial areas and team tracks were noted along this 16-mile segment. Of these six locations, four were clearly active rail shippers. The active shippers include the Port of Palm Beach, which is reported to receive 30 or more daily car loads of predominately intermodal shipments bound for export to Caribbean islands. About 10% to 15% of container traffic to and from the Port moves by rail, sufficient to generate 800 cars of rail traffic each month. Ninety-five percent of rail volume into and out of the port consists of containers; other traffic includes cement and some other bulk materials for transload. In the near future, the Port expects to host an aggregate operation that will import approximately one million annual tons of aggregates. Some of this traffic may move inland by rail[89].

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[88] Construction of this facility would also involve a grade separation where the rail link from FEC would cross Eller Drive (the main access road into the South Port).

[89] The port has its own rail switch engine, and cars are placed on a siding adjacent to the FEC main for pick-up by through trains. This, and deliveries into the port by FEC, have led to frequent blockage of crossings north of the port in Riviera Beach. The port has prepared a Master Plan that addresses this and several other issues that will arise with expected future growth in traffic.

The plan has includes several rail elements. First, the on-dock rail in the port will be reconfigured to enable the port to handle longer cuts of cars. Second, the FEC interchange will be reconfigured to eliminate crossing blockages. Third, the port has plans to construct a new access road along the east-west

Immediately north of West Palm Beach Yard, the Northwood connecting track linking the FEC line with the CSXT operations on the SFRC line provides for interchange of traffic between the two principal freight railroads serving South Florida. This is the only active interchange connection between the two railways in the study area.

The Lewis Terminal is also in the vicinity of West Palm Beach. This off line collection of industrial users is understood to include several active users of FEC carload service. The Terminal also provides a possible, but not heavily used, opportunity for interchange with the nearby parallel CSX operation on the SFRC line[90].

The four remaining turnouts included two active Rinker plants receiving carloads of aggregate and two sites that were not active at the time of the inspection.

Summary – FEC's customer base in South Florida includes three intermodal operations, three industrial warehousing districts, 26 local online customers or team tracks and four locations for the potential interchange of traffic with CSXT operations on the SFRC line.

- The intermodal operations include a major facility at Hialeah used for the local use and Miami port traffic, a ramp at Fort Lauderdale for local use and the service of Port Everglade traffic and the Port of Palm Beach which serves overseas traffic.

- The three industrial warehousing districts include the vicinity of Hialeah, the Pompano Market north of Fort Lauderdale and the Lewis Terminal district in the vicinity of West Palm Beach.

- The 26 local online customers and team tracks included 14 locations which were observed to be actively engaged in the shipment of building materials (10), food products (3) and paper (1). The remaining 12 sites were observed and reported to be inactive at the time of the inspection trip.

- The four potential locations for possible interchange of traffic with CSXT operations on the SRFC lines include Iris in Miami (diamond crossing with SFRC), Pompano Market in Broward County, Northwood, north of downtown West Palm Beach (an active

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FP&L right-of-way leading to the port. This road will provide a path for trucks to move directly to and from I-95 without using local streets. A railroad track may be constructed on this same alignment to link the Port to CSXT rail freight service on the SFRC right of way. There is currently a track connection from the Port to CSX through the Lewis Terminal (see below). However, this low-speed industrial spur has severe curvature that limits its suitability for use as an interchange track.

The impact of the proposed extension of SFRTA (Tri-Rail) passenger rail service to Jupiter over FEC could affect the Port of Palm Beach's rail service. So could an ongoing Community Redevelopment Agency study of Riviera Beach that could recommend relocating U.S. 1 (which parallels the FEC in this area). Relocation would provide additional options for redesigning the rail interchange.

[90] As noted above, the track geometry of the Lewis Terminal connection limits is suitability for substantial volumes of interchange traffic.

interchange track), and the Lewis Terminals (although severe curvature restricts the utility of this connection.)