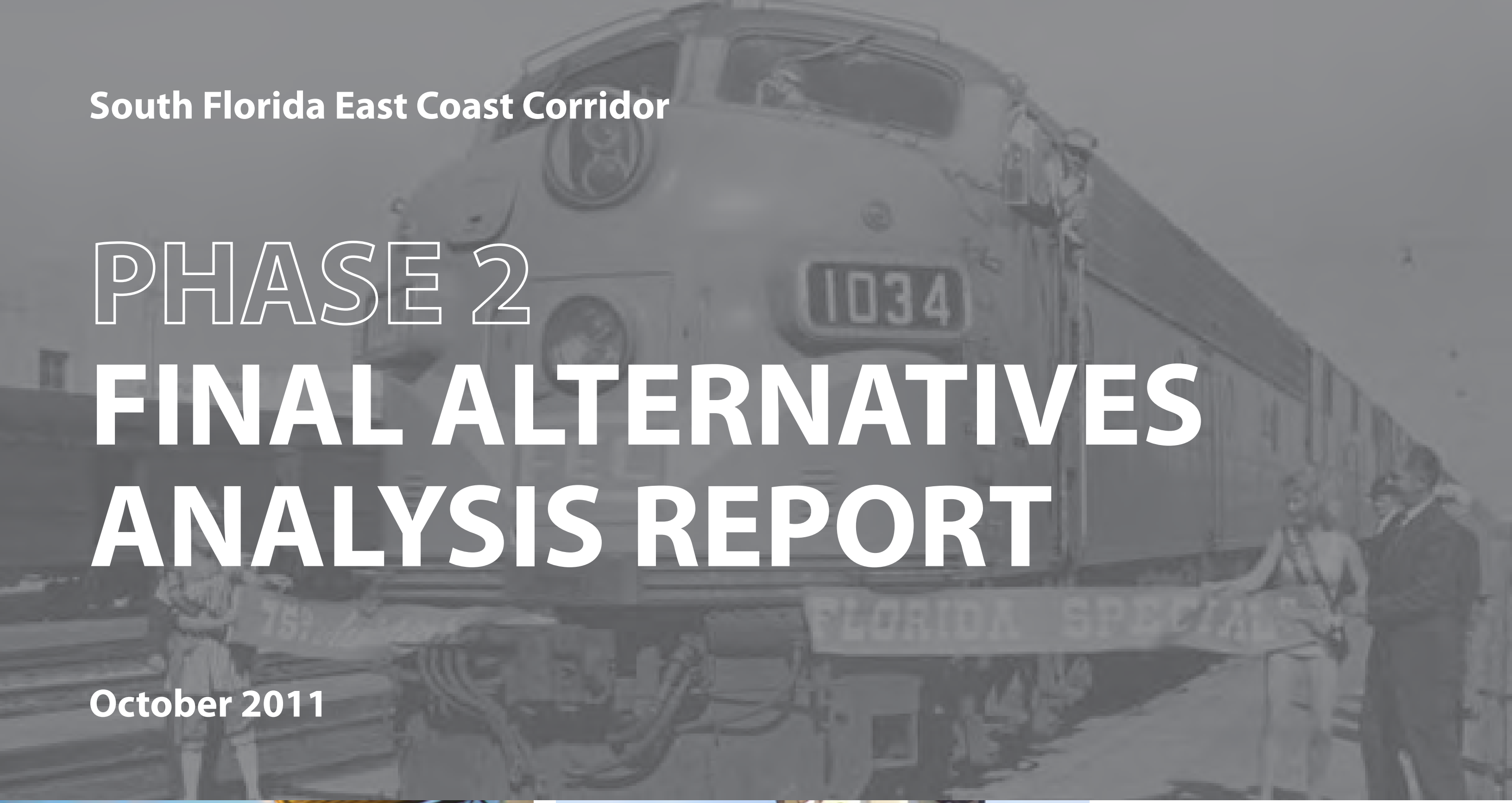


South Florida East Coast Corridor

PHASE 2 FINAL ALTERNATIVES ANALYSIS REPORT

October 2011

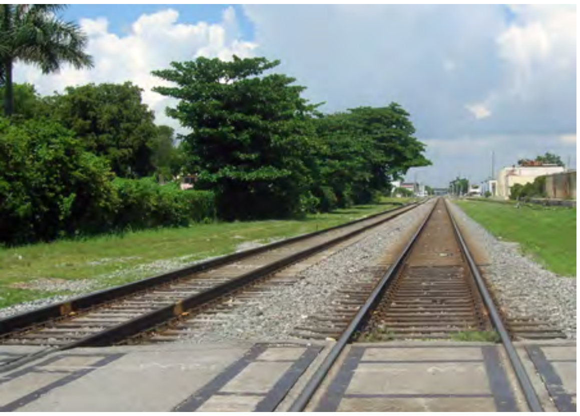
Federal Aid No.
FTAX004

FTA Grant No.
FL-90-X372-07

FM No. 417031-1-22-01

Miami-Dade, Broward, and Palm Beach Counties, Florida

Contract: C-8F66



SOUTH FLORIDA EAST COAST CORRIDOR TRANSIT ANALYSIS

Lead Agencies:
Florida Department of Transportation, Federal Transit Administration

Title of the Proposed Action:
South Florida East Coast Corridor Transit Analysis

ABSTRACT:

This report documents the development and analysis of alternatives for implementing reliable, high quality transit in the 85-mile Florida East Coast corridor located in southeast Florida. The purpose of the project is to increase transit options for travel in southeast Florida, support the Eastward Ho! Initiative of the counties in the region, encourage redevelopment and economic growth in the coastal cities, and supplement the existing highway network. These goals were developed in cooperation with the counties, cities, metropolitan planning organizations, regional planning organizations, civic and business organizations, and the general public.

The study has proceeded in two phases. The first phase led to the development of modally generic alternatives that were refined into four, specific modal alternatives in Phase 2, which is the subject of this report. These four alternatives: TSM, BRT, Integrated Rail "DMU", and Integrated Rail "Push-Pull," were defined and compared against both a No Build alternative and against each other. Each of these alternatives incorporates new transit service along the Florida East Coast Railway (FEC) corridor with existing transit service operated by each of the three counties in the region (Palm Beach, Broward, and Miami-Dade) and Tri-Rail.

The analysis shows a broad range of results in terms of benefits, financial costs, and environmental impacts.

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Executive Summary

This report documents the Alternatives Analysis for the South Florida East Coast Corridor conducted by the Florida Department of Transportation (FDOT), in conjunction with the Federal Transit Administration (FTA) and stakeholders including South Florida Regional Transportation Authority (SFRTA), local Metropolitan Planning Organizations, and county transit agencies. The report is for use by local decision makers, and its purpose is to summarize the study, providing background and technical information on the need for, and scope of, new transit service on the corridor.

The South Florida East Coast (FEC) Corridor is currently a freight railway corridor that traverses the entire east coast of Florida from Jacksonville to Miami. This is a study of the approximately 85 miles that run through Palm Beach, Broward, and Miami-Dade Counties in Southeast Florida. This segment has been identified as the subject of the South Florida East Coast Corridor Transit Analysis (SFECCTA) Study.

The Alternatives Analysis Report is a summary of the findings of technical reports and memoranda undertaken during the transit planning process, providing critical information used to help inform the decision on a Locally Preferred Alternative (LPA). The LPA serves as a basis of advanced planning and to define the project as the locally-favored approach for consideration in advancing the project.

Consistent with the FTA's suggested format, this Alternatives Analysis Report begins by considering the need for a new transit facility and defines the purpose, needs and goals and objectives for the project. The report documents the alternative analysis process, describes the four final detailed alternatives, explains the public involvement process and provides information on transportation benefits, environmental effects, and project costs. The report concludes with a trade-off analysis documenting the benefits and dis-benefits of each alternative under consideration. This evaluation served as a guide for local decision-making on an LPA.

ES.1. Context

This report documents Phase 1 and Phase 2 of the South Florida East Coast Corridor Transit Analysis Study.

The study area is centered on the existing Florida East Coast (FEC) Railway and extends approximately 85 miles from Downtown Miami in Miami-Dade County to Jupiter, just south of the Village of Tequesta and the Loxahatchee River in Palm Beach County. (See **Figure ES.1**) Due to its location and the demand for freight rail transportation, the FEC Railway corridor is included as part of Florida's Strategic Intermodal System (SIS) and the Florida Department of Transportation (FDOT) wants to preserve its vital role in the state's transportation network.

It is not an exaggeration to say that the FEC Railway, Henry Flagler's original railroad, was the engine that established Southeast Florida. As a consequence, the environs of the corridor contain the original centers of the towns that developed along the Railway including West Palm Beach, Fort Lauderdale and Miami. In addition, because of this history, these same areas contain aged building stock now ripe for redevelopment. The study area also remains important to regional population and employment as it accounts for approximately 1/7th of the region's population and more than 1/5th of its employment. These statistics vary among the three counties; the corridor holds an even more important role in Palm Beach County's population and employment. In all three counties, significant traffic generators in the form of central business districts, county and municipal governemnt centers, performing arts and cultural venues, hospitals and universities are within the corridor's travel shed.

The area is directly served by three major transit providers: Palm Tran, serving Palm Beach County, Broward County Transit (BCT), serving mostly Broward County and Miami-Dade Transit, serving mostly Miami-Dade County. Palm Tran and BCT are bus-only agencies. MDT operates buses, Metrorail and Metromover services. The South Florida Regional Transportation Authority (SFRTA) operates commuter rail in the region of the CSX corridor that parallels I-95. Parts of the study area are within Tri-Rail's auto catchment area.

The study area contains a major, continuous, parallel highway arterial, US 1. I-95 also runs continuously, north-south between one-quarter to four miles to the west of the FEC. Congestion on Miami-area roadways is currently among the worst in the country, disproportionate to the region's size, and as future highway building is projected to be outpaced by growth, is likely only to get worse.

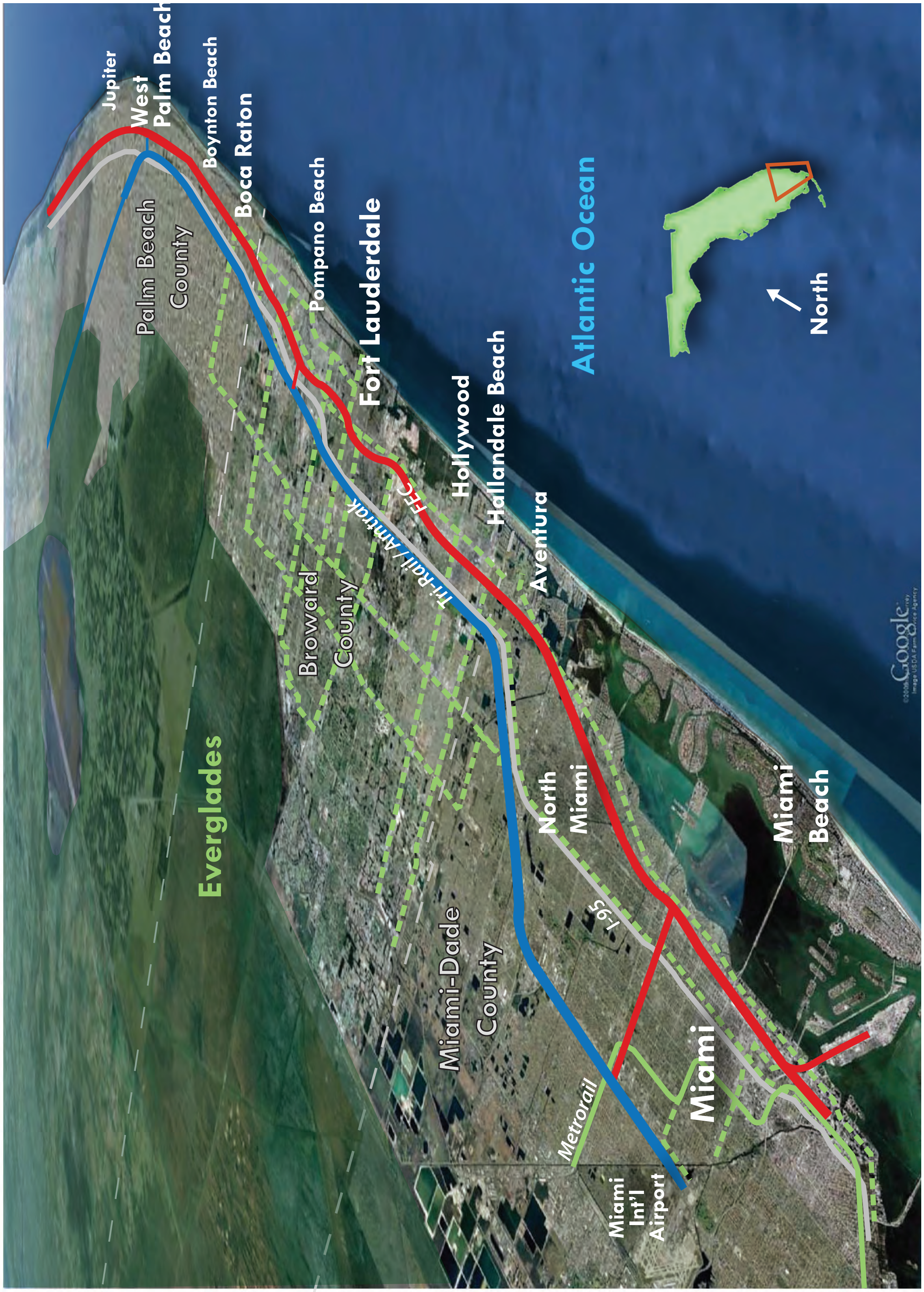


Figure ES.1 – *Study Area Existing Context Map*

ES.2. Purpose and Need of the Proposed Action

The purpose of the South Florida East Coast Corridor Transit Analysis (SFECCTA) is to provide reliable transportation options for South Floridians and to support the region's Eastward Ho! initiative by improving north-south mobility in the study corridor. This project will create an integrated system of premium transit through the redeveloping coastal cities in Palm Beach, Broward and Miami-Dade Counties, to supplement the existing highway network including I-95, and to enhance the utilization of existing transit services. The resulting improved accessibility to and within the study corridor will serve as a catalyst for revitalization and increased economic development within the adjacent communities.

The fundamental need for the SFECCTA results from the following key issues:

- Population and Employment Growth - The study corridor already contains the highest density of employment and population in the region and is expected to grow at higher rates than the region as a whole.
- Increased Highway and Traffic Congestion - Level of service on the highly congested highways in the study corridor will deteriorate as the addition of new highway capacity will not keep pace with population and employment growth.
- The Need For Sustainable Economic Redevelopment, and Land Use Change - The region has adopted a regional policy entitled Eastward Ho! to concentrate future development in the eastern portions of all three counties to preserve land and water resources.
- Desired Access to Eastern Travel Destinations - Existing Tri-Rail passenger service does not provide direct access to important employment centers, medical and educational facilities, and entertainment venues located in the eastern coastal communities.
- Limited Availability of Reliable Transit Services - Arterial transit in the heart of the study area is slow and unreliable due to traffic congestion, particularly at signalized intersections.
- Large Transit-Dependent Populations - Mobility for the significant number of transit dependent people in the study area is provided only by the local bus system, which limits access to jobs, health care, and educational opportunities.
- Enhancing the Local Environment—Creating more opportunities for sustainable living including reducing harmful emissions and greenhouse gases and reducing fuel consumption and dependence on foreign oil.

The goals and objectives of this project are based on addressing these fundamental needs, as follows:

Goal 1: Improve mobility and access for personal travel and goods movement.

1.1. Expand transit options to accommodate future travel demand in the corridor and serve major transportation hubs (including airports and seaports), employment, medical, retail, educational, and entertainment centers, and residents in the region.
1.2. Provide regional transit options that improve travel time reliability for people and goods and result in travel time savings.
1.3. Integrate the proposed transit options with existing and planned transit in the region.
1.4. Integrate the proposed transit options with existing and planned freight transport and potentially intercity passenger transport located within or traversing the study area.

1.5. Provide for seamless connections to all modes of transportation including feeder bus, bicycle and pedestrian facilities.
1.6. Provide regional access and mobility improvements for minority, transportation disadvantaged and low-income groups.
1.7. Support goods movement in the corridor with higher capacity and connectivity.

Goal 2: Coordinate corridor transportation investments to contribute to a seamless, integrated regional multi-modal transportation network.

2.1. Invest in infrastructure, facilities and services that improve connectivity, transfer and circulation in the region.
2.2. Coordinate and integrate with other regional rail, mass transit, and roadway projects.
2.3. Maintain working relationships with transportation partners, including the FTA, FDOT, Regional Transportation Authority, MPOs, counties, cities, regional planning councils, business groups, Florida East Coast Industries, and other stakeholders.
2.4. Avoid or minimize duplication of premium transportation services.
2.5. Coordinate with other transportation and land use planning efforts that are supportive of transit options.
2.6. Accommodate a proposed greenway along the corridor.

Goal 3: Encourage the implementation of transit supportive development.

3.1. Locate transit stations where higher density development exists or can readily be accommodated and near activity centers.
3.2. Complement and support economic development/redevelopment and potential joint development activities that include a mix of uses and affordable housing, within the study area.
3.3. Establish a transit improvement that will contribute, guide and support the urban, transit-oriented scale envisioned by local municipalities for the various downtowns, commercial corridors and abutting residential areas.
3.4. Facilitate creation of transit-supportive and context sensitive development guidelines, zoning and policies.
3.5. Provide transit that complements the scale and character of neighborhoods, housing, and business developments.
3.6 Encourage transit-supportive land uses and sustainable living.

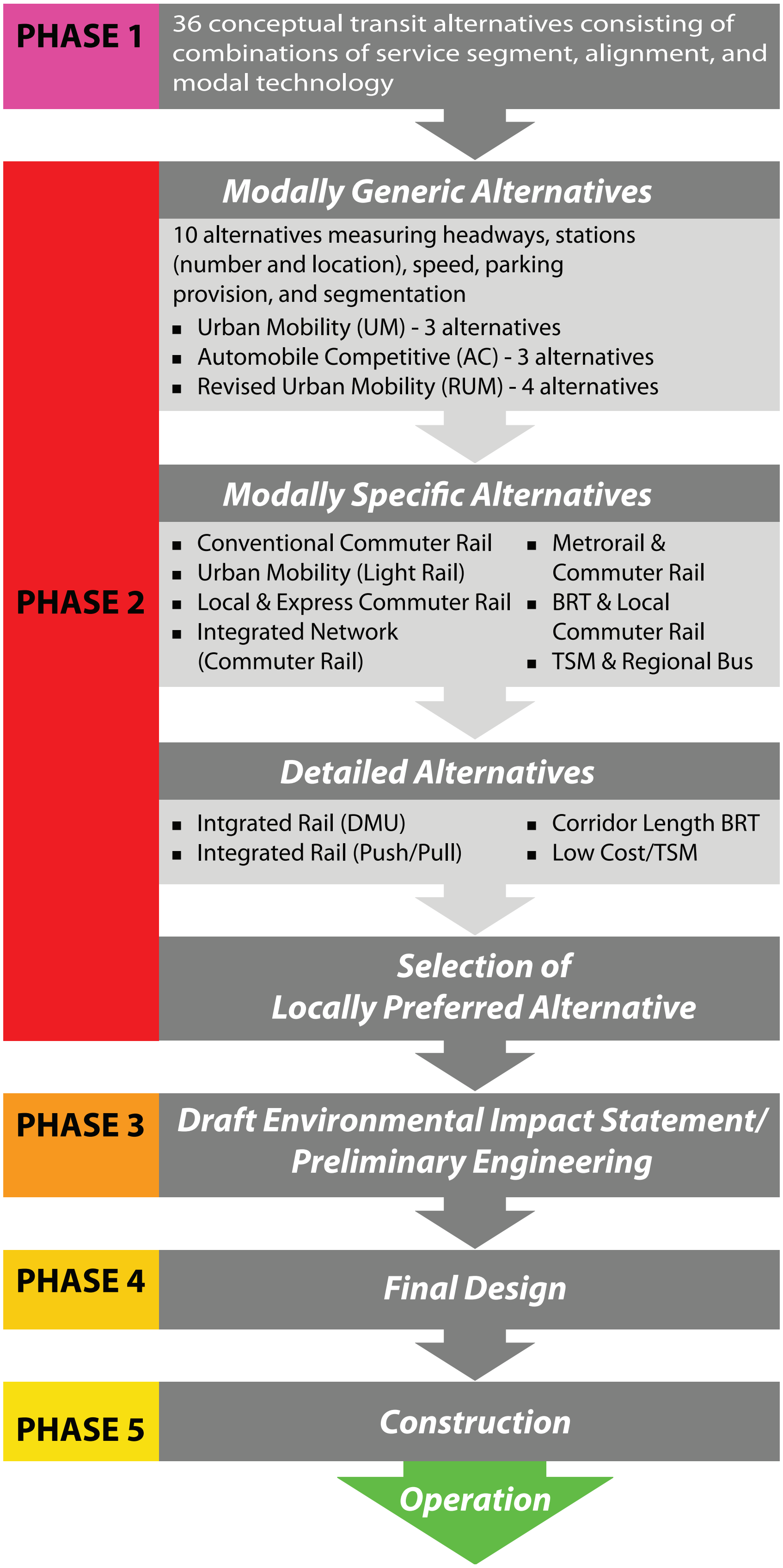
Goal 4: Minimize adverse impacts to the community and local businesses.

4.1. Minimize or mitigate adverse local traffic, parking and safety impacts.
4.2. Minimize or mitigate adverse noise and vibration impacts.
4.3. Avoid or minimize adverse impacts to minority and low income communities.
4.4. Minimize adverse right-of-way and physical impacts to established communities and businesses.
4.5. Optimize the use of existing infrastructure and transportation corridors for expansion of transit.

Goal 5: Preserve and enhance the environment.

5.1. Minimize and mitigate adverse impacts to existing environmental resources.
5.2. Preserve historical and cultural resources.
5.3. Provide transit options that reduce traffic congestion and energy consumption.
5.4. Protect environmentally sensitive areas.
5.5. Improve regional air quality by promoting alternative transportation modes and reducing auto emissions and greenhouse gases.
5.6 Reduce fuel consumption and dependence on foreign oil.

Figure ES.2 – *Alternative Selection Process as part of the Project Process*



Goal 6: Provide a cost-effective transportation solution to meet identified travel needs.

6.1. Ensure that the investment strategy for the corridor will be eligible to receive federal funding.
6.2. Optimize transportation funding resources and obtain local financial support.
6.3. Explore lower technology cost solutions, where applicable, that can be upgraded over time to a higher transit technology solution based on changing needs.

ES.3. Alternatives Considered

In this project, a step-wise approach was taken to defining the alternatives under consideration. (Refer to **Figure ES.2**) Phase 1 of this study focused on project scoping, the development of project alternatives, environmental screening, and the evaluation of conceptual alternatives. The effort led to the identification of the FEC Corridor as the preferred alignment, determined three project segments, and screened 36 available modal technologies to five remaining choices. Phase 2 began by exploring different potential attributes of the system, such as speed, frequency, number of stops and different fare assumptions. The results of this analysis led to a series of modally-specific alternatives, based on the list of modal technologies selected for further consideration from Phase 1 of the study. The modally-specific alternatives were presented to the public in a series of public workshops in October 2009. The public had clear preferences for the time savings provided by express service and the mobility benefits provided by relatively closely-spaced stations and frequent service. They also favored the connectivity offered by utilizing connections between Tri-Rail and new FEC service. As a result of input from the public at these workshops as part of a larger technical screening, four detailed alternatives were developed: two rail alternatives and two bus alternatives. Light rail technology was eliminated from further consideration because the FEC Railway is opposed to a non-compliant technology within their right-of-way, and heavy rail was eliminated from further consideration in this phase because of the cost and visual impact of the elevated structure.

Hand-in-hand with the development of these alternatives were a number of detailed studies of different aspects of the project that informed the definition of the detailed alternatives. These included:

- A study of station locations, which initially identified a list of 98 possible station locations and through a process of analysis and public input selected the 52 station locations included in the detailed alternatives. [*Station Location Evaluation Methodology Memorandum*]

- A study of possible connections between the South Florida Rail Corridor (SFRC) on that Tri-Rail runs and the FEC, which led to the decision to connect the two systems using the Pompano connection in Broward County and the Northwood connection in northern West Palm Beach. [*SFRC - FEC Connections Technical Memorandum*]

- A study of potential maintenance facility sites that concluded that existing facilities should be used and expanded wherever possible; as such the rail alternatives would use the Hialeah Yard for major maintenance and the bus alternatives would build a new facility in the vicinity of Pompano Beach. [*Regional Operations and Maintenance Facility Summary Technical Memorandum*]

- A study of waterway crossings, which identified three navigable waterways that the service would cross over: the Dania Cut-Off Canal in Dania Beach just south of the Fort Lauderdale/Hollywood International Airport, the New River in Fort Lauderdale, and the Hillsborough Canal on the boundary of Broward and Palm Beach Counties. In this phase of study decisions were reached as to the means of crossing. [*Phase 2 Navigable Waterway Analysis Technical Memorandum*]

- A preliminary study of grade crossings that made recommendations on potential closures and eliminated all but 28 crossings from consideration for grade separation. Three grade crossings were preliminarily recommended for grade separation in Phase 2. A preliminary assessment of grade crossings was performed for quiet zones. [*Roadway - Transitway Crossing Analysis Technical Memorandum*]

Descriptions follow of the four detailed alternatives were presented to the decision making bodies for a recommendation on a Locally Preferred Alternative (LPA).

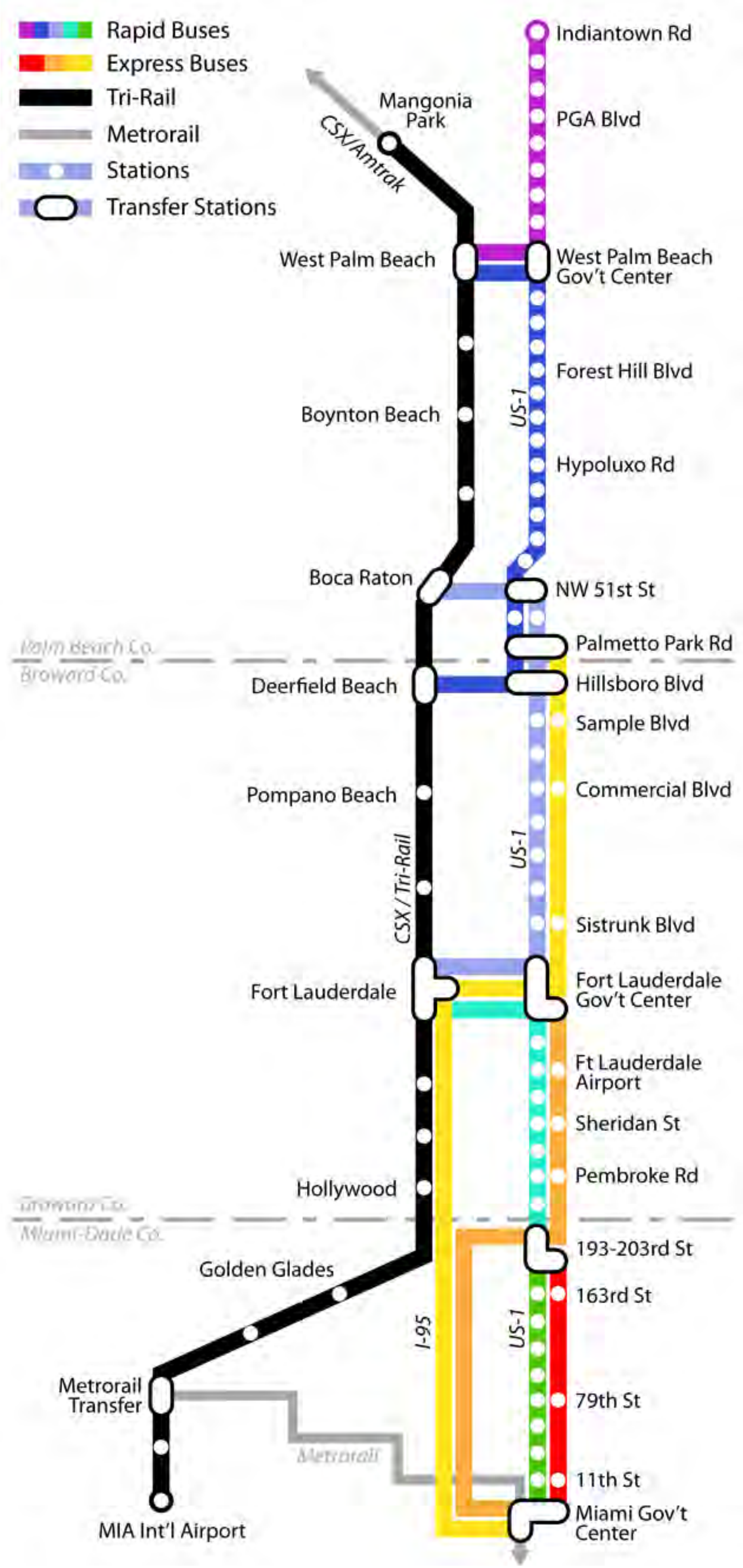
Low Cost/ Transportation System Management (TSM) Alternative

This alternative incorporates the best improvements that can be made to public transportation without a major investment. The Low Cost/TSM Alternative includes:

- A series of local “Rapid Buses” operating, on surface streets parallel to (but outside of) the FEC Railway.
- Three peak-period only, “Rapid Bus” express routes connecting Tri-Rail to major destinations on the FEC before proceeding to downtown Miami.
- Tri-Rail service enhancement.

The term “rapid buses” refers to limited-stop buses running in mixed traffic on local streets without signal priority or preemption. A service diagram is provided in **Figure ES.3**, and a service description is provided in **Table ES.1**. Bus service improvement is at the heart of this alternative. Both local and express bus routes parallel the FEC corridor with stops

Figure ES.3 – *Low Cost/TSM Service Diagram*



located in close proximity to the stops in the build alternatives.

The local rapid bus service, which utilizes articulated buses, is composed of five separate routes for operating reasons. Individual routes would be coordinated to provide five minute transfers between adjoining routes. Where possible the routes begin and end at Tri-Rail stations. The five routes are:

1. Indiantown Road on the FEC to Tri-Rail West Palm Beach Station
2. West Palm Beach Tri-Rail station to Tri-Rail Deerfield Beach station operating parallel to the FEC in between
3. Tri-Rail Boca Raton station to Tri-Rail Fort Lauderdale station operating parallel to the FEC in between
4. Tri-Rail Fort Lauderdale Station to downtown Fort Lauderdale and paralleling the FEC to Aventura
5. Aventura to downtown Miami operating parallel to the FEC.

Three express, "Rapid Bus" routes operating only in the peak hours, connecting Tri-Rail service (in some cases via transfers) with major destinations on the FEC and operating, with limited stops, to Miami Government Center. The three express bus routes are:

1. A limited-stop service from Boca Raton to downtown Fort Lauderdale, then connecting with Tri-Rail before operating express to downtown Miami.
2. A limited-stop service from downtown Fort Lauderdale to Aventura Mall then operating express to downtown Miami.
3. A limited stop service from Aventura to downtown Miami.

A centralized bus maintenance facility for this alternative would likely be located in the vicinity of Pompano Beach.

Bus Rapid Transit Alternative

This alternative was designed to provide BRT service on the FEC rail line for the full

Table ES.1 – *Service Description, Low Cost/TSM*

Service	Description	Equipment	Headway (Peak/ Off-Peak)	Stops*	Travel Time
Rapid Bus					
Route 1	Jupiter – West Palm Beach	Articulated Bus	15/30	10	0:46
Route 2	West Palm Beach - Deerfield Beach	Articulated Bus	15/30	19	1:36
Route 3	Boca Raton – Ft. Lauderdale	Articulated Bus	15/30	14	1:24
Route 4	Ft. Lauderdale - Aventura	Articulated Bus	15/30	10	1:01
Route 5	Aventura - Miami	Articulated Bus	15/30	10	0:57
Express Buses					
Route 6	Boca Raton – Fort Lauderdale - Miami	Articulated Bus	15/- (Only Peak Period Service)	8	1:44
Route 7	Fort Lauderdale – Aventura - Miami	Articulated Bus	15/- (Only Peak Period Service)	6	1:20
Route 8	Aventura - Miami	Articulated Bus	15/- (Only Peak Period Service)	5	0:55

** Transfer points and overlap locations are only counted once, which accounts for the discrepancy between the number of stops in each route and total stops.*

Table ES.2 – *Service Description, Bus Rapid Transit*

Service	Description	Equipment	Headway (Peak/Off-Peak)	Stops*	Travel Time
Route 1	Jupiter to West Palm Beach	Articulated Bus	15/30	10	0:51
Route 2	West Palm Beach to Boca Raton	Articulated Bus	15/30	19	1:28
Route 3	Boca Raton to Fort Lauderdale	Articulated Bus	15/30	14	1:11
Route 4	Fort Lauderdale to Miami Govt. Ctr.	Articulated Bus	15/30	19	1:22
Express buses					
Route 5	Boca Raton - Miami	Articulated Bus	15/- (Only Peak Period Service)	14	1:53
Route 6	Palmetto Park Road - Miami	Articulated Bus	15/- (Only Peak Period Service)	10	1:15

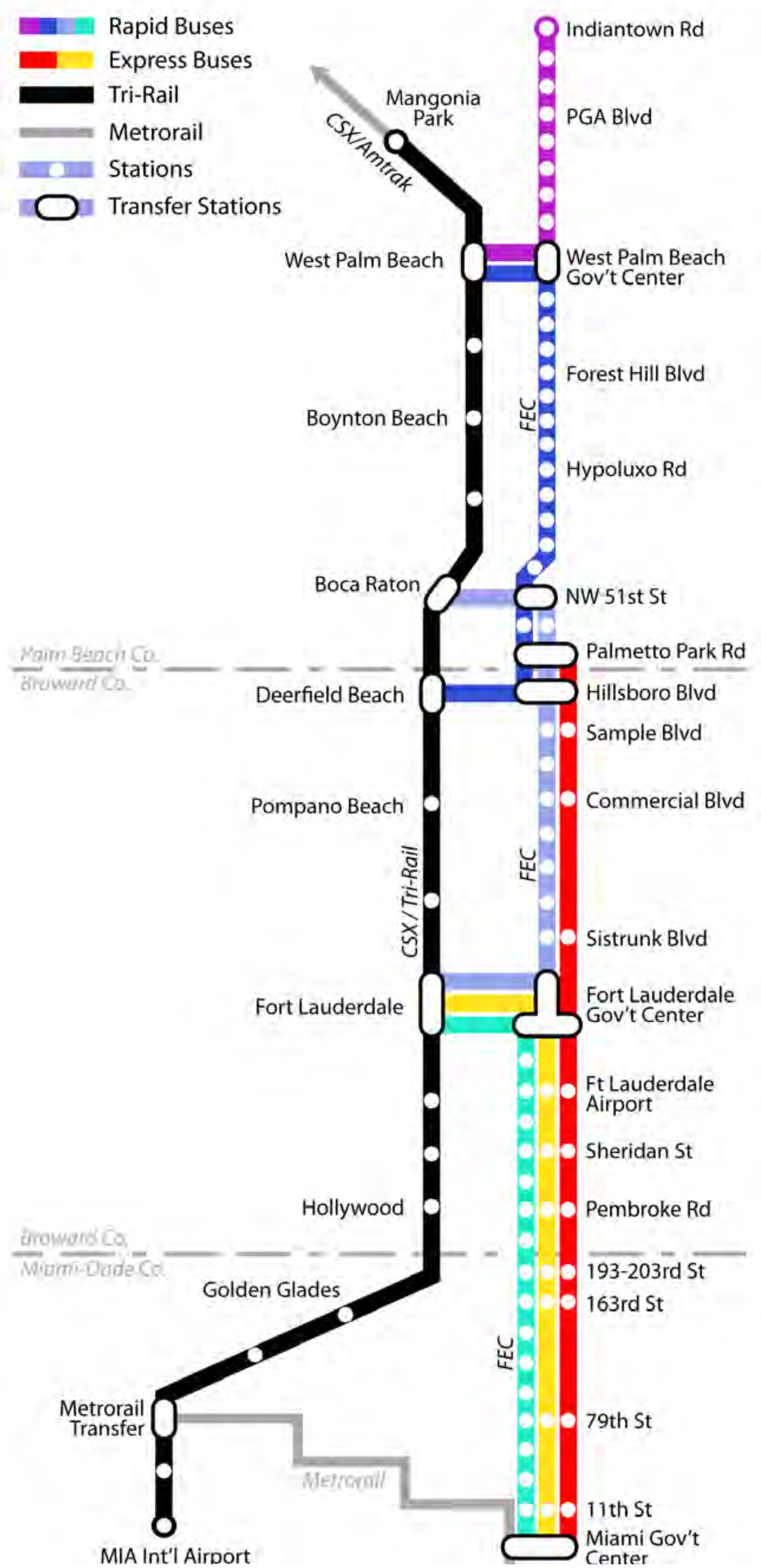
Transfer points and overlap locations are only counted once, which accounts for the discrepancy between the number of stops in each route and total stops

length of the study corridor. This would require the segregation of freight and passenger service, with each service allocated 50 feet of the 100-foot right-of-way. BRT service would connect with Tri-Rail trains at certain locations. Refer to **Figure ES.4** and **Table ES.2**.

While the BRT alternative was envisioned as a full-corridor system, there were concerns about the practicality of operating it as one, continuous service. As a result, the corridor was divided into four sections:

1. Between Jupiter and West Palm Beach's Government Center Station.

Figure ES.4 – *Bus Rapid Transit (BRT) Service Diagram*



2. Between West Palm Beach Government Center and Palmetto Park Road in Boca Raton.
3. Between Palmetto Park and Fort Lauderdale's Government Center.
4. Between Fort Lauderdale and Miami's Government Center.

All four routes connect with each other and with Tri-Rail. Two peak-period only express routes supplement the four local routes. Both operate into downtown Miami – one from Boca Raton and a second from Fort Lauderdale.

All of the local routes operate on a 15 minute headway in the peak periods and a 30 minute headway in the off-peak. The express routes operate on a 15 minute headway in the peak periods and do not operate in the off-peak.

All together, the four BRT routes stop at 50 stations along the FEC located as close as practically as possible to the stops on the Integrated Rail alternatives described below. An operations and maintenance facility is proposed in Pompano Beach, near the existing rail connection.

Integrated Rail - DMU Alternative

This rail alternative provides integration with Tri-Rail, express and local services in high ridership areas, and local, urban mobility service on the FEC corridor. The alternative provides four rail services which preserves service for current Tri-Rail riders while allowing passengers to travel the length of the corridor and move back and forth between the two corridors providing access to multiple destinations via either a one-seat ride or a convenient transfer. The network includes two connections between the two corridors, one in northern West Palm Beach and one in Pompano Beach, north of Fort Lauderdale. In peak hours, services are timed around a transfer station close to the eastern end of the Pompano connection, which will allow passengers to transfer from one service to another with minimal delay. This alternative utilizes FRA-compliant Diesel Multiple Unit

Table ES.3 – *Service Description, Integrated Rail - DMU*

Service	Description	Equipment	Headway (Peak/ Off-Peak)	Stops	Travel Time
FEC Local	45th St. to Miami Govt. Ctr.	DMU	15 / 30	44	2:06
Seaboard Flyer	45th St. to Miami Intl. Airport	Push-Pull	60 / 120	19	1:59
Flagler Flyer	Jupiter to Miami Govt. Ctr., via Northwood and Pompano Bch.	DMU	15 / 30	27 (peak) 41 (off-peak)	2:05 (peak) 2:26 (off-peak)
Airport Flyer	Pompano Beach to Miami Intl. Airport	Push-Pull	15 / 30	11	1:09

Table ES.4 – *Service Description, Integrated Rail - Push-Pull*

Service	Description	Equipment	Headway (Peak/ Off-Peak)	Stops	Travel Time
FEC Local	45th St. to Miami Govt. Ctr.	Push-Pull	15 / 30	44	2:28
Seaboard Flyer	45th St. to Miami Intl. Airport	Push-Pull	60 / 120	19	2:00
Flagler Flyer	Jupiter to Miami Govt. Ctr., via Northwood and Pompano Bch.	Push-Pull	15 / 30	27 (peak) 41 (off-peak)	2:29 (peak) 2:49 (off-peak)
Airport Flyer	Pompano Beach to Miami Intl. Airport	Push-Pull	15 / 30	11	1:09

(DMU) vehicles for two of the services and push-pull vehicles on two services utilizing Tri-Rail's existing push-pull equipment. The use of compliant technology allows the railroad tracks to be shared between passenger and freight services. The DMU Alternative also provides express and local service between Pompano Beach and Miami, projected to be the busiest section of the corridor, and allows for one-seat rides between the most popular origins and destinations. However, it does not allow for a one-seat ride between Tri-Rail stations south of Pompano Beach and downtown Miami; those customers must transfer to Metrorail as they currently do.

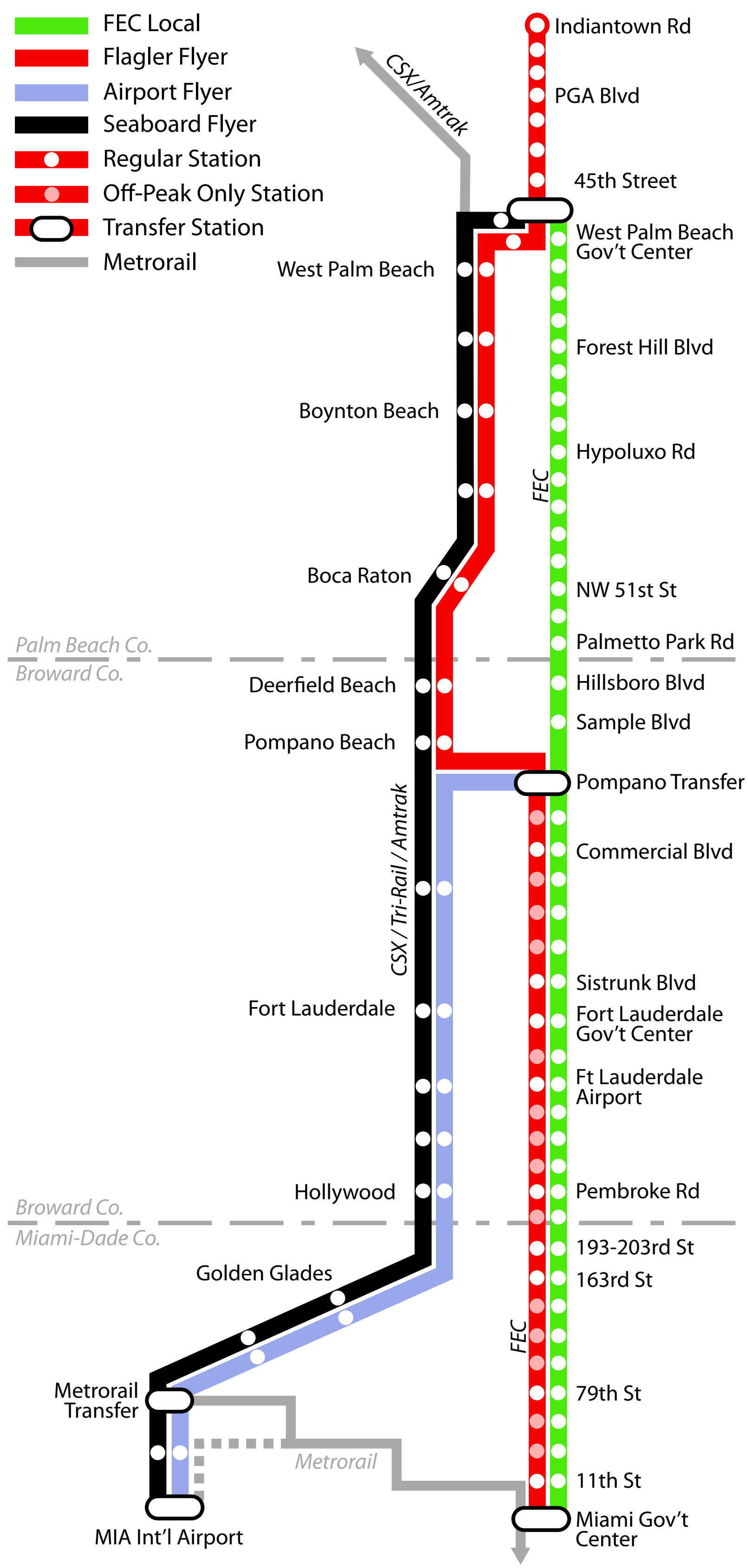
The maintenance facility for this alternative is planned to be located at Hialeah Yard, on the SFRC. A service description for this alternative is provided in **Table ES.3**, and a service diagram representing both Integrated Rail alternatives is provided in **Figure ES.5**.

Integrated Rail - Push-Pull Alternative

This alternative is similar in nearly all respects to the 'Integrated Rail – DMU' Alternative, except that all rail service under this option is operated exclusively by push-pull equipment, where the Flagler Flyer and FEC Local services use DMU equipment in the previous alternative. Other service characteristics, such as headways, stations, and service routes, are identical.

There are several differences between DMU and Push-Pull vehicles, leading to the decision to comparatively evaluate the two options. Tri-Rail currently operates both push-pull and DMU vehicles in passenger service. DMUs provide superior braking and accelerating characteristics, and are more efficient when used as shorter trains of two or three cars. Push-Pull vehicles are currently in predominant use by Tri-Rail, making them consistent with existing fleet and maintenance practices, easing integration and coordination between rail services. Additionally, they are more efficient when used as longer trains of four or more cars.

Figure ES.5 – *Integrated Rail Service Diagram*



The slower braking and accelerating associated with push-pull vehicles is reflected in longer travel times on the FEC Local and Flagler Flyer services, as seen in **Table ES.4**.

A maintenance facility is proposed in the existing Hialeah Yard on the SFRC line, as for the Integrated Rail – DMU alternative.

ES.4. Important Impacts

ES.4.1 Transportation

According to the results from the regional model, providing transit service on the FEC Corridor will generate anywhere from 11,000 to 59,000 new regional passenger trips daily. (Note that the rail alternatives incorporate both FEC and CSX/Tri-Rail corridors, and thus ridership projections include riders on both rail lines.) At a regional scale, adoption of any of the new premium transit services is projected to add between 12,000 and 16,000 new transit riders daily, separate from riders diverted to the new service from existing transit services. Tri-Rail riders will have increased alternatives as they will be able to cross over the Pompano connection and directly access destinations on the FEC Corridor with a one-seat ride or a convenient transfer to another train service. FEC riders would be able to connect into the Miami International Airport via the same connecting link. Transit travel will be reduced by 40 to 70 percent between most origin-destination pairs, greatly improving travel by transit and creating a mode of travel competitive with the automobile.

The build alternatives would bring nearly 300,000 residents and over 300,000 jobs to within 1/2-mile of new transit stations. Additionally, nearly 5,000 households without an automobile would be within 1/2-mile of stations, creating new travel opportunities that are not available today.

While introducing additional rail transit service is not expected to have a major impact on highway congestion, it will take trips off roads within one mile of the corridor by approximately 2 percent. In addition, simply creating viable alternatives to automobile travel in the eastern coastal communities will have a positive impact on both local trips in the area and long-distance trips currently using congested area highways like I-95. Traffic to stations, on the other hand, is not expected to create any major localized congestion. Increasing the frequency of trains through grade crossings has the potential for increased automobile/ train incidents. However improved safety warning and control devices at grade crossings, and even grade separations in some instances, would minimize incident potential. There is also the possibility of additional delay to cross street traffic.

The rail alternatives would enhance the flexibility of freight service and allow for expansion, as these alternatives are based on a shared track system that increases the mileage of track available for use by freight trains. No sidings or existing freight service would be interrupted by the introduction of passenger trains to the corridor. However, it is important to note that the FEC Railway and Fortress Real Estate Holdings, its owner, have expressed concerns regarding the construction of a busway in the FEC right-of-way.

Even when the corridor is reconfigured to accommodate additional track, the 100-foot right-of-way is still wide enough to accommodate a parallel greenway for pedestrians and bicyclists if the FEC Railway will allow such a facility in the corridor. The exception is at stations, where there are active sidings or where the right-of-way is constrained to a narrower width. In these locations the parallel roadways which extend up most of the corridor could be used for the greenway to by-pass these areas. Finally, amenities for cyclists and pedestrian are an important consideration in the future design of stations.

ES.4.2 Environment

No major investment project can be implemented without the potential for creating some impacts to the environment and, therefore, requiring the avoidance or mitigation of those environmental effects. Both the State of Florida and the U.S. Government have procedures to measure resources, assess impacts and avoid and/or mitigate effects. These procedures will be a major consideration in the *Draft Environmental Impact Statement (DEIS)* that will be prepared in Phase 3 of this study. Since the FEC Corridor passes through a fully developed territory, natural effects such as those to wetlands and habitat are likely to be minimal. The most important potential social effects are likely to be noise and vibration from new vehicles on the corridor. While the noise and vibration characteristics of a freight train are far more severe than from a passenger train, this project could introduce many more trains per day onto the corridor than currently exist. There are currently as many as 26 freight trains per day on the FEC; as many as 192 passenger trains per day may be added. The bus alternatives would have less noise and vibration impacts than the rail alternatives. However, the BRT will require more impermeable surface than the rail alternatives so it could have greater impacts to water quality and wetlands.

The Corridor itself is an eligible historic linear resource and passes through or close to many historic districts and buildings. The Division of Historical Resources, Florida Department of State advises that restoration and use of the historic FEC rail line would not constitute a Section 106 adverse effect or a Section 4(f) taking. Staff at will continue looking at the components associated with the rail line that may be individually significant, such as historic bridges or stations. Preliminary discussion between FDOT and Division of Historical Resources has led to the opinion that reuse of historic stations may be possible and that such station rehabilitations could be viewed as a mitigation measure. Further study, including a comprehensive cultural resource assessment survey (CRAS) and effects analysis would need to be coordinated with the Division of Historical Resources, municipal historic boards, and related staff.

ES.4.3 Cost and Financial Feasibility

All options, other than the Low Cost/TSM alternative, have a capital cost of over $2 billion, excluding corridor access costs. This cost includes real estate required for stations and pinch points on the corridor but not the purchase of the actual FEC Railway right of way. Even the Low Cost/TSM alternative, because this is an 85-mile project, has a major cost – equivalent to the capital cost of rail transit projects in many other cities. The rail alternatives and the BRT alternative are remarkably similar from a capital cost standpoint because the BRT requires that the freight tracks be moved to one side of the right-of-way in order to accommodate the busway. Operating costs are also high for the bus alternatives because the number of riders anticipated will require a lot of buses to carry the load. Capital and operating costs are summarized in **Table ES.5**.

In order to implement any system there needs to be a source of funds for both operating and capital costs. The region may look to the federal government to provide a portion of the capital costs but operating funding will be entirely local. On the capital side the major source of federal funds is the New Starts Program. In order to qualify for New Starts funding the project needs to be able to meet certain financial criteria. It may be that the entire project will not qualify as a whole for such funding and that certain segments may be funded with federal participation and others will need to be state funded. Additional analysis will take place in Phase 3 to help make this determination.

Even with federal participation towards capital costs, significant state and local funding will be required for both capital and ongoing operating costs. Some new source of funds will need to be created to provide this ongoing funding. Several options exist to raise the required funding, all of which would need to be endorsed politically in the region. The options that could raise the level of funding required involve special assessments, sales tax, or real estate tax increments or another dedicated, revenue-generating source. All three counties or the region as a whole will need to address this issue for a project of this type to advance to implementation.

Table ES.5 – *Capital and Operating Cost Summary (in millions of dollars)*

Measure	*Low Cost/ Transportation System Mgmt. (TSM)*	*Bus Rapid Transit (BRT)*	*Integrated Rail DMU*	*Integrated Rail Push-Pull*
Capital*	$198 - $242	$2,566 - $3,157	$2,498 - $3,053	$2,701 - $3,301
Operations & Maintenance	$47	$57	$100	$106

**Excluding costs to purchase or lease corridor right-of-way*

ES.5. Evaluation of Alternatives

The evaluation of alternatives supports the local decision-making process by informing – but not determining - the selection of a Locally Preferred Alternative (LPA). Evaluation measures are created to ensure that the goals and objectives of the project are met by the detailed alternatives and are also used to compare the major benefits and costs of each alternative. The evaluation measures are a mix of quantitative and qualitative factors, and are widely varied so as to emphasize that the determination is driven by a multitude of factors, including mobility, community development, economic opportunity, environmental quality, public and political support, and financial viability. These factors can counteract each other, creating trade-offs that local decision-makers must weigh.

The evaluation of alternatives is presented in summary at the end of this chapter. (See **Table ES.7.**) A more detailed explanation of the evaluation matrix is presented in Chapter 7 of the full report. From the matrix and its underlying evaluation, the following can be determined:

- The Low Cost/TSM alternative successfully addresses most of the goals, providing a cost-effective and minimally impactful option. It falls short on Goal 3: Encourage the implementation of transit supportive development. Its benefits are limited; however, the cost of implementing this alternative is lowest. This alternative provides minimal benefits for minimal initial costs, but the counties must be prepared to dedicate resources to its long-term operation.

- The BRT alternative successfully addresses each goal, but BRT is unremarkable in that there are very few measures in which BRT is clearly superior to the other alternatives. This alternative provides modest benefits, but does so with limited support from key stakeholders at a capital cost equal to the rail alternatives and without many of the benefits that rail provides. The owners of the rail corridor oppose busses in the FEC right-of-way because the roadway would limit their ability to expand freight operations or participate in the effects of rail-inspired economic development and would also interfere with access to delivery tracks across the busway.

- The Integrated Rail – DMU alternative successfully addresses each goal and provides the highest benefits of any detailed alternative. Ridership projections are highest for this alternative as are person trips diverted from the automobile. The DMU alternative also has the strongest economic development and transit oriented development potential. This alternative, like Push-Pull, provides substantial contributions to an integrated transportation network while improving freight operations on the FEC corridor. The most substantial costs related to this alternative are capital expenditures, and required acquisitions. Estimated capital costs are between BRT and the Push-Pull alternative costs, though all three build alternatives have relatively similar capital costs. A number of acquisitions would be required, totaling 21 acres. Some of these properties fall within low income or minority communities. However, the Integrated Rail-DMU alternative does a better job of addressing project goals than any other alternative by projecting high ridership, exhibiting strong compatibility with land use and freight plans, and improving economic development and transit-supportive development, all while keeping operating costs to a level below that of the Push-Pull Rail alternative.

- The Integrated Rail – Push-Pull alternative successfully addresses each goal, providing the second-highest ridership projections and person-trips diverted from cars and having high compatibility with local land use plans and policies. The opportunity for transit oriented development exists as well. However, the benefits described come with increased costs. Capital costs, annual operating costs and operating cost per passenger are the highest of any alternative. Additionally, possible noise and vibration impacts are higher with push-pull vehicles than other modes and the same number of acquisitions would be required as in the DMU alternative, above. Overall, this alternative has positive benefits far above the bus alternatives, but there are large financial costs and some community impacts.

- Overall, each alternative has some advantages. The Low Cost/TSM Alternative provides a low-cost option with some positive impacts but little or no local support, while the Integrated Rail-DMU Alternative provides a highly positive option with high levels of public support at a high initial cost. The Push-Pull alternative has similar benefits to the DMU alternative but with slightly higher costs, while the BRT alternative has high capital costs and little public support. Integrated Rail in all forms enjoyed high levels of public support in the public meetings. BRT, in particular, was the second-least favored conceptual build option, ahead of only the Low Cost/TSM option.

ES.6. Public Involvement

Extensive public outreach took place during both Phase 1 and Phase 2 of the study. Over 230 public meetings took place in Phase I including public workshops and public hearings, as well as meetings with various stakeholders and interest groups such as municipal officials and business leaders. Overall the opinion expressed at these meetings was in support of the project moving forward.

Additional public outreach took place throughout the Phase 2 planning process. Three rounds of general public meetings were held: kick-off meetings at the commencement of Phase 2; workshops to get feedback on alternative technologies and service patterns, and to share information on grade crossings, station locations and environmental factors; and formal public hearings on the final alternatives at the conclusion of Phase 2. More targeted meetings were also held with a wide variety of special interest groups and stakeholders focused on the project in general and subjects of local interest. Meetings were held with all the municipalities to determine station locations and in some cases full scale charrettes took place. One-on-one meetings were held with many municipal and county officials. A series of meetings were held with stakeholders to discuss a potential new crossing of the New River in Fort Lauderdale.

In both Phase 1 and 2 flyers advertising the major public meetings were sent out to over 500,000 recipients. Throughout the study

Table ES.6 – *Summary of Phase 2 Public Meetings*

Audience	# Presentations/ Meetings	Attendance (if applicable)
Public Hearings	8	600
Public Meetings/Workshops	34	1200+
Steering Committees	9	
Transportation Policy Boards	7	
City/Town Councils	4	
Municipal Officials / Community Leaders/Local Business Leaders	100+	

a project website was maintained and kept up to date with notices and current project information.

In general, there is public support for the project though a number of concerns about the details have been raised that will need to be addressed as the project progresses. The primary concerns include: noise and vibration from trains, impacts at grade crossings, quiet zones, construction impacts, and river crossing impacts.

ES.7. Project Approvals

Four final alternatives were presented to the regional planning agencies for selection of a locally preferred alternative. Both the Palm Beach Metropolitan Planning Organization(MPO) and the Broward MPO approved regional rail as the preferred alternative with no determination as to specific vehicle technology (push-pull vs. DMU), as did the technical committees of the Miami-Dade MPO. As of this writing the Miami-Dade MPO has requested further information and has not yet voted on a preferred alternative. The Southeast Florida Transportation Council (SEFTC) and the South Florida Regional Transportation Authority (SFRTA), critical to transportation decisions in the region, were also presented the final alternatives for their selection. Both boards approved an alternative consisting of regional rail and Metrorail. Many other regional, county and local agencies have formally supported the project to move forward into the next phase of more detailed project development. Throughout the study coordination has taken place with the Florida East Coast Railway which supports the concept of providing passenger service within their corridor.

Table ES.7 – *Evaluation Summary*

	Goal/ Obj.	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Goal 1: Improve mobility and access for personal travel and goods movement					
Total SFECC ridership (unlinked trips)	1.3, 2.1	11,000	20,000	59,000*	52,000*
Total regional transit trips (linked trips)	1.4, 1.7	650,000	652,000	653,000	648,000
New track miles available for use by freight & Amtrak	1.4, 1.7	0	0	116	116
Compatibility with freight operations	1.4,1.7	N/A	Negative	Positive	Positive
New Stations/stops	1.5	0	52	52	52
Person trips diverted from automobile	1.8	13,000	15,000	16,000	11,000
Zero-Car Households within ½-mile of new stops and stations	1.6	0	4,944	4,944	4,944
Jobs/Population within ½-mile of new stops and stations	1.1, 3.1	0	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590
End to end running time (Peak/Off Peak) (hours)	1.2	4:05/5:20	4:19	2:05/2:26	2:29/2:49
Goal 2: Coordinate corridor transportation investments to contribute to a seamless, integrated regional multi-modal transportation network					
Miles of greenway accommodated	2.6	0	37	51	51
Number of premium transit services connected to alternative	1.6, 2.2	3	3	3	3
Change in Tri-Rail ridership relative to no-build	2.4	+1,000	+2,000	N/A**	N/A**
Change in Metrorail ridership relative to no-build	2.4	-3,000	-2,000	+3,000	+2,000
Goal 3: Encourage the implementation of transit supportive development					
Economic Development Potential	3.1, 3.2	Low	Medium	High	High
Compatibility with local plans and policies regarding transit	2.5, 3.3, 3.4, 3.6	Low	Medium-High	High	High

** The Integrated Rail alternatives incorporate the CSX rail line, and thus ridership numbers include riders on both FEC and CSX corridors*
*** Service integrated with Tri-Rail*

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Table ES.7 continued

	Goal/ Obj.	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Goal 4: Minimize adverse impacts to the community and local businesses					
Number of relocated/ acquired properties and businesses in minority and low income neighborhoods	4.3	0	123 properties 132 acres	119 properties 134 acres	119 properties 134 acres
Number of possible new grade separations	4.1	0	3-28	3-24	3-24
Noise impacts - Number of affected parcels	4.2	0	0	1,200	1,800
Vibration impacts - Number of affected parcels	4.2	0	0	5,700	4,600
Right-of-way acquisitions (acres)	4.4, 4.5	0	43	21	21
Visual Impacts - Number of affected parcels	4.4	2000	20,000	21,000	21,000
Goal 5: Preserve and enhance the environment					
Number of historic and cultural impacts	5.2	4	60	63	63
Directly impacted acres of environmentally sensitive areas (e.g., wetlands, parks, conservation areas)	5.1, 5.4	0	22	10	10
Reduction in regular emissions	5.5	134,232 short tons CO2/day	93,446 short tons CO2/day	248,884 short tons CO2/day	157,475 short tons CO2/day
Goal 6: Provide a cost-effective transportation solution					
Capital Cost*	6.1	$198 - $242 million	$2.57 - $3.14 billion	$2.50 - $3.05 billion	$2.70 - $3.30 billion
Annual Operating Costs (excluding Tri-Rail)	6.1	$47.3 million	$56.5 million	$99.6 million	$106.1 million
Capital cost per weekday passenger	6.1	$6,000	$48,000	$42,000	$48,000
Capital cost per passenger mile	6.1	$0.90	$8.80	$7.20	$8.50
Operating cost per annual passenger	6.1	$11.80	$9.90	$10.90	$12.70
Operating cost per passenger mile	6.1, 6.3	$0.60	$0.50	$0.60	$0.70
Annual Revenues	6.1	$16.0 million	$18.2 million	$23.0 million	19.8 million

** All costs listed are in 2009 dollars*

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Chapter 1

Purpose and Need

Highlights:

- The FEC rail corridor is 85 miles long and operates in the historic economic core of South Florida, connecting downtowns of large and small cities.
- Despite existing transit services in the tri-county area, traffic congestion is a major problem, particularly on large north-south roads like I-95 and US-1 that parallel the FEC corridor.
- Inter-county bus service along US-1 is inconvenient due to the organization of county-operated bus service.
- Regional land use and economic development efforts have been focused on the eastern portions of South Florida, through which the FEC rail corridor travels.
- A new transit service would increase mobility, supplement transportation capacity, and increase regionally supported development opportunities.
- Goals and objectives were created to guide the transit planning process.

1.1 Corridor Description

The South Florida East Coast Corridor Transit Analysis (SFECCTA) study area extends approximately 85 miles through the tri-county area of Southeast Florida along the FEC Railway corridor (**Figure 1.1**). This corridor represents the historic economic core of Southeast Florida that developed along the railroad, and links highly urbanized CBDs of Miami, Fort Lauderdale, and West Palm Beach in addition to their respective seaports and airports. Today, the corridor is used exclusively for rail and intermodal freight operations. The corridor includes residential, employment, recreational, cultural, educational, medical, retail, and tourist uses. Due to its location and the demand for travel, the FEC Railway corridor is included as part of Florida's Strategic Intermodal System (SIS). Florida's SIS is comprised of statewide and regionally significant facilities and services for moving both people and goods, and includes linkages that provide for smooth and efficient transfers between modes and major facilities. The South Florida Rail Corridor (SFRC), owned by the state of Florida and over which both CSX freight and Tri-Rail passenger trains run, lies directly to the west of the FEC Corridor.

The Corridor's Historical Background: The FEC Railway was initially built in the late 1880's to early 1900's by Henry Flagler to provide passenger and freight service along the east coast of Florida. Passenger service along the FEC Railway into southern Florida operated until 1968 when it was discontinued. Today, the FEC Railway continues to dispatch freight trains from its headquarters in St. Augustine, sending trains along virtually the same route developed by Henry Flagler over 100 years ago.

Study Background:

The Florida Department of Transportation (FDOT) Districts 4 and 6, partnered with the three regional Metropolitan Planning Organizations (MPO), South Florida Regional Transportation Authority (SFRTA), and the county transit agencies PalmTran, Broward County Transit, and Miami-Dade Transit, initiated the FEC study in December 2005 as a multi-phased Alternatives Analysis (AA) employing a Tiered Programmatic Environmental Impact Statement (PEIS) approach to transportation and environmental matters. At the conclusion of the first tier, a Locally Preferred Alternative (LPA) had not been identified and a broad range of modal alternatives remained under consideration. However, the FEC Corridor was identified as the preferred corridor for a new transit service and the number of alternative modes had been refined. As a result, FDOT and Federal Transit Administration (FTA) agreed the proposed study remain in early scoping, consistent with the National Environmental Policy Act (NEPA) and discontinued the pursuit of a Tiered PEIS process. From that point on, the work, now in Phase 2, has advanced following the FTA Early Scoping/Alternatives Analysis and FDOT Efficient Transportation Decision Making (ETDM) processes. A NEPA Draft Environmental Impact Statement (DEIS) will not be prepared in Phase 2. The DEIS will follow the selection of an LPA at the conclusion of Phase 2. This change in approach to project development resulted in the Tier 1 Final PEIS document becoming an interim planning report, renamed the Final Conceptual Alternatives Analysis/Environmental Screening Report (AA/ESR). An early scoping notice announcing the availability of the Final Conceptual AA/ESR and the initiation of Phase 2 (AA/Early Scoping) was published in the Federal Register on January 13, 2009 and in the Florida Administrative Weekly on January 16, 2009.

As seen in **Figure 1.1**, the Southeast Florida region is strongly oriented in a north-south direction, squeezed between the Everglades on the west and the Atlantic Ocean on the east. The FEC corridor extends down the heart of the coastal ridge and historically anchored the development of the region's oldest and densest towns and cities. I-95 was built on the western edge of these centers,

Figure 1.1 – *Study Area context*

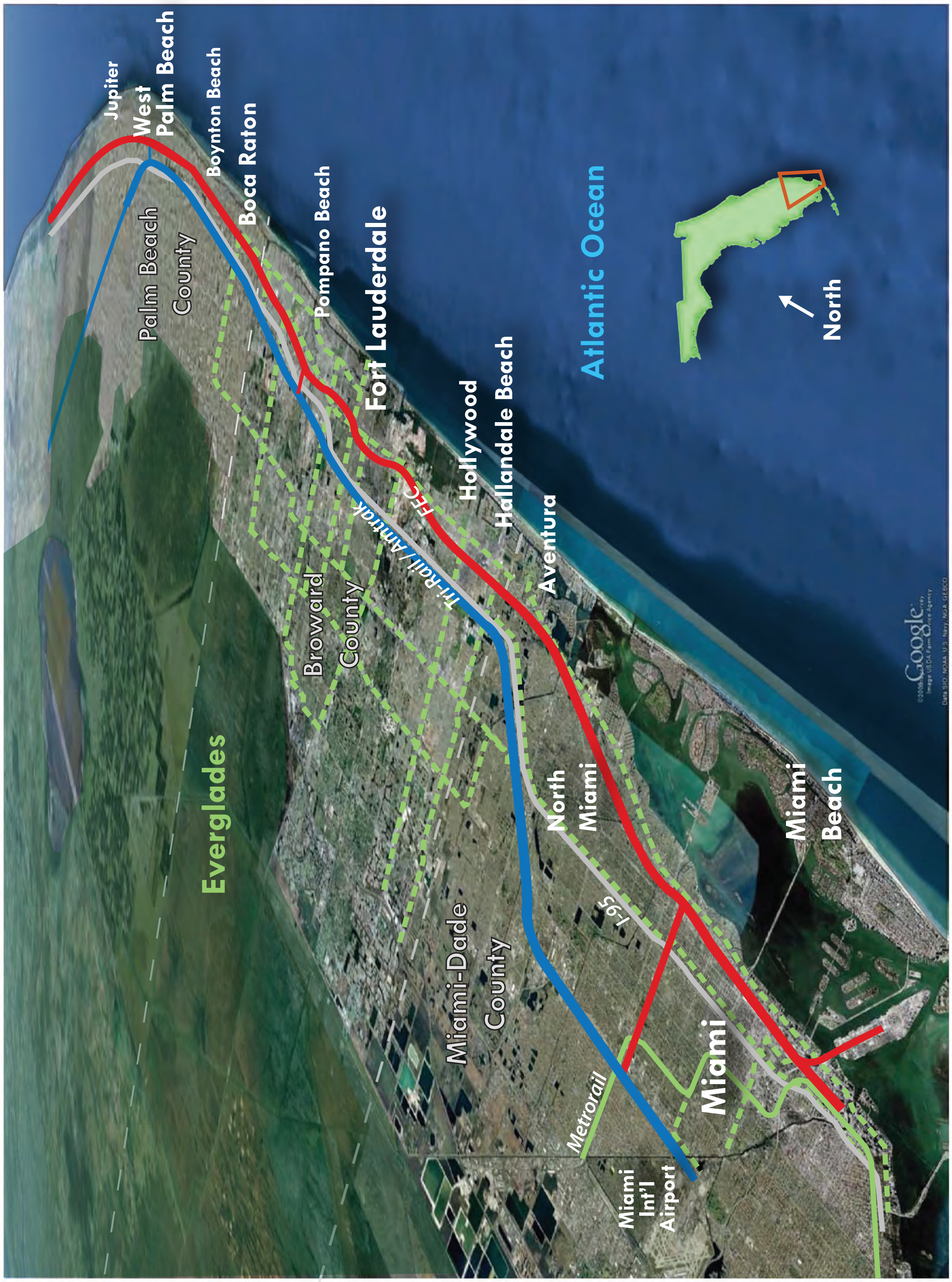
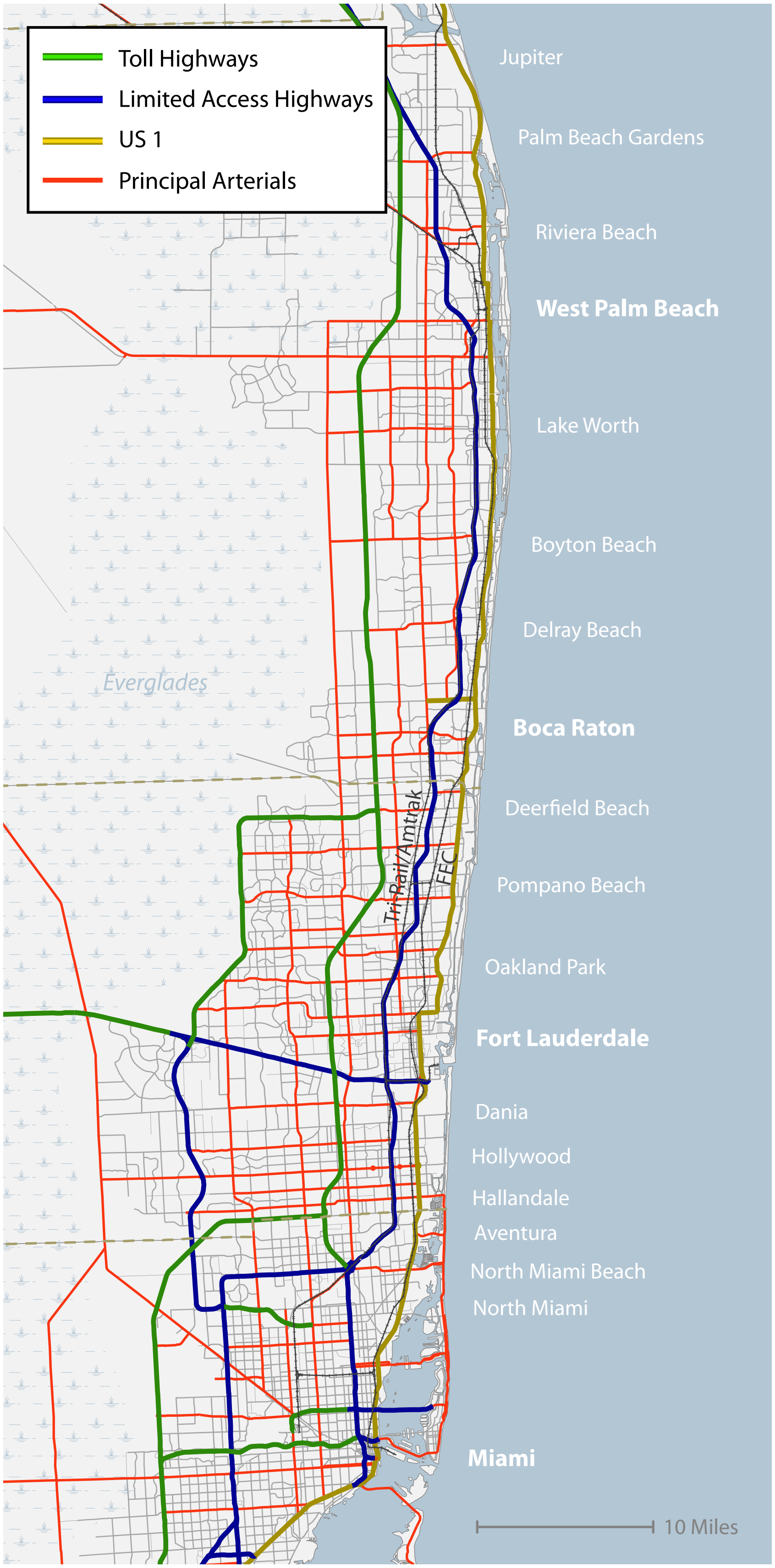


Figure 1.2 – *Existing Highway System*



and newer suburban development has spread further west towards the Everglades.

1.2. Transportation Facilities and Services in the Corridor

1.2.1. Existing Highway System

The regional highway system proximate to the study area includes two continuous major north-south roadways, US 1 and I-95 (**Figure 1.2**). Dixie Highway and A1A are also major north-south roadways but are not continuous. Other roadways further west in the tri-county region include US-441 and Florida's Turnpike. I-95 is a limited access highway with eight to twelve travel lanes. Recently, FDOT has instituted High Occupancy Toll (HOT) Lanes on I-95 between Golden Glades and Miami. These lanes reduce travel time for express buses and some users who are both willing and able to pay the tolls. I-95 currently carries some of the highest traffic volumes in the nation.

US 1 is a principal arterial with four to eight travel lanes and with closely-spaced signalized intersections at all the major east-west arterials. Additional turn lanes for both left and right hand turns are provided at these intersections. Though there are typically sidewalks along US 1, they are narrow and immediately adjacent to speeding travel lanes. Intersections are significant barriers to walking because there are so many lanes to negotiate.

1.2.2. Existing Transit Services

There are several public transportation providers currently in operation in South Florida. Palm Beach County operates Palm Tran bus services, Broward County operates Broward County Transit (BCT) bus services, and Miami-Dade County operates Miami-Dade Transit (MDT) bus, Metrorail and

Metromover services. South Florida Regional Transportation Authority (SFRTA) operates Tri-Rail commuter rail services. Amtrak also provides intercity passenger rail service connecting to Central Florida and beyond. A service description of the fixed-guideway transit is provided in **Table 1.1**. Service characteristics of the bus systems in the tri-county area are provided in **Table 1.2**.

1.2.2.1. Amtrak

Amtrak operates two daily trains in each direction between New York Penn Station and Miami Station in Hialeah. Within the southeast Florida region, these trains use the same tracks as Tri-Rail and CSX freight trains. Ridership between local Amtrak stops in the region is non-existent, as Amtrak does not sell tickets for intra-regional travel. The service is important, however, to the region's connectivity with the rest of the state and country. A regional service map is shown in **Figure 1.3**.

Table 1.1 – *Service Characteristics of Fixed-Guideway Transit Providers*

Service Characteristics	Tri-Rail	Metrorail	Metromover	Amtrak
Route Miles	142	45	8.5	130
County(s)	Palm Beach, Broward, Miami-Dade	Miami-Dade	Miami-Dade	Palm Beach, Broward, Miami-Dade
Technology	Commuter Rail	Rail Rapid Transit	Automated Guided Transit	Intercity Rail
Number of Stations	18	22	21	6
Average Station Spacing	8 miles	2 miles	0.4 miles	21 miles
Service (trains/weekday)	52	180	varies by route	2
Span of Service	4:44 PM - 10:25 PM	5:00 AM - 12:00 AM	5:00 AM - 12:00 AM	Minimal service
Ave. Commercial Speed (incl. stops)	40 mph	29 mph	9 mph	Not available
Weekday Peak/Non-Peak Hour Headway	20/60 min.	7-8/15 min.	1.5/3 min.	Not applicable
Average Weekday Ridership (2008)	16,000	63,000	28,000	0*

** Amtrak tickets are not available for travel within Southeast Florida*

Table 1.2 – *Service Characteristics of Bus Transit Providers*

Service Characteristics	Palm Tran	Broward Transit	Miami-Dade Transit
Number of Routes	36	41	101
Route Miles	1,074	1,029	1,847
Span of Service	5:00 AM - 10:30 PM	4:30 AM - 12:30 AM	all day
Range of Service Frequency	15 to 60 min.	15 to 60 min.	8 to 90 min.
Average Weekday Ridership (2008)	33,000	96,000	133,000

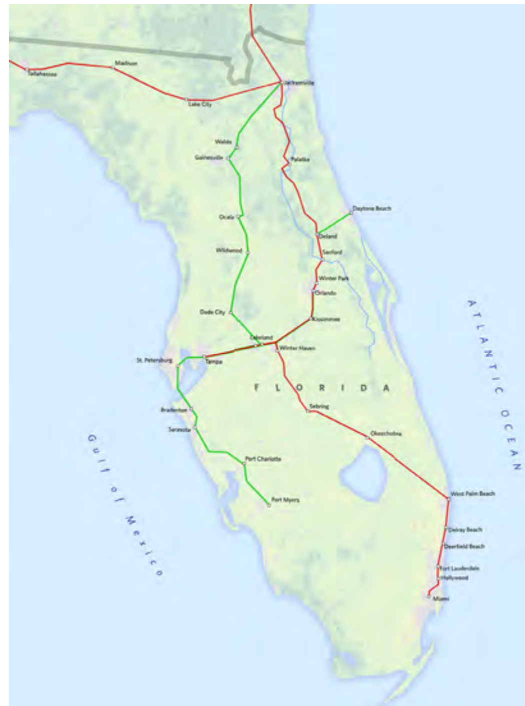
Service data from current schedules as of August 6, 2010.

1.2.2.2. Tri-Rail

North-south mobility by rail in the tri-county region is currently provided by Tri-Rail commuter rail service that is operated by the SFRTA. Tri-Rail operates along the South Florida Rail Corridor (SFRC), which is owned by the State of Florida and is shared with CSX freight and Amtrak service. The SFRTC operates two types of equipment on the service. The majority of their trains are push-pull train sets, with either two or three bi-level passenger cars per train. They also operate two Diesel Multiple Unit (DMU) trains which are also bi-level.

The Tri-Rail alignment generally runs parallel to I-95 (see **Figure 1.4**), often several miles to the west of the concentrated development of the region's major CBDs. Service connects to Miami-Dade Transit's Metrorail system at the Tri-Rail Metrorail Transfer Station (at 79th Street), the busiest Tri-Rail station. The Miami Intermodal Center (MIC) proximate to the Miami International Airport (MIA), is the southern terminus for both Amtrak and Tri-Rail trains and will connect directly to a new Metrorail route, allowing for a second connection between the Tri-Rail and Metrorail systems. Connecting bus services and free parking are available at all Tri-Rail Stations. Tri-Rail stations typically have between 200 and 600 parking spaces. Tri-Rail has cooperative agreements on fares with transit services provided in each of the three counties in which it operates. Tri-Rail operates 16 different shuttle bus routes that meet most or all weekday trains at nine stations. These routes offer free connecting service to several locations along the Tri-Rail Corridor, including the airports, downtown Fort Lauderdale, and office parks in Boca Raton, Deerfield Beach and Pompano Beach. In the past year, Tri-Rail's ridership has fluctuated from a high of 17, 250 to a low of 11,560 per weekday, having been influenced by the state of the economy, the price of gasoline and the fares charged by Tri-Rail which increased by 25 percent on June 1, 2009, during Phase 2 of the study.

Figure 1.3 – *Amtrak's Florida Routes*



1.2.2.3. Miami-Dade Transit

Miami-Dade Transit (MDT) is the largest transit agency in the State of Florida, but only the 12th largest public transit system in the United States despite the County's population ranking 8th in the nation. MDT operates Metrobus routes, and Metrorail and Metromover services.

Metrobus

Thirty-seven Metrobus routes either intersect the FEC corridor or operate partly or completely within the FEC study area (**Figure 1.5**). These routes have a combined average weekday ridership of 133,000. Of these 37 routes, seven routes (Routes 2, 3, 9, 10, 16, 62 and 93) run parallel to the FEC corridor in a north-south direction. These seven routes have a combined average weekday ridership of 34,000, which is 25% of the ridership in the study area. Of these seven routes, the route that carries the most passengers is Route 3, with an average weekday ridership of 8,171. This route operates along 25 miles of US 1, between Hallandale Beach in Broward County and Downtown Miami.

MDT has recently initiated service on a series of I-95 express buses running between the Park and Ride lot located on Broward Boulevard in Fort Lauderdale. and downtown Miami (Government Center), and between Hollywood and downtown Miami. The Fort Lauderdale route makes an intermediate stop at the Tri-Rail Fort Lauderdale Station before reaching downtown Miami. The Hollywood route travels directly between Sheridan Street Tri-Rail Station and downtown Miami.

Metrorail

Metrorail is a 22.6-mile long, electrically powered, elevated rail rapid-transit system extending from Kendall in South Miami-Dade County to Medley in West Miami-Dade County (see **Figure 1.4**). A 2.4-mile extension to the airport (new MIC) is currently under construction.

The southern leg of Metrorail, between Miami-Dade County Government Center and Kendall, attracts the highest ridership. In 2008, the average weekday ridership for the Metrorail Station at Government Center was 10,000, which is 16% of the system's total ridership. Government Center serves as the southern terminus of the FEC study area.

Metromover

Metromover is an electrically powered, fully-automated guided transit (people mover) system that operates along a 4.4-mile route (**Figure 1.4**). Metromover is a free service, and connects with Metrorail at the Government Center and Brickell stations and with Metrobus at various locations throughout Downtown Miami. The Miami-Dade County Government Center serves as the busiest station of the 21 Metromover stations. In 2008, the average weekday ridership was 6,500, which is 23% of Metromover's total ridership.

1.2.2.4. Broward County Transit

Of Broward County's more than 1,200 square miles, Broward County Transit (BCT) buses provide service to its urbanized 410 square miles with 43 regular weekday routes

Figure 1.4 – *Rail-Based Transit Map*

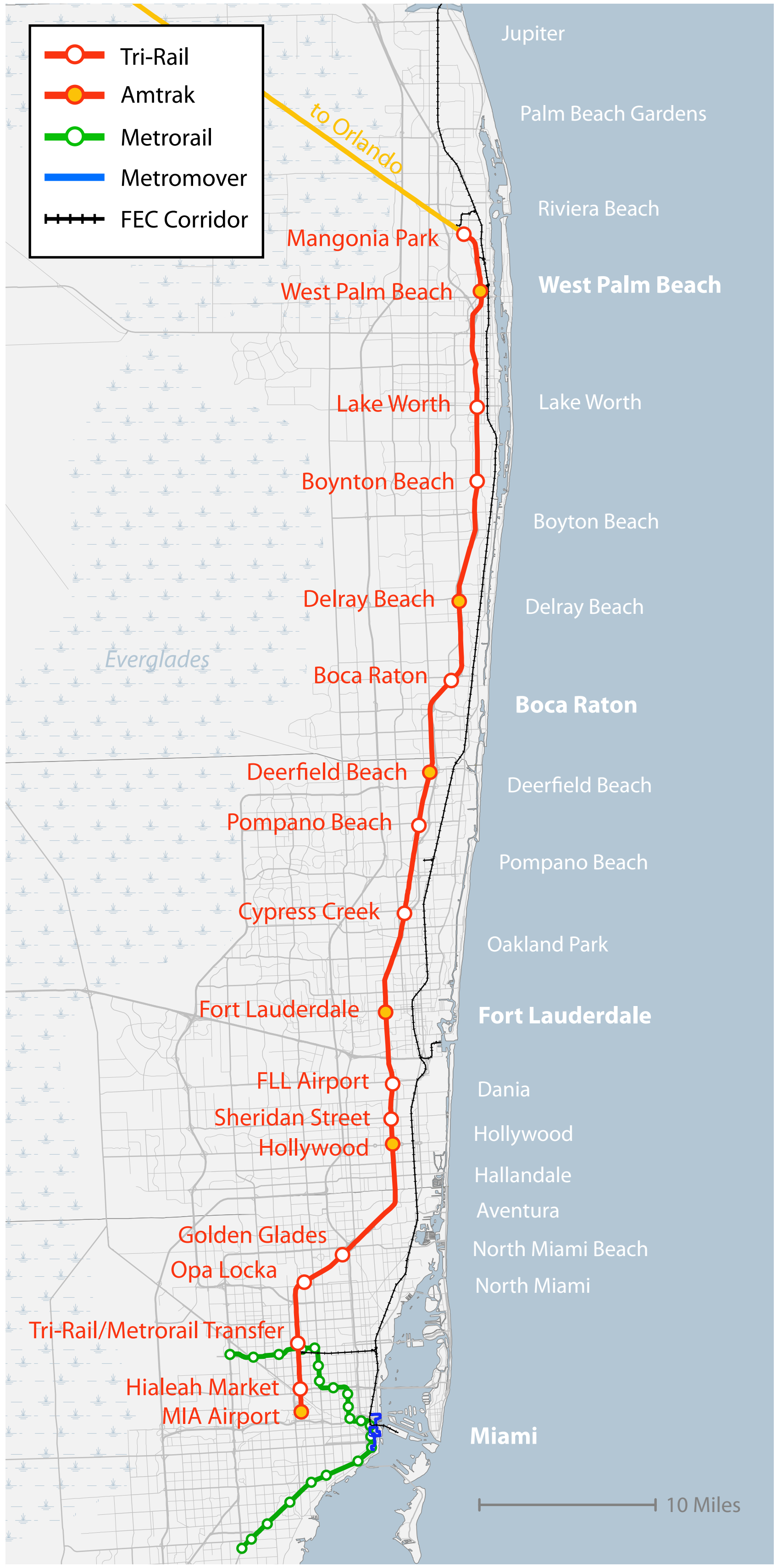
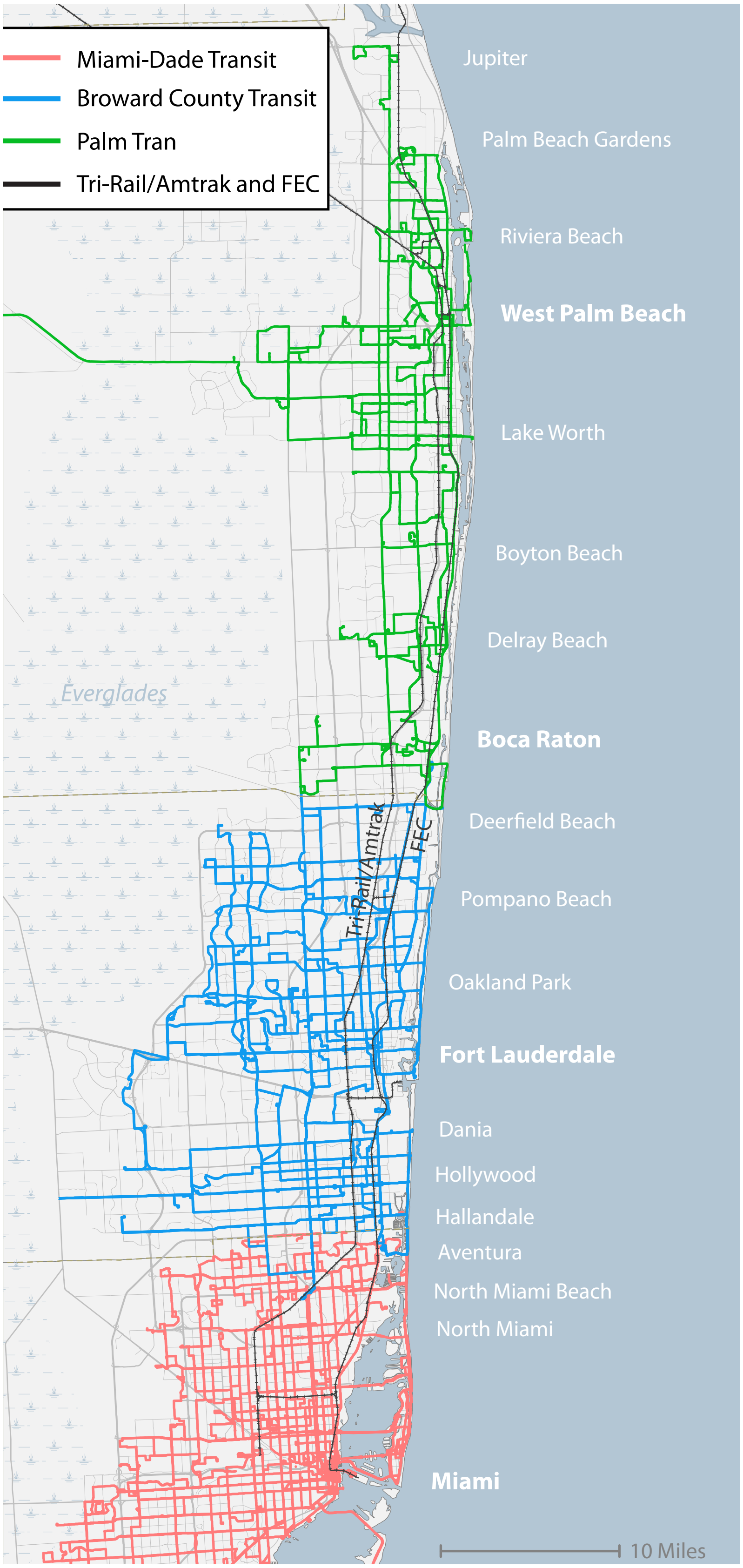


Figure 1.5 – *Bus Transit Map*



(**Figure 1.5**). Service is concentrated in the eastern portion of the County, with three routes extending north into Palm Beach County and six routes extending south into Miami-Dade County to serve inter-county travel markets. BCT has local agreements with 22 cities, offering 64 community bus routes designed to increase the number of destinations within city limits that residents can access using public transit. BCT's 27 bus routes that operate in the FEC study area reported an average weekday ridership of 95,782 for fiscal year 2008. Out of these 27 routes, six routes (1, 6, 10, 20, 50, and 60) run in the general north-south direction, parallel to the FEC railroad. These six routes recorded 25,649 in average weekday boardings, approximately 27% of the total system-wide boardings.

The bus route with the highest ridership is Route 1 with an average weekday ridership of 8,041. This route travels along US1 (also known as Federal Highway) between Aventura Mall in Miami-Dade County and the BCT Central Terminal in Downtown Fort Lauderdale.

Service recently started on a BCT I-95 express bus route running between Pembroke Pines, and Downtown Miami (Government Center). The route makes three intermediate stops (including the Tri-Rail stations at Hollywood and Golden Glades) before reaching downtown Miami.

1.2.2.5. Palm Tran

The majority of Palm Tran's service is concentrated in the eastern portions of Palm Beach County as far north as Jupiter and as far south as Boca Raton (see **Figure 1.5**). Thirty of the 36 Palm Tran routes intersect the FEC or operate partly or completely within the FEC study area. Ridership on these 30 bus routes amount to approximately 31,305, over 90% of Palm Tran's system-wide total. Of these 30 routes, four routes (1, 10, 21, and 70) are significant to the FEC project in that they run in a general north-south direction, parallel to the FEC Railway. These four routes recorded 9,452 in average weekday boardings, approximately 29% of the total county-wide boardings. This generally shows that a significant portion of the system ridership is along the eastern part of the county. Palm Tran Route 1 in particular, which operates over 38 miles between Boca Raton and Palm Beach Gardens along US 1, carries the bus system's highest ridership – 7,860, which is almost 24% of the total system-wide ridership.

In August 2009, Palm Tran started a limited service, express commuter bus on I-95 from Stuart (in Martin County) to the West Palm Beach Intermodal Center. Recent service changes were made in an attempt to improve ridership.

1.2.3. Existing Freight Services

There are two freight railroads within the Study Area. CSX operates freight service between Orlando and Miami on the South Florida Rail Corridor (SFRC) which is owned by FDOT and which also carries Tri-Rail commuter rail service. The Florida East Coast Railway owns and operates a railroad between Jacksonville and Miami, no passenger service has been carried on this railroad since 1968.

1.3. Performance of the Transportation System

1.3.1. Highways

Traffic Congestion

The total daily volume of traffic on major highways within the FEC corridor at key locations in Miami-Dade, Broward and Palm Beach Counties is over 28 million vehicle miles traveled. According to the 2007 National Mobility Report, the Miami urban area (including Palm Beach, Broward and Miami-Dade counties) is tied in second place for most congested peak period travel among very large urban areas (**Table 1.3**). The Miami area is exceeded only by the Los

Table 1.3 – *Nationwide Congestion Statistics*

Urban Area	*Percent of Peak Period Travel that is Congested*	*Percent of Peak Daily Travel that is Congested*
LA-Long Beach-Santa Ana, CA	86%	43%
Miami, FL	**82%**	**41%**
San Francisco-Oakland, CA	82%	41%
Washington, DC	81%	40%
Chicago, IL-IN	79%	39%
Atlanta, GA	75%	38%
Houston, TX	73%	36%
Detroit, MI	71%	35%
New York-Newark, NY-NJ-CT	69%	34%
Dallas-Fort Worth-Arlington, TX	66%	33%
Seattle, WA	66%	33%

Source: *2007 National Mobility Report*

Figure 1.6 – *Typical morning rush-hour conditions on I-95 southbound into downtown Miami, one mile west of the FEC corridor.*

Angeles-Long Beach-Santa Ana region but its congestion is worse than that of much larger areas such as Chicago, New York, and Dallas-Fort Worth-Arlington, TX.

Projected population and employment growth will further exacerbate existing roadway congestion over the next two decades. Increasing congestion on the limited north-south facilities will result in an increase in travel times and delays for automobile drivers as well as for bus transit and highway freight. According to this analysis, in 2030, 30 percent of total travel is projected to occur on roadways operating at level of service (LOS) E or F as compared to only 19 percent of travel in 2005. As the highway system becomes overloaded, a loss of system reliability will have negative impacts on the economic competitiveness of the region.

Figure 1.7 indicates that congestion is particularly severe on north-south roadways; however, east west roadways in the study area also highly congested, which impedes access to eastern destinations from the west. Major north-south roadways parallel to the FEC corridor, such as SR-7, I-95, Military Trail/ Andrews Avenue, US 1, and A1A are congested and will become more heavily congested into the future.

Further widening of either of either I-95 or US 1 to increase capacity is impractical due to the enormous cost and significant community impacts that would be generated. Given constraints such as land values, land availability, and the costs of roadway construction, the provision of additional roadway capacity (additional lane miles) is projected to continue to lag behind the area's growth rate. The 2030 Cost Feasible Long Range Transportation Plans of the respective counties include a 16 percent increase in total lane miles and 19 percent increase in total capacity for the entire tri-county area between 2005 and 2030. The Region's freeways will witness a 13 percent increase in lane miles. However, during this same period, the tri-county region is projected to witness a 39 percent increase in traffic volume. Much of the additional lane miles of capacity will be added in the less densely-developed areas, away from the east coast and the FEC corridor. The planned additional roadway supply will be far outstripped by the growth in demand.

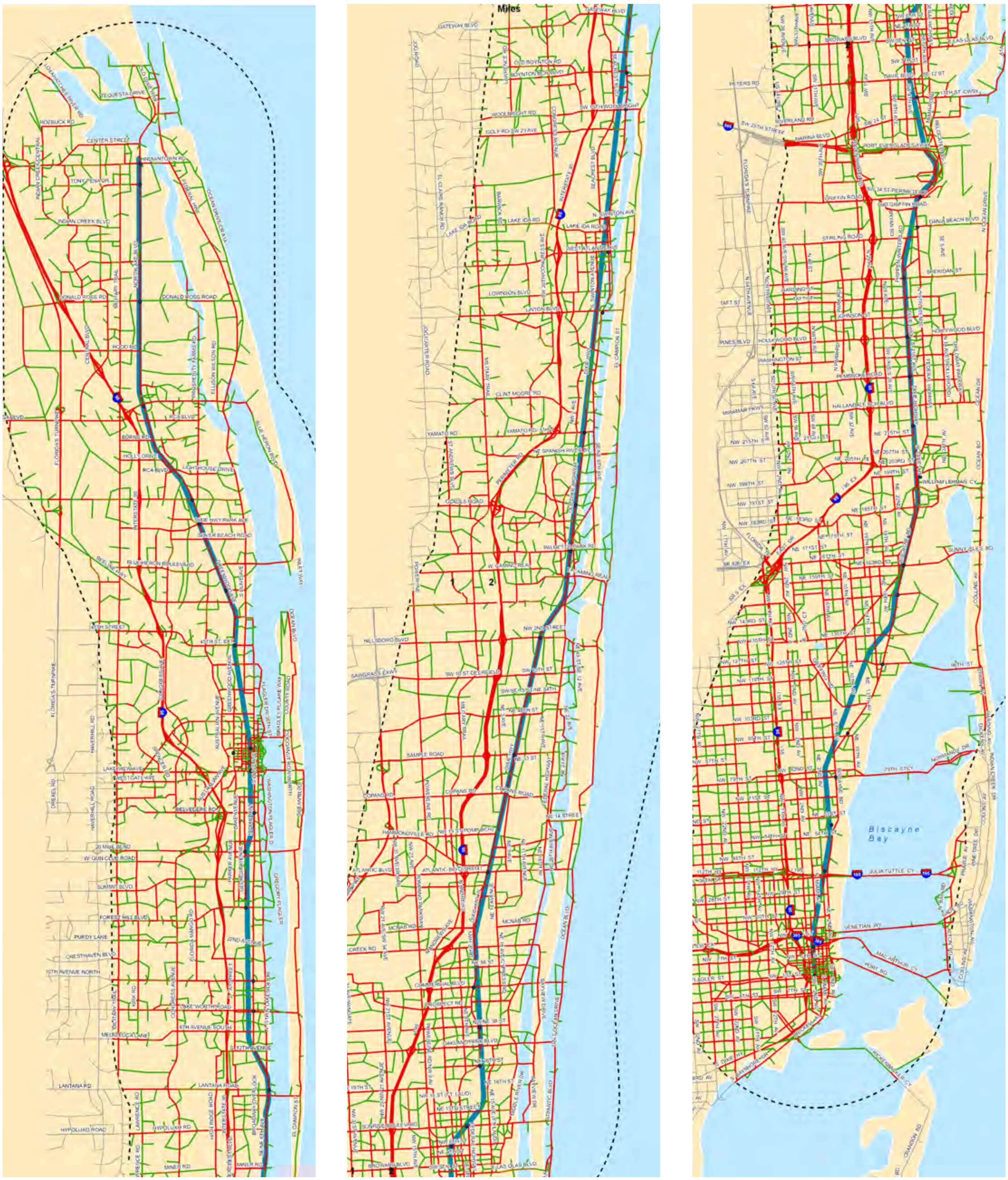
According to the 2007 National Mobility Report, in order to maintain current flow of traffic, the Miami area alone needs an additional 330 lane miles every year. However, the planned growth of supply indicates that the entire tri-county area will add an average of 92 lane miles per year until 2030, thus congestion will only worsen over time without other alternatives to address this issue. Increased congestion will lead to further travel time delays and, ultimately, a loss in productivity and economic competitiveness. The National Mobility Report indicates that in 2007, an average commuter in Miami spent 47 hours every year in congestion that resulted in a congestion cost of $903 per peak traveler and cumulative cost of $2.69 billion for the Miami area alone. The Miami area was ranked fourth in the nation in terms of total delay and fifth in terms of congestion cost.

The region is traversed by a series of freeways and arterials generally traveling with a north-south or east-west orientation. Florida's Turnpike, I-95, and U.S. 1 travel through nearly the entire corridor from Miami on the south to Jupiter on the north. North-south arterials in Palm Beach County include Powerline Road, Military Trail and Dixie Highway. SR 7 in Broward County is another north-south arterial in the major highway network. These arterial tend to be used for shorter trips. Twenty-seven highways and major arterials carry traffic east and west through the corridor. The Dolphin Express-

Table 1.4 – *Daily Travel (VMT)*

Travel	2005	2030
Travel on uncongested roads	16,743,000	15,923,000
Travel on congested roads	4,227,000	12,260,000
Total Travel	20,970,000	28,183,000

Figure 1.7 – *Level of Service: No-Build, AM Peak Period, AL/VC LOSC Capacity Ratio*



Under Capacity Near Capacity Over Capacity FEC Corridor

Table 1.5 – *Daily One-Way Traffic Volumes on Major North-South Roadways in the Study Corridor*

County	2005	2030
Miami Dade	167,000	233,000
Broward	242,000	292,000
Palm Beach	181,000	187,000

Table 1.6 – *Two-Way Traffic Volumes on East-West Roadways*

Roadway	Number of Through Lanes	Year 2005 Bidirectional Vehicle Volumes	Year 2030 Bidirectional Vehicle Volumes
Indiantown Rd	6	33,000	37,000
Donald Ross Rd	6	15,000	36,000
PGA Blvd	6	65,000	66,000
Northlake Blvd	6	43,000	46,000
Blue Heron Blvd	6	27,500	32,500
Lake View Ave	8	44,000	50,000
Linton Blvd	6	49,000	51,000
Yamato Rd	6	62,500	69,000
Glades Rd	6	42,500	61,000
Hillsboro Blvd	6	37,500	44,000
SW 10 St	6	42,500	44,500
Sample Rd	6	51500	59,000
Copans Rd	6	35,500	43,000
Atlantic Blvd	6	43,000	51,000
Cypress Creek Rd	6	32,000	33,000
Commercial Blvd	6	46,000	55,500
Oakland Park Blvd	6	40,500	43,000
Sunrise Blvd	6	41,000	44,500
Broward Blvd	6	42500	46,000
I-595	8	40,500	50,500
Griffin Rd	6	26,500	44,000
Stirling Rd	6	25,000	46,500
Sheridan St	6	50,000	63,000
Hollywood Blvd	6	45,000	48,500
Hallandale Beach Blvd	6	54,500	66,000
Ives Dairy Rd	6	69,000	77,000
NE 185 St	6	39,500	57,000
NE 167 St	6	37,000	55,000
I-195	6	55,000	65,000
I-395	8	63,000	68,500

way (SR 836), Airport Expressway (SR 112), Palmetto Expressway (SR 826), and I-595 are the only east-west limited access highway facilities.

All of these roads carry significant traffic volumes throughout the day and particularly during peak periods. I-95 for example, carries volumes exceeding 300,000 vehicles per day in certain sections. **Table 1.4** shows the magnitude of the congestion levels in Southeast Florida today and in the year 2030.

In 2005, the base year for this analysis, more than 20 percent of daily travel occurred on congested roadways where delay represents a significant portion of the total travel time. This congested travel is expected to increase by 2030 when 43 percent of travel occurs on congested roadways.

The significant volume and limited alternatives is also shown in **Table 1.5**. Traffic was summed across the major north-south limited access and principal arterial roadways of US-1, I-95, and the Florida Turnpike at the midpoint of each of the three Southeast Florida counties. Volumes greater than 200,000 vehicles per day can be observed today and this number is expected to increase by more than 20 percent by 2030. In both Miami-Dade and Broward Counties the volumes for all alternatives exceeds the capacity of the roadway facilities. In Palm Beach County, the volume approaches the capacity of the roadways.

Figure 1.7 shows the peak period operating conditions on the roadways within the study area. The roadways shown in red indicate a peak period volume in excess of capacity (LOS D) while the roadways in brown shown, LOS D volumes that are near the capacity. Green links are generally operating at levels better than the traffic-carrying capacity of the roadways. The graphic indicates that most of the roadways exceed capacity in Miami-Dade County with many of the roadways throughout the corridor at or near capacity.

Traffic traveling east-west through the study area as well as traffic in the western portions of the region seeking to travel north-south is using the east-west arterials and highways. Given the limited number of north-south facilities, longer distance north-south travel must first travel east to the Turnpike or I-95, then travel north or south, finishing the trip on east-west facilities. The volumes on the 27 east-west facilities through the region are shown on **Table 1.6**. These roadways are arterial streets and the volumes exceed generally accepted capacities of arterial streets, resulting in congested travel not only during the morning and afternoon peak commuting periods but also for several hours before and after the peaks. Midday and even weekend traffic operates at levels below that considered acceptable even for urbanized areas such as Southeast Florida.

The 2009 FDOT Quality/Level of Service Handbook indicates that six-lane arterials can be expected to carry between 44,000 and 55,000 vehicles per day (bi-directional) depending upon traffic signal spacing. Most of these roadways approach and even exceed those thresholds for the year 2005 with many exceeding those levels in 2030. This indicates failing traffic operations not only during the peak periods of the day but often for midday, late evening, and weekday periods. By 2030, traffic peak periods can be expected to occur over longer durations on a routine basis.

1.3.2. Transit

Existing transit service is offered in Southeast Florida by county transit agencies and SFRTA, most of which accommodates north-south travel. However, local bus transit is hampered by its slow speed due to highway congestion and discontinuous service. Additionally, each county has its own transit agency and there is only limited service crossing county lines, serving transit trips between neighboring counties. These characteristics make the bus less competitive with the automobile. Tri-Rail, which mostly parallels I-95, is a relatively high-speed "commuter" oriented service serving long haul trips along the I-95 corridor.

Despite congested roadways, the 17 bus routes that parallel the FEC corridor, out of a total of 169 in the tri-county area, carry approximately 26 percent of total system ridership. Peak operating speeds are almost universally quite low. There exists a significant travel demand along the FEC corridor that cannot be met by highways, and may be better served by providing a premium transit service that can move people more quickly and effectively than current bus service. Both the existing bus riders and those driving

Figure 1.8 – *New 95 Express Commuter Bus, which runs on three routes to downtown Miami from Fort Lauderdale, Dania Beach, and Hollywood.*

Table 1.7 – *Typical Transit Trip Times (2005)*

Peak Period Service		Existing Transit Travel Times (min)
To West Palm Beach	Jupiter to Downtown WPB	110
	Lake Worth to Downtown WPB	40
To Delray Beach	Boca Raton to Downtown Delray Beach	25
To Boca Raton	Downtown WPB to Boca Raton	85
	Downtown Delray Beach to Boca Raton	20
To Fort Lauderdale	Pompano Beach to Downtown Fort Lauderdale	36
	Downtown Hollywood to Downtown Fort Lauderdale	31
	North Miami (US 1/123 St) to Downtown Fort Lauderdale	91
	Downtown Miami to Downtown Fort Lauderdale	67
To Miami	Fort Lauderdale to Downtown Miami	67
	Hollywood to Downtown Miami	61
	North Miami (US 1/123 St) to Downtown Miami	42

along congested north-south highways and major arterial roadways would benefit from faster transit service.

Table 1.7 shows typical transit travel times between key origin-destination pairs representing the principal geographic travel markets within the study area. Assuming a departure time of approximately 8 a.m., trips today, based on current schedules, can be expected to be of a duration as shown in the table. Transit in the FEC corridor can be expected to greatly reduce typical transit trip times. These reductions would result from better frequency of service, faster running speeds, and more direct service.

Tri-Rail's ridership has been limited by the fact that it does not directly serve many of the major destinations in the region.

Tri-Rail does not directly serve downtown Fort Lauderdale or downtown Miami, or many of the smaller destinations on the east coast such as Aventura, Hollywood, Pompano Beach, Delray Beach, Boynton Beach, etc. Typically, the SFRC (Tri-Rail corridor) is 2 – 6 miles to the west of these destinations. This results in passengers needing to transfer to a local bus or, in Miami, to Metrorail in order to reach their final destinations. The 2007 Tri-Rail survey of passengers found that some people actually leave a second car at their destination stations. Because many people require a three-seat ride to reach their destination, this limits patronage among those who have a choice in how they travel.

1.3.3 Freight

The region is served by two major freight railroads, CSX and the Florida East Coast (FEC) Railway. Both railways are important to the SFECCTA project. Within the region, CSX operates their main line from Mangonia Park to the Miami Airport, just to the west of I-95. The main line was sold to the state of Florida in 1988. This stretch of railroad is known as the South Florida Rail Corridor (SFRC) and is also the corridor over which the South Florida Regional Transportation

Authority (SFRTA) operates its Tri-Rail passenger service. CSX retains all of their freight rights and dispatching and conducts all maintenance-of-way operations within the SFRC. A large double-tracking project was completed in 2007, making the SFRC into a high-speed, two track railroad with frequent cross-overs for almost its entire length.

The FEC Railway runs from Jacksonville to Miami, a total of 368 miles, through the historical hearts of many of the region's oldest communities. It is the original railroad line built by Henry Flagler. The railway has been in continuous operation in the region since train service was introduced to Miami in 1896, though no passenger service has operated since 1968 and today it serves exclusively as a freight railroad. The business of the railroad has been tied to the economic boom (and more recent decline) of the regional and state economy, which has been heavily correlated with the slowdown in the construction market. As a significant portion of the FEC's business has been related to building materials (particularly limestone for use in concrete production), rail traffic on the FEC has been negatively affected in recent years.

Physically, the FEC Railway in Southeast Florida is primarily a single-track, class IV railway, which means that it is rated for 60 m.p.h. maximum authorized speed (M.A.S.) for freight trains and 80 m.p.h. for passenger traffic, though there are significant stretches in which the FEC chooses to limit its speeds to 45 m.p.h. The right-of-way within the FEC corridor is typically approximately 100 feet wide. Approximately one-third of the length of the railway accommodates passing and freight sidings. There are more than 200 grade-crossings on the FEC corridor within the SFECCTA study area.

Physically, the SFRC and FEC corridors parallel each other throughout the region and are, depending on location, between one-half and 6 miles apart. The two railroads interface in the following locations:

- In the Northwood section of West Palm Beach.
- Lewis Terminals in Riviera Beach.
- In Pompano Beach via the FEC Pompano Market Branch.
- Iris interlocking in Miami.

1.4. Demographics and Land Use

1.4.1. Population and Employment

The tri-county area witnessed a 23 percent population growth between 1990 and 2000 and a 7 percent population growth between 2000 and 2005 (**Table 1.8**). Between 1990 and 2000, Broward, Miami-Dade, and Palm Beach Counties were ranked 11th, 18th, and 20th, respectively, nationwide in terms of largest numerical increase in population in the country. The overall Metropolitan Statistical Area (MSA), which incorporates all three counties, was the fourth largest in the nation.

Population and employment are both concentrated around the FEC railway. In 2005:

- Approximately 14 percent of the tri-county area population resided within one mile of the FEC corridor.

Table 1.8 – *Population Growth*

	Population			Population Growth	
County	1990	2000	2005	1990-2000	2000-2005
Miami-Dade	1,937,194	2,253,779	2,356,697	16%	5%
Broward	1,255,531	1,623,018	1,763,706	29%	9%
Palm Beach	863,503	1,131,191	1,255,007	31%	11%
Tri-County Area	4,056,228	5,007,988	5,375,410	23%	7%

Source: University of Florida, Bureau of Economic Business Research

- One in every five persons (22 percent) in the tri-county region was employed within one mile of the corridor.
- In Miami-Dade, one in every seven jobs (17 percent) was located within one mile of the corridor.
- In Broward County, one in every five residents (21 percent) and one in every seven jobs (15 percent) were within one mile of the corridor.
- In Palm Beach County, one in every four residents (25 percent) and one in every three jobs (35 percent) were within one mile of the corridor.

By 2030, more than one million people will reside and 750,000 will be employed within one-mile of the FEC corridor (**Table 1.9**). Palm Beach County, which contains the longest segment of the FEC corridor, is projected to have more than 400,000 residents within one mile of the FEC corridor.

The rate of projected growth in the corridor is higher than the already large rate of growth projected for the region as a whole. The number of households within one mile of the FEC corridor is projected to increase by 36 percent compared to 28 percent for the overall tri-county area. Similarly, employment along the FEC corridor is projected to witness a 29 percent increase compared to 26 percent for the rest of the tri-county area. The projected population and employment growth along the FEC corridor is a result of sustained efforts by local, county, and state agencies to concentrate development and redevelopment through the passage of Eastward Ho!, changes in zoning, and other similar efforts.

In part to address the decline in business, the FEC has reacted by choosing to run longer trains than they otherwise would, saving the labor expense of extra train crews. Within the region, there are relatively few local customers. FEC operates a number of "drive to meet" trains, which start out from opposite ends of their railroad (Jacksonville and Miami) and meet in central Florida to exchange crews, allowing for locally-based crews. The limited number of local customers allows freight operation to focus on on-time and relatively high-speed performance, a good match for a passenger operation.

1.4.2. Transit-Dependent Populations

Transit-dependent people, indicated by factors such as households with no cars, minority or low-income households, and youth and elderly populations (those under age 18 or older than 65), typically rely on transit ser-

Table 1.9 – *Population and Employment, 2005-2030*

Geography	Population (in '000s)			Households (in '000s)			Employment (in '000s)		
	2005	2030	% change	2005	2030	% change	2005	2030	% change
Miami-Dade County	2,359	3,149	33%	834	1,085	30%	1,379	1,590	15%
Within one mile of FEC corridor in Miami-Dade County	194	293	51%	74	106	43%	220	264	20%
Broward County	1,747	2,293	31%	694	854	23%	736	981	33%
Within one mile of FEC corridor in Broward County	263	383	46%	112	150	34%	178	209	17%
Palm Beach County	1,270	1,779	40%	538	712	32%	544	783	44%
Within one mile of FEC corridor in Palm Beach County	292	417	43%	126	171	36%	186	279	50%
Tri-County	5,377	7,221	34%	2,067	2,651	28%	2,660	3,355	26%
Within one mile of FEC corridor	749	1,093	46%	313	426	36%	585	753	29%

Source: *Southeast Florida Regional Planning Model 6.5*

Table 1.10 – *Transit-Dependent Populations Within the FEC Corridor*

Population	Tri-County	Within One Mile of Corridor	Percent Within One Mile of Corridor	Number per Mile Within One Mile of Corridor
Low-Income Households	455,461	88,744	19%	771
Zero-Car Households	209,389	43,953	21%	426
Population Under 18, Over 65	1,998,330	281,128	14%	2,156

vices to access jobs, services, education and other activities. Southeast Florida contains a significant number of transit-dependent people. This is particularly true along the corridor. In the tri-county area as a whole, the 2000 Census reported over 200,000 zero-car households and more than 450,000 minority or low-income households. Over 20,000 zero-car households are located within 0.25 miles of the corridor (**Table 1.10**). Overall, there is a high concentration of transit-dependent people along the corridor compared to the rest of the tri-county area.

1.4.3. Existing Land Use and Activity Centers in the Region

The entire 85-mile study area from Jupiter to Miami is developed. There are three major cities – Miami, Fort Lauderdale and West Palm Beach and 25 smaller towns on the corridor. The FEC Railway passes directly through the downtown of almost all these communities. The three major cities are all major employment destinations but, in recent years, significant high-rise residential development has been built within their downtown cores. Many of the smaller communities such as Boca Raton, Boynton Beach, North Miami, Aventura, Hollywood, Lake Worth and Delray Beach also have high-to-medium density downtowns with mixed residential, commercial, and office land uses. These towns, which were established and developed prior to World War II, are organized around a grid of streets with continuous sidewalks and other essential elements of transit-oriented development. In contrast, to the west of I-95, development is lower density, organized in single-use developments and gated communities. Only north of Riviera Beach does the land use pattern change to a suburban type of development. This development took place in a time when gated communities and large blocks were the organizing principles. Palm Beach Gardens has a suburban, auto-oriented land use pattern, but has approximately 20,000 jobs within a half mile of the corridor. Jupiter has a pedestrian scale, mixed uses and a small block pattern of development to the west of the FEC tracks. Both of these communities are working towards focused growth and higher densities.

There are numerous activity centers within the study area in addition to the town centers. These are: three international airports; major medical campuses; college and university campuses; and major shopping/entertainment centers (see **Figures 1.9** and **1.10**).

1.4.4. Recent and Projected Economic Trends

In recent years, smaller urban communities have once again become attractive places to live and conduct business – partly because the architecture of the era has become fashionable again and partly because regional and local policies have encouraged, and continue to encourage, redevelopment with mixed use, mid-rise buildings.

For example, the cities of Boynton Beach, Boca Raton, Wilton Manors and Hollywood all have recently allowed the construction of five-to-eight story mixed-use buildings with retail on the ground floor and residential above within walking distance of the FEC railway. (See **Figure 1.10**). Many other projects

Figure 1.9 – *Activity Centers Within or Near FEC Corridor*

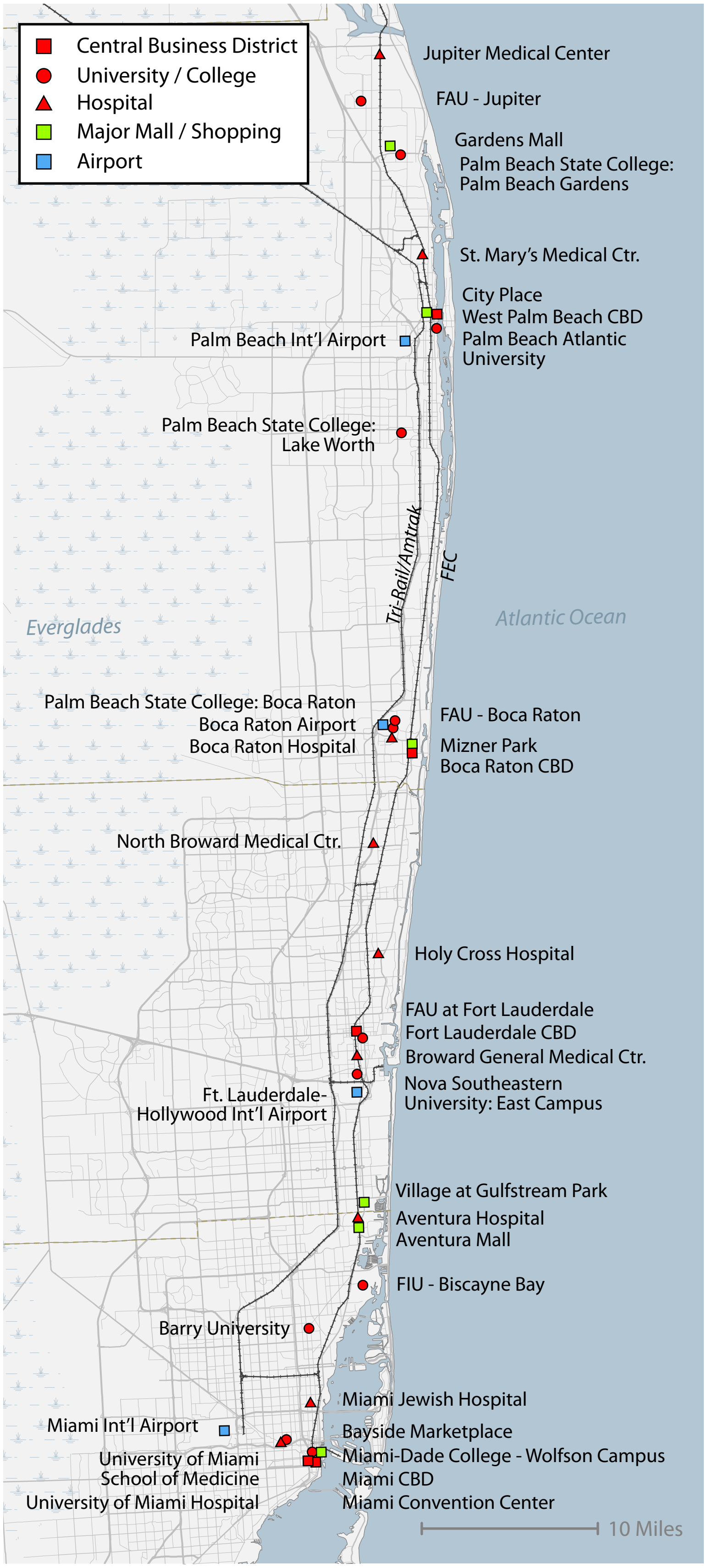
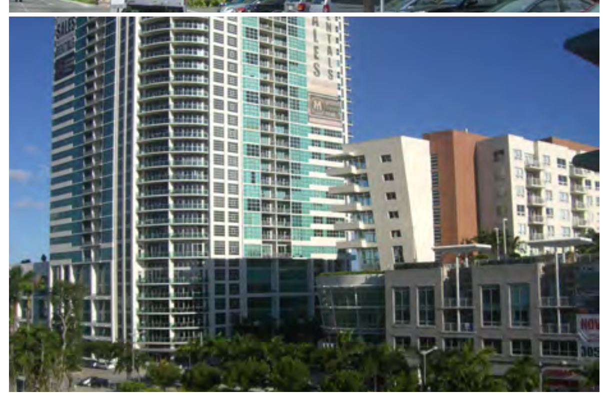


Figure 1.10 – *Mixed-use along the FEC corridor*



New mixed-use developments along the FEC corridor are of a higher density than surroundings and often take cues from the rail line. Top to Bottom: "City Place" in West Palm Beach, "Wilton Station" in Wilton Manors, "Hollywood Station" in Hollywood, and "Midtown Miami."

in other communities have been designed and approved and are ready for implementation once the economy recovers. To facilitate and promote redevelopment activities within the communities on the corridor, local governments have included land adjacent to the FEC Railway in Community Redevelopment Areas (CRA). Having a CRA designation provides a funding mechanism for infrastructure and other improvements within the designated area through Tax Increment Financing (TIF) whereby total property taxes for a CRA are assessed in a base year and any increase in tax revenue in the subsequent years is directly reinvested into the CRA. There are 12 CRAs in Miami-Dade County, seven existing and one proposed in Broward County and nine in Palm Beach County within or in the immediate vicinity of the study area. In total, the land areas of the CRAs in the study area comprise more than 21,000 acres.

1.4.5. Mobility Needs of High-Density Land Uses

Because of the limited availability of developable land, the tri-county area has been experiencing a large amount of redevelopment, mostly in the CBDs of the medium to large cities along the corridor. Integrated land use and transportation is critical to the success of development and redevelopment efforts, particularly for high-density development. The combination of existing and proposed land uses along the FEC study corridor will ensure that a new, premium transit service will serve a wide variety of markets (commuters, students, visitors, tourists, residents).

The majority of the 28 municipalities along the corridor have recently amended (or are in the process of amending) their Comprehensive Plans and recognize the FEC corridor as a premium transit corridor. In this process, these municipalities are adopting new policies to increase density and create transit-friendly mixed uses along the corridor and around potential station locations. Almost all of the communities in the corridor either have adopted or are in the process of adopting zoning codes that benefit transit. This is being accomplished either by increasing residential densities or by designating areas for employment and mixed use. The few municipalities that are not planning to change their densities tend to be small, completely built-out, stable, and are comprised primarily of residential neighborhoods.

1.5. Travel Markets

An analysis of the 2005 and 2030 trip productions and attractions within the tri-county area indicates a significantly high concentration of activity along the FEC corridor, primarily due to the fact that the FEC passes through 28 cities with substantial productions and attractions. Approximately 60 percent of the trips are work trips and 40 percent are non-work trips. By 2030, a high trip production density is projected throughout the eastern communities along the FEC corridor. Seventeen percent of all trip productions in the tri-county area are forecast to be within one mile of the FEC corridor, which would directly serve the CBDs of Miami, Fort Lauderdale and West Palm Beach (**Table 1.11**).

Table 1.11 – *Daily Productions and Attractions along the FEC corridor*

	Productions		Attractions	
County	**2005**	**2030**	**2030**	**2030**
Tri-County Area	18,633,079	25,162,437	18,639,069	25,167,419
Within One Mile of FEC Corridor	3,058,864	4,277,540	3,781,423	5,168,900
Percent within One Mile of FEC Corridor	16%	17%	20%	21%
Number per Acre within One Mile of FEC Corridor	53	85	100	151

Similarly, one in every five trips (21 percent) will have destinations within one mile of the FEC corridor.

Major trip flows were developed to gauge where people were traveling to and found that approximately 22 percent of trips were from Broward County to Miami-Dade County, 15 percent were from Miami-Dade to Broward County, 13 percent in Broward County and 12 percent in Palm Beach County; the remaining 11 percent were trips to or from Palm Beach County. The highest flows for 2030 occur in Broward and Miami-Dade Counties.

Productions and attractions within ½-mile of I-95 and the FEC corridor were derived from the travel demand model and are displayed in **Figure 1.11**. This figure shows six main peaks identified for productions and attractions along the FEC corridor. Conversely, the productions and attractions along the I-95/Tri-Rail corridor were significantly lower and more uniform throughout the study area, with no discernible peaks. This indicates that there are major origin/destinations such as downtown Miami, Fort Lauderdale Airport, downtown Fort Lauderdale, Boca Raton, Boynton Beach and West Palm Beach and lesser, but still significant origin/destinations in North Miami Beach, Hollywood, Delray Beach and Palm Beach Gardens, all that are directly on or within ½-mile of the FEC Corridor.

Additional analysis utilizing the SERPM Model looked at travel between six-mile radius production zones and one mile radius attraction zones centered on 33 potential station locations on the FEC Corridor and all 19 stations on the Tri-Rail Corridor. Total travel between the zones on the Tri-Rail Corridor, including all modes, was 750,000 daily trips. Whereas travel between zones surrounding the 33 station locations on the FEC corridor was over two million trips.

Figure 1.11 – *Productions and Attractions within 1/2-mile of FEC and I-95*

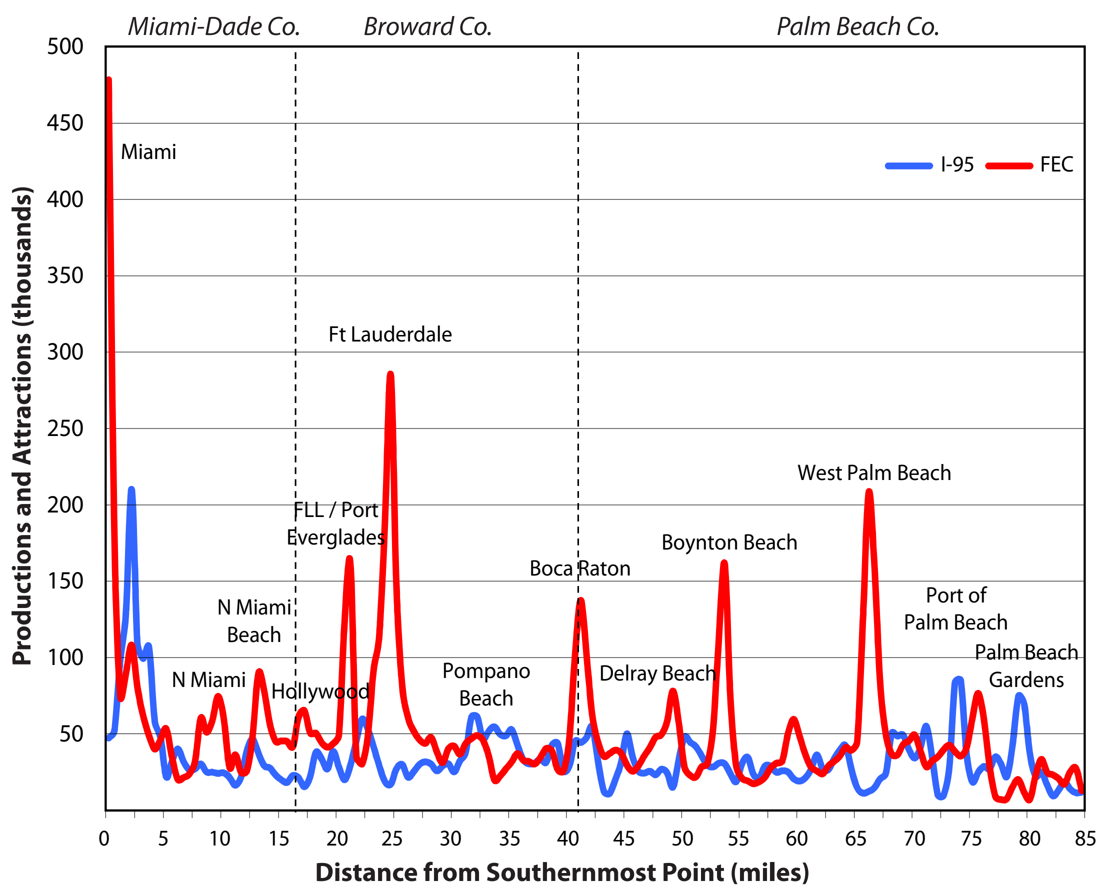


Figure 1.12 – *Trip Flows*

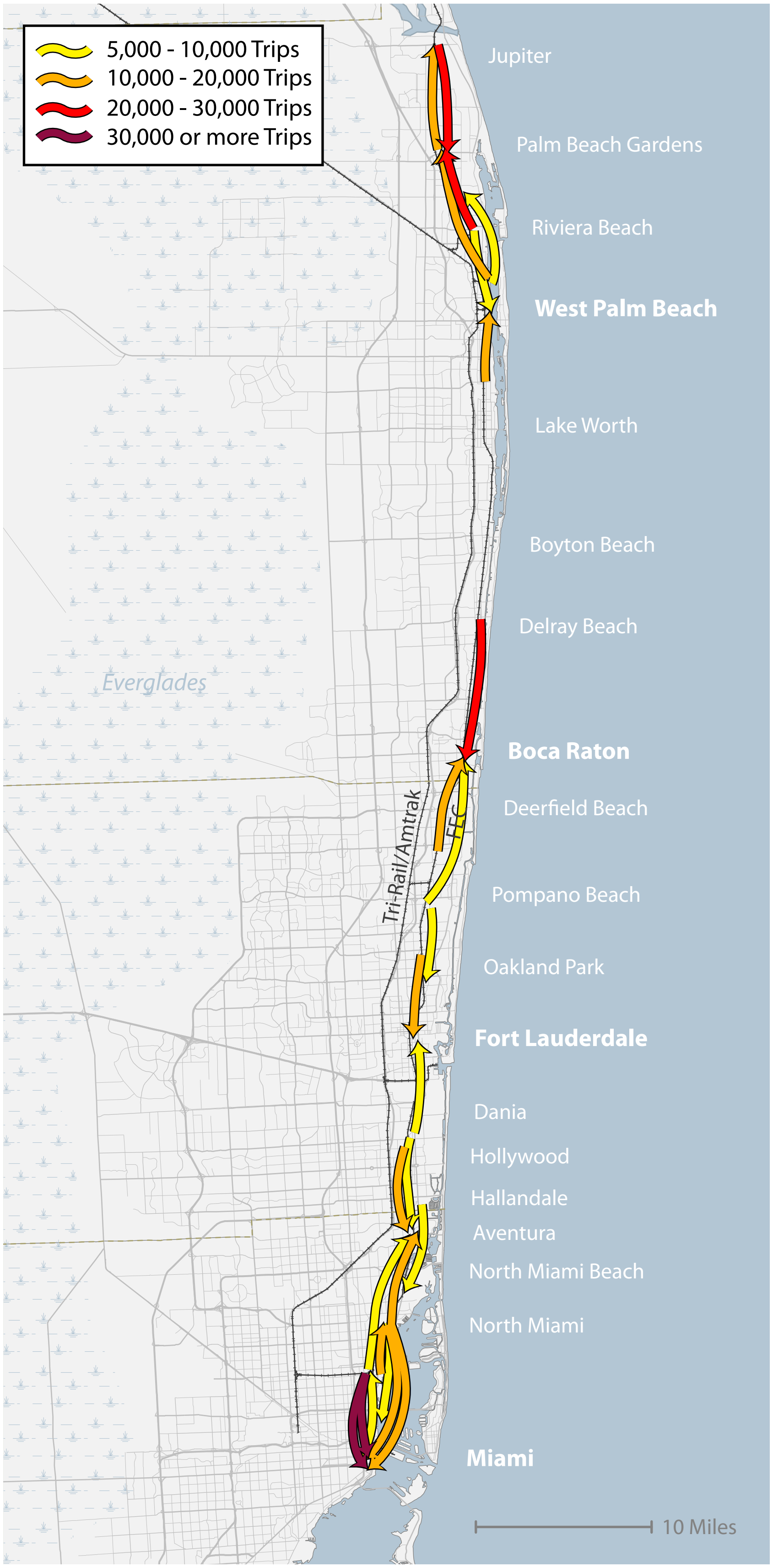


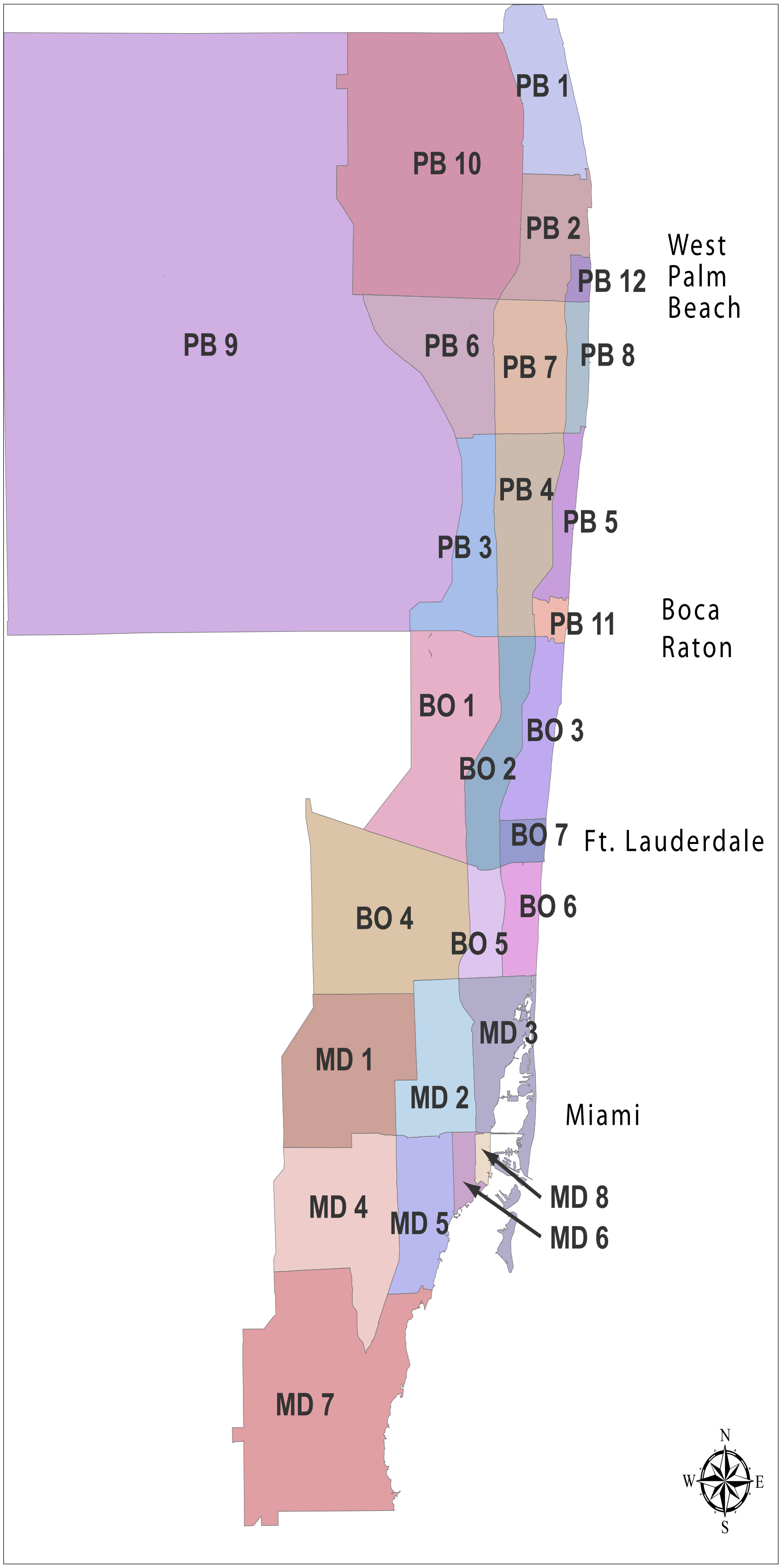
Figure 1.12 indicates the twenty-five pairs of potential stations along the FEC with the greatest travel between them. Even if only a small percentage of these trips will be captured by transit, the numbers indicate the potential for substantial transit ridership.

The major travel markets which exist within the FEC corridor that can be served by new premium transit service include work and non-work trips. Ridership forecasts from the regional travel demand model indicate that for the build alternatives, work trips are bidirectional with commuters traveling both north and south to the major employment centers on the corridor. For example people travel from the Boca Raton area both north to West Palm Beach and south to Fort Lauderdale in approximately equal numbers. Boca Raton itself is also an employment destination. Similarly, further south, Hollywood commuters go both north to Fort Lauderdale and south to Miami.

Many middle and long distance commuters can be expected to drive to the corridor and will park-and-ride to their destinations. However, the pedestrian-friendly nature of the surrounding land use and demographics of the population on the FEC Corridor suggest that there is a significant market for shorter trips by people who live close to the corridor and may walk to local stations. This market includes residents of new, mid-rise developments that have already been constructed in anticipation of future premium, transit service, future residents of additional planned development, as well as transit-dependent people in the surrounding communities. This market includes travel for off peak trips for shopping, entertainment and medical appointments

The Tri-County area was divided into districts to facilitate the analysis and understanding of travel patterns and markets. The districts were numbered by county with "PB" representing districts in Palm Beach County; "BO" representing districts in Broward County; and "MD" representing districts in Miami-Dade County. See **Figure 1.13** for a district key. Most of the productions (where

Figure 1.13 – *Productions and Attractions Key*



trips originate) and attractions (where trips are destined) are located in eight key districts: MD-3, BO-2, BO-3, BO-6, BO-1, BO-7, MD-5, and MD-8. Figures 1.14 through 1.29 show the districts with the highest productions and attractions in the region. Each figure shows either the productions or attractions to one district, indicated in the title of the figure. Each dot represents one trip production or attraction; the darker the district the greater the density of productions or attractions. These productions and attractions represent well over 50 percent of trips, with the balance scattered throughout the three-county area.

The highest number of productions and attractions for 2030 are located in district MD3 which represents the area bounded by the Broward County line to the north, the Turnpike/I-95 to the west, the City of Miami on the south and the Atlantic Ocean on the east. Included in this area is Aventura, North Miami Beach, Miami Beach, Key Biscayne and parts of unincorporated Miami-Dade County (see **Figure 1.14** and **Figure 1.15**). The area contains one of the highest concentrations of residential and mixed use development in Aventura, North Miami Beach, Downtown Miami and Key Biscayne, with pockets of low income neighborhoods adjacent to the FEC right-of-way. Trip attractors in the area include the Aventura regional mall, Aventura Hospital, Florida Atlantic University commuter college, Golden Glades multimodal center, the Miami Design District and the beach. A large number of these trips could be well served by transit using a combination of the bus network and one of the proposed transit alternatives.

Figure 1.14 – *MD-3 Attractions*

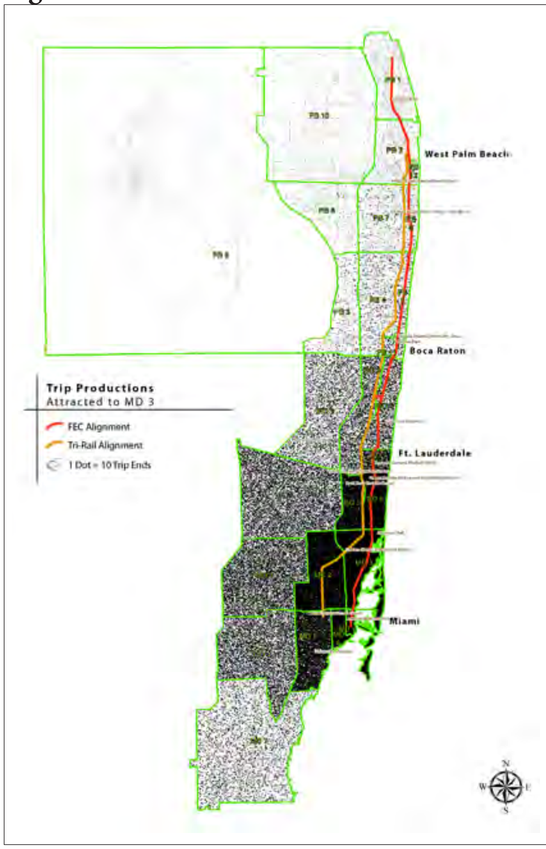
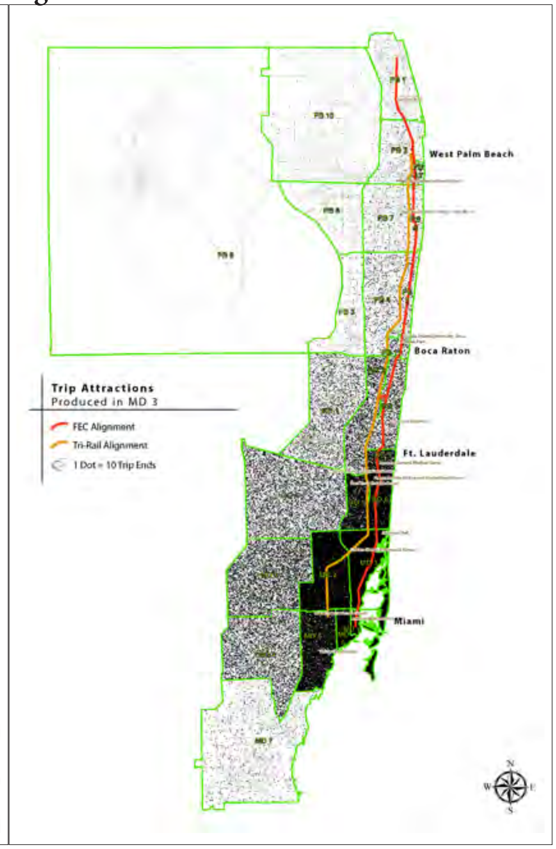


Figure 1.15 – *MD-3 Productions*



As shown in **Figure 1.14**, over half of the transit trips originate from districts in Miami-Dade County where housing densities are higher; the remaining trips are scattered around the Fort Lauderdale area and in those Palm Beach County districts closer to the Broward County line.

Figure 1.15 shows that well over half of the attractions are in districts having high employment centers, regional shopping malls and/or commuter colleges (includes districts BO1, BO2, BO3, BO4, BO6, MD3, MD4 and MD7).

Figure 1.16 – *BO-2 Productions*

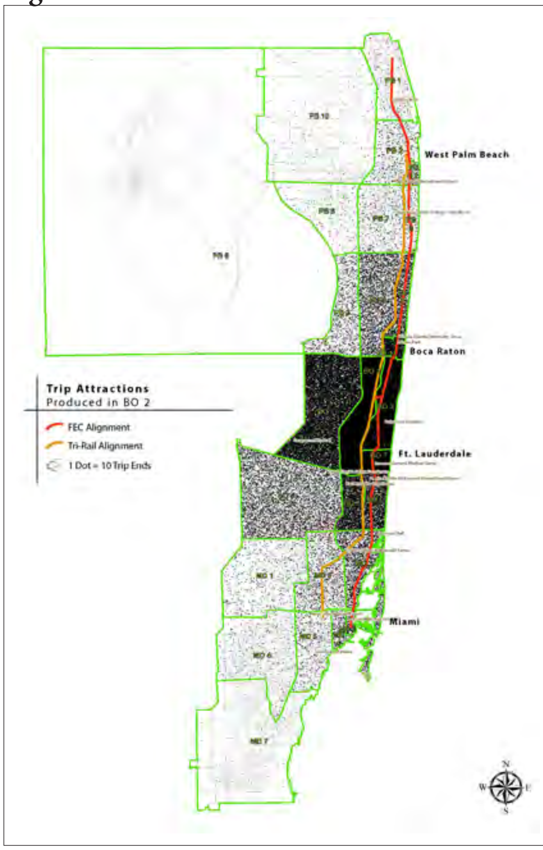
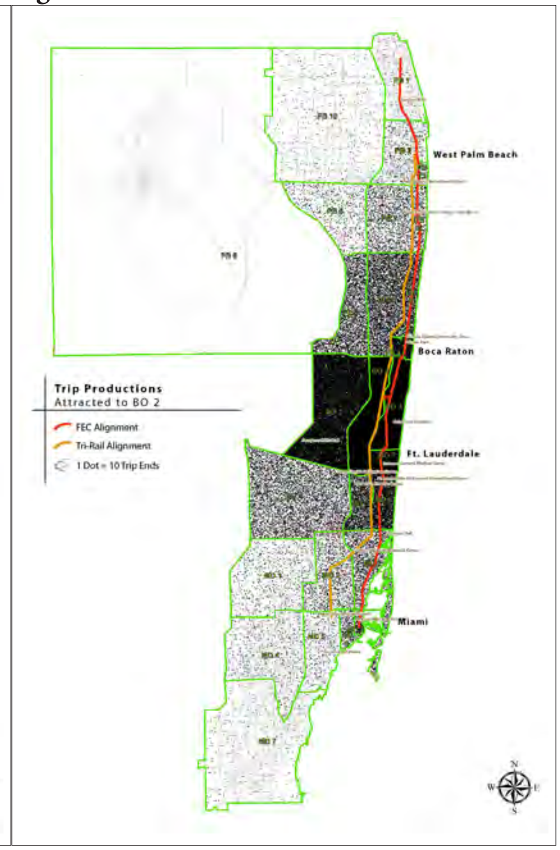


Figure 1.17 – *BO-2 Attractions*



Other substantial concentrations of trip generation include districts BO2, BO3 and BO6. **Figure 1.16** shows the destinations of trips produced in District BO2 which is bounded by I-595 on the south, the City of Boca Raton on the north, I-95 on the east and the Turnpike on the west. While some productions are expected because of the residential character of portions of the area, **Figure 1.17** shows that there are more attractions located in this district because of office developments, light industrial and two commuter colleges.

Figure 1.18 and **Figure 1.19** show district BO3 which is the area located along the coast. This area is made up of 10 beach communities located along the FEC right-of-way with a high potential for walk to transit trips. The production and attraction trip activity in this district is similar to that in district BO2, but there is less light industrial. **Figures 1.20** and **Figure 1.21** show the destinations of trips produced in and the origins of trips attracted to district BO6, which is made up of the cities of Dania Beach, Hollywood and Hallandale Beach. These cities are older, mixed use communities with some low income and major high rise residential near the beach, contributing to the substantial number of productions.

Figure 1.18 – *BO-3 Productions*

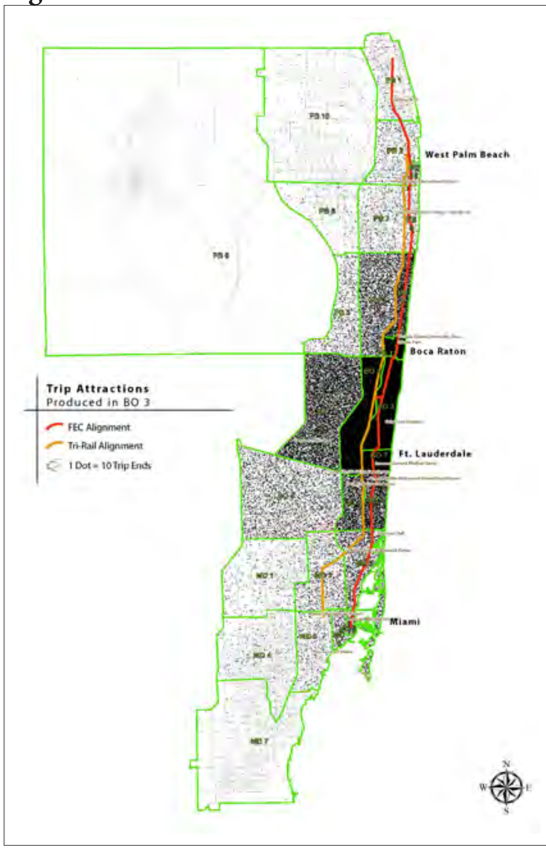


Figure 1.19 – *BO-3 Attractions*

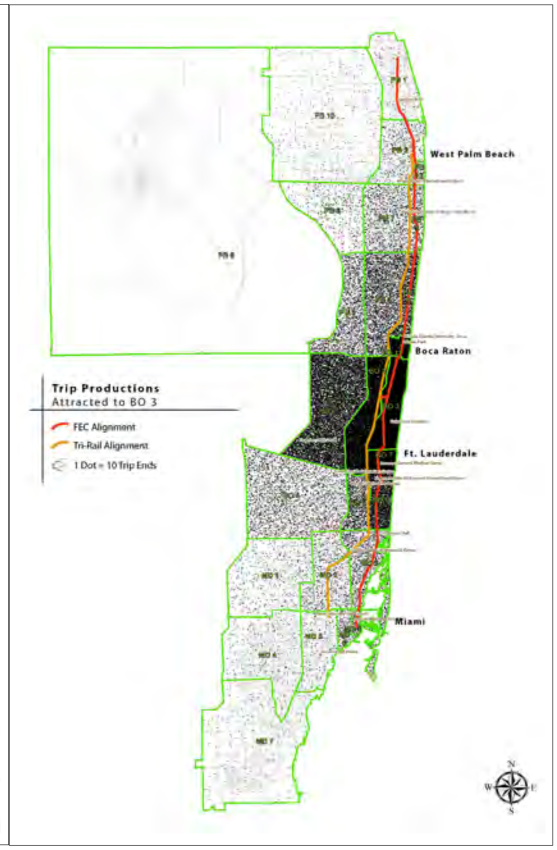


Figure 1.20 – *BO-6 Productions*

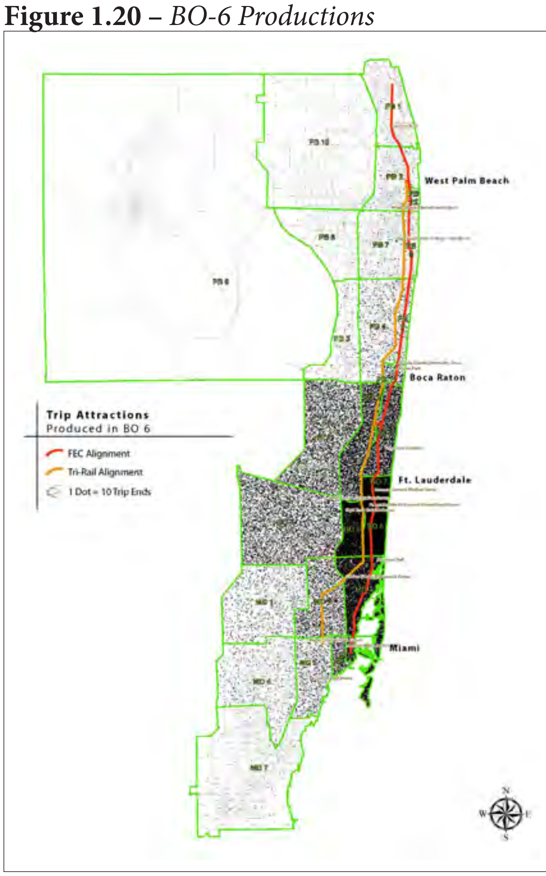
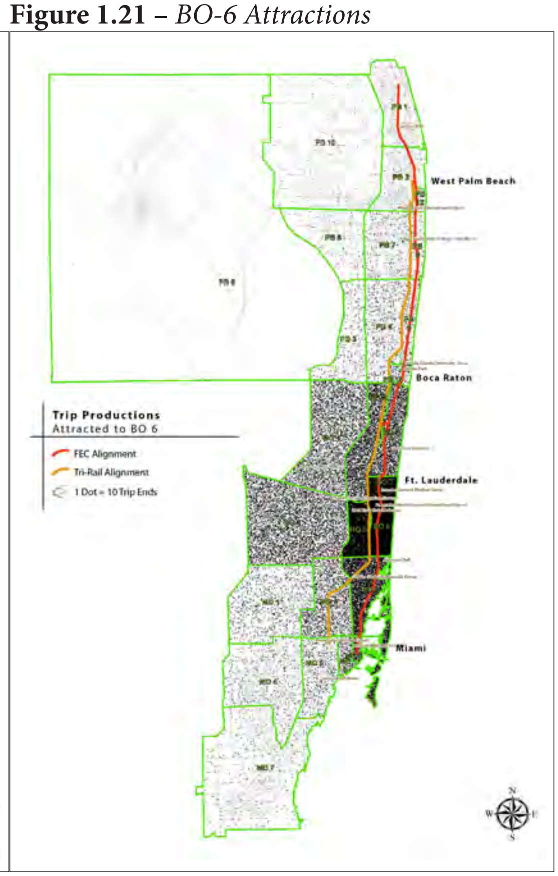


Figure 1.21 – *BO-6 Attractions*



District BO1 is made up of several cities with low density suburban residential development, some office parks and some light industrial. **Figure 1.22** shows the potential for attractions that could be served by feeder bus and the proposed transit alternatives.

Figure 1.22 – *BO-1 Productions*

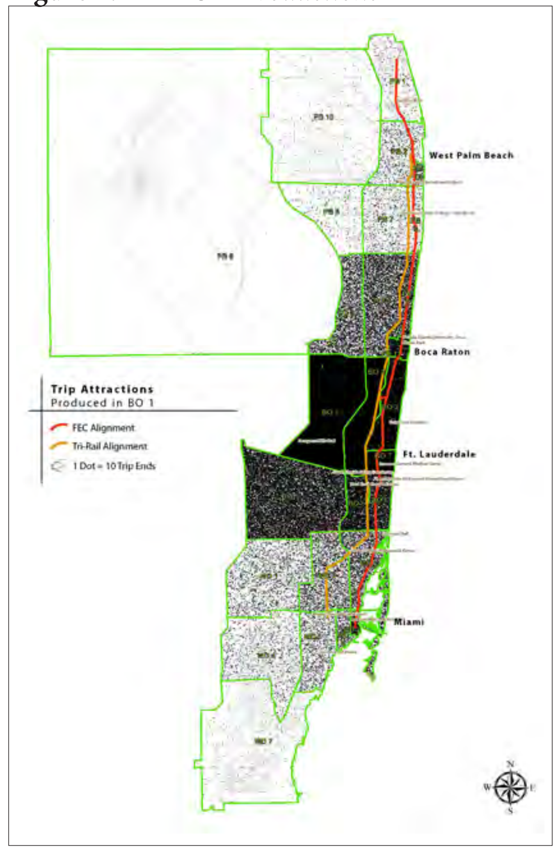


Figure 1.23 – *BO-7 Attractions*

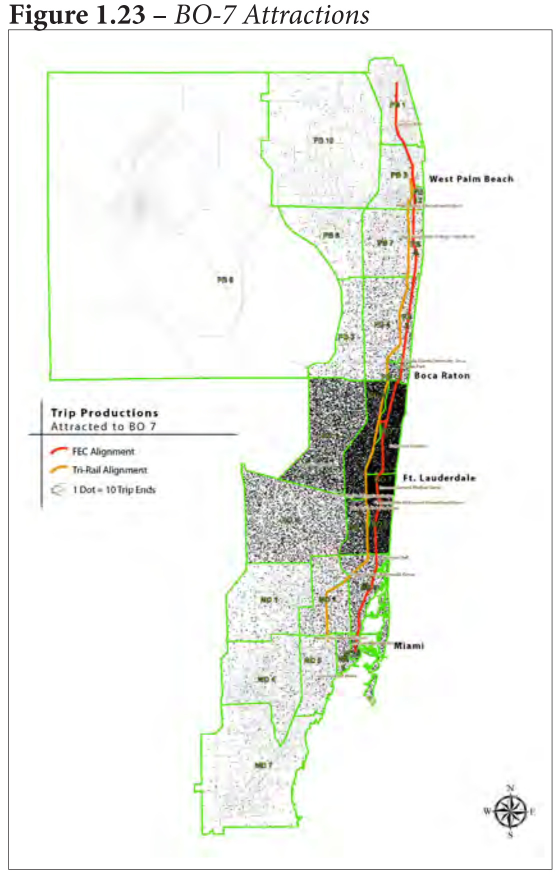


Figure 1.24 – *MD-5 Attractions*

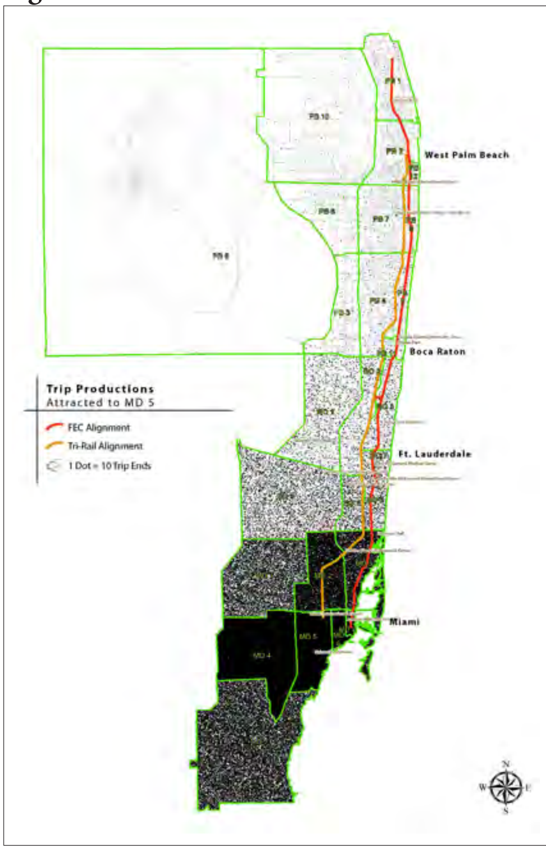
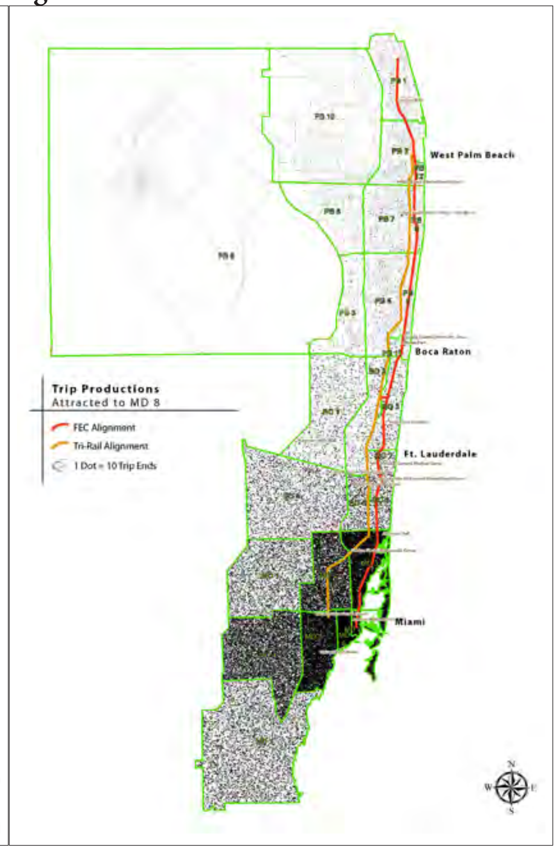


Figure 1.25 – *MD-8 Attractions*



Districts BO7, MD5 and MD8 all serve more as destinations than origins, with a number of attractions. The origins of trips attracted to these districts are depicted in **Figure 1.23**, **Figure 1.24** and **Figure 1.25**. These districts include the downtowns of the two largest cities in the corridor (Miami and Fort Lauderdale), and the cities of South Miami and West Miami. These last two cities have developed into prime locations to live and work. Typical attractions in this districts include government seats, performing arts centers, new urban mixed uses, and Broward General Hospital in BO7. A large number of these attractions are located within the FEC market area, facilitating access to transit stations.

As indicated above in the discussions of daily trips and markets, many of the districts include commuter colleges. **Table 1.12** shows the largest of the commuter colleges in the three counties area and their 2009 enrollment figures. Also shown in **Figures 1.26** through **Figure 1-29** is the distribution of students' place of residence by university, many of which are within the FEC market area and, therefore, likely candidates for transit usage.

Travel markets that tend to be more dependent on transit for mobility are present in the FEC corridor, as shown earlier. The transit dependent markets (zero-car households, households below the poverty line, under the age of 18 or 65 and older) are spread throughout the corridor with several concentrations found in West Palm Beach, Lake Worth, Deerfield Beach, Pompano Beach, Fort Lauderdale, Dania Beach and Miami.

Table 1.12 – *Large College Enrollments*

College	Enrollment
Florida Atlantic University PB State College (Boca Raton)	23,313
MDC Wolfson Campus	26,946
PB State College (Lake Worth)	13,491
PB State College (Palm Beach Gardens)	5,690

Source: College registrar's office

Figure 1.26 – *Place of Residence - PBSC Lake Worth*

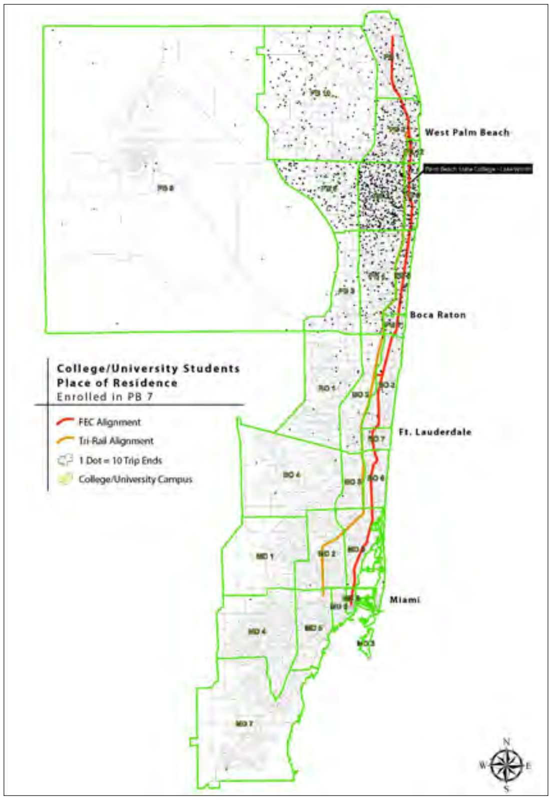


Figure 1.27 – *Place of Residence - PBSC Palm Beach Gardens*

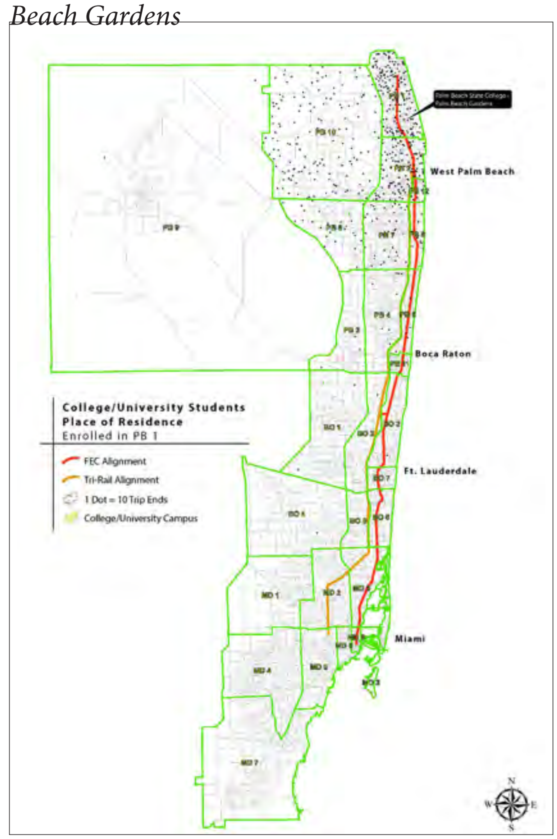


Figure 1.28 – *Place of Residence - PB State Coll.*

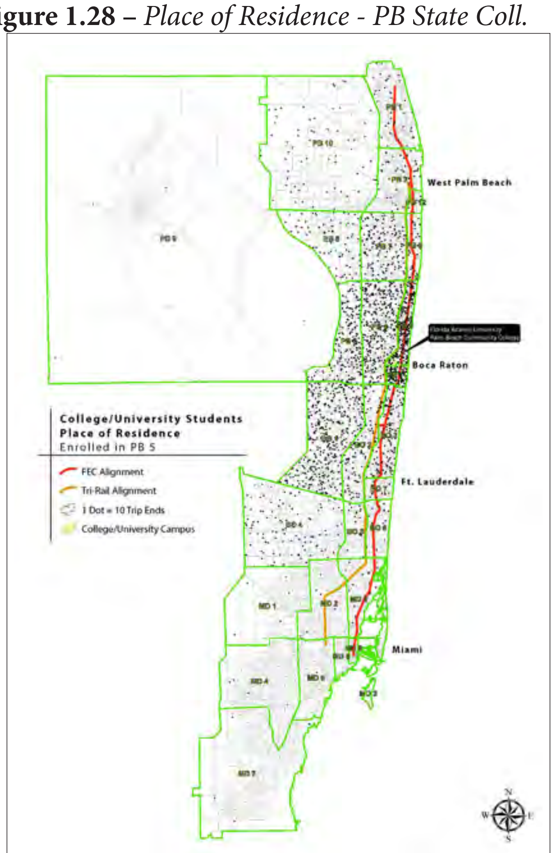
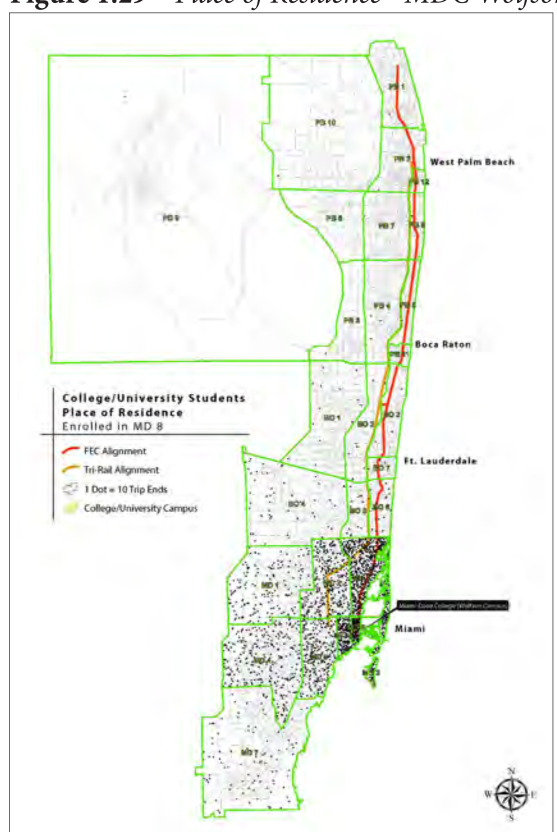


Figure 1.29 – *Place of Residence - MDC Wolfson*



1.6. Transportation Problems and Needs

The fundamental need for the project results from the following key issues:

Increased Population and Employment

Southeast Florida has been growing rapidly due to in-migration and high birth rates and is expected to continue to grow in the foreseeable future. By 2030, the number of households in the study area is projected to increase by 36% compared to 28% for the overall tri-county region. Population will increase even more with a 34% growth in the region and 46% in the study area, bringing total population within one mile of the FEC Corridor to over one million by 2030. Employment is also expected to grow faster in the study area than in the region as a whole, with a 29% increase in the study area compared to 26% for the region. Automobile ownership and vehicle miles traveled (VMT) are expected to increase even more dramatically than population.

Highway Capacity and Traffic Congestion

Existing north-south highways in southeastern Florida, such as I-95 and US 1, are severely congested today and as growth takes place, this congestion is expected to get more severe. While the population is expected to increase by 28% by 2030, and highway traffic volume is projected to grow by 35%, the planned increase in highway capacity is only 19%. The entire region is built-out, making the addition of capacity on existing highways extremely impactful and costly. The volume of traffic and the number of lanes on these facilities results in an elevated number of traffic accidents. These incidences lead to delay and decreased safety and make travel time unpredictable for roadway users.

Sustainable Economic Development and Land Use

The region's "Eastward Ho!" initiative emphasizes redevelopment and promotes greater density of development in coastal, southeast Florida rather than continued sprawl in less developed areas in the west. This initiative will help protect the environment by keeping growth away from the Everglades and reducing green house gas production by reducing trip lengths. All three counties also have policies in place with their comprehensive plans to focus future development within the study area - the Miami-Dade County Comprehensive Development Master Plan, the Palm Beach County Comprehensive Plan, and the Broward County Comprehensive Plan. The communities within the study area already have a walkable pattern of development in their commercial cores. In many areas the rail corridor itself is lined with small scale industrial uses but beyond that immediate strip much of the area is small lot single family and small apartment buildings accessed from a network of pedestrian-friendly local streets. Land values are increasing as vacant land further west has become scarcer leading to the potential for higher and better uses than the current buildings serve. Investment in premium transit, along with new land use and zoning regulations for increased density and mixed use could be expected to help attract redevelopment to these areas. Without additional premium transit service, however, these higher densities may not be realized because the road network is already congested and cannot accommodate the increased travel demand created by denser development.

Access to Eastern Travel Destinations

Existing rail transit on Tri-Rail does not conveniently serve the travel destinations in the cities and towns east of I-95. There are a number of medical facilities such as the Jupiter Medical Center, St. Mary's and Good Samaritan Hospital in West Palm Beach, Broward General Medical Center and Aventura Hospital all of which are directly on the FEC Corridor. The major government centers in West Palm Beach, Fort Lauderdale and Miami are also adjacent to the corridor and several college campuses are within walking distance or short shuttle rides from the FEC. The Scripps Campus at Florida Atlantic University in Jupiter is also an easy shuttle bus ride distance from the Corridor. The existing Tri-Rail corridor is two to six miles to the west of these and other destinations, with stations that are not within walking distance of most destinations. This means that almost all of Tri-Rail riders need to transfer to local buses, circulators or, in Miami, Metrorail to reach their final destinations. Since the Tri-Rail corridor is immediately to the west of I-95, I-95 acts as a barrier between the Tri-Rail stations and the coastal communities and their transit-friendly neighborhoods. The FEC corridor as a whole is thus more walkable and provides better access to major eastern travel destinations.

Transit Service Deficiencies

The local buses that run throughout the study area are slow due to traffic congestion and frequent stopping patterns. The average travel speed of local buses is 11 to 16 mph, which is not competitive with the automobile. This limits local bus ridership to transit-dependent customers and short trips. The study area includes three major CBDs and other, smaller downtowns that serve as regional and local destinations and attract large numbers of trips. Today, these communities are connected in a limited fashion by slow, local bus routes and most travel is carried out by automobile. By 2030, 17% of all trip productions and 20% of trip attractions in the tri-county area will be in the study area, with clear peaks in productions and attractions in the multiple downtowns that bisect the FEC corridor and yet no current transit provider optimizes the links between these major travel markets.

Large Transit-Dependent Populations

Large transit-dependent populations - defined as zero car households as well as people too old, too young or too debilitated to drive, - are located within the study area. Increased mobility options are needed to improve the ability of this population to travel to jobs, education, health care and leisure activities and improve their opportunities for economic advancement and their quality of life. Stations would be within walking distance of many transit-dependents and the destinations they may desire to travel to for work and services. The existing Tri-Rail service is not within walking distance of these communities.

1.7. Project Purpose

The purpose of the South Florida East Coast Corridor Transit Analysis (SFECCTA) is to provide reliable transportation options for South Floridians, and to support the region's Eastward Ho! initiative by improving north-south mobility in the study corridor. Without improving transit in this corridor it will be impossible to attract the increased density development that Eastward Ho! envisaged. This project will create an integrated system of premium transit through the redeveloping coastal cities in Palm Beach, Broward and Miami-Dade Counties, to supplement the existing highway network including I-95, and to enhance the utilization of existing transit services. The resulting improved accessibility to and within the study corridor will serve as a catalyst for revitalization and increased economic development within the adjacent communities.

The project would supplement highway capacity, improve north/south connectivity and improve the quality of transit services especially for those who are dependent on transit. This project would also accommodate robust future growth in population and employment consistent with regional land use objectives. The project would improve mobility for shorter trips and provide direct access to existing and planned development along the economic spine of Southeast Florida.

The FEC Railway historically operated passenger rail service along Florida's east coast, traversing the Southeast Florida Region. The development of the communities along Florida's east coast centered around the train stations along the FEC Railway. Modern cities along Florida's east coast are currently implementing programs to redevelop historic downtowns built around the train stations. The public policy Eastward Ho!, developed by the Governor's Commission for a Sustainable South Florida, provides guidance for improving quality of life and managing growth including the redevelopment of eastern Miami-Dade, Broward, and Palm Beach Counties. Improved mobility is highly desired in the Southeast Florida Region and throughout the State of Florida. The reintroduction of passenger service along Florida's east coast would provide near-term jobs and economic stimulus for Florida's residents and businesses. The reduction in growth of Vehicle Miles Traveled (VMT) and changes to the distribution of trips by transportation mode would reduce fuel consumption and the amounts of pollutants emitted in the Southeast Florida Region. The FEC Railway Corridor right-of-way represents a unique and strategic transportation corridor that provides vital freight and transportation rail services to and from Southeast Florida.

Proposals to use existing and new east-west track connections between FEC and Tri-Rail would permit Tri-Rail trains to operate over portions of the FEC corridor and vice versa. An integrated system, offering "one–seat, no transfer rides", could attract more riders than two parallel rail services with connecting buses. More origins and destinations would be directly served by such an integrated system.

Regional environmental goals are being achieved by concentrating development to the east, rather than between I-95 and the Everglades. A new premium transit service along the FEC Railway corridor would support such development activities in Community Redevelopment Areas (CRA).

The goals and objectives reflect the project purpose, and are as follows:

Goal 1: Improve mobility and access for personal travel and goods movement.

1.1. Expand transit options to accommodate future travel demand in the corridor and serve major transportation hubs (including airports and seaports), employment, medical, retail, educational, and entertainment centers, and residents in the region.
1.2. Provide regional transit options that improve travel time reliability for people and goods and result in travel time savings.
1.3. Integrate the proposed transit options with existing and planned transit in the region.
1.4. Integrate the proposed transit options with existing and planned freight transport and potentially intercity passenger transport located within or traversing the study area.
1.5. Provide for seamless connections to all modes of transportation including feeder bus, bicycle and pedestrian facilities.
1.6. Provide regional access and mobility improvements for minority, transportation disadvantaged and low-income groups.
1.7. Support goods movement in the corridor with higher capacity and connectivity.

Goal 2: Coordinate corridor transportation investments to contribute to a seamless, integrated regional multi-modal transportation network.

2.1. Invest in infrastructure, facilities and services that improve connectivity, transfer and circulation in the region.
2.2. Coordinate and integrate with other regional rail, mass transit, and roadway projects.

2.3. Maintain working relationships with transportation partners, including the FTA, FDOT, Regional Transportation Authority, MPOs, counties, cities, regional planning councils, business groups, Florida East Coast Industries, and other stakeholders.
2.4. Avoid or minimize duplication of premium transportation services.
2.5. Coordinate with other transportation and land use planning efforts that are supportive of transit options.
2.6. Accommodate a proposed greenway along the corridor.

Goal 3: Encourage the implementation of transit supportive development.

3.1. Locate transit stations where higher density development exists or can readily be accommodated and near activity centers.
3.2. Complement and support economic development/redevelopment and potential joint development activities that include a mix of uses and affordable housing, within the study area.
3.3. Establish a transit improvement that will contribute, guide and support the urban, transit-oriented scale envisioned by local municipalities for the various downtowns, commercial corridors and abutting residential areas.
3.4. Facilitate creation of transit-supportive and context sensitive development guidelines, zoning and policies.
3.5. Provide transit that complements the scale and character of neighborhoods, housing, and business developments.
3.6 Encourage transit-supportive land uses and sustainable living.

Goal 4: Minimize adverse impacts to the community and local businesses.

4.1. Minimize or mitigate adverse local traffic, parking and safety impacts.
4.2. Minimize or mitigate adverse noise and vibration impacts.
4.3. Avoid or minimize adverse impacts to minority and low income communities.
4.4. Minimize adverse right-of-way and physical impacts to established communities and businesses.
4.5. Optimize the use of existing infrastructure and transportation corridors for expansion of transit.

Goal 5: Preserve and enhance the environment.

5.1. Minimize and mitigate adverse impacts to existing environmental resources.
5.2. Preserve historical and cultural resources.
5.3. Provide transit options that reduce traffic congestion and energy consumption.
5.4. Protect environmentally sensitive areas.
5.5. Improve regional air quality by promoting alternative transportation modes and reducing auto emissions and greenhouse gases.
5.6 Reduce fuel consumption and dependence on foreign oil.

Goal 6: Provide a cost-effective transportation solution to meet identified travel needs.

6.1. Ensure that the investment strategy for the corridor will be eligible to receive federal funding.
6.2. Optimize transportation funding resources and obtain local financial support.
6.3. Explore lower technology cost solutions, where applicable, that can be upgraded over time to a higher transit technology solution based on changing needs.

Chapter 2

Alternatives Considered

Highlights:

- Phase 1 began the alternatives refinement process, which included planning efforts such as: examining possible service alignments, assessing travel markets, identifying sections of independent service utility, determining potential modal technologies and station locations, and assessing the potential for consolidated freight operations.
- Phase 2 began with a more manageable number of alternatives, which further refined alternatives from modally generic to modally specific to the final detailed alternatives.
- Modally Generic Alternatives focused on service attributes, such as number of stations, and service parameters, such as headways.
- Seven Modally Specific Alternatives were created to explore the expected ridership, cost, and impacts of different vehicles (or modes) and service attributes.
- Using a set of evaluation criteria which included significant public input, elements of the Modally Specific Alternatives were refined to create four Detailed Alternatives.
- The Detailed Alternatives chosen for evaluation include two rail alternatives, one bus rapid transit alternative, and a Low Cost/Transportation System Management (TSM) alternative. The rail and BRT alternatives operate on the FEC corridor, while the Low Cost/TSM alternative operates on adjacent roadways.
- Station area planning was integral to the alternatives selection process.

2.1. Phase 1 Conceptual Alternatives

Phase 1 was conducted between 2005 and 2008 and began the work of determining alternatives suitable for consideration as the Locally Preferred Alternative. **Figure 2.1** provides a flow chart of the alternatives analysis process. Phase 1 of the study conducted a preliminary environmental screening of 36 conceptual transit alternatives on a regional level consisting of combinations of service segment, alignment and modal technology. These alternatives were evaluated for their ability to meet the project's purpose and need using as criteria effectiveness, environmental impacts, cost effectiveness and equity. The purpose of the evaluation was to refine the set of alternatives considered in Phase 2. A summary of the Phase 1 recommendations are as follows:

Process

The Phase 1 alternatives were developed, analyzed and evaluated in a two-part process. The first part reviewed a broad range of urban transport modal technologies to identify which modes were most consistent with the project goals and objectives. Preliminary analyses were conducted on 20 urban transport modes. The second part reviewed three transit elements in combination:

- General Alignments - consisting of three contiguous north-south transportation corridors (the general alignments of the FEC Railway, US-1, and I-95 north of Mangonia Park only).
- Modal Technologies - consisting of the five viable modal categories from the initial phase.
- Service Segments - consisting of six overlapping segments of transit service produced by subdividing each of the three general alignments. Three special analysis segments were also created to analyze the potential of alternate southern termini for the existing Tri-Rail service and a new premium transit service in the corridor.

Alignments

Six general alignments were analyzed in Phase 1: the FEC Railway, the SFRC Railway, US-1, I-95 (north of West Palm Beach), the Intercoastal Waterway, and rail corridor connections such as utility rights-of-way or state canal properties. Viable service alignment options were identified for further analysis in Phase 2. The general alignment options moving forward were primarily along the FEC Railway, with a portion in the I-95 corridor in northern Palm Beach County also advancing. Generally, the alternatives that were not pursued into Phase 2 were extremely expensive, did not support the needed ridership to gain funding, and generated significant environmental impacts.

Modal Technology

Four vehicle - or modal - technologies, Bus Rapid Transit, Light Rail Transit, Regional Rail Transit and Rapid Rail Transit were advanced for further evaluation along the FEC railway alignment. One modal technology, Regional Bus, was advanced for evaluation on the I-95 alignment. Nine technologies were rejected as not viable, too expensive or ill-suited to the subject application:

- Diesel/Electric Hybrid Coach Regular Bus Street Transit,
- Electric Coach Regular Bus Street Transit,
- Streetcar Street Transit
- Electric Coach (Trolleybus), Driver Directed, Bus Rapid Transit
- Electric Coach (Trolleybus), Guideway Directed, Bus Rapid Transit
- Automated Guideway Transit (AGT)
- Monorail
- Electric Multiple Unit (EMU) Rubber-Tired Rapid Transit
- High Speed Ferry

Stations

Sixty locations were identified as preliminary station areas. Additionally, possible operations and maintenance facility locations were identified.

Detailed information about Phase 1 of this project can be found as part of the *Phase 1 Final Conceptual Alternatives Analysis / Environmental Screening Report* on the study website.

2.2. Modally Generic Alternatives

In the earliest stages of the corridor analysis, the study team identified and evaluated a number of modally generic transit services to test what service parameters and combinations of service attributes would be most effective in attracting transit riders. The alternative testing serves two different but related purposes: to evaluate the potential impacts of the different options on the FEC corridor in terms of the ridership generated; and to assess the forecasting model's performance in response to a range of transit service assumptions including speed, headway, fare, and parking restrictions.

The insight gained from the alternative testing formed the basis for refining future Low Cost/TSM and Build Alternatives that were tested in subsequent tasks.

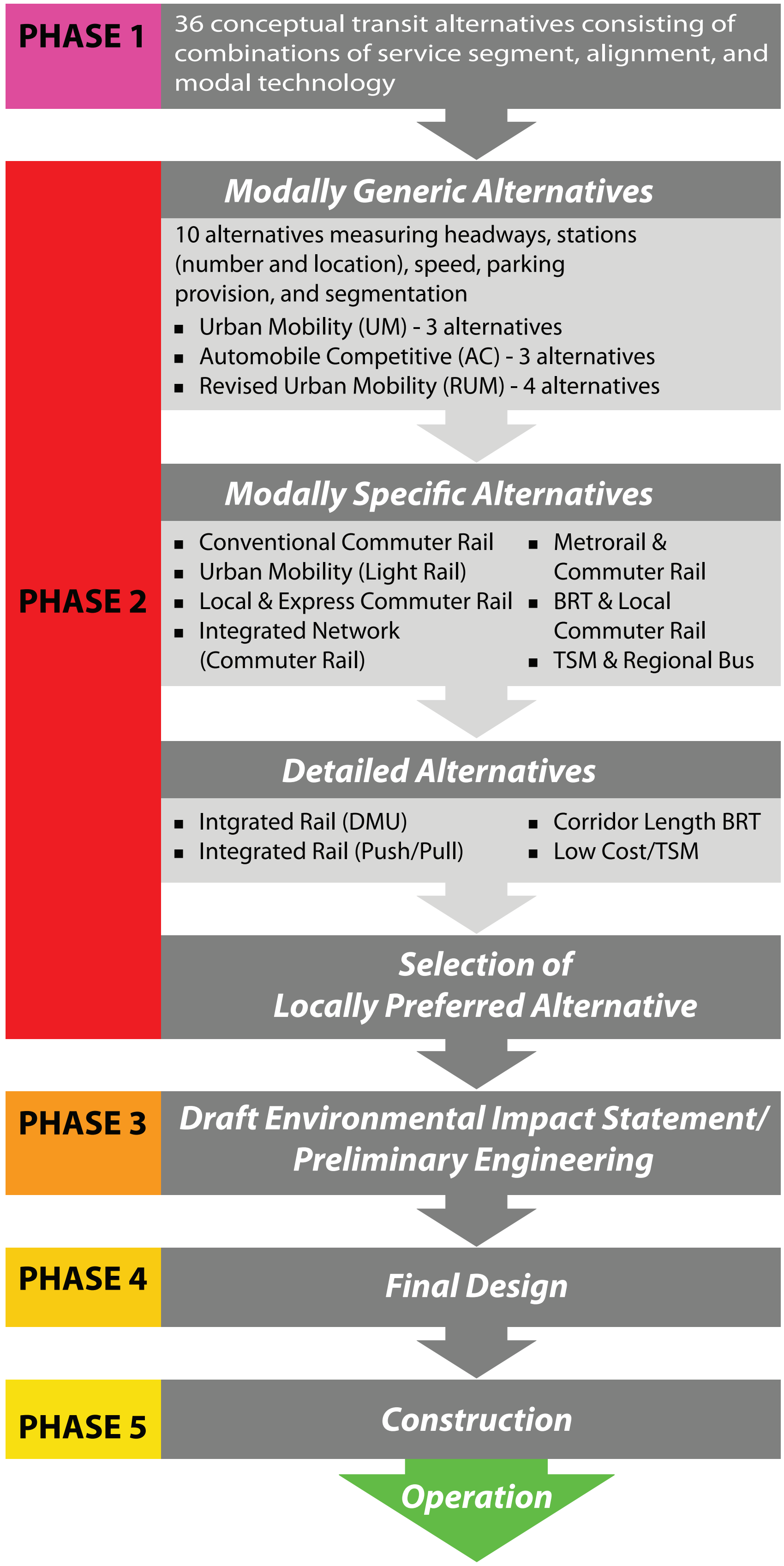
2.2.1. Definition of Alternatives

Three general series of modally generic service options were designed and evaluated for the corridor:

- Urban Mobility (UM)
- Automobile Competitive (AC)
- Revised Urban Mobility (RUM)

Each option spanned the length of the corridor from Indiantown Road in Jupiter to Miami's Government Center.

Figure 2.1 – *Alternative Selection Process as part of the Project Process*



The Urban Mobility (UM) series was characterized by high station densities (84 stations in 82 miles), frequent stops, and slower maximum authorized speeds.

The Automobile Competitive (AC) series, in contrast to the UM series, was designed to improve transit speeds by reducing the number of stations to 42 and providing express service along the corridor.

The Revised Urban Mobility (RUM) series was a variant of the UM series. The RUM series had 61 stations, requiring more frequent stops than the AC series but less frequent stopping, and therefore higher speeds, than the UM series.

2.2.2. Evaluation of Modally Generic Alternatives

Ten modally generic alternatives were created in this stage, each a variation on one of the three generic service options described above. Model runs of these alternatives yielded findings that influenced the Modally Specific Alternatives, the next stage of the alternatives analysis. In summary, the findings were:

- Ridership was very sensitive to changes in headways, suggesting that headways needed to stay short to generate adequate ridership
- Ridership was impacted by the number of transit stations, with the RUM alternatives generating more ridership than the AC and the UM alternatives, suggesting that frequent station and fast trip time are both important and need to be balanced for optimal ridership generation
- The model was fairly insensitive to maximum speed if the difference was between 60 and 80 miles per hour, which allowed for flexibility in travel times without adversely affecting ridership
- Providing parking at the station locations resulted in a transit ridership increase of 29 percent, though not all potential station locations on the corridor are suitable for large parking facilities

2.3. Modally Specific Alternatives

The findings of the Modally Generic Alternatives led to the creation of seven modally specific alternatives that utilize the five modes advanced in Phase 1 (Regional Rail, Light Rail Transit, Rail Rapid Transit, Bus Rapid Transit, and Regional Bus) and incorporate the Modally Generic Alternative findings on stations, headways, speed, and parking.

These Modally Specific Alternatives were designed to provide a range of transit options in sufficient detail to solicit public feedback on preferences regarding the aspects of transit service explored in the Modally Generic Alternatives stage. Given the large number of permutations of service characteristics under consideration at this stage, Modally Specific Alternatives were designed to act as a proxy for multiple characteristics. For example, an electrified light rail vehicle alternative could inform about ridership for both electrified and diesel light rail, while also informing about capital cost for both electrified light rail and electrified heavy rail. This allowed the number of modally specific alternatives to remain low enough for public discussion.

Seven Modally Specific Alternatives were created, and are described below.

2.3.1. Definition of Alternatives

A: Conventional Commuter Rail

The Conventional Commuter Rail alternative would be similar to the Tri-Rail system already in place in south Florida. It would operate between Jupiter and the Miami Government Center Station using push-pull rail vehicles, providing a fast end-to-end service that would stop at 17 stations along the corridor with an end-to-end running time of less than two hours. The stations and alignment are depicted in **Figure 2.2**. These 17 stations are similar to the express stations provided in the Automobile-Competitive modally generic alternative. Trains would average 43 MPH and would operate every 20 minutes in

Figure 2.2 – *Conventional Commuter Rail*

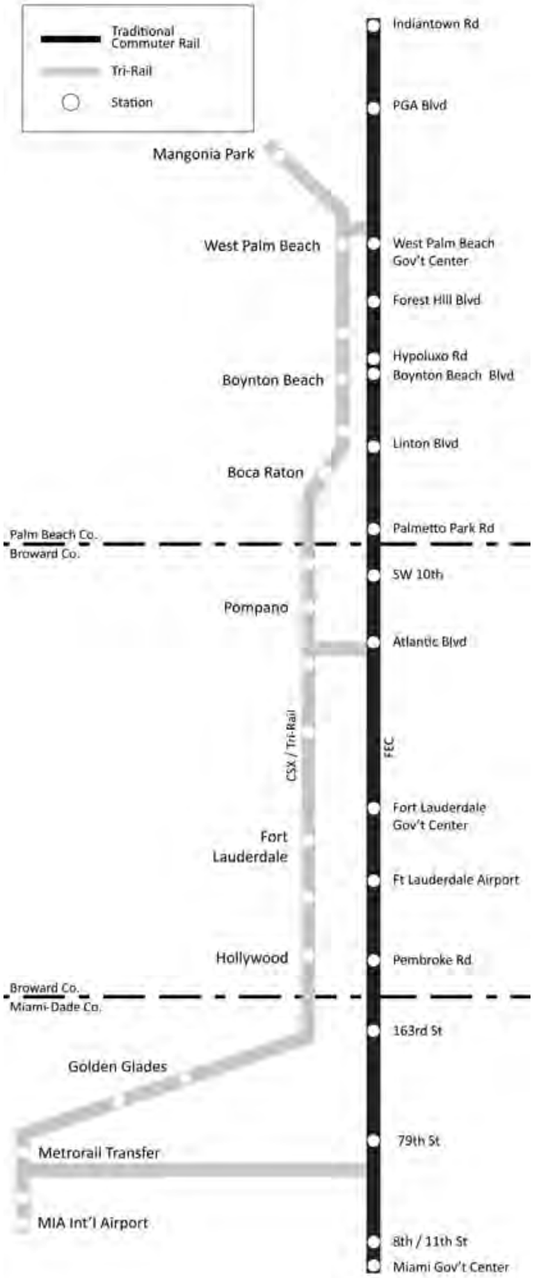
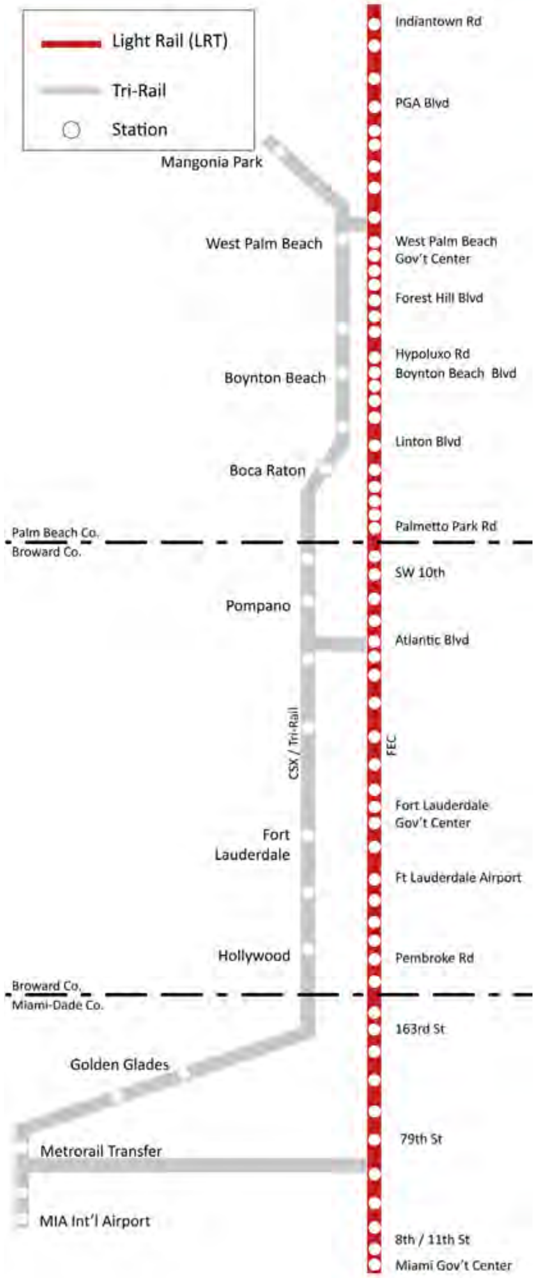


Figure 2.3 – *Urban Mobility*



Push-Pull Rail

Light Rail

Figure 2.4 – *Local and Express Commuter Rail*

Push-Pull Rail

Type-1 DMU

the peak period and hourly in the off-peak period. The trains would be long enough to seat 450 passengers.

While the service would be similar to existing Tri-Rail service, the two services would be unconnected, as this alternative would be constrained to the FEC corridor. In this alternative, roadway closures (stopped traffic on cross streets) would occur no more than six times per hour at any grade crossing.

B: Urban Mobility

The Urban Mobility alternative would provide a much more dense volume of service, making 56 stops along the route from Jupiter to Miami and thus providing station access to a large number of communities. The stations and alignment are depicted in **Figure 2.3.** This electrified light rail service would take over two and half hours to operate from end-to-end, averaging 31 MPH during the trip.

The Urban Mobility alternative would operate every 10 minutes in the peak period and every 15 minutes in off-peak times, a frequency conducive to walk-up service. The increased frequency would require grade crossings to close more frequently, up to twelve times per hour at each grade crossing. The seating capacity is barely half that of Conventional Commuter Rail, at 270 passengers.

This service would operate exclusively on the FEC corridor, and have no direct connection to Tri-Rail service.

C: Local and Express Commuter Rail

The Local and Express Commuter Rail alternative combines many of the aspects of the Conventional Commuter Rail and Urban Mobility alternatives. It overlays two services: an express commuter rail serving 17 stations; and a local commuter rail serving 56 stations. The stations and alignment are depicted in **Figure 2.4.** Mirroring the previous alternatives, the express is a two hour trip, and local a two and a half hour trip. Each train would operate every 15 minutes, which means that the 17 stations receiving both express and local services would see a train every 7.5 minutes. Grade crossings would need to be closed up to sixteen times per hour.

While the Urban Mobility alternative used electrified light rail as its operating mode, the local service on this alternative would use FRA-compliant rail vehicles.

Like the previous conceptual alternatives, service spans from Jupiter to Miami running exclusively on the FEC corridor.

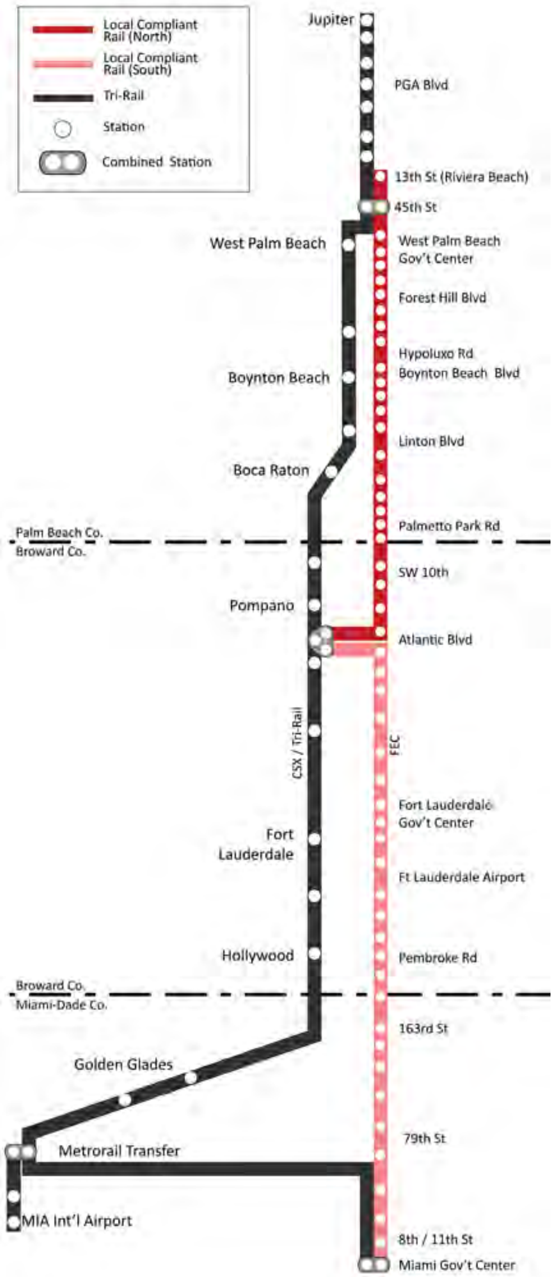
D: Integrated Network

This alternative explored how Tri-Rail and a potential service on the FEC could work together. Three major connecting points between the two corridors were envisioned: the Northwood connection at the northern end lies south of Mangonia Park Tri-Rail station; the Pompano Connection in the middle of the corridor; and the Little River connection in Miami, which would connect this service to the Metrorail Transfer station. This integrated network design to would allow one seat rides into downtown Miami from Tri-Rail rather than the current transfer to MetroRail at the MetroRail Transfer station.

This is the most complex operating concept of the conceptual alternatives, with three separate services provided. One service is an extension of existing Tri-Rail service. This service would stop at 23 stations between Jupiter and Miami International Airport. The service would operate on both the FEC and SFRC rail lines – the FEC line would be used between Jupiter and West Palm Beach, and again between 72nd St. and Government Center in Miami. Average speeds on this service would reach 36 MPH, with an end-to-end running time of 2:28. A 15-minute peak headway and 30-minute off-peak headway would be used for all services. All trains would use FRA-compliant vehicles.

The other two rail services would operate primarily on the FEC corridor, but use the rail crossing in Pompano Beach to connect to a transfer station on Tri-Rail. The northern service would operate between Riviera Beach and Pompano Beach, while the southern service would operate between Pompano Beach and Miami Government Center. A transfer

Figure 2.5 – *Integrated Network*



Tri-Rail


Type-1 DMU

Figure 2.6 – *Metrorail with Local Commuter Rail*


Metrorail

would be required to ride end-to-end on the FEC corridor. The headways (15-minute peak, 30-minute off-peak) would lead to as many as eight closures per hour on grade crossings. The shorter length of the FEC services allows for an end-to-end trip of 2 hours and 20 minutes at average speeds of 30-33 MPH. The stations and alignment are depicted in **Figure 2.5**.

E: Metrorail with Local Commuter Rail

This alternative would extend current Miami-Dade Metrorail service north from Miami Government Center along the FEC Corridor to the edge of Miami-Dade County at Aventura. Metrorail operates on an elevated structure, grade-separated from vehicular traffic, and can carry up to 600 passengers per train. The Metrorail portion of this alternative would stop 11 times over a 30-minute route. A local FRA-compliant commuter rail service with a similar service pattern and station locations as the Urban Mobility alternative would operate in Broward and Palm Beach Counties. An express non-stop service would be provided from Aventura to downtown Miami at grade underneath the Metrorail service, supplementing existing Metrorail service. The local service would make 48 stops over a slightly less than 2.5 hour route, averaging 34 MPH. Commuter rail service would run every 15 minutes in the peak hour, closing the grade crossings up to 8 times per hour. Metrorail service would run every 5 minutes in the peak hour, and operate at average speeds of 28 MPH. The stations and alignment are depicted in **Figure 2.6**.

Both services would operate exclusively on the FEC corridor, and no connection to Tri-Rail would be provided.

F: BRT with Local Commuter Rail

Early ridership projections suggested that the northern portions of the study corridor, particularly areas north of West Palm Beach, were likely to generate ridership better suited to Bus Rapid Transit (BRT) service than the rail options presented in the other conceptual alternatives. To that end, this alternative would provide BRT service between West Palm Beach and Jupiter, with local commuter rail service between West Palm Beach and Miami Government Center. The BRT system would make 11 stops over a 45 minute route, averaging 22 MPH and providing a seating capacity of 57 passengers per bus. The stations and alignment are depicted in **Figure 2.7**. BRT would operate every 5 minutes in the peak periods and every 10 minutes in off-peak periods, while Local Commuter Rail would operate every 15 minutes in the peak and 30 minutes in the off-peak, similar to other conceptual alternatives. Local Commuter Rail would have an end-to-end (West Palm Beach to Miami) running time of just over 2 hours, with average speeds of 32 MPH.

While grade crossing closures could be as high as eight times per hour for the local commuter rail portion of this alternative, BRT service would be signalized without priority, similar to the current operation of the South Miami-Dade Busway BRT signalization at cross streets would be complicated by frequency of service as well as coordination with freight movements.

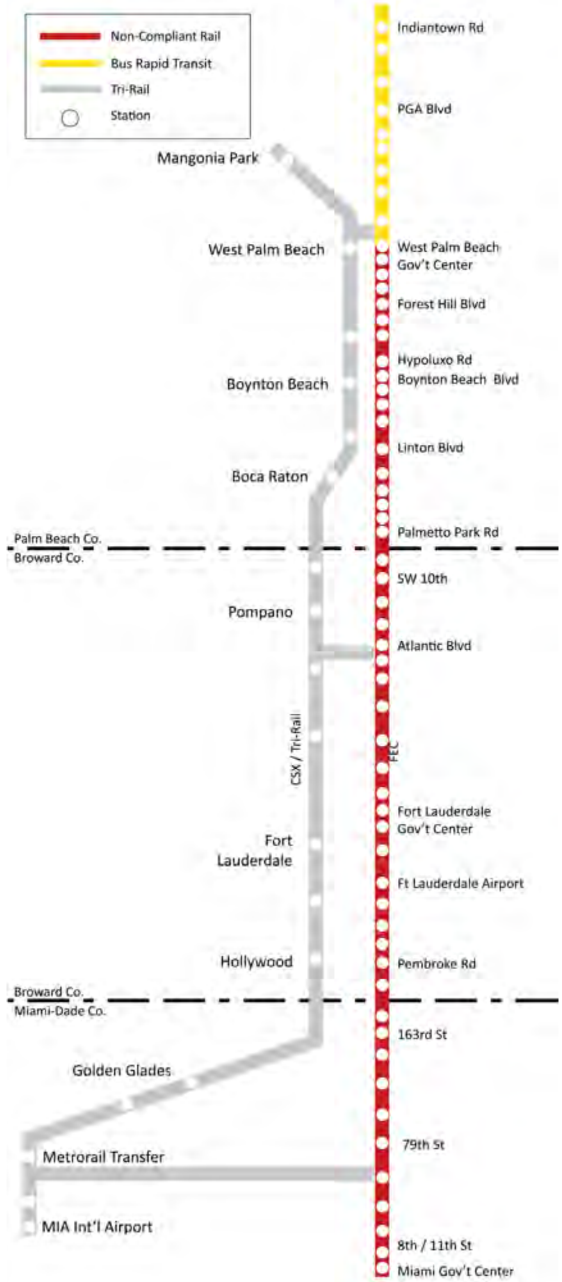
Both services would operate exclusively on the FEC corridor, and no connection to Tri-Rail would be provided.

G: TSM with Regional Bus

The Transportation Systems Management (TSM) alternative attempts to satisfy as much transit demand as possible without a major capital investment. This TSM alternative would have two key components, a Rapid Bus and Jupiter Commuter Bus.

The Rapid Bus would run from Jupiter to Miami, along local arterials adjacent to the FEC corridor, making 86 total stops over a 4-hour route. Av-

Figure 2.7 – *Bus Rapid Transit with Local Commuter Rail*




Type-1 DMU


Bus Rapid Transit

Figure 2.8 – *TSM with Regional Bus*

Regional Bus

erage speeds would reach 21 MPH. Each bus could hold as many as 57 seated passengers, similar to BRT. Buses would operate every 10 minutes in the peak and every 15 minutes during off-peak times.

The Jupiter Commuter Bus provides a connection between Jupiter and Tri-Rail in West Palm Beach. Between Jupiter and Palm Beach Gardens it would operate on US 1 parallel to the FEC corridor. South of Palm Beach Gardens it would run non-stop to the West Palm Beach station on I-95. It would make 7 total stops on a 35 minute route, with an average speed of 31 MPH.

The TSM would also include enhancements to Tri-Rail service, including three new stations and improved speeds. The stations and alignment for this alternative are depicted in **Figure 2.8**.

Although TSM vehicles would be equipped to offer a better service than conventional, local services, they would operate on the existing streets in mixed traffic. With the exception of several short sections of roadway, these higher quality bus routes would operate on streets that operate at LOS D or lower and therefore cannot offer rapid movement though the study area.

2.3.2. Stations

Station area planning was an early focus of the SFECC transit planning process. In addition to more traditional transit planning activities, station area planning work helped make an informed decision about the nature of FEC passenger service. This strategy supports the evidence of a connection between land use and transportation, while also conforming to the New Starts guidance.

Station area planning began in Phase 1, when sixty stations were identified at locations with good east-west access to the corridor, (i.e. at major arterial roadway crossings), and each was preliminarily evaluated for suitability based on FTA criteria: transit-supportive land use, development patterns, connectivity, and station area environment. The full land use suitability analysis can be found in the *Phase I Conceptual Alternatives Analysis/Environmental Screening Report.* In Phase 2 this list of 60 stations was enhanced by public input from stakeholders such as public officials, municipal planning staff, and the general public.

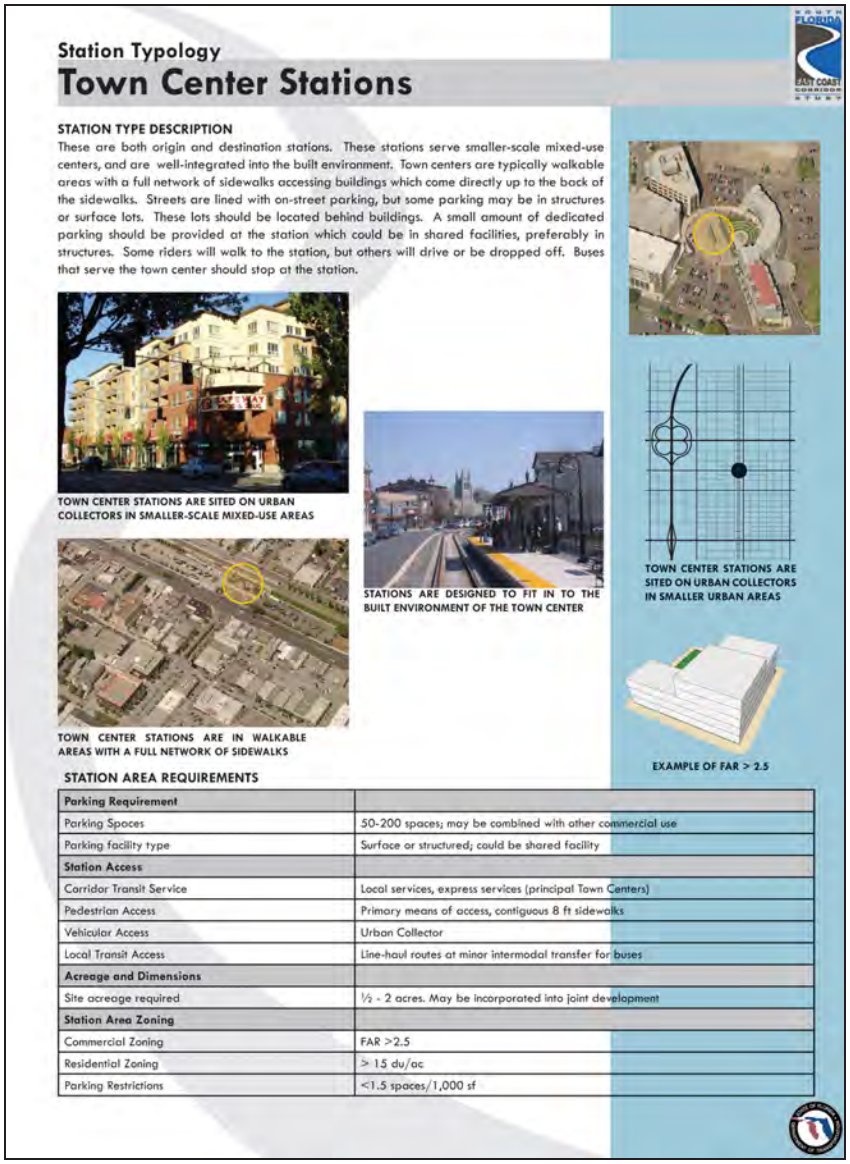
Using a three-step evaluation process, 95 preliminary station areas were evaluated, of which 84 were on the FEC corridor and 11 were on possible connections to the SFRC corridor. The three-step evaluation process can be summarized as follows:

Step 1 – Eight prototypical station types were created (see Figure 2.9 for a sample prototypical station) and each preliminary station area was evaluated to determine conformance with station type. Station areas that conformed to at least one station type were advanced to Step 2 for more detailed evaluations. Station areas that did not conform to any station type were eliminated from future consideration.

Step 2 – The remaining station areas were evaluated against one another using a hierarchy of station types, community preference (public input gained from community meetings, charrettes, and meetings with municipal staff), station spacing, and other factors to ensure that station areas would serve distinct travel markets.

Step 3 – Operations planning work further removed redundant or underperforming stations, making some station areas candidates for long-term implementation. This step was performed during the development of the de-

Figure 2.9 – *Sample page from the Prototypical Station Types Memo*



Station Typology

Town Center Stations

STATION TYPE DESCRIPTION

These are both origin and destination stations. These stations serve smaller-scale mixed-use centers, and are well-integrated into the built environment. Town centers are typically walkable areas with a full network of sidewalks accessing buildings which come directly up to the back of the sidewalks. Streets are lined with on-street parking, but some parking may be in structures or surface lots. These lots should be located behind buildings. A small amount of dedicated parking should be provided at the station which could be in shared facilities, preferably in structures. Some riders will walk to the station, but others will drive or be dropped off. Buses that serve the town center should stop at the station.

TOWN CENTER STATIONS ARE SITED ON URBAN COLLECTORS IN SMALLER-SCALE MIXED-USE AREAS

STATIONS ARE DESIGNED TO FIT IN TO THE BUILT ENVIRONMENT OF THE TOWN CENTER

TOWN CENTER STATIONS ARE SITED ON URBAN COLLECTORS IN SMALLER URBAN AREAS

TOWN CENTER STATIONS ARE IN WALKABLE AREAS WITH A FULL NETWORK OF SIDEWALKS

EXAMPLE OF FAR > 2.5

STATION AREA REQUIREMENTS

Parking Requirement	
Parking Spaces	50-200 spaces; may be combined with other commercial use
Parking facility type	Surface or structured; could be shared facility
Station Access	
Corridor Transit Service	Local services, express services (principal Town Centers)
Pedestrian Access	Primary means of access, contiguous 8 ft sidewalks
Vehicular Access	Urban Collector
Local Transit Access	Line-haul routes at minor intermodal transfer for buses
Acreage and Dimensions	
Site acreage required	½ - 2 acres. May be incorporated into joint development
Station Area Zoning	
Commercial Zoning	FAR >2.5
Residential Zoning	> 15 du/ac
Parking Restrictions	<1.5 spaces/1,000 sf

Table 2.1 – *Sample Requirements by Station Typology*

	Parking	Acreage Required	Vehicular Access	Commercial Zoning*	Residential Zoning
City Center	No parking required	< 1 acre	Local Road	FAR > 10	> 25 units/acre
Town Center	50-200 spaces	.5 - 2 acres	Urban Collector	FAR > 2.5	> 15 units/acre
Neighborhood	50-100 spaces	.5 - 1 acre	Local Road	N/A	> 8 units/acre
Employment Center	No parking required	< 1 acre	Minor Arterial	FAR > 2.5	> 25 units/acre
Local Park-Ride	200-600 spaces	2 - 6 acres	Minor Arterial	FAR > 2.5	>15 units/acre
Regional Park-Ride	600-2000+ spaces	5+ acres	Principal Arterial	FAR > 6	>25 units/acre
Airport/Seaport	No parking required	N/A	Urban Collector	N/A	N/A
Special Event Venue	No parking required	N/A	N/A	N/A	N/A

NOTE: FAR is an abbreviation for Floor Area Ratio. It is the ratio of the total floor area of a building to the land area on which the building is located.

tailed alternatives, and is covered in Section 2.4.

Step 1 - Prototypical Stations

Station area planning began with the development of eight prototypical station types, based on a series of land use and zoning characteristics such as density (both existing and planned), station access, parking, and required acreage. A full description of the prototypical stations can be found in the *Programmatic Guidelines for Prototypical Station Types Technical Memorandum*. Some of the primary characteristics of the eight different station types are summarized in **Table 2.1**.

These prototypical stations served as the starting point for the station area evaluation. A full description of the station area evaluation methodology can be found in the *Station Location Evaluation Methodology Technical Memorandum*.

The land use characteristics for each of the 95 preliminary station areas were compared to the characteristics of the eight prototypical station types. If the station area conformed to the characteristics of a station type, it passed the screening. Some station areas conformed to multiple station types, as not all station types are mutually exclusive. Station areas that were non-conforming for all eight station types failed the screening. Twenty-one station areas did not conform to any station type and were thus considered ineligible for inclusion in the recommended station list. The remaining stations were advanced to Step Two.

Step 2 - Station Area Evaluation

Step Two of the evaluation determined two things: a recommended station area list, and corresponding station types for each station area. In Step One each station area was evaluated independently of all other station areas. In Step Two the evaluation was comparative, meaning that adjacent station areas were considered in determining the recommendation of a station area. This was done in an attempt to create a robust mix of station types that would increase mobility and the diversity of the transit system's ridership. As discussed in detail in the *Station Location Evaluation Methodology Technical Memorandum*, an evaluation methodology was created that categorized station types by relative importance (for example, City Center stations were considered more vital to a transit network than Neighborhood stations, all other things being equal), looked at community preference, ridership projections, market potential, and considered basic operational constraints such as station spacing. The application of these criteria yielded a list of 56 recommended station areas, each with a recommended station type.

Additional information related to stations and station design may be found in Section 2.4.5.

2.3.3. Rail Connections

A number of connections between the SFRC and FEC Corridors were examined to determine whether the two corridors could be connected to allow for potential integration of transit service, and if so how. **Figure 2.10** shows potential rail connections between the corridors.

Rail connections were evaluated in each of the three counties in the study area. In the vicinity of West Palm Beach close to the northern end of the corridor, a connection was in discussion prior to the inception of this study that would allow an extension of Tri-Rail service from the SFRC to Jupiter on the FEC. Seven possible alignments were developed and evaluated technically and in a public charrette held in West Palm Beach in January 2010. The Northwood connection, north of the existing West Palm Beach Station was found to be the best option.

Three alternative connections were considered in Broward County, two of which were modeled to determine ridership potential. Only one of these alternatives is an existing east-west rail corridor. This option is connected to the FEC in the east and close, but not currently connected, to the SFRC at its western end. This connection, referred to as the Pompano Connection, proved to be the best alternative when benefits and impacts were taken into consideration.

Two alternative connections were considered in Miami-Dade County, at the southern end of the corridor. Of these the Little River FEC Spur was the more practical connection and was used as part of the Integrated Network Alternative. However, subsequent analysis indicated that ridership on this connection would be too low to warrant its use for passenger service as it would duplicate the faster service offered by Metrorail, albeit with a one-seat ride into downtown Miami. The Little River connection is included in the final alternatives for non-revenue service to allow trains access into SFRTA's maintenance facility in Hialeah.

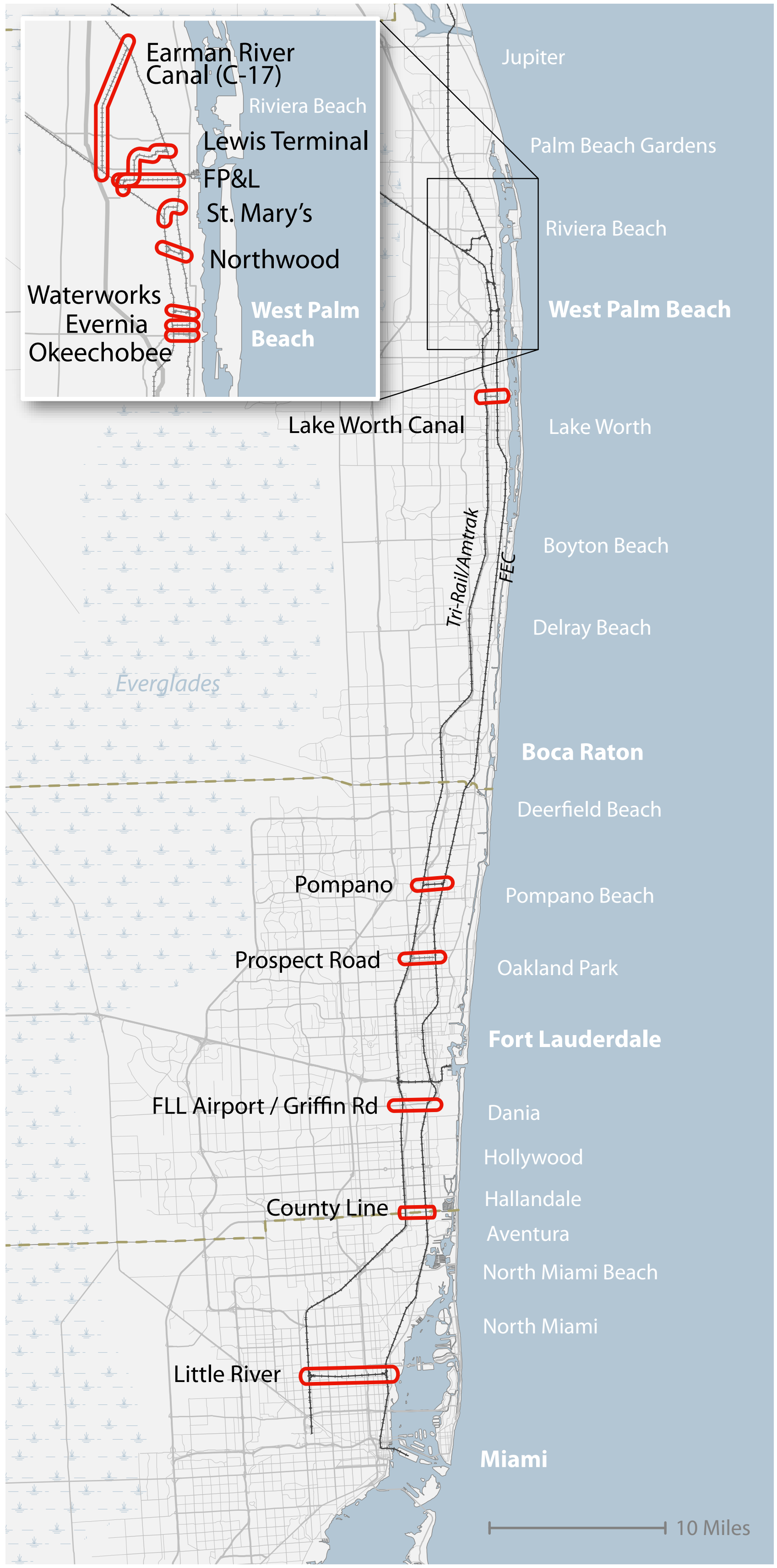
A full analysis of connections can be found in the *SFRC-FEC Connections Technical Memorandum* and the *North End Connections Technical Memorandum*.

2.3.4. Waterway Crossings

The United States Coast Guard (USCG) indicated that bridge permits will be required for construction of new bridges or improvements to FEC Railway bridges over three navigable waterways within the study area. These are the Dania Cut-Off Canal, in Dania Beach just south of the Fort Lauderdale/Hollywood International Airport, the New River in downtown Fort Lauderdale and the Hillsboro Canal on the Broward County/Palm Beach County line. A fourth crossing, Tri-Rail crossing the Miami Canal to access the Miami Intermodal Center, may also be included. This crossing will be upgraded with or without the SFECC project as Tri-Rail plans to extend its existing service into the airport.

Presently, the FEC Railway bridges over the Dania Cut-Off and Hillsboro Canals are fixed, low-level bridges while the FEC bridge over the New River is movable but remains in the open position until a freight train approaches. The New River is by far the most significant of these waterway crossings. In

Figure 2.10 – *Potential connections between FEC and CSX/Tri-Rail*



addition, the Integrated Rail Alternatives utilize the CSX/Tri-Rail corrior for service into the Miami Intermodal Center. This corridor crosses the Miami Canal, which is also a navigable waterway.

Because these waterways have been designated as navigable by the USCG, new bridges would require the necessary vertical clearance to "meet the reasonable needs of navigation" for those particular locations as part of the permit conditions. Vertical clearance for new bridges over the remaining waterways need only match that of the existing bridges.

Very preliminary concepts were developed for the three FEC crossing locations (see **Figure 2.11**). Cross sections and longitudinal sections as well as 3-D visualizations for various bridges, both fixed and movable, and tunnel alternatives were developed as initial concepts to begin the dialogue with the stakeholders. In all these concepts it was assumed that the freight railroad would remain operating at grade. No decisions were made in this phase as more detailed analysis, including surveys of river traffic, will be required to make informed decisions. This work will be carried out in Phase 3. (See *Environmental Screening Report* for further details.)

Figure 2.11 – *Bridge renderings concepts - from top: New River high-level fixed by day; by night; New River mid-level bascule; Hillsboro River Canal*

2.3.5. Operations and Maintenance Facilities

Southeast Florida currently has ten major transit maintenance and storage facilities compatible with the detailed alternatives which have advanced. Eight exist for bus maintenance and two are for regional rail equipment. In addition, a number of existing or former rail yards have been considered for use as either maintenance or storage locations. The ten existing facilities were inventoried and reviewed for compatibility with the detailed alternatives.

The criteria for storage and maintenance facilities are similar, which would include the availability of real estate with the following characteristics:

- Preferably undeveloped, under-developed, or currently in industrial use
- Sufficient capacity (acreage), to accommodate the expected maintenance operation
- A regular shape to the parcel (or parcels) to accommodate the maintenance function
- In a location reasonably close to established service termini
- Compatible with surrounding land uses
- An absence of significant, adverse, environmental impacts

Using this criteria, the following sites and their respective sizes were identified:

- NW 15-17th Streets, Miami,
- NW 19th Street, Miami
- Little River Wye, Miami
- Pompano Beach / NW 15 St. / I-95
- Pompano Beach / NW 15 St. / I-95
- Pompano Beach / NW 15 St. / I-95
- Pompano Beach / NE 48 St & Dixie Highway
- Flagler Boulevard Wye, West Palm Beach

For the Regional Rail alternatives, Hialeah Yard, despite considerable need for deadhead running via the Little River lead, appears to present the best option for a major maintenance facility for the network because of its capacity and ownership status. At present, the most likely siting of a maintenance building appears to be undersized unless some sharing of maintenance functions can occur with other tenants, such as SFTRA.

Considerably more flexibility is afforded in choosing a site for one additional bus maintenance facility for either the BRT or TSM alternatives. The most desirable location for a new bus maintenance facility would be either somewhat north of Fort Lauderdale or somewhat south of Miami Government Center. Off-corridor locations would be acceptable. If a bus alternative is chosen, a likely compromise would likely be one of the facility locations identified near Pompano Beach

The full analysis of operations and maintenance facilities can be found in the *Regional Operations and Maintenance Facility Summary Technical Memorandum*.

2.3.6. Evaluating the Modally Specific Alternatives

Alternatives evaluation provides a means of determining and comparing how the alternatives address the goals and objectives of the project (see section 1.8 for a list of goals and objectives). Consistent with FTA guidance materials, an evaluation framework was created using five categories as described below:

Effectiveness – the extent to which the project solves the stated transportation problems in the corridor.

- Project Impacts – the extent to which the project supports economic development, environmental or local policy goals
- Cost-effectiveness – that the costs of the project, both capital and operating, be commensurate with its benefits
- Financial feasibility – that funds for the construction and operation of the alternative be readily available in the sense that they do not place undue burdens on the sources of those funds
- Equity – that the costs and benefits be distributed fairly across different population groups

Thirty-seven objectives were listed in Chapter 1. Each objective had at least one evaluation measure that addressed FTA guidance and was consistent with one of the five evaluation categories above. Each category was represented by at least one evaluation measure, which suggested that the objectives for this project reflected the wide range of impacts and benefits that major transit projects create. The full list of measures is shown in **Table 2.2**.

Consistent with standard practice, the conceptual alternatives were screened using a subset of the full list of measures used to evaluate the detailed alternatives. The selected measures are a cross-section of the larger evaluation, representing measures that were likely to be significant differentiators and could highlight the benefits and costs of different modes. All five evaluation categories are represented. **Table 2.3** summarizes the findings of these selected measures. The findings from that screening highlight the tradeoffs of each alternative. Commuter Rail, while modeling a reasonable level of ridership per station, had poor total ridership and cost-efficiency along with limited public interest. Urban Mobility had high cost-efficiency due to high ridership projections, but capital costs for electrification were high, and Tri-Rail ridership was reduced by more than 50 percent. The Express & Local alternative provided new track miles to freight and Amtrak vehicles and was the most popular choice of the public, but had a high number of grade crossing closures and a high operating cost per passenger. The Metrorail & Regional Rail (RGR) alternative had high ridership projections but at a prohibitive capital cost. The Bus Rapid Transit (BRT) & RGR alternative was a strong choice based on cost-efficiency, but limited future freight operations and had poor public support. Low Cost/TSM was similar to BRT in that it had good cost-efficiency numbers but was unpopular with the public. Additionally, determinations were made about modal options. Guideway-directed, diesel/electric hybrid coach in a Bus Rapid Transit application was rejected as it has higher costs, operational disadvantages and limited advantages over more conventional, Driver Directed vehicles. Certain electrified modes survived the Phase 1 modal technology assessment but were rejected due to cost and incompatibility with Southeast Florida's natural environment, as each major storm that threatened the region would put system operability at risk. Consensus among stakeholders was to pursue technologies that could operate reliably after a severe storm.

While the other conceptual alternatives had clear positives and negatives, the Integrated Network was the only alternative to have no significant negative aspect, and thus was the most likely alternative to address the full range of project goals and objectives. (See **Table 2.3**.) Ridership was high, cost-efficiency was comparable to previously funded transit projects, public opinion was high, and capital and operating costs were in line with other alternatives.

However, this review highlighted that several alternatives had benefits that met or exceeded those of the Integrated Network, such as the ridership projections of Urban Mobility, the popularity of express service, and the cost-efficiencies of BRT and the Low Cost/TSM. This understanding of benefits and costs led to the decision to pursue the following detailed alternatives:

1. Integrated Network that incorporates elements of the Urban Mobility and Express & Local rail
2. Corridor-wide BRT
3. TSM

Table 2.2 – *Evaluation Measures*

Measure	Goal/Objective
EFFECTIVENESS	
Jobs/Population within ½-mile of stops and stations	1.1, 3.1
Average weekday ridership (linked trips)	1.3, 2.1
Total regional transit trips (linked)	1.4, 1.7
Total regional transit trips (unlinked)	1.4, 1.7
New stops and stations	1.5
Person trips diverted from automobile	1.8
Transfer points with other premium transportation services	1.5, 2.2
Number of street crossing closures (crossing gates down) in peak hour	4.1
PROJECT IMPACTS	
Compatibility with local plans and policies regarding transit	2.5, 3.3, 3.4, 3.6
Compatibility with freight operations	1.4,1.7
New track miles available for use by freight & Amtrak	1.4, 1.7
Miles of greenway accommodated	2.6
Economic Development Potential	3.1, 3.2
Visual Impacts - Number of affected parcels	4.4
Number of possible new grade separations	4.1
Noise impacts - Number of affected parcels	4.2
Vibration impacts - Number of affected parcels	4.2
Property acquired/relocated for right-of-way acquisitions (acres)	4.4, 4.5
Number of historic and cultural resources affected	5.2
Directly impacted acres of environmentally sensitive areas (e.g., wetlands, parks, conservation areas)	5.1, 5.4
Reductions in regional emissions	5.5
Maintenance of working relationships with stakeholders	2.3
FINANCIAL FEASIBILITY	
Capital costs	6.1, 6.4
Annual Operating Costs (in millions)	6.5
New operating costs as compared to existing regional funding for operating costs	6.1
COST-EFFECTIVENESS	
Change in Tri-Rail ridership relative to Low Cost/TSM	2.4
Change in Metrorail ridership relative to Low Cost/TSM	2.4
Capital cost per weekday passenger	6.1
Capital cost per passenger mile	6.1
Operating cost per annual passenger	6.1
Operating cost per passenger mile	6.1
EQUITY	
Zero-Car households within ½-mile of new stations	1.6
Number of relocated/acquired properties and businesses in minority and low income neighborhoods	4.3

Table 2.3 – *Conceptual Alternatives Evaluation Summary*

	Commuter Rail	Urban Mobility	Express & Local	Integrated Network	Metrorail and RGR	BRT and RGR	TSM with Regional Bus
Effectiveness							
Total SFECC ridership (daily)	21,000	69,000	50,000	62,000	72,000	50,000	30,000
New track miles available for use by freight & Amtrak	164	0	246	146	164	164	0
Number of Stations	17	56	56	52 FEC, 22 Tri-Rail	59	57	112
Grade crossing closures (gate down time) in peak hour	6	12	16	8	8	8	0
Project Impacts							
Community Preference Score	3.8	4.5	5.1	4.5	3.7	2.8	1.6
Number of grade crossings	179	175	179	179	179	179	0
FRA-Compliant vehicle buff strength	Yes	No	Yes	Yes	Yes	No	No
Cost-Effectiveness							
Change in Tri-Rail ridership relative to baseline	-5,000	-12,000	-12,000	0	-11,000	-9,000	0
Capital cost per weekday passenger	$128.00	$55.00	$71.00	$52.00	$80.00	$59.00	$6.00
Capital cost per passenger mile	$16.43	$9.24	$10.02	$8.53	$13.70	$10.73	$0.95
Operating cost per annual passenger	$10.59	$6.69	$11.25	$8.69	$8.17	$6.04	$9.49
Operating cost per passenger mile	$0.42	$0.41	$0.34	$0.48	$0.42	$0.33	$0.42
Financial Feasibility							
Capital costs (billions)	$2.80	$3.80	$3.50	$3.30	$5.80	$3.00	$0.20
New operating costs (% of current budget)	24.50%	35.70%	40.80%	26.30%	42.00%	28.20%	27.30%
Equity							
Transit-Dependent Populations within ½-mile of stations	6,000	18,000	18,000	18,000	18,000	18,000	N/A

Green = Comparative Positive, Red = Comparative Negative

2.4 Detailed Alternatives

The evaluation of 24 conceptual alternatives led to the ultimate advancement of three concepts that would constitute the detailed build alternatives. The three concepts were modified in an attempt to optimize the effectiveness of each alternative. The result was four total detailed alternatives; a corridor-length Low Cost/TSM alternative, segmented to allow for reasonable operations, a corridor-length BRT service segmented similarly to the Low Cost/TSM alternative; and two rail alternatives that propose similar service characteristics but different vehicles. Each is defined below.

2.4.1. Low Cost / Transportation System Management (TSM) Alternative

The Low Cost/TSM Alternative is, by definition, the best performance that can be achieved by the existing highway and transit network without major capital investments. It is used as a comparison for evaluating the rail and BRT alternatives requiring major capital investments.

The Low Cost/TSM for this project is composed of three elements:

- Element # 1: A series of local "Rapid Bus" routes operating, on surface streets parallel to (but outside of) the FEC Railway right-of-way,
- Element # 2: Three peak-period only, "Rapid Bus" express routes connecting Tri-Rail to major destinations on the FEC before proceeding to downtown Miami, and
- Element #3: Tri-Rail service enhancement

Element #1, the local rapid bus operation, closely mirrors the local portion of the build alternatives. In this element of the Low Cost/TSM, buses run close and parallel to the FEC Railway, but outside of the actual right-of-way, on surface streets in mixed traffic, without traffic signal priority. The Low Cost/TSM

Figure 2.12 – *Low Cost/TSM Service Diagram*

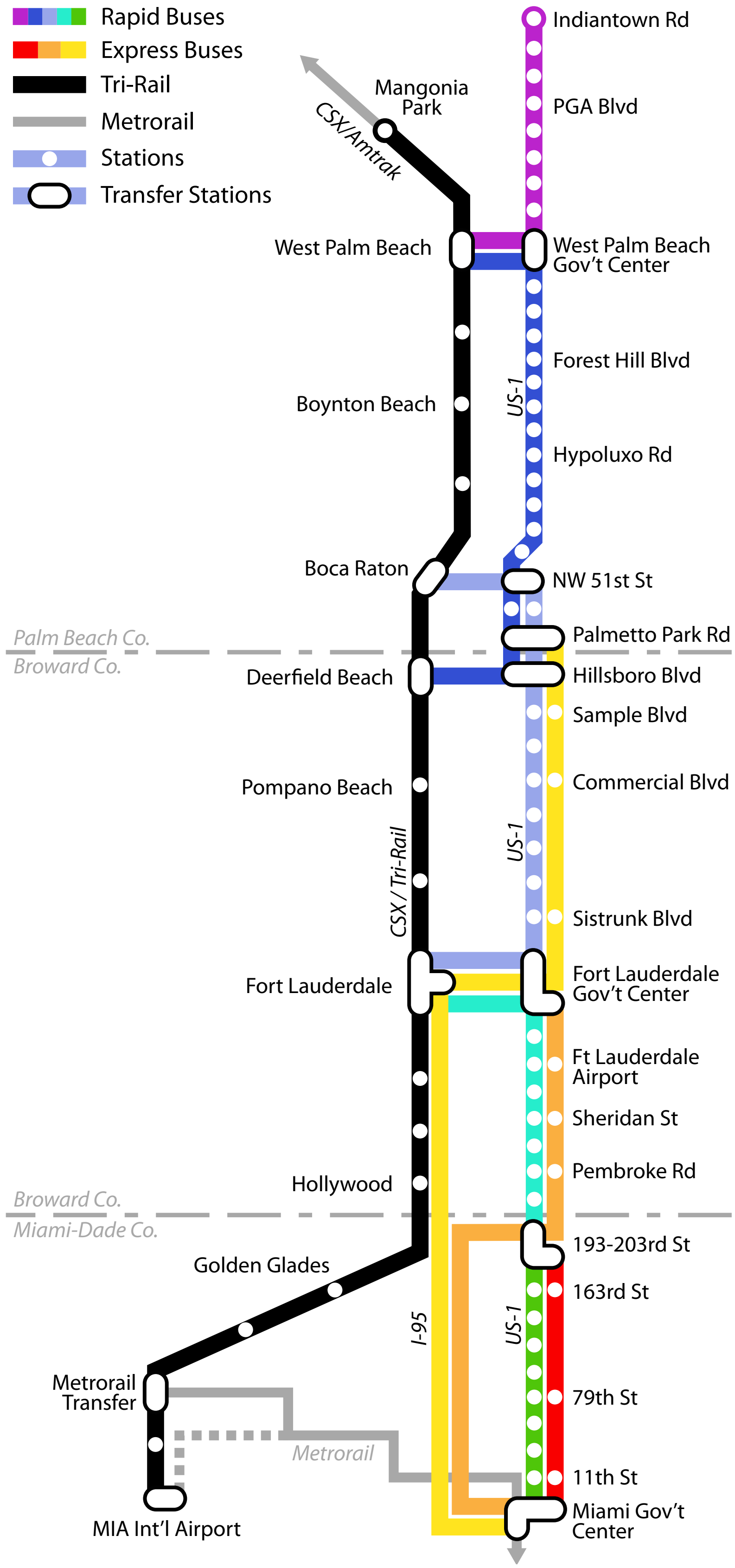


Table 2.4 – *Low Cost/TSM Bus Route Segments*

Service	Description	Equipment	Headway (Peak/ Off-Peak)	Stops*	Travel Time
Rapid Bus					
Route 1	Jupiter – West Palm Beach	Articulated Bus	15/30	10	0:46
Route 2	West Palm Beach - Deerfield Beach	Articulated Bus	15/30	19	1:36
Route 3	Boca Raton – Ft. Lauderdale	Articulated Bus	15/30	14	1:24
Route 4	Ft. Lauderdale - Aventura	Articulated Bus	15/30	10	1:01
Route 5	Aventura - Miami	Articulated Bus	15/30	10	0:57
Express Buses					
Route 6	Boca Raton – Fort Lauderdale - Miami	Articulated Bus	15/- (Only Peak Period Service)	8	1:44
Route 7	Fort Lauderdale – Aventura - Miami	Articulated Bus	15/- (Only Peak Period Service)	6	1:20
Route 8	Aventura - Miami	Articulated Bus	15/- (Only Peak Period Service)	5	0:55

** Transfer points and overlap locations are only counted once, which accounts for the discrepancy between the number of stops in each route and total stops.*

Rapid Bus service would operate from Jupiter to Miami Government Center, making limited stops at 50 locations. These locations are in close proximity to the stations within the FEC right-of-way that would be provided in the rail and BRT alternatives. The Rapid Bus stops would be spaced, on average, every 1¾ miles. In order to make the Rapid Bus more operationally feasible, the route was broken into five separate bus routes that, combined, serve the entire length of the corridor. The routes have transfer locations and, in most cases, either start or end (and in some cases both) at Tri-Rail stations. The five routes are listed in **Table 2.4** and displayed in **Figure 2.12**.

Comparable to the rail and BRT alternatives, the local rapid buses would run on 15-minute headways in peak periods and 30 minute headways in the off-peak.

Figure 2.13 – *Example Bus Rapid Transit Vehicle*

The local buses would operate mainly within major north-south roads in mixed traffic with no signal priority or preemption; the following major roads run closely parallel to the Florida East Coast Railway:

- Dixie Highway
- Federal Highway
- Andrews Ave
- Biscayne Blvd.
- 2nd Ave in Miami

The local Rapid Buses would also operate on stretches of lower capacity roadways where those roadways allow the bus to operate closer to the FEC Railway corridor.

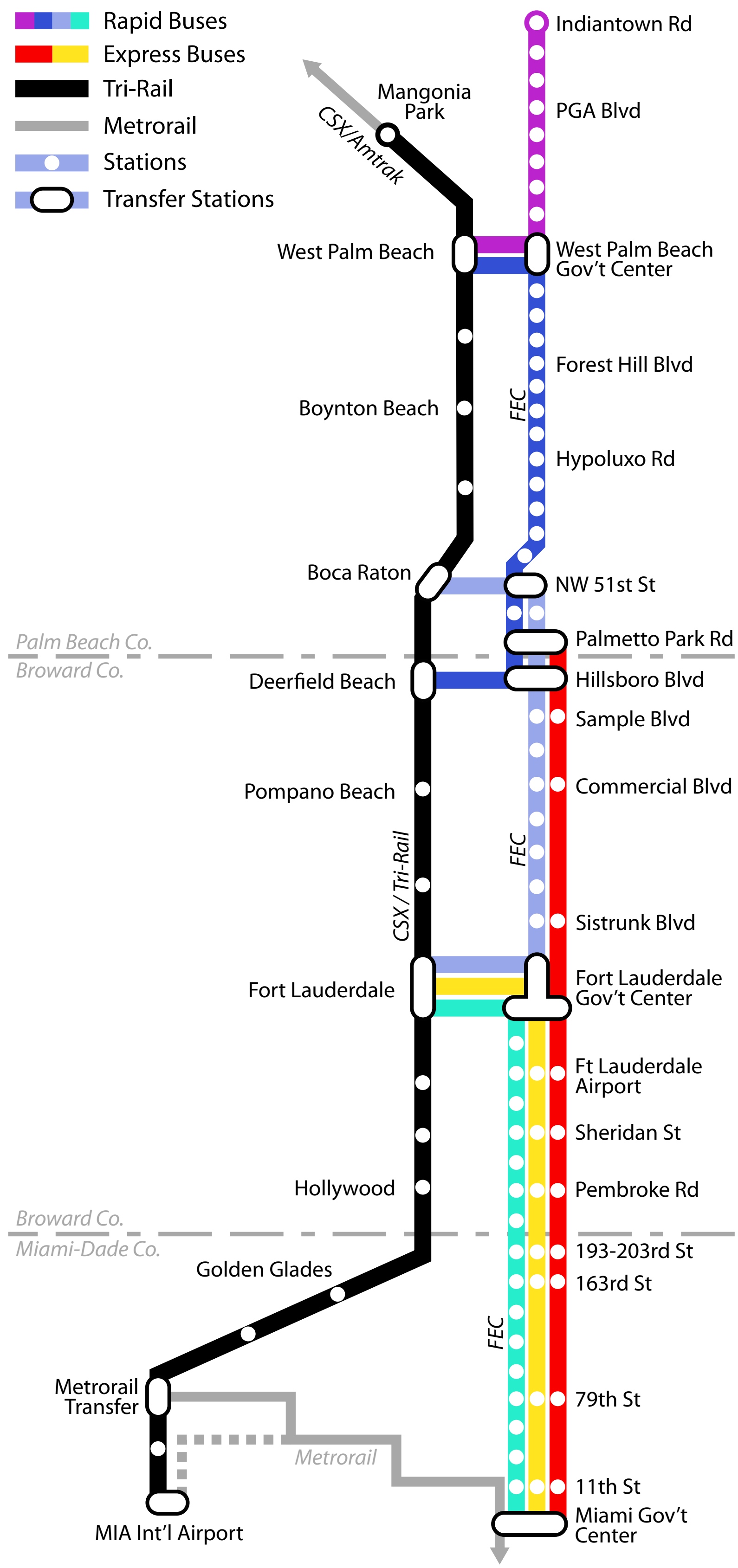
Scheduled end-to-end travel time on the series of Rapid Buses (between Jupiter Indiantown Road and Miami Government Center) would be five hours and 43 minutes.

Element #2 of the Low Cost/TSM Alternative consists of three separate "Rapid Bus" express routes which would, in most cases, connect Tri-Rail stations to specific destinations on the FEC and then proceed into downtown Miami. These express buses are overlaid on top of the local rapid bus routes. The routes are as follows:

1. Boca Raton-Fort Lauderdale Express:
- Limited stops Boca Raton to Fort Lauderdale Government Center (FGC) via Rapid Bus Routing, making stops at Palmetto Park Road, Hillsboro Boulevard, Sample Road, Commercial Boulevard, Sistrunk, and Fort Lauderdale Government Center (FGC) /Broward Central Terminal
  - Express FGC to Miami Government Center (MGC) via I-95, stopping at Fort Lauderdale Tri-Rail Station.

2. Fort Lauderdale-Aventura Express:
  - Limited FGC to Aventura via Rapid Bus Routing, with stops at FGC/Broward Central Terminal, Fort Lauderdale Airport/Griffin Road, Sheridan Street, Pembroke Road, and Aventura Mall/193-203 St.
  - Express Aventura to MGC via I-95, no stops en-route.

Figure 2.14 – *Bus Rapid Transit (BRT) Service Diagram*



3. North Miami Express
    - Limited Aventura to MGC via Rapid Bus routing, with stops at Aventura Mall/193-203 Street, 163rd Street, 79th Street, 11th Street/Overtown Station, and MGC.

The "Boca Raton-Fort Lauderdale Express" would be an extension of the existing 95X: Broward Bus (as opposed to operating in conjunction with the 95X: Broward).

Service on the express rapid bus routes would only operate during peak periods, comparable to express service on the rail and BRT alternatives. Service in the peak period would operate on 15 minute headways, again comparable with the build alternatives.

Park and Ride passengers will be accommodated through parking lots at designated Rapid Bus stops and through connections to Tri-Rail stations along the Route. Park and Ride lots will be provided at the following nine Rapid Bus stops.

1. Hillsboro Boulevard
2. Sample Road
3. Commercial Boulevard
4. Sistrunk
5. Sheridan Street
6. Pembroke Road
7. 163rd Street
8. 79th Street, and
9. 11th Street (Overtown Station)

For Element #3, Tri-Rail service enhancements, headways on Tri-Rail would decrease from 20 to 15 minutes in the peak, and from hourly to 30 minutes in the off-peak.

2.4.2. Bus Rapid Transit Alternative

The Bus Rapid Transit (BRT) alternative was designed to provide BRT service on the FEC rail line for the full length of the study corridor. This would require the segregation of freight and passenger service, with each service allocated approximately half of the 100-foot right-of-way. BRT service would connect with Tri-Rail trains at certain locations (see **Figure 2.15**).

While the BRT alternative was envisioned as a full-corridor system, there were concerns about operating it as one, continuous service. As a result, the corridor was divided into four sections: 1) Jupiter to West Palm Beach's Tri-Rail Station; 2) West Palm Beach Tri-Rail Station to Palmetto Park Road in Boca Raton; 3) Palmetto Park Road to Fort Lauderdale's Tri-Rail Station via Fort Lauderdale Government Center; 4) Fort Lauderdale's to Miami's Government Center. All four routes connect with each other and with Tri-Rail, and are detailed in **Table 2.5**.

In addition, two peak-period only express routes supplement the four local routes. Both operate into downtown Miami – one from Boca Raton and a second from Fort Lauderdale. Refer to **Figure 2.14**

All of the local routes operate on a 15 minute headway in the peak periods and a 30

Table 2.5 – *Service Description, Bus Rapid Transit*

Service	Description	Equipment	Headway (Peak/Off-Peak)	Stops*	Travel Time
Route 1	Jupiter to West Palm Beach	Articulated Bus	15/30	10	0:51
Route 2	West Palm Beach to Boca Raton	Articulated Bus	15/30	19	1:28
Route 3	Boca Raton to Fort Lauderdale	Articulated Bus	15/30	14	1:11
Route 4	Fort Lauderdale to Miami Govt. Ctr.	Articulated Bus	15/30	19	1:22
Express Buses					
Route 5	Palmetto Park Road to Miami	Articulated Bus	15/- (Only Peak Period Service)	14	1:53
Route 6	Palmetto Park Road to Miami	Articulated Bus	15/- (Only Peak Period Service)	10	1:15

minute headway in the off-peak. The express routes operate on a 15 minute headway in the peak periods and do not operate in the off-peak. All together, the four local BRT routes stop at 50 stations along the FEC, the same station locations that are served by the Integrated Rail alternatives. An operations and maintenance facility is proposed in Pompano Beach, near the east-west FEC industrial track close to Tri-Rail's Pompano Beach station.

2.4.3. Integrated Rail – DMU Alternative

This rail alternative would provide integration with Tri-Rail, express and local services in high ridership areas, and local, urban mobility service on the FEC corridor. The alternative provides four rail services that would allow passengers to travel the length of the FEC corridor and move back and forth between the two corridors providing access to multiple destinations via either a one-seat ride or a convenient timed transfer. **Figure 2.15** provides a service diagram for this alternative. The network includes two connections between the two corridors, one in northern West Palm Beach which will require a short length of new track and the second in Pompano Beach, north of Fort Lauderdale which will utilize an existing east-west rail corridor with a new connection to the SFRC tracks, called "The Pompano Connection" in this report. In peak periods, services are timed around a transfer station close to the eastern end of the Pompano connection, which will allow passengers to transfer from one service to another with minimal delay. This alternative utilizes FRA-compliant Diesel Multiple Unit (DMU) vehicles (see **Figure 2.16**) for two of the services and push-pull vehicles (see **Figure 2.17**) on two services utilizing Tri-Rail's existing and recently purchased push-pull equipment. The use of compliant technology allows the railroad tracks to be shared between passenger service and the freight services already in operation with savings in infrastructure and right-of-way costs.

Figure 2.15 – *Integrated Rail Service Diagram*

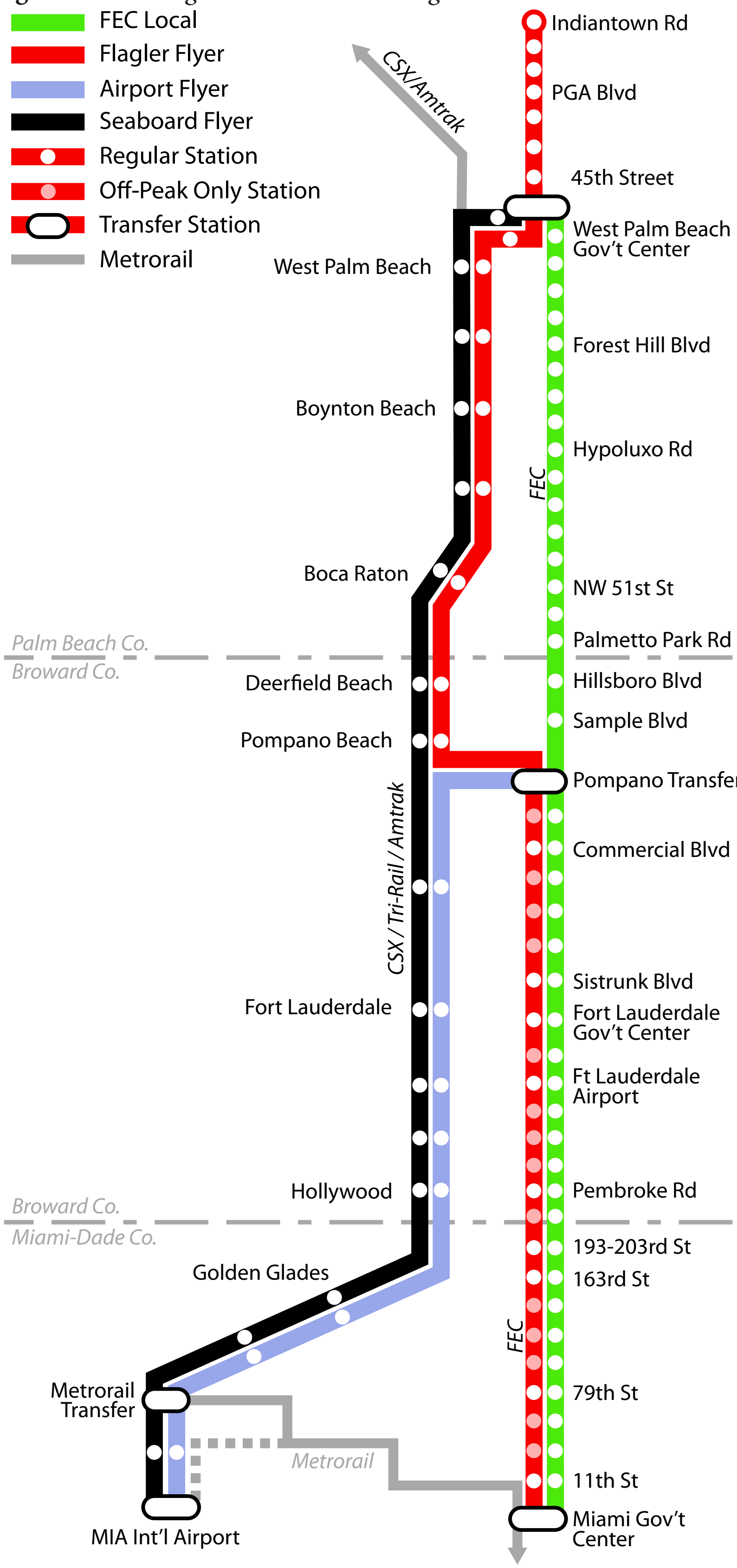


Figure 2.16 – *Example DMU Vehicle*

The longest route, called the Flagler Flyer, would run from Jupiter to Miami, using both the FEC and SFRC corridors. The service would start in the north, using the FEC corridor from Jupiter to northern West Palm Beach. At this point, the route would connect to the SFRC corridor, running in place of Tri-Rail from West Palm Beach to the Pompano Transfer station. From Pompano Transfer, the Flagler Flyer line travels on the FEC corridor, running as an express service during peak hours and as a local service at other times, to Miami Government Center, where passengers can transfer to Metrorail and Metromover for downtown circulation and trips to other destinations. The service would operate on 15-minute headways in the peak period and 30 minute headways in the off-peak. There would be 41 stations on the Flagler Flyer, seven on the SFRC line and 33 on the FEC. One station, Northwood, is on the connection between the corridors. Eleven stops on the Flagler Flyer are express stops during peak hours of service. DMU vehicles would be used on this service.

From West Palm Beach to Miami, a service called the FEC Local is provided on the FEC corridor. This service is similar to the Urban Mobility conceptual alternative in that it would provide stations at short intervals along the length of the corridor, providing access to all of the walkable town centers on the corridor. When the FEC Local is combined with the Flagler Flyer, it would create an Express and Local service between Pompano Transfer and Miami Government Center. The service would operate on 15-minute headways in the peak period and 30 minutes in the off-peak. The FEC Local would have 44 stations, all on the FEC corridor. DMU vehicles would be used on this service.

The third service, the Airport Flyer, would operate between Pompano Transfer and the Miami International Airport. This service would utilize the SFRC corridor except at the northern end where it would connect to Pompano Transfer north of Cypress Creek. The Airport Flyer would operate on 15-minute headways in the peak period and 30 minutes in the off-peak. The service would have 11 stations, all of which, except Pompano Transfer, are existing Tri-Rail stations. As a separate project Tri-Rail will be extended into the Miami Intermodal Center at the Miami Airport and is therefore viewed as an existing station for the purposes of this study. This service would utilize push-pull vehicles currently in service on Tri-Rail.

The fourth service, called the Seaboard Flyer, would be a service equivalent to Tri-Rail's current service, though it would start from 45th Street on the FEC Corridor instead of Mangonia Park. It would cross the new connection in northern West Palm Beach

Figure 2.17 – *Example Push-Pull Vehicle*

and thereafter operate on the SFRC to Miami International Airport. It would stop at existing Tri-Rail stations between the current West Palm Beach station and the airport, plus Northwood Station. This service would operate on 60-minute headways in the peak period, and 120-minute headways in the off-peak, overlapping with the Flagler and Airport Flyer services to replicate the one-seat ride that current passengers enjoy who have origins north of the Pompano Connection and destinations to the south (and vice versa). As with the Airport Flyer, the Seaboard Flyer service would utilize push-pull vehicles.

Table 2.6 summarizes the service characteristics of this alternative.

In summary, the DMU service would create two points of connection between the two rail corridors, in West Palm Beach and in Pompano Beach. It would also provide express and local service between Pompano Beach and Miami, projected to be the busiest section of the corridor, and allows for one-seat rides between the most popular origins and destinations. However, it would not allow for a one-seat ride between SFRTA stations south of Pompano Beach and downtown Miami; those customers would transfer to Metrorail as they currently do. An operations and maintenance facility is proposed at the existing Hialeah Yard on the SFRC corridor.

Table 2.6 – *Service Description, Integrated Rail - DMU*

Service	Description	Headway (Peak/ Off-Peak)	Stops	Travel Time
FEC Local	45th St. to Miami Govt. Ctr.	15 / 30	44	2:06
Seaboard Flyer	45th St. to Miami Intl. Airport	60 / 120	19	1:59
Flagler Flyer	Jupiter to Miami Govt. Ctr., via Northwood and Pompano Bch.	15 / 30	27 (peak) 41 (off-peak)	2:05 (peak) 2:26 (off-peak)
Airport Flyer	Pompano Beach to Miami Intl. Airport	15 / 30	11	1:09

2.4.4. Integrated Rail – Push-Pull Alternative

The Integrated Rail – Push-Pull alternative is similar in nearly all respects to the DMU alternative, except that all rail service under this option would operate exclusively using push-pull equipment, where the Flagler Flyer and FEC Local services use DMU equipment in the previous alternative. Other service characteristics, such as headways, stations, and service routes, are identical.

There are several differences between DMU and Push-Pull vehicles, leading to the decision to comparatively evaluate the two options. DMUs provide superior braking and accelerating characteristics, and are more efficient when used as shorter trains of two or three cars. Push-Pull vehicles are more efficient when used as longer trains of four or more cars.

The slower braking and accelerating associated with push-pull vehicles is reflected in longer travel times on the FEC Local and Flagler Flyer services, as seen in **Table 2.7**. The existing Hialeah Yard could serve as an operations and maintenance facility, same as in the DMU alternative.

2.4.5. Stations

Step 3 of the three-step station evaluation incorporated operations planning undertaken during the creation of the detailed alternatives. Following the completion of Step 2, at which point 56 stations were identified as preliminary recommendations, service alternatives were developed and simulated in the regional travel demand model to generate projected ridership and station-by-station boardings. As a result, in order to create the most efficient and cost effective project four more stations were removed, resulting in 52 recommended stations being included in Phase 2. Recommended stations and their station types are listed in **Table 2.8** and mapped in **Figure 2.18**.

Station Design Guidelines

Stations are important because they are the gateways to the communities that they serve. Station design guidelines have been developed that provide detailed information on layouts and design elements for each of the eight station types. See the *Regional Station Area Design Guidelines Technical Memo randum* on the study website. **Figure 2.19** provides a sample diagram of design guidelines, featuring a prototype Town Center station.

Stations would typically consist of island or side platforms, nominally 500 feet in length. The exact length and height of platforms will be determined in Phase 3. The length will be based on the length of train sets and the height will be determined when the exact type of equipment is specified. Platforms would be covered with canopy structures for weather protection for the entire length of the train and could incorporate solar panels to power station lighting and other electrical needs. Amenities such as benches and bicycle storage would be provided. Stations would be designed to have a standard func-

Table 2.7 – *Service Description, Integrated Rail - Push-Pull*

Service	Description	Headway (Peak/ Off-Peak)	Stops	Travel Time
FEC Local	45th St. to Miami Govt. Ctr.	15 / 30	44	2:28
Seaboard Flyer	45th St. to Miami Intl. Airport	60 / 120	19	2:00
Flagler Flyer	Jupiter to Miami Govt. Ctr., via Northwood and Pompano Bch.	15 / 30	27 (peak) 41 (off-peak)	2:29 (peak) 2:49 (off-peak)
Airport Flyer	Pompano Beach to Miami Intl. Airport	15 / 30	11	1:09

Table 2.8 – *Recommended Stations and Typology*

	Municipality	Location	Typology		Municipality	Location	Typology
1	Jupiter	Indiantown Rd	LPR	27	Pompano Beach	E Sample Rd	EC/LPR
2	Jupiter	Toney Penna Dr	TC	28	Pompano Beach	Pompano Transfer	LPR
3	Jupiter	Fred. Small or Donald Ross Rd.	EC	29	Pompano Beach	E Atlantic Blvd	TC
4	Palm Beach Gardens	PGA Blvd	RPR	30	Oakland Park	Commercial Blvd	EC
5	North Palm Beach	Northlake Blvd	LPR	31	Oakland Park	NE 38 St	TC
6	Lake Park	Park Ave	TC	32	Wilton Manors	NE 26 St	TC
7	Riviera Beach	W 13 St	N	33	Fort Lauderdale	Sunrise Blvd (at NE 13 St)	LPR
8	West Palm Beach	45 St	N/EC	34	Fort Lauderdale	Sistrunk Blvd (at Andrews Ave)	EC
9	West Palm Beach	23-25 St	TC	35	Fort Lauderdale	Government Center	CC
10	West Palm Beach	Government Center	CC	36	Fort Lauderdale	SE 17 St	TC
11	West Palm Beach	Okeechobee Blvd	TC	37	Fort Lauderdale	FLL Airport	AIR
12	West Palm Beach	Belvedere Rd	AIR	38	Dania Beach	Dania Beach Blvd	TC
13	West Palm Beach	Southern Blvd	EC/LPR	39	Dania Beach / Hollywood	Sheridan St	LPR
14	West Palm Beach	Forest Hill Blvd (at Gregory)	RPR	40	Hollywood	Hollywood Blvd	TC
15	Lake Worth	10 Ave N	N	41	Hollywood/ Hallandale Beach	Pembroke Rd	RPR
16	Lake Worth	Lake - Lucerne Aves	TC	42	Hallandale Beach	E Hallandale Beach Blvd / SE 3rd St	TC
17	Lantana	Lantana Rd	TC	43	Aventura	NE 193-203 St	EC
18	Lantana	Hypoluxo Rd	RPR	44	North Miami Beach	NE 163 St	TC
19	Boynton Beach	Boynton Beach Blvd	TC	45	North Miami Beach	NE 151 St	EC
20	Boynton Beach	SE 15 Ave / Woolbright Rd	N	46	North Miami	NE 125 St	LPR
21	Delray Beach	Atlantic Ave	TC	47	Miami Shores	NE 96 St	N
22	Delray Beach	Linton Blvd	RPR	48	Miami	NE 79 St	TC
23	Boca Raton	NW 51 St	EC	49	Miami	NE 54 St	TC
24	Boca Raton	NW 20th/Glades Rd	EC	50	Miami	NE 36 St	TC
25	Boca Raton	Palmetto Park Rd	TC	51	Miami	NW 8/11 St	TC/RPR
26	Deerfield Beach	E Hillsboro Blvd	TC	52	Miami	Government Center	CC

Typology Abbreviations:
CC - City Center
TC - Town Center
N - Neighborhood
EC - Employment Center
LPR - Local Park & Ride
RPR - Regional Park & Ride
AIR - Airport

Figure 2.18 – *Station Locations for Integrated Rail Alternatives*

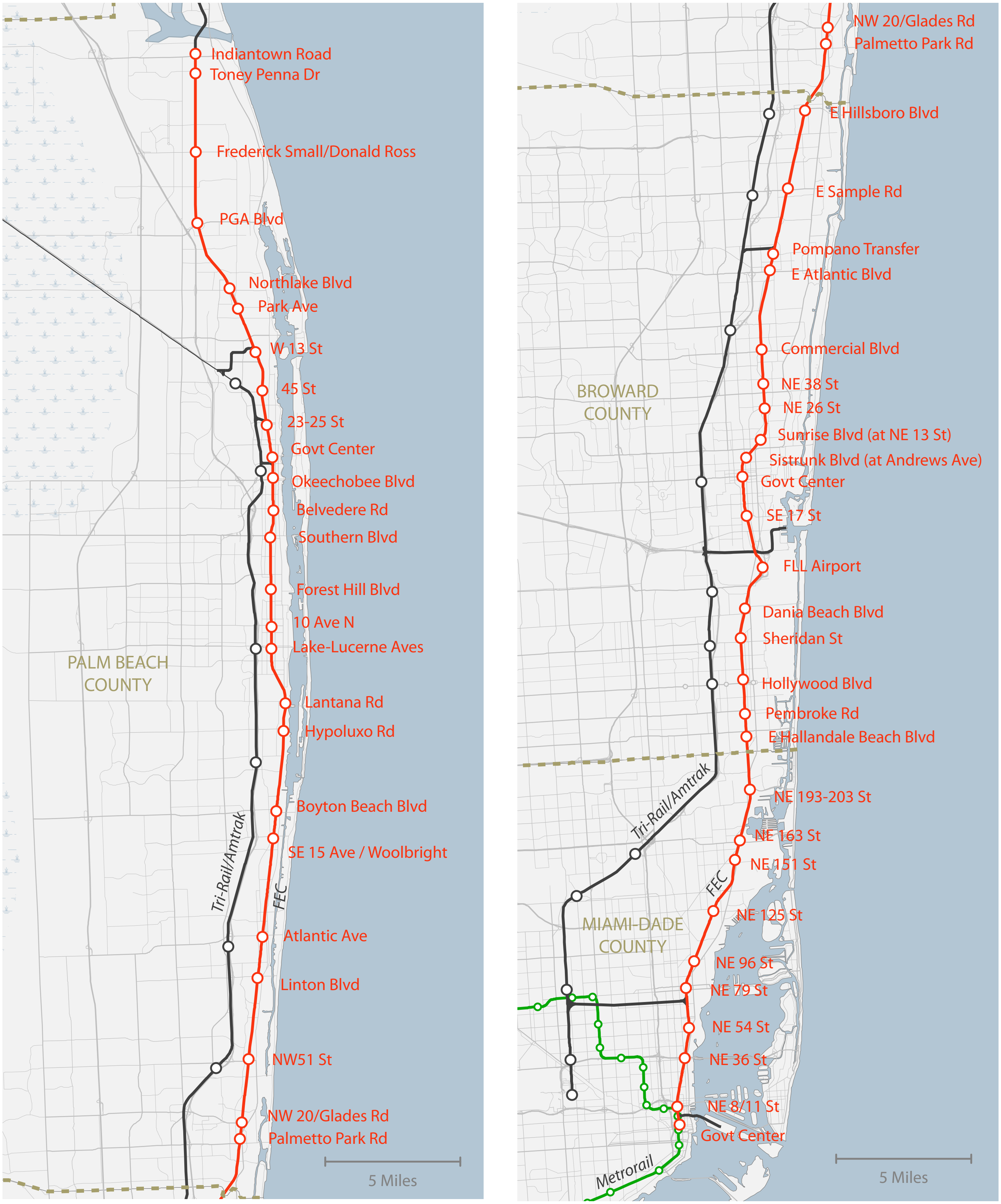
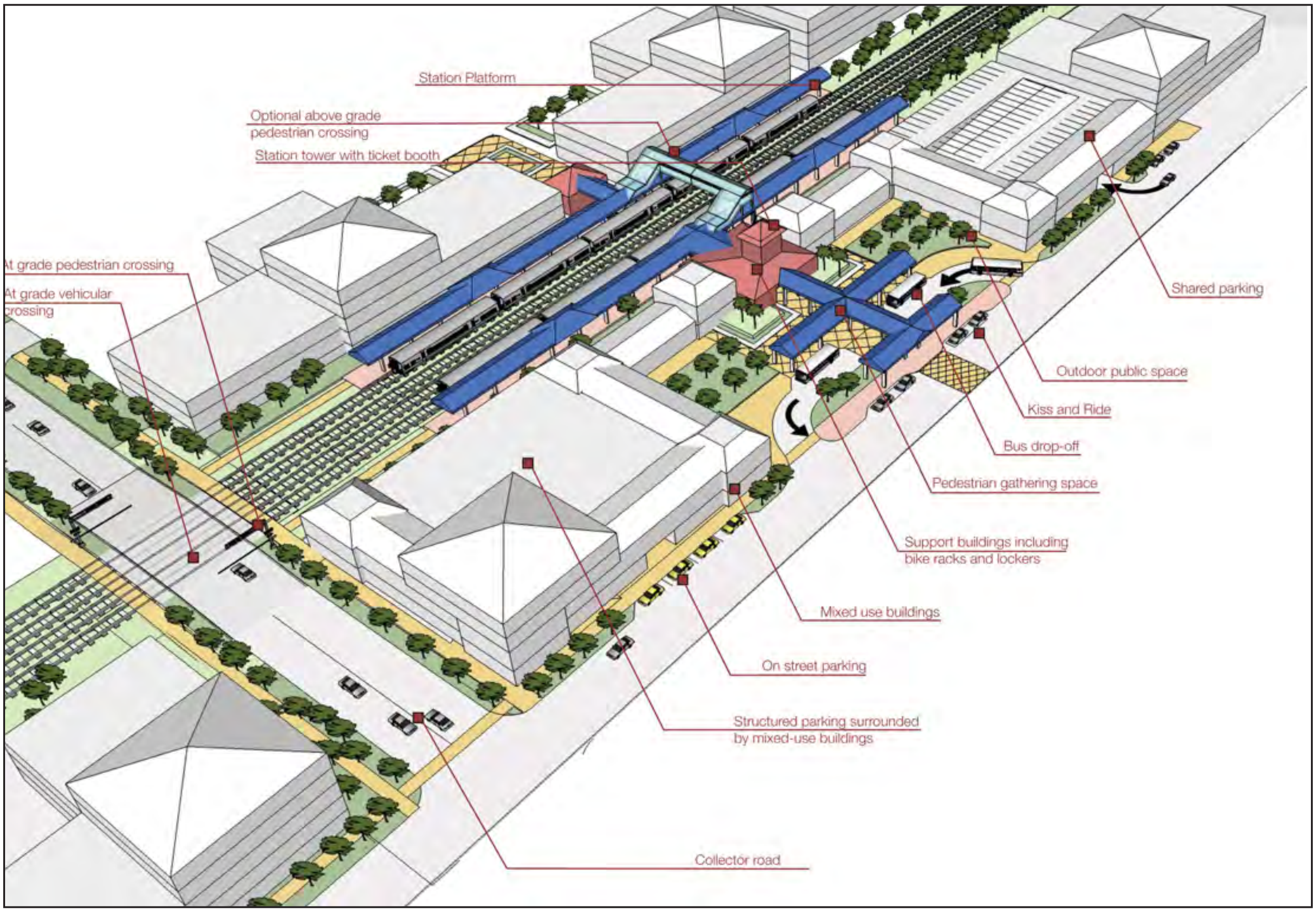


Figure 2.19 – *Diagram from Station Design Guidelines*



tional layout for ease of use by passengers but would provide opportunities for communities to make them aesthetically compatible with their particular surroundings through such programs as the Art in Transit program.

Convenient access for pedestrians, buses, kiss-and-ride users and people who park at the station would be optimized for every individual station location. Parking would be accommodated either at-grade or in structures and will, wherever possible, be incorporated into joint development projects. In all cases, the standardized layouts presented in the guidelines would be adapted, working with local communities, to provide the best fit for every specific site.

Location

In general, stations would be located close to east-west roadway crossings. Station platforms would be set back far enough from the roadway edge to allow the crossing gates to be open for roadway traffic while a train dwells in the station. Most stations, except for high ridership stations or where there are grade separations, would be accessed at grade and would rely on the roadway and sidewalk crossing protection for pedestrian access from northbound to southbound platforms. Only high ridership stations, or stations that are grade separated because of roadway or river crossings would require vertical circulation and pedestrian bridges over the tracks. **Figure 2.20** shows illustrative renderings of selected proposed station areas.

Figure 2.20 – *Renderings of proposed station areas*
Top to bottom: Atlantic Avenue in Pompano Beach illustrating potential transit-oriented development; 11th Street in Overtown illustrating a center platform with solar panel awning; Miami Government Center station with mixed-use air-rights development, streetfront retail, and a multi-level green roof over the station platforms.

Chapter 3

Transportation Impacts

Highlights:

- Transportation impacts of the four detailed alternatives include transit, highway, freight, navigable waterways, bicycles and pedestrians, and grade crossings.
- Total regional transit ridership in 2030 is projected to increase by 11,000 to 16,000 average weekday riders under the four build alternatives.
- On the FEC corridor in particular, average weekday ridership is projected to be from 11,000 in the Low Cost/TSM alternatives to 59,000 in the Integrated Rail - DMU alternative. Note that the Integrated Rail alternatives incorporate the CSX corridor, so ridership numbers are for both FEC and CSX rail lines.
- Future travel times on the Integrated Rail alternatives are projected to be substantially better than comparable automobile trips in the southern portion of the corridor, and competitive with the automobile on much of the northern portion as well.
- All build alternatives would slightly reduce total daily highway traffic.
- Freight operations are improved under the two Integrated Rail alternatives, while the BRT alternative would potentially have negative impacts on freight. The Low Cost/TSM alternative would have negligible effects.
- The rail alternatives could accommodate up to 50 miles of greenway along the corridor while BRT could accommodate nearly 40 miles, but safety issues have yet to be assessed and will need to be done in consultation with FEC staff in Phase 3.
- Four transitway-roadway grade crossing locations are recommended for grade separation, while another 24 crossings have been identified for further study as potential grade-separated locations.

This chapter addresses the potential transportation impacts of the four detailed alternatives, also referred to as build alternatives described in Chapter 2. The impacts addressed are transit, highways, freight, navigable waterways, bicycles and pedestrians, and grade crossings.

3.1. Transit

As described in Chapter 1, there are several public transportation providers currently operating in Southeast Florida. Each county provides bus service (Palm Tran, Broward County Transit, and Miami-Dade Transit). There are three fixed guideway systems in the region. Tri-Rail commuter rail is run by the South Florida Regional Transit Authority (SFRTA), and service runs through all three counties. Miami-Dade Transit operates both Metrorail and Metromover in Miami-Dade County. Metrorail is an elevated rail rapid transit service and Metromover is an automated guided transit (people mover) that circulates through downtown Miami. The build alternatives are each designed to improve upon this existing transit system by providing complimentary service, direct access with better transfers, and expanded overall coverage.

3.1.1 Transit Impacts

Transit impacts that result from the build alternatives were projected for the year 2030, using the SERPM 6.6B3 model. Note that during the course of Phase 2 the SERPM model was being revised and updated. As new versions of the model became available the most recent version was used to perform the analysis.

Transit Demand

Patronage demand forecasting began in March 2009, prior to Tri-Rail's November 2009 fare increase. For the purposes of the ridership projections, a premium fare, comparable to Tri-Rail's fare prior to November 2009, was used to generate ridership projections.

The following fares were assumed for all alternatives:

1 Zone - $2.00
2 Zones - $3.00
3 Zones - $4.00
4 Zones - $4.50
5 Zones - $5.00
6 Zones - $5.50

Transfers to and from local transit were assumed to be free.

Total Regional Transit Ridership is listed in **Table 3.1**. Ridership numbers vary slightly among the alternatives, with all of the alternatives potentially producing an additional 11,000 to 16,000 average daily transit riders as compared to the No Build alternative. The Integrated Rail – DMU alternative has the highest regional transit ridership projection.

Projected ridership on the actual alternatives shows a wider range than for transit as a whole. This suggests that some alternatives attract more transit riders from other transit services. The Integrated Rail – DMU alternative has the highest projected 2030 ridership

Table 3.1 – *Average Weekday Ridership by Alternative*

	No-Build	Low Cost/TSM	BRT	Integrated Rail DMU	Integrated Rail Push-Pull
Total Regional Transit Trips (linked)	637,000	650,000	652,000	653,000	648,000
SFECC Ridership	N/A	11,000	20,000	59,000*	52,000*
Change in Tri-Rail ridership relative to no-build	N/A	+1,000	+2,000	Included in number above	Included in number above
Change in Metrorail ridership relative to no-build	N/A	-3,000	-2,000	+3,000	+2,000

**** Includes ridership on both FEC and CSX corridors***

at 59,000 followed in order by the Push-Pull (52,000), BRT (20,000), and Low Cost/TSM (11,000) alternatives. The ridership figures for the BRT and Low Cost/TSM alternatives count transfers as one trip. This was done so that long bus trips and long train trips were counted equally.

The three build alternatives provide higher ridership than the Low Cost/TSM. The rail alternatives had higher maximum ridership projections than BRT.

The impacts of each of the build alternatives can also be measured in the projected ridership changes on existing premium transit services. Tri-Rail is projected to have over 27,000 riders in 2030; Metrorail is projected to have 241,000 in the same time horizon, but much of this ridership is based on planned system expansion. **Table 3.1** provides the projected ridership changes for these two existing services assuming the implementation of the build alternatives.

The Low Cost/TSM is projected to have a slightly positive impact on the existing Tri-Rail system. BRT would also have a positive effect on Tri-Rail ridership. As the build alternatives integrate Tri-Rail and FEC service, accurately measuring the change in Tri-Rail ridership is subject to interpretation; for example, under the build alternatives, passengers can use both corridors during their trip, making a direct comparison impossible.

With regards to Metrorail, the Low Cost/TSM and BRT alternatives are projected to have small negative impacts between 2,000 and 3,000 riders. The rail alternatives, however, are projected to have a small positive impact on Metrorail ridership due to the three transfer points on the integrated network, one existing transfer at 79th Street in Miami, and two new transfers: one at the MIC and another at Miami Government Center.

Access

Given the high densities of population and employment along the FEC corridor, transit service on the corridor would improve access and mobility to thousands of Southeast Florida residents and visitors. **Table 3.2** highlights accessibility measures. The BRT and rail alternatives have the same 52 station locations, while the Low Cost/TSM alternative makes on-street stops at the intersection nearest to the 52 station locations. The Low Cost/TSM alternative does not introduce new stops or stations, as all stops are on existing bus routes.

Projected 2030 population and employment within ½-mile of the rail and BRT stations, the commonly accepted distance for most walk access, will increase by almost 300,000 for population and over 300,000 for jobs.

Some people within the larger population are transit dependent. The transit-dependent include zero car households as well as people too old, too young or too debilitated to drive. It is vital that this transit-dependent population have access to any new transit service. **Table 3.2** shows the total number of zero-car households (used as a surrogate for all transit

Table 3.2 – *Accessibility by Alternative*

	Low Cost/ TSM	BRT	Integrated Rail DMU	Integrated Rail Push-Pull
New stops and/or stations	0	52	52	52
Population within ½-mile of new stations	0	293,380	293,380	293,380
Jobs within ½-mile of new stations	0	304,590	304,590	304,590
Zero-Car households within ½-mile of new stations	0	4,944	4,944	4,944
Number of premium transit services connected to alternative	3	3	3	3

dependents), within ½-mile of proposed stations. The three build alternatives would provide access to nearly 5,000 transit-dependent households, serving the high number of transit-dependent residents along the FEC corridor.

Access can also be measured by connectivity with existing transit service. The four build alternatives all improve inter-service connectivity, but differ in their means of connection. The two rail alternatives are designed to connect to Tri-Rail at transfer stations in West Palm Beach and Pompano Beach, while also connecting to Metrorail at Miami Government Center. The Metrorail Transfer Station on Tri-Rail would also still operate. The BRT Alternative would connect to Metrorail as well and connect with Tri-Rail at West Palm Beach, Deerfield Beach, Boca Raton, and Fort Lauderdale. The Low Cost/TSM would operate on surface roads along the FEC corridor. However, many Low Cost/TSM routes would either originate or terminate at a Tri-Rail station, thus providing connectivity to the other corridor. Low Cost/TSM rapid bus routes connect with Tri-Rail at West Palm Beach, Deerfield Beach, Boca Raton and Fort Lauderdale. For the purposes of this analysis local bus routes were not considered as access points because bus routes can be changed fairly easily.

Transit Travel Time

The FEC Corridor offers a travel mode that compares favorably with existing transit service and even with highway travel. **Tables 3.3 and 3.4** show a comparison of projected travel times between origin-destination pairs along the corridor. The transit times listed in **Table 3.3**, both for no-build and integrated rail alternatives, are station-to-station times. Clearly, the integrated rail alternative offers substantially shorter travel for these representative trips. Future transit travel times will be 40 to 80 percent faster than current transit options.

The highway times listed in **Table 3.4** are from downtown-to-downtown for the locations listed. Note that every representative trip by future transit will be shorter than a

Table 3.3 – *Projected Travel Times - Existing Transit vs. Build Alternative*

Peak Period Service		Existing Transit Travel Times (min)	Build Transit Travel Times (min)*	Change in Transit Travel Time
To West Palm Beach	Jupiter to Downtown WPB	110	30	-73%
	Lake Worth to Downtown WPB	40	10	-75%
To Delray Beach	Boca Raton to Downtown Delray Beach	25	5	-80%
To Boca Raton	Downtown WPB to Boca Raton	85	30	-65%
	Downtown Delray Beach to Boca Raton	20	6	-70%
To Fort Lauderdale	Pompano Beach to Downtown Fort Lauderdale	36	12	-67%
	Downtown Hollywood to Downtown Fort Lauderdale	31	11	-65%
	North Miami (US 1/123 St) to Downtown Fort Lauderdale	91	18	-80%
	Downtown Miami to Downtown Fort Lauderdale	67	33	-51%
To Miami	Fort Lauderdale to Downtown Miami	67	33	-51%
	Hollywood to Downtown Miami	61	22	-64%
	North Miami (US 1/123 St) to Downtown Miami	42	15	-64%

** Based on integrated Rail DMU alternative proposed schedule*

Table 3.4 – *Projected Travel Times - Transit vs Highway*

Origin - Destination	Highway Travel Time (Minutes)	Transit Travel Time: Integrated Rail (minutes)
Jupiter - West Palm Beach	32	30
West Palm Beach - Boca Raton	47	30
Boca Raton - Ft Lauderdale	35	31
Ft Lauderdale - Aventura	34	15
Aventura - Miami	36	19

similar highway trip. Additionally, the transit trips are more reliable. The highway trips are frequently longer due to delay from random occurrences of congestion, such as accidents, adverse weather, and vehicle failure.

Low Cost/TSM Operations

The Low Cost/TSM includes a series of high quality bus services including rapid and express bus. Although these vehicles would be equipped to offer a better service than conventional, local services, they would operate on the existing streets in mixed traffic. With the exception of several short sections of roadway, these high quality bus routes would operate on streets that operate at LOS D or lower and therefore cannot offer rapid movement though the study area.

Cost-Effectiveness

Cost-effectiveness pertains to the relative cost of transit normalized to a standard unit such as passenger-mile or weekday passenger. Measures of cost-effectiveness should consider both capital and operating costs. While total capital costs and annual operating costs are discussed in detail in Chapter 5, cost-effectiveness measures are discussed in this section.

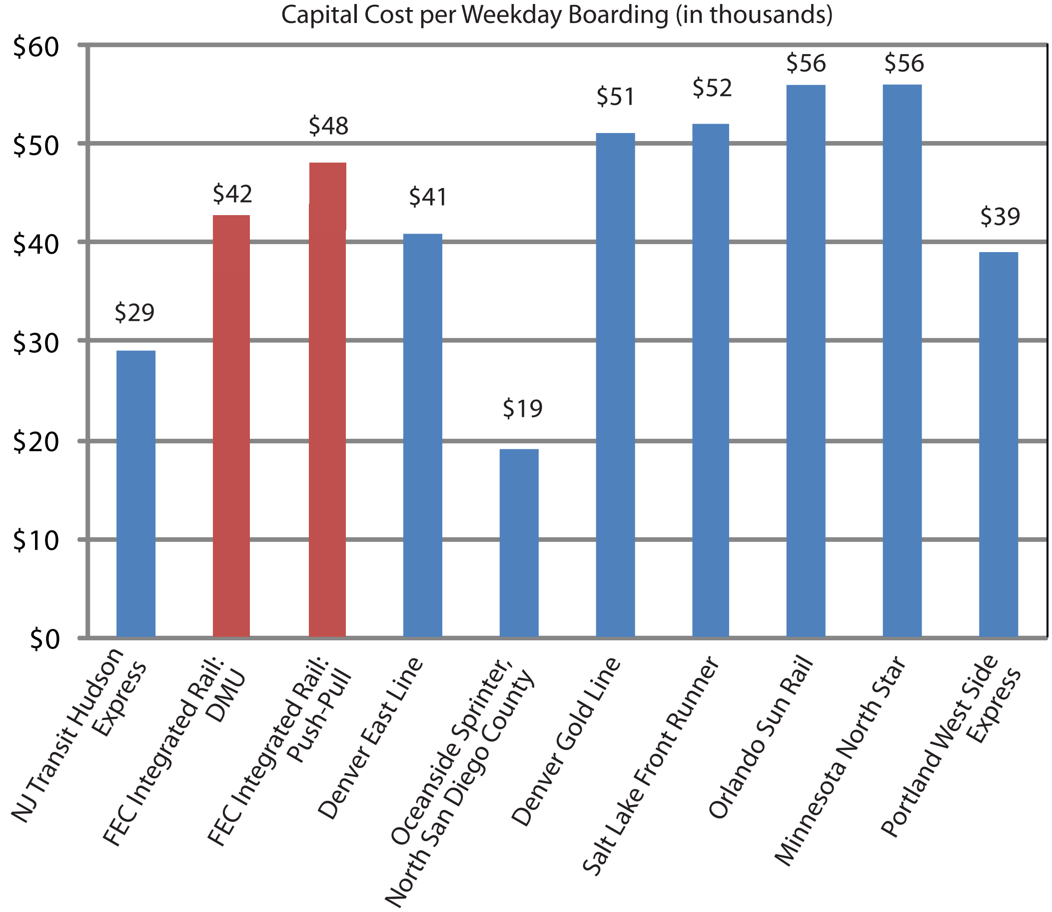
Table 3.5 summarizes cost-effectiveness measures. The Low Cost/TSM alternative is by definition designed to be a cost-effective, low-investment alternative. This is reflected in the low capital costs per weekday passenger and per annual passenger-mile relative to the other detailed alternatives. The DMU alternative has the lowest capital cost per passenger and per passenger mile of the remaining alternatives. The BRT alternative has the highest capital cost per passenger and per passenger mile, while the Push-Pull alternative has per passenger costs equal to, and per passenger mile costs slightly lower than, BRT.

To provide a frame of reference for these findings, **Figure 3.1** on the following page shows the capital cost per weekday passenger for a series of existing and planned rail projects around the country, as listed in the *FTA Annual Report on Funding Recommendations, 2010*. Both DMU and Push-Pull alternatives are in the middle of the range of per passenger mile costs for rail projects.

Table 3.5 – *Cost Effectiveness*

	Low Cost/TSM	BRT	Integrated Rail DMU	Integrated Rail Push-Pull
Capital cost per weekday passenger	$6,000	$48,000	$42,000	$48,000
Capital cost per passenger mile	$0.90	$8.80	$7.20	$8.50
Operating cost per annual passenger	$11.80	$9.90	$10.90	$12.70
Operating cost per passenger mile	$0.60	$0.50	$0.60	$0.70

Figure 3.1 – *Cost-Effectiveness of Nationwide Transit Projects*



Source: National Transit Database

Operating cost effectiveness is more consistent across the four alternatives than the wide-ranging capital cost measures, though BRT and the DMU rail alternatives are generally projected to be more cost effective than the Low Cost/TSM and Push-Pull alternatives.

3.2. Highway

The introduction of passenger service to the FEC corridor will affect the highway network both in terms of traffic operations and highway safety. Impacts to traffic operations would extend throughout the region, though generally be most apparent within approximately one mile of the FEC alignment. It is in this proximity that the greatest ridership will be drawn and therefore in which the

Table 3.6 – *Travel on Uncongested and Congested Roadways*

	No-Build	Low Cost/ TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Uncongested Travel (Percentage of Daily VMT)	56%	57%	57%	57%	57%
Congested Travel (Percentage of Daily VMT)	44%	43%	43%	43%	43%

Table 3.7 – *Total Daily Traffic on Major Study Corridor North-South Roadways*

County	No Build	TSM	BRT	Integrated Rail DMU	Integrated Rail Push-Pull	Capacity
Miami-Dade	233,000	233,000	231,000	230,000	232,000	101,000
Broward	292,000	291,000	290,000	289,000	291,000	208,000
Palm Beach	187,000	187,000	187,000	186,000	187,000	238,000

most noticeable change in travel mode – from auto to transit – would be observed. It is also within this area that local impacts resulting from increased travel to and from the stations would be apparent.

3.2.1. Impacts

Passenger service in the FEC corridor will produce a shift in travel, from auto to rail, particularly within one mile of the corridor. Overall, highway travel can be expected to decrease by approximately one percent on a daily basis. While this will have a beneficial effect on all roadway links it can be expected to have the most significant effect on those links currently operating under congested conditions. The result is that travel on congested links will decline by nearly two percent for that portion of the roadway network within a mile of the FEC corridor (See **Table 3.6**).

A summation of the total volume on major roadways within one mile of the FEC corridor at a key location in Miami-Dade, Broward, and Palm Beach Counties highlights the substantial traffic volumes traveling north and south through the study corridor. **Table 3.6** shows the daily traffic volumes across these roadways at the selected locations.

In both Miami-Dade and Broward Counties the volumes for all alternatives exceeds the capacity of the roadway facilities. In Palm Beach County, the volume approaches but does not exceed the capacity of the roadways. **Table 3.1** also shows the small reduction in total volumes that would occur as a result of the construction of the build alternatives.

Because the passenger stations will attract ridership that would access the station by automobile as well as other modes, some congestion could occur on the roads immediately surrounding them. Passengers would arrive at and depart from the stations through a variety of modes: driving and parking (either alone or as a passenger), drop-off or pick-up, walk, bus, taxi, or bicycle. The distribution of passengers using the various modes of access would vary by station type, which is in turn based upon the station location.

For example, city center stations would offer no passenger parking and so little auto access would be expected. The employment center and airport/seaport stations would not have dedicated parking at the stations. While some passengers could park in the employment center, airport, or seaport parking those numbers would not be expected to be significant. At the remaining station types, auto access could be expected to constitute a majority of the passenger arrivals and departures.

The roadway network surrounding each station is different with some stations located adjacent to major facilities and offering multiple routes for vehicular access. Some stations are quite limited in route choices. Comparing the anticipated passenger volumes at each station with the extent and quality of the surrounding roadway network enables an assessment of the congestion likely to result, predominantly during the peak periods, on the surrounding street network.

Based on this analysis, automobiles accessing the passenger stations would have no noticeable impact on existing traffic operations. Generally, the volumes are small enough, relative to the street system capacity, to avoid any change in level-of-service, the primary measure of traffic operations, on any intersection in the vicinity of the passenger stations.

The FEC is an operating rail corridor with numerous rail-highway at-grade crossings. The introduction of passenger service, in the case of the rail alternatives, would increase the number of trains operating in the corridor and therefore theoretically increase the potential for auto-train collisions. However, proposed grade crossing improvements would reduce the potential for collisions, and thus reduce possible highway safety impacts. Improvements in warning and control devices at the crossing would further reduce the potential for collisions between trains and vehicular traffic.

The BRT alternative would introduce buses into the at-grade crossings. This would require a change to the current traffic signal and lane control system to reflect a system similar to that used in the South Miami-Dade Busway. However, the changes made within this corridor would be considerably more complex than near the South Miami-Dade Busway, as the Busway lacks a parallel active freight railway service. This change would introduce the potential for additional conflicting moves between buses and other traffic, as well as impacts that may arise from changes to intersection geometry needed to accommodate bus movements. No conclusions can be reached on the congestion or safety impact of these changes, especially with regard to east-west traffic until more detailed analysis is carried out in Phase 3.

The traffic impact of the Low Cost/TSM alternative is uncertain but would add additional heavy, slow-accelerating vehicles making periodic stops at major intersections to an already congested north-south roadway network. No provision has been made in this alternative for bus pull-offs beyond what is currently in place which will mean the introduction of stops with longer dwell time and more delay to other traffic. The safety impact is unknown but there is the potential for more rear-end collisions from motorists neglecting to allow sufficient stopping distance for buses making stops as well as possible intersection impacts from queuing through intersections behind stopped buses..

The principal impacts to highway travel would come from those who choose transit as an alternative to travel on congested roadways. Passenger service in this corridor would represent the first significant inter-county transit operation, allowing individuals from each of the three counties in the service area to travel beyond the county of trip origin without transferring from one county bus system to another. For the build alternatives, such travel would be more reliable than auto travel, which is subject to delays due to congestion from high volumes as well as non-recurring congestion produced by highway incidents (e.g., collisions, vehicle-breakdowns).

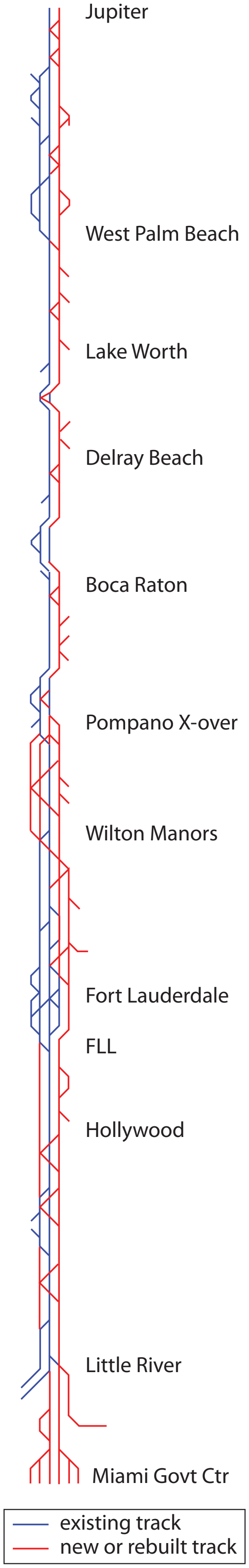
The construction of any of the bus or rail transit alternative would have a minimal effect on the existing roadway network, allowing for typical traffic operations during the construction period.

The SFECC transit alternatives would tend to promote redevelopment in the vicinity of the transit stations. With proper land use guidance, development can be expected to be of a higher density than currently exists and certainly higher than development trends particularly to the western part of the region. Higher densities and mixed use development will have a tendency to reduce mid-day vehicular traffic as individuals can conduct midday business by foot, traveling from work place to restaurants and retail operations without the need for an automobile. Consequently, traffic congestion would be less than would occur were such development not to occur.

3.3. Freight

Freight movement within the FEC study corridor is largely related to the activities of the FEC Railway though there is some freight movement by trucks on the nearby parallel roadways. The four detailed alternatives differ in their projected impacts on current and future freight activities. All of the build alternatives are designed to operate consistent with Federal Railroad Administration (FRA) regulations as they relate to operation of pas-

Figure 3.2 – *Track Chart for Rail Alternatives*



senger and freight on the same corridor and in the case of the rail alternatives, on the same track. The two rail alternatives have the most positive overall impacts. The Low Cost/TSM alternative is largely neutral with regards to freight impacts. The BRT alternative has potential negative impacts. In initial meetings, the freight owner has indicated that they would not support introducing a BRT to the freight corridor due to the complications that it introduces to their operation. For the BRT option to advance, an approach to resolve this apparent impasse would have to be achieved.

The FEC Railway, at its recent commercial height in 2005, operated approximately 25 daily trains in their corridor between the Port of Miami and Jupiter, and then beyond up the Florida coast. Of this number, approximately 23 were longer-distance, "road trains" operating straight through from Miami's Hialeah (or, in some cases, Fort Lauderdale) Yard mostly to the Jacksonville area. The FEC Railway in Southeast Florida is somewhat unusual as a railroad in this regard, with very few local customers. Most traffic is destined for other places. However, there are local customers on both sides of the tracks, and trains would need to cross the BRT busway at various locations in order for the FEC to continue serving them. While the two rail alternatives introduce additional trackage to be shared with freight trains, the BRT alternative introduces no new track and limits future track expansion to what can be accommodated in half the corridor.

3.3.1. Impacts

Freight Operations

Figure 3.2 portrays changes envisioned to the design of the current railroad as a result of either of the rail alternatives. The blue lines represent existing tracks. The red lines represent new or rebuilt track. Because both Integrated Rail alternatives would utilize FRA-compliant technologies, passenger and freight services will be able to share track. As a result, the Railway will see a huge increase in available capacity, as the existing freight line is not completely double-tracked. This will greatly increase operational flexibility. The number of new track miles available to freight is provided in **Table 3.8**.

Table 3.8 – *Miles of New Track Available for Freight Use*

Low Cost/TSM	0
BRT	0
Integrated Rail - DMU	116
Integrated Rail - Push-Pull	116

While the most obvious capacity expansions occur in the southern portion of the corridor, between Pompano Beach and Miami, the most important capacity enhancements may be those further north, where sections of single track are expanded to two tracks. Single-track sections are adequate to a railroad operation, but are routinely subject to delay because they rely on precise timing of rail operations to prevent conflicts. When uncertainties of schedule or schedule delays are introduced, negative operational impacts occur. The Regional Rail DMU alternative is somewhat more favorable to rail freight movement than the push-pull alternative. This is because the DMU technology is quicker in acceleration and braking and therefore capable of reaching a higher speed for a given station spacing. This additional speed leads to shorter periods of track occupancy and thus greater line capacity.

The BRT alternative would operate within the current railroad right-of-way, but is an incompatible mode operating adjacent to railroad freight traffic, thus requiring separation between the BRT and the freight. Freight tracks would be relocated to one side of the right-of-way in order to accommodate the width of the busway and its stations. The impact BRT will have on freight performance is expected to occur primarily with respect to local rail freight delivery, where the possibility exists that a local delivery site will be on the same side of the railway as the BRT right-of-way. This issue would create an additional source of conflict in reaching local freight customers. These trains would have priority over the nearby BRT vehicles when crossing the busway to make deliveries but, in addition to negotiating other railway traffic, trains would have to ensure that the crossing gates are properly functioning and that the crossing is clear before venturing across. This source of conflict would create a negative impact on freight operations in the corridor without producing any countervailing, positive, freight impacts.

The transportation elements of the Low Cost/TSM alternative do not take place within the rail rights-of-way of the FEC Railway, so no direct impacts to rail freight operations are expected. The Rapid Bus service along arterials and other roadways adjacent to the FEC corridor could increase roadway congestion, which may negatively affect the performance of local roadway-based freight transportation and delivery. However, this would not be expected to create a significant freight impact.

3.4. Navigable Waterways

As discussed in Chapter 2, the United States Coast Guard (USCG) indicated that bridge permits will be required for construction of new bridges or improvements to FEC Railway bridges over three navigable waterways within the study area, four if the Miami Canal crossing, which would allow Tri-Rail service to the Miami Intermodal Center, is included. The New River is by far the most significant of these waterway crossings. Because these waterways have been designated

Table 3.9 – *Number of Navigable Crossings*

Low Cost/TSM	0
BRT	2
Integrated Rail - DMU	3
Integrated Rail - Push-Pull	4

as navigable by the USCG, new bridges would require the necessary vertical clearance to "meet the reasonable needs of navigation" for those particular locations as part of the permit conditions. Vertical clearance for new bridges over the remaining waterways need only match that of the existing bridges.

3.4.1. Impacts

Very preliminary concepts were developed for each of the crossing locations. Cross sections and longitudinal sections as well as 3-D visualizations for various bridges, both fixed and movable, and tunnel alternatives were developed as initial concepts to begin the dialogue with the stakeholders. Stakeholder meetings were well attended, indicating a great interest on the part of the public in how these crossings are designed. In all the concepts it was assumed that the freight railroad would remain operating at grade. No decisions were made in this phase as more detailed analysis, including surveys of river traffic and continued stakeholder coordination, will be required to make informed decisions. This work will be carried out in Phase 3, and will include an extensive outreach program with all potentially impacted groups.

3.5. Bicycle / Pedestrian

Bicycle and pedestrian impacts focus primarily on safety. Pedestrian, bicycle and vehicle safety will be an important issue to consider and address as this project proceeds into Phase 3. Safety issues are most likely to occur at transitway-roadway crossings, station areas, and along the FEC Railway mainline.

3.5.1. Impacts

The primary impact to bicyclists and pedestrians is the proposed accommodation of a greenway within the FEC corridor right-of-way. Previous planning documents related to the corridor have recommended and supported a greenway as part of FEC transit provision. Safe accommodation of pedestrians and cyclists will be addressed in more detail in later phases of the project. Further discussions with FEC will also be held to determine if there are any safety issues with the railway. The number of miles that can be accommodated within existing right-of-way pending FEC approval are shown in **Table 3.10**.

Table 3.10 – *Miles of Potential Greenway Accommodated*

Low Cost/TSM	0
BRT	37
Integrated Rail - DMU	51
Integrated Rail - Push-Pull	51

The rail alternatives would accommodate more greenway miles along the 85-mile corridor than the BRT alternative, but right-of-way constraints at points all along the corridor prevent the inclusion of a continuous on-corridor greenway. Right-of-way is particularly constrained in southern portions of the corridor.

In addition to greenway accommodation, bicyclists and pedestrians are addressed in the rail and BRT alternatives through station design guidelines that encourage the use of bicycle racks, shelters, and other amenities to improve bicyclists and pedestrians that want to incorporate transit into their travel behavior.

Grade crossing changes will also impact bicyclists and pedestrian, as the implementation of the rail or BRT alternatives would create many more daily grade crossing closures, increasing possible interactions between freight, transit, vehicle, pedestrian, and bicycle traffic. All alternatives would provide appropriate safety measures at crossings. Typical crossing safety measures are discussed in the Grade Crossings section below.

3.6. Grade Crossings

The FEC railway includes approximately 215 grade crossings where roadway and pedestrian traffic interacts with rail traffic. Assessing the impacts and mitigating adverse impacts related to the interaction between the proposed transit infrastructure and these crossings is a key project component. Among the potential adverse impacts are reduced traffic capacity, noise and air quality impacts, visual impacts, and increased risk of vehicle and pedestrian conflicts with rail operations. Various approaches will be considered to mitigate adverse impacts in future phases, including enhanced safety measures, crossing separation, modifications to the traffic circulation, implementation of quite zones, and street crossing closure. Approaches to mitigate the initial impact may bring their own adverse affects, which require crossing specific alternatives analysis. Where grade separations are planned, a number of alternatives may be considered. If a street crossing is grade separated, the structures used for this grade separation could have significant costs that will need to be evaluated as part of the overall alternative. This study completed a number of evaluations related to grade crossing treatments and potential impacts and has summarized this information in the *Roadway-Transitway Crossing Analysis Technical Memorandum*, in order to address the issue.

3.6.1. Impacts

Crossing recommendations come in one of five categories: closure, relocation, at-grade improvements, traffic pattern reconfiguration, and grade separation. Closure, relocation, and at-grade improvements are all relatively low-cost recommendations. Closures of cross streets are recommended in situations where traffic is minimal. Relocations are recommended at crossings where an existing street crossing is found to be less compatible with rail operation than a nearby roadway. This occurs in such situations as where roads cross railways at an angle instead of perpendicular to the rail corridor. Improvements to enhance the safety of the crossing may include reconfiguration of the street crossing to provide a 90 degree intersection, so as to allow sufficient queuing distance for waiting traffic. In some cases, revising the traffic pattern to introduce one way couplets may provide a means to enhance the crossing safety. At-grade improvements like four-quadrant gate systems and gates with medians or channelization devices can be used to avoid grade separations under most conditions.

Figure 3.3 – *Rendering of a grade separation at NE 163rd Street.*

However, in situations where low-cost improvements are not sufficient, grade separations may be needed. This is a complex undertaking whereby a railroad bridge is constructed over the roadway, or a roadway bridge is built to pass over the railroad. No universally applicable industry-wide tool exists to provide the assessment of the need for grade separation, though local governments and authorities having jurisdiction over highway grade crossings have developed tools that serve the purpose, some of which are discussed in the *Roadway-Transitway Crossing Analysis Technical Memorandum*. A preliminary assessment of this issue concluded that up to 24 crossings may require further consideration of grade separation for the two rail alternatives. For the BRT, up to 28 crossings merit additional consideration of a grade separation. At the same time it must be recognized that additional safety enhancements may mitigate the need to grade separate and the grade separation itself may introduce many potentially negative impacts such that the overall best interests of the roadway network and the local environment, and the crossing safety are not served by construction of a grade separation. Additional traffic, safety, and impact assessment is needed to refine the list of proposed separations as well as the implementation schedule for these. For this Alternatives Analysis, the project is including separation of three crossings to mitigate adverse impacts (See **Table 3.11**).

The 28 crossings identified for further evaluation are listed in **Table 3.12**. The three recommended separations are Commercial Boulevard in Oakland Park, NE 186th Street, and NE 163rd Street, in Miami. These three crossings were chosen based on an assessment of crossings across the country which exhibit similar characteristics as those in the SFECC study area, such as traffic volumes and number of auto lanes.

Given the potential impacts surrounding grade crossing decisions (such as construction costs, local traffic safety impacts, etc,), more detailed evaluation will occur as part of Phase 3 of this project. It is recommended that a local, region specific methodology be developed to consider the many and varied risks and impacts related to level, or at-grade, crossings for use in the subsequent phases of the study.

Table 3.11 – *Grade Separations*

Low Cost/TSM	0
BRT	3 to 28
Integrated Rail - DMU	3 to 24
Integrated Rail - Push-Pull	3 to 24

Table 3.12 – *Crossings Requiring Further Investigation*

Crossing	County	AADT	Left Turn Lanes	Thru Lanes	Right Turn Lanes
Indiantown	Palm Beach	43,000	2	6	0
Northlake Blvd	Palm Beach	49,000	0	6	0
Park Ave	Palm Beach	22,500	1	3	0
8TH (MLK Jr. Blvd.)	Palm Beach	9,000	1	4	0
Woolbright Rd**	Palm Beach	39,000	0	4	0
Linton Blvd	Palm Beach	38,500	1	6	0
Yamato Rd	Palm Beach	48,000	2	6	0
Glades Rd	Palm Beach	28,000	1	6	0
Palmetto Park Rd**	Palm Beach	30,500	1	4	1
Hillsboro Blvd	Broward	36,000	1	6	0
SW 10th St	Broward	35,000	1	4	0
Sample Rd	Broward	37,500	1	6	0
Atlantic Blvd	Broward	51,500	1	6	0
Commercial Blvd *	Broward	56,500	0	6	0
Oakland Park Blvd	Broward	41,000	1	6	0
Sunrise Blvd	Broward	44,500	0	6	0
NE 3rd Ave	Broward	22,600	0	4	0
N Andrews Ave	Broward	20,000	0	4	0
NW 6th St	Broward	14,000	0	4	0
SW 24th St**	Broward	33,500	0	6	0
Stirling Rd	Broward	27,500	1	6	0
Sheridan St**	Broward	33,500	1	4	0
Hallandale Beach Blvd	Broward	40,500	2	6	0
NE 186th * (Miami Gardens Dr)	Miami-Dade	48,500	2	4	1
NE 163rd St *	Miami-Dade	66,500	2	6	1
NE 125th St	Miami-Dade	40,000	0	4	0
NE 6th Ave	Miami-Dade	10,500	0	4	0
NE 36th St/NE 2nd Ave	Miami-Dade	15,500	3	4	0

* Recommended for grade separations
** Recommended for BRT alternative only

Chapter 4

Affected Environment and Environmental Consequences

Highlights:

- Since the completion of Phase 1, work has advanced following the FTA AA-Early Scoping and FDOT Environmental Transportation Decision Making (ETDM) processes.
- Seventeen key environmental factors were used to assess the relative potential of the four build alternatives for causing environmental impacts.
- An evaluation was conducted that provided a framework for comparing the alternatives to each other in terms of the relative potential for adverse environmental effects.
- The Low Cost/TSM Alternative has the least potential for affecting the environment as compared to the other alternatives.
- The BRT Alternative has the next lowest potential for affecting the environment.
- The DMU and Push-Pull alternatives have the highest potential for affecting the environment. They are not dissimilar in potential effects in each environmental factor, with the exception of the Noise and Vibration factors, where the DMU technology shows a greater potential for vibration effects than Push-Pull and a lesser potential for noise effects, as compared to the other alternatives.
- The DMU and Push-Pull alternatives have the greatest potential to increase property values around stations and support transit oriented development.

4.1. Phase 1 Environmental Activities

The FDOT initiated the SFECCTA study in December 2005 as a multiphased AA employing a Tiered Programmatic Environmental Impact Statement (PEIS) approach to transportation and environmental issues.

Phase 1 of the study included an environmental review process consistent with NEPA guidelines. At the conclusion of the first tier, a LPA had not been identified and a broad range of modal alternatives remained under consideration. As a result, FDOT and FTA agreed the proposed study should remain in early scoping, consistent with NEPA, and discontinued the pursuit of a tiered PEIS process. From that point on, work has advanced following the FTA AA-Early Scoping and FDOT Environmental Transportation Decision Making (ETDM) processes. The study underwent an initial ETDM screening in 2006 and was assigned an ETDM Project Number, which provides a continuous project record accessible through the public ETDM website (http://etdmpub.fla-etat.org/est). The agency reviews (including Environmental Technical Advisory Team reviews in Phase 1 and 2) and ongoing extensive public involvement activities for the project help ensure that NEPA consultation and pre-permit coordination requirements have been satisfied.

For more information on the AA-Early Scoping and ETDM processes, and the preservation of decisions from Phase 1 and 2 of the SFECCTA study, see the Notice of AA-Early Scoping, available on the project website.

4.2. Comparative Analysis

This section compares potential environmental effects of the four build alternatives. It is a snapshot of distinguishable potential effects of the alternatives on the study area. It is intended to provide a framework for comparing the alternatives to each other in terms of the relative – not absolute - potential for adverse environmental effects, and not intended to quantify the impacts on natural or social/man-made resources. This comparative analysis only considers environmental factors that were identified as possible differentiators, and does not include all environmental factors considered in the *Phase Two Detailed Environmental Screening Report*, which provides a detailed discussion of the full environmental screening process.

The possible differentiating environmental elements or factors examined during these initial screenings are:

- Compatibility with Plans
- Property Values
- Property Acquisitions
- Visual
- Noise
- Vibration
- Historic & Archaeological
- Wetlands
- Parks, recreation and other public lands
- Wildlife & Habitat
- Water Quality/Resources
- Floodplains
- Coastal Zone Consistency
- Farmlands
- Navigation
- Energy Consumption
- Alternative Emissions /Air Quality

Table 4.1 summarizes the environmental findings. Each alternative is ranked based on ratings of "Lowest, Medium, Medium High, and Highest", indicating the relative potential for impacts as compared to the other build alternatives. This environmental information addressed the 17 key factors listed above. The final composite scores and rankings were derived using a Geographic Information System (GIS) based tool called the Environmental Screening Model developed to "rank" each alternative based on environmental information/data produced for each.

The comparative environmental analysis is based on an examination of those factors that were likely to show marked differences in potential environmental effects between alternatives. Of the 17 environmental factors examined, 14 show differences between the alternatives and three show little to no potential effect. The three showing negligible to low potential effects include:

- Wildlife & Habitat
- Coastal Zone Consistency
- Farmlands

Of the 14 remaining environmental factors showing a potential for environmental effects, 13 of them clearly show that the Low Cost/ TSM Alternative is expected to have the least potential effects on the environment as compared to the BRT, DMU or Push-Pull alternatives. The Low Cost/TSM requires less significant physical improvements to the infrastructure, therefore introducing very few new elements that could affect the environment. However, in the case of the Noise and Vibration factors, both the Low Cost/TSM and BRT alternatives are ranked as having "Low" potential for environmental effects. The BRT, DMU and Push-Pull shared alignment runs along the FEC Railway mainline. The DMU and Push-Pull alternatives also share a common route along the CSXT/SFRC (Tri-Rail) Corridor and its connection corridors. Since the BRT, the DMU and Push-Pull would share the same basic alignment, these three alternatives would have similar potential environmental implications in 12 categories; however, the BRT Alternative has a higher potential for environmental effects than the DMU and Push-Pull alternatives in the categories of wetlands, water quality, and property acquisition. In the areas of compatibility with local plans and policies, visual effects and historic and archeological, the BRT and the two rail alternatives are ranked the same. This leaves nine environmental categories where the BRT and rail alternatives have differing potential effects, and that can be used to compare the alternatives to each other. These categories include:

- Land and Real Property Values
- Property Acquisition
- Noise
- Vibration
- Wetlands
- Water Quality
- Floodplains
- Energy Consumption
- Alternative emission rates

Nonetheless, the Environmental Screening Model took all 17 categories into consideration and scored the alternatives first by individual environmental factor, and then developed a composite score for each alternative. Each environmental factor was assigned a weight based on numerous meetings with staff, FDOT and the study committees. The composite scores ranked the alternatives insofar as potential for environmental effects as follows:

- Low for the Low Cost/TSM Alternative
- Medium for the BRT Alternative
- High for the DMU and Push-Pull alternatives

More detailed information is shown in **Table 4.1**. The results of this comparative analysis of environmental effects are included in the criteria developed for the study and described in Chapter 7, where all of the evaluation measures used in this analysis are arrayed to better compare the alternatives to each other. The measures serve to emphasize that the decision to select a transit alternative is driven by a multitude of factors, including ridership, community development, economic opportunity, environmental quality, public and political support, and cost.

Table 4.1 – *Likely Environmental Differentiators*

Environmental Factor	
Number of acres required as new right-of-way (property acquisition)	Although specific right-of-way acquisitions and relocations have not yet been identified, there will likely be a need for additional property at stations for platforms, drop-off areas, bus pullouts, and park and ride lots; railway connections between Tri-Rail and the FEC, Operations and Maintenance facilities, and alignment configurations where the FEC right-of-way is not wide enough. These observations are based on conceptual engineering alignment drawings. These drawings identify the footprint of the build alternatives and were used to calculate additional acreage needed. Potential acquisitions and relocations will be identified and a Conceptual Stage Relocation Plan will be developed during the DEIS study phase.
	Conclusions: The alternative that with the most potential change to real property is the BRT while the Low Cost/TSM will have the least. The rail alternatives are expected to require less additional property then the BRT because the rail alternatives have a narrower cross section at stations.
Visual Effects	The affected visual environment is defined as those properties from which the view is altered by introduction of new physical infrastructure into the environment. The potential visual effects of the DMU, Push-Pull and BRT are similar. The potential visual effects primarily have been measured as changes to views due to new vehicles in the viewshed that are not there in the existing condition, and by new stations and ancillary facilities, such as park and ride lots.
	Conclusions: The rail alternatives have a somewhat greater potential for visual changes because the vehicles are taller and therefore visible from more properties as the trains pass through neighborhoods. All of the build alternatives would experience the same visual effect with the location of stations. The Low Cost/TSM Alternative would not introduce significant visual infrastructure improvements and would have the least effect.
Noise	The potential affected environment for noise consists of properties where quiet is an essential element of their intended purposes such as residential areas, historic landmarks, schools, libraries, churches and outdoor amphitheaters, and hotels. FTA noise impact guidelines were used to analyze the potential for noise impacts.
	Conclusions: The Push-Pull has the potential to affect the largest number of properties because operations of the Push-Pull with its horn and larger diesel locomotive are the loudest, even louder than the DMU vehicles, hence the broader reach. In contrast, noise effects are expected to be limited for BRT and Low Cost/TSM which will use quieter, rubber-tire vehicles.
Vibration	Receptors sensitive to vibration are similar to those identified for noise, including others such as laboratories or work places using sensitive equipment. FTA vibration impact guidelines were used to analyze the potential for vibration impacts. (Vehicles by other manufacturers may have different vibration characteristics.)
	Conclusions: The results of the analysis found that the DMU, followed next by the Push-Pull vehicles, had the greatest potential for changes in vibration levels. These finding are based on measuring the existing vibration levels of the Tri-Rail vehicles in the study area. Tri-Rail currently operates both push-pull locomotives and DMU vehicles.
Historic and Archaeological	The types of cultural resources in the study area that have the potential to be affected include cemeteries, archaeological sites and historic properties and districts. The measure used is number of properties.
	Conclusions: all of the build alternatives have some level of potential effect. The Low Cost/TSM Alternative has the lowest potential effect and the remaining build alternatives have generally the same potential effect.

Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
0 acres	43 acres	21 acres	21 acres
Lowest impact potential	Highest impact potential	Medium high impact potential	Medium high impact potential
0 properties with views of the Low Cost/TSM improvements.	20,000 properties with views of a BRT vehicle passing by; visual changes are also likely in the vicinity of the new stations.	22,000 properties with views of rail vehicles passing by; visual changes are also likely in the vicinity of the new stations	22,000 properties with views of rail vehicles passing by; visual changes are also likely in the vicinity of the new stations
Lowest impact potential	Medium-high impact potential	Medium-high impact potential	Medium-high impact potential
0 properties potentially affected	0 properties potentially affected	1,200 properties potentially affected	1,800 properties potentially affected
Lowest impact potential	Lowest impact potential	Medium impact potential	Medium high impact potential
0 properties potentially affected	0 properties potentially affected	5,700 properties potentially affected	4,600 properties potentially affected
Lowest impact potential	Lowest impact potential	Medium high impact potential	Medium impact potential
4 potentially affected resources	60 potentially affected resources	63 potentially affected resources	63 potentially affected resources
Lowest impact potential	Highest impact potential	Highest impact potential	Highest impact potential

Environmental Factor	
Wetlands	The study identified areas of potentially affected wetlands within the footprint of the alternatives. The wetlands identified are found primarily at waterway crossings, including canals and rivers, which all build alternatives cross.
	Conclusions: The BRT was identified as potentially affecting the largest number of wetland sensitive acres because of its wider footprint, thus requiring wider bridges.
Section 4(f) Parks Recreation areas and Public Lands	A survey of all parks, recreational areas and public lands in the study areas was conducted to determine the potential for disturbing these designated lands.
	Conclusions: The Low Cost/TSM Alternative has the least potential to impact parks, recreation areas and public lands. The BRT has the potential to impact more acreage of park and other public lands because of its wider footprint, but the DMU and Push-Pull each also have four acres of sensitive land that may be needed at narrow sections of the FEC right-of-way.
Wildlife & Habitat	An initial list of species listed as threatened or endangered that could be found within the study area was compiled. Acreage of potential habitat for one or more species was identified, but these habitats are not within the FEC right-of-way. Overall at the current level of study detail there is not a discernible difference between the build alternatives and the Low Cost/TSM with regard to potential impacts to wildlife and habitats.
	Conclusions: It appears that the alternatives have the same potential to affect endangered species and habitats identified in the study area; therefore, this factor is not a differentiator for comparing the build alternatives to each other. The occurrence of listed species within the potential habitat areas will be investigated in the next phase of project development.
Water Quality	An initial evaluation of water was completed to identify waterways that could potentially be polluted by the build alternatives. Typically pollution from transportation projects results from runoff produced by constructing impermeable surfaces, such as roadways and park and ride lots. The Low Cost/ TSM Alternative would add more bus service, and a proposed operations & maintenance facility. The DMU and Push-Pull alternatives would add paved park and ride lots at their stations and the gravel rail beds in time would begin to solidify with dirt and other materials and become less permeable. The BRT alternative would add impervious surface over the length of the right-of-way and at stations. Overall, each of the alternatives will add project elements that would increase runoff.
	Conclusions: The Low Cost/ TSM Alternative has the lowest potential effect on water quality because of the smaller quantities of new pavement and little change in runoff. The BRT Alternative is expected to have increased amounts of impermeable surface and, therefore, the highest levels of potential runoff. Initially there is low potential for runoff effect from the rail alternatives, but as the gravel rail beds become compacted over time and dirt and other debris start to solidify the gravel, there is expected to be a change in runoff from rail right of way with the added DMU or Push-Pull services. All alternatives would increase the acres of impermeable surfaces with park and ride lots. The Low Cost/ TSM and rail alternatives have the same size and number of park and ride lots.
Floodplains (100 year)	Floodplains are areas that are prone to flooding and mapped by the FEMA GIS Floodplains and Flood Insurance Rate Maps. There are floodplains identified in the study area and there is some potential that the alternatives may adversely affect these floodplains due to construction of new impervious surfaces. This potential is most significant for the BRT which has a wider footprint. The rail alternatives introduce a new crossing connecting to Tri-Rail that is located within a floodplain.
	Conclusions: The rail alternatives both have the same potential number of acres in mapped floodplains, which is less than the number of potentially affected acres for the BRT. The Low Cost/TSM has the smallest area for potential concerns.
Coastal Zone Consistency and Coastal Barrier Island Resources	Although the alignment runs parallel to the Atlantic Coast and Intercoastal Waterway, all alternatives are entirely outside of coastal waters and adjacent shore lands and are not expected to impact coastal areas. Therefore, this factor is not considered a differentiator for comparing the alternatives to each other.

Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
0 acres of potentially sensitive wetlands	17 acres of potentially sensitive wetland areas	6 acres of potentially sensitive wetland areas	6 acres of potentially sensitive wetland areas
Lowest impact potential	Highest impact potential	Medium impact potential	Medium impact potential
0 acres of potentially affected resources	5 acres of potentially affected resources	4 acres of potentially affected resources	4 acres of potentially affected resources
Lowest impact potential	Highest impact potential	Highest impact potential	Highest impact potential
55 species potentially in study area	55 species potentially in study area	55 species potentially in study area	55 species potentially in study area
Lowest impact potential	Lowest impact potential	Lowest impact potential	Lowest impact potential
2 acres of new impervious surfaces	905 acres of new impervious surfaces	720 acres of new impervious surfaces	720 acres of new impervious surfaces
Lowest impact potential	Highest impact potential	Medium high impact potential	Medium high impact potential
4 acres with potential impacts	140 acres with potential impacts	160 acres with potential impacts	160 acres with potential impacts
Lowest impact potential	Medium high impact potential	Highest impact potential	Highest impact potential
None	None	None	None
Not applicable	Not applicable	Not applicable	Not applicable

Environmental Factor	
Farmlands	The project area does not contain farmlands as defined in 7CFR 658. Therefore, this factor is not considered a differentiator for comparing the alternatives to each other.
Navigation	Several navigable waterways as defined by the US Coast Guard have been identified in the study area, each being used by a variety of vessels. The construction of bridges over these waterways could potentially affect their use for navigation if the bridges are constructed too low to allow passage of vessels that use the waterway.
	Conclusions: The Low Cost/TSM has no identified potential navigation affect. The rail alternatives each potentially affect four navigable waterways while the BRT will potentially affect three. The rail alternatives would cross the Miami Canal to access Tri-Rail's southern terminus at Miami Intermodal Center, which would not be required for the BRT Alternative. However, this crossing is required to extend Tri-Rail service into the MIC with or without the FEC project. At the current level of study there is not an appreciable difference between the BRT, DMU or Push-Pull alternatives.
Energy Consumption	The daily energy consumption of each alternative is measured in Million British Thermal Units (MMBTU). The DMU uses the greatest MMBTU each day, followed by the Push-Pull. The energy consumption for the BRT and Low Cost/TSM were found to be lower. Energy consumption can be viewed as a potential impact to energy resources (electricity, petrochemical fuels, coal, nuclear) and minimizing this potential impact is environmentally beneficial. Conversely, by providing a mobility option with any of these alternatives, Vehicle Miles Traveled (VMT) and energy consumption would be reduced overall by passengers opting to take transit rather than their automobile.
	Conclusions: The DMU and Push-Pull alternatives each collectively consume more MMBTU than the BRT and Low Cost/ TSM alternative due to fuel consumption mechanics and the frequency of operation. Buses (the primary transit mode of both BRT and Low Cost/ TSM) consume significantly less MMBTU per vehicle mile traveled since they are powered by a smaller, more fuel-efficient engine. In addition to having larger and less fuel-efficient engines, the DMU and Push-Pull alternatives travel more vehicle miles than the BRT and Low Cost/TSM alternatives since multiple service lines are operating simultaneously (Flagler Flyer, FEC, Airport Express) with along longer routes (CSXT/SFRC and FEC Railway mainline). With respect to VMTs, the Low Cost/TSM alternative shows the lowest reduction and presumably the lowest energy savings, and the rail alternatives show the highest energy savings for the region.
Alternative Emission Rates	The DMU and Push-Pull alternatives will potentially produce the most carbon dioxide (CO_2) which is the primary Green House Gas emission. Emissions are primarily a function of the modal technology type and the frequency of its operation. The DMU and Push-Pull alternatives each collectively emit more than the BRT and Low Cost/TSM alternative due to fuel consumption mechanics and running on two parallel corridors (CSXT/SFRC and FEC Railway mainline). Buses emit significantly less CO_2 per vehicle mile traveled since they are powered by a smaller, more fuel-efficient engine. In addition to having larger and less fuel-efficient engines, the DMU and Push-Pull alternatives travel more VMTs than the BRT and Low Cost/TSM alternatives since multiple service lines are operating simultaneously (Flagler Flyer, FEC, Airport Express) along longer routes (two parallel corridors). However, when you look at the VMTs reduced by introducing premium transit service, the differences in overall CO_2 emissions are very small, in all cases no more than 0.3% more than no-build conditions
	Conclusions: Differences in alternative emission rates are negligible between build alternatives, and all build alternatives have little to no effect on regional emission rates

Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
None	None	None	None
Not applicable	Not applicable	Not applicable	Not applicable
None	3 crossings	4 crossings	4 crossings
Lowest impact potential	Highest impact potential	Highest impact potential	Highest impact potential
306 MMBTU per day consumed by alternative Reduces VMT by 144,336 per day (region) Reduces MMBTU by 901 per day (region)	874 MMBTU per day consumed by alternative Reduces VMT by 100,480 per day (region) Reduces MMBTU by 627 per day (region)	6,555 MMBTU per day consumed by alternative Reduces VMT by 267,616 per day (region) Reduces MMBTU by 1,671 per day (region)	6,103 MMBTU per day consumed by alternative Reduces VMT by 169,328 per day (region) Reduces MMBTU by 1,057 per day (region)
Lowest impact potential	Medium impact potential	Highest impact potential	Highest impact potential
46 new short tons of CO2 per day produced by alternative Reduces VMT by 138,996 per day (region) 78,057 short tons of C02 per day produced (region)	65 new short tons of CO2 per day produced by alternative Reduces VMT by 96,763 per day (region) 78, 077 short tons of CO2 per day produced (region)	143 new short tons of CO2 per day produced by alternative Reduces VMT by 257,715 per day (region) 78,154 short tons of CO2 per day produced (region)	305 new short tons of CO2 per day produced by alternative Reduces VMT by 163,063 per day (region) 78,317 short tons of CO2 per day produced (region)
Medium-high impact potential	Highest impact potential	Lowest impact potential	Medium impact potential

** VMT - Vehicle Miles Traveled*

Environmental Factor	
Compatibility with local plans and policies	The compatibility assessment is based on a review of existing comprehensive plans for the 28 municipalities located in the study area to determine if transit improvements are compatible with plans, and if existing approved plans and policies support any of the build alternatives. This review determined that the BRT and rail alternatives (high quality transit) are supported by the municipalities in 16 plans and are not specified in the remaining 12 city plans.
	Conclusion: 16 cities have transit-friendly zoning in place and desire premium transit service on the FEC right-of-way; 12 cities do not have transit-friendly zoning in place.
Potential effects of alternatives on land & real property values	Within ½-mile of the FEC corridor are an estimated 121,400 parcels comprising 10 different land uses. Based on national studies on transit systems being implemented throughout North America, a rail-based transit system will ultimately have a greater positive influence on property values and development potential within ¼ to ½ mile of stations. Supportive local policies and demographics, well-designed stations, reliable, efficient and effective transit service, and strong real estate market dynamics must also exist for transit to have a significant positive effect on property values and development potential. Value capture benefits associated with close proximity to transit are greatest in areas with rapid population/job growth, traffic congestion, buoyant economies and public policies that support transit and accommodate transit-oriented development in adjacent/nearby locations.
	Conclusion: The two rail alternatives have the highest potential to create a positive effect on property values for uses within walking distance of a rail station, followed by BRT with lower potential, and Low Cost/TSM with the lowest potential.

Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Least compatible with local plans as 16 communities have zoning in place anticipating premium transit on the FEC corridor	Compatible with zoning in 16 of 28 communities on FEC corridor	Compatible with zoning in 16 of 28 communities on FEC corridor. 6 communities also have plans in place or in process for specific station areas in anticipation of rail service	Compatible with zoning in 16 of 28 communities on FEC corridor. 6 communities also have plans in place or in process for specific station areas in anticipation of rail service
Medium-high impact potential	Medium impact potential	Lowest impact potential	Lowest impact potential
Low Cost/TSM is not likely to produce any significant impacts on land and real property premiums, although if it serves to improve existing transit service to selected locations (e.g., suburban business/office parks), it may produce some positive effect. In this case, any value changes will more likely be attributed to economic recovery, population/job growth, and real estate market dynamics such as absorption/leasing activity.	BRT has been determined to produce lower value premiums than rail-based transit on nearby properties when compared to a rail-based transit system. In areas with BRT service, value capture is highest among parcels fronting on BRT stations that provide reliable service on semi-exclusive right-of-way, with short headways in high-density commercial business districts, such as the 16th Street Transitway in Denver.	National studies indicate that a viable, rail-based transit system generates value capture premiums for land uses located within ½ mile around stations ranging from 3% to 13% for all land uses.	National studies indicate that a viable, rail-based transit system generates value capture premiums for land uses located within ½ mile around stations ranging from 3% to 13% for all land uses. However, the increased noise potential of this mode suggests a lower maximum value capture than if DMU vehicles were used.
Lowest impact potential	Medium impact potential	Highest impact potential	Medium high impact potential

Chapter 5

Cost and Financial Analysis

Highlights:

- Capital costs are estimated for the detailed alternatives as the Low Cost/TSM costing $220 million; BRT, $2.39 billion; Integrated Rail - DMU, $2.47 billion; and Integrated Rail - Push-Pull, $2.52 billion.

- Annual operating costs, exclusive of current Tri-Rail costs are estimated as: Low Cost/TSM, $47 million; BRT, $57 million; Integrated Rail - DMU, $100 million; and Integrated Rail - Push-Pull, $106 million.

- Revenues are projected to meet only a fraction of annual operating costs.

- Capital and operating funding strategies are provided, utilizing Federal, State, and Local sources, to indicate potential sources of funds to cover costs of the projects.

5.1. Costs and Available Resources

5.1.1. Capital and Operating & Maintenance Costs

The financial cost of the proposed alternatives is comprised of two distinct elements: capital costs and operating and maintenance costs. Capital costs include vehicles, track or roadway, stations, parking, pedestrian overpasses and elevators in stations, demolition and site preparation, assumptions related to hazardous soils remediation, train and traffic controls, signaling and communication, purchase of real estate, and soft costs such as mobilization, design, project management for design and construction, permitting fees, finance charges, insurance and contingencies.

Operating and maintenance expenses include the cost of operations and supervision, maintenance of equipment including parts, maintenance of way (where applicable), fuel and expendables, and administration. These costs have been calculated based on the 2030 patronage demand indicated by the SERPM 6.6B3 model.

The capital and operating and maintenance costs in **Table 5.1** reflect year 2009 costs. The Transportation Systems Management (Low Cost/TSM) alternative is the least costly alternative at $220 million, but would require fairly substantial operations and maintenance costs because of the slow movement of buses on-street and the need for considerable frequency to satisfy the demand. Bus Rapid Transit would require considerably higher capital costs, though not as high as the regional rail alternatives. The two integrated rail alternatives require the largest capital expenditures.

5.1.2. Revenues

The estimates of passenger revenue found in **Table 5.2** were derived from the zonal fare structure in place at Tri-Rail prior to November 2009. Historically, fares for Tri-Rail service have been very low compared with services nationwide. Using Tri-Rail fares resulted in relatively low revenue forecasts for all services.

Integrated Rail – DMU has the highest projected revenue, followed by Integrated Rail – Push-Pull and BRT. All build alternatives are projected to generate several million dollars more than the Low Cost/TSM alternative. However, none of the revenue estimates are equal to the projected operating and maintenance costs for the four alternatives.

Table 5.1 – *Capital and Operating & Maintenance Costs (2009 dollars)*

	Low Cost/ TSM	Bus Rapid Transit	Integrated Rail DMU	Integrated Rail Push-Pull
Capital Cost	$198 - $242 million	$2.57 - 3.14 billion	$2.50 - $3.05 billion	$2.70 - $3.30 billion
Capital Cost per mile	$2.26 million	$28.12 million	$29.06 million	$29.65 million
Operating & Maintenance Cost	$47 million	$57 million	$100 million	$106 million

Table 5.2 – *Annual Revenues (2009 dollars)*

	Low Cost/TSM	Bus Rapid Transit	Integrated Rail: DMU	Integrated Rail: Push-Pull
Annual Revenues	$16.0 million	$18.2 million	$23.0 million	19.8 million

5.2. Financial Feasibility

Transportation funding in Florida is accomplished through a variety of sources and following a well established process. Particularly in urban areas of the state such as the South Florida East Coast Corridor (SFECC) area, the Metropolitan Planning Organizations (MPO) play a key role in identifying needed transportation improvements and setting priorities for limited financial resources. While certainly not all inclusive, the following sections identify and describe some of the more significant funding and financing options that ultimately may be incorporated into detailed project specific capital and operating finance plans. The information below describes potential funding sources available through public sector grant and loan programs, areas where local governments already have authority to generate additional revenues for transportation purposes, and opportunities for the private sector to financially participate in the development of new SFECC transit improvements.

5.2.1. Capital Funding Strategy

The order-of-magnitude capital cost of constructing the corridor-wide transit improvements is estimated to be between $220 million and $2.59 billion (in current dollars). The $220 million estimate for the Low Cost/ TSM Alternative averages $2.66 million per mile. For the BRT alternative, the construction cost is $2.39 billion. The construction cost per mile would be approximately $28.12 million. The costs for the DMU alternative and the Push-Pull alternative are different. For the DMU alternative, the construction cost is $2.47 billion. The construction cost per mile would be $29.06 million. Lastly, In the case of the Push Pull alternative, the construction costs are $2.52 billion. The construction cost per mile would be $29.65 million, including vehicles. In addition, the three build alternatives would require the acquisition of access rights from the current owner/ operator of the FEC railroad corridor. This cost would be in addition to the construction and rolling stock cost estimates above. Access rights can be accomplished through different financial mechanisms including a fee for trackage rights, purchase of an easement, and fee simple acquisition of the entire corridor (or portions of the corridor). A fee for trackage rights is typically paid annually and is based on a combination of real estate value and the incremental cost of operations and maintenance of the corridor due to the introduction of additional rail service. Purchase of an easement can be paid up front or over time. Acquiring fee simple title to the entire corridor is typically based on fair market real estate value. The exact pricing of any of these alternatives would be negotiated by the buyer and seller. The negotiation must also consider appropriate discounts for conditions that may impact the buyer's intended use such as the disposition of existing third party property interests (e.g., utility relocations, clean up of contamination/ environmental hazards, or any grant of exclusive operating easements to allow continuation of rail freight service, etc.).

Public Sector Grants

The capital funding strategy currently envisioned for the SFECC transit improvements assumes a federal share with matching funds from the state and local jurisdictions. The corridor-wide improvements would be implemented in specific geographic segments over time. Once more detailed information is developed regarding scope, cost, scheduling, and ridership, each segment would be evaluated against potential funding sources to arrive at the "best fit," considering the scope and cost of the improvement compared to the eligibility requirements of each funding source/program. For example, the segment between Miami and Ft. Lauderdale may demonstrate the greatest ridership potential and therefore prove the strongest candidate to compete for federal grants through the Federal Transit Administration (FTA), while on other segments debt financing repaid from non-federal sources may prove the preferred strategy for initial construction given the lengthy process and structured scoring criteria for securing FTA grants.

Traditional transportation funding sources include grant programs administered by federal and state transportation agencies. Funding transportation improvements within the SFECC will require the use of a variety of sources, including federal and state participation in some form. Following are examples of some of the more prominent federal and state funding programs that may have application.

Federal Transit Administration

Federal funds typically are involved in funding major transportation improvements, including highways and transit. Under the U.S. Department of Transportation (US DOT), the Federal Transit Administration (FTA) administers funding programs designed to assist state and local agencies fund major new transit projects such as new passenger rail services ("New Starts"). Competition for New Starts funds is intense as many cities and regions around the country advance projects that assume federal participation as a major funding source. The cost of a New Starts project can be significant and the process applied by FTA to approve a project for funding can be rigorous.

Nonetheless, FTA New Starts funding has been used by many agencies throughout Florida to help fund major transit investments including Miami-Dade County and the SFRTA, which operates Tri-Rail.

Federal Highway Administration

The Federal Highway Administration (FHWA) also administers funding programs designed to assist state and local agencies fund transportation improvements. The FHWA funding programs are structured around funding improvements to highways. However, local areas, through their Metropolitan Planning Organizations (MPO), can "flex" highway funding for use on transit improvements. The process involves a transfer of funds from the FHWA to the FTA. Depending on the nature of the proposed transit improvement, the FTA applies its relevant program requirements to the transferred funds.

New federal transportation legislation is currently under consideration by the Administration and the U.S. Congress, which may modify or otherwise restructure the FTA New Starts program as well as create new opportunities for federal funding assistance in the planned SFECC improvements. The State of Florida will be an active participant in the federal legislative process in an effort to shape national transportation policy and new implementing legislation that favor major transportation investment programs such as the SFECC transit improvements program.

National Infrastructure Innovation and Finance Fund

In its FY 2011 budget recommendations, the Administration proposed a new National Infrastructure Innovation and Finance Fund (NIIF). Funding is proposed at $4 billion, which may be available for either grants or loans. Similar concepts (national infrastructure banks) are also under consideration by Congress in the context of new transportation reauthorization legislation. NIIF is intended to fund major projects of national, regional or local significance with eligibility afforded to highway, transit, rail, aviation, ports, and maritime investments. Grants, loans and loan guarantees would be provided for infrastructure projects that improve the sustainability of regional transportation networks or for transportation elements of non-transportation projects. As proposed, this new fund would also be used to promote collaboration on major projects among states, municipalities and private investors.

Florida Department of Transportation

FDOT administers many programs to help fund transportation improvements across all modes of transportation. Program initiatives such as the Strategic Intermodal System (SIS) and the Transportation Regional Incentive Program (TRIP) are designed to provide funding for transportation improvements to major statewide or regional transportation corridors. TRIP was established in Florida's Growth Management reform legislation passed by the 2005 Florida Legislature. The SFECC alternatives analysis study is a regional undertaking and will produce a collection of candidate projects that result in improvements to this major tri-county regional transportation corridor. Importantly, the Florida East Coast Railroad is a designated SIS corridor. Consequently, both SIS and TRIP funding are potential capital funding sources for the SFECC improvements program.

The 2005 Growth Management reform legislation also established significant funding for a state "New Starts" transit program. The program is intended to help fund transit capital projects in metropolitan areas. Based on available funding, candidate projects may receive up to 50 percent of the non-federal share of project costs.

Local Government Programs

Local governments in Florida have limited authority to raise revenue and fund transportation improvements. Authority is derived from the Florida Constitution and under specific state legislation. Examples include ad valorem taxes and related revenue raising mechanisms, special assessments, and a variety of local option taxes. Transportation improvements within the SFECC will require the use of a broad array of funding mechanisms including those available to affected local governments.

Constitutional and Home Rule Authority

- Tax Increment Financing. Under Section 163, Florida Statutes, municipalities or counties are authorized to designate Community Redevelopment Areas (CRA) in areas that meet specific criteria related to blighted conditions. CRAs may receive contributions from affected taxing jurisdictions within the area. Generally, the contribution formula is based on new ad valorem tax revenue generated from within the CRA subsequent to its creation (i.e. the base year) and adoption of a redevelopment plan. Approval is required by the local governing body and affected taxing jurisdictions. Historically, growth in new development and significant redevelopment within the tri-county region has resulted in the formation of several CRAs to take advantage of this value capture technique.
- Special Assessment Districts. Under Sections 170 and 190, Florida Statutes, municipalities or counties may create improvement districts and levy special assessments on the property owners within the district. Among other things, special assessments may be used for transportation purposes. The improvement or service being funded by the assessment must directly benefit the property owner paying the assessment. Approval is required by the local governing body. Depending on the type of district created, a majority of the property owners must also agree to the assessment. This mechanism has been used successfully around the state to create and sustain business improvement districts (BID), community development districts (CDD), and downtown development authorities (DDA).

Local Option Taxes

- Fuel Taxes. Under Sections 206.41, 206.87, 336.021, 336.025, Florida Statutes, local governments are authorized to levy up to 12 cents of local option fuel taxes in the form of three separate levies – a one cent levy (known as the "Ninth-Cent Fuel Tax"), a six cent levy, and a five cent levy. The proceeds may be used for transportation and infrastructure development. Depending on the levy, at least a majority vote of the governing body or a voter referendum is required to impose the tax. In the tri-county region, Miami-Dade County has levied 10 cents and Broward and Palm Beach Counties have imposed the full 12 cents.
- Charter County Transportation System Surtax. Under Section 212.055, Florida Statutes, the Charter County Transporta-

tion System Surtax may be levied at a rate of up to one percent in eligible counties, which include, among others, Broward, Palm Beach, and Miami-Dade. The proceeds may be used for development, construction, operation, and maintenance of fixed guideway rapid transit systems, bus systems, and roads and bridges. Voter approval, through a county referendum, is required for the tax to be imposed. In the three-county region, Miami-Dade is the only county that has levied a (one-half cent) sales tax under this legislation.

- Local Government Infrastructure Surtax. Section 212.055, Florida Statutes permits the imposition of the Local Government Infrastructure Surtax. This sales tax may be levied at the rate of one-half or one percent. The proceeds may be used for infrastructure development. All counties in the state are eligible to levy the tax. Voter approval is required. The tax has not been imposed by any of the three counties within the SFECC region.

5.2.2. Capital Financing Sources

While traditional transportation funding sources emphasize federal and state grant programs innovative financing techniques such as loan programs and public/private partnership (P3) arrangements have become more common. To the extent a funding gap remains after application of available grant funds, the capital costs may be financed through one of the following debt programs or combinations thereof. Debt service payments could be made from state and/or local sources or through private sector sources further described below.

National Infrastructure Innovation and Finance Fund

As described above, the Administration has proposed a NIIFF of $4 billion in its FY 2011 budget that could be used for grants, loans, and loan guarantees.

Railroad Rehabilitation and Improvement Financing Program

The Railroad Rehabilitation and Improvement Financing (RRIF) Program was established by the Transportation Equity Act for the 21st Century (TEA-21). Under RRIF, the Federal Railroad Administration (FRA) is authorized to provide up to $35 billion in direct loans and loan guarantees for projects that acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops; refinance outstanding debt incurred for the purposes listed above; and develop or establish new intermodal or railroad facilities. Direct loans can fund up to 100 percent of eligible project costs. Eligible borrowers include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad and limited option freight shippers who intend to construct a new rail connection.

Transportation Infrastructure Finance and Innovation Act

Under the Transportation Infrastructure Finance and Innovation Act (TIFIA), project sponsors can apply for various forms of federal credit assistance, including direct loans and loan guarantees, in lieu of federal grants. This type of assistance can be a key component in structuring financial plans for major transportation investments. TIFIA loans for example, are being used successfully to help finance key components of the Miami Intermodal Center (MIC) program. More recently, TIFIA loans were also part of the approved financial plans for the I-595 Corridor Improvements Program in Broward County and the Port of Miami Tunnel in Miami-Dade County. TIFIA is administered by the FHWA.

State Infrastructure Bank

The State Infrastructure Bank (SIB) provides loans to eligible transportation projects at very competitive interest rates and flexible repayment terms. Since the inception of the

SIB, over $1 billion in loans have been awarded, representing approximately 13 percent of total project costs. Interest rates applied to these loans have generally been below market rates, with repayment terms ranging from as little as one year to as many as 30 years. FDOT solicits SIB loan applications annually for candidate projects. The SIB will be evaluated during the financial planning process for its potential application on specific project segments as a SFECC financing mechanism.

Fixed Guideway Bonds

Section 215.615, Florida Statutes, authorizes the use of up to two percent of the state's transportation revenues to issue bonds to finance the building, expansion, or reconstruction of fixed guideway systems in urban areas. Each bonded project must be approved by the Florida Legislature. According to FDOT's 2009 Bond Financing Update Report, this bond program can generate $1.05 billion in bonding capacity for fixed guideway systems at 5 percent interest for 30 years.

5.2.3. Capital Renewals and Replacements

In addition to the initial cost of putting the transit system in service would be the ongoing capital costs related to the renewal and replacement of capital items. Examples include: major component replacements, mid-life overhaul of vehicles, and vehicle replacements.

The FTA has two grant programs that help fund capital renewal and replacement costs. The Urbanized Area Formula Program (49 U.S.C. 5307) provides federal funding to urbanized areas and to governors for transit capital and operating assistance and for transportation-related planning. The project proponents may apply for funds to offset eligible costs upon reporting the route miles and revenue miles to the National Transit Database after the first full year of operations with disbursement of the grants following the federal budgeting process.

In addition to funding new fixed guideway systems (New Starts), the federal transit capital investment program (49 U.S.C. 5309) also provides capital assistance for modernization of existing rail systems. Funding is available for fixed guideway systems: any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part, and includes commuter rail. The statutory formula for allocating funds contains seven tiers. Funding under the last three tiers (5, 6, and 7), applicable to any SFECC transit improvements, is apportioned based on the latest available route miles and revenue vehicle miles on segments at least seven years old as reported to the National Transit Database. The statutory formula multiplies the route miles and revenue vehicle miles by the apportionment data unit values for Tiers 5, 6, and 7, which is published annually.

These federal grants require matching on an 80/20 federal/non-federal basis. FDOT may elect to use toll credits generated by Florida's Turnpike (these exceed $500 million per annum) and by other FDOT toll facilities to match the FTA grants.[1] This "soft match" would only apply once the specific project becomes operational. Toll credits would not be applied as matching funds for the construction of the transit improvements.

5.2.4. Operating Funding Strategy

Order-of-magnitude SFECC annual operating expense estimates, excluding current Tri-Rail operating expenses, range from $47

1 Effective September 20, 2007, "it is the policy of the Department to make available the option to use toll revenue credits, authorized by Title 23 U.S.C. 120(j)(1), to Florida transit systems for use as soft match on eligible federal transit capital projects." (Visit http://www2.dot.state.fl.us/procedural documents/procedures/bin/000725025.pdf for the policy statement signed by the secretary of the FDOT).

million to $106 million, depending on the alternative.

Operating Revenue/Funding Sources

Funding sources for the annual operating and maintenance expense of the SFECC transit improvements will comprise a variety of sources including both system-generated and non-system-generated revenue. System-generated revenue may include farebox revenue, ancillary revenue, usage fees, and lease revenue. Non-system-generated revenue may include federal block grants, state operating assistance, and local operating support. Below is a summary of potential sources to fund annual operating and maintenance expense.

Farebox Revenue

Farebox revenue is typically the single most important source of system-generated operating revenue. Typical farebox recovery ratios may provide an indication of how much of the operating expense may be offset by fare collections. According to the 2008 National Transit Summaries and Trends from the National Transit Database[2], recovery ratios nationwide, defined as the percentage of operating expenses paid through fare revenues (in constant 2000 dollars), ranged between 31.4 percent and 37.1 percent between 1999 and 2008. During the same period, the range was slightly higher (33.2% to 39.5%) for urban areas with a population of one million or more (the metropolitan statistical areas of Miami-Miami Beach-Kendall, Fort Lauderdale-Pompano Beach-Deerfield Beach, and West Palm Beach-Boca Raton-Boynton Beach all have populations exceeding one million). For commuter rail systems in particular, the farebox recovery ratio was 50.3 percent in 2008.[3]

2 http://www.ntdprogram.gov/ntdprogram/data.htm

3 Fare revenue of $2,160.5 million divided by operating expense of $4,293.8 million, per 2008 National Transit Profile.

Ancillary Revenues

Ancillary revenues have been used by many local and regional transit agencies around the country to assist with financing new transit services. The private sector has demonstrated an interest in paying for advertising space, naming rights, sponsorships, concessions and other commercial ventures at transit stations or in conjunction with transit vehicles. Having a station in a prominent location carry a name "brand" has value. Likewise, "wrapping" a vehicle with tasteful advertising also has value and has been successfully used by many transit agencies across the United States, including those in Florida. Ancillary revenue mechanisms can generate either one-time or recurring financial contributions from the private sector, which can be applied to funding the cost of new transit services.

User Fees

Should acquisition of access rights from the current owner/operator of the FEC railroad corridor be accomplished through acquisition of the entire corridor, the new owner of the FEC Railroad right of way, presumably a public agency, would find itself in a position to collect fees for use of the asset. A private freight rail carrier, whether the FEC or another company, would want access to the tracks so that freight rail service could continue to the many captive shippers located on the line. Similarly, Amtrak may want access to the tracks for intercity passenger rail service. Use of the tracks by others typically necessitates the need for usage fees and other charges to be paid to the owner by the freight rail company and/or by Amtrak. Revenues from these sources could be applied to the maintenance of the right-of-way and infrastructure as well as investment in the corridor to develop new passenger rail/transit services.

Lease Revenue

The owner of the corridor may be able to collect revenue from leasing the right of way to utilities and telecommunication companies. The FEC rail corridor in the tri-county area is particularly attractive compared to highway alternatives because it is continuous and unobstructed, it would have a single owner, and construction could be accomplished without significant disruption of traffic. One example of a potential source of revenue is from the leasing of fiber optic conduit. FDOT recently contracted with an independent appraiser to estimate the market rent of the existing fiber optic cable communication system of a national telecommunications company. The cable runs through an 81-mile north-south rail corridor between Miami and West Palm Beach alongside track owned by FDOT. According to the market rent estimate, the potential revenue from leasing the fiber optic cable is $2.81 (2009 dollars) per lineal foot. If the 85-mile alignment of the FEC corridor were to be leased at this rate, the annual revenue would be $1.3 million (2009 dollars).

FTA Block Grants

A portion of the costs to operate and maintain passenger service along the SFECC could be categorized as preventive maintenance. These costs include engineering and maintenance of way costs related to the track and right of way, bridges and structures, and signals and communications, as well as equipment maintenance costs. Transit-related preventive maintenance costs are of a capital nature and therefore deemed eligible costs by the FTA for purposes of accessing funds from the Urbanized Area Formula Program (49 U.S.C. §5307) and the Fixed Guideway Modernization Program (49 U.S.C. §5309). Operating revenue may therefore include block grants allocated from these FTA programs to fund preventive maintenance costs.

State Operating Assistance

State assistance may be a source of operating revenue in, at least, the initial operating period. For example, FDOT currently provides an annual operating subsidy to Tri-Rail along with operating subsidies provided by the three counties served by the commuter rail system. In Central Florida (SunRail), FDOT has agreed to subsidize operations for the first seven operating years; thereafter, the local government partners would fund any operating deficits.

Local Operating Support

As explained in the Capital Plan discussion, local governments in Florida have authority to employ several means of raising revenue and funding transportation improvements. These may serve as sources not only of capital funding and/or debt repayment but also operating subsidies. Examples include ad valorem taxes and related revenue raising mechanisms, special assessments, and a variety of local option taxes.

Real Estate Related

Ideally, the corridor will be attractive for Transit Oriented Development (TOD), -comprising residential, workplace, and supporting uses such as retail real estate. TOD would create opportunities for private sector participation around passenger stations or terminal locations. Long-term lease revenue from the private sector in exchange for development rights may be a potential funding source used by local jurisdictions for operating subsidies. This could involve a variety of forms. For example, to the extent land surrounding potential station areas is already in public ownership or control, or local jurisdictions intend to acquire land surrounding potential station areas, there will be opportunities to explore long-term lease arrangements with the private sector in exchange for some form of development rights.

5.3. Risk and Uncertainty

Table 5.3 identifies initial financial risk areas along with mitigation strategies to be more fully addressed during subsequent phases of SFECC project development.

Table 5.3 – *Risk and Uncertainty Matrix*

Construction Cost and Revenue Risk	*Risk Assessment and Mitigation*
Capital costs are preliminary and represent order-of-magnitude corridor wide estimates • Implementation of the SFECC improvements will be phased through specific project segments • The next phase of project development will include detailed segment specific Project Development and Environmental (PD&E) studies	The PD&E process will afford the opportunity to refine preliminary capital cost estimates • The preliminary cost estimates include a 20% unallocated contingency • More detailed information will be developed for each segment, e.g., scope, scheduling, and other issues impacting cost • The continuing financial planning process will use this information to match project costs with capital funding source/program requirements
Assumptions regarding FTA New Starts funding may be optimistic • The New Starts process is very structured • Could potentially delay project implementation and increase costs • Competition for New Starts funding is intense nationally	Objectively assess the cost/benefit of seeking New Starts funding • Select only those corridor segments that best meet New Starts criteria • Set realistic funding and timing expectations
Assumptions regarding local capital funding sources may be optimistic • New local funding sources will be required to implement segment specific projects	Local support for the project will be key to a viable capital financial plan • Additional public involvement/outreach will be undertaken during the PD&E process • Local governments in Florida have existing authorities to raise revenues/funding
The construction environment will be complex and challenging, potentially increasing costs • Existing highway and utility easements constrain effective corridor width • Construction would be undertaken within an active rail freight corridor	Reach understandings up front as part of access rights negotiations • Access rights to the existing rail corridor would need to address construction issues • The disposition of third party property interests would need to be resolved as part of access rights negotiations

Operating Cost and Revenue Risk	*Risk Assessment and Mitigation*
Operating costs are preliminary and represent order-of-magnitude corridor wide estimates • Implementation of the SFECC improvements will be phased through specific project segments • The next phase of project development will include detailed segment specific PD&E studies	The PD&E process would afford the opportunity to refine preliminary operating cost estimates • Detailed operating plans would be developed for each segment including refined cost and ridership estimates • The continuing financial planning process would use this information to match project costs with operating funding source/program requirements • The operating financial plan would include provisions for deposits to a cash reserve to address revenue/expense shocks.
Assumptions regarding local operating funding sources may be optimistic • New local finding sources will be required to implement segment specific projects	Local support for the project will be key to a viable operating financial plan • Additional public involvement/outreach would be undertaken during the PD&E process • Local governments in Florida have existing authorities to raise revenues/funding

Chapter 6

Public and Agency Involvement

Highlights:

- Public outreach was coordinated across 28 cities and three counties.

- Public input was a crucial factor in the development of the four detailed alternatives.

- Public events included: a series of fourteen Alternatives Workshops at eleven strategically-located venues addressing conceptual transit provision alternatives; meetings with all 28 municipalities to address station locations and preliminary station area planning concepts; a series of charrettes in Palm Beach County to address station locations, land use and transit oriented development concepts; meetings to solicit input on waterway crossings along the corridor.

- Multi-faceted input was collected through alternatives workshops, FEC website comment form, meetings with elected officials and agencies, and detailed guidance from the Project Steering Committee.

- Outreach by invitation included 570,000 promotional flyers mailed to property owners, businesses, and stakeholders.

- Innovative outreach included "transit audio demonstrations" for participants to listen to various transit technologies and freight simulations. Additional elements included a large television displaying a continuous loop slide show and a live demonstration computer station to show the environmental model techniques and results in an interactive manner.

- Public hearings held in September 2010 allowed participants to vote on their preferred alternative, with 66% of voters selecting the Integrated Rail - DMU alternative.

6.1. Overview of the Plan and Program

Public outreach began in Phase 1 and has continued throughout the length of the study. During the course of the Phase 1 study, over 230 public presentations and/or briefings were held throughout the study area, including Elected Officials/Agency Representatives Kick-Off Meetings and the Public Kick-Off/Scoping Meetings. In addition, over 50 meetings with technical and citizen review committees and 11 unscheduled meetings with interested parties such as homeowner associations, grassroots organizations (e.g., Sierra Club) and civic groups were also conducted. At least 20 one-on-one meetings with local business leaders were held from June through December 2006. Presentations were given to Mayors, City Commissions, and City and Village Council members between the months of June 2006 and November 2006. Over 30 of these presentation meetings were held with elected officials and/or their representatives. These presentations were informational and included updates on the alternatives and priorities selected during Phase 1 as well as discussions on the role the various municipalities may play in supporting the proposed project. Some of the comments received from the City Mayors and City Commission members during these presentations were related to financing the project, station suitability study, and security at the proposed station areas.

An agency Coordination Plan (CP) was prepared as part of the environmental review process for Phase 2 of the FEC study. The CP identified the process by which the FDOT would solicit comments from, and communicate information to, cooperating and participating agencies, the public, and other interested governmental agencies. A Public Involvement Plan (PIP) was also prepared at the initiation of Phase 2 of the FEC Study to provide continuity for public outreach from Phase 1 into Phase 2. The PIP was prepared in accordance with the FDOT Project Development and Environment (PD&E) Manual and both the NEPA and the FDOT Efficient Transportation Decision Making (ETDM) processes. These two plans were related in that the primary process for involving the public was documented in both plans, but the CP also focused on the process of involving the cooperating and participating agencies, while the PIP focused on the details of all the public involvement activities.

The primary goals of the Phase 2 PIP included the following:

- Reconnecting with participants from the Phase 1 public involvement activities to maintain their awareness of the study and update them on recent findings

Table 6.1 – *Summary of Phase 1 Public Meetings*

Audience	# Presentations/Meetings
Public Hearing	3
Public Meetings/Workshops	35
Technical Review Committees	40
Citizens' Review Committees	15
Transportation Policy Boards	20
City/Town Councils	23
Municipal Workshops	11
Municipal Officials / Community Leaders	65
Local Business Leaders	20+
TOTAL	232

- Involving new participants in the Phase 2 public meetings and workshops
- Reaching out to minority groups by advertising meetings in English, Spanish and Creole newspapers
- Opening and maintaining dialogues with major regional and local business interests
- Updating state, county, and municipal government officials and maintaining lines of communication with these agencies

Four individual public involvement (PI) firms, two in Palm Beach County, one in Broward and one in Miami-Dade Counties, were assigned to conduct public and agency outreach in their respective counties. This approach ensured a local point of contact familiar with local policies, regulations, and culture. These firms maintained a mailing database of over 600,000 entries listing civic and business stakeholders, property owners, elected officials, agency and public contacts. A Frequently Asked Questions (FAQ) fact sheet was developed to update interested stakeholders on the progress of the study. In addition, several visualization techniques were used to assist elected officials, members of the general public, and other stakeholders visualize various aspects of the study, including proposed transit alternatives. (See **Figure 6.1**)

Public and agency outreach within the study area was accomplished through various activities. This included scheduled public meetings such as Kick-off Meetings, Alternatives Workshops, and Public Hearings held at venues throughout the study area within one week of each other. Throughout the course of the study, additional "one-on-one" meetings were held to ensure interested stakeholders were adequately informed and represented. These stakeholder briefings typically included elected officials, homeowners' associations, business leaders and civic associations. Additional outreach was conducted for disadvantaged communities and other areas of special concern in the study area. In order to improve public outreach, addresses and/or nearest intersection/landmark were recorded for all meeting attendees and mapped

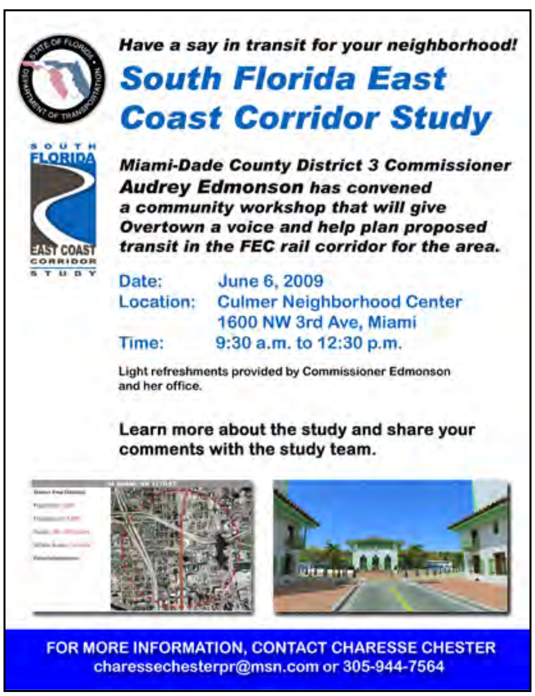


Figure 6.1 – *Flyer and photograph from a Phase 2 Public Workshop in the Overtown section of Miami*

Figure 6.2 – *Kick-Off Meeting Flyer (front and back)*

to visualize underrepresented areas. The PIP provided a complete listing of the types of meetings and presentations held during Phase 2 of the study.

6.2. Public Meetings

6.2.1. Kick-Off Meetings

Fourteen Phase 2 kick-off meetings were held at venues throughout the study area during January and February 2009 (see meeting flyer in **Figure 6.2**). All the workshops were conducted from 6 p.m. to 8 p.m. with additional afternoon meetings held from 3:30 p.m. to 5:30 p.m. in the three major down-

Table 6.2 – *Dates of Publication – Kick-Off Meeting Notification*

Newspaper	County	Date Advertisement Appeared
Miami Herald Neighbors: Zone 10	Miami-Dade	Thurs, Jan 15 & Sun, Feb 1, 2009
Miami Herald Neighbors: Zone 11	Miami-Dade	Thurs, Jan 15 & Sun, Feb 1, 2009
Miami Herald Neighbors: Zone 13	Miami-Dade	Thurs, Jan 15 & Sun, Feb 1, 2009
Haiti en March	Miami-Dade	Wed, Jan 14 & Wed, Feb 4, 2009
Diario las Americas	Miami-Dade	Thurs, Jan 15 & Sun, Feb 1, 2009
Miami Times	Miami-Dade	Wed, Jan 14 & Wed, Feb 4, 2009
Sun Sentinel: Broward Local Edition	Broward	Thurs, Jan 15, 2009
Sun Sentinel: Neighbors Zones NE & SE	Broward	Sun, Feb 1, 2009
South Florida Times	Broward	Friday, Jan 16 & Fri, Jan 30, 2009
Palm Beach Post	Palm Beach	Thurs, Jan 15 & Sun, Feb 1, 2009
La Palma	Palm Beach	Friday, Jan 16 & Fri, Jan 30, 2009

town locations: Miami-Dade, Ft. Lauderdale, and West Palm Beach. Notification dates are listed in **Table 6.2**.

The purpose of the kick-off meetings was to provide an overview of the study and a description of the tasks to be accomplished in Phase 2. The meeting format included an open house period followed by a formal presentation and a question-and-answer period. The open house format allowed the Project Study Team to interact with meeting participants directly while referring to project illustrations on display boards. As the open house period concluded, the FDOT Project Manager introduced or acknowledged elected officials in attendance. A Power Point slide show (available for viewing as a PDF file on the project website http://www.sfeccstudy.com) was provided and the meetings were concluded with a group question-and-answer period. Written summaries of the kick-off meetings were prepared as documentation in the project record.

Meeting notifications were prepared for agency representatives, elected officials, and the general public. There were 1,334 agency representatives and elected officials of the Tri-County area invited to attend the kick-off meetings by a letter from Mr. Jim Wolfe, P.E., FDOT District 4 Secretary. Meeting invitation flyers were mailed to over 570,000 residents and businesses in the study area. The meetings were also advertised at various City Clerk offices as well as local newspapers in English, Spanish and Haitian Creole languages. (Refer to **Figure 6.3.**) Electronic invitations were sent to those individuals on the project mailing list who included an e-mail address. In addition, the kick-off meetings were advertised in the Public Meetings section of the project website (http://www.sfeccstudy.com).

Cumulative totals of attendees by county were derived by adding the total number of attendees at the Miami-Dade, Broward and Palm Beach meetings: 163, 159, and 243 respectively, for a total of 565. A 14-page color Kick-Off Meeting Information Booklet, a two-page project Fact Sheet and a four-page Project Newsletter handout were produced and distributed to all attendees at the meeting. These meeting materials are available for download from the project website. Written Comment Cards were also distributed and collected at the end of each meeting. A Creole translator was available at selected kick-off meeting locations in Miami-Dade and Broward Counties. Bilingual English-Spanish staff also provided Spanish translation at every meeting location. Verbal comments were also recorded during all of the meetings. Summaries of each Public Kick-Off Meeting were also produced and made part of the project record.

In general, the vast majority of the attendees were in support of implementing passenger service along the FEC corridor. The following points summarize the other comments received:

Figure 6.3 – *Newspaper Display Advertisement*

- Frustration was expressed regarding the length of time required to implement the project
- Interest was expressed in incorporating Quiet Zones as part of the project implementation
- Concern was raised over how to pay for construction and operation of the SFECC transit service

6.2.2. Alternative Workshops

The Alternatives Workshop series, held in October 2009, concentrated on informing the general public on the progress of Phase 2 and obtaining input on work to date. The workshops followed the same format as those conducted during Phase 1. The purpose of the workshops was to (a) update the general public on the project, (b) engage attendees in discussion on the seven transit alternatives illustrated in the exhibit area, and (c) develop a ranking of the alternatives based on public preference. Workshop attendees were asked for input on the recommended station areas; the grade crossing recommendations (for grade separation or closure); environmental-related issues such as noise, vibration, wetlands, social and cultural resources, water and air quality; and potential funding sources. The workshops allowed the Project Study Team to provide updates on various aspects of the study and to seek input on the narrowed selection of alternatives and station locations, as well as on the environmental issues associated with implementation of transit service within the SFECC corridor. For this series of Phase 2 workshops, the project website was updated with the workshop display boards.

The workshops were held throughout the study area in October 2009. All workshops were conducted from 6 p.m. to 8 p.m. in the locations itemized below (listed from north-to-south). In addition, afternoon workshop sessions were held from 3:30 p.m. to 5:30 p.m. in the three major downtown locations.

Meeting notifications were prepared for agency representatives, elected officials and the general public. 1,576 agency representatives and elected officials of the Tri-County

Figure 6.4 – *Alternatives Workshop attendees listening to a sound demonstration*

area were invited by a letter from Mr. Jim Wolfe, P.E., FDOT District 4 Secretary to attend the kick-off meetings. Over 573,000 invitation flyers for these workshops were mailed out to property owners, businesses, and other stakeholders located along the SFECC corridor in all three counties. E-mail invitations were also sent to those individuals in the project mailing list who included an e-mail address. Local advertisements in area newspapers were also placed in advance of the meetings and were also displayed in the Public Meetings section of the project website. Electronic postcards were sent via e-mail to municipalities within the study area, and requests were made to place the meeting date, time, and location on the municipal calendars and bulletin boards.

Attendance at the meetings included 153 individuals in the three Miami-Dade County workshops, 168 individuals in the three workshops held in Broward County, and 301 individuals in the five workshops held in Palm Beach County (622 total). Materials distributed at the workshops included a 2-page color project Fact Sheet, Transit Alternative Comment Form, and an Environmental Comment Form. The Comment forms and the Fact Sheet handout were available in English, Spanish and Creole. A Creole translator was available at selected workshop locations in Broward and Miami-Dade Counties. Bilingual English-Spanish staff also provided Spanish translation at every workshop location. Verbal comments were also recorded during the workshops.

Upon arrival, workshop attendees were asked to sign in and view an introductory video that provided an overview of the study. From there, the workshop format included an informal period in which attendees could tour the various project exhibits under "Alternatives," "Crossings," "Stations," and "Environmental," guided by SFECC Team members. Study team members narrated the information on the display boards, answered questions, and assisted attendees with completing the Comment/Survey forms.

The Alternatives Workshops utilized several visualization techniques to convey the technical elements of the study. These visualization elements included architectural renderings, three-dimensional aerial photographs, a large television displaying a continuous loop slide show indicating the process of the screening method employed, and a live demonstration computer station to interactively show the GIS data model techniques and results.

From the exhibit area, workshop attendees were guided to a separate area to participate in a "Transit Audio Demonstration." (**Figure 6.4**) The audio demonstration allowed participants to experience the sounds generated

Figure 6.5 – *Charrette flyer*

by various transit technologies and freight trains. These simulations were preceded by an audio-visual primer on the fundamentals of sound by a leading expert on the project team. Video clips and actual stereo sound recordings of transit vehicle and freight trains were played, in a calibrated environment, so that participants could see and hear the sounds generated by freight and passenger transit vehicles (as recorded in the project vicinity and elsewhere specifically for this study).

6.2.3. Waterway Crossing Meetings

Outreach efforts were undertaken to assist the Study Team in determining the reasonable needs of navigation for certain waterways of interest to the SFECC Study.

The FEC Railway crosses three navigable waterways within the FEC study area, the Dania Cut-off Canal, New River, and Hillsboro Canal. One of these waterways, the New River, is crossed by a movable FEC Railway Bridge. The other two are crossed by fixed, low-level bridges. If these existing crossings/FEC railway bridges need to be replaced by the proposed project, a new vertical clearance must be determined based on the reasonable needs of navigation for the particular waterway and a permit from the U.S. Coast Guard (USCG) will be required. The USCG may require a public hearing prior to issuing a permit.

Through interviews and meetings with interested stakeholders, the Study Team collected additional information on the reasonable needs of navigation for the subject waterways, and on local concerns in general. Efforts were made to contact operators of marinas and boat yards, river user groups, homeowners and others identified through the project mailing database, the Broward County property appraisers database, marine interest groups and others identified by neighboring municipalities. Over 4,000 property owners and other stakeholders were mailed invitation flyers. Town halls and city managers near the waterway crossings were also contacted for any information on current marine interests in the area.

Three public meetings were held on the subject of waterway crossings, one in December 2009 and two in January 2010. There were 85 total attendees, and all questions and answers were recorded as part of the public record. Issues that were brought to the Study Team's attention include concerns in Fort Lauderdale regarding the impacts to the downtown and its residents of a new higher level bridge over the New River. Comments about Dania Cut-Off Canal focused on a desire to raise the level of the existing bridge to allow bigger boats to pass beneath it. There were no issues raised regarding the Hillsboro Canal crossing.

6.2.4. Charrettes

During the study the Treasure Coast Regional Planning Council (TCRPC) took the lead in organizing and running a number of design charrettes in different communities in Palm Beach County (see meeting flyer in **Figure 6.5**). The project team participated in these charrettes, which helped educate communities on Transit Oriented Development and resulted in consensus on station locations and plans for development around those stations. Charrettes were held in Jupiter, Lake Worth, Palm Beach Gardens, and West Palm Beach. Several station locations were recommended and plans developed around them. In addition, a plan was developed for the Northwood connection between Tri-Rail and the FEC that showed how affected areas could be reconfigured and redeveloped around a station on that connection. The results of several of the charrettes are still in the process of being officially adopted by the municipalities in question.

In other towns in Palm Beach County such as Delray Beach, Boca Raton, Boynton Beach and Lantana, workshops to develop concepts for station areas were held with the municipal staff and TCRPC staff. Fort Lauderdale also held a workshop without TCRPC attendance.

See Table 6.7 for a list of station related decisions by community.

6.2.5. Public Preference of Modally Specific Alternatives

At the October 2009 workshops, attendees were given surveys specific to the transit alternatives and encouraged to fill them out with the help of a study team member. The surveys were distributed immediately after reviewing the seven concepts. These surveys asked participants to rank the alternatives from most preferred to least preferred, to provide comments on what aspects of service they liked and/or disliked, and answer three questions regarding trade-offs among service attributes. The questions about trade-offs were designed to solicit participants' preferences about three trade-offs of transit service design:

- Stations– Which would you prefer?:
  a. A fast transit trip with fewer stops; or
  b. A slower transit trip with more stops, possibly closer to home or work.
- Service Frequency – Which would you prefer?
  a. A more frequent transit service with more frequent railroad crossings of the cross streets; or
  b. A less frequent transit service with less frequent railroad crossing closures of the cross streets.
- Vehicle Speed – Which would prefer?
  a. Lower speeds along the corridor with slower transit trips; or
  b. Higher transit speeds along the corridor with faster transit trips

Survey participants ranked the seven transit alternatives on a scale from 1 to 7.

The rankings from each of the 325 surveys collected were used to calculate each alternative's average ranking. **Figure 6.6** shows the average scores for each alternative with 7 being the most often preferred alternative. The Express & Local alternative had the highest rating, followed by the identically ranked Urban Mobility and Integrated Network alternatives.

To better understand the public's preferences, survey results were aggregated by home county. Of the 325 surveys collected, 24 had no home zip code listed and four were from counties outside the study area, leaving 295 surveys from Palm Beach, Broward and Miami-Dade Counties.

Figure 6.6 – *Public Preference Score by Alternative*

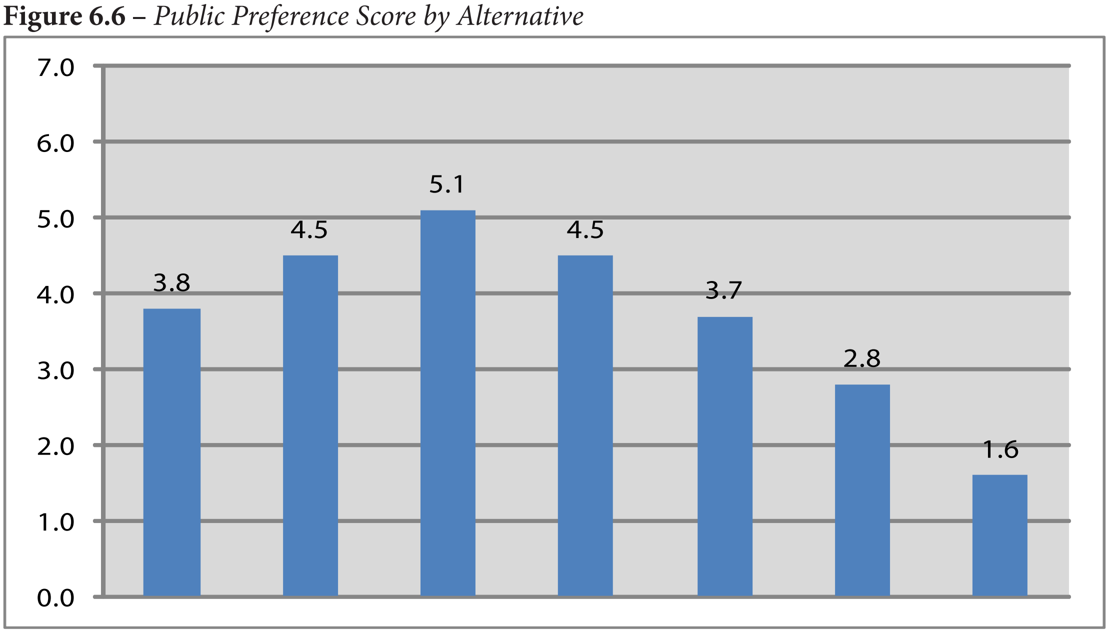


Table 6.3 lists the rankings for the alternatives within each of the three counties, as well as the overall total. Similar to the overall rankings, the (C) Express and Local service concept ranked highest in every county while (F) Bus Rapid Transit and (G) TSM with Regional Bus rank lowest in all counties. Interestingly, participants in Miami-Dade County ranked (B) Urban Mobility as the second-most preferred over (D) Integrated Network, while the inverse was noted for Palm Beach and Broward Counties.

Table 6.4 presents, for each county, the public preferences in terms of the three trade-off questions asked in the transit alternatives survey. Both Broward and Miami-Dade County participants preferred more stops over faster service, while participants in Palm Beach County did not demonstrate a preference in this area. All counties show a preference for frequent trains and high speeds.

Overall, the respondents tended to favor higher station density, higher service frequency and higher vehicle speeds. However, higher vehicle speed was uniformly the most popular choice, a finding which was reflected in public disinterest for the TSM. Interestingly, Palm Beach respondents varied on station density, with less interest in high station density than respondents from the other two counties.

6.2.6. Public Hearings

A series of eight public hearings were held in five locations throughout the study area in September 2010. Six hundred individuals attended the Public Hearings, including 207 attendees at the Palm Beach County venues, 223 individuals at the venue in Broward County, and 170 who attended the venues in Miami-Dade County.

These hearings, like those in Phase 1, provided the public an update on the study and gave them an opportunity to provide input on the final selection of alternatives and station locations, as well as on key environmental issues associated with implementation of transit service within the SFECC corridor. The Public Hearings consisted of an open-house period, formal FDOT Public Hearing statements spoken by FDOT representatives, and a formal presentation in the form of a 19-minute video (this video presentation is available for viewing on the project website as an embedded wmv video file), after which the public was invited to voice comments during a public testimony period.

Table 6.3 – *Alternative Ranking by County*

	Palm Beach	Broward	Miami-Dade	Overall Total
Survey Count	93	133	69	322
C. Express and Local	1	1	1	1
B. Urban Mobility	3	3	2	2
D. Integrated Network	2	2	3	2
A. Conventional Commuter Rail	4	4	4	4
E. Metrorail	5	4	5	5
F. Bus Rapid Transit	6	6	6	6
G. TSM with Regional Bus	7	7	7	7

Table 6.4 – *Preferred Service Attributes by County*

Preference	Palm Beach	Broward	Miami-Dade	Overall Total
Higher Number of Stations	50%	69%	65%	60%
Higher Service Frequency	60%	75%	69%	66%
Higher Vehicle Speed	79%	79%	75%	77%

The video presentation informed the public about four build alternatives which were selected from a larger set of alternatives, based upon additional analysis and feedback received during and after the Public Workshops held in October 2009. The video presentation also provided a general overview of the study, including the work accomplished to date, public outreach activities, and about the next phase of the study.

Materials distributed at the public hearing included an 8-page informational booklet, comment form, and build/no-build alternative survey cards. The booklet was available in English, Spanish, and Creole. During the open-house period, before and after the public hearing, individuals were invited to tour exhibits, including various display boards and technical documents. The display boards included information on each of the following topics: Build Alternatives, Environmental Evaluation, Alternative Trade-Off's, Recommended Station Areas, Waterway and Railroad Crossings, Project Benefits, Maintenance/Layover/Storage Facility locations, and some general information. The technical documents available at each hearing consisted of the Draft AA Report, Station Area Data Book, engineering plans, and the draft Environmental Screening Report.

Notifications about the hearings were prepared for elected officials, agency representatives, and the general public. Invitations were sent to 1,217 agency representatives and elected officials of the Tri-county area by a letter from FDOT District 4 Secretary Jim Wolfe. Over 576,000 invitation flyers were mailed out to property owners, businesses, and stakeholders located along the FEC corridor in all three counties. The public was informed through newspaper advertisements, postcard notices, the project website, municipal websites, email "blast" distributions, invitation flyers available at city halls and public libraries, and through a notice published in the Florida Administrative Weekly. Electronic fliers and media advisories were also distributed to municipalities within the study area, and requests were made to place the meeting date, time, and location on the municipal calendars, bulletin boards and local government TV channels.

Participants provided written and verbal comments and were asked to indicate their favored alternatives on the transit alternatives survey cards. The Study Team was then able to use this feedback to help with the selection of a Locally Preferred Alternative. There were 323 votes placed for the selection of a preferred alternative, which consisted of 214 for the Integrated Rail- DMU alternative, 67 for Integrated Rail - Push-Pull, 6 for BRT, 18 for Low Cost / TSM, and 18 for the No-Build.

6.2.7. Overall Findings

Of the 1,327 Phase 2 comments received, 31 percent expressly indicated support for the project; less than 1 percent indicated opposition; 3 percent indicated support if a specific condition is met; and the remaining 65 percent of the comments touched upon a variety of topics related to the project. These comments were for the most part inquiries on specific topics that can be loosely labeled as conditionally supportive as well. The most frequently mentioned topics are listed below:

- Station locations
- Tri-Rail
- East-west connections
- Noise and vibration
- Economic development
- Grade crossings
- Build alternatives
- Funding sources
- Capital costs

6.3. Stakeholder Outreach

6.3.1. Local Stakeholder Meetings

Numerous meetings were conducted with local groups, including citizen review committees, elected officials, Chambers of Commerce, homeowner associations, business and civic groups, and other stakeholder organizations. In addition, a number of briefings with local business leaders were held during Phase 2. Some meetings with business leaders were held in a one-on-one format while others were included on the agendas of their respective groups. Additional business individuals and groups were identified, contacted and offered presentations as the study progressed.

6.3.2. Agency Coordination Plan

An Agency Coordination Plan was prepared as part of the environmental review process for Phase 2 of the study as defined in Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (P.L. 109-059) (SAFETEA-LU). The Agency Coordination Plan identified the process by which FDOT solicited comments from and communicated information to cooperating and participating agencies, the public and other interested governmental agencies. In addition, the Plan clarified participating agency roles and responsibilities, established time limits on review and comment periods for agencies and the public, and provided an avenue to identify and resolve issues of concern as early as is practicable during the environmental review process. Approximately 140 federal, state, and local agencies were invited to participate in the environmental review process as participating or cooperating agencies.

A project schedule provided an estimated timeline for coordination points (project milestones) including meetings, documents and review periods, timeframes for input, and identified the organizations or agencies to be involved at each coordination point. Cooperating and participating agencies were typically given 30 days from receipt of mate-

Table 6.5 – *Summary of Agency Meetings*

Agency	*Date*	*Description*
South Florida Water Management District (SFWMD)	5/21/2008	Meeting with SFWMD and National Oceanic and Atmospheric Administration Fisheries
	10/7/2008	Follow-Up Meeting with Bill Leonard
FDOT	12/10/2008	Study Meeting with FDOT Utility Coordinator
	2/5/2009	Project Briefing with FLL Sunport Deputy Director
	3/17/2009	SFECC-Service Planning Presentation
Federal Railroad Administration	4/27/2009	Teleconference with FRA
Citizen's Independent Transportation Trust	4/30/2009	Phase 2 presentation to CITT
City of Fort Lauderdale	7/6/2009	Ft. Lauderdale Meeting
Chamber of Commerce of the Palm Beaches	7/20/2009	One-On-One with Chamber of Commerce of the Palm Beaches – Dennis Grady
Center for Independent Living (CILO)	8/24/2009	Briefing to CILO, Ft. Lauderdale Office
CILO	9/24/2009	Briefing to CILO, Miami-Dade Office
Public Involvement Management Team (PIMT)	10/16/2009	Briefing to Miami-Dade PIMT
City of Miami	10/26/2009	Conference call with City of Miami
Miami Dade Transit (MDT)	10/28/2009	Met with MDT
State Historic Preservation Office (SHPO) & Central Environmental Management Office (CEMO)	12/14/2009	Cultural resources coordination with SHPO & CEMO.

rials and documents to review and provide comments; a written reminder was sent to reviewing agencies seven days prior to the end of the review period. An exception to the review period was made for the draft Detailed Alternatives Analysis/Environmental Screening Report (AA/ESR) which had a 45-day review period. Each document had a transmittal letter attached describing the review period and what input was expected from the agency. FDOT assumed no opposition from those agencies from whom no response had been received by the end of the 30-day period. The most current version of the Plan and all documentation/materials referenced has been maintained on the project website (http://www.sfeccstudy.com).

6.3.3. Steering Committee

The Project Steering Committee (PSC) was comprised of representatives from the MPOs, county transit agencies, regional planning councils, the South Florida Regional Transportation Authority (SFRTA), and Districts 4 and 6 of the FDOT. The PSC advised the Study Team and FDOT on policy-related and technical issues. The PSC was responsible for review and comment on the study process and technical reports. Quarterly meetings were held with the Project Steering Committee (PSC) throughout Phase 2.

6.3.4. Agency Meetings

Fifteen agency meetings were conducted at venues throughout the corridor from the Notice to Proceed Date (NTP) April 29, 2008 through January 29, 2010. The purposes of these meetings were to discuss the study process and coordinate efforts as discussed in the Agency Coordination Plan. The meetings were held with agencies shown in **Table 6.5**.

6.3.5. Unscheduled Stakeholder Meetings

Eighteen unscheduled stakeholder meetings were conducted at various venues from the Notice to Proceed Date (NTP) April 29, 2008 through January 29, 2010. The purposes of these meetings were to familiarize public stakeholders with the study area, to discuss the progress of the study, and to resolve any concerns or questions the stakeholders had.

6.3.6. Stakeholder Comments Summary

Among the many comments received during the various outreach meetings discussed above, key issues emerged that helped shape the direction of this analysis. They are:

- Seek input from people with disabilities during the design phase of the process
- Provide convenient access for bicyclists to the system
- Ensure stations and vehicles use green technology
- Partner with private companies to develop stations
- Be aware of competing with other unfunded projects, particularly in Miami-Dade County
- System needs to be "faster, cheaper and better" than current options
- A distinction is needed between Amtrak, high-speed rail and SFECC Study
- The New River is crossed by a moveable bridge; building a fixed bridge would limit the height of boats able to use the New River, and add a new visual to adjacent residences
- Address where additional tracks will be located in the right-of-way

6.3.7. Website

A stand-alone project website was developed (http://www.sfeccstudy.com). The website is consistent with FDOT policies and was designed to provide summaries and detailed project information, and to inform visitors about how various alternatives and potential station areas were situated within the study area. The website was updated approximately every two weeks during the course of the study. Website updates included news items, document downloads, project schedule updates, and notices of public workshops. The website included reciprocal hyperlinks to and from the websites of partners in the study, including MPOs and transit agencies. As a way of making technical memoranda, reports and graphic-intensive project illustrations available to interested parties, the project website was used as a repository for project documentation. The website has been visited over 40,000 times since July 2009.

6.3.8. Station Location Meetings

Meetings were held in municipalities throughout the corridor to solicit public input on the location of stations. These meetings were held in any community that wanted to discuss station locations, so there were varying degrees of participation depending on municipal interest. The status of station decisions is summarized in **Table 6.7**, on the following page. A summary of all Phase 2 Public Meetings is provided in **Table 6.6.** Additional detail on all public involvement activities can be found in the *Public Involvement and Agency Coordination Technical Memorandum* on the study website at www.sfeccstudy.com.

Table 6.6 – *Summary of Phase 2 Public Meetings*

Audience	# Presentations/ Meetings	Attendance (if applicable)
Public Hearings	8	600
Public Meetings/Workshops	34	1200+
Steering Committees	9	
Transportation Policy Boards	7	
City/Town Councils	4	
Municipal Officials / Community Leaders/Local Business Leaders	100+	

Table 6.7 – *Summary of Station Related Decisions*

	County/ Municipality	Summary of Station Related Decisions
PALM BEACH COUNTY	Town of Jupiter	A charrette was led by TCRPC in January 2008 to consider station locations. Three locations were identified: Indiantown Road (Local Park-Ride), Toney Penna Drive (Town Center) and Frederick Smalls Road (Employment Center). Of the three the most important to the community is Toney Penna. Subsequent discussions in the community have reintroduced Donald Ross Road as a possible preferred alternative to the Frederick Smalls location for an Employment Center Station serving the Scripps Campus. The Town has amended its comprehensive plan to reflect the Toney Penna Town Center station and engaged TCRPC for further planning of the Toney Penna Corridor in anticipation of a station. The other two locations have not been formally adopted.
	City of Palm Beach Gardens	A charrette was led by TCRPC in March 2009. A site was identified in the charrette for a Regional Park-Ride station immediately north of the PGA Boulevard bridge over the FEC railroad. The charrette resulted in a plan for this station showing two potential locations for station parking. Results of the charrette have yet to be formally adopted by the city.
	Village of North Palm Beach	A Local Park-Ride location was identified by the Study Team at or to the north of Northlake Boulevard. This location has not been endorsed by the community.
	Town of Lake Park	The team met on several occasions with the town planner and manager, who are in strong support of a Town Center station at Park Avenue. The Town Council adopted a resolution in support of the project that also endorsed a station location in the vicinity of Park Avenue.
	City of Riviera Beach	A charrette was led by TCRPC in October 2007. Though the SFECC project was not a main focus of the charrette nonetheless a station site was identified in the charrette at West 13th Street. City and Community Redevelopment Agency staff are in support of a station in the vicinity of 13th Street.
	City of West Palm Beach	A charrette was led by TCRPC in January 2010 to consider all station location options within the City and develop a consensus around a station and CSX/FEC track connection at 23rd Street in Northwood. Plans were developed for seven station locations in the City (Belvedere Rd, 45th St, 23rd St, Government Center, Okeechobee Blvd, Southern Blvd, and Forest Hill Blvd). The charrette report has not yet been submitted to the City, as there was a need for further detailed impact studies before proceeding.
	City of Lake Worth	A charrette was led by TCPRC in June 2008 to consider station locations. Two locations were identified: Lake-Luzerne (Town Center station) and 10th Avenue North (Neighborhood station). The results of the charrette were adopted by the CRA Board and the city is working on changes to the zoning ordinance to reflect the station locations. The CRA is working on an infill development program for the area around the Lake-Luzerne station.
	Town of Lantana	Several workshop sessions were held with the town manager and town planning staff to identify station locations. Two locations were identified and sketch plans prepared by TCRPC with agreement by staff on the locations and basic concepts.
	City of Boynton Beach	Several workshop sessions were held with the town manager, planning and CRA staff to identify station locations. Two locations were identified and sketch plans prepared by TCRPC with agreement by staff on the locations and basic concepts.
	City of Delray Beach	Several workshop sessions were held with the town manager, planning and CRA staff to identify station locations. Two locations were identified, but plans were not prepared. The city staff intend to conduct their own planning exercises for the station areas.
	City of Boca Raton	Several workshop sessions were held with the town manager and planning staff to identify station locations. Three locations were identified: NW 51st Street (Employment Center station), NW 20th Street (Employment Center station) and north of Palmetto Park Road (Town Center station). Sketches were prepared by TCRPC staff for each location with agreement by city staff on location and basic concepts. Results will be presented to City Council in the Fall of 2011.

Table 6.7 cont - *Summary of Phase 2 Station Related Decisions*

County/ Municipality		Summary of Station Related Decisions
BROWARD COUNTY	City of Deerfield Beach	Several meetings were held with city staff to discuss station locations. A single location was identified close to Hillsborough Boulevard. No actual planning as to exact location and layout has taken place.
	City of Pompano Beach	Several meetings were held with city staff to discuss station locations. No conclusion was reached as to number of stations or final locations, though three stations are currently included in the project: Sample Road (Employment Center/Local Park-Ride), Pompano Transfer (Local Park-Ride station), Atlantic Boulevard (Town Center station).
	City of Oakland Park	Several meetings were held with the Town Manager. Two locations for stations are included in the project: Commercial Boulevard (Employment Center station), and NE 38th Street (Town Center). The City Manager is a strong advocate for the town center station.
	City of Wilton Manors	Several meetings were held with the city planning staff. One location for a station was identified in the vicinity of NE 26th Street. The City is a strong advocate for this station.
	City of Fort Lauderdale	Several workshops were held by the city planning staff with participation of the project team. Five station locations were identified during these meetings (Sunrise/13th St, Sistrunk/Andrews Ave, Government Center, SE 17th St, and FLL Airport). No specific plans have been developed. In addition meetings were held with the planning staff for the airport and seaport regarding a station at the Fort Lauderdale/Hollywood International Airport.
	City of Dania Beach	Several meetings were held with Dania Beach and CRA staff. Two station locations are included in the project: Dania Beach Boulevard (Town Center station) and Sheridan Street (Local Park-Ride). The City is in strong support of the town center location and have constructed a parking garage at City Hall which they intend to share with the station. The second location is less important to the City but is included in the project to provide parking for passengers travelling from the west.
	City of Hollywood	Several meetings were held with the City staff to discuss station locations. Only one location is currently identified within the city limits, though city staff expressed interest in a number of locations, with a station close to Hollywood Boulevard being the most important. This is a Town Center station to the north of Hollywood Boulevard. No station area planning has taken place.
	City of Hallandale Beach	Several meetings were held with City and CRA staff. Two stations locations are identified in the City: Pembroke Road (Regional Park-Ride), SE 3rd Street (Town Center). The city staff regards the SE 3rd Street station as key to the redevelopment of the downtown area. The project team met with the owners of the Mardi Gras Casino to discuss shared use of the casino parking lot at Pembroke Road.

Table 6.7 cont - *Summary of Phase 2 Station Related Decisions*

County/ Municipality		Summary of Station Related Decisions
MIAMI-DADE COUNTY	City of Aventura	Several meetings were held with the city planner and other members of the city administration. One station location was identified opposite the Aventura Mall between 193rd and 203rd Streets. The station is designated an Employment Center station but parking will probably be needed at this location. The specific location and configuration of this station has not been determined. A charrette was discussed with the City but has not yet taken place. This station also affects an unincorporated area of Miami-Dade County known as Ojus. There have been no meetings with representatives of Ojus.
	City of North Miami Beach	Several meetings were held with the City staff. Two station locations were identified for inclusion in the project: NE 163rd Street (Town Center station), and 151st Street (Employment Center station). No station area plans have been developed to date.
	City of North Miami	One station location has been discussed and agreed with the city staff at 125th Street. No station area planning has taken place.
	Village of Biscayne Park	Several meetings were held with village officials and a half day public meeting was held to discuss the location of a station in the village. The conclusion was that there should be no station in the village, which could be served from stations to the north and south.
	Village of Miami Shores	Several meetings have been held with the mayor to discuss a station in Miami Shores. The village administration is split as to whether they want a station in their community. One station is included in the project plan at NE 96th Street (Neighborhood station).
	Village of El Portal	Several meetings were held with village officials, who have changed their view several times on their need for a station in El Portal. At one point they desired a station, but surrounding land use changes would not have been transit supportive; later they agreed that the 79th Street Station in Miami was close enough to serve them. The project does not include a station in El Portal.
	City of Miami	Several meetings were held with city planning, economic development and CRA staff. These meetings resulted in a staff level agreement on 5 stations within the city: NW 79th Street (Town Center station), NW 54th Street (Town Center station), NW 36th Street (Town Center station), NW 8/11th Street in Overtown (Regional Park-Ride/Town Center station) and Miami Government Center (Center City station). No plans have been developed for any of the stations except at Overtown. A one day charrette was held with the community in Overtown to help determine whether there should be an Overtown Station and if so where it would be located. As a result the Overtown Station is included in the project, but the exact location has not yet been determined and will require further work with the community.

Chapter 7

Trade-Offs Analysis

Highlights:

- Comparative benefits and costs of the four detailed alternatives are based on evaluation measures that directly support project goals and objectives.
- Evaluation measures fall into one of five categories: Effectiveness, Project Impacts, Cost-effectiveness, Financial Feasibility, and Equity.
- The evaluation highlights the cost-effectiveness of the Low Cost/TSM, the operating cost advantages of BRT, and the large number of positive impacts the rail alternatives can provide, particularly DMU.
- Each alternative meets the goals and objectives of the project, and each alternative has some positive benefits. However, the Integrated Rail – DMU option has the highest potential for positive impacts of any alternative.
- The summary table at the end of the chapter is a useful guide in showing comparative benefits and costs.

7.1. Approach

This chapter provides information on the comparative benefits and costs of the four build alternatives, using evaluation measures that directly support the project goals and objectives listed in Chapter 2. This evaluation was designed to support the local decision-making process, but did not attempt to determine the Locally Preferred Alternative (LPA). The evaluation measures used in this analysis are a mix of quantitative and qualitative factors that define the major benefits and costs of each alternative. The measures also serve to emphasize that the determination on providing a new transit facility is driven by a multitude of factors, including mobility, community development, economic opportunity, environmental quality, public and political support, and financial viability. These factors can counteract each other, creating trade-offs that local decision-makers must weigh.

Federal Transit Administration (FTA) guidance was used as the basis for grouping the evaluation measures into five categories:

- Effectiveness – the extent to which the project solves the stated transportation problems in the corridor
- Project Impacts – the extent to which the project supports economic development, environmental or local policy goals
- Cost-effectiveness – that the costs of the project, both capital and operating, be commensurate with the benefits
- Financial feasibility – that funds for the construction and operation of the alternative be readily available in the sense that they do not place undue burdens on the sources of those funds
- Equity – that the costs and benefits be distributed fairly across different population groups

The findings for the evaluation measures are summarized in the sections that follow. Note that Goal 6 Objective 2, 'Optimize transportation funding resources and obtain local financial support', is not represented in this evaluation, as this objective will be explored in Phase 3 of this study.

7.2. Effectiveness

The effectiveness measures chosen for this alternatives analysis focus on a mix of transit characteristics such as ridership, demographics, stations, freight interactions, and accessibility. In general, higher numbers in these effectiveness measures are more advantageous.

The findings for the nine evaluation measures that fall under the Effectiveness category are in **Table 7.1**. Each measure also lists the goal and objective that it is designed to address.

Ridership projections for the build alternatives are listed in both total project ridership and total regional transit ridership. In both instances, the Integrated Rail – DMU has the highest projected ridership. The two bus alternatives have lower SFECC ridership projections than the rail alternatives, with Low Cost/TSM ridership the lowest of the build alternatives. At a regional scale, the differences between the alternatives are muted, as all alternatives contribute to regional ridership in the range of between 648,000 and 653,000. Closely related to ridership is the finding of person trips diverted from the automobile. All alternatives have a narrow range of impact, from 11,000 to 16,000.

Effectiveness can also be measured by the amount of access that the alternatives provide. In all cases except Low Cost/TSM, there are a large number of jobs and residents within ½-mile of project stops and stations. The BRT and rail alternatives share the same 52 new station locations, while the Low Cost/TSM alternative operating on existing bus corridors provides increased accessibility as there are no new stops or stations. The 52 new stations are within 1/2-mile of nearly 300,000 residents and over 300,000 jobs. This averages to nearly 6,000 residents and jobs per station within 1/2-mile, numbers that reflect the high density found throughout the SFECC corridor.

Access to the wider premium transportation network can be measured by the number

Table 7.1 – *Effectiveness Measures*

	Goal	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Jobs/Population within ½-mile of new stops and stations	1.1, 3.1	0	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590
Average weekday SFECC ridership (unlinked trips)	1.3, 2.1	11,000	20,000	59,000*	52,000*
Total regional transit trips (linked)	1.4, 1.7	650,000	652,000	653,000	648,000
New Stops and Stations	1.5	0	52	52	52
Person trips diverted from automobile	1.8, 5.3	13,000	15,000	16,000	11,000
Number of premium transit services connected to alternative	1.5, 2.2	3	3	3	3
Number of street crossing closures (crossing gates down) in peak hour	4.1	0	0**	8	8

** The Integrated Rail alternatives incorporate the CSX rail line, and thus ridership numbers include riders on both FEC and CSX corridors*
*** There are no crossing gates associated with the BRT alternative but an additional set of signals and complicated geometry may have a negative effect on east-west cross-street traffic.*

of new transfer points between proposed FEC service and services like Tri-Rail and Metrorail. The two rail alternatives are designed to connect to Tri-Rail at transfer stations in West Palm Beach and Pompano Beach, while also connecting to Metrorail at Miami Government Center. The Metrorail Transfer Station on Tri-Rail would also still operate. The BRT Alternative would connect to Metrorail as well and connect with Tri-Rail at West Palm Beach, Deerfield Beach, Boca Raton, and Fort Lauderdale. The Low Cost/TSM would operate on surface roads along the FEC corridor, originating and terminating at Tri-Rail stations, thus providing connectivity to that rail corridor. It should be noted that there are a number of east-west premium transit services being planned in all three counties. However, at this point in time there is no way to know which of these will be in operation by the design year.

Impacts to vehicular traffic can be measured by the number of street crossing interruptions. For rail, grade crossing closures would prevent traffic from crossing the tracks up to eight times per hour in peak running times. The BRT alternative would not require crossing closures, but crossings would require new traffic signals at the intersection.

7.3. Project Impacts

Project impact measures look at the degree to which the alternatives are compatible with land use, support environmental conservation, promote economic development, and minimize interference for freight operations. The findings for project impact measures are in **Table 7.2**.

Based on a comprehensive review of local land use planning documents, the rail alternatives are highly compatible in 16 out of 28 plans, as many existing planning documents support and encourage FEC passenger service in general and rail service in particular. The BRT alternative has modest plan compatibility, while the Low Cost/TSM does nothing to advance the goals of municipal, county, and regional planning efforts. Additionally, the rail alternatives are compatible with freight, as the shared-track design (discussed in more detail in section 3.3) promotes improved operations by more than doubling the trackage currently used by

Table 7.2 – *Project Impacts Measures*

	Goal	Low Cost/ TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Compatibility with local plans and policies regarding transit	2.5, 3.3, 3.4, 3.6	Low	Medium-High	Medium-High	Medium-High
Compatibility with freight operations	1.4,1.7, 6.3	N/A	Negative	Positive	Positive
New track miles available for use by freight & Amtrak	1.4, 1.7	0	0	116	116
Miles of greenway accommodated	2.6	0	37	51	51
Economic Development Potential	3.1, 3.2	Low	Medium	High	Medium-High
Visual Impacts - Number of affected parcels	4.4	0	20,000	22,000	22,000
Number of possible new grade separations	4.1	0	4-28	4-24	4-24
Noise impacts - Number of affected parcels	4.2	0	0	1,200	1,800
Vibration impacts - Number of affected parcels	4.2	0	0	5,700	4,600
Property acquired / relocated for right-of-way acquisitions (acres)	4.4, 4.5	0	43	21	21
Number of historic and cultural resources potentially affected	5.2	4	60	63	63
Directly impacted acres of environmentally sensitive areas (includes wetlands, parks, conservation areas)	5.1, 5.4	0	22	10	10
Reduction in regional emissions (short tons of CO_2/day)	5.5	134,232	93,446	248,883	157,475
Maintenance of working relationships with stakeholders	2.3	Yes	Yes	Yes	Yes

the FEC. This is also reflected in the number of new track miles available to freight and Amtrak, where the rail alternatives provide 116 new track miles along the 85-mile corridor. Conversely, the Low Cost/TSM provides no new track mileage and no freight compatibility, and BRT impedes freight movement due to the need for segregation of BRT and freight on the corridor.

7.4. Financial Feasibility

There are three measures in the financial feasibility category, as shown in **Table 7.3**.

The Low Cost/TSM by definition is designed to have a low capital cost. The Low Cost/TSM, at $220 million, is well below the other three alternatives. The vast majority of cost for this alternative is from purchase of new vehicles. The BRT and rail alternatives are much costlier due to the need for construction of new track/busway in addition to purchasing new vehicles. The rail alternatives are estimated to be costlier than BRT, with the DMU alternative costing as much as $2.5 billion.

Annual operating costs are more similar, with all of the alternatives estimated to cost between roughly $47 and $106 million annually. As compared to regional operating costs, these services would all account for less than 15 percent of the current total budgets for operating costs at the four regional transit agen-

Table 7.3 – *Financial Feasibility Measures*

	Goal	Low Cost/ TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Capital costs	6.1	$198 - $242 million	$2.57 - 3.14 billion	$2.50 - $3.05 billion	$2.70 - $3.30 billion
Annual Operating Costs (in millions)	6.1	$47 million	$57 million	$100 million	$106 million

cies (Miami-Dade Transit, Broward County Transit, Palm Tran, and SFRTA).

7.5. Cost-Effectiveness

The cost-effectiveness measures focus on metrics for capital and operating cost per passenger, as well as projections of ridership loss on the existing premium transit systems of Tri-Rail and Metrorail. Ideally, the preferred alternative would have capital and operating costs competitive with recently funded transit projects elsewhere in the United States and would draw only a limited portion of its projected ridership from existing transit services. In general, the Low Cost/TSM alternative should be the most cost-effective alternative, as the purpose of the Low Cost/TSM is to maximize cost-efficiencies without a major capital investment.

The findings for the six evaluation measures that fall under the Cost-Effectiveness category are in **Table 7.4**.

The BRT alternative is projected to increase ridership on the current Tri-Rail corridor by about 2,000. The Low Cost/TSM also improves Tri-Rail's ridership projections, but not to the extent that the rail alternatives increase total regional transit ridership. These increases are most likely due to improvements to Tri-Rail included in all alternatives. The rail alternatives cannot accurately reflect change in Tri-Rail ridership, as the Tri-Rail and FEC corridors are merged into a larger rail system. Metrorail is negatively impacted by the Low Cost/TSM and the BRT alternatives, but modestly increases under the two rail alternatives, with the DMU alternative generating 3,000 new Metrorail riders.

The two cost effectiveness measures reflecting capital cost show the Low Cost/TSM as being the least financially impactful, as the alternative was designed to be. The rail and

Table 7.4 – *Cost-Effectiveness Measures*

	Goal	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Change in average weekday Tri-Rail ridership relative to Low Cost/TSM	2.4	+1,000	+2,000	N/A	N/A
Change in average weekday Metrorail ridership relative to Low Cost/TSM	2.4	-3,000	-2,000	+3,000	+2,000
Capital cost per weekday passenger	6.1	$6,000	$48,000	$42,000	$48,000
Capital cost per passenger mile	6.1	$0.90	$8.80	$7.20	$8.50
Operating cost per annual passenger	6.1	$11.80	$9.90	$10.90	$12.70
Operating cost per passenger mile	6.1	$0.60	$0.50	$0.60	$0.70

BRT alternatives' capital costs are all substantially higher overall, and more expensive per rider; however, the capital costs are all competitive with recently FTA-funded or approved systems nationwide. For example, several recent projects having capital cost per weekday passenger estimates of above $50,000, while none of the build alternatives for the FEC corridor have costs estimated above $48,000, and the Integrated Rail-DMU has a cost of approximately $42,000.

Operating costs per passenger were lowest for the BRT alternative, with the other three alternatives costing $1-3 per person more to operate. Integrated Rail – Push-Pull had the highest operating costs per passenger. The Low Cost/TSM is, on a per-passenger basis, comparatively cheaper to build but relatively more expensive to operate because it generates relatively few riders for the number of buses that it takes to operate the service.

In general, when considering cost-effectiveness characteristics, the Low Cost/TSM alternative has the lowest capital and operating costs overall, but operating cost per annual passenger and per passenger mile are not dissimilar to other alternatives. The BRT alternative is expensive to build, equivalent to the two rail alternatives, but it is marginally cheaper to operate. Of the two rail alternatives the Integrated Rail DMU appears to be more cost effective as it's capital and operating costs are lower per passenger than the Push-Pull alternative. It also has the most positive effect on Metrorail ridership of all the alternatives.

7.6. Equity

For the project to be equitable it should not unduly impact disadvantaged communities. The two equity measures chosen for this evaluation highlight one positive impact and one possible negative impact. The findings for this category are listed in **Table 7.5**.

The opportunity to provide transit-dependent populations new access to transit stations is a clear benefit for these groups. The 52 stations proposed for the BRT and rail alternatives are within ½-mile of nearly 5,000 zero-car households, while the Low Cost/TSM provides no new access as this alternative utilizes existing bus stops..

Conversely, the need for right-of-way acquisitions leads to the possibility of acquiring or relocating properties in minority or low income neighborhoods. The rail alternatives would require at least a portion of as many as 119 properties in designated minority or low income neighborhoods, equating to nine total acres to acquired land. The BRT option would impact a slightly higher number, 123 properties totaling 10 acres. The Low Cost/TSM would impact none. While the overall number of acres and properties are similar among the rail and BRT alternatives, the rail acquisitions are disproportionately in minority and low income neighborhoods: for the rail alternatives, 21 acres of acquisition are required systemwide, while 43 acres are required in the BRT alternative. The percentage of acquisition required in low-income and minority neighborhoods (9/21 = 43%) is higher in the rail alternatives because of the demographic characteristics around the

Table 7.5 – *Equity Measures*

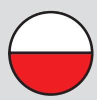
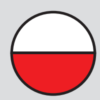
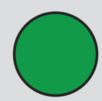
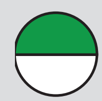
	Goal	Low Cost/ TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Zero-Car households within ½-mile of new stations	1.6	0	4,944	4,944	4,944
Number / Acres of relocated/acquired properties and businesses in minority and low income neighborhoods	4.3	0	123 properties 10 acres	119 properties 9 acres	119 properties 9 acres
Total right-of-way acquisitions (acres)	4.4, 4.5	0	43	21	21

Pompano and Northwood crossover connections, which are absent in the BRT alternative.

7.7. Significant Trade-Offs

Looking at the five FTA evaluation categories has shown that the measures used to evaluate the project's build alternatives are robust, and that this project has taken into account the multitude of factors that can influence a transit investment decision. The measures have highlighted the cost-effectiveness of the Low Cost/TSM and the large number of positive impacts the rail alternatives can provide, particularly DMU. However, the build alternatives were designed first and foremost to meet the goals and objectives of this project (see Chapter 1.7 for a list of the project goals and objectives) which are derived from the Purpose and Need for the study. Each measure used in this evaluation is related to one or more project objective. **Table 7.6** below sorts the evaluation measures by goal and comparatively "grades" each alternative on how well it achieves each goal. This shows the degree to which each alternative meets the goals, and the significant trade-offs that must be considered based on the different characteristics of each alternative. Understanding these trade-offs was the pivotal information needed by the counties to select a Locally Preferred Alternative.

Table 7.6 – *Evaluation Summary*

	Goal/ Obj.	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Goal 1: Improve mobility and access for personal travel and goods movement					
Total SFECC ridership (unlinked trips)	1.3, 2.1	11,000	20,000	59,000*	52,000*
Total regional transit trips (linked trips)	1.4, 1.7	650,000	652,000	653,000	648,000
New track miles available for use by freight & Amtrak	1.4, 1.7	0	0	116	116
Compatibility with freight operations	1.4,1.7	N/A	Negative	Positive	Positive
New Stations/stops	1.5	0	52	52	52
Person trips diverted from automobile	1.8	13,000	15,000	16,000	11,000
Zero-Car Households within ½-mile of new stops and stations	1.6	0	4,944	4,944	4,944
Jobs/Population within ½-mile of new stops and stations	1.1, 3.1	0	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590	Population: 293,380; Jobs: 304,590
End to end running time (Peak/Off Peak) (hours)	1.2	4:05/5:20	4:03/4:18	2:05/2:26	2:29/2:49

* *The Integrated Rail alternatives incorporate the CSX rail line, and thus ridership numbers include riders on both FEC and CSX corridors*

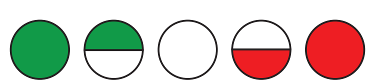
<-- Poor  Good -->

Table 7.6 cont. - *Evaluation Summary*

	Goal/ Obj.	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Goal 2: Coordinate corridor transportation investments to contribute to a seamless, integrated regional multi-modal transportation network					
Miles of greenway accommodated	2.6	0	37	51	51
Number of premium transit services connected to alternative	1.6, 2.2	3	3	3	3
Change in Tri-Rail ridership relative to no-build	2.4	+1,000	+2,000	N/A*	N/A*
Change in Metrorail ridership relative to no-build	2.4	-3,000	-2,000	+3,000	+2,000
Goal 3: Encourage the implementation of transit supportive development					
Economic Development Potential	3.1, 3.2	Low	Medium	High	Medium-High
Compatibility with local plans and policies regarding transit	2.5, 3.3, 3.4, 3.6	Low	Medium-High	High	High
Goal 4: Minimize adverse impacts to the community and local businesses					
Number/Acres of relocated/ acquired properties and businesses in minority and low income neighborhoods	4.3	0	123 properties 10 acres	119 properties 9 acres	119 properties 9 acres
Number of possible new grade separations	4.1	0	3-28	3-24	3-24
Noise impacts - Number of affected parcels	4.2	0	0	1,200	1,800
Vibration impacts - Number of affected parcels	4.2	0	0	5,700	4,600
Right-of-way acquisitions (acres)	4.4, 4.5	0	43	21	21
Visual Impacts - Number of affected parcels	4.4	2000	20,000	21,000	21,000

* *Service integrated with Tri-Rail*

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Table 7.6 cont. - *Evaluation Summary*

	Goal/ Obj.	Low Cost/TSM	BRT	Integrated Rail: DMU	Integrated Rail: Push-Pull
Goal 5: Preserve and enhance the environment					
Number of historic and cultural potential impacts	5.2	4	60	63	63
Directly impacted acres of environmentally sensitive areas (e.g., wetlands, parks, conservation areas)	5.1, 5.4	0	22	10	10
Reduction in regular emissions	5.5	134,232 short tons CO2/day	93,446 short tons CO2/day	248,884 short tons CO2/day	157,475 short tons CO2/day
Goal 6: Provide a cost-effective transportation solution					
Capital Cost	6.1	$198 - $242 million	$2.57 - $3.14 billion	$2.50 - $3.05 billion	$2.70 - $3.30 billion
Annual Operating Costs (excluding Tri-Rail)	6.1	$47.3 million	$56.5 million	$99.6 million	$106.1 million
Capital cost per weekday passenger	6.1	$6,000	$48,000	$42,000	$48,000
Capital cost per passenger mile	6.1	$0.90	$8.80	$7.20	$8.50
Operating cost per annual passenger	6.1	$11.80	$9.90	$10.90	$12.70
Operating cost per passenger mile	6.1	$0.60	$0.50	$0.60	$0.70
Annual Revenues	6.1	$16.0 million	$18.2 million	$23.0 million	$19.8 million

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Looking at each alternative in turn, the Low Cost/TSM alternative successfully addresses each goal, providing a cost-effective and minimally impactful option. However benefits like SFECC ridership, person trips diverted from automobiles, and economic development potential are limited. Additionally, there is no new access for transit-dependent riders nor is there new access to significant numbers of jobs. However, the low impacts of this alternative have benefits, particularly as related to low capital cost and limited adverse community impacts. In sum, this alternative provides minimal benefits for minimal initial costs, but the counties must be prepared to dedicate resources to its long-term operation.

The BRT alternative successfully addresses each goal, but BRT is unremarkable in that there is no goal where it is the most positively rated. Adverse impacts are minimized, but not to the same extent as the Low Cost/TSM. Ridership and transit-supportive development possibilities are significant, but not as high as the rail alternatives. The BRT alternative has modest capital and superior operating costs relative to the rail alternatives, but costs per passenger mile are no better than the other build alternatives. Additionally, the owner of FEC Industries, Fortress Investment Group, opposes busses operating in the FEC right of way because the roadway would limit their ability to expand freight operations and would interfere with access to delivery tracks located across the busway. This limits the feasibility of this alternative. Overall, this alternative provides modest benefits, but does so with limited support from key stakeholders at a capital cost equal to the rail alternatives without many of the benefits that rail provides, and potentially a policy decision from the FEC to not allow busses to operate on the right-of-way.

The Integrated Rail – Push-Pull alternative successfully addresses each goal, providing the second-highest SFECC ridership projections and person trips diverted from cars. It also demonstrates high compatibility with local land use plans and policies. Both Push-Pull and DMU rail alternatives would substantially contribute to a seamless, integrated transportation network that includes the possibility of improved freight operations. The opportunity for transit oriented development is somewhat reduced by negative environmental impacts on adjacent properties caused by noise and vibration close to the tracks, yet the net benefits are still higher in this alternative than in the two bus alternatives. The benefits described, however, come with increased costs. Capital costs are higher than the bus alternatives, while annual operating costs and operating cost per passenger are the highest of any alternative. There are a number of acquisitions required, totaling as much as 20 acres, some of which fall within environmental justice communities. Overall, this alternative has positive benefits far above the bus alternatives, but there are large financial costs and some community impacts.

The Integrated Rail – DMU alternative successfully addresses each goal, and provides the highest benefits of any build alternative. Ridership projections are highest for this alternative, as are person trips diverted from the automobile. The DMU alternative also has the strongest economic development and transit oriented development potential. This alternative, like Push-Pull, provides substantial contributions to an integrated transportation network while improving freight operations on the FEC corridor. This alternative has high compatibility with local land use plans and policies, many of which specifically mention support for passenger rail on the FEC. Evaluation measures focusing on operating costs, both annually and per passenger, show this alternative to be relatively affordable to operate, with only BRT being more cost-effective. The most substantial costs related to this alternative are capital expenditures and required acquisitions. Estimated capital costs are higher for this alternative than for the BRT alternatives, at $2.47 billion, but not higher than the Push-Pull alternative. In sum, the Integrated Rail-DMU alternative does a better job of addressing project goals than any other alternative by projecting high ridership, exhibiting strong compatibility with land use and freight plans, and improving economic development and transit-supportive development, all while keeping operating costs to a level similar to BRT and Push-Pull build alternatives. However, there is a cost to providing these benefits, as initial capital investment is high, and potential impacts along the corridor must be addressed.

Note that this analysis did not assume any potential mitigation to minimize or avoid environmental impacts. Therefore, the environmental factors should be considered as potential impacts many of which could be mitigated. The Draft Environmental Impact Statement to be prepared in Phase 3 will determine in more detail the actual impacts of the project.

Overall, each alternative has advantages with the Low Cost/TSM Alternative providing a low-cost option with some positive impacts but little or no local support, while the Integrated Rail-DMU Alternative provides a highly positive option at a high initial cost. The other two alternatives, BRT and Integrated Rail – Push-Pull, do not provide as many positives while having only incrementally smaller costs as the DMU alternative.

Chapter 8

Approval Process and Regional Support

Highlights:

- Project has received approvals from two of the three Metropolitan Planning Organizations in the Study area, the Southeast Florida Transportation Council, and the South Florida Regional Transportation Authority

- Numerous other regional agencies and local municipalities have also endorsed the project.

- The Miami-Dade MPO requested additional information before approving the project.

8.1 Approval Process

Despite the complexity of the project and the diversity of the South Florida region, throughout this study there has been, and continues to be support from communities and regional decision-makers, as well as the general public. That support has been built by a strong commitment to and understanding of the concerns of the towns and cities along the corridor and of the regional stakeholders.

Following the September 2010 public hearings the project was presented to a broad spectrum of regional agencies and their respective technical subcommittees. With one exception these entities have endorsed the project and passed formal resolutions in favor of the project moving forward to the next phase.

8.1.1 Metropolitan Planning Organizations

There are three separate Metropolitan Planning Organizations (MPO) representing different geographic areas of the corridor: the Miami-Dade MPO, Broward MPO and Palm Beach MPO. Each has technical subcommittees that typically review projects before they are presented to the full board for action. The project team offered individual briefings to each individual member of the three MPO boards, and met with all those who expressed interest. The project was taken to the technical subcommittees prior to presentation and the full MPO board meetings. As a result the Palm Beach MPO, at their October 21, 2010 meeting endorsed the regional rail alternative (utilizing either push-pull or DMU equipment). The Broward MPO passed a similar resolution at its October 14, 2010 board meeting. The Miami-Dade MPO deferred a decision with a request for additional information. (See **Table 8.1**)

8.1.2 Regional Agencies

In addition to the MPOs which represent each of the three counties in the study area, there are two regional agencies that cover the entire region in the study area and two regional planning councils that hold an important role in advancing the project. The regional agencies are the South Florida Regional Transit Authority (SFRTA) which runs existing Tri-Rail service, and the South East Florida Transportation Council (SEFTC) which is a three member board comprised of the chairs of the three MPOs. The SFRTA and SEFTC also have a technical advisory committee (PTAC and RTTAC, respectively) that typically review important projects prior to review by the full board. Both boards passed resolutions selecting the regional rail alternative with consideration of Metrorail as their preferred systems alternative.

The southern portion of the region is also represented by the South Florida Regional Planning Council (SFRPC) and the northern portion of the region by the Treasure Coast

Table 8.1 – *Metropolitan Planning Organization Approvals*

Agency	Date	Resolution
Broward County MPO TCC	Sept 27, 2010	Approved project (no specific alternative)
Miami-Dade MPO TPC	October 4, 2010	Approved Regional Rail
Palm Beach MPO TAC	October 6, 2010	Approved Regional Rail
Palm Beach MPO CAC	October 6, 2010	Approved Regional Rail
Broward MPO	October 14, 2010	Approved Regional Rail
Miami-Dade MPO CTAC	October 20, 2010	Approved Regional Rail
Palm Beach MPO	October 21, 2010	Approved Regional Rail
Miami-Dade MPO	Nov 18, 2010	Deferred with request for further information

Regional Planning Council (TCRPC). Both boards have passed resolutions endorsing the project. (See **Table 8.2**)

8.1.3 County Agencies

In addition to the MPOs each County has a County Commission that engages in planning on a county-wide basis. Schools in Florida are organized into county school districts, so there are three school boards that represent the interests of the school communities in Palm Beach, Broward and Miami-Dade Counties. Some of these, and other county wide organizations have also adopted resolutions of support for the project in general. (See **Table 8.3**)

8.1.4 Local Municipalities and Agencies

Resolutions of support have also been received from a number of the communities along the corridor. These resolutions both support the project in general and typically also affirm the station locations within each community's jurisdiction.

In addition, the City of Miami Downtown Development Authority approved the project on June 25, 2010 and the Fort Lauderdale

Table 8.2 – *Regional Agency Resolutions of Support*

Agency	Date	Resolution
TCRPC	September 7, 2010	Regional Rail
SEFTC	September 27, 2010	Regional Rail with Metrorail
SFRTA PTAC	October 13, 2010	Regional Rail
SEFTC RTTAC	October 22, 2010	Regional Rail
SFRPC	November 8, 2010	Regional Rail
SFRTA Board	January 24, 2011	Regional Rail with Metrorail

Table 8.3 – *Countywide Resolutions of Support*

Agency	Date
Broward Board of County Commissioners	2009
Miami-Dade TARC	January 13, 2010
Palm Beach County School Board	August 4, 2010
Palm Beach County League of Cities	September 22, 2010

Table 8.4 – *Municipal Resolutions of Support*

Municipality	Date	Municipality	Dates
Oakland Park	August 11, 2010	Jupiter	October 5, 2010
Fort Lauderdale	September 1, 2010	Lake Park	October 6, 2010
Hollywood	September 1,2010	Palm Beach Gardens	October 21,2010
Aventura	September 7, 2010	Miami	October 28,2010
Dania Beach	September 14, 2010	Boynton Beach	November 16, 2010
North Miami	September 14, 2010	Village of Palm Springs	November 18,2010
Pompano Beach	September 14, 2010	Lake Worth	November 19, 2010
Wilton Manors	September 14, 2010	North Miami Beach	January 4, 2011
Hallandale Beach	September 15, 2010	Biscayne Park	February 1, 2011
Deerfield Beach	October 5, 2010	Hialeah	February 8, 2011
		El Portal	February 22. 2011

Downtown Development Authority approved it on September 9, 2010. Several Community Redevelopment Authorities (CRAs) have also adopted resolutions of support including those in Lake Worth and Delray Beach.

8.2 Next Steps

As of this writing the Miami-Dade MPO governing board had not yet endorsed the project. The team has assembled the additional information requested by the board and FDOT will present this information at the October 2011 MPO meeting.

Once their endorsement is secured the project will have full regional buy-in and will be positioned to move forward with more detailed studies and environmental documentation.

APPENDIX

Documents Referenced in this Report:

- Public Involvement Plan
- Agency Coordination Plan
- North End Connection Technical Memorandum
- Phase 1 Final Conceptual Alternatives Analysis / Environmental Screening Report
- Phase 2 Navigable Waterway Analysis Technical Memorandum
- Programmatic Guidelines for Prototypical Station Types Technical Memorandum
- Regional Operations and Maintenance Facility Summary Technical Memorandum
- Roadway-Transitway Crossing Analysis Technical Memorandum
- SFRC-FEC Connections Technical Memorandum
- Station Location Evaluation Methodology Technical Memorandum
- Station Location Methodology Memorandum
- Regional Station Area Design Guidelines Technical Memorandum
- Phase Two Detailed Environmental Screening Report

These documents can be viewed on the study website (http://www.sfeccstudy.com) or at FDOT District 4.
See “Abstract” at beginning of this document for contact information.