Technical Memorandum:

Alternative Options and Policy Implications

Prepared for:

Florida Department of Transportation
Systems Planning Office

June 2010

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Prepared for:

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Prepared by:

WilburSmith ASSOCIATES

In association with:

Reynolds, Smith, and Hills
TranSystems Corporation

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Chapter 1 - Introduction

1.1 Background

The Department of Transportation is required, as part of recently passed legislation, to conduct a transportation alternatives study of the Interstate 95 (I-95) corridor by June 30, 2010. HB 1021 was signed by Governor Crist on May 27, 2009, adding Section 26, Chapter 2009-85, Laws of Florida. This section, which went into effect on July 1, 2009, includes the following language:

> *"The Department of Transportation, in consultation with the Department of Law Enforcement, the Department of Environmental Protection, the Division of Emergency Management of the Department of Community Affairs, the Office of Tourism, Trade, and Economic Development, affected metropolitan planning organizations, and regional planning councils within whose jurisdictional area the I-95 corridor lies, shall complete a study of transportation alternatives for the travel corridor parallel to Interstate 95 which takes into account the transportation, emergency management, homeland security, and economic development needs of the state. The report must include identification of cost-effective measures that may be implemented to alleviate congestion on Interstate 95, facilitate emergency and security responses, and foster economic development. The Department of Transportation shall send the report to the Governor, the President of the Senate, the Speaker of the House of Representatives, and each affected metropolitan planning organization by June 30, 2010."*

1.2 Study Purpose

The purpose of the study is to assess the travel demand from people and goods moving along the I-95 corridor in the State of Florida against four measures: transportation, emergency management, homeland security, and economic development. Additionally, the study will identify cost effective strategies to alleviate congestion, facilitate emergency and security response, and foster economic development in the State of Florida.

This Technical Memorandum, Alternative Options and Policy Implications, is the second in a series of documents describing the development of the I-95 Transportation Alternatives Study. This document identifies numerous alternative transportation options available for improving mobility, emergency and security response, and economic development along the I-95 corridor, along with the policy implications of implementing those alternatives. This document does not recommend specific projects or solutions for implementation, but rather presents a comprehensive list of alternative approaches within the 12 county study area.

The first Technical Memorandum, Identification of Corridor Conditions and Needs, was issued in February 2010 and identifies existing conditions along the I-95 corridor from different perspectives, including transportation, demographic, emergency management, homeland security, and economic development. The document also describes deficiencies from each of these perspectives and identifies corridor related needs for each perspective.

A final report document summarizing the I-95 Transportation Alternatives Study will conclude the series by late spring 2010.

1.3 Study Corridor

The development of the I-95 Corridor has occurred over a 50 year period and still continues today. Construction of I-95 was initiated in Miami with a short segment being completed in 1961. Development of the corridor continued from both ends and, except for a gap in Martin and St. Lucie Counties, was substantially completed by 1980. The final segment in Martin and St. Lucie Counties was opened in 1987. Even as construction was being accomplished on new segments, major re-construction and widening was occurring on older, more heavily traveled segments.

Current plans call for substantial transportation improvements within the existing corridor, and there are only two segments with four lanes remaining in the corridor. These segments, in Volusia/Brevard and Brevard/Indian River Counties, are planned for expansion to 6 lanes. There are currently existing High Occupancy Toll (HOT) lanes in Miami-Dade County with construction eminent to extend the HOT lanes to I-595 in Broward County.

I-95 connects the most populous counties in Florida and is Florida's busiest freeway, with current volumes exceeding 200,000 vehicles per day at many locations in South Florida[1]. I-95 is a critical corridor, moving freight, transit and passenger vehicles into, through and out of the corridor each day. Preserving mobility within the corridor is of prime concern to Florida.

Along with this growing need for preservation, portions of I-95 are overwhelmed with traffic demand. Because I-95 has significantly exceeded its traffic design expectations, a combination of strategies is needed. FDOT is targeting I-95's congestion problems by adding lanes, improving ramps and interchanges and making it easier for motorists to travel. In addition, FDOT and its partners are pursuing key strategies to improve traffic flow on parallel corridors and provide

[1] Refer to the Chapter 4 of the I-95 *Technical Memorandum: Identification of Corridor Conditions and Needs* for additional information.

alternatives for motorists on I-95 to choose other routes. These strategies include making our highways more efficient at moving people and goods with new traffic technology and managing traffic demand through a combination of strategies.

1.4 Study Area

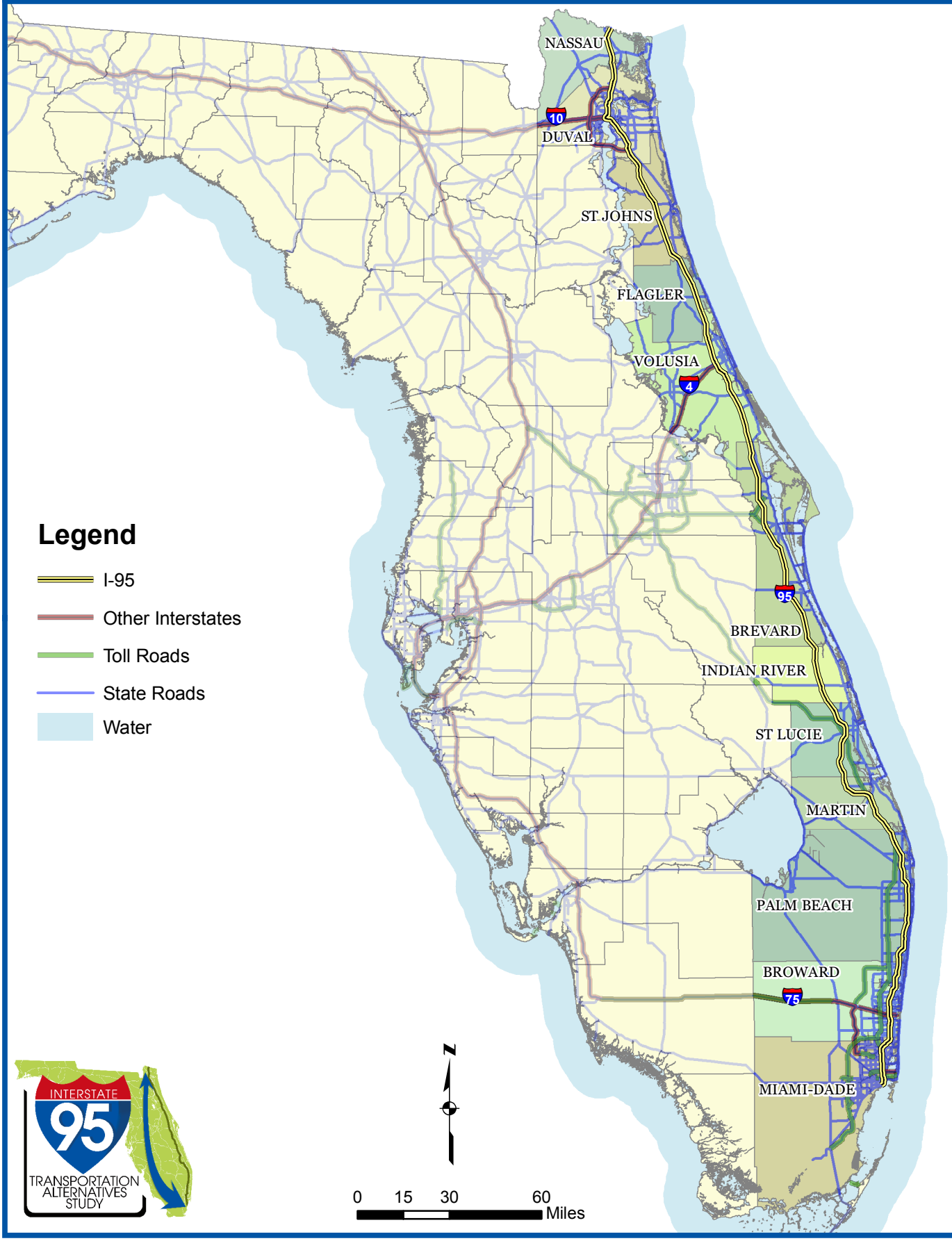
The study corridor under evaluation includes the 12 coastal counties along the east coast of Florida, as identified in **Figure 1.4.1**. The I-95 Corridor is one of the State's most critical transportation facilities, providing for the movement of people and goods along the east coast of Florida. The 12 counties along the study corridor are home to over 8.3 million residents, which constitutes approximately 45% of Florida's total population.

1.5 Study Participants

The study includes coordination and consultation with the following agencies and organizations:

- Florida Department of Law Enforcement (FDLE);
- Florida Department of Environmental Protection (FDEP);
- Florida Division of Emergency Management (FDEM);
- Florida Highway Patrol (FHP);
- Office of Tourism, Trade, and Economic Development (OTTED);
- Florida Metropolitan Planning Organizations Advisory Council (MPOAC);
- Four Regional Planning Councils (RPCs) along the I-95 Corridor;
    - Northeast Florida Regional Council;
    - East Central Florida Regional Planning Council;
    - Treasure Coast Regional Planning Council;
    - South Florida Regional Planning Council;
- Nine Metropolitan Planning Organizations (MPOs) along the I-95 Corridor;
    - North Florida Transportation Planning Organization;
    - Volusia County Metropolitan Planning Organization;
    - Space Coast Transportation Planning Organization;
    - Indian River County Metropolitan Planning Organization;
    - St. Lucie Transportation Planning Organization;
    - Martin Metropolitan Planning Organization;
    - Palm Beach Metropolitan Planning Organization;
    - Broward Transportation Planning Organization;
    - Miami-Dade Metropolitan Planning Organization;
- Flagler County;
- Multiple offices within the Florida Department of Transportation (FDOT):
    - Districts Two, Four, Five, and Six;

Figure 1.4.1 Twelve County Study Area



- State Traffic Engineering and Operations Office;
- Office of Policy Planning;
- Emergency Management Office;
- Environmental Management Office; and
- Systems Planning Office.

The Florida Department of Transportation, Systems Planning Office (SPO), is the lead office coordinating all study activities. SPO led the coordination and consultation activities between FDOT and its partners who were asked to provide data and information for the study. All comments were incorporated into study product.

The nine MPOs and four RPCs located along the study corridor, as well as Flagler County, are key organizations involved in transportation planning activities. The four FDOT Districts located along the corridor have existing working relationships with the MPOs and served as the key points of contact between the MPOs, RPCs, and the study team.

During the development of the Needs Plan, MPOs and RPCs were asked to provide data, information, and/or other input into the study process to ensure the study team is aware of local issues and activities impacting the I-95 Corridor. During subsequent phases of the study, MPOs and RPCs will be asked to review study products, assist with policy development activities relating to the I-95 corridor, and provide additional input to their FDOT District offices.

1.6 Project Information and Communications

Up to date information regarding the progress of the I-95 Transportation Alternatives Study can be found at the study website and SharePoint site established for the study (www.I-95Alternatives.com). The SharePoint site was a principal communication link between FDOT and its partner agencies during the course of the study. The site also provides the ability for the general public to review study documents.

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Chapter 2 – Alternative Options

The I-95 corridor contains a wide variety of alternative transportation options from parallel corridors in some areas to commuter rail in others. This chapter discusses a wide range of alternative options to consider as the corridor continues to grow in the future.

Numerous transportation alternatives are available for development in the I-95 corridor. The 13 categories of alternatives are listed in **Table 2.0**. The Table also provides examples of what the category can include where several options exist. Certain categories may only be applicable in portions of the corridor. There is a detailed discussion of each alternative in the following sections.

Table 2.0 Alternative Transportation Options

Section	Alternative Transportation Category	Alternatives Included in the Category
2.1	Add Capacity to Parallel Corridors	Add lanes on arterials, improve local intersections
2.2	New Location Corridors	New location arterials, new grade separated crossings for local connectivity
2.3	Transportation System Management and Operation (TSM&O)	Virtual Freight Network, Intelligent Transportation Systems (ITS)
2.4	Tourist Oriented Directional Sign (TODS) Program	TOS, Orlando's "Follow the Sun"
2.5	Special Use Lanes	HOV Lanes, Truck Only Lanes, Managed Lanes, Express Lanes, Dedicated Bus
2.6	Integrated Logistics Center (ILC)	Cluster of freight terminals or a freight village
2.7	Inland Port	Inland Port
2.8	Short Sea Shipping (Marine Highways)	Short Sea Shipping
2.9	Parallel Freight Rail Corridors	Florida East Coast Railroad, CSX
2.10	Passenger Rail Services	High Speed Rail, Commuter Rail, Light Rail, Amtrak
2.11	Intra-Regional Transit Services	Cross county bus services, express bus services, Bus Rapid Transit
2.12	Transportation Demand Management/Commuter Service	Carpool, vanpool, ridesharing, park and ride, telecommuting
2.13	Add Capacity to I-95	Add full lanes, add interchanges, add auxiliary lanes, operational improvements

2.1 Add Capacity to Parallel Corridors

Because the I-95 roadway corridor is approaching, and in some cases exceeding, its practical capacity, a combination of strategies is needed. FDOT is targeting I-95's congestion problems by adding lanes, improving ramps and interchanges and making it easier for motorists to travel. In addition, FDOT and its partners are pursuing key strategies to improve traffic flow on parallel corridors and provide alternatives for motorists on I-95 to choose other routes. These strategies include making our highways more efficient at moving people and goods with new traffic technology and managing traffic demand through a combination of strategies. The following discussion will focus on adding capacity to parallel corridors as a strategy to manage congestion, increase efficiency, and continue to spur economic development. Parallel corridor improvements also include intersection related improvements, such as turn bays and roundabouts. Parallel corridors may include the Florida Turnpike, U.S. 1, or I-75 on a statewide level or local arterials providing short trips within the regional or local level.

Heavy congestion along I-95, especially during the morning and afternoon weekday commute periods, may raise concerns about potential diversion of traffic to other nearby corridors, and vice versa. Heavy congestion on one facility would likely have a spillover effect on other roads.

Potential Benefits and Drawbacks

Adding capacity to parallel highway corridors is typically achieved by the construction of additional through lanes. These through lanes may operate as general-purpose lanes or special use/managed lanes.

Performance objectives for increased mobility benefits include the following:

- Reduced congestion;
- Reduced travel times;
- Diversion of local trips from I-95;
- Improved emergency response;
- Improved freight flow; and,
- Increased connectivity.

Economic benefits include the following:

- Lowered production and distribution costs;
- Increased productivity; and,
- Potential job creation.

Drawbacks include land use impacts, potential impacts to the natural, physical human environment and high right-of-way costs.

Implementation Costs

Table 2.1.1 compares the approximate cost per mile to add additional general-purpose lanes to divided arterials and the interstate for year 2009. It should be noted the models used are generic in nature and are for reference purposes only. The generalized costs only include construction costs, and do not include right of way acquisition. Right of way is typically one of the most expensive portions of a roadway improvement project. As the Table shows, construction costs for divided arterials are significantly less than interstate construction costs for both rural and urban segments.

Table 2.1.1 2009 Generalized Per Mile Construction Costs

Classification	Project	Approximate Cost Per Mile
Divided Arterial (Parallel Arterials) Construction Costs		
Urban	Widen 6 Lanes to 8 Lanes	$4,500,000
Rural	Widen 4 Lanes to 6 Lanes	$2,700,000
Interstate Construction Costs		
Urban	Widen 6 Lanes to 8 Lanes	$7,800,000
Rural	Widen 6 Lanes to 8 Lanes	$4,500,000

Source: State Estimates Office, Office of Policy Planning
Note: Table does not include cost of right of way needed to construct additional lanes, which is typically one of the most expensive portions of an improvement project.

A major component of costs is material prices. Even when taking into account price reductions experienced in the last two years, asphalt costs have increased over 80% since 2003 while structural concrete and steel has increased over 40%[1]. It appears unlikely costs will reduce over the planning period but will fluctuate and steadily increase.

Impact to Mobility

The first assessment of the I-95 Transportation Alternatives Study was to gain an understanding of the volume passing through the region and consumed by a community. As an example, for the southern half of the I-95 corridor, traffic forecast data was available from several sources:

- Greater Treasure Coast Regional Planning Model (GTCRPM);

[1] *Update on Highway Construction Cost Trends in Florida*, April 2007

- Southeast Florida Regional Planning Model (SERPM); and,
- Trend based on historical data.

Figures 2.1.1 and **2.1.2** depict the Annual Average Daily Traffic (AADT) forecast conditions and capacity thresholds at two sites along I-95 in south Florida. Each site is on an urbanized segment of interstate in Miami-Dade County and Palm Beach County.

Model output data incorporates regional demand based upon a multitude of factors including growth projections, land use, alternative routes, etc. Extremely high model output volumes on I-95 indicate even the parallel facilities are at capacity or else the traffic would have shifted to these parallel routes.

Results discussed in the I-95 *Technical Memorandum: Identification of Corridor Conditions and Needs* show I-95, even at build-out, will be operating at congested, over-capacity conditions. Model results illustrated in Figure 2.1.1 and Figure 2.1.2 imply parallel facilities will be facing a similar problem, as future traffic volumes far exceed available capacities on I-95 and will likely fill available capacity on parallel corridors.

Figure 2.1.1 AADT and Capacity Thresholds in Miami-Dade County

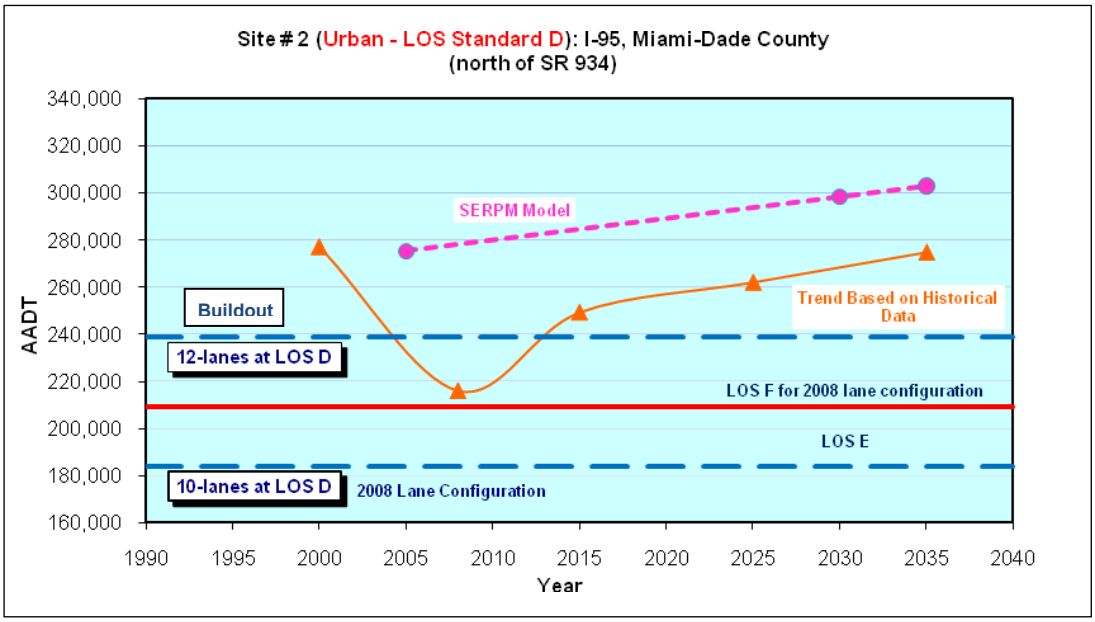
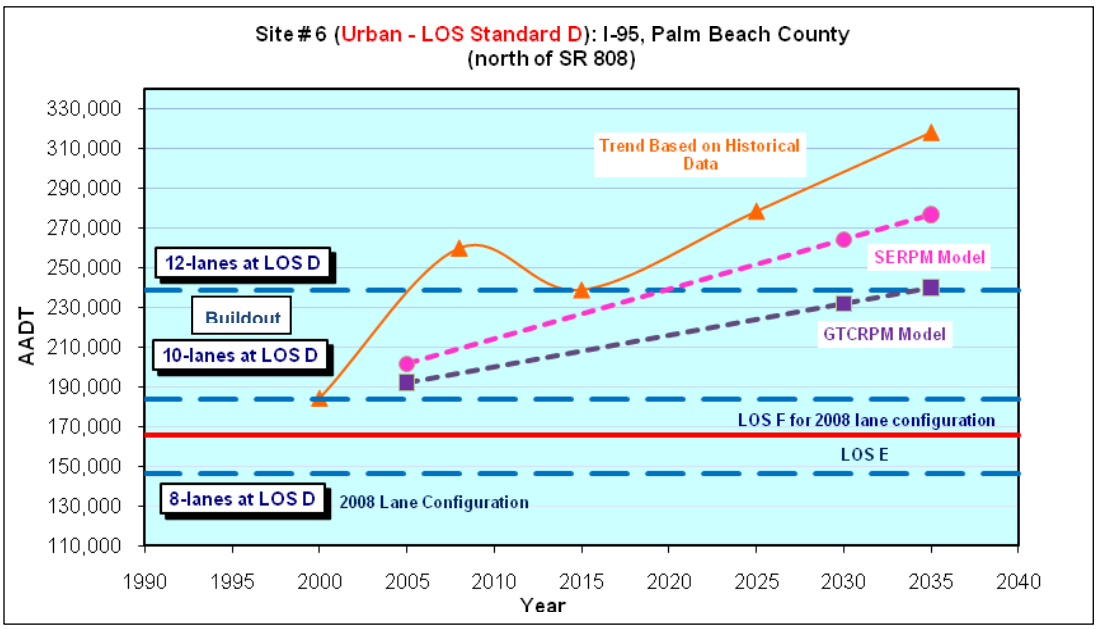


Figure 2.1.2 AADT and Capacity Thresholds in Palm Beach County



The screen line analysis for all three forecast sources shows by year 2035, little or no vehicle capacity will be available on parallel streets. Data points for all locations are above the Level of Service (LOS) F line, indicating LOS F conditions and likely traffic diversions to parallel facilities. LOS F is defined as the point of failure for the facility. By year 2035, all three forecast sources are considerably higher than the failure point, suggesting parallel arterial corridors, which typically have lower capacities than the interstate, would also exceed capacity as they attempt to absorb the traffic diverting from I-95.

In these areas, alternative transportation routes, such as new location corridors, and more modal choices, such as intra-regional bus rapid transit services and commuter rail options, should be pursued to ensure the safe and efficient movement of passenger and freight travel.

2.2 New Location Corridors

This alternative involves building one or more entirely new roadway facilities to help reduce traffic congestion on I-95, facilitate emergency and security responses, and foster economic development. Also included in this alternative is developing new grade separated crossings of I-95 to improve local circulation and connectivity options. This section does not include new interchanges along I-95, which are included and discussed in section 2.13 – Add Capacity to I-95.

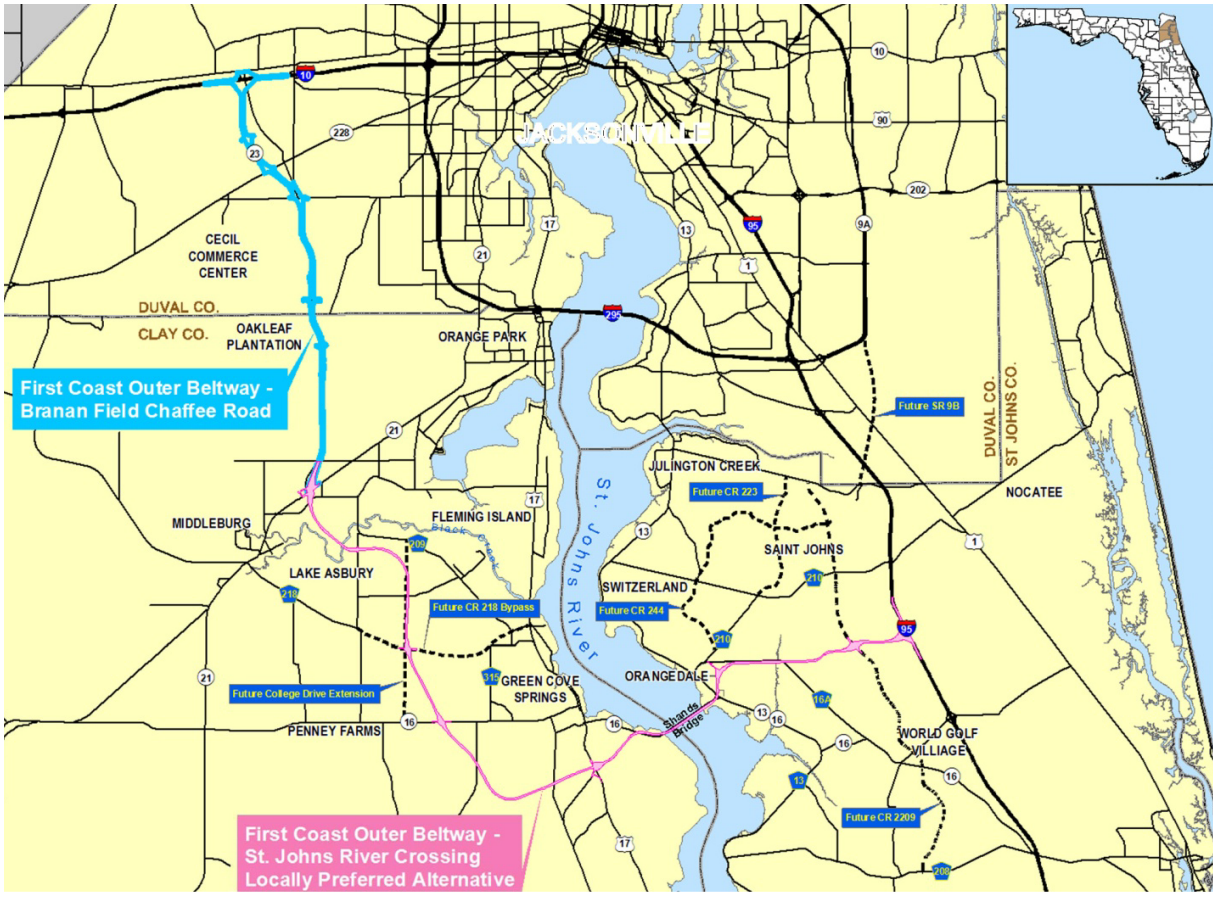
Example Locations and Characteristics of New Location Corridors

An example of such a project in the 12 county study area is the proposed First Coast Outer Beltway (FCOB). The FCOB is a proposed four-lane limited access toll facility including the St. Johns River Crossing Corridor in St. Johns and Clay Counties and Branan Field-Chaffee Road (SR 23) in Clay and Duval Counties, as illustrated in **Figure 2.2.1.**

The First Coast Outer Beltway will provide a connecting roadway, outside of the existing I-295 loop, between I-95 in St Johns County and I-10 in Duval County. A total of 13 new interchanges and a major bridge structure across the St. Johns River are also proposed. The total length of the proposed roadway is approximately 46.5 miles.

This new corridor will allow traffic using I-95 south of Jacksonville heading to/from I-10 to avoid the urbanized area of downtown Jacksonville. The relief provided by this roadway will allow for improved operations of both the I-95 mainline and the interchanges from the connecting point of the FCOB up to the I-95/I-10 interchange in downtown. The Department is currently reconstructing this interchange (I-95/I-10) with a completion date anticipated for late calendar year 2010. More information on the First Coast Outer Beltway can be found on the Department's web site established for the project at: http://www.fdotfirstcoastouterbeltway.com/index.asp

Figure 2.2.1 First Coast Outer Beltway Locally Preferred Alternative



Source: Florida Department of Transportation, District 2.

Another example of such a project study area is the proposed St. Johns Heritage Parkway in south Brevard County, as illustrated in **Figure 2.2.2**. Although it has been under consideration for many years, the original purpose of the Parkway was to address a need for "emergency evacuation, economic development and appreciation of our natural resources via ecotourism[2]." Likely speed limits would be 45-50 mph, and traffic signals spaced .25 to 1 mile apart. The project would aim to provide an alternate north-south route, therefore removing traffic from congested I-95 through southern Brevard County.[3,4] The Parkway will also provide additional connectivity to other regional facilities, such as U.S. 192, to improve mobility and aid in emergency evacuation.

[2] http://www.stjohnsheritageparkway.com/
[3] http://www.tcpalm.com/news/2009/feb/23/economy-plays-role-st-johns-heritage-parkway-build/
[4] http://www.tcpalm.com/news/2009/feb/23/economy-plays-role-st-johns-heritage-parkway-build/

Figure 2.2.2 Example Parallel Corridor

Source: Florida Today

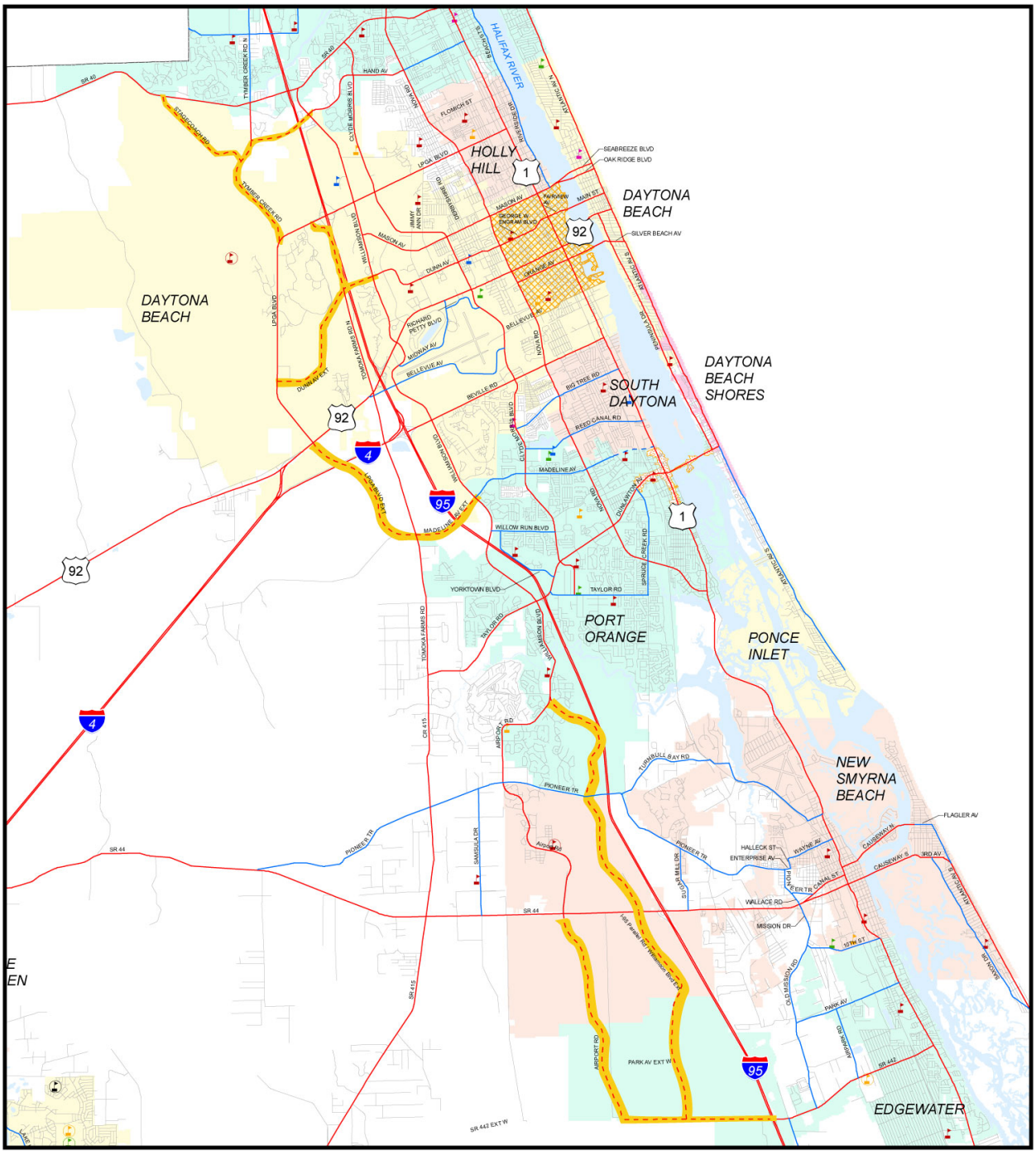
Another example is in Volusia County, where several local alternative corridors are proposed on the County's 2025 Thoroughfare Plan, as illustrated in **Figure 2.2.3**, LPGA Boulevard, Williamson Boulevard, Airport Road, and Tymber Creek Road are all planned for future expansion parallel to I-95. These new location corridors will provide parallel routes to I-95 and help to provide for local traffic circulation away from the interstate corridor.

The Western Parkway Concept Plan is also an example. The Martin/St. Lucie 2030 Regional Long Range Transportation Plan identifies this corridor as a limited access, parallel, north-south facility traveling through Martin, St. Lucie, and Indian River counties, roughly following the alignment of CR 609/Range line Road. The concept will also provide alternative options to I-95 to improve emergency response and alleviate congestion.

Example and Characteristics of New Crossings

Also included in this alternative is developing new crossings of I-95, such as a new overpass, to improve local circulation and connectivity options. Overpass options do not include interchanges with I-95, so traffic on the overpass cannot enter or exit the interstate. Overpass options provide benefits in improving local circulation and connecting land uses on opposite sides of the interstate, which typically leads to lower traffic volumes at interchanges as motorists have other options to cross I-95 other than travelling through an interchange.

Figure 2.2.3 Volusia County 2025 Thoroughfare Plan



Source: Volusia County

Potential Benefits and Drawbacks

Developing new location corridors and new grade separated crossings of I-95 certainly provide many benefits in terms of both mobility and emergency management. These benefits include the following:

- Overall reduction in congestion and vehicle hours traveled (VHT) on the transportation network as a whole, as a new location roadway provides additional capacity and circulation options. In terms of I-95, new location corridors will shift some of the local traffic away from I-95 to the new more localized route;
- Vehicle operating cost savings can be realized if the new location corridor provides a reduction in vehicle miles traveled by providing shorter, more direct connections between origins and destinations;
- Improves emergency management by providing an alternate route to I-95 and additional options for local trips to begin the evacuation process, such as the connectivity to other regional facilities;
- If the new corridor is developed as a toll facility, additional revenue would be generated to cover, at a minimum, the operating and maintenance costs of the facility;
- Provides safety benefits for I-95, as a reduction in congestion along a corridor results in a corresponding reduction in incidents; and,
- Economic development benefits occur as a new location corridor opens additional land for development of new businesses and residential neighborhoods. In addition, developers typically partner with governmental agencies on the costs associated with development of the new corridors as they may be mutually beneficial.

Along with the potential benefits are a few drawbacks, including the following:

- There are large capital and maintenance costs associated with development of new location corridors, and development of these corridors is typically a long process;
- In urban areas, limited or no options exist for locations of new corridors, without major impacts to existing land uses;
- New Corridors typically result in urban sprawl and create new environmental and community impacts
- Historically, increases in demand for highway facilities have continued over time, which may make congestion reduction along the I-95 corridor only temporary in nature; and,
- Limited funds are available in transportation budgets, making the competition for those funds very strong. New arterial corridors are typically local government investments in response to development/land use patterns.

Building a new location corridor would have direct impact to mobility on any part of the corridor. For better or worse, the interstate system revolutionized America's mobility[5]. In a similar manner, new location corridors could open up many possibilities. In urban areas, the travel time savings due to higher speeds and fewer intersections would allow for greater access to destinations. In rural areas a new facility would expand the transportation network and provide access to entirely new destinations.

However, the greatest impacts would likely be felt in areas with shorter travel patterns. It is very unlikely inter-regional travelers on I-95 will get off the congested interstate and take advantage of additional facilities. Counties along the I-95 corridor with a larger percentage of local trips include Miami-Dade, Broward, Palm Beach, Brevard and Duval.

Implementation Costs

In these economic times, it is especially critical to consider the cost of each alternative. The process to plan, design, and construct a new location corridor is often quite long and expensive. Each phase can take months or even years, and then maintenance costs must be considered indefinitely.

The cost of right of way varies widely depending on the location in the state, and can be very sensitive to local real estate market impacts. Right of way costs can also be hard to calculate if the project location has not been finalized, a common occurrence during the early stages of a project. It is very important, where undeveloped land is still available adjacent to I-95, the planning process preserves right of way for future parallel corridors.

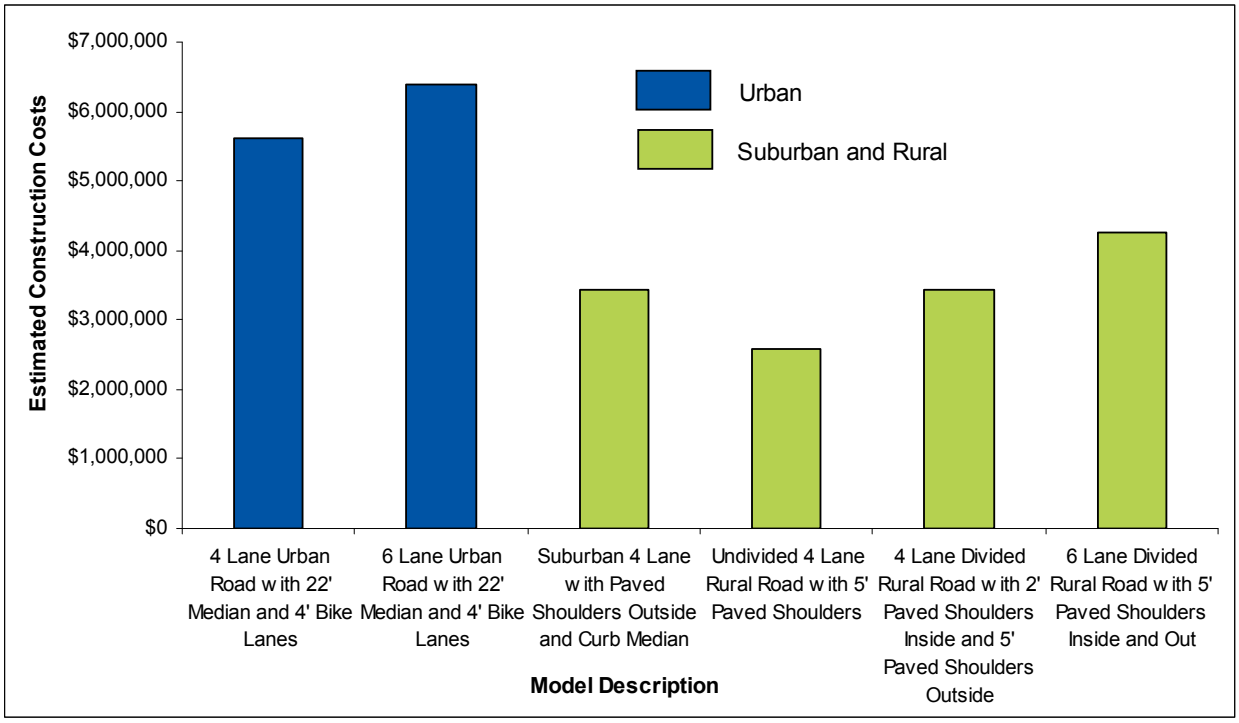
The cost of construction varies across the state and noticeable differences may occur within a single FDOT District[6]. Several variables affect the cost of construction on highway projects. Examples of such factors might include terrain type (rolling hills or flat), development type (rural or urban), type of highway (Interstate quality freeway or two-lane local highway), material type (concrete or asphalt), and pavement thickness, (which depends largely on projected auto and truck volumes).

The Florida Department of Transportation Specifications and Estimates Office provides generic cost per mile models. These models are updated on January 1st and July 1st each year. **Figure 2.2.4** illustrates a comparison of these generic cost models.

[5] http://www.fhwa.dot.gov/planning/econdev/lessons.htm

[6] http://www.dot.state.fl.us/planning/policy/costs/

Figure 2.2.4 Generic Construction Cost Per Mile Models



Source: FDOT Specifications and Estimates Office 2010
Note: All models shown are new construction.
Rural sections are defined as those having paved/grassed shoulders and open drainage;
Urban sections are those with closed drainage system (curb and gutter sections).

2.3 Transportation System Management and Operation

A safe, efficient, and reliable transportation system requires more than just infrastructure. It demands coordinated management and operations[7]. This alternative involves development of Transportation System Management and Operations (TSM&O) strategies to improve mobility and freight/goods movement.

TSM&O represents an organizational shift from transportation system outputs to mobility outcomes designed to maximize efficiency of the transportation system. Traditional mobility improvement strategies, e.g. adding more lane miles, are becoming less feasible due to their cost. TSM&O is a performance driven approach for solving congestion and traffic problems in which Intelligent Transportation Systems (ITS), information and communications technology for infrastructure and vehicle systems, are used to locate, inform travelers, and correct the causes of congestion in real-time.

Effective regional management and operations requires collaboration and coordination among operating agencies across jurisdictions and between transportation and public safety agencies in order to improve the security, safety, and reliability of the transportation system. Strengthening the connections between these two processes and activities – planning and operations – can enhance both activities[7].

ITS strategies have been in use by FDOT for many years, and have become an integral part of the transportation system. More recently, ITS strategies have been combined with other techniques to further improve operations. For example, TSM&O strategies are currently in development in the areas around the I-95 corridor. Examples of TSM&O strategies include:

- traffic detection and surveillance;
- work zone management;
- electronic toll collection;
- traffic incident management;
- road weather monitoring and information;
- emergency management; and,
- traveler information services.

[7] Federal Highway Administration- Getting More by Working Together: Opportunities for Linking Planning and Operations, A Reference Manual

Example Locations

ITS technology is present throughout the I-95 corridor in various stages, as documented in the I-95 *Technical Memorandum: Identification of Corridor Conditions and Needs.* In addition, the report identified various ITS technology improvements planned for different segments of I-95 and are not repeated here. This section focuses on two proposed strategies, TSM&O and Virtual Freight Corridors, currently in the early stages of implementation within the I-95 corridor.

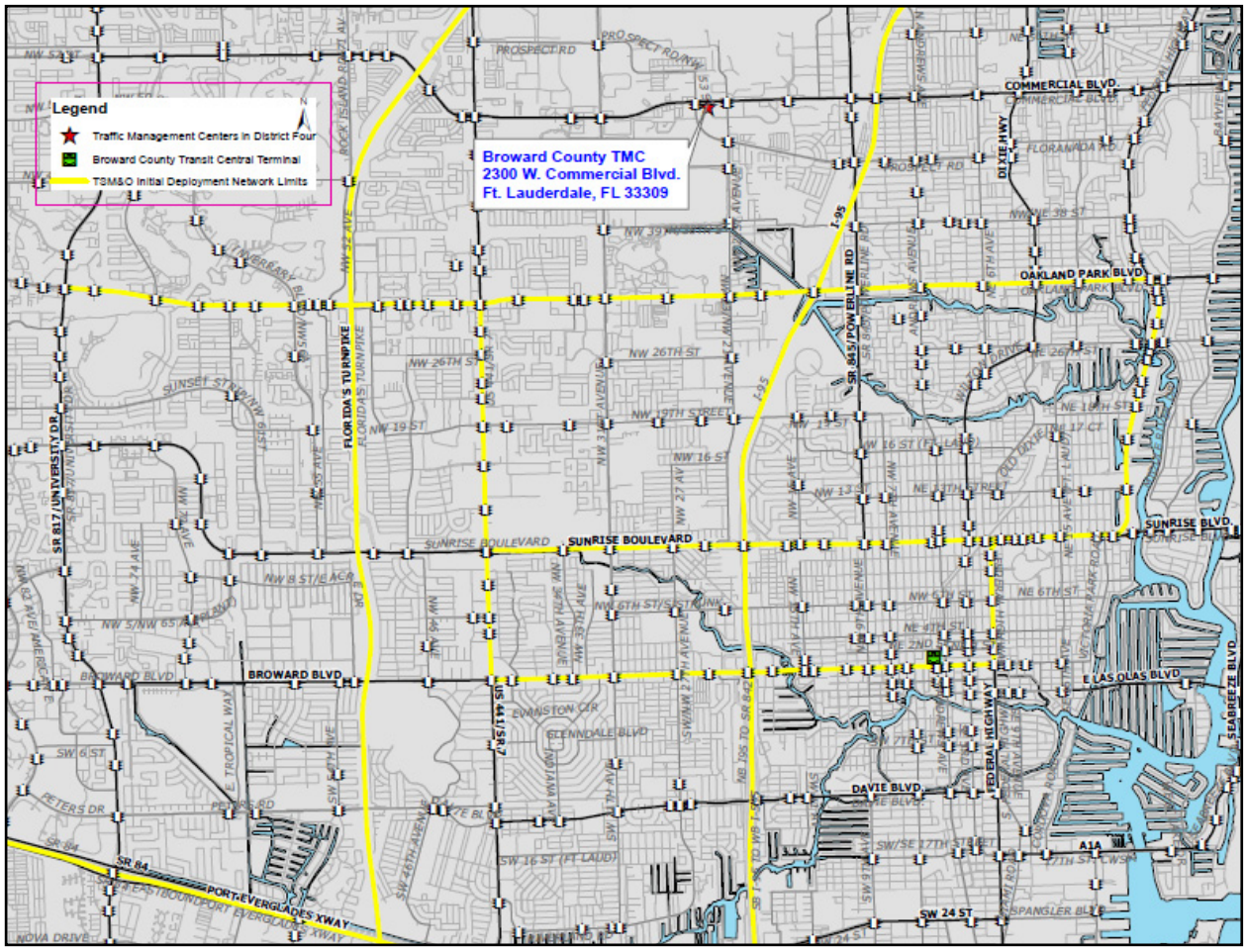
TSM&O - TSM&O strategies are being initiated in multiple locations within the I-95 corridor study area. Multiple cities and counties are currently gathering data on selected arterial roadways and determining how incident management could be utilized. Broward County is farthest along in the implementation process. They are developing a design-build request for proposals package for their Initial Deployment Network, which should be complete in winter of 2011. Construction is not expected to begin until at least January 2012[8]. **Figure 2.3.1** shows the initial network to be monitored in. In addition, the North Florida TPO is considering implementation of a similar concept in the I-95/U.S. 1 corridor in Jacksonville.

Virtual Freight Network - a Virtual Freight Network concept is being developed jointly by District 4 and District 6 as a pilot project and has been proposed for implementation along I-95. A Virtual Freight Network is defined as an integrated network of public/private-sector information systems and technologies linked through technology standards and data sharing protocols in order to improve freight mobility. A Virtual Freight Network is designed to improve freight mobility, improve safety, improve network performance, improve security of freight shipments, and improve environmental stewardship. The proposed initiatives in District 4 and District 6 include the following:

- Provide information targeted to freight/goods movers at terminal points and en route;
- Provide active diversion management within corridor using parallel facilities;
- Provide rapid incident response on high value corridors;
- Measure freight/goods movement performance on high value corridors and use results as input to process improvement; and,
- Provide information sharing between traffic management centers and terminal points.

[8] The timeframe for construction was provided by FDOT District 4.

Figure 2.3.1 TSM&O Initial Deployment Network in Broward County



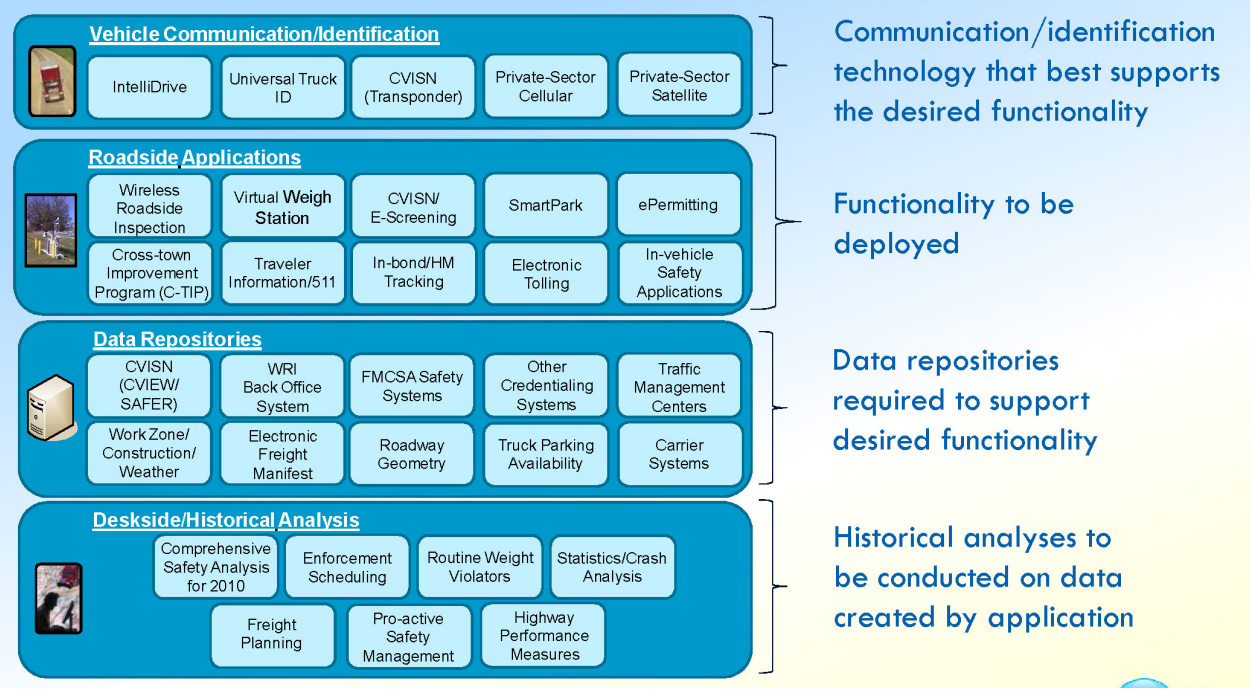
Source: Florida Department of Transportation, District 4.

The proposed functionality of the Virtual Freight Network is illustrated in **Figure 2.3.2**. According to FDOT District 4, the desired functionality of the proposed system from mobility, safety, and security standpoints include the following:

Mobility Functionality:

- Integrate real-time traveler information (e.g., traffic, weather, construction, special event) into commercial vehicle planning and dispatch operations;
- Load-matching application to identify loads in need of transport;
- Intermodal port reservation system;
- Notify motor carrier when its load arrives at intermodal facility and is ready to be picked-up;
- Identify designated staging areas for commercial vehicles and dedicated lanes to/from intermodal port to expedite access to intermodal facility;
- Electronic freight manifest;
- Streamline import/export regulatory operations;
- Electronic screening of commercial vehicles;
- Support carrier identification of whether a load requires an Oversize/Overweight (OS/OW) permit;
- Modify signal timing to account for commercial vehicles in queues;
- Coordinate traffic signals around intermodal facilities to accommodate departing shipments;

Figure 2.3.2 I-95 Virtual Freight Network Functionality



Source: Florida Department of Transportation, District 4.

Safety and Security Functionality:

- Deploy virtual weigh station/virtual compliance station so commercial vehicles can be weighed and their compliance with credentialing regulations verified electronically;
- Conduct wireless roadside inspections to verify the real-time condition of commercial vehicles electronically;
- Integrate real-time brake testing into screening algorithm;
- Identify commercial drivers in real-time and at highway speeds so they may be included in roadside screening operations;
- Provide real-time truck parking availability information to commercial vehicle drivers and dispatchers;
- Use freight data to schedule enforcement resources;
- Provide real-time weight information to commercial vehicles as they depart intermodal facility;
- Provide data from virtual safety systems to support carrier safety management operations;
- Limit commercial vehicle access to specific locations/areas (geofence); and,
- Identify stolen vehicles/cargo in real-time and notify enforcement personnel.

Potential Benefits

A TSM&O strategy, including ITS and Virtual Freight Networks, provides several benefits to the transportation system, including the following[9]:

- Offers lower cost techniques with results in the short-term;
- Getting better with time, as information and vehicle technologies are becoming more sophisticated and more available to the average consumer;
- Encourages coordination of transportation improvements, so operators and planners are able to have a greater impact on the performance of the transportation system in the region;
- Reduces delays and travel times with responsive systems;
- Coordinating traffic signals decreases fuel consumption and vehicle emissions;
- Improves on-time performance with transit signal priority treatments;
- Managing demand reduces congestion;
- Providing real-time information allows travelers to alter decisions;
- Managing traffic incidents improves traveler safety and detecting incidents quickly restores lost capacity;
- Improving incident clearance times reduces incident delay and cost;

[9] Sources: Oregon Transit Association, Annual Conference Resources 2009, ITE Quad Conference 2009, Getting More by Working Together: Opportunities for Linking Planning and Operations- Federal Highway Administration, Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation- Federal Highway Administration, Regional Concept for Transportation Operations: The Blueprint for Action, A Primer- Federal Highway Administration

- Actively managing transportation system optimizes infrastructure investments;
- Provides options for enhanced freight and goods movement through targeted ITS initiatives.

Enhanced mobility is a major benefit of TSM&O strategies, as the value of TSM&O is improving the productivity of existing highway facilities through the use of ITS technology and incident management rather than building more capacity. When integrated with existing systems along the I-95 corridor, parallel highway facilities should begin to operate more efficiently. This will encourage locals to use other roads, and open up capacity for longer distance travelers. Miami-Dade, Broward, Palm Beach, Brevard and Duval counties all have higher percentages of local trips and would likely benefit more from these strategies. With programs specifically designed to increase performance on measures such as reliability of travel times and incident clearance times, mobility should increase with the success of TSM&O initiatives[10].

Intersections of evacuation routes with I-95 is one of the emergency management considerations considered critical, and these intersections need to be monitored during an evacuation event to ensure and expedite vehicle movement. The same ITS strategies used to manage demand and reduce congestion could be used to evacuate travelers efficiently in an emergency. Another emergency management consideration is if I-95 was damaged or impassable, alternate routes should be available and clear. A TSM&O program of providing real-time information to travelers would allow recovery operations to alter route decisions as needed.

TSM&O could also be used to assist various law enforcement units in monitoring and controling traffic, investigating accidents, and providing general security enforcement. Reliability and security issues can be difficult to address solely with infrastructure investments. However, TSM&O technologies could provide data to agencies to gather, process, analyze, and disseminate relevant information.

Implementation Costs

The costs of ITS technology improvements are low relative to some of the other options. As TSM&O is based on technology upgrades rather than building new facilities, implementation costs are much more reasonable. Costs may vary by the type of TSM&O strategy, the local transportation network, any previous ITS investments, and other factors.

[10] Broward County TSM&O- November 2009 Newsletter County TSM&O- November 2009 Newsletter

The virtual freight corridor concept being considered using TSM&O and ITS strategies to improve the movement of freight and goods is also relatively low cost compared to other alternatives.[11]

For the purposes of this estimate, the concept is assumed to be deployed on I-95 within the following urban areas:

- Miami-Fort Lauderdale Metropolitan Area;
- Fort Pierce-West Palm Beach Metropolitan Area;
- Daytona Metropolitan Area;
- Jacksonville Metropolitan Area;

A very rough estimate of capital, operating and maintenance, and replacement costs associated with this concept is as follows:

- **Capital cost** = $39million (construction estimate, $56k per centerline mile);
- **Operating and maintenance cost** = $7miiion per year ($9.3k per centerline mile);
- **Replacement cost** = $700K per year after 3 years ($1k per centerline mile).

[11] Florida Department of Transportation, District 4

2.4 Tourist Oriented Directional Sign (TODS) Program

By definition, tourist oriented directional signs are "way finding" signs of standard size and design, usually white on blue. The intent is to safely direct tourists to local destinations whose major portion (51%) of income is derived from patrons traveling 20 miles or more[12].

For example, through the Tourist Oriented Directional Signing (TODS) Program, FDOT allows qualified county and municipal governments to install guide signs on the state highway system to identify local facilities, parks, libraries, tourist attractions, etc. This particular program is currently designed for rural areas, but can be implemented in urban areas as well. Orlando's "Follow the Sun" project placed 400 new road signs bearing a tourist-friendly sunburst logo to aid non English-speaking visitors in finding their way[13]. **Figure 2.4.1** shows these example tourist oriented signs.

Figure 2.4.1 Example Tourist Oriented Signs

Source: Florida Department of Transportation Traffic Engineering and Operations Office and Osceola County

Table 2.4.1 identifies categories of local destinations commonly included in the Florida tourist-oriented directional sign program.

[12] Florida Department of Transportation Traffic Engineering and Operations Office

Table 2.4.1 Example Categories of Tourist Oriented Directional Signs

Cultural	Historical	Educational	Recreational	Commercial
Drama	Memorials	Museums	Lakes/beaches	Gift shops
Theaters	Reservations	Tours	Parks	Antiques/crafts
Galleries	Mansions	Colleges	Scenic/caves	Winery
		Universities	Camping*	Farmers markets
		Vocational/ technical schools	Amusement parks	Food*
			Golf courses	Lodging*
			Sports complexes	Gas*

*Often already included on Interstate signage with adequate trip generation.
Sources: Florida Department of Transportation Traffic Engineering and Operations Office and Interstate Logos, LLC

Potential Benefits and Drawbacks

Potential benefits towards implementing the Tourist Oriented Directional Sign program are nearly all economic development related and include the following[13]:

- Promotes local culture and sustainable tourism as often no franchise or national chains are included;
- Allows each local government the flexibility to create criteria for designations to suit the area;
- Creates validity when fabricated and installed according to FDOT standards and specifications; and,
- Addresses tourist-related safety with a problem-related solution, particularly in urban areas.

Potential drawbacks include the following:

- Does not directly benefit emergency management or mobility;
- Could create problems due to limits on the number of destinations included in each location; and,
- Usually requires local governments to construct, maintain, and operate sign program. Some areas may not have adequate resources, particularly in rural areas.

[13] Florida Department of Transportation Traffic Engineering and Operations Office

Impact to economic development

I-95 is a key contributor to economic development in the 12 county study area. Proximity to I-95 is an important aspect in business location, which is linked to the ability to move goods and people. This holds true for smaller scale businesses, services and activities located along I-95, along with larger businesses. With the implementation of TODS on interstates, family-oriented businesses would be allowed to reap the benefits of a very effective advertising tool.

This strategy could also be used to reinforce economic development efforts in Enterprise Zones and Rural Areas of Critical Economic Concern (RACECs). With the TODS program, each local government has the freedom to set their own criteria, so they could decide to focus on businesses in these underserved areas. Each local government would also have the freedom to define the community image to include local treasures or include national franchise operations based on the economic development goals of the area.

The cost of this alternative is low relative to some of the other options. Design criteria have already been established, so the only costs would be to fabricate, install, and maintain the signs. These costs have traditionally been the responsibility of the local governments. The construction cost of each sign is typically between $50 and $1500, depending on the materials and use of logos[14].

[14] Traffic and Parking Control Co, Inc. and Rice Signs, LLC.

2.5 Special Use Lanes

Special use lanes, for the purposes of this study, generally involve the development of dedicated lanes along the interstate highway reserved for a specific use. The goal of special use lanes is to aid in alleviating congestion, improve safety conditions, and enhance mobility in a more cost efficient manner but still maintaining the integrity of the I-95 corridor. Special use lanes include the following:

- **Managed Lanes** are typically comprised of one or more types of special use lanes, such as high occupancy vehicle (HOV) lanes, toll lanes, express lanes, and truck lanes. Managed lanes are tolled using either a traditional or a variable rate throughout the day. The variable toll increases or decreases throughout the day to maintain a minimum operating level of service and speed. For example, motorists are provided a toll rate, which may increase as congestion increases during peak times in order to discourage additional traffic from entering the toll lane. This approach ensures the toll lane operates at a higher level to ensure a decrease in travel time is realized by the driver. Express lanes may also be used for express bus services.

- **Reversible lanes** are lanes in which traffic may travel in either direction depending on traffic conditions and time of day. Typically, they are meant to improve traffic flow in the peak direction of traffic during both the morning and afternoon rush hours. This is accomplished by daily phasing in of traffic to the reversible lane using overhead message boards, special signing, traffic control safety devices (signal lights, gates, vehicle restraints, etc.) on a regularly scheduled daily time interval.

  Reversible lanes are designed to reverse direction to handle peak travel times. Peak hours are normally considered between the hours of 6 a.m. and 9 a.m. and 3 p.m. and 6 p.m. Reversible lanes are typically operational, during time blocks. For example, 5 a.m. to 11 a.m. peak direction and 2 p.m. to 8 p.m. peak direction. The lanes would be open for both directions in off-peak times or not open at all, depending on travel demand needs for the adjacent general purpose lanes.

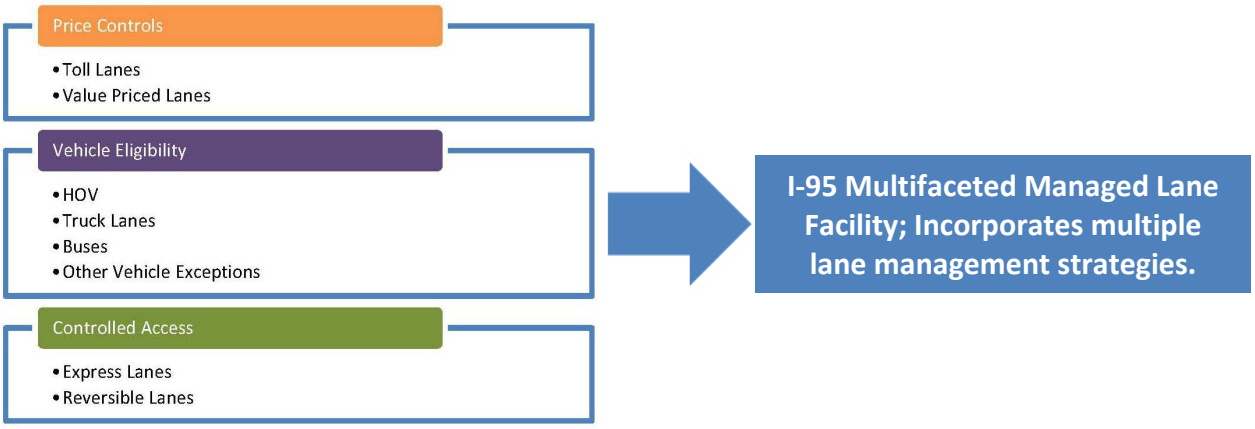
- **High Occupancy Vehicle (HOV)**, **Dedicated Bus Lanes**, **and High Occupancy Toll (HOT)** lanes are each specific types of special use lanes. HOV lanes or carpooling lanes are reserved for vehicles with a driver and one or more passengers. HOV lanes may either be designated simply by diamond markings or separated by a physical barrier. HOT lanes give single occupancy motorists access to HOV lanes by paying a toll; however, "toll lanes" can be in combination with most of the other special use lanes. Typically, the tolls are variable depending on time of day and traffic conditions. Dedicated bus

lanes are provided for the exclusive use of bus and transit vehicles to improve reliability and travel times of buses. The South Miami-Dade Busway is a convenient way to get to Metrorail and was the first of its kind in Florida. A state-of-the-art alternative to traffic congestion, the Busway runs parallel to (and separate from) U.S. 1. Express buses travel the exclusive lanes, swiftly shuttling passengers to Metrorail.

- **Truck only lanes** are special use lanes separating trucks from passenger traffic. This strategy is designed to reduce congestion, increase the longevity of pavement, and expand the economic benefits of streamlined freight mobility. Two common methods of separating trucks from general traffic are lane striping and concrete barriers. The lane markers can be paint or "rumble strips" consisting of grooves in the roadway. Truck lanes may be tolled and are typically more expensive to construct, as the pavement must be designed to accommodate heavier weights and larger vehicles.

Managed Lanes

Managed lanes are lanes created to help relieve congestion in the general-purpose lanes and improve travel times and reliability. They are proactively managed in response to changing conditions to reach the desired outcome. Three broad application types encompass many individual strategies. Those application types include price controls, vehicle eligibility, and controlled access. The figure below outlines each application and associated managed lane type.



- **Price Controls** utilize either traditional tolling methods or variable tolls, which adjust accordingly in response to demand (e.g. peak charge, off-peak discounts).

- **Vehicle Eligibility** allows certain vehicles access while restricting others. Examples would be high occupancy vehicles, buses, Inherently Low Emissions Vehicles (ILEVs), or emergency response vehicles.

- **Controlled Access** allows all vehicles but minimizes access points. An example would be limited access lanes bypassing multiple interchanges and minimizing weaving maneuvers in the flow of vehicles.

Example of a Managed Lane – 95 Express

95 Express is the Florida Department of Transportation's (FDOT) congestion management program for Interstate 95 (I-95) in southeast Florida. The express corridor incorporates High Occupancy Toll (HOT) lanes with car pool and transit incentives, ramp signaling, and rapid incident detection and management strategies. Express/HOT lanes offer drivers a choice to use the express lanes for the cost of a toll, which fluctuates with the level of demand for the express lanes. The goal is to keep the express lanes operating at 45 mph. However vanpools, carpools, public transit vehicles (Miami-Dade and Broward County transit), over the road motor coaches, Hybrids/ILEV vehicles, and motorcycles can use the express lanes without paying a toll. The express lanes (2 NB and 2 SB) were created by reducing the existing lane widths and reducing the inside and outside shoulders.

95 Express is being implemented in three phases. Phase 1A is open, as of January 2009, northbound on I-95 from State Road (SR) 112 to just north of NW 151st Street in Miami-Dade County. On January 15, 2010 Phase 1B was implemented and began southbound operations, along with express bus service. The southbound operation runs from the Golden Glades Interchange to I-395. In addition, Phase 1B extended the north bound express further south from SR-112 to I-395. Phase 2 of 95 Express will create HOT lanes in both directions on I-95 between the Golden Glades Interchange (Miami-Dade County) and I-595 (Broward County). Phase 2 of the project is funded for construction and is currently in the contractor selection process, planned for a June 2010 letting.

95 Express Benefits

Today, transportation departments and local governments are unable to build adequate capacity to meet growing demand. However, express lanes, specifically 95 Express, offer opportunities to reduce congestion and eventually create more travel options and support the use of transit. The congestion pricing management strategy employed in the 95 Express project offers an advantage; it allows the price of the toll to change in response to the level of congestion. This pricing strategy can be used to manage demand and generate revenue for operations and maintenance of the lanes and associated transit). The 95 Express project does support a regional express bus transit service between Broward and Miami-Dade Counties in the express lanes. The pricing strategy also promotes emission reduction and encourages a reduction in vehicle miles traveled (VMT). Although affordable in comparison to construction projects, funding express lane development may be challenging in the present economic climate with many agencies and local governments struggling with a severe transportation funding crisis.

95 Express Implementation Costs and Revenues

According to the FDOT's 2009 *95 Express Midyear Report* Phase 1A and 1B was projected to cost $121.5 million. A USDOT Urban Partnership Agreement Grant provided $62.9 million, of which $19.5 was for transit. The State of Florida allocated an additional $35 million, with the balance of funding coming from future toll revenues. Some of the cost was also carried by the contractor as part of their design, build, and finance contract.

As reported in the FDOT's 2009 *95 Express Midyear Report,* the northbound 95 express lane had total revenue of approximately $2.8 million, approximately 89 percent of the projected estimates. In regards to the average monthly revenue, 55 percent came from the PM peak period. The average PM peak period revenue was nearly $10,700 from over 6,900 vehicles between 4pm and 7pm daily. Concerning the southbound operations, data is only available for January 2010. During January, total revenue for southbound operations was $220,124.[15]

95 Express Impacts on Mobility

In terms of the impact to mobility, 95 Express illustrates a positive effect on speed/travel times, reliability, and person throughput. According to the *95 Express Midyear Report*, travel speeds along both the northbound express lanes and general purpose lanes increased considerably. The express lanes operated PM peak period speeds roughly 39 MPH faster with travel times 14 minutes faster through the

[15] From January 15 2010

corridor than in 2008. Likewise, general purpose lanes were generally 23 MPH faster than in 2008 and travel times decreased by 11 minutes during the PM peak period. In terms of reliability, the express lanes operated at speeds in excess of the minimum requirement (45 MPH) 95.4 percent during PM peak and 99.5 percent all of the time.

As part of the FDOT midyear report, data on average vehicle occupancy was collected, including express bus ridership and traffic volume data to calculate the person throughput of 95 Express northbound. Person throughput increased by 12 percent overall, compared to 2008. Person throughput on express lanes during the PM peak increased 23 percent, while general purpose lanes increased by 8 percent.

95 Express Impacts on Emergency Response

In terms of emergency response, 95 Express is a good case in point illustrating the benefit of working in partnership and coordinating with local agencies and authorities. District Six, in a collaborative effort with local police, fire rescue, Florida Highway Patrol (FHP), and transit officials, developed an incident management plan. The incident management plan provides guidelines for resources, multi-agency protocols, and quick clearance polices. With added resources and incident management training for FHP troopers, the duration of travel lane blockage and response times was reduced by 45 percent and 15 percent respectively.

Reversible Lanes

A reversible lane is a lane in which traffic may travel in either direction depending on traffic conditions and time of day. Typically, they are meant to improve traffic flow during both the morning and afternoon peak hours. This is accomplished by daily phasing in of traffic to the reversible lane using overhead message boards, special signing, traffic control safety devices (signal lights, gates, vehicle restraints) on regularly scheduled time intervals. Tolls may be imposed to generate revenue.

Example of a Reversible Lane – Crosstown Expressway

Tampa's Crosstown Expressway is an example of Reversible Express Lanes (REL) employed in Florida. Opened to motorists in July 2006, the Crosstown Expressway combines the innovations of concrete segmental bridges, reversible express lanes, cashless open-road tolling, and full electronic controls. It provides three lanes toward Tampa in the morning peak and three lanes out of Tampa and into the suburbs of Brandon in the afternoon peak.

Benefits of Reversible Lanes

Reversible lanes provide benefits to both mobility and economic development, as noted in Tampa. Identified benefits include the following:

- Good alternative when highway widening is neither physically nor financially feasible;
- In the case of Tampa, REL constructed within the existing right-of-way of the Lee Roy Selmon Crosstown Expressway;
- Technological innovations, including cashless road tolling at free-flow speeds and video toll collection; and,
- Accommodated continued development growth in both Tampa and Brandon when widening would not have been possible.

Implementation Costs of Reversible Lanes

- Lower project costs, and reduced impacts to the community and the environment;
- In Tampa, the total contract cost for the project was approximately $300 million in year 2004 dollars. This includes all of the planning, design, right-of-way, construction, and construction management and inspection for the reversible express lanes and two gateways;
- Construction funding for the Tampa's REL was provided through a combination of revenue bonds and loans; and,
- State of Florida loaned the Expressway Authority $25 million in order to accelerate construction.

Impacts to Mobility

The reversible lanes implemented in Tampa also provided mobility benefits to the travelling public. These benefits included the following:

- Tampa's REL has yielded a time savings of 20–30 min for each of the peak-hour directions, consequently delivering a time savings of up to one hour per day at a cost of $3 per round trip;
- Tampa's REL improves reliability due to the safe conditions resulting from the express lane design and the elimination of vehicle conflicts caused by large trucks and numerous entrance and exit ramps;
- Tampa's REL enhanced public transit service from suburban Brandon to downtown Tampa, public transit ridership up by over 40% on two express bus routes; and,
- Actual traffic volumes have exceeded forecasts by 25%.

High Occupancy Vehicle (HOV) and High Occupancy Toll (HOT) Lanes

HOV lanes or carpooling lanes are reserved for vehicles with a driver and one or more passengers. HOV lanes may either be designated simply by diamond markings or isolated lanes. HOT lanes gives single occupancy motorists access to HOV lanes by paying a toll. Typically, the tolls are variable depending on time of day and traffic conditions. South Florida's 95 Express in an example of HOV/HOT Lanes[16].

Benefits of HOV or HOT lanes

- Encourages carpooling and vanpooling, as the HOV lane provides an incentive to share rides. This in turn provides environmental benefits relating to reduced fuel consumption and fewer emissions;
- Maximizes use of existing highway capacity; and,
- Dynamic pricing strategy can be used to manage demand and generate revenue.

Mobility Impacts

Mobility benefits for HOV lanes are similar to managed lanes and include the positive effect on speed/travel times, reliability, and person throughput. The 95 Express project demonstrates these impacts.

Truck Only Lanes

Truck only lanes are special use lanes separating trucks from passenger traffic. This strategy is designed to reduce congestion, increase the longevity of pavement, and expand the economic benefits of streamlined freight mobility. Two common methods of separating trucks from general traffic are lane striping and concrete barriers. Tolls may be imposed to generate revenue. Barrier separated dedicated truck lanes achieve optimum feasibility when truck volumes exceed 30% of the total vehicle mix, peak hour volumes exceed 1800 vehicles per lane-hour, and off-peak volumes exceed 1200 vehicles per lane hour.

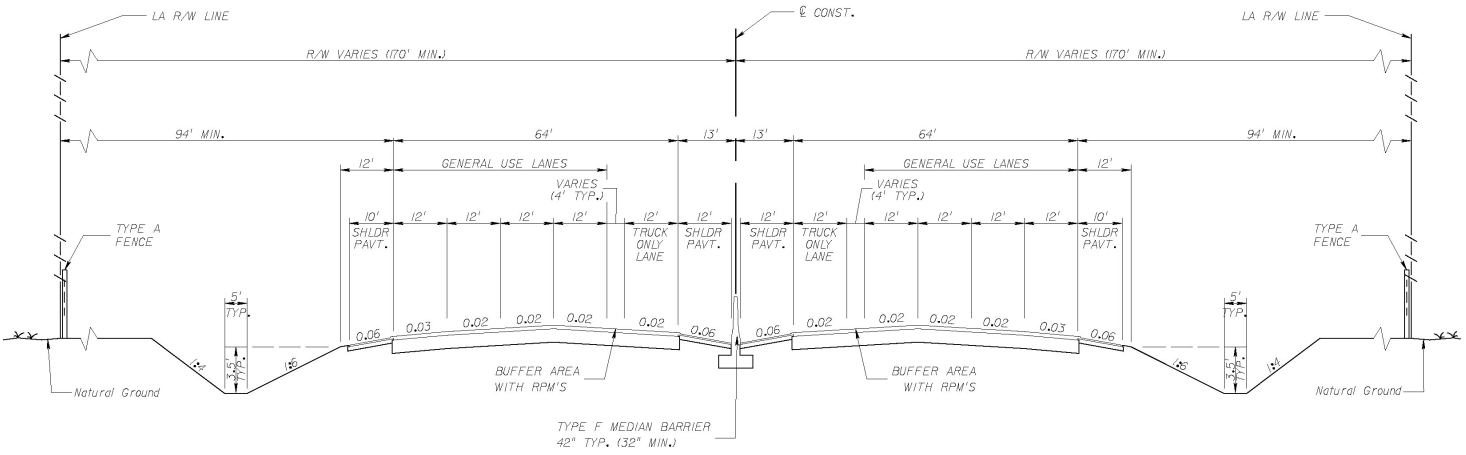
Currently the Florida Department of Transportation is building a new north-south toll road, connecting Interstate 4 with the Selmon Expressway west of 31st Street in Tampa. The elevated roadway will link the two major east-west corridors with the intent to improve the movement of people and goods. The new roadway will provide truck only lanes for direct access to the Port of Tampa and remove heavy

[16] Refer to 95 Express Case Study for more on HOV/HOT and Express Lanes.

truck traffic from local roads in Ybor City, which is a National Historic District. The estimated cost is $389.5 million.

In addition, FDOT District Five prepared a document entitled *Truck-Only Lane Quick Reference* to provide a general introduction to truck-only lanes, discuss current status, and to provide quick reference to basic design criteria for these facilities. It also includes typical sections for buffer and barrier separated truck lanes for informational purposes. One of these typical sections is illustrated in **Figure 2.5.1**.

Figure 2.5.1 Example Typical Section of Interstate Truck Only Lane



Source: Truck-Only Lane Quick Reference, FDOT District 5, March 2008

Benefits and Drawbacks of Truck Only Lanes

Truck only lanes provide benefits to both freight and passenger vehicles. Benefits include the following:

- Reduces many passenger vehicle and heavy truck conflicts by separating these vehicles;
- Contributes to the reduction of congestion and emissions, and improves safety in general purpose lanes; and,
- Economic benefits can be viewed in terms of more efficient movement of goods resulting in reduced freight costs, as well as improving travel speeds in the general purpose lanes.

Truck only lanes also have some drawbacks, such as the following:

- If tolled, the cost may deter some independently operated truck drivers from using the lanes;
- Without expensive direct access ramps serving truck only lanes, there are safety and mobility issues with trucks weaving from truck only lanes in the median to typical right-hand exit ramps;
- Difficulties may arise when accidents occur or maintenance needs to be conducted;
- Truck only lanes may be viewed by the public as providing a minimal overall benefit because citizens will not be able to use them; and,
- Truck lanes may discourage growth of the rail-highway intermodal system, which is more energy efficient and more effective in reducing greenhouse gas (GHG) emissions.

Costs

Truck only lanes are similar to other types of special use lanes in terms of implementation costs. Special items relating to costs include the following:

- Initial funding of designated truck lanes would come from tolling implemented to fund the construction; and,
- Costs for constructing truck ways are estimated to be higher than typical per lane mile freeway costs. The increased costs are due to design changes sometimes required to accommodate heavy trucks, such as thicker pavements, increased lengths of acceleration and deceleration lanes, changes to horizontal and vertical curvature, and grades on overpasses.

2.6 Implementation of Integrated Logistics Centers

For the purposes of this study, an integrated logistics center (ILC) is any facility with multiple modal access (including rail and highway) around which clusters of related businesses, such as warehousing and distributing centers, arise. They are also known as urban shared use facilities, freight terminals, ports, and freight villages. An ILC can be further defined as an area within which all activities relating to transport, logistics and the distribution of goods, both for national and international transit, are carried out by various operators. ILCs are characterized by modal shifts in the transport of freight, the location of active distribution centers and industrial activities adjacent to modal shift facilities, unified management of the facility, and sometimes includes support activities such as office space, restaurants, and hotels.

The I-95 corridor is one of the State's most critical transportation facilities for the movement of people and goods along the east coast of Florida. An effective freight transportation strategy is necessary for a successful economy because consumers and businesses rely on the timely and efficient delivery of goods. The movement of goods in urban areas can put a heavy burden on a transportation network. When large trucks mix with congested urban passenger and pedestrian traffic, they can cause safety hazards can result and the congestion contributes to urban air quality degradation. The establishment of ILCs at key locations provides an alternative to increasing highway capacity along I-95 through a modal shift to rail.

Characteristics of Recognized ILCs

ILCs have seen great success. Criteria used in the determination of the location of a future distribution facility include infrastructure, labor costs, proximity to customers, and community and site characteristics. ILCs typically have the following characteristics:

- **Modal Shift** – goods are moved between two or more forms of freight transportation such as rail to truck, barge to rail and/or truck, and air to truck to rail;
- **Active Management** – no passive activity or container storage located on-site; active distribution centers and industrial activities located adjacent to modal shift facilities;
- **Ancillary Activities** – site offers support activities such as truck stops/rest areas, office space, retail and commercial outlets, hotels, etc.;
- **Unified Management** – ILCs are under management of single entity;
- **Location** - located in or near metropolitan areas; and,

- **Typically Compact** – ILC sites can be several thousand acres in size, but a site of this size is highly unlikely in an urban area; urban sites typically comprise 125 or more contiguous acres.

Potential Benefits and Drawbacks

An ILC offers many advantages, including the following:

- **Alleviating Congestion** – provides a location to shift goods to a different mode of transportation, consolidating freight loads into fewer trucks thereby reducing corridor volumes. Removes long distance trucks from I-95 with a mode shift to rail;
- **Improved Safety** - provides a location for truckers to wait out peak travel times, thereby minimizing the interaction between truck and passenger traffic in dense urban areas;
- **Environmental Benefits** - consolidating smaller trucking loads into fewer loads facilitates reduced vehicle miles travelled (VMT), thereby assisting in alleviating energy consumption and reduced emissions[17]. Given that ILCs are active centers for modal shift in the transport of goods, their establishment has the potential to decrease land devoted to warehousing, thereby potentially allowing more land to remain undeveloped. A ILC is also an excellent use for brownfield redevelopment; and,
- **Economic development** – reducing the cost of trucking from excessive fuel usage and extended staff time, as well as reducing the time it takes to move freight supports existing industries while also fostering an environment to attract more businesses. Additionally, ILCs attract ancillary, support business activities benefitting the host communities through increased revenues and job creation.

The establishment of an ILC also has potential drawbacks. Identified drawbacks include the following:

- **Large Development Area** - an ILC is a large, highly industrialized site, operating around the clock, located adjacent to or within an urbanized area. Consolidating and acquiring the land necessary to house a facility of this nature could be costly;
- **Land Use Conflicts** - industrial operations housed within an urban area must be located in an area acceptable to the host community; and,

[17] The Sustainable Urban and Regional Freight Flows program (1998) found modifying transport, warehousing and logistics processes usually decreased negative environmental impacts and resulted in a roughly 20% reduction in VMTs.

- **Environmental Impacts** - the quantity of land required to establish a ILC and the potential cost of assembling large amounts of acreage within an urbanized area may result in potential environmental impacts.

Example Locations

Given the benefits of existing infrastructure and services, and the availability of a workforce pool, the location for a future ILC should focus on developed areas. Choosing a site in an urbanized area should take into consideration the context of the host community, site constraints, and the private sector perspective in terms of the feasibility of future investments in the project. To locate a large-scale industrial operation in an urbanized area, brownfield redevelopment may offer an optimal solution to many issues.

Brownfield sites are abandoned or underused industrial and commercial facilities available for re-use. These sites typically have the infrastructure necessary to the operation of a successful ILC. Given these sites are already impacted in some manner, locating an industrial operation on a brownfield could reduce potential environmental impacts on undeveloped land. In addition, until brownfield sites are redeveloped, an empty brownfield site can be a financial burden on the community containing them. Redevelopment of a brownfield site has some potential financial incentives given the land is likely to cost less than undeveloped land and necessary infrastructure is likely to already be in place.

The following discussion of example locations considers proximity to or location within an urbanized area with high volumes of truck traffic. The identification of potential future locations also considers proximity to infrastructure and availability of brownfield sites in excess of 125 acres. These locations are not exhaustive of all locations having the potential to be successful ILCs, and any potential site would need to be coordinated with local planning and zoning authorities. They are only provided here to illustrate example locations including the conditions stated above for development. Four example locations are identified, three of which are within the I-95 study area. The fourth is located outside of the I-95 study area, but locating a ILC at this site may offer the benefits to the I-95 corridor sought through this study. The example locations include:

- **Jacksonville -** In the I-95 corridor, there appear to be some locations conducive to a successful ILC operation. The northern extent of the I-95 corridor study area contains the Jacksonville urbanized area. In this area, the I-95 corridor experiences greater than 15,000 AADT from truck traffic alone. The peak area of traffic congestion is located within Jacksonville's Enterprise Zone area and encompasses a large industrial area of the City north of Downtown. Most importantly, this area offers access to three prominent rail

facilities (CSX, FEC, and Norfolk Southern) providing connections to central and south Florida as well as the rest of the U.S. rail network. This area also offers access to several key facilities, such as I-10, I-95, and U.S. 1/U.S. 23 (New Kings Road), a deepwater seaport, the Westlake Industrial Park owned by Norfolk Souther, and Jacksonville International Airport (JIA). The area around JIA has numerous sites planned for light industrial/warehousing. Additionally, the Cecil Commerce Center, west of downtown Jacksonville near the I-10/SR 23 interchange, has large parcels suitable for the development of a ILC;

- **Daytona Beach Area -** The Daytona Beach area brownfield site is located in close proximity to I-4, contains the Daytona Beach International Airport, and is a potential inland port site. This site is also bordered on the north by an emerging SIS connector. Truck traffic ranges from between 10,000 to 15,000 trucks per day. Despite this site not having access to rail at this time, given the multimodal opportunities afforded to this site, it is an example location to be studied for development of a ILC;

- **Melbourne Economic Enhancement District** - The Melbourne Economic Enhancement District is an approximately 5900-acre brownfield located with connections to the Melbourne Regional Airport and SR-500, an east-west route connecting to central Florida. AADT from truck traffic in this area is high, with volumes in excess of 15,000 trucks per day. This site does not have access to rail at this time;

- **St. Lucie County International Airport Area -** The St. Lucie County International Airport contains a large area of open land adjacent to the airport. This location has good access to the FEC rail corridor and the highway network, including I-95, U.S. 1, and the Turnpike;

- **Titusville Area -** The Titusville area is host to the Norfolk Southern intermodal facility, which is next to the Space Center Executive Airport. This area has open land and excellent access to the highway network, including I-95, U.S. 1, and SR 528; and,

- **Westgate/Belvedere Homes CRA Area** - The location of the Westgate/ Belvedere Homes CRA in Palm Beach, with its proximity to arterial roads, the Florida Turnpike, and Palm Beach International Airport, make it a potential location for a future ILC. Connecting to rail may be an option with a rail alignment located east of the property, running parallel to I-95. This site is directly adjacent to Palm Beach International Airport and is bordered on the north by Okeechobee Boulevard providing a direct connection to the Florida Turnpike.

2.7 Inland Port Concepts

An inland port is most often described as a port facility on a river or lake connected via other waterways to major shipping channels. A more recent definition is an inland facility affiliated with a seaport and serving as an extension of the services typically provided at a seaside terminal. For the purposes of this study, an inland port is directly linked with the functions of a single seaport. More specifically, an inland port can be described as a specialized intermodal facility dealing mostly in standardized shipping containers. Once unloaded from a ship, the moving of containers between modes (truck to rail, rail to truck, etc.) can be accommodated off the port site at an inland port acting as transfer centers for shipping containers between modes.

Characteristics of Recognized Inland Ports

As the private sector has become more and more focused on globalization and efficient global supply chains, inland ports are starting to emerge in the transportation community. At inland ports, transportation resources such as access to the interstate highway system, intermodal rail facilities, or air cargo operations are viewed as necessary components for businesses seeking competitive advantages. The following list describes the majority of the typical characteristics of inland ports:

- **Regional Centers** – located nearby one or more large markets and have direct transportation access to them;
- **International Trade Facilitators** – assist international trade by being connected to international gateways, international logistics services, and customs;
- **Multi-modal Capabilities** – located at the crossroads of an efficient, multi-modal transportation infrastructure;
- **Foreign Trade Zone status** – encourages secondary development around the facility;
- **Specific Available Labor** – provides higher paying jobs and requires a certain skill-level;
- **Information Technology** – operate efficiently, in real time, and be secure, with IT infrastructure as the foundation;
- **Marketing** – aggressively marketed locally, nationally, and internationally to establish the facility as a node in larger supply chain networks; and,
- **Public/Private Balance** – cooperation among public and private entities helps develop and expand the facility as well as support growth opportunities.

Potential Benefits and Drawbacks

The development of an inland port offers significant advantages to the I-95 corridor, but also has potential drawbacks. Inland Port facilities can add substantial benefits to existing seaports and the I-95 corridor, including the following:

- **Economic Development** – existing seaport operations would be enhanced by freeing up land to expand capacity, creating new market opportunities, and enhancing overall efficiency. Inland ports also typically create new regional economic development opportunities;
- **Alleviating Congestion** – development of an inland port would provide enhancements to the freight system (existing and future), improved intermodal connectivity, dispersal of truck traffic, and diversion of truck trips to rail (emissions reductions), all benefit the overall mobility of the I-95 corridor, along with other roadways in the transportation network;
- **Environmental Benefits** - diverting truck trips to rail provides emissions reductions and fuel efficiencies in the movement of containers from the port to their final destination; and,
- **Benefits to Other Modes** - supplementary operations at an inland port, such as air cargo, could also help to reduce growth pressures on major commercial airports.

While there are numerous benefits to an inland port there are also drawbacks, such as the following:

- **Capital Costs** - initially, the capital required to acquire land and construct such a facility would likely be upwards of $30 million. Other necessary improvements to the local and regional roadways to accommodate heavier trucks and higher truck volumes, along with any freight rail improvements, could equal or exceed the capital construction costs of the facility itself;
- **Secondary Economic Impacts** - rail and secondary improvements to allow long-haul movements from the seaport to inland port, impacts to secondary businesses located near the seaports, and overcoming shippers desire to not add another node in the transportation network; and,
- **Environmental Concerns** - additional concerns related to an inland port are the potential environmental impacts relating to a new site.

I-95 Corridor Existing Seaport Facilities

In order to analyze whether or not an inland port is a feasible alternative for the I-95 Corridor in Florida, one must first look at the existing seaport facilities. Within the twelve county I-95 study area, there are seven existing seaports. The seaport's

location, distance and access to I-95, basic operations, and expansion issues are identified in **Table 2.7.1**.

Panama Canal Widening

A major change is scheduled to take place within the international maritime industry as the Panama Canal widening project is scheduled to be completed in 2014. The widened canal will allow super-sized cargo ships easier access to points around the globe. Shipping routes will be significantly transformed creating lower shipping costs. The Atlantic and Gulf Coast ports of the U.S. are actively awaiting the completion of the Panama Canal widening. The Panama Canal widening will allow these ships, with nearly twice the current capacity, to reduce the time goods have to travel from Asia to reach ports or other warehousing facilities in the Eastern United States. Currently, over half of the goods from Northern Asia arrive via ports along the U.S. west coast. From those ports, the goods are carried on trains and trucks across the country to the east. As a result of shipping directly from Asia to east coast ports. The new canal would provide some relief to the high traffic ports along the west coast and the rail corridors between the Pacific Coast and transfer facilities in the Midwest.

The State of Florida is actively ramping up their efforts to attract commerce from the widened Panama Canal; however, they are not alone as every major port facility within the Gulf of Mexico and along the Atlantic seaboard are planning expansions. Improvements such as increasing channel depths to accommodate the larger ships will also need to be completed. The competition among states and regions to capture the expected increase in traffic is driving the push to improve infrastructure within and outside of existing port facilities in Florida.

Example Locations

Nearly all of the seaports within the I-95 Corridor are suffering from increasing confinement by development on their borders. The residential and commercial growth over the past two decades has increased traffic volumes which in turn have choked access corridors which are vital to port transportation needs.

In order to analyze the expansion possibilities and the feasibility of inland ports the I-95 Corridor was broken down into two major segments, South Florida and North Florida. The South Florida segment includes six (6) counties; Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River. The North Florida segment also includes six (6) counties; Brevard, Volusia, Flagler, St. Johns, Duval, and Nassau.

Table 2.7.1 Existing Seaports within the 12 County I-95 Corridor Study Area

Facility	Location	Distance to I-95	Access to I-95	Cargo Tonnage (2008)	Passenger Traffic (2008)	Expansion Issues
Port of Miami (Miami-Dade County)	518 acres just east of downtown Miami within Biscayne Bay	One (1) mile to the west	Exits 2c (6th/8th St.) and 2D (I-395)	7,420,000	3,780,000	Since the port is located on an island within Biscayne Bay it has limited options for expansion
Port Everglades (Broward County)	2,190 acres in Ft. Lauderdale	Three (3) miles to the west	Exits 24 (I-595), 25 (SR 84), and 26 (Davie Blvd.)	24,200,000	3,400,000	The port has several hundred acres of possible expansion area; but, the majority is ecologically sensitive wetlands adjacent to a state park.
Port of Palm Beach (Palm Beach County)	153 acres in Riveria Beach	Three (3) miles to the west	Exits 74 (45th St.), 76 (Blue Heron Blvd.), and 77 (SR 850)	5,100,000	500,000	The port facility is completely surrounded by existing development and has no potential for expansion areas.
Port of Fort Pierce (St. Lucie County)	20 acres in Fort Pierce (adjacent privately owned Indian River Terminal on 12 acres)	Five (5) miles to the west	Exits 129 (SR 70) and 131 (Orange Ave.)	500,000	none	The port is just in its infancy and currently is mostly vacant land, some expansion options exist but is limited to only about 75 ac.
Port Canaveral (Brevard County)	886 acres on Cape Canaveral	Eleven (11) miles to the west	Exits 202 (SR 524) and 205 (SR 528/ Beach Line Expressway)	4,470,000	2,200,000	There are several hundred acres for potential expansion.
Port of Jacksonville (Duval County)	1,216 acres northeast of downtown Jacksonville (4 separate sites)	Varies between two (2) and seven (7) miles to west	Varies but includes Exits 354 (MLK Pkwy.) 355 (Golfair Blvd.), 357 (Tallulah Ave.), 358 (Heckscher Dr.), 362 (I-295/SR 9A), and 337 (I-95/I-295/SR 9A)	20,700,000	300,000	Since the port facilities are spread amongst four (4) separate locations there are numerous expansion opportunities within those existing facilities along with other potential locations along the St. John's River.
Port Fernandina (Nassau County)	20 acres in Fernandina Beach	Fifteen (15) miles to the west	Exits 373 (SR A1A/SR 200) and 380 (U.S. 17)	500,000	none	The port has limited possibilities for expansion since it is surrounded by existing development.

Within the southern portion of I-95 Corridor in Florida only Port Everglades and the Port of Fort Pierce have any possible land expansion areas; however, they are relatively limited based upon acreage and potential environmental impacts. The remaining port locations, Miami and Palm Beach, are entirely landlocked. Understanding the potential growth avenues with the widened Panama Canal and the limitations of South Florida's ports, the Port of Palm Beach requested FDOT conduct the *South Florida Inland Port Feasibility Study* in 2007. The study explored the feasibility of an inland port facility at a centralized location in South Florida. The reasoning for the study was to combat the increased congestion on the transportation corridors in South Florida, along with the landlocked nature of the Port of Miami-Dade, Port Everglades, and the Port of Palm Beach. Over the past decade, Eastern South Florida has been experiencing increasing traffic congestion because of high levels of growth with limited capacity expansion opportunities. With natural barriers to the east (Atlantic Ocean) and west (Everglades) along with the existing built environment, there are very few development opportunities. The only avenues for port expansion are outside of the built up corridor in the rural western portions of Miami-Dade, Broward, and Palm Beach counties.

Since the development of an inland port requires several thousand acres for the actual port facility and secondary development activities, only a small handful of potential sites were suitable candidates for further review. The study looked at five (5) potential sites for an Inland Port and weighed the positives and negatives for each location. The potential sites were located within approximately 20 miles of Lake Okeechobee in Palm Beach County (3 sites), Martin County (1 site), and Highlands County (1 site). The study recommended the location along U.S. 27 near the City of South Bay on the southern shore of Lake Okeechobee within Palm Beach County.

In mid-2009, the Port of Palm Beach submitted an RFQ for potential sites and development opportunities for the proposed inland port. On December 17, 2009, the port voted to partner with Florida Crystals Corporation, a major sugar company, who submitted a site located just south of the City of South Bay. This site was previously identified in the *South Florida Inland Port Feasibility Study,* however, the final site location is currently in the selection/negotiation process. The project will centralize both rail and truck cargo distribution systems and related industrial activities into one complex. In addition, the approximately 3,500 acre site will allow the port to handle the abundance of cargo expected from the Panama Canal expansion. Furthermore, both Port Everglades and the Port of Miami would also be able to truck cargo to the site.

There are several improvements proposed to efficiently and effectively transport goods to and from the region. Many of the cargo movements by truck to the south will utilize U.S. 27, to the west of populated areas for faster and safer deliveries.

Currently, these trucks utilized the highly congested I-95 and Florida Turnpike corridors. Upgrades to the east-west roadway corridors are likely the first improvements. Future east-west rail improvements are planned or proposed to connect to the Medley and Hialeah (west of Miami) rail yards (served by FEC), which would relocate a majority of the current freight rail traffic away from the I-95 corridor and move it further inland away from population centers. A recent study looked at rail improvements along the U.S. 27 corridor from South Bay in Palm Beach County to Miami.

Both Port Canaveral and the Port of Jacksonville have the potential for increases in land area and only the Port of Fernandina is limited in expansion opportunities. Furthermore, the Ports in Jacksonville and Cape Canaveral are both major Atlantic Coast freight terminals with the potential for future expanded passenger opportunities, while the Port of Fernandina is a relatively small port with a focused clientele. The Port of Jacksonville has been aggressive over the past few decades in looking for expansion opportunities and working with state, regional, and local agencies to make sure road and rail infrastructure needs have been met. While both Duval and Brevard counties have congestion issues, they are not severe enough to hinder current and future freight service. Since I-95 is the only major north-south high speed corridor within this portion of Florida, congestion mitigation will remain a potential issue into the future.

While, the lack of port expansion opportunities and increased congestion were the determining factors for the Southern Florida study, other reasons such as increased economic development and expanding modal opportunities are the common reasons given across the globe for exploring inland port development. Since no expansive study has been completed regarding inland ports in Northern Florida, the following analysis is based upon factors in similar studies. These factors have not been formalized but can be utilized to determine appropriate areas for inland port locations. The following factors or components of inland ports were utilized:

Access to Major Container Seaport – Northern Florida has only two (2) major container seaports; Port Canaveral which is located in Brevard County and Port of Jacksonville which is located in Duval County. The Port of Fernandina in Nassau County is not a major container seaport.

Served by a Class 1 Railroad – The Florida East Coast Railway (FEC) mainline, between Jacksonville and Miami, runs parallel to I-95 in the corridor. Both CSX and Norfolk Southern (NS) use the FEC for rail-highway intermodal service into Southeast Florida. This high quality service attracts UPS and other time sensitive shippers. The NS has operating rights over the FEC to Miami and has a new intermodal facility south of Titusville, which serves Central Florida.

Over 1,000 acres of Total Land – There are numerous locations where 1,000 acres of land could be obtained along either the FEC or CSXT railroads or other major roadways in Northern Florida.

Foreign Trade Zone (FTZ) status – Currently, there are three (3) FTZ's in Northern Florida along the I-95 Corridor including JAXPORT/Jacksonville Intentional Airport, Port Canaveral, and Daytona Beach International Airport. Two (2) additional FTZ's are in close proximity including the Orlando International Airport, located south of downtown Orlando, and the Sanford International Airport, located northeast of Orlando. In order to acquire FTZ status the sites must be within or adjacent to a U.S. Customs and Border Protection (CBP) port of entry. Additional CBP ports of entries are located at airports in Melbourne, St. Augustine, and Fernandina Beach. New CBP port of entries and subsequent FTZ status can be accomplished through a Federal Action.

Access to a local metropolitan market/Access to a strong labor pool – The U.S. Census Bureau has classified four (4) metropolitan statistical areas (MSAs) within the I-95 Corridor; Palm Bay-Melbourne-Titusville MSA (Brevard County) with a population of 557,320 (2007 estimate), Deltona-Daytona Beach-Ormond Beach MSA (Volusia County) with a population of 517,851 (2007 estimate), Palm Coast MSA (Flagler County) with a population of 100,050 (2007 estimate), and the Jacksonville MSA (includes Baker, Clay, Duval, Nassau, and St. Johns counties) with a population of 1,359,173 (2007 estimate). The Orlando-Kissimmee MSA (Lake, Orange, Osceola, and Seminole counties) with a population of 2,098,102 (2007 estimate) is also within proximity.

Accessibility to major State/Interstate Highways – There are nine Strategic Intermodal System (SIS) or emerging SIS Corridors intersecting or parallel to I-95 within the six counties in Northern Florida. They include; SR 528/Beachline Expressway, I-4, U.S. 17, SR 40, SR 100, SR 207, SR 9A/I-295, I-10, U.S. 1, and U.S. 301. There are numerous other SIS connector roadways and state highways within the I-95 Corridor.

It should be noted the Orlando Metro Area, which is outside of the I-95 Corridor, was included in this analysis because any potential inland port would have to consider the Orlando area due to its proximity to Port Canaveral and the Atlantic Coast.

2.8 Short Sea Shipping Concepts

Short Sea Shipping is defined as the movement of goods and people by water over relatively short distances on routes not crossing an ocean. It can occur within lakes and river systems and along coast lines. It consists of mainly domestic shipping but can also include cross-border traffic, for instance between Canada, U.S., and/or Mexico. The vessels used for short sea shipping include small cargo ships, fast ferries and barges. They carry containers, truck trailers, and freight related bulk cargo like coal.

This transport system has proven to be financially and socially beneficial in many parts of the world, primarily in Western Europe. In the United States, however, this system is still in an introductory stage and is currently limited to the movement of international containers between ports by ocean or river barges. It offers an alternative to truck and rail transport. Existing domestic short sea services in the U.S. include:

- Port of Virginia, which has barge operations from Portsmouth to Baltimore, Philadelphia and sometimes New York;
- Roll-on Roll-off (RO-RO) ships and container barges between Bridgeport, Connecticut and New York;
- Barge service between the port of Hampton Roads and Richmond using the James River;
- Barge service for containers and general/break bulk between Brownsville, TX and Port Manatee. SeaBridge Freight offers a four-day scheduled bluewater service from the with a 600 TEU barge (approximately 300 truckloads);
  Container and RO-RO services between Jacksonville and both Puerto Rico and the Dominican Republic;
  Container and RO-RO services between Port Everglades and Puerto Rico;
- Container shipping between Freeport, TX and Chester, PA and also between the ports of Seattle and Tacoma in the pacific northwest;
- Container barge service connecting Houston, Lake Charles, New Orleans, Memphis, Chicago, Mobile, Pascagoula, and other U.S. Gulf Coast and Inland river ports[18].[19].

Dubbed also as the America's Marine Highway, short sea shipping operations moved about six percent of the nation's freight tonnage in 2000. Helping to eliminate congestion on busy coastal highways or postponing costly roadway expansions is one of the benefits associated with short sea shipping.

[18] U.S. DOT Maritime Administration, http://www.marad.dot.gov/ships_shipping_landing_page/mhi_home/mhp_map/mhp_gc_map/mhp_gc_map.htm

[19] An Economic Feasibility Study of Short Sea Shipping, by Athanasios Denisis, 2009

Potential Benefits and Drawbacks

Investment in Short Sea Shipping can help minimize the impacts caused by projected freight growth both at the ports and on the surface transportation modes. Benefits of short sea shipping include[20]:

- **Reduce safety issues** - Shipping is one of the safest modes of transportation. One 1500-ton barge can carry the equivalent load of 60 trucks or 15 rail cars;
- **Reduce environmental concerns** - one 1500-ton barge can move the equivalent of 60 trucks or 15 rail cars, such that one ton of cargo can move 514 miles by barge with one gallon of fuel or 202 miles by train or 50 miles by truck[21];
- **Hazardous materials** can be transported without moving through major population centers or environmentally sensitive lands;
- **Reduce highway noise** - trucks are responsible for about two-thirds of the highway vehicle noise emissions. Reducing the number of trucks on the highway system will have a positive impact;
- **Increase jobs** - re-establishing the United States as a competitive shipbuilder and create thousands of new family wage jobs in ship building communities;
- **Port security improvements** - with short sea shipping, feeder ships will create the ability to de-consolidate import volumes into smaller manageable volumes for screening at feeder ports ensuring more imported cargo is screened;
- **Emergency management** - in the case of an emergency, such as a natural disaster or terrorist attack, feeder ships can provide a shallow draft alternative to move cargo in and out of main ports quickly. River and coastal communities can be served by feeder ships when roads and bridges are down;
- **Improve port productivity** - by swiftly trans-shipping containers out of major ports using feeder vessels and container barges, short seas shipping can increase the capacity of the port terminals and minimize processing time.

The successful implementation of short sea shipping to transport domestic trailers will require a new partnership with trucking companies to deliver short sea containers. Trucks will do the short-haul pick up and the delivery of the cargo to its final destination.

[20] An Economic Feasibility Study of Short Sea Shipping, by Athanasios Denisis 2009 and Florida Intracoastal Inland Waterway Study, Final Report 2003, FDOT.

[21] Short Sea Shipping Steams Ahead, by Bryant E. Gardner, in 7 Benedict's Maritime Bulletin, 2/3rd Quarter 2009.

There are several drawbacks to implementing short sea shipping in the United States. Chief among these are:

- **Handling costs** - there may be added handling costs since short sea shipping operations do not use roll-on/roll-off technology requiring lifting cargo off the ships. The manpower required to lift cargo at both ends of the trip adds to cost, making the service less competitive with other modes;
- **Harbor maintenance tax** - This is a 0.125 percent levy on the value of cargo as it is unloaded or loaded from a commercial vessel in a U.S. port. Some perceive this tax to be unfair on short sea shippers giving overland modes a competitive advantage;
- **Modification costs** - costs of port modifications in order to handle short sea shipping vessels;
- **Jones Act complications** - The Jones Act requires ships operating between U.S. ports are built, staffed, maintained, and owned by U.S. companies. Some argue this 1920 law significantly increases the capital and the operating costs for any short sea operation making short sea shipping more expensive and less competitive;
- **Reliability** - Domestic shippers view reliability as a priority. Short sea shipping has traditionally been regarded as a slow, unreliable mode of transportation and thus not suitable for on-time delivery. This perception must be overcome for short sea shipping to compete against other transport modes.

Despite these constraints, the passage of the Energy Independence and Security Act of 2007 during the 110th Congress directed the Secretary of Transportation to establish a short sea transportation initiative. Among other things, the Act directs the Secretary to designate short sea transportation routes and short sea projects offering a waterborne alternative to shore-side transportation. The Department of Transportation published an interim final rule on Oct. 9, 2008, establishing a framework to provide federal support to expand the use of America's Marine Highway. The four primary components of the framework, as defined by USDOT, are[22]:

- **Marine Highway Corridors**: Designating Corridors will integrate the Marine Highway into the surface transportation system and encourage the development of multi-jurisdictional coalitions to focus public and private efforts and investment;
- **Marine Highway Project Designation**: Designating Marine Highway Projects is aimed at mitigating landside congestion by starting new or

[22] U.S. DOT Maritime Administration, http://www.marad.dot.gov/ships_shipping_landing_page/mhi_home/mhi_home.htm

expanding existing services to provide the greatest benefit to the public in terms of congestion relief, improved air quality, reduced energy consumption and other factors. Designated projects will receive direct support from the Department of Transportation;

- **Incentives, Impediments and Solutions**: The Maritime Administration, in partnership with public and private entities, will identify potential incentives and seek solutions to impediments to encourage utilization of the Marine Highway and incorporate it, including ferries, in multi-state, state and regional transportation planning; and,
- **Research**: The Department of Transportation, working with the Environmental Protection Agency, will conduct research to support America's Marine Highway, within the limitations of available resources. Research would include environmental and transportation benefits, technology, vessel design, and solutions to impediments.

Short Sea Shipping as an Alternative to Trucking on I-95 in Florida

Florida has about 1,350 miles of coastline, the second longest in the U.S., which is mostly navigable for commercial water transportation. A waterway is a river, canal, or other body of water serving as a route or way of travel or transport. There are six interdependent systems categorizing Florida's navigable waterways. These are:

- Atlantic Intracoastal Waterway Inshore System;
- Gulf Intracoastal Waterway Inshore and Offshore System;
- Apalachicola-Chattahoochee-Flint River System;
- Okeechobee Waterway System;
- Miami River; and,
- St. Johns River System.

The Atlantic Intracoastal Waterway (ICWW) traverses from Jacksonville to Miami for a distance of 370 miles. The ICWW is made up of an almost continuous series of protected waterways just inside the coast, on which more than 105 million tons of cargo is carried annually. If some of the freight currently trucked south on I-95 from Jacksonville or other coastal cities further north were diverted to short sea shipping, this would provide some of the much needed relief on the I-95 highway and the FEC line.

The east coast of Florida also has seven deepwater ports, which currently handle international cargo. These are the Port of Fernandina, Port of Jacksonville, Port Canaveral, Port of St. Pierce, Port of Palm Beach, Port Everglades and Port of Miami. One of these ports, Port of Jacksonville, currently participates in Short Sea Shipping with its container and RO-RO service to Puerto Rico and the Domincan Republic. There are seven more deepwater ports on the west and south coasts of

Florida. Some of these ports already have facilities to accommodate short sea shipping at minimum start-up costs.

Some of the obstacles to be overcome before implementing Short Sea Shipping in Florida are:

- **Environmental concerns** – Florida strives to save and protect the pristine and sensitive environment of Florida's coastline. As commercial waterborne transportation near public beaches, coastal residential communities, and urban areas grow, the worry of Florida losing its prestige of being a vacation spot is becoming more evident;
- **Weather** - hurricanes can cause a lot of damage to Florida's waterways or to unaware ships out in the ocean. They could block waterways, ports and roads, which would hinder short sea shipping vessels from delivering their cargo on time and/or prohibit trucks from picking up the cargo;
- **Invasive exotic plants** - water hyacinth is a weed capable of clogging canals and water intakes and restricting navigation along rivers and lakes. It can double its size in about two weeks by using runner stems and seeds. Without proper maintenance of the water hyacinth, it could become a real threat to short sea shipping; and,
- **Bridges** - bridges could be an impediment to Short Sea Shipping if they are not high enough for boats or barges to pass underneath. In addition, shallow drafts and competition for space from recreational boaters impact the use of using the Intercoastal waterway for short sea shipping.

2.9 Improve Parallel Freight Rail Corridors

Growth in the economy has led to significant rise in the demand for freight transportation over the years. In 2006, the total percentage of U.S. freight ton miles by mode were: rail, 40%; truck, 28%; pipeline, 20%; and, water, 12%. Since 2000, domestic rail-highway intermodal service has been rapidly growing, spurred by double stack trains with 53 foot containers; rail ton miles during this period have been growing faster than truck ton miles. With a moderate three percent per year growth in the U.S. economy, domestic freight tonnage will increase by 57 percent by 2020[23].

The freight rail system is an important part of the nation's freight transportation system and is critical to the economy. Most high-volume bulk commodities such as coal, grain and chemicals travel by rail and many manufactured goods are transported by train during part of their journeys. The U.S. Department of Transportation recently forecasted freight railroad demand would increase to 88 percent by 2035 from 2002 levels[24]. Other forecasters predict substantial rail traffic growth – pointing to the urgent need for adequate investment in rail capacity in the years ahead to meet the anticipated growth.

An American Association of State Highway and Transportation Officials (AASHTO) report prepared in 2002 mentions if all freight-rail were shifted to trucks tomorrow, it would add 92 billion truck vehicle-miles of travel (VMT) to the highway system and cost federal, state and local transportation agencies an additional $64 billion for highway improvements over the next 20 years[23].

However, the highway system in urban areas and intercity corridors is already experiencing significant congestion, and truck traffic is a major contributor to the situation. The social, economic and environmental costs of adding new highway capacity are prohibitively high in many areas. While it is expensive to add highway capacity to the existing highway system, freight rail is still an underutilized mode of freight transport. The choice between using trucks or freight rail depends on the shipper's logistics costs. However, factors such as reliability, flexibility, cost, timeliness, security and the value of the freight all go into the decision on whether to use trucks or freight rail or any other mode of freight transportation. Some shippers are willing to pay more in order to get a better quality service including quality rail-highway intermodal service.

[23] Transportation Invest in America – Freight – Rail Bottom Line Report, by AASHTO, 2002
[24] Overview of America's Freight Railroads, Association of American Railroads, May 2008

I-95 Corridor Rail System

Several existing railroads serve the I-95 corridor study area including the Florida East Coast (FEC) railroad, CSX, and Norfolk Southern (NS). Class I Freight Railroad systems in the U.S are railroads which have annual operating revenue of $359.6 million or more, while regional railroads operate at least 350 miles of railroad and/or earn revenue between $40 million and the Class I threshold. There are two (2) Class I Railroads operating in Florida (CSX and NS), and both impact the I-95 corridor. CSX provides parallel service to I-95 serving the entire corridor from Jacksonville to Miami, while NS serves the Jacksonville area and provides connections to the southeastern U.S.. The FEC railroad is a regional railroad running parallel to the I-95 interstate corridor from Jacksonville to Miami along the east coast of Florida.

Potential Benefits and Drawbacks

The freight rail system provides the public with several benefits over highway trucking. The AASHTO Freight Rail Bottom Line report lists the following public benefits of the freight-rail system:

- **Reduction in highway maintenance costs** – costs are reduced due to lower truck vehicle miles of travel (VMT) and reduction in shipper logistics costs;
- **Reduction in highway congestion** – congestion and vehicle delays are reduced with fewer trucks on the highway;
- **Cost effective** - freight rail is cheaper and more cost-effective than trucking or aviation for transporting goods over long distances. Depending on the density of the commodity, one railcar may move the same weight or volume as four or five trucks;
- **Fuel efficient** - freight rail is more fuel-efficient and generates less air pollution per ton-mile than trucking;
- **Intermodal system** - freight rail in partnership with the trucking industry provides intermodal transportation connecting U.S. seaports with inland producers and consumers. Intermodal transportation enables U.S industries to be competitive in the global economy; and,
- **Emergency management** - freight rail also is critical in the case of a national emergency. It is vital for military mobilization and provides critically needed transportation system redundancy.

Rail freight service can be tailored to the customers' needs where adequate rail facilities are in place. The FEC line between Jacksonville and Miami has excellent facilities for existing demand and provides fast and on-time rail-highway intermodal service. The FEC also handles up to five daily rock trains at lower cost, but slower

speeds. Speed is often restricted for safety reasons in areas with many grade crossings, which results in one of the downsides of freight rail: increased congestion at these street crossings.

Another drawback is the limited number of rail crossings over the St. Johns River in Jacksonville. While shifting freight from truck to the FEC line improves many parts of I-95, the single rail crossing in downtown Jacksonville is an impediment to improving freight movement in northeast Florida and thereby improving operations of I-95.

In many cases, due to a variety of factors, it takes two days to move freight by rail from the Port of Jacksonville's Dames Point Marine Terminal to the intermodal yards on the west side of Jacksonville. This same transfer can be completed in only four hours by truck.

Unlike other domestic modes of transport, U.S. rail service is provided over infrastructure largely owned and maintained by private corporations. Expansion efforts on the physical capacity of the railroads to match with expected growth are very costly to implement and maintain on a continuing basis. The AASHTO report cited above found by making a relatively small amount of public investment in the nation's freight railroads, it would result in large public benefits for the nation's highway infrastructure, highway users and freight shippers.

Rail Improvement Examples

Several recent investments by FDOT in Florida's rail network were funded using Strategic Intermodal System (SIS) funds. For example, FEC improvements such as construction of a rail bridge over the Miami Canal, located in west-central Miami-Dade County, will allow for trains to bypass the Hialeah Yard. Double-tracking on the lead rail line in Medley, in western Miami-Dade County, will also allow for trains to bypass the Hialeah Yard and reduce traffic delays at rail crossings.

In addition, the Lacy Siding to Simpson Yard Norfolk Southern Railroad project provides an improved passing opportunity for trains at a critical bottleneck in the Norfolk Southern/Florida East Coast system. The new siding is a section of track parallel to the through line and connected to it at both ends by switches. Passing sidings are constructed to allow one train to pass another, and are thus an essential feature of single track lines. Because the existing Lacy Siding was too short for modern train standards, trains have been forced to wait for long periods in distant sidings until opposing trains pass. These delays create a limit to the amount of rail freight moving along Florida's East Coast. The addition of this 2.7 mile long siding will allow an additional train in each direction between Miami and points north daily and the estimated shift in freight to rail may eliminate 73,000 trucks per year from

Florida's highways. Norfolk Southern Railroad is providing a 50% match and work will be done by the railroad and their contractors.

Elsewhere, the State of Virginia has spent significant state funds on rail and inland port projects as a less expensive means to provide freight capacity than adding lanes along the I-81 and I-95 corridors. Reductions in truck traffic and congestion on the I-95 corridor, along with economic development opportunities, were justifications for these state expenditures. This effort has resulted in the Norfolk Southern (NS) Railroad's $2.5 billion Crescent Corridor Project which will start operation within the next two years. NS has three new intermodal facilities under construction in Memphis, Birmingham, and Franklin County, PA (Hagerstown area) and other improvements underway or planned. The 2,500 mile rail network extends through 13 states from Louisiana to New Jersey. The project is estimated to divert 1.3 million long-haul trucks from the Interstates per year.

Florida East Coast (FEC) Railroad and the I-95 Corridor

The Florida East Coast Railway (FEC) operates 351 miles of mainline track along the east coast of Florida. It has connections to Class I railroad carriers, Norfolk Southern and CSX, in Jacksonville. Some of the major cities being serviced by the FEC railroad in Florida are Jacksonville, West Palm Beach, Fort Lauderdale and Miami. FEC moves major carload commodities of aggregate, automobiles, lumber, farm products, food, machinery, pulp paper, petroleum products, stone quarries, clay and glass.

FEC provides intermodal railroad service very competitive with truck services. FEC has five intermodal terminals. In 2003, over 3.65 billion ton miles were handled by the FEC rail intermodal movements. In addition, between 200 and 350 trailers and containers arrive at the intermodal terminal in Jacksonville each day and more arrive to the FEC terminal via its connections with Norfolk Southern and CSX.

Because of its geographical location, South Florida is difficult to service by truck. The region consumes entire trainloads of products each day but produces little of its needs locally. Most truckloads are transported empty on the return trip. Truck drivers have to deal with the congestion on I-95, negotiate their loaded trucks around the clogged streets of West Palm Beach, Fort Lauderdale and Miami and then head back north burning fuel hauling an empty trailer as far north as Atlanta or Savannah before getting another backhaul[25]. The FEC offers a cheap alternative to move freight between Jacksonville and Miami instead of using I-95. FEC used to operate between 22 and 24 trains each day accounting for only 10% of the freight going into South Florida[27]. However, the recent downturn in the economy has

[25] That Cool Railroad in Red-Hot, Trains magazine article by Fred W. Frailey, October 2007

reduced the number to ten (10) trains per day, according to the FEC chief dispatcher. Trucking is the dominant mode of transporting goods into South Florida. The 350-mile existing FEC line consists of sections which are double tracked and single tracked. Only thirteen percent (45.3 miles) of the existing line is currently double tracked. The double-track segments are between Beaver Street and Sunbeam in Jacksonville; between north of Sycamore Street and just south of Camp Road in Indian River County; between Lake Park and just south of 12th Street in West Palm Beach; between Wilton Manors to Ft. Lauderdale/Hollywood International Airport in Broward County; and also between North Miami (north of 107th Street) and a mile before Hialeah Yard between W 8th Avenue and Okeechobee Road. Train speeds over the line range from 10 to 60 MPH. The railroad crosses a total of sixty six (66) bridges and over 300 at-grade crossings over its entire length.

Further improvements to the FEC line would bring benefits to the public along the I-95 corridor from Jacksonville all the way to South Florida. The ten percent freight currently being handled on the FEC corridor would likely increase, resulting in more freight ton-mileage diverted from the highway system. This would help to bring down highway maintenance costs, fuel usage and minimize air pollution as well as ease congestion in the I-95 corridor. The average unit cost of upgrading from one level of railroad corridor capacity to another ranges from $0.7 million per to mile to $4.4 million per mile depending on the type of upgrade and without including the cost for land acquisition and also for major bridges.[26] Since most of the FEC had double track in the 1960s, the addition of a second track would be relatively inexpensive. Costs for constructing truck lanes are estimated to be $4 to $8 million per mile and include right of way acquisition, heavy duty construction, and design work[27].

Benefits can be realized by shifting some of the freight cargo currently being trucked on I-95 to rail. Revenues for many railroad companies are not enough to carry out all the expansions needed to accommodate more demand and maintenance. Therefore, public funding or public-private partnerships may be required to fund the additional capacity on the freight rail system. Without proper investment to keep up with the increase in cargo demand, the railroad share of freight will stagnate. This will force more freight to be trucked using already congested highway corridors or require the construction of new ones, and eventually making it more costly to the public, the shippers and consumers.

[26] National Rail Freight Infrastructure Capacity and Investment Study, 2007

[27] Reich, S, Davis, J, Catala, M, Ferraro, A, and Concas, S. *The Potential for Reserved Truck Lanes and Truckways in Florida*. Tampa, FL: Center for Urban Transportation Research. 2002.

2.10 Implement Passenger Rail Services

Passenger rail service presents a mobility option to serve Florida's East Coast along the I-95 corridor. Travel within specific urban areas along the I-95 corridor is highly congested in peak travel periods due to single driver automobile use. With the recent establishment of the Florida Rail Enterprise and future allocations of state funds for passenger rail the costs and right-of-way issues associated with developing new infrastructure, and relatively linear growth patterns along I-95, passenger rail service offers a viable mobility option for the state's future transportation network.

The following paragraphs include a brief overview of current or planned passenger rail systems within the corridor and an analysis of each system to serve as a viable mobility strategy to alleviate congestion, facilitate emergency and security responses, and foster economic development within the I-95 corridor. Specifically, the following issues are addressed for passenger rail alternatives:

- Description/definition of alternative;
- Impact to mobility in the corridor;
- Impact to emergency response in the corridor;
- Impact to economic development in the corridor; and,
- Policy implications.

Passenger rail systems relevant to I-95 to be considered for this alternative mobility option include high speed rail, Amtrak (Florida East Coast Service), and commuter services including the South Florida Tri-Rail System and Jacksonville's proposed commuter rail corridors. The following section summarizes the status of these projects.

High Speed Rail

The Florida Department of Transportation (FDOT), through the newly formed Florida Rail Enterprise, will be implementing the first true High Speed Rail (HSR) system in the United States capable of speeds greater than 150 miles per hour. Florida has a long history, dating back to the mid 1970's, of planning for the possible implementation of a HSR system similar to those in use in Europe and Japan. These plans became a lot closer to reality early in 2009 with a new federal initiative as part of the American Recovery and Reinvestment Act (ARRA) Stimulus program: "A Vision for High Speed Rail in America," as illustrated in **Figure 2.10.1**.

Figure 2.10.1 Vision for High Speed Rail in America

Source: 2009 High Speed Rail Strategic Plan

This initiative created a national competition for $8 billion for designated HSR corridors to begin implementing projects. On January 28, 2010, President Obama announced the winners of this competition in Tampa. Florida received one of the largest single project award in the nation: $1.25 billion for the Tampa to Orlando project. Florida won this award due to several factors:

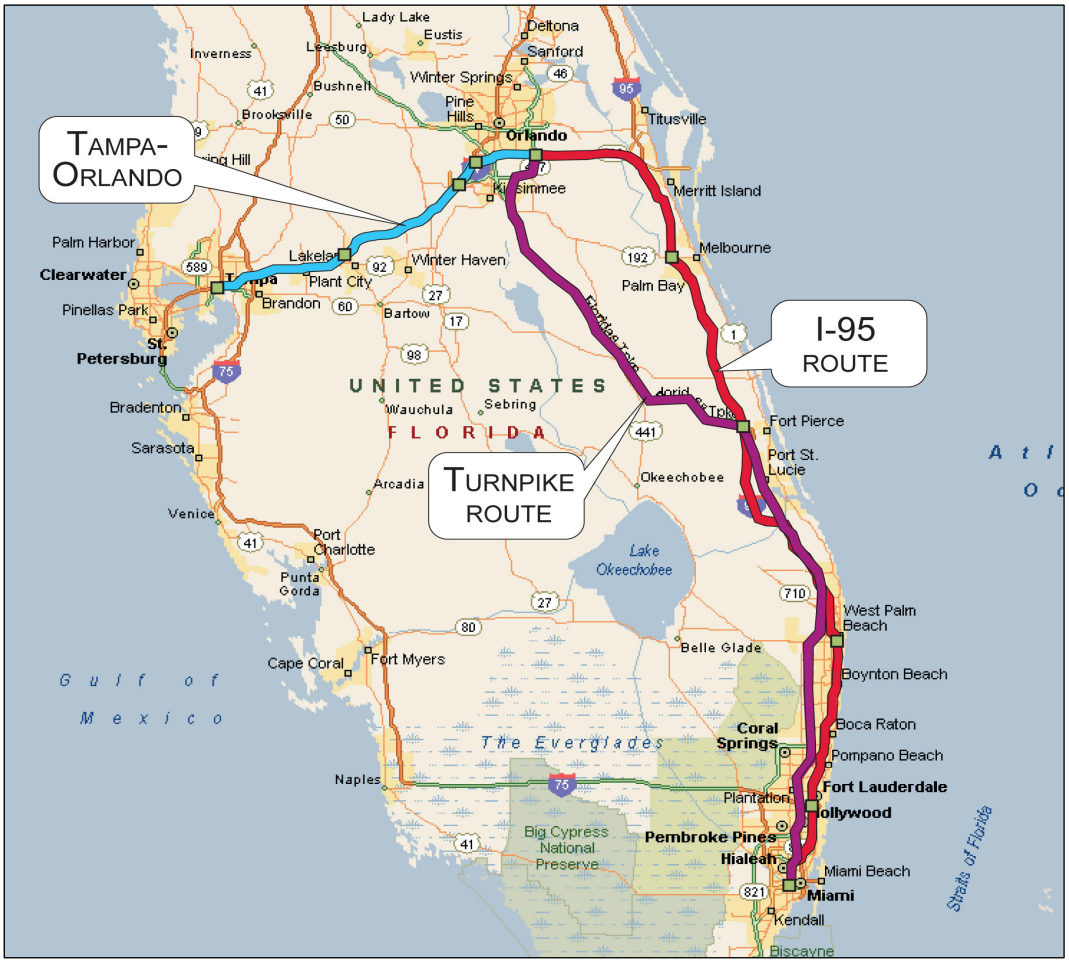
- Strong political support from Governor Crist and the Legislature with the passage of Florida Rail Act in December 2009, creating the Florida Rail Enterprise and mechanisms for supporting passenger rail development;
- Florida's favorable geography and level terrain make the HSR corridor highly affordable;
- Grass Roots support through several business organizations including the Tampa Bay Partnership, Central Florida Partnership and "ConnectUS" initiatives include key stakeholders along the corridor;
- The federal permitting process for the initial segment is virtually complete based on extensive prior work done and recent update. The Final Environmental Impact Statement (FEIS) has been approved by the Federal Railroad

Administration and a Final Record of Decision (ROD) for the project is expected to be completed in May 2010;

- The project can be under construction soon, putting many Floridians to work when jobs are most needed; and,
- FDOT's vision in preserving the median of I-4 for this specific use.

The Tampa to Orlando segment is only the first phase for a statewide system. A connection to Miami and other parts of the State will follow. **Figure 2.10.2** illustrates the HSR corridor phases under consideration.

Figure 2.10.2 Florida High Speed Rail

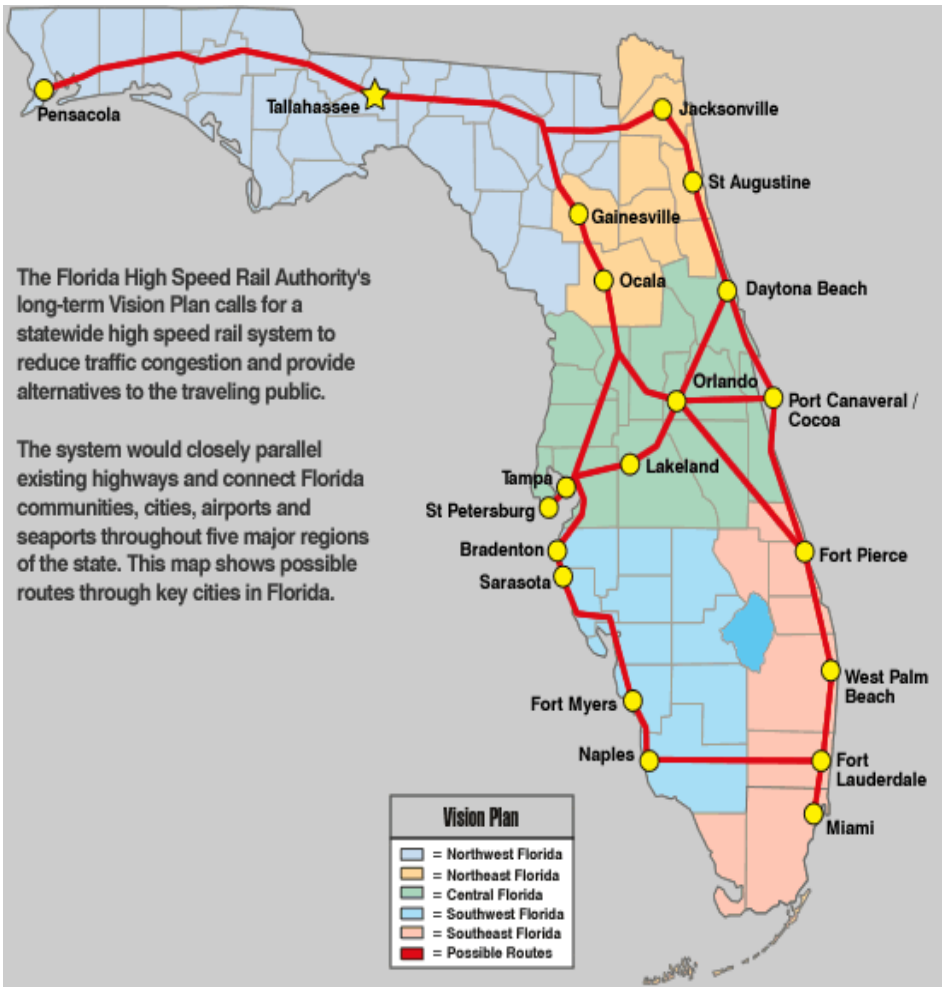


Source: Florida Department of Transportation, 2010

Phase 1 of the HSR project extends from Tampa to Orlando and Phase 2 extends from Orlando to Miami. The Environmental Impact Statement (EIS) for the Orlando to Miami corridor is underway and will take approximately two years to complete. The feasibility for use of portions of the I-95 corridor between Orlando and Miami will be assessed during engineering/environmental corridor work. A 2003 Orlando-Miami feasibility study by the High Speed Rail Authority found the I-95 corridor to be the most feasible.

A Statewide Vision Plan for high speed rail service in Florida is shown in **Figure 2.10.3**.

Figure 2.10.3 2001 Florida HSR Vision Plan



Source: Florida Department of Transportation, 2001

Potential Benefits for High Speed Rail

HSR projects will provide mobility options for residents and tourists alike, and have the potential to affect the very way we choose to live. The vision of livable and walkable communities connected with rail and transit, reducing dependence on foreign oil, and creating highly skilled jobs for residents is much closer to reality with the implementation of HSR. Potential benefits to implementing HSR in the I-95 corridor would include the following:

- Diverting drivers to HSR particularly for through trips in congested urban areas;
- Creating approximately 20,000 to 45,000 direct and indirect jobs during the construction period and approximately 2,400 to 4,800 jobs during the subsequent years of operation and maintenance;
- Reducing fossil fuel use by 4.8 million gallons and the associated 42,000 metric tons of greenhouse gases through 2020 due to energy efficiency of rail versus auto and estimates of diverted riders;
- Reduce emissions and improve air quality; and,
- Improving accessibility to intermodal terminals in the I-95 corridor such as airports and seaports.

The proposed HSR Project is expected to benefit mobility in the I-95 corridor, with reduced travel times between Miami and points north, improved safety over auto travel, and diversion of auto traffic from I-95 to HSR. HSR would offer potential I-95 motorists a transportation alternative during times when I-95 lanes are blocked or extreme congestion exists due to emergency events.

The HSR project is expected to also have economic development impacts. The primary impacts to economic development in the corridor would likely occur around the proposed station locations. The magnitude of these benefits has not yet been estimated.

The High Speed Rail Project is consistent with the Florida State High Speed Rail Vision Plan. The Miami Orlando Tampa corridor was one of a handful of corridors designated as a high speed rail corridor early in the process in the 1990s. The Department is also working on getting the Federal Railroad Administration (FRA) to expand our state's high speed rail corridor designation to include the Orlando to Jacksonville segment. Florida's high speed rail network is consistent with the National Vision *for High Speed Rail in America*.

Amtrak/Florida East Coast (FEC) Railway Service

As part of its national system, Amtrak currently provides service between Jacksonville, Orlando and South Florida using the CSX rail line through the center of

the state. The purpose of the Amtrak FEC project is to re-establish intercity passenger rail service to Florida's east coast communities. The project consists of improvements to the FEC railway to allow rail service operation for speeds up to 90 mph, building and redevelopment of passenger rail stations, constructing a connection between FEC and the South Florida Rail Corridor(SFRC), and completion of additional improvements to the Miami Intermodal Center (MIC) to accommodate Amtrak service. Eight new cities are included in the service plan, as well as Jacksonville and 5 other cities in Southeast Florida, including Miami, which are currently served by Amtrak.

Potential Benefits for Amtrak/FEC Services

Potential benefits associated with the implementation of the FEC Project include the following:

- Divert over 850,000 persons per year to passenger rail service;
- Create approximately 884 jobs during the construction period and approximately 164 jobs during the subsequent years of operation;
- Achieve environmental benefits through reductions in vehicle miles of travel from diverting drivers and reductions in green house gases (GHG); and,
- Improve accessibility to intermodal terminals in the I-95 corridor such as airports and seaports.

The proximity of the FEC to I-95 will provide a rail passenger mobility option for motorists traveling on I-95, as illustrated in **Figure 2.10.4**. I-95 is located along the east coast of Florida and is within approximately five (5) miles of the FEC corridor for the entire length of the state. Thus, the project has the potential to divert a portion of the trips between Jacksonville and Miami or points in between. The FEC project is expected to enhance economic development opportunities in the study corridor. The primary impacts to would likely occur around the proposed station locations. The magnitude of these benefits has not been determined.

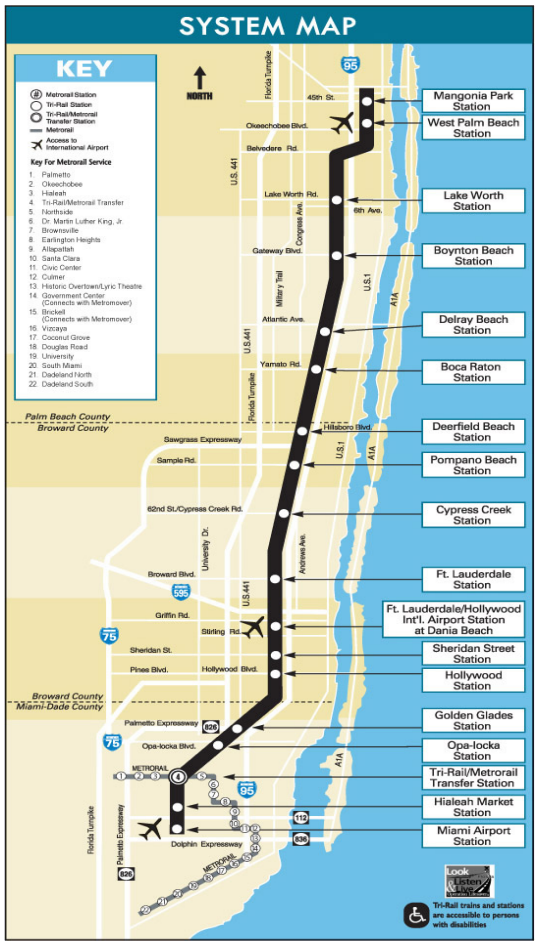
Figure 2.10.4 FEC Rail Corridor

Source: Florida Department of Transportation

South Florida Regional Transportation Authority (SFRTA) Tri-Rail

The Tri-Rail commuter rail system serves south Florida including Palm Beach, Broward and Miami-Dade Counties. Tri–Rail is operated by the South Florida Regional Transportation Authority (SFRTA) and is supported by select feeder bus services in Broward County, Miami–Dade and Palm Beach County. Tri-Rail has eighteen (18) stations along its 71 mile route, as illustrated in **Figure 2.10.5**. The commuter rail corridor utilizes the South Florida Rail Corridor parallels I-95 throughout its length from the Miami International Airport to Mangonia Park in West Palm Beach. The corridor also provides for CSX freight service.

Figure 2.10.5 Tri-Rail System Map



Source: South Florida Regional Transportation Authority

Tri-Rail serves a number of intermodal facilities in South Florida, including Miami International Airport, Fort Lauderdale–Hollywood International Airport, Palm Beach International Airport, the Tri-Rail/Metrorail Transfer Station, and the Miami Amtrak Station. In March 2010, Tri-Rail had a ridership of approximately 12,566 passengers per day for an estimated 3.3 million annual riders.

The proximity of Tri-Rail to I-95 provides a rail passenger mobility option for motorists traveling on I-95 in the three county areas of West Palm, Broward, and Miami-Dade Counties. However, diversion of potential riders from I-95 may be limited due to pedestrian connectivity considerations along the current Tri-Rail corridor. Park-n-ride stops and other passenger distribution options may maximize the effectiveness of the system and generate additional ridership.

While Tri-Rail itself would not be used for emergency access or service, potential I-95 motorists would likely divert to Tri-Rail during times when I-95 lanes are blocked or extreme congestion exists due to emergency events.

Tri-Rail currently has significant economic development impacts to the three counties in which it runs. The primary impacts to economic development in the corridor occur around the proposed station locations.

South Florida East Coast Corridor Transit Analysis

A regional Alternatives Analysis of the FEC Corridor extending 85 miles from downtown Miami to the Town of Jupiter in northern Palm Beach County is currently underway. The corridor traverses the downtowns of 28 of the original cities on the east side of Miami-Dade, Broward, and Palm Beach Counties which developed when Henry Flagler built his railroad in the early 1900's. The FEC passes through the city centers of West Palm Beach and Fort Lauderdale, terminating in downtown Miami, whereas the South Florida Rail Corridor (SFRC) while serving West Palm Beach passes west of the employment centers of Fort Lauderdale and Miami and terminates, instead, at the MIC.

The FEC corridor has some of the oldest building stock and most expensive land values in Southeast Florida. Until the recent economic downturn, it experienced intense high-density redevelopment along the linear corridor which transit is optimal for serving. This development pattern is expected to continue as the economy recovers.

The study will determine the preferred type or types of public transit systems to implement in the Florida East Coast (FEC) Railway corridor. A broad range of alternatives, including busway, light rail, heavy rail, and regional rail (commuter)

technologies are being evaluated and compared. The results of the study will provide the basis from which final selections will be made. The study includes:

- Analysis of implementing transit services in an active freight railroad corridor;
- Determining the amount of right-of-way required to implement transit services;
- Determining the safety improvements needed at over 200 railroad street crossings;
- Determining preliminary capital and operating and maintenance costs for the preferred systems;
- Identifying methods for financing construction and operations and maintenance costs; and,
- Coordinating with corridor cities to create visions and policies producing high density development at station areas best served by transit and selecting station locations.

In response to public workshops, an integrated passenger rail system was explored with different service connections between the FEC and SFRC corridors. Connections at the north end, in the center and at the southern end were all explored.

The SFECC Team has been working with all the communities on the corridor to identify station locations and to begin the discussion about land use around those station locations. This phase began with a round of meetings identifying all the possible station locations on the corridor. This resulted in 97 possible stations locations. Since then these locations have undergone a three step evaluation which included a number of factors such as existing and proposed land use, access, economic development potential, demographics and land availability. This process has resulted in a final list of 52 station locations to carry forward into the next phase when more detailed planning will take place.

Stations have been located as close as possible to cross streets, which would be used as the mode of access for pedestrians and vehicular east-west circulation. This would eliminate the need for expensive and inconvenient overhead bridges with elevators where possible. The project team is recommending center platforms at many station types but this could change later depending on community preference.

A Station Working Group has been meeting regularly for approximately two years. This group consists of representatives from the Counties, the MPOs and several of the larger municipalities. One of the group's recent activities has been to begin drafting model Station Area Land Use Ordinance language for Transit Oriented

Development around stations and to achieve densities consistent with the FTA New Starts Land Use criteria, so when an FTA application is prepared in the future the regulations will reflect the types of future land use FTA favors in its rating process, especially as land use will be an even more important factor in the revised rating process.

Jacksonville Transportation Authority Proposed Commuter Rail

The Jacksonville Transportation Authority (JTA) provides regional transit services and roadway infrastructure in Northeast Florida. The JTA is responsible for regular and express bus service, downtown trolleys, paratransit services, a stadium shuttle and downtown Jacksonville's downtown automated guideway system, known as the JTA Skyway. In terms of passenger rail services, JTA has proposed development of a commuter rail system.

In July 2009, the JTA completed a report entitled the *First Coast Commuter Rail Feasibility Study*. The purpose of the study was to determine the feasibility of commuter rail service as part of a multi-modal approach to providing regional transportation service. The study was conducted in an eight county portion of Northeast Florida, including Duval, Clay, St. Johns, Putnam, Flagler, Nassau, Baker, and Volusia Counties.

A preliminary screening of seven potential service corridors identified three preferred corridors for more detailed examination, as illustrated in **Figure 2.10.6**. Two of these corridors, the Southeast Corridor to St. Augustine and the North Corridor to Yulee, paralleled the I-95 corridor.

Potential benefits to I-95 in implementing the Commuter Rail Project would include the following:

- Diverting over 400,000 to 800,000 passengers per year from autos to passenger rail in the year 2015;
- Creating jobs during the construction and during the subsequent years of operation;
- Achieving environmental benefits through reductions in vehicle miles of travel as a result of diverted riders and reductions in green house gases; and,
- Improve accessibility to intermodal terminals in the I-95 corridor such as the proposed Jacksonville Regional Transportation Center.

The proximity of the proposed Commuter Rail to I-95 could provide a rail passenger mobility option for motorists traveling on I-95 in Duval, St. Johns and Nassau Counties since the project would be located within several miles of I-95 in these counties.

Figure 2.10.6 JTA's Potential Commuter Rail System Corridors

Source: Jacksonville Times-Union

The Commuter Rail project would offer local I-95 users a transportation option during times when I-95 lanes are blocked or extreme congestion exists due to emergency events. Primary impacts to economic development in the corridor would likely occur around the proposed station locations. The magnitude of these benefits has not been determined.

2.11 Intra-Regional Transit Services

Many of these counties, or in one case several counties together, operate their own bus fixed route transit system. These county or regional transit systems are listed below:

- Miami-Dade County – Miami-Dade Transit;
- Broward County –Broward County Transit;
- Palm Beach County – Palm Tran;
- Martin County– Martin County Transit;
- St. Lucie County – St. Lucie County Transit;
- Indian River - GoLine Indian River Transit;
- Brevard County – Space Coast Area Transit (SCAT);
- Volusia County – Votran;
- St. Johns County - Sunshine Bus Company;
- Duval County – Jacksonville Transportation Authority (JTA).

The primary purpose of these urban transit systems is to provide intra-county or intra-regional travel, and their impact on travel mobility within the I-95 corridor is focused on local trips. These regional transit systems can benefit local or commuter travel within the I-95 corridor particularly during peak travel demand periods. The specific relationships between I-95 travel demand and the individual transit systems is discussed in the following paragraphs.

Miami-Dade County

Miami-Dade Transit is the 12th largest public transit system in the USA and the largest transit agency in Florida. This integrated transportation system consists of four major components: the Metrobus fleet, connecting most areas of Miami-Dade County in addition to southern Broward and northern Monroe Counties; Metrorail, an electrically-powered, elevated, rapid-transit system stretching 22.6 miles, from Kendall to Medley; Metromover, a 4.4-mile elevated people mover serving the downtown central business district of Miami, including Omni and Brickell; and Special Transportation Service (STS), designed to meet the needs of people with disabilities unable to use regular transit services. Currently, Miami-Dade Transit records over 326,000 daily (weekday) boardings on this unified system. Paratransit services are available through MDT's Special Transit Service.

Metrobus

Miami-Dade Transit provides bus service throughout Miami-Dade County 365 days a year. Service is available from Miami Beach and Key Biscayne to West Miami-Dade, as far north as Diplomat Mall in Broward County, and as far south as

Homestead, Florida City, and the upper Keys. The Metrobus system, designed to intersect with Metrorail and Metromover, serves all major business, shopping, entertainment, and cultural centers, as well as major hospitals and schools.

Buses travel over 32.6 million scheduled miles throughout Miami-Dade each year. The current fleet consists of 772 directly-operated 40 ft. buses and 121 minibuses operating on 90 fixed routes. The total annual ridership was over 83 million in fiscal year 2007.

Metrorail

This electrically-powered, elevated, rapid-transit rail system extends from Kendall in South Miami-Dade to Medley in West Miami-Dade. Metrorail connects a major portion of Miami-Dade County to business, cultural, and shopping centers. Travel from one end of the system to the other is only 42 minutes.

This heavy rail system consists of 22 stations located approximately 1 mile apart on the 22.6 mile elevated network. Metrorail averages approximately 61,700 daily boardings. Several expansion projects are currently in development, including an airport connection to the Miami Intermodal Center (MIC) currently under construction.

Metromover

Metromover consists of a 1.7 mile double loop with nine (9) stations. This electrically powered, fully automated people mover system connects with Metrorail at Government Center and Brickell stations and with Metrobus at various locations throughout downtown Miami. Metromover offers convenient access to a variety of government, business, entertainment, and cultural centers in the central downtown, Omni, and Brickell areas.

Major destinations include American Airlines Arena, Bayside Marketplace, the Miami Arena, Miami-Dade College, the James L. Knight Center, the Miami-Dade County School Board, The Miami Herald, and the Stephen P. Clark and Cultural centers.

Interregional Bus Service

Express bus service was recently started between Broward County and Downtown Miami using the 95 Express managed lanes with three different routes. One route, from the Broward Boulevard Park and Ride Lot to Downtown Miami, is operated by Miami-Dade Transit and runs approximately every 15 minutes on weekdays. Another route operated by Broward County Transit runs approximately every thirty minutes on weekdays during morning and afternoon peak travel periods between

Pines Boulevard/Flamingo Road to Downtown Miami. A third route, operated by Miami-Dade Transit, travels between the Sheridan Street Park and Ride and Downtown Miami every 15 minutes on weekdays.

Broward County

Broward County operates 43 regular bus routes seven days a week for a service span of nearly 20 hours per day. In addition to fixed route service, Broward County Transit also coordinates 64 community bus routes in 22 municipalities in Broward County to provide connectivity between the fixed route system and surrounding communities. Paratransit service is also offered through Transportation Options Paratransit Services (TOPS) for passengers unable to use the regular fixed route system.

Palm Beach County – Palm Tran

Palm Tran operates 33 fixed route buses seven days a week approximately 18 hours per day. Service is concentrated in the eastern portion of the county along the coast and operated from Boca Raton in the south to Palm Beach Gardens in the northern portion of the county. An additional route travels to the western boundary of Palm Beach County and connects to circulator systems serving the City of Belle Glade and Canal Point South. Palm Tran also offers van and trolley vehicles which are operated through the cities of Boynton Beach and Lake Worth. Paratransit service is offered through Palm Tran Connection to serve residents unable to utilize the fixed route system.

Martin and St. Lucie Counties

St. Lucie County Transit and Martin County Transit have operated a service since 2002 which connects the two counties along US 1, known as the Treasure Coast Connector.

East/West connections are available as five separate routes in St. Lucie County and connect to the US 1 service. Additional fixed routes to connect to US 1 are expected as funding becomes available. Paratransit services are available in St. Lucie County and Martin County through their respective County Councils on Aging.

Indian River County

Public transit in Indian River County is available through GoLine, which operates 11 routes throughout Indian River County and in Barefoot Bay. Service operates weekdays for eight hours a day with extended service hours on selected routes

during the week as well as limited weekend service. Service is available along US 1 and connecting east and west in the County to nearby communities.

Brevard County

The Space Coast Area Transit (SCAT) provides fixed route bus service, trolley service, carpool/vanpool service, and paratransit service. Regular fixed route service is available throughout Brevard County to points of interest in the cities of Melbourne, Titusville, Merritt Island, Rockledge, and Palm Bay. Connector service is available between Melbourne and Titusville. In addition, trolley service is available in Cocoa Beach. Vanpools are also available to assist groups of commuters and social services in Brevard County.

Volusia County

Votran provides fixed route, trolley, and paratransit service within Volusia County. Fixed route service is available in all urban areas of the county through 26 routes and four trolleys operating approximately 13 hours per day on weekdays with limited weekend service. A Volusia/Orlando Express route is also available to connect passengers to employment and leisure activities in these areas.

Flagler County

Transit service in Flagler County is limited to paratransit service for the transportation disadvantaged, and is operated by Flagler County Public Transportation.

St. Johns County

Sunshine Bus is a newer transit agency operated under contract by the St. Johns County Council on Aging, Inc. Services include fixed route motorbus and demand response operations with connections to the JTA transit system at the Avenues Mall. In addition, a St. Augustine historic downtown shuttle is available for visitors and residents of the St. Augustine area.

Duval County

The Jacksonville Transportation Authority (JTA) provides regional transit services and roadway infrastructure in Northeast Florida. The JTA is responsible for regular and express bus service, downtown trolleys, paratransit services, a stadium shuttle and Jacksonville's downtown automated guideway system, known as the JTA Skyway. The JTA is currently studying a bus rapid transit (BRT) system as an option

to supplementing capacity requirements to meet the existing and projected demand. These transit options are discussed in the following paragraphs.

JTA Bus Rapid Transit

Jacksonville's regionally planned bus rapid transit (BRT) system will consist of a 29-mile premium transit system connecting downtown Jacksonville with four adjoining corridors: north, southeast, east, and southwest. BRT will improve upon existing regular bus service to allow residents more efficient service to choice locations along these corridors, and elements of the BRT system will include:

- 10-15 minute headways;
- Dedicated bus lanes;
- New low floor vehicles;
- Major transit stations or stops;
- Traffic Signal Priority; and,
- Real time traveler information.

The JTA is in the process of preparing Environmental Assessments for the four routes of a proposed Bus Rapid Transit (BRT) Network in the City of Jacksonville in Duval County, as illustrated in **Figure 2.11.1**. Currently, BRT environmental documentation is underway for the Downtown and North Corridor. Subsequent environmental documentation will soon be underway for the other three corridors, although funding for implementation has not been identified.

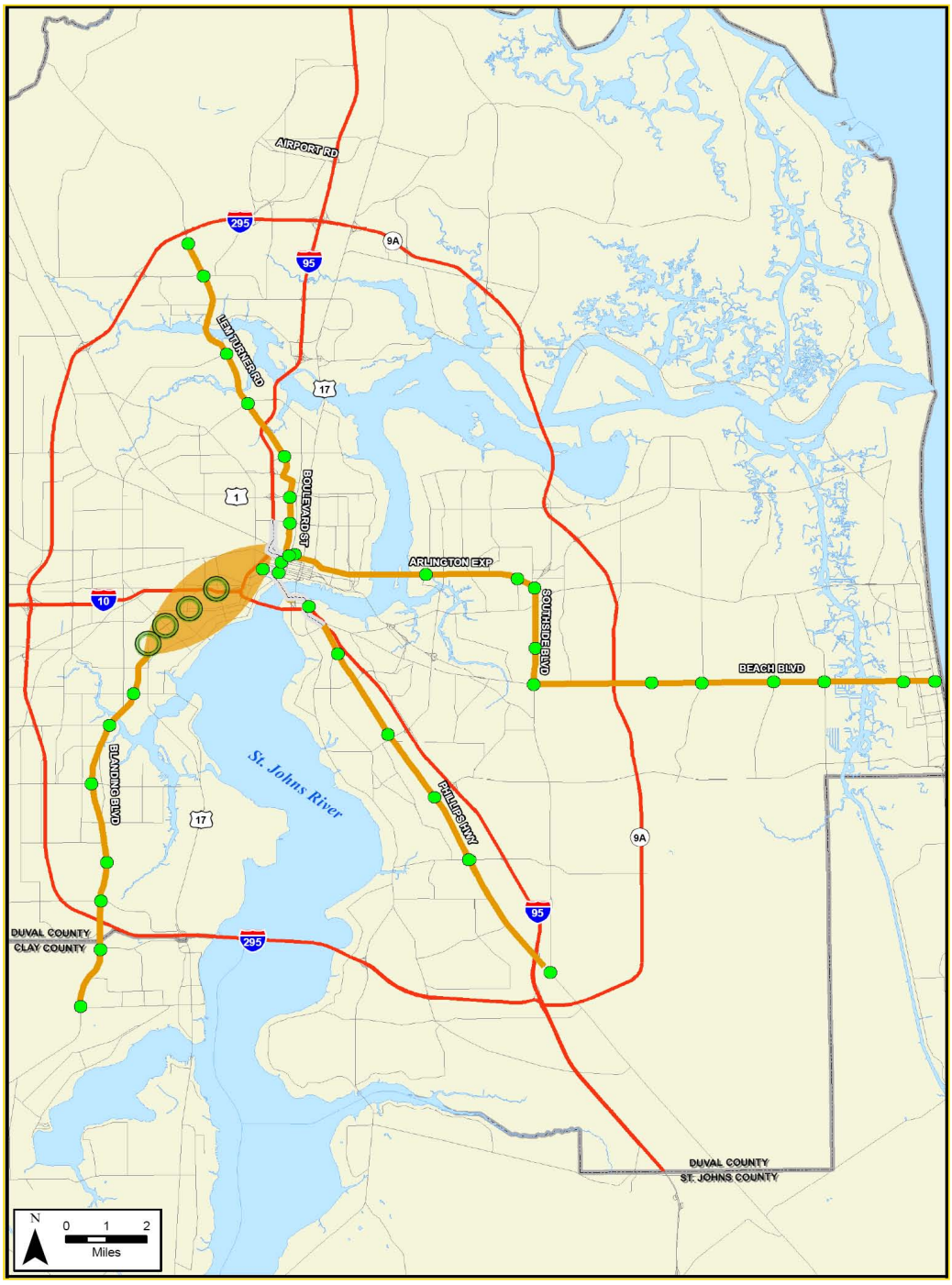
Two of the four proposed routes would be parallel to I-95 and thus could be considered as alternative options in helping to meet existing and projected demand: the North and Southwest routes

Potential benefits to I-95 in implementing the BRT Project would include the following:

- Can be implemented relatively quickly on existing roadway rights-of-way and relatively inexpensively, even with the requirement for variances and design exceptions;
- Achieve environmental benefits through reductions in vehicle miles of travel as a result of diverted riders and reductions in green house gases; and,
- Improve accessibility to intermodal terminals in the I-95 corridor such as the proposed Jacksonville Regional Transportation Center.

The proximity of the proposed north and southeast BRT routes to I-95 could provide passenger mobility options for local commuters normally using I-95 for work, shopping or other short distance travel.

Figure 2.11.1 JTA's Proposed BRT System



Source: Jacksonville Transportation Authority, 2009.

Since the JTA BRT proposal uses buses in mixed traffic and not segregated lanes, BRT buses would unfortunately experience the same congestion as automobiles. Primary impacts to economic development in the corridor would likely occur around the proposed stop locations.

JTA Skyway and Trolley Service

The Skyway is an elevated automated guideway system offering train service in downtown Jacksonville and across the St. John's River slightly south of downtown. Service is provided approximately every 3 minutes from Monday through Friday during peak hours (six minute intervals otherwise) and is connected to trolley service throughout the downtown area, allowing downtown patrons and employees to access the area efficiently without an automobile.

Park and rides are available for commuters at the following stations denoted by the red circles on **Figure 2.11.2**: the Convention Center just east of I-95, Jefferson Street, St. Andrews adjacent to the Jacksonville Arena, San Marco Station, and Kings Avenue on the south side of the river. Of these park-n-ride locations, the Convention Center is located in close proximity to I-95.

Figure 2.11.2 JTA Skyway System

Source: Jacksonville Transportation Authority, JTA Skyway Brochure, October 2009.

Buses and Community Shuttles

JTA provides regular bus service seven days a week throughout Duval County. JTA has 56 routes with vehicles traveling 8.5 million revenue miles each year with approximately 320 bus operators and 110 maintenance employees supporting an active fleet of 180 vehicles. A series of community shuttles connect to the regular bus system to allow greater connectivity between main service lines and nearby communities.

Five express routes are also in place to serve popular destinations such as beaches, residential, and commercial development. These include: the Mandarin Commuter, Westside-Flagler Center Express, Orange Park Express, Beaches Express, and Blanding Commuter Express. JTA also has free park-n-ride lots served by local bus routes and express service to Downtown.

With relation to I-95, there are a number of lines currently utilizing I-95 for transit service. Of the five park-n-rides serviced by existing bus routes, one is located within the vicinity of I-95 south of the St. John's River along Phillips Highway. This park-n-ride is approximately ½-mile from I-95.

Ferry

The Jacksonville Port Authority oversees ferry service in Jacksonville, which operates every 90 minutes seven days a week. The St. Johns River Ferry connects the north and south ends of SR A1A in Duval County, linking Mayport Village and Fort George Island. The Mayport entrance is located at the intersection of Ocean Street and Broad Street. The Fort George entrance is located about a block south of the intersection of Shad Creek Drive and Heckscher Drive. Ferry service is located east of Downtown Jacksonville close to nearby beaches. Because of this location, traffic due to ferry use is not expected to impact I-95.

Nassau County

Transit services are limited to vanpool service provided through the North Florida Transportation Planning Organization (TPO) and paratransit services for the transportation disadvantaged offered through the Council on Aging in Nassau County. Limited options currently exist for intra-regional transit in Nassau County as a viable alternative to I-95.

Figure 2.11.3 St. Johns River Ferry

Source: Jacksonville Port Authority website, retrieved March 2010.

Analysis of Intra-Regional Transit Service Options

Intra-regional transit offers varying degrees of service provisions throughout the I-95 corridor. As the description of services notes, services in Miami-Dade and Broward Counties as well as Duval County offer a diverse array of transit options. These areas present ideal conditions for future transit investments. Enhanced transit ridership can alleviate traffic congestion along I-95 due to the level of interconnectivity of the systems and their ability to move passengers north and south parallel to I-95.

Other systems currently lack adequate connectivity and system capacity to present a viable alternative to automobile travel along I-95 without substantial investment. In addition, many of these systems operate independently and would require new strategies for encouraging cooperative functions between systems to provide adequate connectivity and consistent operations. Operational costs through federal agencies to provide these services are limited and additional funding sources would need to be identified to expand system connectivity.

2.12 Transportation Demand Management Programs

Single occupant vehicle(SOV) commuters are one of the greatest causes of peak highway congestion in urban areas. A coordinated effort to provide Transportation Demand Management (TDM) alternatives for these commuters, using existing or low cost resources, can be beneficial to the development of public transit statewide and also can assist in efforts to relieve traffic congestion, improve air quality and assure energy conservation[28]. TDM programs encourage public/private partnership to provide brokerage services to employers and individuals for:

- Carpools;
- Vanpools;
- Express bus service;
- Emergency Ride Home Services;
- Group taxi services;
- Implementation of shuttle services;
- Preferential parking for ride-sharers;
- Telecommuting; and,
- Bicycling/walking programs.

Commuter services program can be run by public or private agencies providing commuter assistance services to a defined local area, usually at the county level. The local commuter service organization provides ride matching, marketing, survey and support to transportation management associations (TMAs) as well as needed coordination. The Florida Department of Transportation (FDOT) defines TMAs as public/private partnerships formed so employers, developers, building owners, central business districts, downtown merchant associations, and government entities can work collectively to establish polices, programs and services to address local transportation problems within the specific congested "hotspot". TMAs use Transportation Demand Management (TDM) strategies to address transportation issues facing their members.

The commuter services program can encourage the use of public transit services through promotion and distribution of discounted transit passes. It encourages bicycling and walking as modes of commuting to work as well as the use of other TDM methods such as flextime, telecommuting, and alternative work hour programs.

The FDOT Central Office develops and maintains program policies and procedures for statewide commuter assistance programs and monitors compliance with established procedures. At the District level, FDOT establishes and maintains

[28] Commuter Assistance Program, FDOT – Office of Transit, September 2002

communication with local public and private organizations to advise them of availability of Department financial and technical assistance programs for commuter assistance and transportation demand management. The Department provides and manages matching grants to local governments or their designees for running these commuter services programs. The funds can be used for salaries, marketing materials, advertising, computer matching, reporting, purchasing of promotional items as part of public information, and education campaigns for the promotion of alternatives to single-occupant vehicle travel. The Department is authorized to fund up to 100 percent of the eligible costs of commuter assistance projects determined by the District to be regional in scope and application or statewide in nature. Funding may also be provided to TMAs organized as private not-for-profit corporations, in cooperation with local government. These organizations can be funded for up to 50 percent of their total budget, or $75,000, whichever is smaller[25].

There are numerous benefits to commuters and employers who participate in the commuter service programs as well as to the public. Ridesharing, even with one other person, can significantly cut a commuter's costs. The commuter will spend less money on gas, maintenance, and parking fees, can use the HOV lane and reduce commute time during peak hours. With most commuter service programs, ridesharing will qualify the commuter for a free taxi ride home for a certain number of times in a year in case of an emergency and also the commuter can qualify for certain commuter tax benefits per month.

Potential Benefits and Drawbacks

How employees travel to work is an issue most often overlooked by businesses. However, employees who are less stressed through commuting are likely to be more productive. Benefits to employers participating in the commuter service program include:

- Expanding the labor market by making transportation to and from your work location easier for all employees;
- Recruit and retain skilled employees. Commute options and flexible schedules reduce turnover;
- Reduced overhead costs;
- Tax savings benefits for the company and its employees; and,
- Reduced need for parking.

The major public benefit resulting from people participating in commuter service programs is a reduction in the number of cars on the road during the peak commute hours, thus alleviating urban highway congestions. Other benefits include:

- Less air pollution;
- Less fuel consumption helping with energy conservation efforts;
- Improved mobility for the entire community due to reduced number of vehicles on the road and hence enhancing the economic vitality of the region;
- Reduced need for costly highway improvements; and,
- Less vehicles on the road which means faster response times for emergency vehicles.

Lack of interest from employers and commuters has been cited as one major obstacle to the success of some of the commuter services programs. Many commuters are used to the idea of driving alone and enjoy the freedom and flexibility associated with it. In order to convince such commuters on the merits of ridesharing or other alternative modes of transportation, there must be a genuinely strong incentive for them to participate. High travel costs and frustrating congestion are the best incentives. For instance, during 2008, when gas prices were at their highest, the number of commuters who visited the commuter services programs greatly increased, but as soon as gas prices dropped, interest waned.

Example Programs

Currently the following commuter services are known to operate within the 12 county I-95 corridor[29]:

- **South Florida Commuter Services** - providing commuter assistance in Miami-Dade, Monroe, Broward, Palm Beach, Martin and St. Lucie counties
- **Space Coast Area Transit (SCAT) -** providing transit, vanpools and commuter services in Brevard County
- **Volusia County Public Transportation (VOTRAN) -** providing transit, vanpools and commuter assistance in Volusia County
- **Jacksonville Area Commuter Assistance Program** - sponsored by North Florida Transportation Organization in Duval, Clay, Nassau and St. Johns counties.

Depending on the ride-matching software used, the services offered, the marketing aggressiveness, administrative costs and the area covered, the cost to implement a commuter services assistance program can range anywhere from $150,000 to upwards of $2,500,000 per year according to rough estimates given by one commuter services coordinator in Florida.

Because of the many benefits to be derived from the successful implementation of a commuter services program both to the commuters and to the public, promotion of

[29] TDM in Florida (www.commuterservices.com)

these services should be encouraged through education and marketing strategies. If only a fraction of the single-occupant vehicle commuters were to switch to a ridesharing or use public transit, this would have a dramatic reduction on the peak hour congestion, air and noise pollutions.

2.13 Add Capacity to I-95

Interstate 95 connects some of the most populous counties in Florida. It is Florida's busiest freeway, with current volumes exceeding 200,000 vehicles per day at many locations in South Florida.[30] Volumes in the corridor continue to grow and preservation of mobility within the corridor is of strategic importance to Florida. I-95 is a critical corridor, moving freight, transit and passenger vehicles into and through the corridor each day.

Along with the need for preservation, I-95 is overwhelmed with traffic demand. Because the I-95 roadway corridor is approaching, and in some cases exceeding, its practical capacity, a combination of approaches is needed. FDOT is targeting I-95's worst chokepoints by adding lanes, improving ramps and interchanges and making access easier for motorists and to improve the efficiency and reliability of the system. To meet increasing transportation needs, FDOT is staying focused on key strategies to improve traffic flow on I-95. These strategies include adding new roadway capacity where it provides the most benefit, making our highways more efficient at moving people and goods with new traffic technology, and managing traffic demand through a combination of strategies. This section will focus on adding new roadway capacity as a viable alternative to capture growing demand.

Potential Benefits and Drawbacks of Capacity Expansion

Adding capacity to the interstate is reached by the construction of through lanes, along with operational improvements to improve traffic flow. Through lanes may operate as general-purpose lanes or special use/managed lanes. Expanding interstate capacity generally means widening and constructing at grade directional lanes. Performance objectives for increased mobility benefits include the following:

- Reduced congestion;
- Reduced travel times;
- Decreased interference between "through traffic" and "short trips";
- Improved emergency response;
- Improved freight flow; and,
- Increased connectivity.

Economic benefits include the following:

- Lowered production and distribution costs;

[30] Refer to the Chapter 4 of the I-95 *Technical Memorandum: Identification of Corridor Conditions and Needs* for additional information.

- Increased productivity;
- Jobs creation;
- Overall contribution to improving social welfare; and,
- Congestion reduction could decrease greenhouse gas emissions.

There a number of drawbacks to adding capacity to I-95 including:

- Potential high cost, especially in congested urban areas, where right-of-way will likely be required;
- Relocation or division of communities by acquisition of additional right-of-way; and,
- Additional greenhouse gas (GHG) emissions from increased number of motor vehicles.

Implementation Costs of Capacity Expansion

The recent rise in construction costs has posed a threat to the ability of the Florida Department of Transportation to maintain its "commitment" to project development and construction and has forced project deferrals. **Table 2.13.1** compares the approximate cost per mile to add additional general-purpose lanes to the interstate for year 2009. The estimates do not include the cost of any additional right-of-way, which can be as costly as construction in urban areas. It should be noted the models are generic in nature and are for reference purposes only.

Table 2.13.1 2009 Interstate Construction Costs

Classification	Project	Approximate Cost Per Mile
Urban	Widen 6 Lanes to 8 Lanes	$7,800,000
Rural	Widen 6 Lanes to 8 Lanes	$4,500,000

Source: State Estimates Office, Office of Policy Planning

A major component of costs is material prices. Asphalt costs have increased over 80% since 2003 while structural concrete and steel has increased over 40%.[31] Even with recent economic events, it appears unlikely costs will reduce over the planning period but will fluctuate and steadily increase.

Transportation infrastructure and other major projects often require the taking of real property, or right of way. The cost of partial takings, commercial properties, remainder damages, court costs, utility relocations, and other right of way related

[31] *Update on Highway Construction Cost Trends in Florida*, April 2007

items are difficult to anticipate. An accurate right of way cost estimate is vital to the success of a project as it is the basis from which so many other decisions are made.

Right of way costs can be difficult to anticipate and standard forecasting methods do not always apply. The cost of right of way acquisition in urban areas often exceeds the actual construction cost of the highway improvements. Urbanized segments of interstate typically have higher right of way costs because of denser land use patterns. Real estate prices increase with density and demand, and these urbanized locations have the highest traffic demand.

Many urbanized segments of I-95 within Miami-Dade and Broward Counties have been built out to maximum capacity due to surrounding land use constraints. FDOT is continually developing unique designs, which enable capacity expansion within the right of way. One such project is 95 Express, which converted existing general-purpose lanes to managed lanes. By slightly reducing lane widths at many locations, an additional lane was added with no need for further right of way acquisition.

Impact to Mobility

As discussed in the I-95 *Technical Memorandum: Identification of Corridor Conditions and Needs*, I-95 has multiple large-scale capacity projects planned. These projects create additional capacity by adding either general-purpose lanes or managed/special use lanes. General-purpose lanes are at-grade directional lanes, which increase the available capacity and dilute the number of vehicles per lane. Managed or special use lanes provide support to general-purpose lanes and may include HOV, HOT, or Express lanes.

Benefits associated with expanding capacity have tangible impacts to the corridor. **Table 2.13.2** depicts the 2008 lane configuration and number of needed lanes by 2035 if the currently adopted LOS is maintained.[32] Throughput on I-95 will be at maximum capacity by the 2035 planning year through the majority of urbanized sections of interstate. For the purposes of this report, 12 through lanes has been determined as maximum throughput capacity.[33]

Adding capacity to the interstate through general-purpose lanes remains the primary means undertaken to combat growing demand and increase mobility. However, demand is anticipated to grow beyond what planned improvements can accommodate. Capacity expansion should take place after efforts have been made to optimize capacity and use of existing facilities.

[32] Includes funded and unfunded from the SIS Cost Feasible Plan and the Unfunded Needs Plan.
[33] Not including exemptions: special use lanes and auxiliary lanes.

Table 2.13.2 Number of Lanes Needed by 2035

Site #	Description	2008 No. of Lanes	Lanes Needed by 2035
1	North of U.S. 1, Miami-Dade Co.	4	4
2	North of SR 934, Miami-Dade Co.	10	12
3	South of Broward Co. Line, Miami-Dade County	10	10
4	South of Sunrise Blvd, Broward Co.	11	12
5	At NE 48th Street, Broward Co.	8	12
6	North of SR 808, Palm Beach Co.	8	10
7	At SW 23rd overpass, Palm Beach County	10	10
8	At Congress Avenue, Palm Beach County	6	8
9	North of Donald Ross, Palm Beach Co.	6	8
10	North of Martin Co. Line, St. Lucie Co.	6	8
11	I-95, south of SR 68, St. Lucie Co.	4	8
12	I-95, north of SR 60, Indian River Co.	4	6
13	North of Malabar Rd, Brevard Co.	4	8
14	North of SR 50, Brevard County	4	6
15	South of I-4/ SR 400, Volusia Co.	6	6
16	North of LPGA Blvd, Volusia Co.	6	12
17	North of International Golf Pkwy, St. Johns Co.	6	10
18	North of Emerson St, Duval Co.	6	12
19	South of 20th St/ MLK Pkwy/ U.S. 1, Duval Co.	6	10
20	North of 20th St/ MLK Pkwy/ U.S. 1, Duval Co.	6	10
21	South of I-295, Duval County	6	8
22	North of I-295, Duval County	6	8

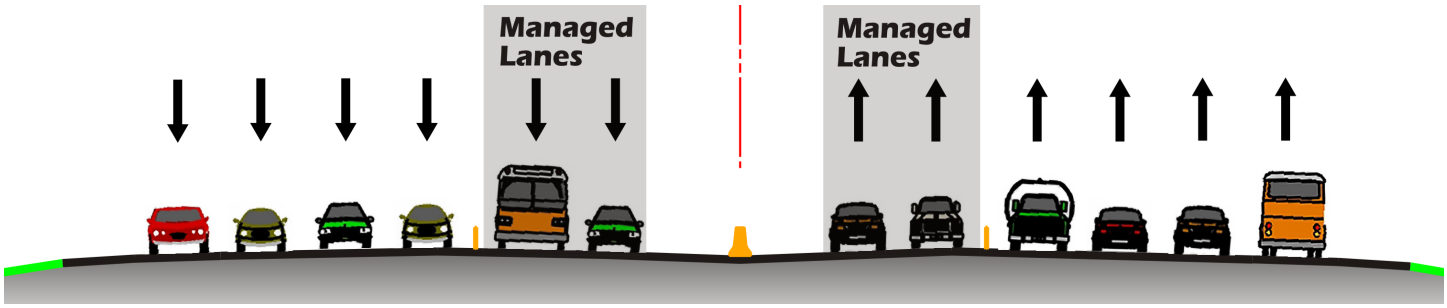
*Includes funded and unfunded from the SIS Cost Feasible Plan and the Unfunded Needs Plan.

*Not including exemptions: special use lanes and auxiliary lanes.

Given the cost prohibitive nature of constructing additional general-purpose lanes and the present economic climate straining funding sources, other means of congestion support may prove more effective once planned improvements have been integrated.

Figure 2.13.1 depicts a typical segment of I-95 generally found within urbanized sections in South Florida. The configuration consists of four directional general-purpose lanes and two directional managed lanes amounting to 12 through lanes. This represents the maximum effective number of through lanes for the interstate, not including auxiliary lanes. The right-of-way required for an interstate facility severely restrains the expansion capabilities.

Figure 2.13.1 I-95 Typical Interstate Section in South Florida



Emergency Response

In terms of emergency response, development or expansion of an incident management plan has proven effective. The incident management plan provides guidelines for resources, multi-agency protocols, and quick clearance polices. With added resources and incident management training for FHP troopers the duration of travel lane blockage and response times will be reduced.

New Interchanges

An interchange is a road junction typically using grade separation, and one or more ramps, to permit traffic on at least one highway to pass through the junction without directly crossing any other traffic stream. Interchanges are the access points for limited-access highways. Interchanges are typically used along expressways or freeways, though they may occasionally be used at junctions between two surface streets.

New interchanges provide additional access to I-95 and typically increase demand along the interstate. Interstates are limited access freeways designed for long distance, interstate travel, so particular attention is paid to requests for new interchanges. All interchange modifications, including new interchanges, must be approved at the federal level.

Potential Benefits and Drawbacks of New Interchanges

Potential benefits of new interchanges include the following:

- **Increased connectivity** – provides additional access to local cross streets and encourages economic development near the interstate;

- **Improved emergency response** – provides additional access to the interstate to facilitate improved emergency response; and,
- **Reduced demand and improved operations** - new interchanges may reduce demand at an adjacent congested interchange, which increases the overall regional performance, increases connectivity, and reduces safety concerns.

Potential drawbacks of new interchanges include the following:

- **Increase in local trips** – Local trips are trips motorists make on the interstate to gain access to local destinations not easily accessible by local arterials. Local trips increase with additional access points;
- **Potential for increased safety concerns** - weaving creates both safety and capacity problems and is more prevalent on facilities with multiple access points. Interchanges may be spaced too close together due to lack of any real east-west arterial roads; and,
- **Right of way cost** – Right of way costs are typically the most expensive part of improvement projects on the interstate due to adjacent land uses.

2.14 Summary

Improving mobility, emergency and security response, and economic development on the I-95 corridor can be accomplished using a variety of alternatives. All of the alternatives considered for implementation provide a positive impact in terms of mobility, emergency management, homeland security, and economic development. In order to provide a general summary of the alternative options, information for each alternative was generalized to a rating scale based on its impact to the main goals of the study, as illustrated in **Table 2.14.1**. The degree of impact is indicated by the number of symbols and was evaluated based on **the impact to the 12-county I-95 corridor**. The degree of impact was determined as follows:

- **Mobility** – All alternatives improve mobility in some form, either for passenger movements, freight movements, or a combination of the two. Three symbols indicate these alternatives have the largest positive impact to mobility, in terms of improved traffic flow, reduced congestion, and modal choices. Two symbols indicates some reductions in congestion and increased modal choices, but not as large an impact as three symbols. One symbol indicates those alternatives with the smallest impact on improving mobility along the I-95 corridor;

- **Emergency Response** – Three symbols indicates a positive impact to emergency response by providing additional capacity for evacuation efforts or improving communication for response efforts. Two symbols indicate some positive and some negative effects of the alternative, with little overall change to emergency response. One symbol indicates the alternative will have a negligible effect on emergency response;

- **Homeland Security** – Three symbols indicate the alternative provides benefits to homeland security preparedness, such as increased communication or ability to respond to incidents. Two symbols indicates the alternative has some positive and some negative effects, while one symbol indicates the alternative will have a negligible impact on homeland security;

- **Economic Development** – All alternatives improve economic development to some degree, typically in terms of improving efficiencies of goods movement, job creation, spurring new businesses or commercial developments, or a combination of factors. Three symbols indicate these alternatives have the largest positive impact to economic development within the I-95 study area, while two symbols indicate some increase in economic development activities, but not as large an impact as three symbols. One symbol indicates those alternatives with the smallest impact on economic development along the I-95 corridor;

Table 2.14.1 Summary of Impacts by Alternative Option

	Mobility in the I-95 Corridor	Emergency Response	Homeland Security	Economic Develop-ment	Affordability	Ease of Implement-ation
Add Capacity to Parallel Corridors	❸❸❸	②②	②②	②②	1	1
New Location Corridors	②②	②②	1	❸❸❸	1	1
Transportation Systems Mgmt and Operation	❸❸❸	❸❸❸	❸❸❸	1	❸❸❸	❸❸❸
Tourist Oriented Sign Program	1	1	1	②②	❸❸❸	❸❸❸
Special Use Lanes	❸❸❸	②②	②②	1	②②	②②
Intermodal Logistic Centers	②②	1	②②	❸❸❸	1	1
Inland Ports	②②	1	②②	❸❸❸	1	1
Short Sea Shipping	1	1	②②	1	②②	②②
Parallel Freight Rail Corridors	❸❸❸	②②	②②	1	②②	②②
Passenger Rail Services	②②	②②	1	❸❸❸	1	1
Intra-Regional Transit Services	1	1	1	②②	②②	❸❸❸
Commuter Services	1	1	②②	1	❸❸❸	❸❸❸
I-95 Additional Capacity	②②	❸❸❸	②②	1	1	1

Note: All of the alternatives considered for implementation provide a positive impact in terms of mobility, emergency management, homeland security, and economic development. The degree of impact is indicated by the number of symbols and was evaluated based on ***the impact to the 12-county I-95 corridor****.*

- **Affordability** – Three symbols indicate the alternative is highly affordable compared to other alternatives and generally costs significantly less than other alternatives. Two symbols indicate the alternative has a medium cost level, while one symbol indicates the alternative has significant cost issues and is likely expensive; and,

- **Ease of Implementation** – Three symbols indicate the alternative is easy to implement, with little or no right-of-way required, minimal environmental mitigation efforts, and can be completed within a few years time. Two symbols indicate the alternative takes longer to implement and may require some right-of-way, mitigation efforts, or longer to design and construct. One symbol indicates the alternative will take much longer to implement and will require coordinated efforts of various agencies and groups over a multiple year period.

While Chapter 2 identified numerous alternative transportation options available for improving mobility, emergency and security response, and economic development along the I-95 corridor, it does not recommend specific projects or solutions for implementation. Through the identification of these alternative options, several policy implications emerged for consideration in conjunction with the implementation of alternatives. These policy implications can be summarized in five major policy initiatives, including:

- Land Use Decisions;
- Modal Options;
- Safety Considerations;
- Interregional Coordination; and,
- Funding.

The Florida Transportation Plan (FTP) is the state's long range transportation plan. The FTP identifies the goals, objectives, and strategies to guide transportation decisions and addresses how Florida's transportation system can meet the mobility needs of our growing population, help make our economy more competitive, help build great communities, and help preserve our natural environment. The policy implications identified in relation to the I-95 corridor are consistent with these goals and objectives and are summarized in the following sections.

In addition, the Enterprise Florida Roadmap to Florida's Future has addressed Growth Leadership Infrastructure as a Strategic Priority in its 2010-2015 Strategic Plan for Economic Development. The Roadmap recognizes Florida must take a proactive, systems-based approach to infrastructure issues, and their solutions. The solutions should be focused on growth leadership rather than growth management to realize prosperous, well-balanced communities.

3.1 Land Use Decisions

The relationship between land use and transportation is reciprocal — land use creates a demand for transportation facilities and transportation facilities support economic development generating additional demand. As a result, it is important to continue to strengthen the linkages between land use and transportation planning. Land use decisions, such as where to develop new residential neighborhoods or locate new shopping centers, have significant impacts on the I-95 corridor and are typically made by local governments.

The interstate corridor is intended to provide for efficient inter-regional and inter-state movements and not local trip movements. In many urban parts of the corridor, local trips make up a large percentage of the traffic stream on I-95. Local trips are defined in this case as trips originating and ending within the same county. This is

caused primarily by local land use decisions not requiring development of sufficient connectivity options in connecting residential areas to commercial and business areas. The lack of this connectivity causes motorists to use I-95 in the same manner as a local street.

Currently, interstate corridors located on the periphery of urban areas such as I-95 in Indian River County provide access to the area from a regional perspective but have little value for local trips. Future development and expansion of urban service areas by local governments across interstate corridors should be closely reviewed and evaluated. As development occurs and the area immediately adjacent to I-95 becomes urbanized, local land use policies should require connectivity of land uses and minimize impacts to the interstate corridor. The I-75 corridor in SW Florida is an excellent example, where steps to mitigate impacts to the interstate are proposed and reviewed. Improvements such as parallel local roads, access roads between developments and grade separated connections across I-75 with no interchange, have helped with local circulation and preserved the interstate corridor.

Land use decisions also impact emergency management and homeland security efforts, as residential development location and density greatly impact emergency evacuation efforts. While local land use improvements are an important economic development mechanism, their development should also be balanced with emergency management needs. Appropriate local circulation and connectivity within local communities as well as connectivity to numerous regional transportation systems are important components of the effort to balance economic development with emergency management needs.

In addition, local land use decisions should help to ensure the transportation system supports community livability and is implemented in an environmentally responsible manner. The Florida Transportation Plan (FTP) encourages conservation of natural resources and sustainable development patterns. The FTP also guides transportation investments at the local level to enhance the livability of Florida's communities, while transportation investments at the statewide or interregional level typically should be oriented towards mobility and economic competitiveness needs and should rest lightly on the built and natural environments.

3.2 Modal Options

The ability to expand the I-95 Corridor is limited in some areas, as build-out of the corridor in these areas is generally complete and adjacent land uses generally prohibit the ability to expand the right of way. While corridor expansion options are appropriate in some areas and investments can clearly be made in relieving physical and operational bottlenecks, it is clear investment in the I-95 corridor should focus on a combination of alternatives to provide greater modal choices, both in terms of

passenger and freight movements. FDOT and its agency partners are already working towards developing many of these options throughout the corridor. Examples include promotion of regional transit and commuter service options; investigation of inland port facilities; and, implementation of high speed rail service.

Florida must also improve connectivity among modes of transportation along the I-95 corridor. This improvement would help eliminate bottlenecks and unnecessary delays, reduce travel time, improve reliability, and expand options available for inter-regional travel. These factors attract new and expanding businesses in Florida, resulting in job creation and capital investment in Florida.

Modal options are also important from an emergency management standpoint. Enhanced transportation options will provide additional opportunities for moving people out of harms way during an emergency evacuation or moving supplies into an area during recovery operations. For example, passenger rail options can provide additional capacity to move citizens out of a region, while freight rail track improvements can move supplies back into a region.

The development of new regional and interregional corridors are also important in providing modal options, as development densities are not great enough in non-urbanized portions of the corridor to support some of the modal alternatives. These new or improved corridors can help to address major gaps in connectivity and service, particularly in economically distressed areas of the state.

3.3 Safety and Security Considerations

Safety and security considerations must be integrated into any alternative considered for implementation in the I-95 corridor. All aspects of transportation planning should address safety and security concerns during the development of alternatives, while at the same time continuing to improve passenger and freight mobility. Passenger safety and security is critical for successful implementation of new transportation alternatives, while the security of the I-95 corridor's freight transportation system is crucial for the continued economic development of the corridor.

It is important transportation providers continue to help identify and deter security threats, effectively manage the transportation network during emergency evacuation events, and help minimize incident response times.

3.4 Implementation and Coordination

While some alternatives will be developed locally or regionally to serve a specific purpose, the alternatives as a group should be integrated together to form a complete, corridor wide transportation system. The integration will require a high level of coordination among all of the planning and implementing agencies. The State of Florida should promote growth leadership through regional visioning initiatives. Regional visioning efforts engage experts and the public in a process to establish transportation and community development goals for a specified point in the future. These efforts are in line with a proactive, systems-based approach to growth leadership.

Currently, metropolitan planning organizations (MPOs) serve to coordinate the local transportation network throughout their metropolitan area. In areas outside MPO boundaries, such as Flagler County, FDOT coordinates directly with the County. MPOs act in cooperation with FDOT to coordinate projects and to meet statutory provisions. A mechanism does exist for coordinating all MPOs. However, the development of some of the alternative options for the I-95 corridor, such as passenger rail service, will require coordination at a higher level. Coordination with traditional partners, such as FDOT, Federal Highway Administration (FHWA), the Federal Transit Administration (FTA) or the Federal Railroad Administration (FRA) will continue, and other partners, such as the Division of Emergency Management (DEM) and Florida Department of Law Enforcement (FDLE), should be included in coordination efforts along the I-95 corridor.

Developing a greater understanding of the connectivity of rural and urban areas is important to meeting rural challenges. Intense urbanization of Florida's coastal areas contribute to conservation pressures in rural Florida. Growth management regulations and preservation initiatives can challenge the success of rural development plans. Internal connectivity among rural areas may provide opportunities for coordinated economic development. Improved personal mobility can enhance economic development by expanding access, improving individual's employment opportunities, and supporting increased commercial activity.

It is important to note this is a step in the early planning process. As this effort advances it will progress through either the FDOT environmental process for either state or federal actions (i.e., National Environmental Policy Act). The beginning step would be for this project to follow the FDOT's Efficient Transportation Decision Making Process (ETDM) as a means to fulfill environmental regulations and requirements as well as to facilitate coordination and consultation with the various environmental resource and permitting agencies in Florida. Studies and actions taken, such as this study, will be used to inform each subsequent step in the process as the project advances.

3.5 Funding

Revenue for transportation expenditures is generated from multiple sources. While there are many categories of funding sources available, funds generally come from these main sources:

- State Funds:
  - Fuel tax (gasoline, diesel, aviation fuel);
  - Fees (initial registration, tag, rental car surcharge); and,
  - Documentary stamp revenue.
- Federal Funds
  - Highways (Federal gas tax – distributed to states); and,
  - Transit (funds distributed to providers)
- Other Funds
  - Turnpike and Tolls;
  - Bonds; and
  - Local Revenues (local motor fuel taxes, local option sales taxes and other sources).

Funding the development of alternatives along the I-95 corridor will be challenging in the present economic climate, as State and local governments struggle with a transportation funding shortfall. Some of the I-95 alternative options generate revenue from user fees. However, the revenue is not usually sufficient to cover more than the operating and maintenance costs. Significant initial investments are typically required for development of the new systems and major modifications to existing systems. Additional funding appropriations may be required to support a consistent and connected system throughout the state as well.

The massive level of need requires that Florida must continue to fund transportation trust fund dollars to devote to job-creating connectivity projects. Additionally, new means of funding major improvements must be explored. The current federal transportation legislation, SAFETEA-LU, has been extended to December 2010. The US Congress is working on a new federal transportation bill, and it will likely impact Florida's federal funding levels. FDOT is actively monitoring this federal legislation and evaluating its impact on Florida's transportation system.

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WilburSmith
ASSOCIATES