The Potential for Reserved Truck Lanes and Truckways in Florida

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16. Abstract

The purpose of this research was to evaluate the potential for reserved truck lanes and truckways in Florida in addition to determining how commercial vehicles have been managed within other states. The project specifically examines where exclusive truckways and truck lanes have been evaluated and constructed within the U.S. It summarizes and documents the costs and motivating factors in those cases where exclusive facilities have been contructed in the U.S.

The study then evaluates the potential for reserved truck lanes and truckways on the Florida State Highway System (SHS) by employing a G.I.S. screening tool and field review of the highways that emerge as having a high potential for use of this strategy. The methodology is presented in detail and the results of the analysis for each corridor that was identified for the potential for exclusive truck lanes are discussed along with an identification of oppurtuinties for consideration.

The research also documents and maps abondoned railroad rights of way and relates them to highway corridors where additional exclusive truck facilities may be warranted. The report includes a brief discussion on the current uses of differential speed limits for trucks and automobiles.

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The report is prepared in cooperation with the State of Florida Department of Transportation and the U.S. Department of Transportation.

EXECUTIVE SUMMARY

THE POTENTIAL OF TRUCKWAYS AND EXCLUSIVE LANES FOR TRUCKS IN FLORIDA

Purpose

This report presents the results of research conducted to determine the potential for roadways that are used exclusively by trucks. The purpose of this research was to evaluate the potential for truckways and exclusive lanes for trucks in Florida, in addition to determining how commercial vehicles have been managed within other states. The project specifically examines where exclusive truckways and truck lanes have been evaluated and constructed within the U.S. It summarizes and documents the costs and motivating factors in those cases where exclusive facilities have been contructed in the U.S.

The research also documents and maps abondoned railroad rights of way and relates them to highway corridors where additional exclusive truck facilities may be warranted. The report includes a brief discussion on the current uses of differential speed limits for trucks and automobiles.

Background

Facilitating the movement of freight throughout Florida is receiving increased attention by decision makers throughout the state. Freight movement is one of the most important components of a healthy state economy.

The Florida Department of Transportation (FDOT) engaged the Center for Urban Transportation Research at the University of South Florida (CUTR) to lead the research effort to investigate the potential of truckways and exclusive lanes for trucks in the state. After conducting a thorough literature review, researchers identified national case studies and visited sites where special treatments for trucks had been implemented.

Literature Review

The review of relevant studies found that few truly exclusive facilities for trucks and/or heavy vehicles exist, thus reinforcing previous investigations. Researchers examined truck volumes, the percent of trucks in the traffic stream, peak and non-peak hour volumes, roadway geometrics, and pavement conditions to determine the potential. Most truckways are not warranted because of limited truck volumes and/or high cost. Nonetheless, exclusive facilities for trucks may have positive impacts on the environment, such as lowering air and noise pollution levels, and reducing fuel consumption.

Several factors have steered local and state agencies away from implementing exclusive truck facilities; however, the most common issue was the high construction costs. Estimates of cost ranged from $4 to $8 million per mile. High costs were attributed to right of way acquisition, the heavy-duty construction that is required, and the type of design (with elevated structures costing the most). In addition, public acceptance of truck-related countermeasures has been mixed. Although public interest groups are generally in favor of making highways safer by removing trucks, they are usually reluctant to fund such projects. The trucking industry has been skeptical of the benefits of reserved truck lanes, often pointing to a reluctance to pay tolls and the potential for unfavorable public opinion. Most agree that it is difficult to estimate the trucking industry's level of compliance if a special facility was in place.

Although the literature review revealed no long-distance, truck-only highways, a few special-use facilities were found. The special-use facilities were site-specific and usually served a limited portion of traffic, such as port-related freight movement or international border crossings. However, in most cases, implementation of the special-use facilities has had a significant impact on local truck traffic.

National Case Studies

Through site visits, the project team documented conditions at existing limited access facilities in Boston, New Orleans, New Jersey, and Laredo, Texas. These truck-only facilities can be classified as short-haul, special-use facilities. Although state and local agencies may have recognized a corridor congestion problem involving trucks, most have not taken action, except for site-specific cases in need of improvement. The only facility resembling a long haul facility is a 30-plus mile section of the New Jersey Turnpike that excludes trucks from separated lanes for non-commercial traffic. The practical effect of the exclusion, however, is a truck lane.

Methodology

CUTR developed a methodology to select sites that warranted further consideration for exclusive truck facilities. Specifically, researchers constructed several GIS suitability models to identify "hot spots" based on truck-related crashes; truck volume; percent of trucks; highway level of service; proximity to airports; proximity to seaports; and, proximity to other Intermodal facilities. The process of creating and selecting the appropriate suitability model was iterative. Each of the variables was individually considered, and multiple combinations of the models were run. A review of each of the variables and models is included in the report along with a description of the process of creating a suitability model.

By using various combinations and weightings of factors, three models were developed and run for the State Highway System (SHS) in order to identify the most suitable highways for exclusive truck facilities serving the following trip types: "Between Cities," "Within Cities," and "Regional Facilities."

The objective of the Between Cities Model was to identify highway corridors that may be deemed suitable for an exclusive facility to move truck traffic from one city to another. Important factors in identifying these types of corridors are the percentage of trucks of total traffic, segments that have high volume of trucks and truck crashes, and a low level of service. It was determined that a highway's proximity to a specific local truck traffic generator was far less important than the absolute demand for the movement of freight at a system level. This model attempts to identify the most basic movements of trucks in the state. Truck volume is highly weighted in this model with 75% of the model being attributed to truck volume. Level of service has the second highest weighting with 15%. Percent trucks and truck crash rate were both given a weight of 5%.

Based on the Between Cities Model, six potential corridors emerge. These corridors were selected based on a their high scores and where high scoring segments were generally contiguous.

1. Miami to Titusville
2. Daytona to Jacksonville
3. Naples to Ft. Myers
4. Tampa to Orlando to Daytona
5. Venice to Valdosta, Georgia
6. Lake City to Jacksonville

The design of the Within Cities Model attempts to identify those areas where additional truck capacity may be required in urban areas. These areas are sometimes characterized as those links needed in order to move freight the "last mile" to an Intermodal facility or distribution center. In this model, proximity to airports with high levels of air cargo activity and seaports are highly valued. Truck mix becomes more important than the absolute number of trucks as a measure of need.

The Within Cities Model identifies highway segments based on level of service, truck volume, percent trucks, truck crash rates, distance to truck terminals and transfer facilities, airports and seaports. In selecting the areas for further review derived from this model, routes were excluded if they were being addressed in the Between Cities Model.

The project team focused on access to local Intermodal facilities. Priority was given to those local corridors that connected major Intermodal facilities with an emphasis on connectivity to the Interstate System. Three sites emerged for additional examination:

1. Miami: Port of Miami to the Area of Miami Intermodal Center
2. Tampa: Port of Tampa to Interstate Route 4/275
3. Jacksonville: North Interstate Route 295 at Interstate Route 95

In an attempt to determine if the first two models would fail to capture facilities or needs of a regional nature, a third model was constructed. This Regional Model is a hybrid of the previous two models discussed. It builds off of the Within Cities Model, but gives higher values to some of the factors that are significant in the Between Cities Model; consequently, some of the variables from the Within Cities Model are given less weight. The results of the Regional Model identified no additional highway segments beyond those in the Within Cities Model. Although the scoring of specific highway segments varied, no new roadways emerged.

RESULTS - CORRIDORS IDENTIFIED

Between Cities Model
Miami to Titusville

Portions of the I-95 corridor from Miami (the southern terminus of I-95) to around Titusville scored very high on the GIS Between Cities Model. The highest scores in the corridor, which stretches for approximately 210 miles to Titusville, were in the southern Broward County area.

With median constraints on the southern end of this corridor, it seems doubtful that an exclusive truck facility could be easily constructed. An alternative that at first glance seems to make sense is to try to route long haul trucks to Florida's Turnpike. A serious attempt to do this with toll reductions for turcks was conducted in the mid-1990's with little success; however, other potential opportunities do exist. One low cost potential is to make the existing HOV lanes available in the off-peak hours to trucks only. This would, however, be inconsistent with the current truck lane restrictions in Dade, Broward, and Palm Beach Counties. Another is a scheme that would involve operating I-95 and Florida's Turnpike as one facility on the northern part of the corridor providing exclusive, separated lanes for commercial traffic. Through St. Lucie, Indian River, and Brevard Counties, there appears to be sufficient median width to contemplate an exclusive truck accommodation. Theoretically, a separate median facility consisting of two 12-foot lanes, two 8-foot outside shoulders, and two 6-foot inside shoulders is possible within the 64-foot median that is available.

Daytona to Jacksonville

The I-95 corridor from Daytona to Jacksonville, Florida generally scored high on the GIS Between Cities Model. The highest scores in the corridor, which stretches for approximately 89 miles from north of Daytona to north of Jacksonville, were on I-295 near the I-10 interchange area. For most of its length, this corridor principally serves north/south through traffic. Closer to Jacksonville, the corridor also serves as a commuter route and as part of the intra-regional circulation network. Jacksonville, with over one million inhabitants as reported in the 2000 Census, is home to the 15^{th}

largest port in the nation, based on the value of cargo handled, and is the second largest automobile port in the nation.

With the impending opening of the southern connection of State Route 9A to mainline I-95 on the south of Jacksonville, through north/south traffic will have three alternatives through the city. If there are no truck restrictions contemplated on the "eastern bypass," there seems to be a potential for a shift of significant truck traffic from existing I-295 to the east side. This may be one of the only opportunities in the state where taking an existing mixed-use lane and converting it to a truck-only lane may be worth considering.

The additional through traffic capacity that will be available with the completion of the loop provides decision makers with a unique opportunity to provide an incentive for long distance trucks to use one side of the loop or the other. If it was deemed more appropriate that through truck traffic be on the west side of the loop, then an exclusive truck lane, signed and striped, could be instituted at a fairly low cost. If the through truck traffic were on the east side of the loop, the converse would not be true given that the new facility is only a four-lane highway.

Naples to Ft. Myers

The I-75 corridor from Naples to Ft. Myers, Florida scored high on the GIS Between Cities Model and scored highest north of Immokalee Road and south of Colonial Boulevard. The corridor stretches for approximately 36 miles. The region served by this corridor can be characterized as an area in transition. The traditional agricultural and mining uses to the east of the interstate are giving way to large-scale, low-density residential development.

The only apparent opportunity in the corridor from Naples to Ft. Myers is to widen I-75 to the "inside" and create exclusive truck lanes. Without the proposed widening now programmed for preliminary engineering, there seems to be sufficient median width (minimum of 80 feet) to consider a fully separated exclusive truck facility. Once the widening is completed, it is doubtful that the corridor will score as high on the GIS model because the level of service will improve. The remaining median width, after the widening, will still afford a future opportunity to provide exclusive lanes and, perhaps, even a separated facility.

Tampa through Orlando to Daytona

The I-4 corridor from Tampa through Orlando to Daytona Beach also scored high on the GIS Between Cities Model. Interstate 4 scored highest at its western most end (actually a portion of I-275) and reaches 139 miles from Tampa to Daytona Beach. This corridor changes character dramatically over its length. It is heavy with commuter and recreational traffic for most of its length. It also serves as one of only a few through freeway routes in Orlando and Tampa. In Tampa, only the Crosstown Expressway provides an alternative east-west connection. In

Orlando the nearly completed eastern bypass alternative of Route 417 will provide another option for those using I-4 through the urbanized area.

With the Port of Tampa on one end, massive distribution and significant manufacturing uses in Polk County, and the intense development of all kinds in the greater Orlando area, this corridor will continue to present challenges to transportation professionals. The role of commercial traffic along this critical Florida corridor should not be overlooked. The Orlando International Airport is close to the Ft. Lauderdale facility for the number two air cargo airport in the state. While the Port of Tampa may rank lower than others in the state when ordered by the value of cargo, in terms of pure tonnage it is the highest. Over 25 million tons of phosphate alone move through the Port.

Opportunities for facilitating easier truck movement on the Tampa end of the corridor will be discussed in a section addressing the “Within Cities” findings that follows. While the corridor is long and very complex, some opportunities may present themselves to help in the movement of trucks. However, the “take a lane” option does not seem feasible, and the median is not of an adequate and consistent width across the entire corridor to consider a simple solution.

The High Occupancy Toll Lane Study being conducted on a portion of I-4 in the Orlando area may need to consider movement of trucks as well as commuters. It is possible to consider allowing commercial vehicles in these lanes, and an “off-peak” use of this potential facility may warrant further review. In addition, the High Speed Rail concepts that are being examined for the corridor may be expanded to include a look at freight movement as well as passengers. It is possible that a “total transportation corridor” could emerge as a viable future solution to the growing demands for this corridor and could include accommodation for an exclusive truck facility.

Venice north to the Florida State Line

Interstate Route 75 from Venice north to the Florida/Georgia State line was another long distance corridor that rated a high score on the GIS Between Cities Model. The longest of the corridors identified, it scored highest at three locations (Venice, I-4 and U.S. 27) along its 270 miles. Interstate Route 75 serves both a heavy demand for interstate through movement as well as handling significant commuter traffic around the Tampa and Ocala areas. Its interchanges with Interstate Route 10, U.S. Route 301, and Florida’s Turnpike are all critical linkages for truck traffic.

From Venice to Wildwood, the available median would accommodate an exclusive facility for most of its length. Once north of Sumter County, however, the median width averages only 40 feet. While that width is theoretically enough to add two additional 12- or 13-foot wide lanes, additional room for “oversized inside” shoulders for trucks and a striped buffer to gain separation may be problematic. Like most of the other corridors examined, the highway median is rapidly being consumed for “mixed use” lane capacity additions. Given that the section of I-75 north of Florida’s Turnpike may be able to be widened once more within the existing right of way, and the truck mix in this area is one of the highest found in the study, the “last widening” should be considered for exclusive truck use.

Lake City to Jacksonville

The Interstate Route 10 corridor from Lake City to Jacksonville (60 miles) was, overall, on the lower end of the highest scoring highways on the GIS Between Cities Model. However, the corridor did achieve the highest model score on I-295 north and south of I-10 and at the I-295 interchange in Jacksonville. Interstate Route 10 provides the primary east-west access across all of northern Florida. Interstate 10's 369 miles connect Pensacola, Tallahassee, and Jacksonville with significant truck interchange points at I-75 in Lake City, U.S. 301 in Baldwin and I-95/I-295 in Jacksonville. The route links the ports of Pensacola, Panama City, and Jacksonville to the rest of the state and to the states west of Florida.

Throughout its length, the corridor has sufficient median width (60+) to accommodate even a separated facility within the existing right of way. Few highway overpasses exist from I-295 to I-75 that would require modification, and little vertical curvature exists throughout this portion of I-10. An I-10 National Freight Study is examining potential improvements to facilitate the movement of cargo from California to Jacksonville. More importantly, the additional knowledge that is gained about commodity flow on Florida’s section of I-10 and its relationship with the U.S. will assist in a further understanding of the needs.

An overview of the scoring and characteristics of the Between Cities Corridors is provided in the following table.

Overview of Corridors

	Descriptions					Characteristics							
		Lane Configuration		Median Width			AADT		Truck %		Truck Volume	
Corridor	Designations	Maximum	Minimum	Maximum	Minimum	Ranking	High	Low	High	Low	High	Low
1 - I-95 from Miami to Titusville	Urban-Rural-Urban	10 - 12'	4 - 12'	468'	Barrier Wall	highest score 9	303,000	22,500	21% - 5,674	6% - 12,495	21,650	2,133
2 - I-95 from Daytona to Jacksonville	Urban-Rural-Urban-Rural-Urban	9 - 12'	4 - 12'	250'	Barrier Wall	generally 7 - 8	125,000	22,500	25% - 7,000-9,000	5% - 4,779	11,053	4,218
3 - I-75 from Naples to Ft. Myers	Rural-Urban-Rural/Urban-Rural-Urban	4 - 12'	4 - 12'	182'	80'	highest score 8	70,000	27,000	19% - 5,713	12% - 8,064	8,774	3,578
4 - I-4 from Tampa through Orlando to Daytona Beach	Urban-Rural-Urban-Rural-Urban-Rural	9 - 12'	4 - 12'	400'	4 with Barrier Wall	7 - 8 with one 9	179,000	26,500	21% - 11,097	2% - 1,672	22,027	1,672
5 - I-75 from Venice to Florida State line	Rural-Urban-Rural	10 - 12'	4 - 12'	300'	40'	generally 7 - 8	110,000	25,000	41% - 10,500	10% - 7,681	14,701	6,219
6 - I-10 from Lake City to Jacksonville	Rural-Urban	10 - 12'	4 - 12'	65'	Metal Barrier	7 except one 9	157,500	17,300	40% - 7,000-10,000	2% - 1,000-3,000	10,792	1,387

	Opportunities			
1 - I-95 from Miami to Titusville	Route long-haul trucks to Fl Tpk	HOV lanes available to trucks in off-peak hours	I-95 and Fl Tpk operated as one facility in north	20-mile separate median facility through St. Lucie, Indian River, and Brevard Counties
2 - I-95 from Daytona to Jacksonville	Convert existing N/S mixed use lane through Jacksonville to truck-only lane	Establish exclusive truck lane on one side of loop		
3 - I-75 from Naples to Ft. Myers	Widen I-75 to inside and create exclusive truck lanes			
4 - I-4 from Tampa through Orlando to Daytona Beach	Allow commercial vehicles to use potential HOT lanes on I-4 in Orlando area	Off-peak use of potential HOT lanes by commercial vehicles		
5 - I-75 from Venice to Florida State line	Exclusive truck-only facility (marked lane or separated lane) on southern section of corridor	Last "widening" on northern section reserved for exclusive truck use		
6 - I-10 from Lake City to Jacksonville	Corridor has sufficient width to accommodate even a separated facility within existing ROW	Consideration should be given to 300 miles of I-10 east of I-75		

Within Cities Model

The scores for the Within Cities Model were lower than the Between Cities scores; however, this is not to suggest the importance of the routes identified by this model are less critical than those identified in the Between Cities Model. The different variables used and their associated weightings account for these differences. As in the Between Cities Model, the Within Cities scores are a ranking of relativity, that is, the scores represent a highway or highway segment's position to all other highways on the State Highway System. Based on the model scores, the areas of Miami, Jacksonville, and Tampa were examined more closely for potential opportunities to enhance freight mobility through the use of exclusive truck facilities.

This model attempts to find areas of need to carry freight "the last mile." While much attention is usually given to through and interstate movements of freight, a common critical constraint is moving from an Intermodal transfer point to a higher level of the transportation system. The National Highway System Connectors (NHS Connector) recognizes these critical links and the problems often associated with provision of quality service for the "last mile."

Miami

The Miami area actually constitutes areas in both Miami and Fort Lauderdale. The presence of the ports and airports in the region contributes to the high scores in the area. Around the Miami International Airport, the highest scores occur on I-95 south of the Palmetto Expressway (SR 828) interchange south to the Dolphin Expressway (SR 836).

The need to provide more efficient north-south access was established in the discussion of the Miami to Titusville corridor and is further demonstrated in this analysis. The need that emerges as different in this model is the east-west demand. The intense distribution activity that has developed (and continues to develop) in the areas in Miami west of the airport along the 72nd Avenue/Palmetto Expressway generates significant truck traffic. The ability of this traffic to move to and from the major port facilities of Miami and Miami International Airport is impeded by the lack of any free flow east to west facility.

The concept of a truck tunnel into and out of the Port of Miami has been studied for some time and would alleviate some of the congestion depending on its western terminus. Because this new proposed facility would not extend far enough west to the distribution centers in the area of the Palmetto Expressway, additional east-west capacity for commercial traffic may still be warranted. Although extremely expensive and not easily constructed, perhaps an elevated facility on either the Airport Expressway (SR 112) or Dolphin Expressway (SR 836) for use by automobiles with the existing at-grade lanes reserved for trucks is viable for, at least, study.

Tampa

The high scores on the Interstates in Tampa are not unique to this model. The Between Cities Model also scored sections in this area as some of the highest in the state. What is different and significant in this Within Cities look at Tampa is the relatively high scoring and length of a corridor leading out of the port area toward the interstate via Causeway Boulevard. These characteristics, combined with the examination of the I-75 corridor in the Between Cities Model, seem to indicate the need for more direct expressway access to the area around Tampa's port.

Currently, truck traffic moving to and from the port that is destined for all points other than west, must wind its way through the local system. A project that may provide relief to this situation is the proposed I-4 connector with the Crosstown Expressway (SR 618). The connector will allow easier movement from areas in south Tampa to the Interstate 4/Interstate 275 corridor. Perhaps special accommodation for Port of Tampa truck traffic could be incorporated into the design of this project. This could potentially remove additional truck traffic from city streets and provide added east-west access via the Crosstown as well as create the connection directly to Interstate 4.

Jacksonville

The Within Cities Model for Jacksonville indicates that the northwest section of Interstate 295 scores very high with a truck volume of 12,911 (average annual daily) and a truck percentage of 29% on U.S. 1 (20th Street Expressway). Other high scoring segments include other portions of U.S. 1 in Jacksonville and the northern sections of I-95 near Dunn Avenue that had between 5,000 and 5,500 trucks daily, with the mix of trucks from 7 to 11 percent of total traffic volumes.

The Jacksonville Between Cities Model discussion dealt with the potential for I-295. This section is, however, the highest scoring segment in this urban area, and its proximity to Jacksonville International Airport has driven its score above other sections of I-295. The site-specific need that this model attempts to locate seems to be for the U.S. 1 area from the port activity along Tallyrand Avenue to I-95. The opportunities outlined in the Between Cities discussion of the Jacksonville area would seem to have little potential impact on what appears to be a local access issue. This would be required before any recommendation could be made for this area, particularly given that the model used in this study only dealt with state highways. The nature of the Tallyrand access area requires detail for the local street system.

A summary of the three Within Cities sites is presented in the following table.

Summary of Within Cities Sites

Site 1 - Miami		
Score: 4-6	Truck Volume	Truck %
Around Miami International Airport; highest scores I-95 south of Palmetto Parkway Interchange south to East-West Expressway	14,248	7%
Score: 9	Truck Volume	Truck %
West of Airport on Palmetto Expressway from U.S. 27 south to 40th Road (State Route 876)	10,885	5%
Score: 4-5		
South of Airport on East-West Expressway between I-95 and Palmetto Expressway and just west of Palmetto Expressway		
Scores: 4-6, Ft Lauderdale Airport		
Score: 6	Truck Volume	Truck %
On I-95 from south of I-595 to I-95/SR 816	18,500-22,000	7%
Score: 5	Truck Volume	Truck %
On I-595 between I-95 and Florida Turnpike	10,770	7%
Score: 4	Truck Volume	Truck %
Florida Turnpike south of I-595 interchange north until U.S. 441	3,800-4,000	5%
Score: 4	Truck Volume	Truck %
Part of State Highway 870 between Florida Turnpike and I-95	2,042	3%
Significant east-west demand in Miami west of airport along 72nd Avenue/Palmetto Expressway; ability to move to and from major port facilities of Miami and Miami International Airport impeded by lack of any free flow east to west facility		
Opportunities		
Truck tunnel would alleviate some congestion dependent upon its western terminus; study potential for elevated facility on an E/W toll road for autos with existing at-grade for trucks		

Site 2 - Tampa		
Score: 6	Truck Volume	Truck %
I-4 and E/W portion of I-275 easyward on I-4 west of U.s. 301 to Orient Road	15,000	11-14%
Score: 6	Truck Volume	Truck %
I-275 and Veteran/State Highway 60 interchange	19,500	10-11%
Score: 4-6		
North of I-275 and I-4 interchange on I-275		
Score: 6	Truck Volume	Truck %
North of State Highway 580	10,000-20,000	8-14%
Relatively high scoring and length of a corridor leading out of the area toward the interstate via Causeway Boulevard results in a need for more direct expressway access to the area around Tampa's port		
Opportunities		
Proposed I-4 connector with Crosstown Expressway may provide relief to truck traffic moving to/from the port destined for points other than west; incorporate special accommodation for Port of Tampa truck traffic into design.		

Site 3 - Jacksonville		
Score: 6	Truck Volume	Truck %
NW section of I-295	12,911	29%
Score: 5	Truck Volume	Truck %
U.S. 1 (20th Street Expressway); small portion of I-95	8,000	13%
Other high scoring segments	Truck Volume	Truck %
Portions of U.S. 1 in Jacksonville; northern sections of I-95 near Dunn Avenue	5,000-5,000	7-11%
Site specific need: U.S. 1 area from port activity along Tallyrand Avenue to I-95		
Opportunities		
Between cities opportunities fail to impact this local access issue; conduct origin & destination truck study with detailed interviews of operators using area; analysis limited due to study parameters based on State Highways only		

Conclusions

Most of Florida's Interstate System emerged as suitable highways for consideration of exclusive truck facilities. The most obvious opportunities to create a truck exclusive facility are where the need seems apparent and the right of way exists to create new lanes for a facility as opposed to "taking" a lane from existing users.

An ideal separated facility would provide for ease of passing and adequate shoulders for disabled trucks. This kind of a facility, if it were to be constructed in the median, would most appropriately be situated in areas where interchanges are far enough apart to avoid the long weave sections that would be required for entering and exiting trucks, and require approximately 60-feet of right of way. This "separate facility" type seems to fit only the Interstate 10 corridor west of Interstate 295. Although the interchange spacing seems appropriate on Interstate 75 north of Tampa, long sections of the northern part of the corridor have insufficient median.

As mentioned in the national case studies, although many agencies have and are studying exclusive roadways for trucks, the only facility close to a true truckway is the 33.5-mile, "dual-dual" section of the New Jersey Turnpike. Although there are sections of Florida's Interstate System that rival the highest traffic sections of the New Jersey Turnpike, the percent of trucks in these areas is lower than the 15 percent on average that New Jersey reports. However, with the continued growth in all traffic, and the demand for truck movement not appearing to cease any time soon, the traffic profiles will approach those of New Jersey. From public policy and public perception standpoints, it may more advisable to create traffic separation by excluding trucks from "express lanes." The precedent for truck lane restrictions is already set. This approach also advantages both constituencies, while avoiding the perception that heavy public investment is being made only for one industry.

A system-wide approach to looking at this issue may present some additional opportunities not specifically addressed in the methodology employed in this study. Without the benefit of detailed origin and destination information for commercial traffic, it is difficult to understand how much of the demand for truck capacity on a particular route is a function of the fact that an interstate exists to facilitate movement. The most efficient way to serve the distribution of traffic, or most commodities requiring a fixed infrastructure, is by way of a grid. It may be prudent to give consideration to creating a system of "truck-friendly" highways to make any desired movement more efficient. The system could rely on existing state highways and minimize the need for new construction on new locations.

Recommendations

- Future improvements to limited access facilities should be made with major truck movements in mind. A "truck grid" or backbone could evolve over time within the context of a plan to provide maximum connectivity and alternatives to the congested urban sections of the Interstate System.

- The results of this study should be immediately shared with those working on the Interstate 10 National Freight Study as input.

- A briefing should be provided to those involved with the detailed work of the FDOT Strategic Intermodal System (SIS) Plan Development to facilitate information of these results.

- If the FDOT is interested in pursuing the concept of exclusive truck facilities further, forecast data and the more refined inputs should be run through the GIS screen. Classified traffic counts, the "new" LOS data, and the truck crash rates would all be helpful along with peak hour volume per lane.

- The Florida Strategic Freight Network database should be updated (perhaps as a part of the SIS work).

- The addition of left exits and contracts in future interstate reconstruction should be carefully considered given that this design element is an impediment to any special use of a highway's inside lanes.

- Further analysis on the economics of providing exclusive truck facilities is warranted. Decision-makers require information on the financial relationships between the high cost of providing truck-only facilities and the potential savings due to safety improvements and less pavement damage on "non-truck" routes.

- Prior to consideration of capital-intensive solutions to providing more efficient truck movements, a review of potential operational changes should take place. Times of day restrictions for trucks, use of HOV lanes in the off-peak periods, and truck exclusivity by time of day are three examples.

- This study found no apparent match between areas that may warrant exclusive truck facilities and abandoned rail rights-of-way. The database that was provided as part of this effort of an inventory of rail rights should be consulted by FDOT when new capacity projects are being contemplated.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

Chapter 1

INTRODUCTION

Reserved Truck Lanes and Truckways in Florida

Facilitating the movement of freight throughout Florida is receiving increased attention by decision makers throughout the state. Freight movement is one of the most important components of a healthy state economy. The recognition of the importance of freight movement on our transportation system is evidenced by the work of the Florida Freight Stakeholders Task Force, which identified a "first-cut" at a Florida Strategic Freight Network and more recently by the major initiative by the Florida Department of Transportation (FDOT) in developing a system of trade corridors and a Strategic Intermodal System for Florida.

The advent of "e-commerce," Just-in-Time Delivery, and manufacturing pull systems have all contributed to an increase in truck traffic on the nation's and Florida's highways. From 1992 to 1998, truck traffic in the peak hour increased at an annual rate of 5% on Florida's interstates while all traffic in the peak hour grew at 4.6% annually. According to the U.S. Census Bureau for cargo originating in Florida, 77% of the tons and over 58% of the ton-miles move by trucks only. These figures are up from the previous Commodity Flow Survey done in 1993, when it was reported that trucks moved 67.8% of the tonnage originating in Florida and 43% of the ton-miles.

Further, the ongoing work of the 2020 Florida Transportation Plan Steering Committee and its Advisory Committees has repeatedly emphasized the importance of ease of freight movement to Florida's economy as well as the need for environmentally sensitive and safe transportation. Two of the 2020 Plan Advisory Committees, i.e., Economic Development and Sustainability, have made references to the potential for separating major truck movements from general traffic.

The importance of truck movement to the state's economy coupled with the safety and environmental implications of heavy trucks in mixed traffic with automobiles suggest there may be locations where reserved truck lanes or even separate truck ways should be considered.

It has been suggested that a potential benefit of the separation of trucks and automobiles is enhanced highway safety. As way of background, the 302 fatal crashes involving large trucks in Florida in 2000 represented 6.1% of the national total. The percent of truck involvement in fatalities in Florida was 7.1% in the same year, which was below the national average of 8.6%, according to the U.S. Department of Transportation National Highway Traffic Safety Administration.

The purpose of this research is to evaluate the potential for reserved truck lanes and truckways in Florida. The project specifically examines the current and future potential for reserved truck lanes and truckways on the State Highway System (SHS) and presents a methodology to allow others to evaluate this potential solution. The research examines conditions favorable to reserved truck lanes or truckways and evaluates potential applications on the SHS. It identifies operational considerations and practices necessary to feasibly implement this potential solution.

The FDOT Systems Planning Office worked closely with the Center for Urban Transportation Research (CUTR) at the University of South Florida during this project. CUTR performed a comprehensive literature review of previous research and current applications of reserved truck lanes and truckways throughout the world. The literature review is summarized in Chapter 2 and focuses on relevant considerations for successful application.

Based on sites identified in the literature review, field visits were conducted to several locations in the United States that have implemented reserved truck lanes or truckways. The New Jersey Turnpike has operated a roadway system separating trucks and autos for a number of years. Photographic records have been be made of actual applications, and a summary of the discussions held with those responsible for implementing and operating the facilities are included in Chapter 3.

Based on the literature review, the site visits, and discussions with operators and with those planning facilities in the U.S., criteria were defined for screening for potential sites for application of this concept. A Geographical Information Systems (GIS) approach was used to screen the SHS for the suitability for special treatment of trucks. Three suitability models were created to address the need for trucks to move “between cities,” “within cities,” and regionally. The methodology and the results of the screen are presented in Chapter 4.

Based on the output of the GIS suitability exercise, the highest-ranking highway sections were identified, and “corridors” for further review were created. Site visits to each of the high scoring corridors were made, and meetings with FDOT District personnel were held to gain a better understanding of the characteristics and potential opportunities that are available for the provision of exclusive truck facilities. Each potential site was reviewed from an operational and physical potential standpoint. The highway facility was inventoried for the "Between City" corridors, and the FDOT Adopted Work Plan was reviewed. The results of these activities, including a description of the corridor, a characterization of the area served and the traffic patterns, and a discussion of potential opportunities for exclusive truck facilities for each of the six Between Cities corridors, are included in Chapter 5.

Chapter 6 includes a brief discussion of the limitations to the model and the data used. After evaluating the suitability of segments on the state highway system for reserved truck lanes, a variety of factors must be used to further evaluate each of the specific sites. These factors are outlined.

Finally, although specific corridor or area recommendations are included in Chapter 5, general findings and conclusions are presented. Some rough cost estimates are discussed for potential median facilities, and a systems concept for dealing with facilitating truck movement is presented. Specific process recommendations are outlined in Chapter 7.

Utilization of an existing railroad right of way for the creation of a truckway was one innovative solution found in the early stages of the study. The FDOT Systems Planning Office asked CUTR to create an inventory of abandoned rail alignments in Florida. CUTR cataloged and mapped abandoned and inactive railroad alignments in Florida relying on several sources. The results of this effort are included in Appendix B and in a GIS readable database provided to the FDOT Systems Planning office.

Supplementary information gathered on the issue of differential speed limits for trucks and automobiles was requested by FDOT. The data and analysis are included in Appendix C of the report.

COORDINATION

Throughout the conduct of the study, the Department encouraged close coordination between the research team and other related groups and efforts. This direction was both important and appropriate given the sheer number of activities underway in the area of providing improved freight mobility. The following meetings, presentations, or other coordination efforts took place through the duration of the study.

- Project initiation meeting with Office of Systems Planning, in Tallahassee Fall 2000
- Coordination meeting with FDOT project staff, February 2001
- Statewide Freight Model Task Force, Tampa, February 2001
- Work session with Port of New Orleans staff, New Orleans, March 2001
- Work sessions and site visits with City of Laredo, Texas DOT, and Camino Columbia Toll Road, March 2001

- Statewide Freight Model Task Force, Orlando, March 2001
- Interviews and work sessions with officials from New Jersey DOT, Port Authority of New York and New Jersey, New Jersey Trucking Association, and port terminal operators, April 2001
- Coordination meeting with FDOT Project Manager, Tallahassee, April 2001
- Site visit and meeting with Boston planning officials, April 2001
- Florida Section ITE presentation, Jacksonville, July 2001
- FDOT interim report presentation, Tallahassee, October 2001
- FDOT project presentation to various departments, Tallahassee, December 2001
- Freight planning workshop, Tallahassee, January 2002
- Level of Service Task Team presentation and University of Florida Truck Level of Service project interface, Orlando, February 2002
- District 2 presentation and work session, Jacksonville, March 2002
- I-10 Freight Study interface, Tallahassee, March 2002
- FDOT Seaport Office interface, Tallahassee, March 2002
- District 3 presentation and work session, Chipley, March 2002
- District 1 presentation and work session, Ft. Meyers, March 2002
- District 5 presentation and work session, Orlando, March 2002
- District 4 presentation and work session, Ft. Lauderdale, March 2002
- District 6 presentation and work session, Miami, March 2002
- Turnpike District presentation and work session, Ocoee, March 2002
- District 7 presentation and work session, Tampa, April 2002
- Tampa-Hillsborough County Expressway Authority presentation, April 2002
- Statewide Freight Model Task Force presentation, Tampa, May 2002
- FIHS Coordinators Meeting presentation, Sarasota, July 2002
- District Planning Managers Meeting, Orlando, July 2002
- Periodic updates with Wilbur Smith, Project Manager, on the State Intermodal System Planning project

Chapter

2

LITERATURE REVIEW

Reserved Truck Lanes and Truckways in Florida

Exclusive highway facilities for trucks are often identified as a countermeasure to reduce congestion, enhance safety, and improve the flow of freight. Although these areas often are studied independently, all three perspectives are relevant to this evaluation. This study seeks to develop a methodology to identify potential applications for exclusive facilities for trucks in Florida. While the original intent was to focus mainly on the interstate highway system, the literature review revealed several short-range, special-use options that may be applicable to areas with high freight traffic, such as ports and bridges.

This review of relevant studies found that few truly exclusive facilities for trucks and/or heavy vehicles exist, thus reinforcing previous investigations. Researchers have examined truck volumes, the percent of trucks in the traffic stream, peak- and non-peak hour volumes, roadway geometrics, and pavement conditions to determine the potential. Most truckways are not warranted because of limited truck volumes and/or high cost. Exclusive facilities for trucks might also have positive impacts on the environment, such as lowering air and noise pollution levels, and reducing fuel consumption. However, benefits have to be weighed against potential harms caused by construction and operation.

This literature review culled information from many diverse sources. First, a thorough summary of several relevant scholarly research projects is presented. Private proposals and policy papers also were studied. Later, applied projects are discussed. This area focused on projects by state and local agencies that have considered exclusive lanes for trucks. Current and past projects that may have considered trucks-only lanes but were not implemented also are included. Information compiled from site visits to national case studies is presented in the next chapter in the form of individual case studies.

SCHOLARLY RESEARCH

Research projects most often identify exclusive highway lane facilities for trucks as a countermeasure to relieve congestion, help prevent highway crashes, or improve freight mobility. Several studies have employed traffic simulation models to assess exclusive truck facilities. In some cases, researchers also have considered the possibilities of trucks sharing priority lanes with buses or high occupancy vehicles (HOVs). Public opinion toward truck mobility solutions also has been included in several investigations.

Over the past 15 years, rapid traffic growth in Texas prompted several studies of exclusive truck facilities (ETFs). In 1986, Mason, Middleton, and Petersen[1] developed a moving analysis program to identify sections of highway that are potential candidates for exclusive truck facilities. Specifically, the program evaluated the feasibility of creating ETFs in the available highway median space (other options were not studied). Development of this analysis tool was the result of a two-fold study completed for the Transportation Planning Division of the Texas State Department of Highways and Public Transportation (SDHTP, now TxDOT).

During the first phase of the project, researchers examined current roadway geometric design policy. Specific topics of study included geometrics, operations, safety, available right-of-way, pavement requirements, and improvement costs to determine a design for ETFs. All factors were deemed important, with roadway geometry standing out as the most crucial consideration. The AASHTO "design vehicle" approach was used to identify the maximum vehicle accommodations required for the project (see Table 2.01).

Table 2.01. Selected Design Vehicle Characteristics

Height	13.5 ft.
Width	102 inches
Length	Single unit truck: 30 feet Single unit bus: 40 feet Intermediate semi-trailer: 55 feet Articulated bus: 60 feet Double-bottom semi-trailer: 65 feet
Driver Eye Height	Passenger car: 3.5 feet Trucks (20-30 mph): 6 feet Trucks (35-45 mph): 7 feet Trucks (50-70 mph): 8 feet
Vehicle Headlight Height	2 feet (with 1-degree divergence of light beam from the vehicle longitudinal axis)
Weight-to-Horsepower Ratio	300 to 1
Vehicle Breaking Distance	14 feet per second for trucks (a car should stop in 2/3 the distance required by a truck.)

Source: Operational and Geometric Evaluation of Exclusive Truck Lanes. Research Report 331-3F, pp. 8-9. Texas Transportation Institute (TTI), May 1986.

The study considered specific geometric design elements for ETFs such as sight distance, horizontal alignment, vertical alignment, and cross-section elements. Table 2.02 lists specific factors reviewed under each design element.

Table 2.02. Geometric Design Elements for Exclusive Truck Facilities (ETFs)

Sight Distance	Perception – reaction time Braking distance Decision sight distance Passing sight distance
Horizontal Alignment	Pavement widening on curves Sight distance on horizontal curves
Vertical Alignment	Vehicle operating characteristics on grades Critical length of grade for design Climbing lanes Vertical curves
Cross Section Elements	Lane widths Shoulder widths Guardrails Drainage channels and side slopes

Source: Operational and Geometric Evaluation of Exclusive Truck Lanes. Research Report 331-3F, pp. 9-17. TTI, May 1986.

Mason et al. examined seven specific truck lane cross sections (see Table 2.03). Barrier-separated truck lanes accounted for only two of the scenarios, while the remaining configurations used signs, raised pavement markers, and special lane designations to identify ETFs. The barrier-separated options assumed a 3-lane, variable passing lane configuration with 4-foot inside shoulders and 10-foot outside shoulders. Researchers stressed that in cases where a concrete barrier is needed to divide the highway, a taller, stronger device was required for scenarios where trucks were directed to travel on inside lanes. However, the taller barrier prompted safety concerns about reduced sight distances, and researchers suggested additional investigation of driver eye height. The study group identified minimum “effective median width,” *the clear width of median measured from the nearest edge of each inside travel lane,* as one of the most important factors to consider during a feasibility evaluation of truck lanes. The width of obstructions was subtracted to determine the usable amount of space available for ETFs. Ten to 12-foot inside shoulder lanes were most desirable, while the minimum acceptable median was 36 feet (5 foot inside shoulders plus 2 12-foot lanes).

Table 2.03. Typical Truck Lane Configurations

ETF type	Median width	Total # truck lanes	ETF location	Inside shoulder width	Advantages	Disadvantages
Minimum median	36 ft.	2	inside	5 ft.	Applicable in narrow medians Specific pavement structure for trucks Longer life existing lanes Most economical	Limited control of exit/entrance maneuvers No provision for truck-only passing lanes Long weaving distances near interchanges Lack of shoulder room for disabled trucks
Desirable median	44-48 ft.	2	inside	10-12 ft.	Same as above	Limited control of exit/entrance maneuvers No provision for truck-only passing lanes Long weaving distances near interchanges
Outside lane	44-48 ft.	2	outside	10-12 ft.	Applicable in narrow medians Specific pavement structure for trucks Longer life for existing lanes Minimized weaving, Slower vehicles on right Smaller median barrier (for cars) required	Existing pavement may be insufficient for total truck loads Lack of capacity near interchanges Provides small incremental improvement
Four-lane	60 ft.	4	inside	5 ft.	Pavement designed exclusively for trucks Passing lane	Limited control of exit/entrance maneuvers Long weaving distances near interchanges Lack of shoulder room for disabled trucks
Depressed median	76 ft.	2	inside	10 ft.	Lower cost: no barrier required because of wide median Exclusive pavement for trucks	Limited control of exit/entrance maneuvers Long weaving distances near interchanges Lack of shoulder room for disabled trucks
Protected w/ variable passing lane	76 ft.	3	inside	4 ft.	Total control of exit/entrance maneuvers Exclusive pavement design for trucks Compatible with separate truck interchanges and elevated facility.	Greater required median width Less clearance for wide loads
Elevated w/ variable passing lane	n/a	3	center	4 ft.	Minimal median width required Passing maneuvers provided Control of access by large vehicles Potential for transit use Compatible with protected lane option	High cost Difficulty in future expansion Icing potential in winter Less clearance for wide loads Potential noise problems

Source: Operational and Geometric Evaluation of Exclusive Truck Lanes. Research Report 331-3F, pp. 18-23. TTI, May 1986.

Based on average daily traffic, number and percent of trucks, existing and anticipated growth in population and traffic, availability of median width, and horizontal and vertical alignment, researchers selected the 250-mile Interstate 35 corridor between San Antonio and Dallas for a case study. (The study area did not include downtown areas of these cities.) Manual observations at 10 sites, as well as state traffic count data, yielded total traffic counts ranging from 15,000-25,000 vehicles per day in rural areas to as high as 130,000 vehicles per day in some urban areas (see Table 2.04). Researchers then developed a scaled strip map of the roadway to show ADT, LOS, and roadway geometrics.

Table 2.04. Daily Traffic Volume Along Study Corridor

Area	Traffic Volume (Vehicles per Day)
Rural sites	15,000 – 25,000
San Antonio (north of I-35/I-410 interchange)	71,000
Austin	70,000 – 130,000
Temple	40,000
Waco	50,000
Dallas (I-35/I-20 interchange)	44,000 - 51,000

Source: Operational and Geometric Evaluation of Exclusive Truck Lanes. Research Report 331-3F, p. 34. TTI, May 1986.

The last phase of the project yielded a computer program to evaluate the feasibility of providing ETFs in the highway median. The program, a BASIC high-speed train simulation reprogrammed in FORTRAN 77, calculated both the level of service and the volume-to-capacity (v/c) ratio for each half-mile highway segment. A printout flagged all locations with “F”-rated levels of service and/or median widths less than 36 feet. Scenarios with and without trucks were identified and compared to show the effect of removing trucks from the traffic flow. Results showed that the two most important outcomes of the analysis were effective median width and improved v/c ratio. Researchers concluded that exclusive truck facilities are not feasible because most of the study area has a level of service of A or B. Only 3% of the corridor operated at LOS D or worse, and the only option for these segments, located in urban areas with little available median space, would be costly elevated ETFs.

Also under the employ of the Transportation Planning Division of the Texas SDHPT, Lamkin and McCasland[2] utilized the previously mentioned computer program to investigate design options, safety implications, and economic feasibility for exclusive truck facilities in the 75-mile Houston-Beaumont corridor. Legal aspects, motor carrier issues, and state agency issues also were examined.

The Houston-Beaumont corridor, serving the second largest seaport in the US (Houston), was selected based on a large volume of through and originating/destination truck traffic. Average truck volume for 1984 was reported to be 4,600-6,600 trucks per day, or 15-25% of total corridor traffic, and surveys found that trucks make up as much as 1/3 of the total daily traffic on I-10. Researchers also used spot checks and documented hourly and peak bi-directional traffic characteristics. Overall ADT was between 23,000-27,000 vehicles per day (vpd). Crash ratios for the corridor were compared to statewide rates, and land use characteristics were documented for available right-of-way and suitability for exclusive truck facilities.

Researchers evaluated several options for exclusive truck facilities, including those suggested by Mason at al. and produced cost estimates for each (see Table 2.05). The study reaffirmed that the most cost effective treatment among median-area alternatives is to add 36-foot non-barrier-separated exclusive truck facility. One- and two-way ETFs can also be created from converted freeway frontage roads.

Table 2.05. Cost Comparisons for Exclusive Truck Facilities (ETFs)

EFT Option	Cost (per mile)	Description
Build in existing median	$4 million	At least 36 feet required for construction Trucks share shoulder & passing lanes with normal roadway No grade separation ramps or exclusive connections to other roadways
Convert frontage road to EFT	$4.5 million	One travel lane and one shoulder/passing lane Grade separation for ramps and crossings
	$9 million	Two travel lanes (bi-directional) and two shoulder/passing lanes Grade separation for ramps and crossings Additional width required
Completely separate roadway	$7-8 million	Four-lane facility Separate right-of-way in new location New structures required

Source: The Feasibility of Exclusive Truck Lanes for the Houston-Beaumont Corridor. Research Report 393-3F, p. 71. TTI, March 1987.

This research maintains that a one-lane, one-way ETF with space for passing and emergency parking is more feasible than the two-way variety because less space is required, the potential for crashes is reduced, and retrofits to existing highways are less difficult. Regardless of the option, researchers described the benefits of ETFs as improved safety and reduced vehicle conflicts, Increased corridor capacity, travel-time savings, and extended pavement life.

Because implementation of ETFs is difficult to justify without a firm commitment by the trucking industry to use them, researchers discussed the issue with representatives from various motor carriers. In general, carriers must be enticed to use the facility by sufficient access, desired length, and higher speeds (reduced travel times). Table 2.06 illustrates the concerns of different types of haulers. Hazardous materials carriers were highly supportive of ETFs, and sand and gravel haulers expressed a willingness to pay for use. Overall, carriers perceived little incentive for separated facilities, especially if additional travel miles and higher operating costs were involved. However, the industry felt adding exclusive or non-exclusive travel lanes to existing highways was acceptable as long as passing was allowed and access was not reduced. Carriers showed limited concern for crash prevention and safety.

Table 2.06. Issues Associated with Various Types of Motor Carriers

Motor carrier type	Concerns
General commodity	Constrained by client time schedules, unable to adjust travel/delivery times ETF should be: near urban center, 25-50 miles long Intercity truck facilities needed
Household goods	Constrained By client time schedules, unable to adjust travel/delivery times ETF should be: near urban center, 25-50 miles long
Hazardous materials	Highly in favor of exclusive facilities for trucks Not interested in high-speed travel Favored long facilities because of long hauls Favored improved pavement designs
Pipe and steel	Usually can adjust delivery schedules around congestion Favored increased speeds ETF should be at least 25 miles in length
Sand and gravel	Constrained by client time schedules, unable to adjust travel/delivery times Would consider paying for use of ETF ETF should be at least 25 miles in length

Source: The Feasibility of Exclusive Truck Lanes for the Houston-Beaumont Corridor. Research Report 393-3F, pp. 72-76. TTI, March 1987.

The study briefly discussed the legal issues associated with exclusive truck facilities, such as lane assignment, determining which vehicles will be allowed or denied access, and questions of liability if designs are found to be inferior to the original roadway. Enforcement agency concerns centered on the numbers of additional officers needed and funding sources. Finally, the issue of emergency response access to elevated or separated lanes was raised.

Researchers concluded that the most cost effective option, widening the roadway in the median or shoulder and restricting trucks to one lane except for passing, could not be considered an exclusive truck facility. While construction of a separate, two or more lane roadway for trucks is the most desirable option, it is also the most expensive. This option may be viable only when truck volumes exceed the capacity of one freeway lane, or when the weight and size of trucks increases to a point where existing pavements would be overly strained. A more cost effective (although still costly) alternative is a two-lane facility built in the median with a variable passing lane. This design, which can also be placed on the outside of the roadway, would prompt lower speeds out of concern for safety, but still would most likely increase travel times. Although the study concluded that current conditions did not warrant extensive construction of exclusive truck facilities, construction of a 2-5 mile, 2-lane separated test section was recommended.

Traffic simulation models have been configured to predict changes in vehicle movement caused by modifications to the existing road network or the addition of exclusive truck lanes. Out of concern for safety, design, capacity, and pavement deterioration, Mahmassani et al.[3] developed an integrated network modeling methodology for studying truck lane needs. The powerful tool was designed to aid Texas SDHPT planners and engineers in the identification, selection, and analysis of highway network sections that were candidates for truck lanes, and to address problems associated with the concept. Researchers stressed the importance of the interaction between passenger cars and trucks within the traffic stream.

The Mahmassani model incorporated three major concepts: critical highway link programming, network traffic assignment, and optimal link selection and network design. To identify critical highway links, researchers looked at several variables related to each of three aspects: roadway geometrics, pavement, and traffic operations (see Table 2.07). The analysis yielded three critical-link computer programs ranging from a general critical aspect matrix to a mid-level tool for conjunctive screening, to a highly detailed sequential interaction screen. Network traffic assignment involved construction of origin-destination trip matrices to visualize traffic flow patterns. Matrices were adjusted for current or anticipated conditions, and the network configuration could be adjusted to assess the impact of improvements on some or all parts of the network. This procedure was the central component of the overall methodology and predicted traffic flows resulting from improvements and truck lane additions. The data output could be used to calculate user costs and benefits. (Data output included truck and car flows, travel time dependence on total flows, recognition of vehicle class, and the interaction between vehicle classes.)

Four test networks were used to improve the accuracy and confirm the usefulness of the model. The final model could be used to assess four different lane addition options, including adding a mixed-use lane or adding an exclusive car lane. Two of the options involved adding an exclusive truck lane, one would allow for mixed-use traffic in the remaining lanes, while the other would restrict use of the remaining lanes to cars. The research team reported that information about the movement of people and goods was a limiting factor, especially for use in origin-destination matrices. They stressed the importance of better understanding of truckers' route choices to achieve better estimates of each potential countermeasure.

Another highly relevant item reviewed during the literature search was a study completed by Janson and Rothi[4] in 1991. Researchers evaluated a computer program called Exclusive Vehicle Facilities (EVFS) to determine the economic feasibility of designating existing lanes or constructing new lanes to separate light vehicles from heavy vehicles. The program was designed for a site-specific analysis in Virginia; authors claimed it was not intended for application to a region or network.

Table 2.07. Critical Link Programming Aspects and Variables

Critical link	Associated variables (value / description, if available)
Roadway Geometrics	Minimum number of through lanes Minimum lanes width (less than 12 ft. not considered adequate) Minimum median width (dependant on type of median) Minimum shoulder width (minimum of 10 ft.) Critical shoulder type Horizontal curvature Grade Minimum passing sight distance
Pavement	Minimum pavement type Minimum pavement condition Pavement section
Traffic / Operational	Maximum AADT value Maximum peak hourly truck volume Maximum percent trucks (cut-off value of 15%) Maximum volume to capacity ratio (cut-off value of 0.8)

Source: *A Methodology for the Assessment of Truck Lane Needs in the Texas Highway Network*. Research Report 356-3F pp. 20-23. Center for Transportation Research (CTR), November 1985.

EVFS presents differences in total travel time, vehicle operating costs, crash costs (including fatalities, injuries, and property damage), and crash-related travel time delays for human travelers and for freight. The data flow of the program is fairly straightforward. The user inputs data such as general site information, traffic characteristics, construction costs, value of time and accident costs, etc. into a spreadsheet format and runs the EVFS calculations. Results generated are net present value, a cost/benefit ratio, and facility performance measures. The study identified several potential benefits of exclusive lane facilities. Smoother traffic flow would lead to lower travel times. Separating different sized vehicles would result in fewer fatal and nonfatal crashes per unit travel. Fewer crashes would mean fewer delays caused by blocked lanes.

Three lane-use policies are allowed in EVFS: mixed vehicle (MV), light vehicle (LV) or car-only, and heavy vehicle (HV) or truck only. Heavy vehicles were defined as all single-unit trucks greater than 10,000 pounds and all combination vehicles. The economic evaluation in EVFS estimated and compared the net present values and cost-benefit ratios of alternative designs. EVFS evaluates five different scenarios: (i.) “do nothing,” (ii.) designation of existing lanes for mixed, light, and heavy vehicle, (iii.) addition of MV lanes with no lane restrictions, (iv.) addition of non-barrier separated lanes with vehicles restriction alignments, and (v.) addition of designated, barrier-separated lanes. The program also examines facility cost differences related to initial construction (right-of-way acquisition, demolition costs, etc.) and routine pavement maintenance (light vehicle lanes are reconditioned less often).

The research group used a corridor study of capacity improvements on US 59 in Houston for sample analyses. Other test sites were also used. Critically-sensitive variables used to analyze the economic feasibility of exclusive vehicle facilities included future traffic volumes, existing and proposed number of lanes by type, percentage of heavy and light vehicles in the mix, costs of interchange and lane construction, pavement resurfacing costs, vehicle operating costs, person and freight values-of -time, crash rates, costs, and lane closures.

The final result of all test analyses identified three key factors that need to exist for barrier-separated truck lanes to be economically feasible (see Table 2.08). Exclusive facilities without a barrier separating the lanes may be warranted for a wider range of traffic volumes and vehicle mixes, depending on other site-specific factors.

Table 2.08. Economic Feasibility Factors for Barrier-Separated Truck Lanes

Peak hour volume must exceed 1,800 vehicles per lane hour
Off-peak volumes must exceed 1,200 vehicles per lane hour
Heavy vehicles must exceed 30% of the traffic mix

Source: Economic Feasibility of Exclusive Vehicle Facilities. *Transportation Research Record 1305* pp. 213-14: Transportation Research Board (TRB), 1991.

Results confirmed initial expectations that exclusive vehicle facilities would be most warranted in major metropolitan areas because the benefits of separation increase with higher overall traffic and a greater percentage of trucks in the traffic mix. Researchers also concluded that exclusive vehicle facilities might also be economically feasible in rural areas with high truck-car crash rates. Construction costs in rural areas would be lower because acquiring undeveloped right-of-way is cheaper, and rural highways are usually constructed at grade compared to urban-area highways that are elevated.

Jason et al.[4] recommended viewing cost and benefit estimates as midpoints on a broad scale because of several assumptions necessary to simplify complex site specifications. In addition, EVFS was not found to be applicable to toll roads because the program does not consider tolls, fee schedule adjustments, special financing arrangements, user charges, or cost allocation issues. The cost effectiveness of HOV lanes can also not be evaluated using EVFS because Passenger vehicles are not categorized based on occupancy. To improve the program, researches suggested the inclusion of freeway simulation, route assignment , and elastic demand models. Such improvements would allow future users to account for traffic attracted to the facility due to crashes on other highways or because of increased capacity.

In 1997, Vidunas and Hoel[5] reviewed previous experiences and factors associated with exclusive truck lanes. Researchers described exclusive vehicle facility options and tested the EVFS model on a 3.1-5 mile segment of Interstate 81 in Virginia. The project found that a minimum of three lanes must be available in order to provide exclusive truck lanes. Results confirmed that the model is an appropriate measure of the economic feasibility of separating trucks from cars.

Vidunas and Hoel identified three categories of feasibility factors associated with the EVFS model: traffic factors, human factors, and other factors. Traffic factors included such items as average daily traffic, expected annual increase in traffic, vehicle mix percent, and number and frequency of crashes involving cars and trucks. Human factors dictated levels of compliance and predicted the effectiveness of separation, while other factors were cost, "constructibility," maintainability, legal issues, and support from affected law enforcement agencies. The research group pointed out that the most difficult part of an economic evaluation of a transportation system improvement is accounting for all costs and savings accrued over the life of the improvement.

The detailed analysis of I-81 found a volume of 40,000 vehicles per day, with trucks making up 25% of the traffic mix. EVFS is designed to evaluate highway sections by direction. As such, the 31.5-mile segment was divided into 8 southbound and 7 northbound sections, each 5 miles long or less. Two levels of analysis are available. Level 1 analysis uses fewer inputs to provide a brief look at many alternatives that may warrant additional examination. Level 2 analysis, performed in this project, requires the input of 57 parameters and produces a much more detailed output. Researchers investigated three- and four-lane segments of highway and considered ten exclusive lane alternatives, including two barrier-separated, heavy vehicle lane options.

The authors reported on four basic strategies for exclusive highway lanes: inside lane – LV only, inside lane – HV only, outside lane – LV only, and outside lane HV only (see Table 2.09). This study identified both positive and negative aspects of barrier-separated, exclusive truck lanes. The facilities enhance highway safety. In particular, barriers placed in rural areas will most likely reduce crashes caused by drivers falling asleep and drifting into other lanes. Highway designers have total control over where trucks may exit or enter the highway. However, several problems were noted. Special interchange designs are required, or gaps in the barrier need to be strategically placed prior to exits. Two lanes are needed in a barrier-separated area to allow passing. Variable passing lanes are also a possibility, but the authors suggest that the possibility for crashes may increase with their use. In addition, enforcement may be a problem because officers would need to patrol both sides of the barrier. The roadway would require greater shoulder and lane width to safely accommodate larger vehicles.

The study concluded that while barrier-separated lanes had a weighted cost-to-benefit ratio above 1.0, they were not significantly different from other strategies. Final evaluation showed that the 3-lane configuration of 2 light-vehicle lanes and 1 heavy-vehicle lane, and the 4-lane configuration of 2 light-vehicle lanes and 2 heavy-vehicle lanes had potential as possible solutions. While EVFS was recognized as a useful tool to analyze overall feasibility, some modifications to the program were suggested. Researchers had to make several assumptions to simplify the complex demands of the site-specific aspect of the program, and hand calculations were required for barrier-separated strategies. In addition, the program does not identify which lane is restricted. New technology is available to eliminate these requirements.

Table 2.09. Basic Strategies for Exclusive Highway Lanes

Strategy	Details
LV only, inside lane	Often associated with truck climbing lanes Trucks are still allowed access to the middle lane Popular with drivers of light vehicles, but may have an improper perception of safety benefits. Drawback: In areas with high truck traffic, tight gaps between trucks can create wall of trucks, leading to a dangerous situation for merging or exiting vehicles “Wall” may also obstruct right-placed highway signs, cause premature lane wear, and hinder enforcement operations
LV only, outside lane	Similar in safety and operational effects to inside lane restriction mentioned above Usually used as a temporary measure during road rehabilitation or to extend pavement life before rehabilitation is required
HV only, outside lane	Appropriate for rural areas where the distance between exits is long and trucks rarely use them Trucks forced to pass to the right Slow-moving trucks could impede traffic flow Multiple lane changes at exits and interchanges are also required
HV only, outside lanes	Reduces weaving considerably Enforcement is difficult

Source: Exclusive Lanes for Trucks and Passenger Vehicles on Interstate Highways in Virginia: An Economic Evaluation. Research Report 97-R16 pp. 8-14. Virginia Transportation Research Council (VTRC), June 1997.

Rodier and Johnson[6] used the Sacramento Regional Travel Model (SACMET96) to simulate the effects of a region-wide system of HOV lanes and compare them to High Occupancy Toll (HOT) lanes, truck-only lanes, and HOT/truck-only lanes (1999). Although results of the study were not published at the time of this writing, the preliminary results are worth noting. While the truck-only scenarios provided the lowest reduction in hours of travel delay, the HOT/truck-only combination scenario showed the greatest reduction. The combination strategy also showed the greatest economic benefits to both commercial and personal vehicle travel. No additional information has been released. Models are not always central to an investigation regarding exclusive facilities for trucks.

In 1992, the Organization for Cooperation and Development[7] (OECD) Scientific Expert Group completed a study of cargo / truck routes and networks. Composed of several European countries, as well as the United States, the OECD is committed to the expansion of trade and sustainable economic growth. The project examined roadway design characteristics necessary to accommodate trucks, considered the possibilities for dedicated facilities for cargo movement, and assessed traffic, safety, and environmental impacts of trucks. Concern for safety was the single most important motivation for the study, and the group identified geometric roadway design as a key element when considering truck-only facilities. Specifically, the study documented alignment, cross-sectional, and intersection features. Vehicle characteristics, such as stability, weight, power, and braking distances, as well as pavement and bridge concerns, also were documented.

In regard to potential congestion-relief countermeasures, OECD pointed out “many traffic management measures favor passenger cars over trucks.” The study suggested that operation of truck-only facilities would be comparable to, but more complicated than, operation of bus-only lanes. For example, while bus lanes are used by a similar group of vehicles, a wide range of vehicle types would most likely use truck-only lanes. Also, the number of truck operators is significant, while only a relative few bus companies are in operation. Regarding specific truck-only remedies, the study discussed urban and inter-urban truck-only lanes. The potential for trucks sharing priority lanes with buses in urban areas was mentioned, but conflicts at bus stops were considered prohibitive. Based mostly on the previous study, the inter-urban option was deemed consistently not cost-effective. OECD concluded that, although truck lanes may be advantageous in selected areas, high cost and potential problems outweighed benefits. Specifically, truck traffic needs to be high for a truck-only facility to be cost effective, but too high volumes may lead to operational problems. The group also pointed out that public acceptance for truck-only facilities would most likely be difficult to achieve, based on low perceived benefit and the potential for high disruption in urban areas.

According to Regan and Golob,[8] the draft 1998 California Transportation Plan for goods movement reported four “constraints and deficiencies” affecting freight transportation in the state: capacity and congestion, safety, geometrics and surface conditions, and Intermodal connections. The pair surveyed the trucking industry’s perspective on capacity, congestion, and Intermodal connections. Over 85% of the respondents agreed that congestion will worsen over the next five years. Most believe that congestion is a serious problem for their business, leading to scheduling problems, frustration and weakened morale among drivers, a higher number of crashes, and increased fuel, maintenance, and insurance costs. Unfortunately, inflexible client delivery schedules force many truckers to operate during peak travel times.

Asked to rank the effectiveness of various congestion-relief mitigations, industry representatives felt that adding more freeway lanes wherever possible would be the most effective. Other favorable strategies included dedicating a single freeway lane to truck traffic; truck-only access roads to ports, rail terminals, and airports; and truck-only lanes on selected surface roads. Many operators felt that the industry as a whole is not using ITS technologies to their fullest extent. The study also found that many carriers experienced serious congestion at Intermodal facilities, especially seaports.

Before serious countermeasures can be implemented, the general public must realize that efficient freight and goods movement is an important factor in the nation's economy. As urban areas become more congested, freight travel times increase and delivery predictability becomes less certain, forcing consumer prices higher. So say Trowbridge et al.[9] in a 1996 study of urban corridor freight productivity improvements completed for the Washington State Department of Transportation.

Using a traffic simulation model, researchers analyzed cooperative (trucks sharing with buses and/or HOV) and exclusive (trucks only) reserved freeway lane capacity improvement strategies in the Seattle metropolitan area. Results indicated that time, miles, and money are potentially saved when trucks are allowed to share the underutilized HOV lane with cars and buses. Although individual per trip savings were small, trucks and single-occupant vehicles (SOVs) saved a combined 4.3 million hours, or $40 million per year (based on $8/hr and $15.85/hr time values for car and truck drivers, respectively). Oddly, the simulation predicted an increase in total miles traveled because more vehicles would be drawn to the highway. Similar results were found for the addition of an exclusive lane for trucks, prompting researchers to dismiss the much higher priced strategy.

Safety impacts, pavement deterioration rates, public opinions, and ITS potential were also documented for both strategies. Researchers felt that although the location of the special use lanes could predict the most common types of crashes, operation and sight distances would improve, and the overall impact on safety would be minimal. Survey results showed that, although the combination strategy was more highly favored, general use of HOV lanes would decline if trucks were allowed to share the lane (from 36% current use to 11%). A total of 49% replied that they would "never" use the HOV if trucks were allowed to share, up from 12% who currently never use it. Both bus and truck drivers preferred an exclusive facility for trucks, although truckers also thought favorably about the shared HOV option. All groups except truck drivers favored HOV lanes to be located on the right side of the highway. Researchers felt that the low opinion of reserved-capacity strategies for trucks was similar to that of HOV lanes when they were first implemented. The report advised the use of a careful marketing campaign to persuade a reluctant general public. Opinion surveys can be used to target public awareness/marketing campaigns related to truck restrictions.

Koehne, Mannering, and Hallenbeck[10] studied trucker and motorist attitudes toward three Puget Sound-region truck lane restrictions (from the left-most lanes). Ninety percent of car drivers favored the restrictions, while only 32% of truckers felt the same. Seventy-five percent of motorists also favored restricting buses to certain lanes. Clarity of the rules was found to be an issue. Less than one third of motorists were aware of the restrictions, while one third of truckers believed the signing to be ambiguous. More than 30% of truckers reported having violated the lane restrictions. Researchers correlated driver information with opinions to determine specific profiles most or least likely to favor and abide by the restrictions. For example, long-time licensed male car drivers are most likely to favor truck lane restrictions, while truckers between the ages of 20 to 40 years who frequently change lanes to avoid rough pavement and admit to violating restrictions are least likely to favor the rule. Ultimately, the authors recommended against further implementation of truck lane restrictions in the area, based on resistance from truckers, no obvious benefits (safety, operational, or economic), and lack of consistency among the sites.

LANE RESTRICTIONS

As stated earlier, studies of restricting trucks from selected highway lanes may not be entirely applicable to this investigation. Results of such studies and implementations have been inconsistent at best, but most report benefits when trucks are restricted from one lane. The methods and results of some projects in this area are worth mentioning.

Vargas[11] evaluated the effects of lane restrictions on crash rates in Broward County, Florida. During the hours of 7 AM and 7 PM, vehicles with 3 or more axles were banned from the far left lane over a 25-mile segment of Interstate 95. A similar segment of I-95 in Palm Beach County was used as the control site. Crash data from three years prior to implementation were compared to data three years and six years after the restriction was set. Results of the study claimed that crashes and injury crashes fell by 38% and 57%, respectively. Although the author recommended the use of lane restrictions as a crash-reduction strategy, the methods used in this study were unclear, and the documentation seemed incomplete.

In 1999, Hoel and Peek[12] used the FHWA freeway simulation model (FRESIM) to investigate truck lane restrictions at three sites in Virginia. Each test site was approximately 10 kilometers in length. Using data from Virginia DOT (VDOT), researchers analyzed changes in three traffic flow elements (density, speed differential, and lane changes) with trucks restricted from the right lane and with trucks restricted from the left lane. Each direction of the highway was studied independently. The study group used a paired-sample t-test to determine significant differences in the elements before and after lane restrictions were applied. Sites were selected for study based on VDOT data for traffic volumes, percentage of trucks in the traffic mix (21%-35%), and exit and entrance ramp locations. To account for truck volumes in 2010 and 2020, the volumes used during the scenario analysis ranged from a figure lower than the current level to a point significantly higher than the current level.

Hoel and Peek concluded that the effects of truck lane restrictions are dependent upon site-specific characteristics. In particular, restricting trucks from the left lane in areas with steep grades caused increased speed differential and may increase density and the number of lane changes performed. The number of lane changes increases when trucks are restricted from the right lane. The authors recommended against restricting trucks from right lanes, and encouraged restrictions from the left lanes in areas where grades are 4% or greater.

APPLIED PROJECTS

The idea of constructing exclusive lanes or highways for trucks has been mentioned by several states, as well as in other nations, as a way to ease congestion, increase safety, or improve freight movement and highway operations. Many highway corridor coalition groups also support exclusive facilities for trucks. Current and recently completed feasibility studies are examined in the following section. For this study, researchers felt that it was especially important to document scenarios where exclusive truck lanes were seriously considered, but ultimately not implemented. In many instances, initial studies are complete, but no further action has been taken to date. Such cases are considered to be pending.

In 1979, the Florida and Georgia Departments of Transportation[13] jointly requested Federal Highway Administration funding for a proposed two-lane heavy truck facility to be constructed on Interstate 75 between Tampa and Atlanta. Investigators hoped to realize improvements to safety and operating characteristics of the highway, energy consumption, highway capacity, and facility life. Average daily traffic for 1978 on the mostly rural highway was reported to range between 10,000-25,000 vehicles in Florida and 19,000-76,000 vehicles in Georgia, with truck traffic accounting for more that 20% of traffic on some segments in both states. At the time, traffic projections for the year 2000 were estimated at between 35,000-65,000 vehicles per day in Florida and between 35,000-163,000 vehicles per day in Georgia.

Researchers intended to use the facility as a test site for various configurations including interior and exterior truck lanes, and to identify effective construction, rehabilitation, and maintenance procedures to accommodate heavy vehicle traffic. Plans for the 209-mile Florida segment called for the truck lanes to be placed on the inside from the Florida Turnpike (Wildwood) north to the Georgia border (see Figure 2.01). South of Wildwood to Tampa, the facility would be located on the outside. Design challenges included passing, vehicle movements at interchanges, access to weighing stations, and proper signing.

Configuration for most of the facility would be non-barrier separated, with trucks directed to use the middle lane for passing. Planners considered using barriers to separate trucks only in areas where interchanges were 10 miles apart or more. Researchers also considered experimenting with non-uniform lane widths, such as 14-foot truck lanes and 11-foot lanes for passenger cars.

Total initial cost for the project was estimated to be over $667 million ($337 million for the Florida portion and $330 million for the Georgia portion), with an average cost of $1.4 million per mile. The projected annual cost was set at over $30 million for each state. Cost measures accounted for bridges and roadways, but no right-of-way cost was included. Unfortunately, lack of funding for the concept led to its abandonment.

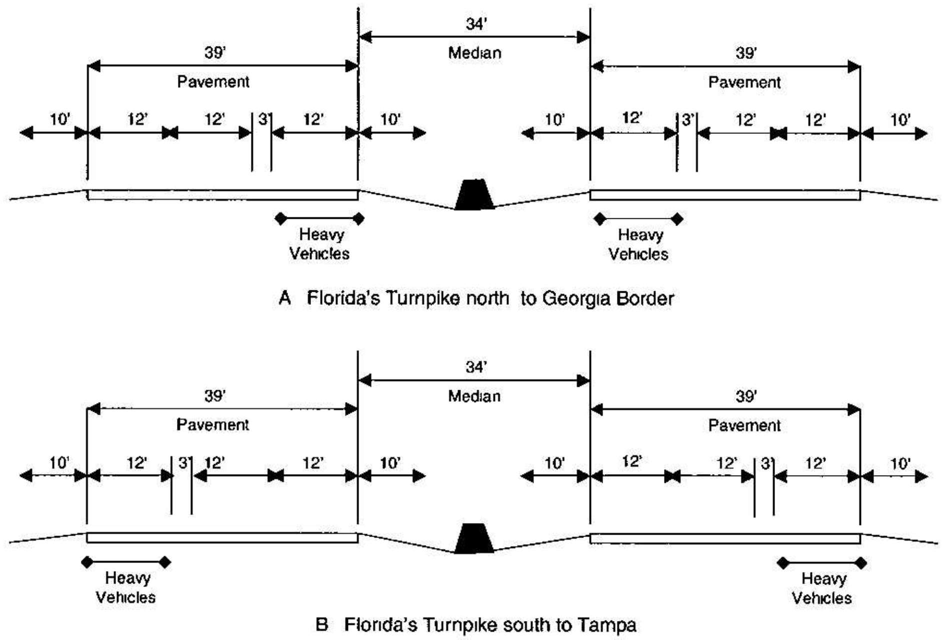


Figure 2.01. Proposed Configurations for Interstate 75 Truck Lanes
Source: *Interstate 75 preferential heavy vehicle lanes evaluation project.* FDOT & Georgia DOT, April 1979.

The Florida Transportation Builders Association[14] (FTBA) proposed an *exclusive truck motorway* (ETM) in 1987. Beginning in Ft. Lauderdale near Interstate 75, the ETM would accommodate very heavy loads and follow the alignment of US Highways 27 and 301 north past Interstate 10. Designed as a toll facility, two alternatives were put forth: the full-length version beginning in South Florida, and an abbreviated version running north from the Turnpike's entrance to I-10. The later option would eliminate direct competition with the Turnpike. The intended fee was estimated to be 10 cents per mile, and total cost for traveling the entire length of the full version was set at $40.

Design options for the facility included increased pavement thickness, a speed limit of 70 mph, and a planned opening in 1992. The roadway would require a minimum right-of-way width of 180 feet, preferably 200 feet to allow for future expansion. For construction through environmentally sensitive areas, the plan called for the road to be built on special viaducts. The plan also included marshalling yards to be placed strategically along the facility to provide connections with railroads, allow for reconfiguration of trucks for travel on mixed-use roadways, and provide services to trucks and drivers.

FTBA categorized potential users of the facility (see Table 2.10) and recognized that costs incurred by truckers to divert to the ETM had to be kept low. Cost of the full-length facility was estimated at $3.1 billion, while the abbreviated option would cost approximately $1.2 billion.

Table 2.10. Potential Users of the Exclusive Truck Motorway

Category	Predicted Use	Percent of Total Users
Corporate fleets	Likely	50%
For-hire carriers	Likely	40%
Owner/operators	Unlikely	10%

Source: *Exclusive Truck Motorway: An Engineering and Bond Feasibility Study,* p. 6. Bureau of Multi-Modal System Planning, Division of Planning and Programming, FDOT, October 1987

Annual operation and maintenance costs were predicted to be $20 million. The feasibility analysis concluded that between 37-52% of the construction costs of the full-length facility could be bonded (assuming 8.5% for 30 years), while between 53-74% of the costs for the shortened version could be bonded. In the end, the analysis recommended against pursuit of the project unless additional revenue sources could be identified.

As mentioned previously, researchers investigated the economic feasibility of exclusive truck lanes along the Interstate 10 Corridor from Houston to Beaumont in Texas.[2] The report concluded that existing and future traffic volume trends did not warrant an exclusive truck facility along the corridor. However, in the years following this study, the state of freight movement has changed considerably in Texas. Researchers did not anticipate the passage of the North American Free Trade Agreement (NAFTA) in 1994. Since implementation, NAFTA has contributed to a dramatic rise in freight movement by trucks in the United States, especially in the state of Texas. Massive growth in population and traffic has been a direct result of the international agreement. Border cities such as Laredo, El Paso, and Brownsville are at the epicenter of this trade revolution. In its wake, transportation agencies in Texas have advanced several projects to address increasing demand for highway capacity.

Commonly referred to as the *NAFTA Superhighway*, a proposal for Interstate 69[15] calls for the completion of a corridor that would provide a direct link between Mexico City and Toronto, Canada, through the heart of the United States. According to TxDOT,[16] I-69 has the greatest likelihood for receiving exclusive truck facilities because they are easier to implement on a new construction project, rather than retrofitting an existing roadway. I-69 currently runs from Port Huron, Michigan (north of Detroit) to Indianapolis, Indiana. If built, the 1,660-mile extension will pass through Memphis, Tennessee and Houston, Texas, and cross the border in Laredo, Texas. Some designs call for the highway to split into three branches, proceeding to the border cities of Brownsville and McAllen, as well as Laredo.

So far, TxDOT has completed an evaluation of candidate routes in and around the Houston metropolitan area. Researchers investigated possible alignments with existing highways and calculated construction, engineering, and right-of-way acquisition costs for each alternative; however, no design commitments have been agreed upon to date. In fall 2000, Texas received $13 million from the US DOT Corridors and Borders program to begin the next phase of the project, an environmental and location study. The funds are part of $45 million earmarked for I-69. Another option to deal with the increased growth of NAFTA-related traffic is to increase capacity within an existing corridor.

By the year 2025, traffic volume on the Interstate 35 Corridor is expected to increase by 85%. The Federal Highway Administration, along with the Departments of Transportation in Texas, Oklahoma, Kansas, Missouri, Iowa, and Minnesota, recently completed an investigation of potential service improvements to highway. [17] The nine-step study, intended as a general strategy guide for future investment, detailed existing conditions, cost, trade flow, trade analysis, economic feasibility, and development impact along the 1,500-mile corridor that stretches from Duluth, MN to Laredo, TX.

After an in-depth review of three options, the study group recommended investment in the Trade Focus Strategy. The strategy involves widening and improving over 1,000 miles of roadway, integration of ITS technologies, urban congestion relief (relief routes, double-decked highway), and provisions for a 490-mile truckway from Dallas to Laredo. This segment of I-35 had the highest projections for truck traffic demand. The proposed truckway would accommodate larger and heavier trucks, and the lanes could be located in the existing right-of-way or on a separate, parallel roadway. (Environmental and cost concerns prompted researchers to dismiss the separate roadway option.) Provisions for the truckway concept include: heavy-duty pavement and bridges, complete ITS for commercial vehicles, and pre-clearance centers for US, Mexican, and Canadian customs.

Although the total cost to implement the Trade Focus Strategy throughout the entire corridor was estimated at $10.9 billion, researchers estimated the return on each dollar invested would be $1.86. Compared to the other alternatives, the plan had several advantages, including the best economic benefits, best reduction in travel times, best reduction in accident costs, and best benefit-to-cost relationships (see Table 2.11). For example, annual operating cost savings by 2025 for truck and rail vehicles was estimated to be almost $600 million, by far the highest among the three alternatives. A decision on further action in the corridor is still pending as of this writing.

Table 2.11. Advantages of the Trade Focus Strategy

Provision	Details (all dollar amounts in 1996 dollars)
Annual cost savings	Annual vehicle operating cost savings: $1.15 billion (all vehicle types) $576 million (truck/rail) Annual travel time cost savings: $1.08 billion Annual crash cost savings: $151 million $2.38 billion annual travel efficiency benefits by 2025
Economic impacts	43,100 permanent jobs created Over $30.8 billion in personal income added Over $18.4 billion in added wages $20.9 billion in discounted value added
Cost/benefit	Total cost $10.9 billion Cost includes roadway, structures, ITS, engineering, administration 11.43% Internal Rate of Return 1.86 benefit-cost ratio

Source: *I-35 Trade Corridor Study: Recommended Corridor Investment Strategies.* Pp.VII-91. HNTB Corp. / Wilbur Smith Associates Team, September 1999.

California has also felt the effects of growing international trade, especially in the southern part of the state. The Los Angeles metropolitan area, noted for its vast network of freeways and its chronic traffic Congestion, has virtually no capacity to accommodate more freight movements by truck. As such, the 1998 Regional Transportation Plan developed by the Southern California Association of Governments (SCAG) proposed an X-shaped network of truck lanes involving State Road 60 (SR-60) and Interstates 5 and 710.[18] With network truck volume estimated to accommodate 40,000 per day, the plan endeavors to ease congestion, reduce pollution, improve freight movement, and facilitate access to the nation's busiest seaport area (Los Angeles/Long Beach). A feasibility study for truck lanes on I-710 has just begun, while the State Road 60 investigation was completed In November 2000 by KAKU Associates.[19]

Running east to west, SR-60 is a vital link in the movement of freight to and from the Ports of Los Angeles and Long Beach. The 38-mile portion of freeway that connects Interstate 710 in Los Angeles to Interstate 15 in Ontario, California (also known as the Pomona Freeway) was examined as a potential site for dedicated truck lanes. Average daily bi-directional truck traffic volumes on the highway are approximately between 7,800 and 27,000, while total traffic counts range from 117,000 to 287,000. By 2020, SCAG anticipates a need for three to five additional mixed-flow lanes in each direction to maintain the current peak-period level of service. To simplify the tasks, the study area was divided into eight segments. After evaluating several criteria, including accessibility and mobility, cost-effectiveness, safety impacts, operational characteristics, regulatory concerns, regional benefits, and environmental impacts, the project team concluded that dedicated lanes for trucks are feasible under specific conditions.

Researchers documented the characteristics of the corridor and identified issues associated with implementation of a truck-only facility (see Table 2.12). Physically, the existing roadway is constrained both horizontally and vertically. Very little space is available in the existing ROW and what is available is committed to future construction of HOV lanes. Truck lane implementations would require widening the existing roadway and acquiring new ROW in most areas. Elevated lanes pose the problems of clearing the more than 40 over-crossings along the corridor, as well as the potential for unattractive structures and unsafe conditions for pedestrians. Researchers also documented major issues that might deviate truck traffic patterns in the future, such as other corridor or construction projects, railroad issues (potential mergers), foreign or domestic trade and economic conditions, and the increase of just-in-time inventory control by businesses along the corridor. Safety concerns investigated were weaving and merging at known problem areas, and speed differentials.

Table 2.12. Issues related to various SR-60 truck-lane configurations

Provision	Concerns
Add lanes at grade	High cost of right-of-way acquisition ROW acquisition necessary for most of study area Steep roadway grades Effects on residences, business, schools, environment
Elevated lanes in median	Only small amount of new ROW needed Horizontal and vertical clearance High construction costs Limited availability of median space Safety concerns: pedestrians on over-crossings, passing, breakdowns Visual intrusion Long ramps required for acceleration/deceleration Use elevated lanes for trucks or HOV?
Allow trucks to share HOV lane	Option not pursued because of several potential negative aspects: Speed variation between cars and trucks Limited space for breakdowns or passing Does not add capacity Funding source(s) for HOV may forbid use by other vehicles

Source: *SR-60 Truck Lane Feasibility Study, Final Report.* Southern California Association of Governments (SCAG), November 2000.

One of the project tasks, an extensive community outreach program, elicited public opinions and answered questions from citizens. Two rounds of public workshops (six in all) were held to hear concerns about safety, noise, traffic, pollution, roadway alignment, pedestrian crossings, and esthetics. Elevated lanes were seen as a further division of the community, while others suggested or denounced proposed roadway alignments. After considering some of the more reasonable citizen ideas, researchers found which alignments of truck lanes the community is most likely to consider feasible.

In conclusion, the project team recommended a strategy that included a combination of four lanes built at grade and on aerial structures in the median. This option was found to be operationally and environmentally feasible, as well as financially feasible, so long as there is an infusion capital from local, state, and federal sources. User fees for the facility would range from $.10 to $1.60 per mile for heavy trucks, with medium and light trucks paying 75% and 50%, respectively. Total construction costs were estimated at $4.3 billion, with $1.2 billion coming from user fees and the rest from other sources.

Although the feasibility study for a long-range exclusive truck facility has not yet begun, Interstate 5 in California, as well as in Oregon, currently has two short-range, separated truck bypass facilities. In California, the highway experiences heavy truck volumes in the area north of Los Angeles, where Interstates 210 and 405 merge into it and the Antelope Valley Freeway (SR 14) begins. The confluence of several lanes of travel created a dangerous weaving situation. Steep grades compounded the problem by that creating a dangerous speed differential. As a result, the California Department of Transportation (CALTRANS) built special three-mile bypass lanes to separate trucks from automobile traffic. However, autos are not restricted from bypass lanes and often use them to bypass congestion or as an alternate exit onto one of the connected interstates. Additional information about the construction of this facility was unavailable.

In Portland, significant grade and weaving concerns also spurred engineers to implement a separated truck bypass lane for northbound trucks. Trucks are required to stay in the right lane, exit onto the bypass, and return to the highway once past the interchange. As in California, automobiles are not prohibited from the bypass lanes; however, the Oregon Department of Transportation reports that compliance by trucks is close to 100%. Neither cost data nor before and after crash data were available for this implementation. Other states also recently have considered the implementation of exclusive truck lanes.

The Missouri Department of Transportation (MoDOT) studied several strategies to relieve congestion on Interstate 70, the link between St. Louis and Kansas City.[20] (A few obscure references to a concept involving the construction of a truck-only toll road from Chicago to Kansas City also were found. No supporting evidence of such a proposal could be obtained.) A field of seven options was narrowed to three, including building an exclusive, parallel roadway or toll way for trucks. MoDOT suggested allowing trucks to travel at much higher speeds than normally allowed on mixed-use interstate highways. This high-speed provision was resisted by members of the trucking industry because of cost concerns associated with tolls and with configuration of trucks for safe travel at such high speeds. The study, completed in December

2000, concluded that exclusive truck facilities would not have a significant impact on the overall traffic volume on Interstate 70. Ultimately, MoDOT decided to promote a plan to widen and reconstruct the existing highway.

In 1995, the Minnesota Department of Transportation's TRANSMART financing program solicited ideas for toll road projects. James Ball, an advocate for the complete separation of cars and trucks, offered a proposal for a trucks-only highway link from Duluth to Winnipeg, Manitoba, Canada[21]. Design of the $1.3 billion, 322-mile long toll road included straight alignment and gentle grades, wider than normal lanes and medians, and widely spaced interchanges. The four-lane highway would utilize automated toll collection and weigh-in-motion technologies; it would also serve as a research facility for materials and procedures specific to truck travel. Designers predicted lane capacity to be 372 vehicles per hour and estimated operation and maintenance costs to be $30 million per year. Heavy-duty pavement and bridges, built with stone mastic asphalt, would accommodate longer trucks weighing up to 160,000 lbs. (twice the US standard). Freight transfer yards would be placed at each interchange and at the ends of the highway to keep freight moving onto standard roadways.

Unfortunately, public forums found that businesses and citizens were generally opposed to the prospect of toll roads in Minnesota. As such, the Department of Transportation backed away from toll proposals, instead focusing efforts on commuter issues. TRANSMART has since been abandoned, but a freight movement initiative is currently in the works for Minnesota. The plan does not include exclusive truck facilities, but there has been some talk of utilizing HOV lanes to move freight.

The original study for the Pennsylvania Turnpike Authority (PTA) considered a dual-dual, trucks-only facility similar to the New Jersey Turnpike.[22] (The New Jersey Turnpike includes a 33-mile dual-dual section that prohibits heavy vehicles from entering the interior roadway. This facility was selected for a national case study and will be documented in greater detail in the next chapter.) According to the PTA research manager this option was not chosen, most likely because of cost considerations (the original feasibility report was unavailable). Cost also played a part in the recent decision to expand the turnpike by one lane in each direction, rather than implement the dual concept. Nationally, the idea of exclusive truck facilities has not been limited to long-range highways.

Four motor vehicle bridges span the Niagara River, connecting western New York State to Ontario, Canada. Capacity improvement projects at two of the four facilities, the Peace Bridge in Buffalo and the Whirlpool Rapids Bridge in Niagara Falls, have considered exclusive facilities for trucks. The Peace Bridge, one of the most important international transportation and trade links between Canada and the United States, handles up to 6,000 trucks per day.[23] According to the

US DOT, surface trade at the crossing increased by 53% from 1994 to 1999. In the early 1990's, suggestions for improving traffic flow on the three-lane, reversible-lane bridge called for the construction of a second span dedicated to commercial traffic.

As planning moved forward, several other options to increase capacity gained favor, including adding three lanes to the existing bridge, replacing the current bridge with a six-lane "signature span," or twinning the span for mixed-use traffic. Currently, all plans are on hold pending the outcome of a second court-ordered environmental impact study. A Detroit-based company has recently entered the fray, proposing a trucks-only bridge to be built approximately one mile north of the Peace Bridge. Other than the construction of a larger commercial vehicle customs-processing center, a trucks-only facility seems an unlikely part of the final design at this point.

In the Niagara Falls area, all commercial traffic is currently directed to use the Lewiston-Queenston Bridge to cross the US-Canadian border. To relieve congestion at this bridge, and at the Peace Bridge in Buffalo, the Niagara Falls Bridge Commission investigated the concept of re-decking the upper level of the Whirlpool Rapids Bridge to accommodate truck and train traffic.[24] The plan, essentially a queue-jumper from US Interstate 190 to Canadian Highway 405, called for one commercial vehicle lane in each direction to be added to the existing single rail line on the upper level. Local passenger traffic would continue to use two lanes on the lower deck. A nearby rail-only bridge was also mentioned as an alternate site for a trucks-only facility.

The feasibility report, completed by Cyr-Brown Associates of Rochester, New York, found concerns about the remaining life of the existing one hundred year-old steel cantilever bridge.[25] The cost of rehabilitating the bridge to current specifications was estimated at $20 million, while an entire now bridge with added truck-only lanes would cost $40 million. Cost estimates for the entire project ranged from $100 to $175 million. The plan included alignment of exclusive truck lanes to bypass the downtown Niagara Falls area and to connect with the interstate at a point farther south of the city. The next step in the process was to be the fatal flaw analysis, however a change in leadership at the bridge commission led the board of directors to reevaluate priorities. As such, the project is on hold indefinitely.

Western New York is an interesting case with regard to freight movement strategy. While other border-crossing areas such as Laredo, Texas; Detroit, Michigan; and Ft. Erie, Ontario have expressed a great sense of urgency to increase capacity, the Buffalo-Niagara Falls area has been slow to act. Although government statistics show many benefits to the region, locals are concerned that the area is merely a pass-through for international trade. Economic benefits to the region job creation and revenue generation) due to the movement of goods across the border are estimated to be low. As a result, local elected officials are reluctant to push for large capital improvement projects.[26]

In a rare case, a congestion problem was addressed by removing separated truck lanes. Figure 2.02 illustrates the original configuration of the double-decked San Francisco – Oakland Bay Bridge.[27] It included six lanes of automobile traffic on the upper deck, and three truck-only lanes and two rail lines on the lower deck. In 1958, the rail lines were removed and the lower deck was reconfigured to accommodate six lanes of one-way travel for mixed-use vehicles. The upper deck also began allowing commercial traffic.

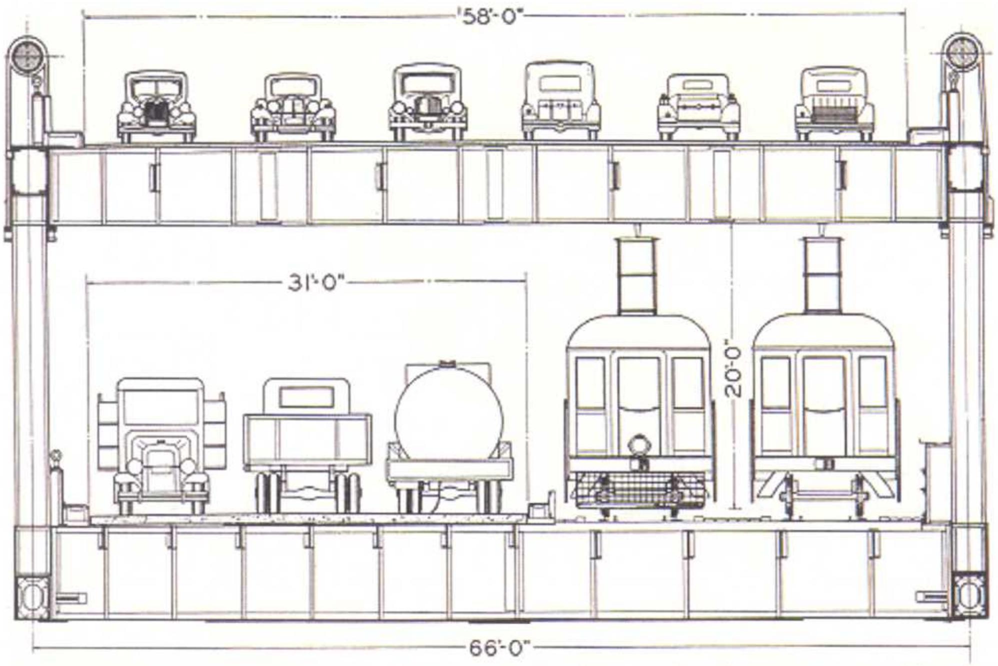


PLATE No. 4—*The bridge will have two decks. The top deck will have six lanes for passenger automobiles; the lower deck will have three lanes for trucks and buses—it will also have two standard gauge electric railway tracks.*

Figure 2.02. Original Configuration of the San Francisco – Oakland Bay Bridge

Source: http://www.lib.berkeley.edu/Exhibits/Bridge/bb at001.html. Originally from *Facts About the San Francisco-Oakland Bay Bridge.* Bay Bridges Educational Bureau, c1935.

The idea of providing exclusive lanes for trucks is not limited to the United States. In 1985, the Autostrade Company, administrating agency of the Italian Freeway System, sponsored a study to improve goods movement in the congested Bologna-Firenze corrido[28] in Italy. Researchers suggested a 33-mile reserved highway for trucks (or "camionale") be built parallel to the existing highway through the Appennine Mountains. The camonale would be engineered to meet the specific needs of trucks. The design criteria included gradual grades and appropriate curve radii, lower crest elevations, improved road stability, increased ventilation in necessary tunnels, and safety features designed specifically designed for large trucks. To date, this project has not been realized because of a number of reasons, including: a change in governments and reassessment of public policy concerns, high construction costs, and difficult administrative processes between state and territorial authorities. However, late word just prior to this writing suggests that a steadily decreasing level of service in the area may force Italian transportation officials to revisit the concept.

The British Department of Transport and the British Highways Agency also discussed exclusive facilities for trucks as one way to manage heavy truck traffic in urban areas. In 1985, an urban truck lane was proposed for Lancaster to help trucks avoid a congested commercial area.[29] Although study deemed the lanes feasible in some locations, no action was taken due to concerns for pedestrian safety that might be negatively impacted. Currently, truck-only lanes are being studied for future investment decisions in areas around London and Newcastle, and in the Liverpool-Hull corridor.[30] Engineers have considered converting the existing hard shoulders into truck lanes.

The Netherlands also considered exclusive truck facilities to address problems of congestion and pollution. Countermeasures suggested include the use of wider, barrier-separated lanes for through truck traffic, creating a lane from the paved shoulder, and redivision of three lanes into four narrower lanes.[31] However, Rijkswaterstaat found that exclusive truck lanes are suitable only for areas with truck volumes of 600 – 1,000 trucks per hour.[32] A compromise may be to operate truck-only facilities only at peak truck traffic hours.

SUMMARY

A considerable body of research has discussed the use of exclusive highway facilities for trucks. Some projects briefly mentioned the concept as a countermeasure to increase safety on congested highways, while others analyzed several configuration options to improve freight movement or extend roadway life. National, state, and local governments have investigated the potential for implementing special lanes for trucks. European nations have also considered the idea. Applications of truckways have been considered to improve conditions for short- and medium-range facilities such as bridges and port area roadways, as well as along entire corridors such as the proposed NAFTA Superhighway. In some cases, the option has been studied and rejected, while others have yet to reach a firm decision on a course of action.

The literature review revealed several different configuration options for exclusive truck facilities. They range from adding lanes in the median space of an existing highway (studies agree that a minimum of 36 feet is required for this action) to the construction of a separate, parallel roadway. Some studies suggest acquiring additional right of way to add lanes, while others opt for an elevated structure built in the median. Truck lanes may be placed on the inside or outside of the roadway, and they may or may not involve a barrier to separate them. Some interior-lane options have been designed as three-lane, variable passing lane facilities. A few areas, such as in

Seattle, have even discussed allowing trucks to share the HOV and/or bus priority lanes. In any event, tolls may or may not be part of the plan.

Some considerations were found to be common among many projects. In most cases, three factors were measured to determine the feasibility of exclusive truck facilities: safety, operations, and roadway geometrics. AADT, percent of trucks in the traffic mix, level of service, and lane and shoulder width were usually among the more important items. Others involved available median width, vehicle characteristics, and roadway and vehicle design. Scholarly approaches often employed a reconfigured traffic model to project future volumes and economic feasibility.

No true exclusive highway facilities for trucks were found to exist. Several factors have steered local and state agencies away from implementing exclusive truck facilities, however the most common issue was the high construction costs. Cost estimates ranged from $4 to $8 million per mile, and high costs were attributed to right of way acquisition, required heavy-duty construction, and design type (with elevated structures costing the most). In addition, public acceptance of truck-related countermeasures has been mixed. Although public interest groups are generally in favor of making highways safer by removing trucks, they are usually reluctant to fund such projects with tax dollars. The trucking industry also has been skeptical of the benefits of reserved truck lanes, often pointing to a reluctance to pay tolls and the potential for low public opinion. Most agree that it is difficult to estimate the trucking industrys level of compliance if a special facility was in place.

It is important to note that a number of studies have evaluated restricting trucks from travel in certain lanes of the highway, and over half of the states impose some form of highway lane restriction on trucks. Most commonly, trucks are prohibited from using the far-left lane. While these studies are significant, and some are referred to in this report, the subject area is considered beyond the scope of this project because the volume of study devoted to lane restrictions is too great to cover in the appropriate detail. Additionally, the report does not seek to recommend truck lane restrictions as an option for improved freight movement.

Chapter 3

NATIONAL CASE STUDIES

Reserved Truck Lanes and Truckways in Florida

OVERVIEW

Very few truly exclusive facilities for trucks exist. Although the literature review revealed no long-range, truck-only highways, a few short-range, special-use facilities were found. The roadways are site-specific and usually serve a limited portion of traffic, such as port-related freight movement or international border crossings. However, in most cases, the implementations have had a significant impact on local truck traffic.

The project team visited six facilities in four cities and met with agency officials responsible for recent or planned implementations (see Table 3.01). The purpose of these visits was to identify specific conditions that led to construction and to document lessons learned during the implementation process. The project team hoped to gain significant insight into the planning and management of such facilities, and to further refine the site selection criteria for potential applications in Florida.

Table 3.01. Site Visit Locations and Facilities

Location	Agency / Facility
New Orleans, Louisiana	Port of New Orleans: Tchoupitoulas Roadway
Northern New Jersey	New Jersey Turnpike Authority Port of Newark / Elizabeth Portway Project Sites New York / New Jersey Port Authority New Jersey Department of Transportation
Laredo, Texas	Laredo Bridge System: World Trade Bridge Camino Colombia Toll Road Texas Department of Transportation
Boston, Massachusetts	Central Artery/Tunnel Project South Boston Haul Road Central Transportation Planning Staff

The following chapter details each commercial vehicle facility visited by the project team.

NEW ORLEANS, LOUISIANA: PORT OF NEW ORLEANS - TCHOUPITOULAS ROADWAY

Figure 3.0.1 Port NOLA Administration Building

Spanning 3 parishes, the Port of New Orleans, Louisiana (Port NOLA), generates $21 million per year in revenue and is an independent unit of state government, with autonomy equivalent to that of a local government. The Clarence Henry Truckway, or Tchoupitoulas Roadway as it is more commonly referred to, is a two-lane, 3.5-mile, heavy-duty road built as part of a major improvement plan in the port area. Two additional miles of roadway, including a direct connection to the Ponchartrain Expressway, are under construction. Completion is anticipated by late 2001. The three-year-old facility, which is reserved for port-related truck traffic, falls under the authority of Port NOLA, and is directly administered by Executive Vice-President Dave Wagner.

According to Mr. Wagner, the Mississippi River is the "busiest waterway in the world." Louisiana boasts 23 ports including six deep-water ports capable of berthing large, ocean-going freighters (including Port NOLA). Ports above Baton Rouge are not deep water, accommodating barge traffic only. Louisiana's deep-water ports handle mainly bulk items such as rubber, hardwood, and grain; ports within 60 miles of the mouth of the river handle mostly oil and gas. Port NOLA's general cargo volume has averaged 11.4 million tons (1995-2000), with a record 14.1 million tons in 1998. According to J. Ron Brinson, president and CEO of Port NOLA, the port boasts "the number one market share among U.S. ports for steel, plywood, and coffee imports.[33]"

Port NOLA handles approximately 70% of cargo arriving in Louisiana, 80% of which is moved by trucks, the rest by rail. As truck traffic surrounding the port increased, the need to improve port facilities and address traffic flow issues in the area became evident. Main access to the port was a two-lane, asphalt road in poor condition. Port traffic fed into local neighborhoods, and truck routes were posted through New Orleans' historic Garden District, and near parks, universities, and retail areas. Citizens expressed concerns about safety and damage to historic buildings in the wake of so much truck traffic. Truck operators opposed restrictions that would increase travel times and distances. In 1983, the city mandated changes for the area including truck restrictions from the historic neighborhoods, reconstruction of the local roadway, and construction of a new reserved truckway for port traffic. Unfortunately, the City had difficulty enforcing truck restriction ordinances and securing the necessary funding for the project.

In 1990, voters approved a penny tax that included $35 million for the port area roadway improvement project. $18 million was specifically designated to build the truckway, while the remainder was used for reconstruction of the local road, Tchoupitoulas Street. The project provided many opportunities for the area, including a direct link from Port NOLA to the interstate system, removal of truck traffic from local neighborhoods, separation of automobile and truck traffic on Tchoupitoulas Street, stimulation of residential and commercial redevelopment in the surrounding area, and redevelopment of vacant and underutilized land and facilities in the port. Port NOLA began an improvement and consolidation project to coincide with local roadway improvements. Specifically, 50 small terminals were turned into five mega-terminals (four are complete, construction of the fifth is in progress.)

Construction of the truckway commenced upon completion of local road improvements. Final cost of the project totaled over $70 million, with Port NOLA making up the shortfall. The Tchoupitoulas truckway was built to survive the wear and tear of the 2,000 trucks that use it each day. One 12-foot lane was built in each direction, with 8-foot shoulders on both sides of the road (see Figure 3.02). The pavement consists of 17½ inches of concrete with a crushed stone base,

Figure 3.02. The Tchoupitoulas Roadway, Port NOLA. Photos show the flood wall and realigned railroad.

prepared sub-base, and is comparable to airport runway specifications that accommodate the landing of 747 jets. The path of the roadway parallels the riverbank and weaves in and out of the floodwall. The wall also serves as a noise barrier for local neighborhoods and security barrier for the port. The project necessitated the realignment of an existing rail line and consolidation to one track.

The Tchoupitoulas truckway is free to enter, but only commercial vehicles or pre-approved vehicles on port-related business are passed through the security areas (see Figure 3.03). Access to the port roadway is limited to four points (two with 24-hour access), but only local deliveries are allowed access anywhere other than the east end of the facility. The port utilizes ITS technologies, including AVI and optical container readers.

Figure 3.03. Main entrance to the Tchoupitoulas Roadways, Port NOLA.

NEW JERSEY TURNPIKE AUTHORITY: DUAL-DUAL ROADWAY SEGMENT

The 148-mile New Jersey Turnpike celebrated its 50th year of service in 2001. One of the busiest limited-access highways in the United States, the facility runs north and south through the state, connecting New York City to Wilmington, Delaware. The 33.5-mile segment between interchanges 8A and 14 consists of interior express lanes for use only by automobiles and exterior lanes for use by all vehicles. This facility, commonly referred to as a dual-dual alignment, uses

Figure 3.04. Separated lanes on the New Jersey Turnpike

physical barriers (guard rails, concrete jersey barriers, etc.) to separate the 12-foot lanes and 12-foot shoulders (see Figure 3.04).

There is no additional charge for use of the express lanes. Implemented in the 1960's, 23 miles of the dual-dual segment have three lanes on both the inner and outer roadways, while the remaining portion that opened in 1990 has three interior lanes and two exterior lanes. A new travel lane was added to the outer roadway in 1996. During peak periods, the new lane is reserved for high occupancy vehicles (HOVs). Each interchange uses a fly-over design to provide access to both sets of roadways (see Figure 3.05).

Figure 3.05. The New Jersey Turnpike. Photo shows the outer roadways carrying trucks, while most automobiles use the inner highway. The flyover (center-left) connects the inner highway to the exit ramp.

Under normal conditions, approximately 60% of traffic uses the inner lanes, while the remaining 40% drive in the outside lanes. Compliance with the lane restrictions is reported to be close to 100%. In fact, casual observations made during the site visit confirmed the estimate. The unique dual-dual concept affords operators the opportunity to prevent long, crash-related delays by using a network of variable message boards to redirect traffic onto the clear roadway. Researchers also observed this procedure, as trucks were redirected onto the inner roadway because of an earlier crash.

According to Turnpike managers, truck traffic volume on the Turnpike, estimated at 60,000 vehicles per day or 27 million per year, has increased 6-7% per year over the past decade. Commercial traffic accounts for 37% of annual revenue collected by the Turnpike (over $148 million). Turnpike authorities claim that concerns about safety and congestion led to implementation of the dual-dual alignment. Trucks make up 15% of the traffic mix on the

Turnpike, but account for 35% of all crashes. In fact, of the seven fatalities in 2001 through March, all involved trucks.

NEW JERSEY DEPARTMENT OF TRANSPORTATION / PORT AUTHORITY OF NY-NJ: PORTWAY PROJECT

Figure 3.06. A container ship docked at the NY/NJ Port Authority Marine Terminal in Elizabeth, New Jersey.

The NJDOT Portway concept encompasses a series of freight-focused projects associated with the northern New Jersey seaport, the largest container port on the East Coast. The northern New Jersey seaport handles more than two million containers each year, and 2.8 million are predicted by 2010. In total, the port handles 20 million tons of cargo per year and creates over 165,000 jobs (direct & indirect). Ninety-five percent of the port volume is moved through New Jersey via truck, rail, air, and warehouse facilities. Currently 15,000 trucks per day travel to the port to carry Intermodal containers, accounting for over two million truck trips each year. Rail movement of freight is expected to increase by 50% over the next 20 years, and airfreight at Newark International Airport, the nation's eighth largest cargo facility, has grown by 10% per year over recent years. Despite the tremendous upward trends of freight movement, local roads have seen no major improvements since the 1950's. Current road configurations are confusing and inadequate for efficient movement of freight.

Figure 3.07. Doremus Ave. bridge reconstruction.

Spanning a 17-mile area, four phases of various projects under the Portway umbrella seek to upgrade streets and highways, improve access to neglected areas, provide new connections to port and freight facilities, and revitalize brown fields. Exclusive truck facilities are an underlying part of the master plan, including modifications to surface streets, bridges, and underpasses; priority port access; and improved access to major highways.

Priority toll lanes and other ITS technologies will also be utilized.

The first Portway project, reconstruction of the Doremus Avenue Bridge, broke ground in July 2000 (see Figure 3.07). The new facility, which will replace a crumbling structure that used to serve as a streetcar bridge, will incorporate “smart bridge” technology and utilize new AASHTO load standards. Cost of the project is $31 million, funded by the NJDOT.

The Portway project is intriguing because although the projects are related, they are independent. As such, even if one project is rejected, modified, or experiences unforeseen delays, all other projects will not be affected. Successful implementation of Portway will require communities, businesses, developers, freight companies, and the State of New Jersey to work together toward common goals of economic growth, environmental sustainability, and efficiency. In addition to the NJDOT, public agencies involved in Portway include the New Jersey Turnpike Authority, the Port Authority of New York-New Jersey (PANYNJ), maritime resources, and economic development agencies. NJDOT and the PANYNJ have made a strong effort obtain input from truckers, trucking companies, terminals, and dock worker groups.

BOSTON, MASSACHUSETTS: SOUTH BOSTON HAUL ROAD

The South Boston Haul Road is a short, commercial vehicle-only access road built quickly to accommodate the Central Artery/Tunnel (CA/T) project in Boston Massachusetts. Affectionately known as “The Big Dig,” the undertaking is the largest and most complex highway project ever undertaken in the history of the United States. The Massachusetts Turnpike Authority (MTA) is overseeing the 7½-mile project that consists of two major components: replacement of the elevated central artery highway with an eight- to ten-lane underground expressway and extension of the Massachusetts Turnpike beneath south Boston and Boston Harbor to Boston (Logan) International Airport. When completed in 2004, the $14 billion, 13-year project will reduce traffic congestion and improve mobility in one of the countrys oldest cities. Until then, the CA/T project, along with a massive new convention center and several other construction projects in progress, make downtown Boston a crowded and confusing place.

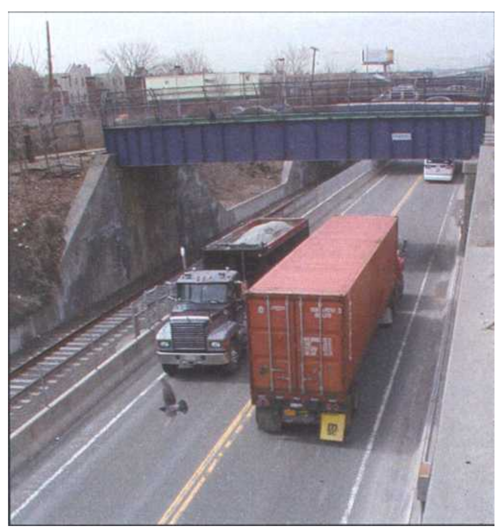


Figure 3.08. South Boston Haul Road, Boston, Massachusetts.

To help move people and supplies in the areas affected by CA/T construction, MTA converted an underutilized four-track rail line to an exclusive access road, or “haul road,” for commercial vehicles. Figure

3.08 shows that a lone rail track now shares the depressed right of way with the two-lane, haul road, allowing trucks and buses easy and unobstructed travel from the South Boston Expressway through residential neighborhoods in South Boston. Not built to AASTO standards, the corridor is approximately 1.5-miles long and ends at the entrance to the Ted Williams Tunnel. The tunnel is also truck/bus only, but this is a temporary condition because of ongoing construction of an interstate connection. The tunnel also provides direct access to Boston Logan Airport; as a result, the haul road handles quite a bit of air cargo movement.

Residents, drivers, and transportation officials were very supportive of the haul road. Cost of implementation was reported to be low, and, although no volume data were available, a constant stream of traffic was observed using the facility. The implementation is an example of a low-cost, quick fix solution to a congestion problem related to freight movement and trucks.

LAREDO, TEXAS: LAREDO BRIDGE SYSTEM - WORLD TRADE BRIDGE

The World Trade Bridge in Laredo, Texas, is a commercial-only facility built to accommodate the rapid growth in truck traffic spurred by the North American Free Trade Agreement (NAFTA). Since the agreement was signed in 1994, exports from Mexico to the United States have grown faster than from any other nation. In less than a decade, commerce between the two nations has tripled. With its strategic position on the border, and its interstate highway connection to the interior of the US, Laredo sits at the epicenter of this economic boom.

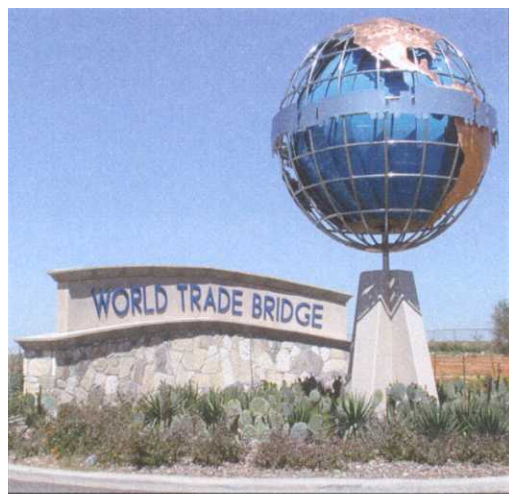


Figure 3.09. Entrance to the World Trade Bridge, Laredo, Texas

According to the 1999 Annual Mobility Report (TTI), Laredo is second only to Las Vegas as the fastest growing city in the United States. By the year 2010, more than two million trucks are expected to pass through the city. A mere 125 miles from the major manufacturing center of Monterrey, Mexico, Laredo is the most obvious point of entry for finished goods bound for American consumers. In fact, the Laredo District was reported to be the 5th busiest in the US in 2000, in terms of trade dollars processed through US Customs facilities ($100 billion). The city has the distinct advantage of being the only border crossing east of the Rocky Mountains served by the US Interstate Highway System. Interstate 35 provides a direct connection to San Antonio and all points beyond: east, west, and north. However, with only three bridges spanning the Rio Grande at the time of the agreement, NAFTA-related truck traffic quickly snarled roads in Laredo.

As commercial traffic continued to jam local roads and highways, safety conditions steadily deteriorated. At the time, the main crossing for commercial vehicles was "Bridge 2." Unfortunately, this facility is located in the heart of downtown Laredo, a major regional government and retail center. Many thousands of pedestrians also cross the border in the vicinity. (A third bridge, the Columbia-Solidarity, was not considered a viable alternative at the time because of its remote location and poor access for trucks on both sides of the border.) Seven- to eight-mile backups on the interstate were common, and limited site distances caused by the now-outdated "camel-back" design of the highway exacerbated the situation. City transportation managers also grew concerned about excessive pavement wear because one 70,000-pound truck was rated equivalent to 700 cars worth of wear. A fatal crash in 1998, one of many involving an automobile rear-ending a stacked truck at 70 miles-per-hour, prompted a call for action, and the Texas Department of Transportation (TxDOT) allocated funds to improve safety and remove trucks from local streets.

Figure 3.10. Mexico-bound trucks enter the World Trade Bridge toll plaza.

Construction of the $80 million World Trade Bridge, the fourth facility in the Laredo International Bridge System, was a joint effort by the Cities of Laredo and Neuvo Laredo, Mexico. In fact, each agency employed its own contractor to build out to the international boundary, and ownership of the bridge is shared by the US and Mexico. The US collects tolls from southbound traffic, while northbound fees are paid to Mexico. Under the direction of Mr. Rafael Garcia, the eight-lane bridge opened in April 2000, operates from 8 AM to midnight, and handles commercial vehicles only. Passenger cars are turned back, and pedestrians are intentionally discouraged from using this crossing. A fifth bridge, solely for use by pedestrians, is planned for the city's downtown historic district.

Figure 3.11. Toll plaza at World Trade Bridge. Handicapped-accessible toll booth; other booths at eye-level with truck drivers.

Builders incorporated several innovative features into the design of the World Trade Bridge. The facility utilizes ITS Technologies such as weigh-in-motion (WIM) and an automatic vehicle identification (AVI) system known as *Laredo Trade Tags*. Unique tollbooths place the collector at eye-level with drivers (see Figure 3.11). Because all fees ($2.75 per axle) are collected electronically, toll collectors are more accurately referred to as "monitors." Trucks up to 80,000 pounds are acceptable, while overweight trucks must obtain a special-use permit to cross. US Customs also operates a modern, 100-vehicle inspection facility on the site. Because of its isolated location north of downtown, the facility has room to expand by up to 8 lanes to accommodate future traffic needs. The 40-acre area also has a queuing area to stack 350 vehicles. This "moving parking lot" has virtually eliminated backups on the interstate. TxDOT is in the process of completing a direct connection to the highway that will facilitate freight movement even further.

Figure 3.12. Trucks from Mexico wait to clear U.S. Customs at the World Trade Bridge.

The World Trade Bridge has clearly had an impact on traffic conditions in Laredo. Up to 20,000 vehicles cross the bridge every day (see Figure 3.12). A comparison of the same seven-month period prior to and after the opening of the bridge shows that the new facility now handles almost 80% of the commercial traffic passing through Laredo (see Table 3.02). Overall, commercial traffic has increased by almost 21%, compared to an 8.4% jump in total traffic trough the system. With trucks now restricted from Laredo II, the World Trade Bridge can be seen as a queue-jumper around downtown for trucks. Access to and from the bridge via the interstate is over 5 miles north of the downtown area.

Table 3.02. Laredo Bridge System Traffic

	Pre-Implementation (10/98 – 4/99)				Post-Implementation (10/00 – 4/01)			
Bridge	Total Traffic	Commercial Traffic	% Commercial Traffic - Bridge	% Commercial Traffic - System	Total Traffic	Total Commercial Traffic	% Commercial Traffic - Bridge	% Commercial Traffic - System
Laredo I	1,383,363	103,926	7.5%	15.5%	1,286,695	22,967	1.8%	2.8%
Laredo II	3,340,992	417,872	12.5%	62.1%	3,189,251	0	0%	0%
Columbia	180,488	150,811	83.6%	22.4%	207,348	156,249	75.4%	19.3%
World Trade	0	0	0%	0%	631,107	631,107	100%	77.9%
TOTALS	4,904,843	672,609	13.7%	100%	5,314,401	810,323	15.2%	100%

Source: Laredo Bridge System, http://www.cityoflaredo.com/index2.html

The system in place for cross-border freight movement is an important factor to consider in the growth of commercial traffic in Laredo. Foreign long haul trucks are not permitted to operate beyond 20 miles into another country. As a result, a system of transfers and short haul operators is used to ferry goods from one country to the other. Previous conditions limited short haulers to about 2 trips per day, with most of the driver's time spent waiting in traffic. The implementation of the World Trade Bridge has allowed most short haulers to double the amount of trips, limited only by the bridge's hours of operation. Although the NAFTA agreement calls for long haul operators to have access to the other nation's highways, this component has not been enacted yet. It remains to be seen whether or not this change, if and when it takes place, will affect Laredo.

Laredo Bridge System administrators offered insight into development of a similar project. They advised the inclusion of operational personnel in the design phase of the facility, and pointed out that conditions for collectors were of great concern. The facility includes a handicapped-accessible booth, and all stations are designed to minimize exposure to exhaust. Officials also related initial problems associated with the Weigh-In-Motion (WIM) device: vehicles deliberately proceeding too quickly in order to cause an inaccurate reading. Stricter speed control and calming devices were suggested, as well as being sure to install the device on a flat grade.

LAREDO, TEXAS: CAMINO COLOMBIA TOLL ROAD

Although the 22-mile Camino Colombia Toll Road is not an exclusive facility for trucks, its inclusion in this chapter is warranted. Using only private funding ($85 million), the two-lane highway was built in the hopes of attracting mostly commercial traffic. The facility, approximately 24 miles north of downtown Laredo, provides a direct "upstream" connection to the Colombia-Solidarity Bridge from Interstate 35. (Prior to construction, commercial vehicles using this crossing were forced to travel 12 miles south on a "farm road" to connect with the northbound interstate.)

After breaking ground in May 1999, the Camino Colombia opened to traffic in October 2000. Carlos Benavides, president of Camino Columbia Inc. (CCI) and chief administrator of the roadway, credits the short construction period to private management practices and

Figure 3.13. Toll plaza at the Camino Colombia Toll Road, Laredo, Texas

strong interest among the 12 landowners involved in the project. Rather than sell the land, investors have a stake in the facility. Trucks pay a $4 flat fee plus an additional $4 per axle to drive the entire length of the road, while cars are charged $3. Commercial vehicles with five or more axles receive a discount after exceeding 100 trips. As at the World Trade Bridge, WIM and AVI are in use, and Camino Colombia plans to participate in Laredo Trade Tags. Service facilities, including eateries, fueling areas, and service centers are also in the works.

Many more cars than expected, most likely tourist traffic bound for San Antonio, have utilized the toll road. In fact, the three-year goal for car volume was exceeded within the first six months of operation. The current daily volume of trucks ranges from 40 to 120. The highway was built to TxDOT standards, the pavement construction is a 13-inch gravel base with a nine inch asphalt top course. Cultural and environmental studies were also completed during construction.

Although the City of Laredo originally opposed the project, many residents appreciate the Camino Colombia Toll Road as a preferred route for hazardous materials. The facility also hopes to spur additional investment in the area. TxDOT responded by upgrading the original connecting road, and a connection to Interstate 69 is highly likely. Several large corporations are planning to open warehouses and distribution centers nearby. Mr. Benavides also reports that a cargo airport is in the works and that the Mexican government is in the process of completing a rail connection to cross in the area. In fact, Mexican state issues have probably played a role in the current status of the Camino Colombia.

Although the major manufacturing city of Monterrey is located in the Mexican State of Nuevo Leon, it borders with the U.S. only briefly. The Colombia-Solidarity Bridge was built on this swatch of land to connect Neuvo Leon with the U.S. The rest of the bridges in Laredo cross into the State of Tamaulipas. In fact, Tamaulipas completes the border from Laredo all the way to the Gulf of Mexico. This situation has created a bit of a rivalry between the two states. Because of poor road conditions leading to the Colombia-Solidarity Bridge, freight originating in Monterrey usually travels through Tamaulipas to reach the U.S. Plans are set for an expressway in Nuevo Leon to link Monterrey directly with the bridge, however until the road is completed, the Camino Colombia Toll Road may continue to see low truck traffic volume.

ADDITIONAL INFORMATION: NAFTA AND MEXICAN TRUCKS

As stated earlier, one of the final provisions of NAFTA, allowing Mexican long-haul trucks full access to the United States, has yet to be ratified by the U.S. Congress. During the summer of 2001, both the Congress and Senate defeated measures to allow in Mexican trucks. Opponents are concerned that Mexican trucks are unsafe due to poor maintenance, overweight vehicles, and overworked drivers. The Senate proposes stricter inspections at the border and would require

Mexican trucking companies to be insured by a company licensed to operate in the U.S. American truck drivers also fear unfair competition because Mexican drivers are paid far less. Supporters of completing NAFTA argue that Mexican long-haulers probably won't venture too deep into the U.S. They also point out that stricter inspections of Mexican trucks are unfair because trucks from Canada are already allowed but do not receive the same treatment. However, Canada holds its own trucks to a higher standard than the U.S.

At the time of writing, the issue has yet to be resolved. An arbitration panel ruled that the U.S. has violated the NAFTA agreement. As such, Mexico is free to take retaliatory steps like blocking the import of American goods. Although such a drastic measure is considered unlikely, the truck ban is reciprocal. U.S. trucks are currently not allowed deep into Mexico. However, American legislators are hopeful to reach a compromise that is beneficial to all interests on both sides of the border.

SUMMARY

Several studies have been conducted, and several areas have considered the option of reserved lanes to carry trucks. However, in no instance has a long-range, exclusive facility for commercial traffic been built. Through site visits, the project team documented conditions at existing limited access facilities in Boston, New Orleans, New Jersey, and Laredo, Texas. These truck-only facilities, as well as most others, can be classified as short-range, special-use facilities. Although, state and local agencies may have recognized a corridor congestion problem involving trucks, most have not taken action except for site-specific cases in need of improvement.

Chapter 4

METHODOLOGY

Reserved Truck Lanes and Truckways in Florida

This project is attempting to identify potential opportunities for implementing special use lanes for commercial trucks in the State of Florida. The previous chapters of this report summarize the information that researchers gathered in order to attempt to screen the Florida State Highway System for areas or links that may be appropriate (suitable) for special truck facilities. To effectively perform this task, a suitability map or model is created to obtain relative values for every location along the state highway system to determine the appropriateness of exclusive truck lanes. A suitability model is a spatial model that identifies locations where reserved truckways may be more suitable than other locations.

The Florida State Highway System is made up of 12,050 centerline miles and a total of 40,203 lane miles, including Florida's Turnpike system. Vehicle miles traveled on the SHS exceed 258,000,000 miles daily.

Data from the Florida Department of Transportation's (FDOT) Statistics Office and the Safety Office are the criteria used to establish suitability. The variables obtained from the FDOT offices include truck volumes, truck percentages, truck crashes, and highway level of service. Additionally, FDOT data on truck terminals, and Bureau of Transportation Statistics (BTS) data on seaports and international airports were used. Each variable contributed to the creation of the site suitability model.

Geographic Information Systems (GIS) technology was utilized to create the spatial model. ESRI's ArcView 3.2, Spatial Analyst 2, and ArcGIS 8.1 were used to perform this task. The Spatial Analyst is a standard extension of ArcView 3.2 and ArcGIS 8.1. Spatial Analyst converts street (polyline) based files into grid (raster) based files and performs spatial analysis on the converted files. These files are then used to assign values to the roadways.

The process of creating and selecting the appropriate suitability model is an iterative one. Each of the variables is considered one at a time, and multiple combinations of the model also are considered to identify the best model. A review of each of the variables and models will follow the description of the process of creating a suitability model.

A typical research approach has an examination of a desired condition and the characteristics contributing to those conditions. As indicated in the national case study review, there is no condition under which a long haul truckway has been constructed. Therefore, a suitability model creation was both iterative and collaborative with FDOT systems planning staff.

SITE SUITABILITY MODEL

A site suitability model is a process spatial model, which identifies optimum locations for a desired condition. A process model attempts to describe the interaction of variables that have a spatial element. In this case, the variables are the different attributes of Florida’s highways and BTS’s data. The potential suitability for a reserved truckway is established through a multiple step process. The process results in a scoring scheme that is relative, i.e. it indicates which sections of the SHS rank highest relative to other sections.

The multiple steps for the site suitability model create a process of ranking each variable one at a time, and then combining the rankings to assign suitability scores for every area being examined. This process involves breaking down the model’s objective into a series of smaller objectives. Each objective answers a question; for example, one of the variable’s objectives for this model is to identify highway segments that have the highest truck volume. To answer the question, the data are classified and assigned a rank or score based on the differing suitability of the data classification. Once each variable is classified and assigned a score for each class, the variable is ready to be combined with other variables to create the suitability model. By combining the variables, all of the data contribute to the model’s outcome. Often, one variable is more important than another, and, therefore, each variable is assigned a weight based on its relative importance to the model.

IDENTIFYING MODEL AND VARIABLE OBJECTIVES

Model Objectives

A site suitability model attempts to identify optimum locations for a desired objective. The model for this project is attempting to identify areas where reserved truckways have the greatest potential. The model is not attempting to recommend where to locate truckways but rather which locations have the greatest potential for a truckway. This distinction is important because the results of the model will be used for closer examination using site visits and case studies. To address the model's objective, the model is broken into a series of questions or objectives. Each variable in the model addresses a specific objective and answers a question; the combination of the variables constitutes the model.

Variable Objectives

The variables are the data used to achieve the goals of the model. Each of the variables specifically addresses a single data question. The variables significantly contribute to the outcome of the suitability model. Data for each variable are classified and ranked based on data ranges of the variables. The ranking for the data ranges constitutes a score for the relative suitability for each data range. Once each variable is assigned rankings for the differing data ranges, every variable is assigned a weighted value based on its contribution to the suitability model. The weighted values are based on how much the variable impacts the likelihood that the location is suitable for a reserved truckway. The variables are combined with varying weights to assess the most suitable sites for a reserved truckway. This process evaluates each segment based on the ranking score for each variable’s data range and the weighted value that each variable is assigned. This evaluation process creates a scale to measure suitability. Highway segments with high scores will be more closely examined. An examination of each variable and its ranking will be discussed. This process creates a spatial model, which evaluates the suitability of segments on the state highway system for reserved special use lanes. The next section of the report will discuss the process of ranking each variable’s data ranges.

Creating Suitability Scales

The Florida Department of Transportation’s Safety Office and Statistics Office provided the data for several variables used in the suitability model. The variables include Average Annual Daily Truck Traffic (Truck Volume), Percent of Truck Traffic, Truck Crashes and highway level of service. For each variable, a suitability scale was created to score the differing data characteristics. A scale between 1-9 was established to determine the relative differences between the classifications. A description of each variable and the purpose of the variable will be reviewed in this section.

Truck Volume

For the variable truck volume, trucks are defined as any vehicle classes 4 through 13 of the FHWA vehicle classification scheme. This includes buses and any truck with two or more axles. This definition of trucks is used only for the "truck volume" and "percent trucks" variables. The definition of a truck for the crash variable will be discussed in the truck crash variable section.

The objective of this variable is to uncover highway segments that show the basic demand for truck movement. As noted in the literature review, instances where truck volumes are high, an exclusive truckway may be a good traffic and safety mitigation strategy. Truck volumes are based on the Florida DOT'S base map, which is a GIS-based map that contains data attributes about the State Highway System. Ranking of the data ranges of this variable establish what constitutes "high" volume and assign a rank or value to ranges of truck volumes.

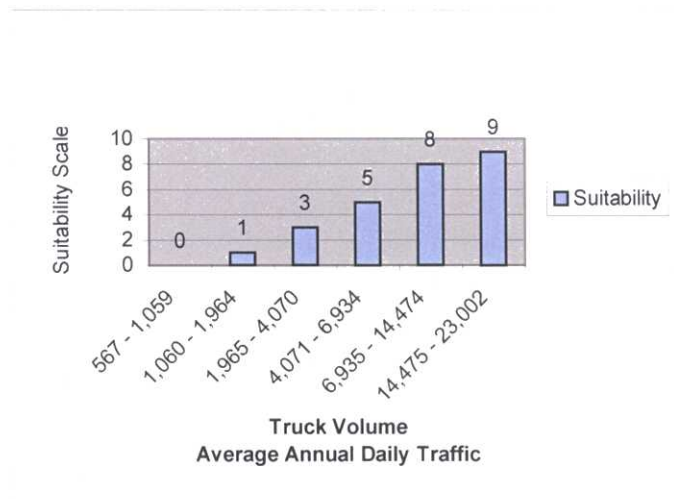
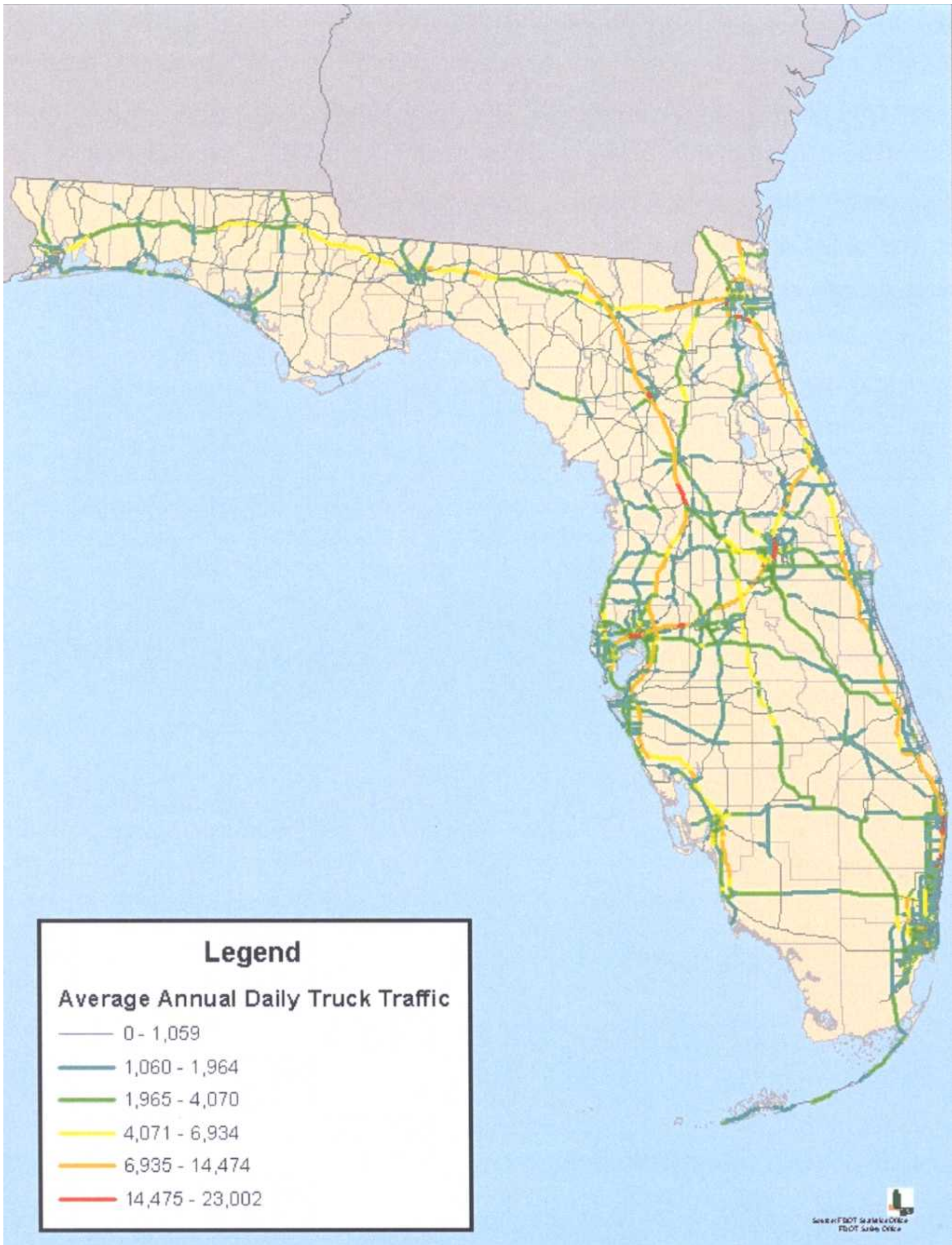


Figure 4.01. Truck Volume Suitability Scales
Source: Roadway Characteristics Inventory (RCI) Database, FDOT Statistics Office, 2000.

Since the truck volumes are not normally distributed, the truck volume ranges were distributed based on the percentiles. Volumes in the 99th percentile were given a ranking of 9 and volumes in the 95th and 90th percentiles were given scores of 8 and 5, respectively. Truck volumes in the 75th percentile were given a ranking score of 3. All highways with truck volumes below the 50th percentile were given a score of 1, and truck volumes below the 25th percentile were given a score of zero. (See Figure 4.01) The highest truck volumes were found on the Florida Interstate Highway System. The range of truck volumes are illustrated on Map 4.01.

Map 4.01.
Truck Volume,
Florida State Highway System



Source: RCI Database, FDOT Statistics Office, 2000.

Percent of Truck Traffic

The objective of this variable is to identify the mix of truck and non-truck traffic. This variable is also based on data from FDOT's base map. Trucks, as mentioned earlier, are defined as busses and trucks with more than two axles. Close examination of the data reveals that most roads with a higher percentage fall within areas that are rural rather than urban. The details of the distribution of the percent of truck volume can be seen in Map 4.02. The classification of the data is based on percentiles. Figure 4.02 illustrates the suitability ranking for each category of percent of truck traffic. Using the same distribution as truck volume, percentages in the 99th percentile were given a score of 9 and percentages in the 95th and 90th percentiles were given a score of 8 and 7, respectively. Truck percentages in the 75th percentile were assigned a score of 5, and all roads below the 50th percentile were assigned a score of zero.

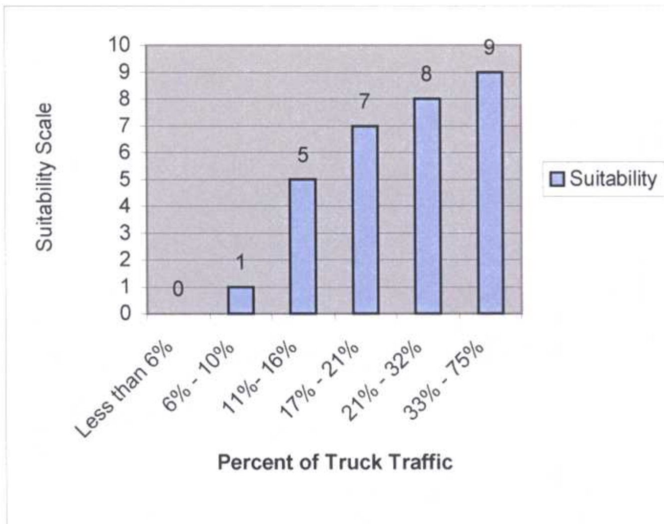
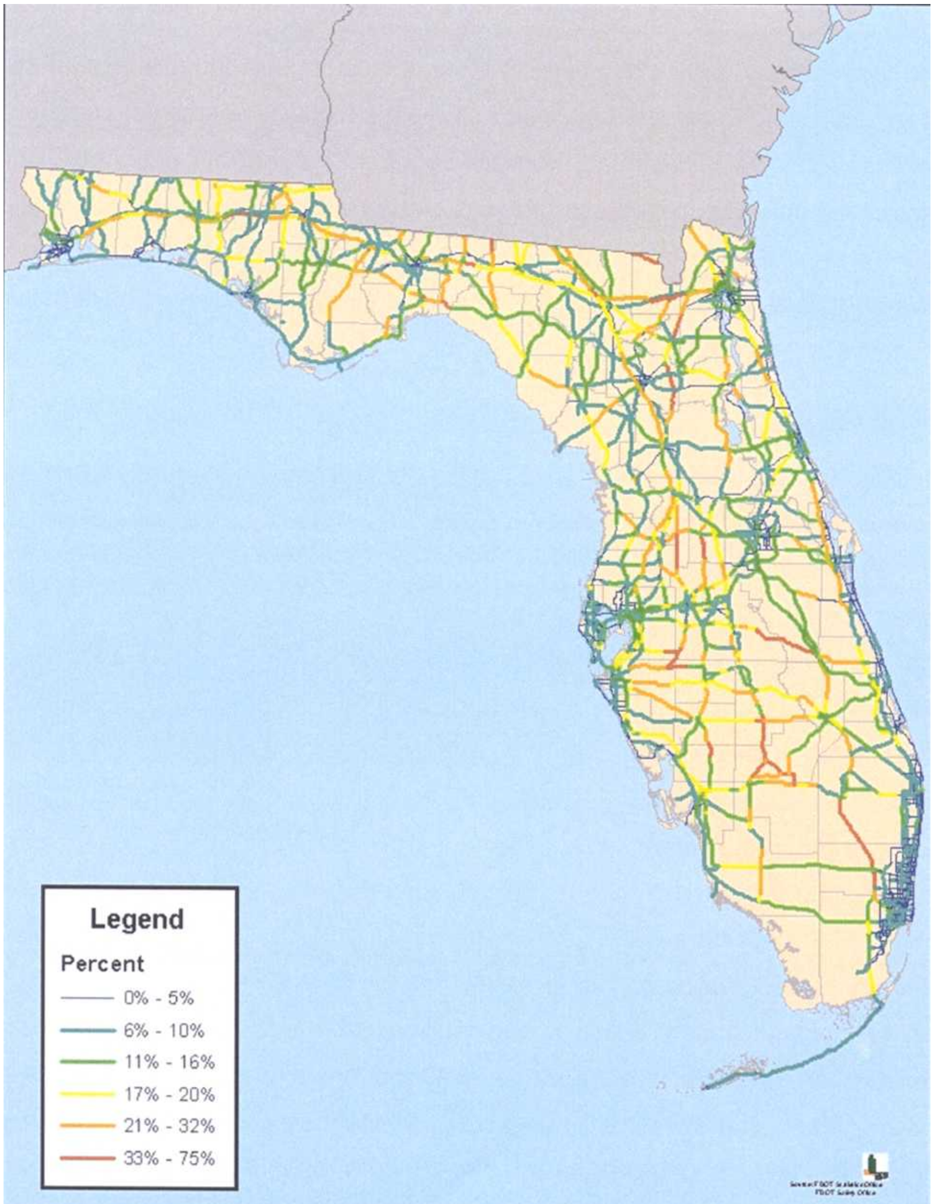


Figure 4.02. Truck Percent Suitability Scales
Source: RCI Database, FDOT Statistics Office, 2000

Map 4.02.
Percent of Truck Traffic,
Florida State Highway System



Source: RCI Database, FDOT Statistics Office, 2000

Truck Crashes

The object of the truck crash variable is to identify highway segments where truck safety may be an issue. These data, provided by the FDOT Safety Office, are for two years and report on all truck related crashes that occurred on a state highway during 1998 and 1999. The crashes constitute traffic crashes occurring within the State of Florida for crashes involving the following vehicle types: 05 (heavy truck – 2 or more rear axles) and 06 (truck tractor – cab). Many of the case studies indicated that typically a truck crash, particularly one involving a high profile fatality, often served as an impetus for the implementation of a truckway. For this reason, the project staff identified truck crashes as a significant variable when considering a site for a truckway.

The truck crash data is a point database, with each incident carrying milepost information of the accident location. The data were assigned to the state highway segments, and then a crash per mile rate was calculated. These data were different from the previous data sets. Because of the distribution of the data, the truck crash rate was divided into two suitability scales, above average and below average. All segments below average were given a score of 1 and those with a score above average were given a score of 9. The ideal classification would have included a crash rate per vehicle miles traveled (VMT).

Level of Service

The objective of the level of service variable is to identify highway segments by their operational performance. The level of service variable classifies roads according to their automobile and truck performance characteristics and is based on a lettering system, with "A" being the best and "F" the worst. This standard is based on the characteristics of the road, i.e.. posted speed, actual speed, number of lanes, roadway classification, and the characteristics of the traffic flow, such as VMT per hour, and varies by highway functional classification. The suitability scale created was based on collaboration with the project staff and FDOT staff. The level of service data are based on the 1998 FDOT level of service handbook. Figure 4.03 illustrates the level of service suitability scale.

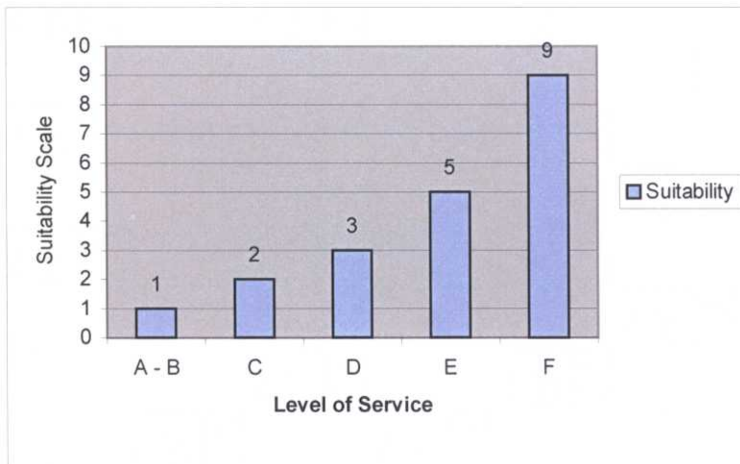


Figure 4.03. Level of Service Suitability Scales
Source: RCI Database FDOT Statistics Office 2000

The remaining variables are not attribute-based. That is, they do not report on characteristics on the State Highway System but rather on the spatial relation the data have on the highway. These variables represent data sets that have impacts on the highway system based on their distance to the highway system and the type of activities that occur at these sites. These variables are truck traffic generators.

Airports

The airport variable attempts to identify roads impacted by truck traffic generated by airports. The data used are a subset of data provided by the U.S. Department of Transportation's Bureau of Transportation Statistics (BTS). While the BTS provides data on all public-use airports, project staff selected airports in Florida that handle significant cargo. The airports were grouped by the tonnage of freight shipped through the airport. A cluster analysis was used to establish this relative grouping. Each of the airports was assigned a score based on the total freight tonnage (see Table 4.01).

Table 4.01. Airport Scores Based on Total Freight Tonnage

Airports	Freight	Buffer	Ranking-Weight	Score for Model
Miami International	501,222.68	1.00	highest	9
Ft. Lauderdale-Hollywood Intl	99,912.78	1.00	second highest	5
Orlando International	96,053.83	1.00		5
Tampa International	36,421.94	1.00	third highest	3
Jacksonville International	24,502.69	1.00		3
Palm Beach International	15,198.09	1.00	fourth highest	2
St. Petersburg/Clearwater Intl	9,406.17	1.00		2
Southwest	4,172.90	1.00	5 highest	1
Pensacola Regional	548.66	1.00	6 highest	Restricted
Craig Municipal	135.36	1.00		Restricted
Jacksonville NAS	128.33	1.00		Restricted
Page Field	61.05	1.00		Restricted
Eglin AFB	60.99	1.00		Restricted
Opa Locka	43.68	1.00		Restricted
Miami Public SPB	0.49	1.00		Restricted

Source: Airport Activity Statistics of Certified Air Carriers, Summary Tables, 12 Months Standing, December 31, 2000, BT501-05, Bureau of Transportation Statistics (BTS), USDOT.

A ten-mile buffer around each airport was created, and each buffer was assigned a value based on the score. The location of such activity centers is critical in identifying potential truckway opportunities. Roads within the buffer area received a value based on the score of the airport. The rankings consisted of six categories with scores between 0-9, assigned accordingly.

Seaports

This variable attempts to identify highway segments that are impacted by the truck traffic generated by seaports. Data are from the BTS and represent all the seaports in the state of Florida. The suitability scale created for seaports is similar to the scales created for the airports, except that the value of cargo, as opposed to the total tonnage, was used. Value of cargo was used to account for the phenomena of low value, high volume cargo that is likely transported by rail or pipeline. A cluster analysis was performed to rank and group Florida's seaports, and a score was assigned (see Table 4.02).

Table 4.02. Port Scores Based on Value of Cargo

Port by Cargo Value of Foreign Trade, U.S. dollars (000s)

National Ranking	Port	Total	Buffer	Ranking-Weight	Score for Model
12	Miami	15,435,987.00	1	highest	9
14	Everglades	10,431,949.00	1	second highest	8
15	Jacksonville	9,845,875.00	1		8
35	Tampa	2,680,023.00	1	third highest	4
45	West Palm Beach	1,480,027.00	1		4
61	Port Canaveral	595,496.00	1	fourth highest	3
70	Fernandina Beach	363,815.00	1	5 highest	2
77	Port Manatee	265,848.00	1		2
78	Panama City	264934	1	6 highest	1
87	Pensacola	166870	1		1
		Total	*10*		

Source: *Seaports of the Americas – AAPA Directory 2000*, http://www.seaportsoftheamearicas.com/pdfweb/rankus2.pdf, American Association of Port Authorities, 2000

The ten-mile buffer was used for this variable to account for the GIS anomalies. The highway segments that fell within the buffer were assigned the respective scores.

The next two variables, truck terminals and trailer-on-flat-car facilities (TOFC) were created by CUTR as part of a previous study for FDOT, *1999 Florida Freight Stakeholder Task Force Technical Report*. These major freight terminals were identified by private and public sector representatives on the task force as representing "...facilities [that] represented the largest contributors to the freight transportation network in the state."

Truck Terminals

The truck terminal variable identifies highway segments impacted by the truck traffic generated by major truck terminals. The suitability scale created for truck terminals is based on varying distances. Roads within one mile of a truck terminal were assigned a score of 9, roads between one and three miles were assigned a score of 7, roads between three and five miles were assigned a score of 5, and any road further than five miles was assigned a 0. The full details of the suitability scores are in Figure 4.04.

Trailer on Flat Car (TOFC)

The trailer-on-flat-car variable attempts to identify roads that are impacted by truck traffic created by TOFC facilities. The suitability scale created for TCFC facilities (Figure 4.05) is based on varying distances. Roads within five miles of a TOFC facility were assigned a score of 9, roads between five and seven miles were assigned a score of 7, roads between seven and nine miles were assigned a score of 5, and any road further than nine miles was assigned a 0.

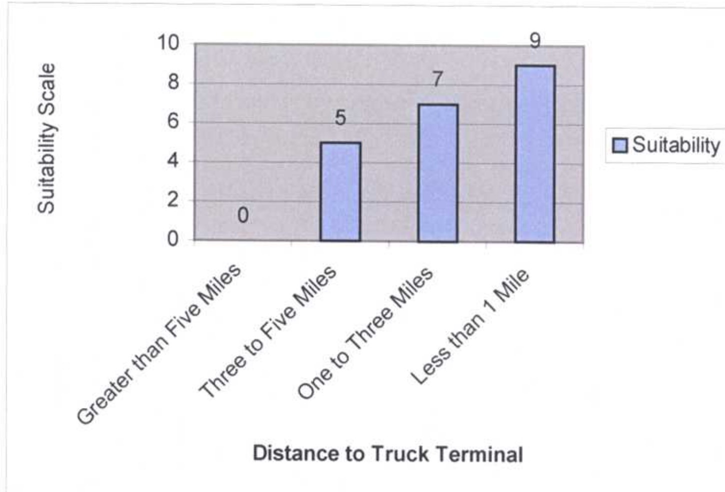


Figure 4.04. Suitability Scale for Distance to Truck Terminal
Source: 1999 Florida Freight Stakeholders Task Force Report, CUTR, 1999.

Creating the Suitability Model

After a range of suitability scores for each variable was established, the complete model was ready to be executed. This step combines each of the suitability scores of each variable. If all of the variables had the same influence on the model, they would be combined using the same weights. However, since some variables have a greater importance than other variables, they are weighted accordingly. The suitability scale rankings are constant throughout each of the suitability models. The process of identifying the relative importance of the variables was based on findings in the literature review, case studies, deliberations with project staff, and consultation with FDOT. Additionally, each variable was examined individually to reveal patterns in the data.

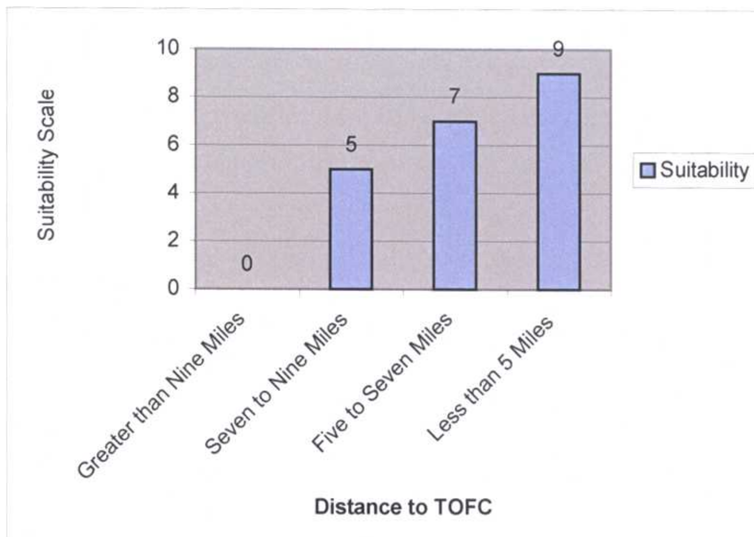


Figure 4.05. Suitability Scale for Distance to Trailer on Flat Car
Source: 1999 Florida Freight Stakeholders Task Force Report, CUTR, 1999.

The national case studies and the literature review pointed to several different types of exclusive truck facilities. Although the original scope of work for this study focused on a “long haul” facility serving intercity commercial traffic, the only examples of facilities that have been built (with the exception of the New Jersey Turnpike's "dual dual" facility) are to serve local access issues.

The conditions that a suitability model should test are not necessarily the same for a local truck access problem and for a facility to move freight by truck over long distances at interstate speeds. It was decided to develop several different screening tools, or suitability models, that would include the most relevant variables and weigh each of them accordingly.

For example, the volume of trucks is important and should weigh heavily when attempting to identify potential areas for a facility serving a city-to-city market. On the other hand, at a local level, the absolute number of trucks traversing a highway segment may not be as indicative of need as the percent of trucks. A highway segment with a low overall traffic volume and an extraordinarily high percentage of trucks is just one example of these differences. Each of the following models attempts to combine the most appropriate variables and weighting of those variables to screen for the most suitable highways for exclusive truck facilities to serve the following trip types: "Between Cities," "Within Cities," and "Regional Facilities."

Model One - Between Cities

This model's objective is to identify highway corridors that may be deemed suitable for an exclusive facility to move truck traffic from one city to another. Important factors in identifying these types of corridors are the percentage of trucks of total traffic, segments that have high volume of trucks and truck crashes, level of service and percent of trucks. It was determined that a highway's proximity to a specific local truck traffic generator was far less important than the absolute demand for the movement of freight at a system level. This model attempts to identify the most basic movements of trucks in the state. Truck volume is highly weighted in this model with 75% of the model being attributed to truck volume. Level of service has the second highest weighting with 15%, and percent trucks and truck crash rate were both given a weight of 5%.

Figure 4.06 illustrates the weighting scheme, and Table 4.03 indicates the suitability index for each of the variables chosen.

A compilation of the suitability scales for the three models identified within the report is included in Appendix A. The results of the model are shown on Map 4.03.

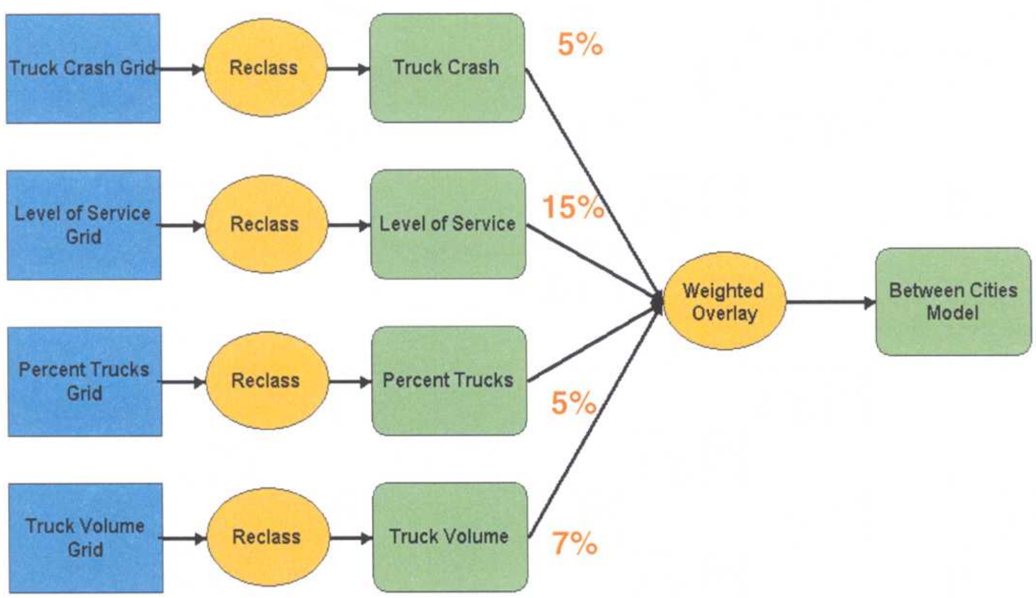
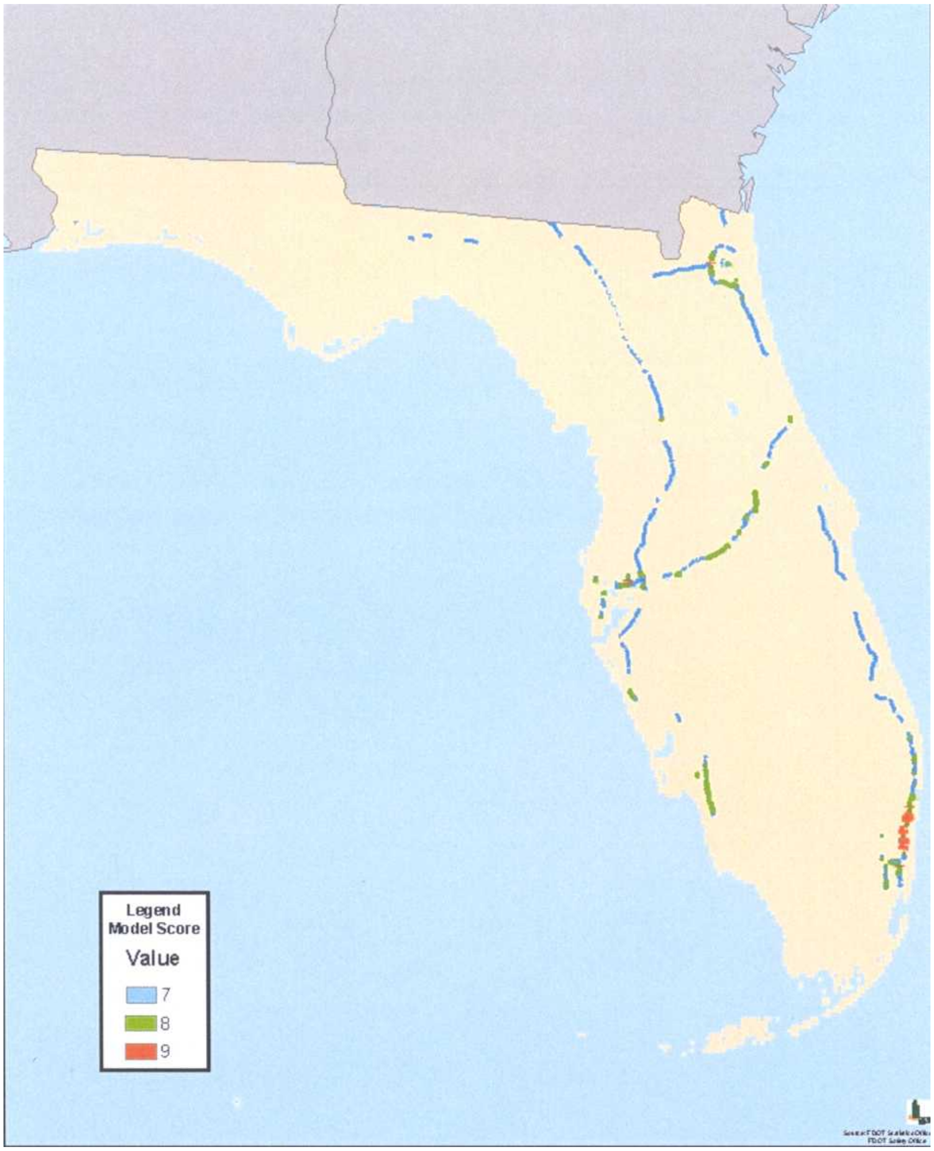


Figure 4.06. Between Cities Model

Table 4.03. Between Cities Model Suitability Scale

Factor	Between Cities Model		
	Weight	Input Variables	Scale Value
Truck Crash	5%	0-0.1996	1
		> 0.1996	9
Level of Service	15%	A+B	1
		C	2
		D	3
		E	5
		F	9
Percent Trucks	5%	0.006-0.11	1
		0.11-0.17	5
		0.17-0.21	7
		0.21-0.33	8
		0.33-0.754	9
Truck Volume	75%	0-1965	1
		1965-4071	3
		4071-6935	5
		6935-14475	8
		14475-23002	9

Map 4.03.
Between Cities Model



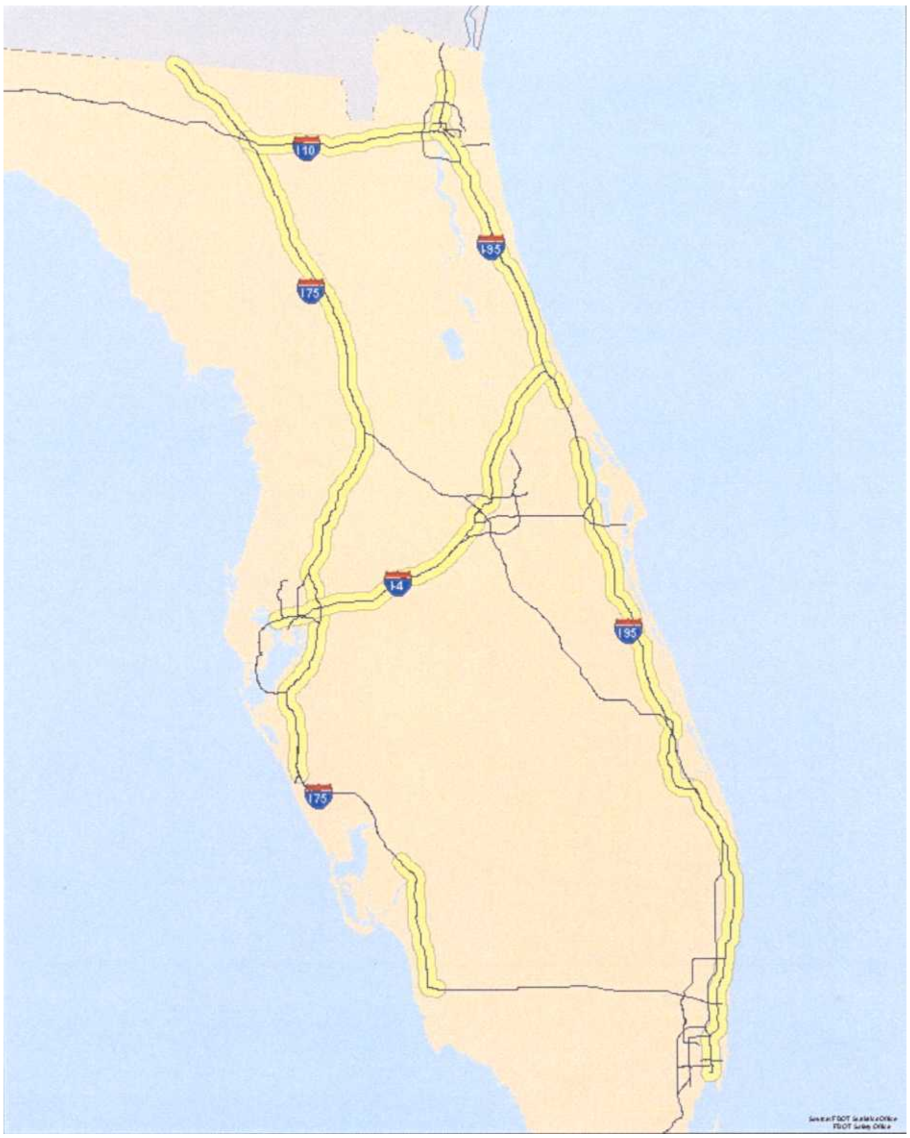
Based on the Between Cities Model, six potential corridors emerge. These corridors are selected based on a score of seven or higher and where high scoring segments are generally contiguous.

4. Miami to Titusville
5. Daytona to Jacksonville
6. Naples to Ft. Myers

4. Tampa to Orlando to Daytona
5. Venice to Valdosta, Georgia
6. Lake City to Jacksonville

With the exception of Interstate Route 10 west of Lake City, these corridors represent most of the Interstate System in Florida. Map 4.04 outlines each of the corridors.

Map 4.04.
Between Cities Model,
Corridors



Model Two - Within Cities

The design of this model attempts to identify those areas where additional truck capacity may be required in urban areas. These areas are sometimes characterized as those links needed in order to move freight the "last mile" to an Intermodal facility or distribution center. In this model, proximity to airports with high levels of air cargo activity and seaports is highly valued. Truck mix becomes more important than the absolute number of trucks as a measure of need.

The Within Cities Model identifies highway segments based on level of service, truck volume, percent trucks, truck crash rates, distance to truck terminals and transfer facilities, airports and seaports. Figure 4.07 illustrates the weighting scheme and Table 4.04 indicates the suitability index for each of the variables chosen.

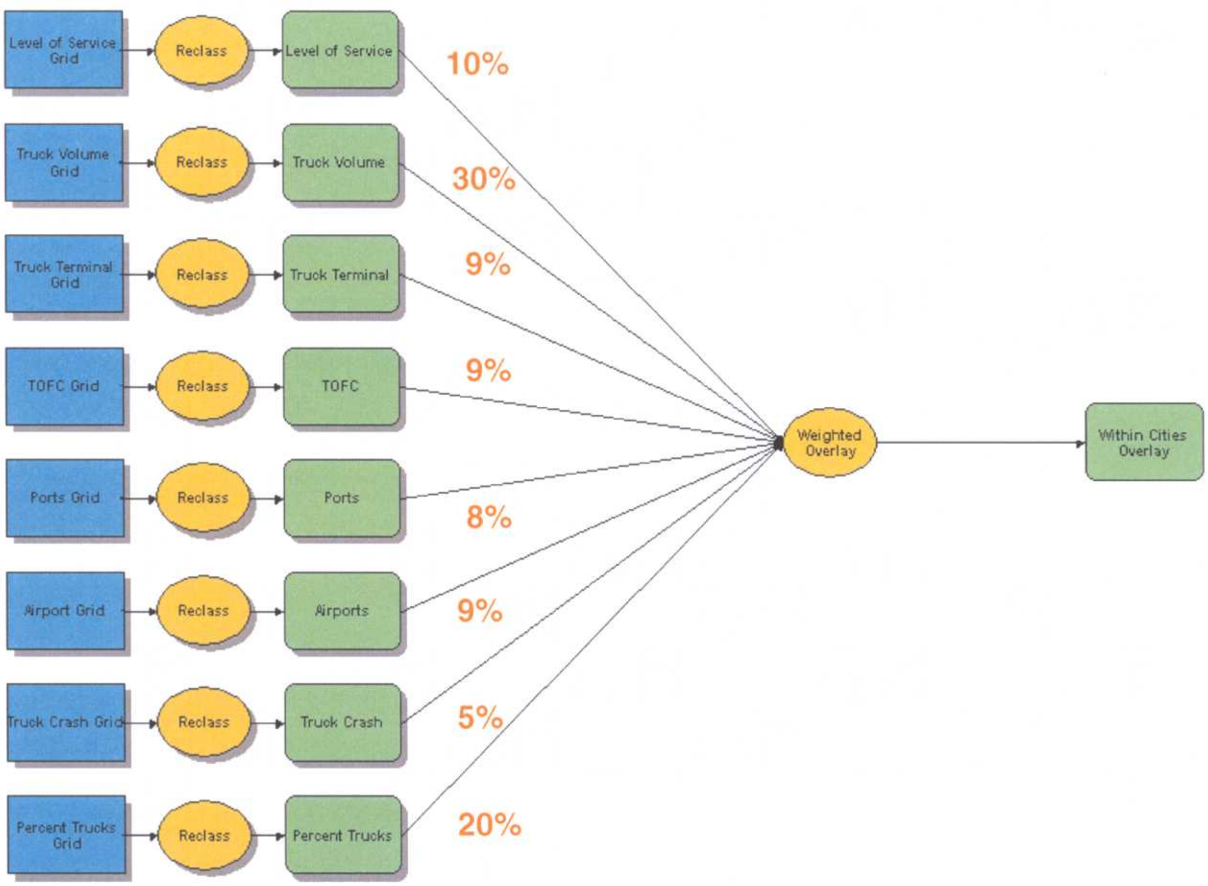


Figure 4.07. Within Cities Model

Table 4.04. Within Cities Model Suitability Scale

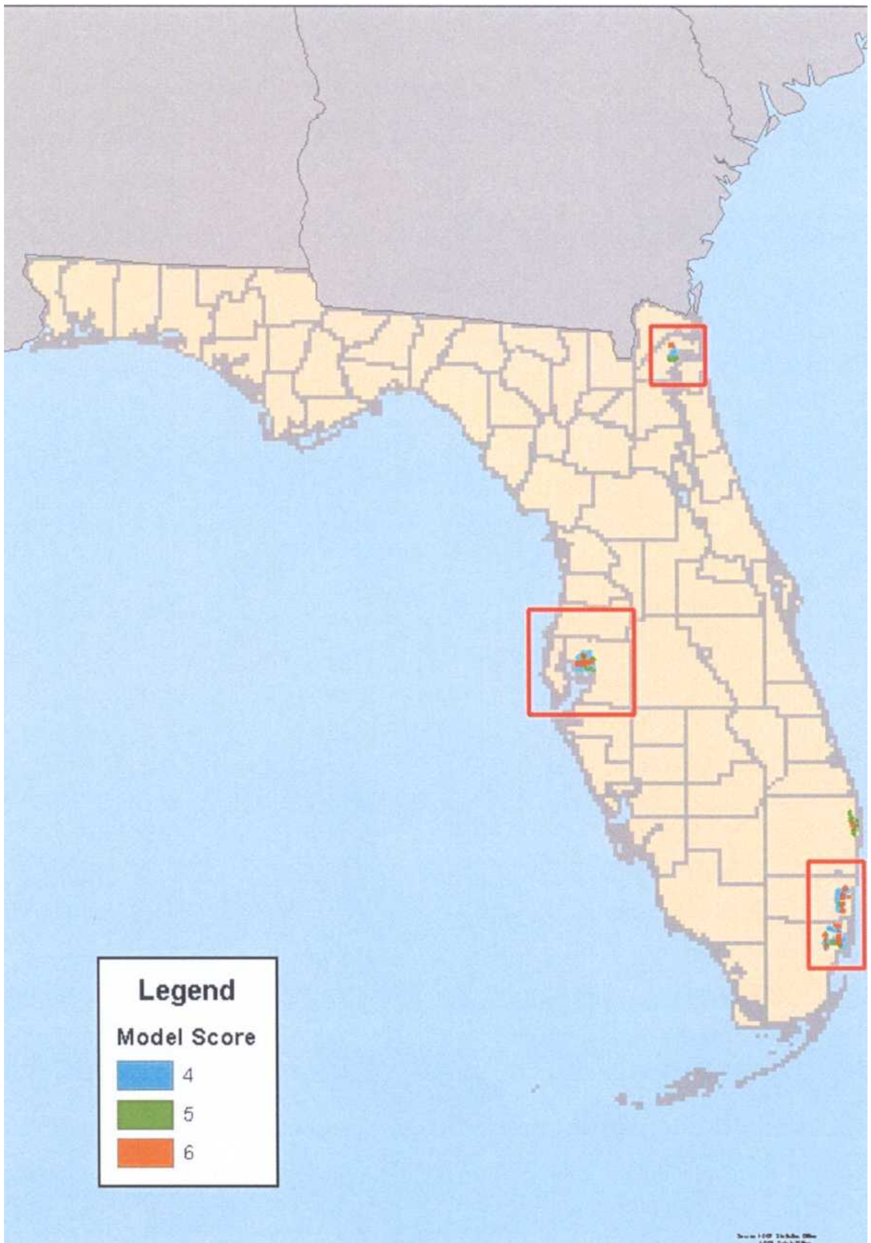
	Within Cities Model		
Factor	*Weight*	*Input Variables*	*Scale Value*
Truck Crash	5%	0-0.1996	1
		> 0.1996	9
Level of Service	10%	A+B	1
		C	2
		D	3
		E	5
		F	9
Percent Trucks	20%	0.006-0.11	1
		0.11-0.17	5
		0.17-0.21	7
		0.21-0.33	8
		0.33-0.754	9
Truck Volume	30%	0-1965	1
		1965-4071	3
		4071-6935	5
		6935-14475	8
		14475-23002	9
Truck Terminal	9%	7-9	5
		5-7	7
		0-5	9
TOFC	9%	9-9	5
		7-9	7
		5-7	9
Ports	8%	166870-265848	1
		265848-595496	2
		595496-1480027	3
		1480027-9845875	4
		9845875-10431949	8
		10431949-15435987	9
Airports	9%	4172-9406	1
		9406-24502	2
		24502-36421	3
		36421-99912	5
		99129-501222	9

Map 4.05 shows the highest-ranking state highway segments when the Within Cities Model is applied. The metropolitan areas of Tampa, Jacksonville, and Miami/Ft. Lauderdale all show segments that rate a six (indicated as a red segment on Map 4.06). It is interesting to note that no highway segments in the Orlando area scored a 3 or higher in the Within Cities Suitability Model.

Map 4.05.
Within Cities Model

In selecting the areas for further review derived from this model, routes were excluded if they were being addressed in the Between Cities model, and the project team focused on access to local Intermodal facilities.

Map 4.06.
Sites Locations for the
Within Cities Model



Priority was given to those local corridors that connected major Intermodal facilities with an emphasis on connectivity to the Interstate System. Three sites emerged for additional examination:

1. Miami: Port of Miami to the Area of Miami Intermodal Center
2. Tampa: Port of Tampa to Interstate Route 4/275
3. Jacksonville: North Interstate Route 295 at Interstate Route 95

Model Three - Regional

In an attempt to determine if the first two models would ignore facilities or needs of a regional nature, a third model was constructed. This "Regional" model is a hybrid of the previous two models discussed. It builds off of the Within Cities model but gives higher values to some of the factors that are significant in the Between Cities suitability model. Consequently, some of the variables from the Within Cities Model are given less weight. The full set of variables and their weights are shown in Figure 4.08, and the suitability scale is outlined in Table 4.05.

Figure 4.08. Regional Model

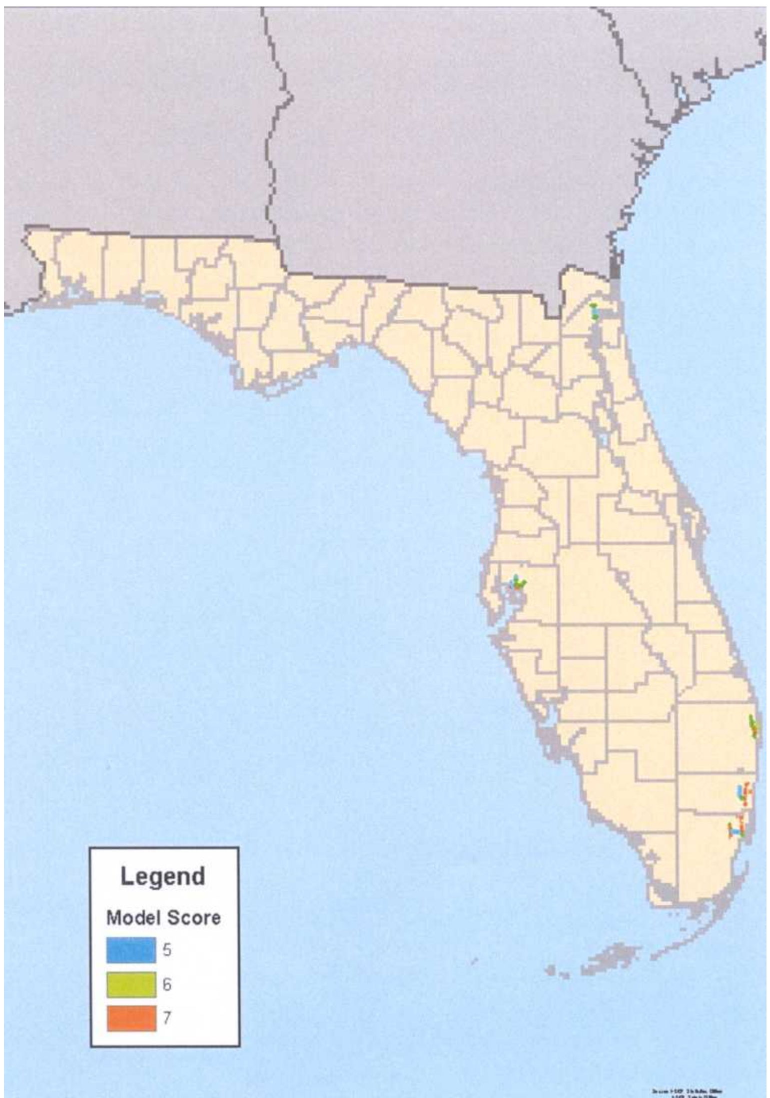
Table 4.05. Regional Model Suitability Scale

Factor	Regional Model		
	Weight	Input Variables	Scale Value
Truck Crash	5%	0-0.1996	1
		> 0.1996	9
Level of Service	10%	A+B	1
		C	2
		D	3
		E	5
		F	9
Percent Trucks	10%	0.006-0.11	1
		0.11-0.17	5
		0.17-0.21	7
		0.21-0.33	8
		0.33-0.754	9
Truck Volume	50%	0-1965	1
		1965-4071	3
		4071-6935	5
		6935-14475	8
		14475-23002	9
Truck Terminal	7%	7-9	5
		5-7	7
		0-5	9
TOFC	6%	9-9	5
		7-9	7
		5-7	9
Ports	6%	166870-265848	1
		265848-595496	2
		595496-1480027	3
		1480027-9845875	4
		9845875-10431949	8
		10431949-15435987	9
Airports	6%	4172-9406	1
		9406-24502	2
		24502-36421	3
		36421-99912	5
		999129-501222	9

The results of model three, the Regional Model, (see Map 4.07) identified no additional highway segments beyond those in the Within Cities Model. Although the scoring of specific highway segments varied, no new roadways emerged. As stated earlier, this model was an attempt to "split the difference" between models one and two. The fact that more "local" roadways are identified as ranking high in the Within Cities and Regional Models gave researchers an indication that the outputs were consistent with expectations. It should be noted and understood that all of the outputs of the models are expressed in a relative scale. That is, segments ranking highest are in relation to the scores for other state highways in Florida. Further, the high-ranking highways or corridors do not indicate anything about where an exclusive truck facility might be feasible to be built, only that there is higher potential for truck mitigation strategies in these areas than for other state highways.

To gain a further understanding of the potential for an exclusive truck facility, and to give consideration of operational considerations, field visits were conducted of the nine areas.

Map 4.07.
Regional Model



Chapter 5

POTENTIAL FLORIDA SITES

Reserved Truck Lanes and Truckways in Florida

After conducting the screening for the highest scoring segments of the State Highway System, nine high scoring corridors were selected for more detailed study. In consultation with the FDOT Systems Planning Office, six "between cities" and three "within cities" corridors or segments identified in Table 5.01 were selected for further review. Those that were selected for "between cities" scored highest in their respective screening runs that were described in Chapter 4, "Methodology."

Table 5.01. Florida Corridors

"Between Cities" model			
Road Segment	Metro areas	FDOT districts	Countries
I-95	Miami to Titusville	4, 5, 6	Broward, Palm Beach, Martin, St. Lucie, Indian River, Brevard, Dade
I-95	Daytona to Jacksonville	2, 5	Duval, St. Johns, Flagler, Volusia
I-75	Naples to Ft. Myers	1	Lee, Collier
I-4	Tampa - Orlando - Daytona Beach	1, 5, 7	Polk, Osceola, Orange, Seminole, Volusia, Hillsborough
I-75	Venice to Valdosta, GA	1, 2, 5, 7	Sarasota, Manatee, Columbia, Hamilton, Suwannee, Alexander, Marion, Sumpter, Hernando, Pasco, Hillsborough
I-10	Lake City to Jacksonville	2	Duval, Nassau, Baker, Columbia
"Within Cities" model			
Road Segment	Metro Areas	FDOT districts	Countries
	Miami: Port of Miami to the area of the Miami Intermodal Center	6	Dade
	Jacksonville: North Interstate Route 295 at Interstate 95	2	Duval
	Tampa: Port of Tampa to Interstate Route 4/275	7	Hillsborough

As indicated in the Scope of Work for the project and in the Project Approach, a review of operational and other considerations was required and performed in order to assess the potential of actually providing exclusive truck facilities. Factors such as the availability of existing rights of way, interchange spacing, existing lane restrictions, proximity to alternative routes, and the nature of the commercial traffic were examined. Discussions with FDOT district staff were held in each of the localities that were traversed by the identified corridors to gain a better understanding of the truck travel characteristics and local issues and plans. What follows is a discussion of each of the nine locations selected for further study.

There were no "Regional Corridors" considered for more detailed analysis. The Regional Model did not identify any additional state highways beyond those identified in the Between Cities Model.

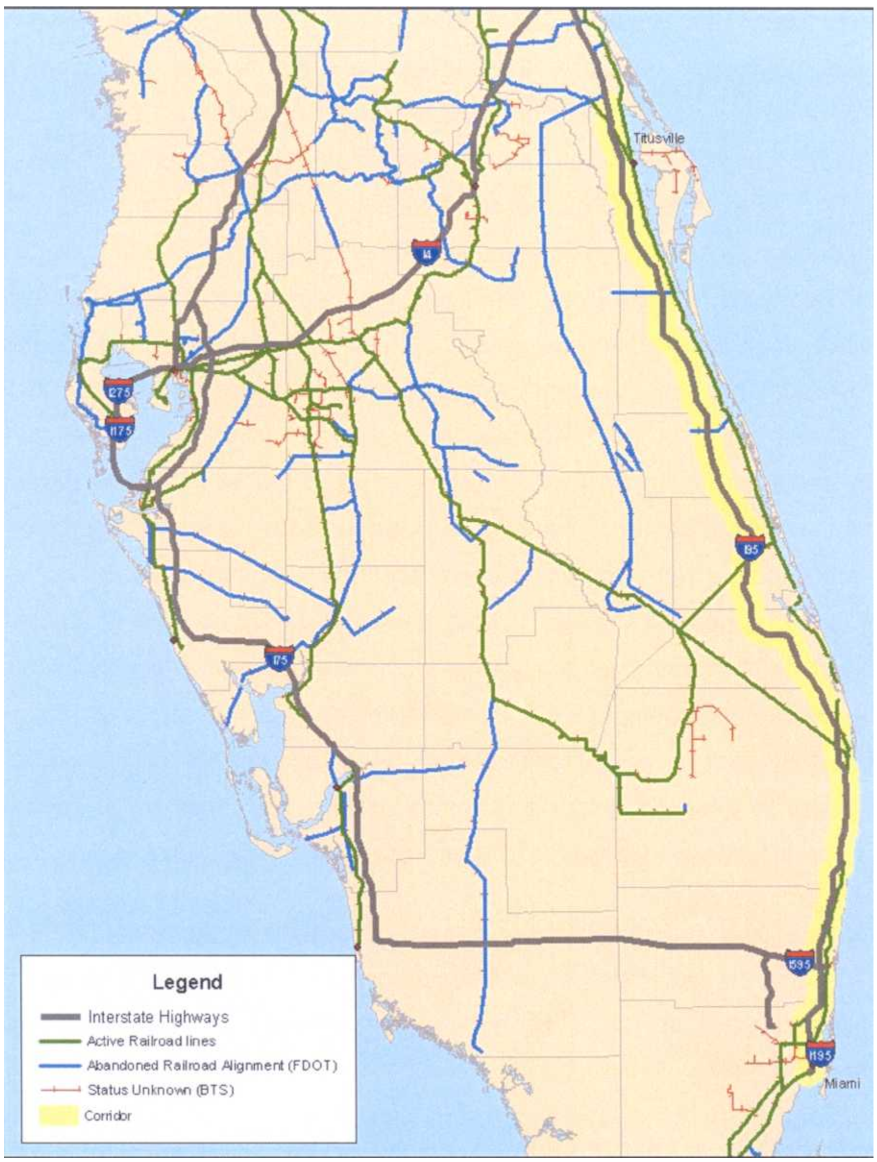
BETWEEN CITIES MODEL

Corridor 1- Interstate Route 95 from Miami to Titusville

Description

Portions of the I-95 corridor from Miami (the southern terminus of I-95) to around Titusville scored as high as "9" on the GIS Between Cities Model. The corridor (see Map 5.01) scored highest in the southern Broward County area and stretches for approximately 210 miles to Titusville.

Map 5.01.
Corridor 1 - I-95 from Miami to Titusville



For about 120 miles, the Interstate is paralleled by Florida's Turnpike providing an alternative to the congested Interstate albeit at a cost of $17.00 for a five-axle truck traveling from Fort Pierce to Golden Glades, according to the Florida Office of Toll Operations.

The highway beginning at its terminus in Miami is an urban freeway that has six 12-foot lanes, a 50-foot median, two 10-foot outside shoulders, and two 2-foot inside shoulders. At various locations in the initial five miles moving north, the median consists of barrier wall with the exception of areas just prior to exits. The highway increases to ten 11-foot lanes for two miles and then lane width increases to 12 feet. At State Route 826, the number of lanes decreases to eight 12-foot lanes. A 25-foot median begins at State Route 860 and the eight-lane highway continues for four miles to the Broward County line. At the Broward County line, the road changes to a 10-lane highway. Lanes are 12.4 feet wide and the median varies from 14 to 38 feet as the highway continues north. The number of lanes varies from 8 to 12 in the area of the four interchanges that occur in the six miles prior to State Route 70. The number of lanes beyond State Route 70 remains at eight to the Palm Beach County line except in those areas adjacent to six additional interchanges. The lane width increases from 12.4 to 12.8 feet with a 24-foot paved barrier median and continues to State Road 794 where the median increases to 32 feet. In the vicinity of Congress Avenue, the median increases to 82 feet. At Linton Boulevard, the travel way decreases to six 12-foot lanes, and continues to the Martin County line where the 100-165 foot lawn median is replaced with a 34-foot paved barrier median. The Interstate continues through Martin County with paved and lawn medians of widths varying from 48 to 165 feet. Northbound and southbound rest areas are located in this section. Median width increases to 468 feet prior to State Route 714, and continues for three miles where it returns to 85 feet at the St. Lucie County line. The number of lanes decreases to four 12-foot lanes at State Route 70 in St. Lucie County, and median width within the county is generally 135-feet. The cross-section continues into Indian River County. The median decreases to 85 feet for six miles and then increases to 138 feet. The rural highway entering Brevard County consists of four 12-foot lanes with a 64-foot median. That cross-section continues to Titusville where it becomes urban. The cross-section continues to Volusia County as a rural highway. Corridor 1 is illustrated in Table 5.02 and Map 5.02.

There are High Occupancy Vehicle Lanes (two or more occupants) along Interstate 95 in South Florida. In Dade County, the HOV lane is operational southbound from 7:00 A.M. to 9:00 A.M. and northbound from 4:00 P.M. to 6:00 P.M. Trucks are restricted from the inside "non-HOV" lane from 7:00 A.M. to 7:00 P.M.

The HOV designation continues into Broward County but is operational in both the north and southbound direction in the mornings and evenings. The truck prohibition from the inside lanes continues along this portion of I-95. The truck restriction remains in place to the Palm

Beach/Martin County line. In Palm Beach County, one lane in each direction continues to be designated as a "2 plus" HOV lane. As in Broward, the lanes are operational in both the morning and evening peak periods in Palm Beach County.

Table 5.02. Corridor 1 Roadway Description – I-95 from Miami to Titusville

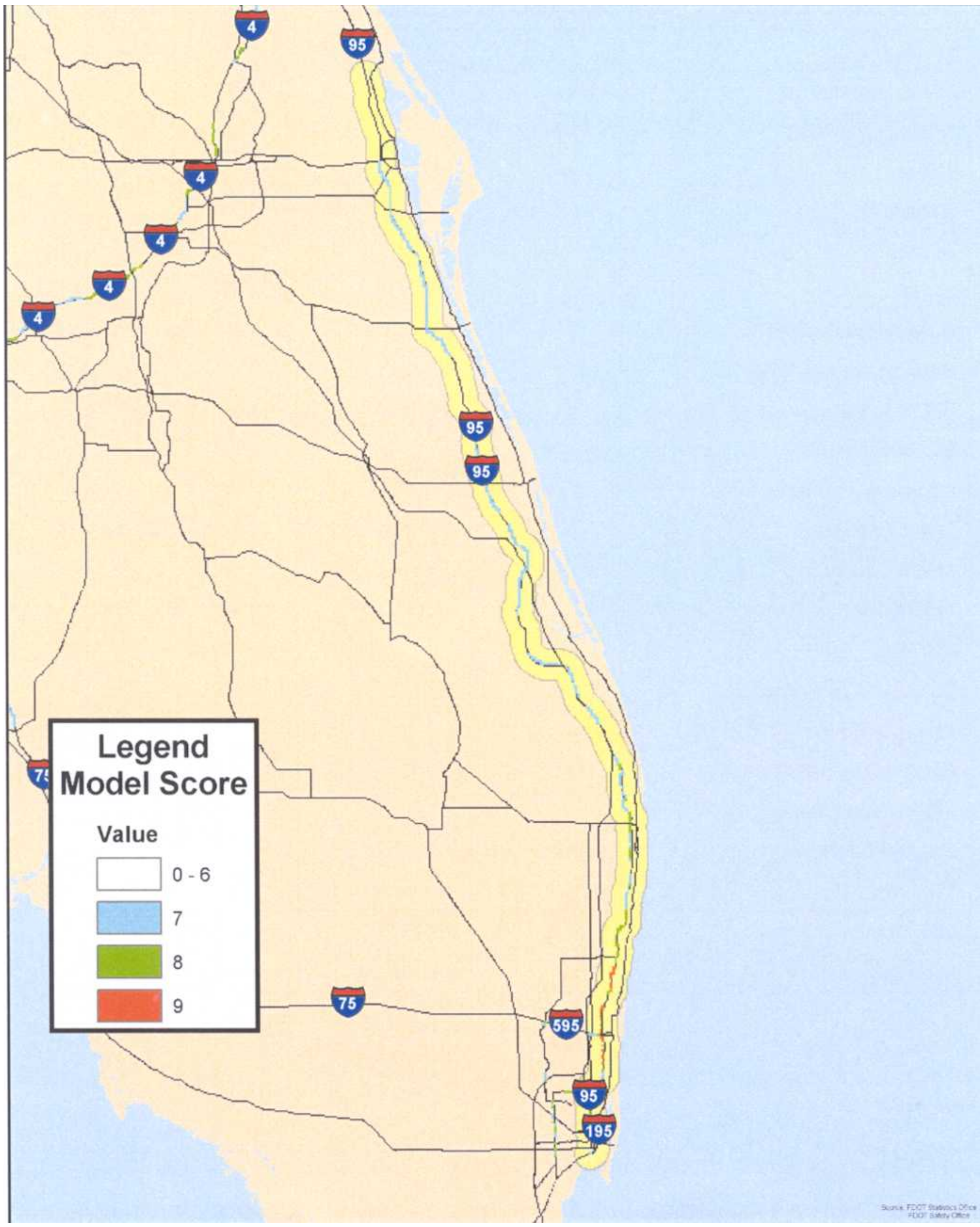
Location	Designation	Lane Configuration	Median Width
Miami terminus	Urban	9 – 12'	50'
5 Miles			Barrier Wall
1 Mile		10 – 11'	
2 Miles		10 – 12'	
SR 826		8 – 12'	
SR 860			25'
Broward County line		10 – 12.4'	14' – 38'
6 Miles prior to SR 70		8 – 12'	
SR 70 to Palm Beach County line		8 – 12.8'	24'
SR 794			32'
Congress Avenue			82'
Linton Boulevard		6 – 12'	100' – 165'
Martin County line			34'
Through Martin County			48' – 165'
SR 714			468'
St. Lucie County line			85'
St. Lucie County			72' – 432'
SR 70 in St. Lucie County		4 – 12'	135'
Indian River County			85' – 138'
Brevard County	Rural		64'
Titusville	Urban	4 – 12'	64'
Maximum		10 – 12'	468'
Minimum		4 – 12'	Barrier Wall

Source: Straight Line Diagrams for FDOT Districts 4, 5, & 6, FDOT, 2002.

Characteristics

Interstate Route 95 in South Florida serves a variety of functions. In addition to serving north – south interstate traffic, it also provides a primary commuter route into and out of the major employment centers of downtown Miami, Ft. Lauderdale, and West Palm Beach-Boca Raton. The counties served by this corridor house over 36% of the state's population, or over 5.5 million residents. Interstate 95 also provides critical access to the ports of Miami (ranked 12^{th} in the nation based on cargo value), Port Everglades with nearly 6,000 ship calls in 2000, the Port of Palm Beach, the Port of Fort Pierce, and Port Canaveral.

Map 5.02.
Corridor 1 - I-95 from Miami to Titusville
Between Cities Model



The facility also provides primary access to Ft. Lauderdale-Hollywood International Airport, the second highest ranked air cargo airport in Florida, and is the critical link in the network that directly services Florida's largest airport, Miami International.

Annual average daily traffic ranges from a high of 303,000 south of Sunrise Boulevard in Broward County to a low of 22,500 in Brevard County near the Volusia County line. The lowest truck percentage was 6% (12,495) and occurred on Broward County from Hallandale Road, State Route 858, to Miami-Dade County line. The highest percentage of trucks was 21% (5,674) in Brevard County from State Road 520 north to the Volusia County line. The lowest truck volume was 2,133 from Indian River County line to County Road 514 in Brevard County. The highest truck volume was 21,650 in Broward County from Davie Boulevard south to Griffin Road. The lowest percentage of trucks and the highest truck volume segments occur within several miles of one another in Broward County. Corridor 1 characteristics are presented in Table 5.03.

Table 5.03. Corridor 1 Traffic Characteristics – I-95 Miami to Titusville

Corridor Ranking	Highest Score of 9	Highest score occurred in Southern Boward County
AADT High	303,000	South of Sunrise Blvd in Broward County
AADT Low	22,500	Near Volusia County line in Brevard County
Truck % High	21% - 5,674	SR 520 north in Brevard County to Volusia County line
Truck % Low	6% - 12,495	Hallandale Rd in Broward County to Miami-Dade County line
Truck Volume High	21,650	Davie Blvd south to Griffin Rd in Broward County
Truck Volume Low	2,133	Indian River County line to CR 514 in Brevard County

Source: RCI Database, FDOT Statistics Office, 2000.

Opportunities

With median constraints on the southern end of this corridor, it seems doubtful that an exclusive truck facility could be easily constructed. The heavily urbanized nature of the southern end of the corridor coupled with the scale of the existing highway seems to make widening the facility for trucks-only impractical. An alternative that at first glance seems to make sense is to attempt to route long haul trucks to Florida's Turnpike. A serious attempt to do this was conducted in the mid-1990's with little success. The toll for trucks was temporarily lowered and little, if any, truck diversion occurred.

Other potential opportunities do exist. One low cost potential is to make the HOV lanes available in the off-peak hours to only trucks. This could, however, be inconsistent with the current truck restriction from the inside, "non-hov", lanes. Another is a scheme that on the northern part of the corridor would involve operating I-95 and Florida's Turnpike as one facility providing exclusive, separated lanes for commercial traffic. The Turnpike closely parallels I-95 from exits 56 to 61. Although traffic conditions are not currently as bad in this section of the corridor as to the south, growth in the area seems robust. In the context of a larger truck-only system, these 20 or so miles present an opportunity. Through St. Lucie, Indian River, and Brevard Counties there appears to be sufficient median width to contemplate an exclusive truck accommodation. Theoretically, a separate median facility consisting of two 12-foot lanes, two 8-foot outside shoulders, and two 6-foot inside shoulders is possible within the 64-foot median that is available.

Contemplating any Between Cities exclusive facility in this region would be terribly complex. It appears that a new opportunity may exist by using a combination of lane restrictions and new construction. Truck traffic seems to disperse throughout Miami-Dade County with truck traffic counts lower there than in Broward. There are other north-south routes available to trucks destined to various areas in the Miami metropolitan area.

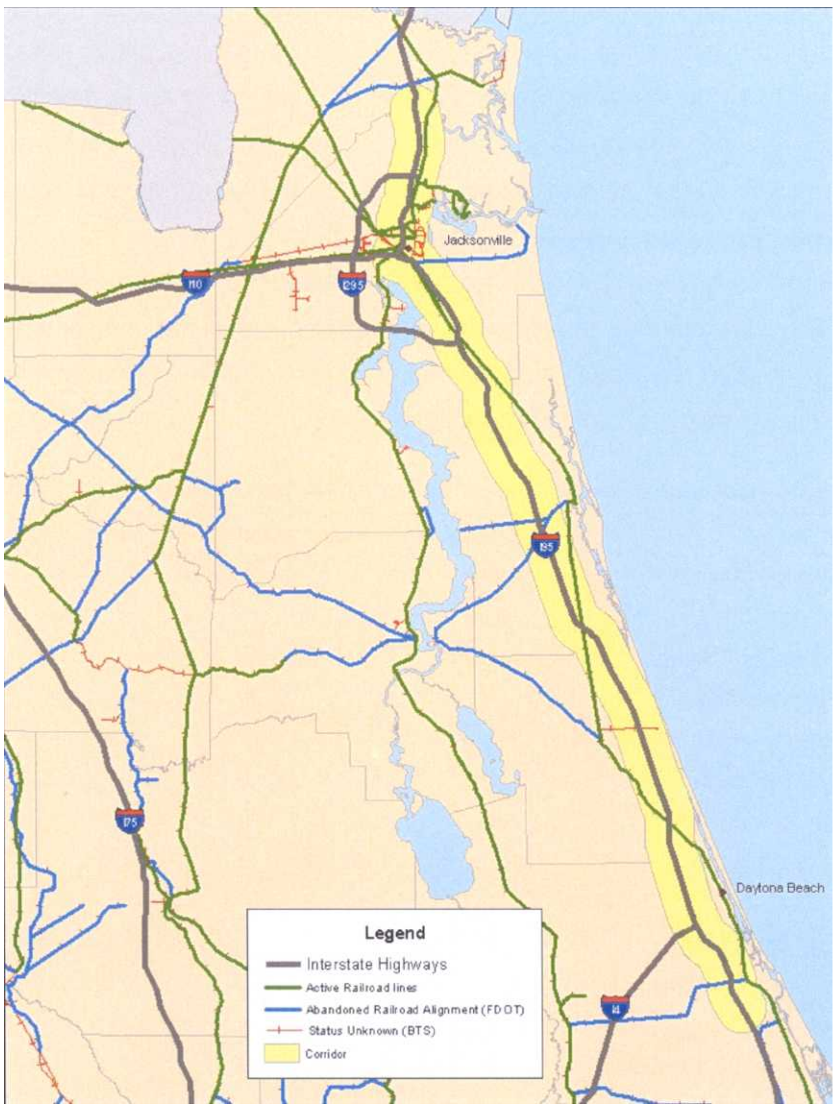
A final opportunity that may assist in the movement of trucks in this region is more of a systems approach and will be discussed in the Conclusions and Recommendations chapter of this report.

Corridor 2- Interstate Route 95 from Daytona to Jacksonville

Description

The I-95 corridor from Daytona to Jacksonville, Florida generally scored between 7 and 8 on the GIS Between Cities Model. The corridor (see Map 5.03) scored highest on I-295 near the I-10 interchange area. This corridor stretches for approximately 89 miles from north of Daytona to north of Jacksonville.

Map 5.03.
Corrider 2 - I-95 from Daytona to Jacksonville



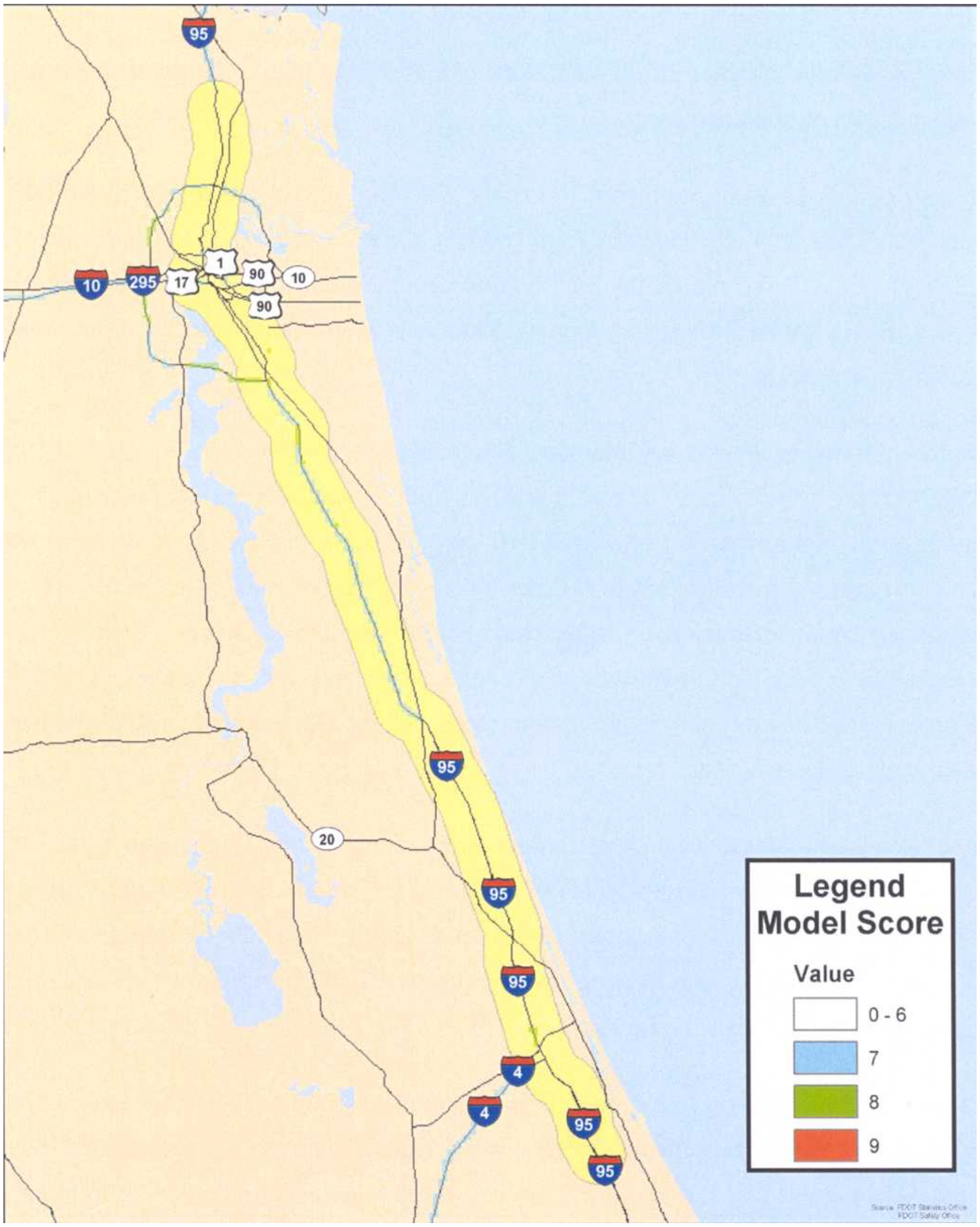
Starting in Volusia County at the interchange with Interstate Route 4, Interstate Route 95 is an urban interstate highway with four 12-foot lanes, a 64-foot lawn median, two 10-foot outside shoulders and two 2-foot inside shoulders. At exit 89, the highway becomes rural. The cross-section with a median variance of 38 to 64 feet continues through Volusia County to Flagler County. In Flagler County, the highway is characterized as rural with the exception of about 8 miles of urban interstate. Northbound and southbound commercial vehicle weigh stations are located in Flagler County where the median ranges from 64-feet to 250-feet. The rural cross-section continues into St. John's County (at the county line, field review notes show all bridges have been widened in preparation for a third travel lane-shoulder, and median information has been kept constant for this section). Northbound and southbound rest areas are located near exit 92. At the Duval County line, the highway widens to six 12-foot lanes with a 40-foot median. As I-95 approaches I-295, the number of lanes increases from six lanes to nine 12-foot lanes to facilitate interchange movements. Beyond State Road 115 (exit 99), the cross-section returns to six 12-foot lanes with 40-foot median. North of JT Butler Boulevard, the median is 16 feet wide with a barrier wall. Four miles to the north, beyond the St. John's River at State Road 5, there are three northbound and two southbound lanes. At Dunns Avenue, the roadway decreases to four 12-foot lanes with a 64-foot median. Near the northern terminus of the corridor in the vicinity of I-295, lanes begin to drop resulting in a decrease to four lanes within a mile of the Nassau County line. Corridor 2 is illustrated in Table 5.04 and Map 5.04.

Table 5.04 Corridor 2 Roadway Description – I-95 from Daytona to Jacksonville

Location	Designation	Lane Configuration	Median Width
I-4/I-95 Volusia County	Urban	4 – 12'	64'
Exit 89	Rural		38' – 64'
8 Miles in Flagler County	Urban		
N/B & S/B Weigh Stations			64' – 250'
Flagler County into St. John's County	Rural		
N/B & S/B Rest Areas			
Duval County line	Urban	6 – 12'	40'
I-95 approach to I-295		9 – 12'	
Beyond SR 115		6 – 12'	40'
North of JT Butler Blvd.			Barrier Wall
SR 5		5 – 12'	
Dunns Avenuee		4 – 12'	64'
Northern terminus of I-295		5 – 12'	
		6 – 12'	
Nassau County		4 – 12'	
Maximum		9 – 12'	250'
Minimum		4 – 12'	Barrier Wall

Source: Straight Line Diagrams for FDOT Districts 2 & 5, FDOT, 2002.

Map 5.04.
Corridor 2 - I-95 from Daytona to Jacksonville
Between Cities Model



Characteristics

For most of its length, this corridor is principally serving north/south through traffic. Closer to Jacksonville, the corridor also serves as a commuter route and as part of the intra-regional circulation network. Jacksonville, with over one million inhabitants as reported in the 2000 Census, is home to the 15th largest port in the nation based on the value of cargo handled and is the second largest automobile port in the nation. JAXPORT's three marine terminals handled 6.8 million tons of cargo in 2001, including over 700,000 containers. It is also the home of significant and thriving distribution center business.

The Jacksonville airport handled over 24,000 tons of air cargo in 2000. This ranked the airport 5th in the state in terms of enplaned cargo.

The city also boasts several Intermodal terminals including a CSX Intermodal yard, CSX Auto Distribution, CSX Transflo, Jacksonville Port Transflo, CSXT Tallyrand Auto Distribution Center, Florida East Coast Railway Intermodal Facility, and several other Intermodal facilities associated with the port. Publix, Winn Dixie, and Michael's all have large distribution facilities just west of the I-295 and I-10 interchange.

Although the corridor is labeled as Interstate Route 95, the corridor also consists of Interstate Route 295, the western "bypass" of the downtown area. Truck counts on I-295 near I-10 are nearly three times higher than on I-95 near I-10 indicating that the bypass route is carrying the majority of through truck traffic. Highway access to the port terminals at JAXPORT's Blount Island is served by an extension of I-295, State Route 9A, and Heckscher Drive. Heckscher Drive operates at a very high level of service connecting trucks with the interstate and the port facilities northeast of town. Local improvement plans call for the widening of the remaining two-lane sections of this local facility.

Residential and commercial retail development is booming in the southeastern part of Duval County, and critical highway linkages to serve this development are now under construction. The completion of the last remaining segment of the "belt" around Jacksonville (Route 9A) will likely result in dramatic changes in the existing traffic patterns. This connection will provide a shorter alternative to I-95 than the existing I-295 bypass.

Annual average daily traffic on I-95 ranges from a high of 125,000 between J.T. Butler Boulevard and University Boulevard in southeast Jacksonville in Duval County to a low of 22,500 in Brevard County between exit 82 and the Volusia County line. The lowest percentage of trucks was 5% (4,779) and occurred in southeast Jacksonville from Atlantic Boulevard south to I-295. The highest percentage of trucks was 25% (7,000-9,000) and occurred in central St. John's County running south to the Flagler County line. The lowest volume of trucks was 4,218 and occurred in Duval County inside the I-295 loop between Bay Meadows and Southside Boulevard. The highest volume of trucks was 11,053 and occurred in Jacksonville just south of the St. John's River to Atlantic Boulevard. These counts appear to be inconsistent with the counts on either side of segment. The second highest count is on the segment of I-95 south of the I-95/I-295 intersection to the south of Jacksonville. Corridor 2 characteristics are presented in Table 5.05.

Table 5.05. Corridor 2 Traffic Characteristics – I-95 Daytona to Jacksonville

Corridor Ranking	Generally 7 - 8	Highest scores occurred at I-295 near I-10
AADT High	125,000	JT Butler Rd to University Blvd in Duval County
AADT Low	22,500	Exit 82 and Volusia County line in Brevard County
Truck % High	25% - 7,000-9,000	Central St. John's County to Flagler County line
Truck % Low	5% - 4,779	Atlantic Blvd south to I-295 in Jacksonville in Duval County
Truck Volume High	11,053	South of St. John's River in Jacksonville to Atlantic Blvd in Duval County
Truck Volume Low	4,218	Inside I-295 loop between Bay Meadows and Southside Blvd in Duval County

Source: RCI Database, FDOT Statistics Office, 2000.

Opportunities

With the impending opening of the southern connection of State Route 9A to mainline I-95 on the south of Jacksonville, through north/south traffic will have three alternatives through the city. If there are no truck restrictions contemplated on the "eastern bypass," then there seems to be a potential for a shift of significant truck traffic from existing I-295 to the east side. This may be one of the only opportunities in the state where taking an existing mixed-use lane and converting it to a truck-only lane may be worth considering.

The additional through traffic capacity that will be available with the completion of the loop provides decision makers with a unique opportunity to provide an incentive for long distance trucks to use one side of the loop or the other. For example, if it was deemed more appropriate that through truck traffic be on the west side of the loop, then an exclusive truck lane, signed and striped could be instituted at a fairly low cost. If the through-truck movement were on the east side of the loop, the converse would not be true given that the new facility is only a four-lane highway.

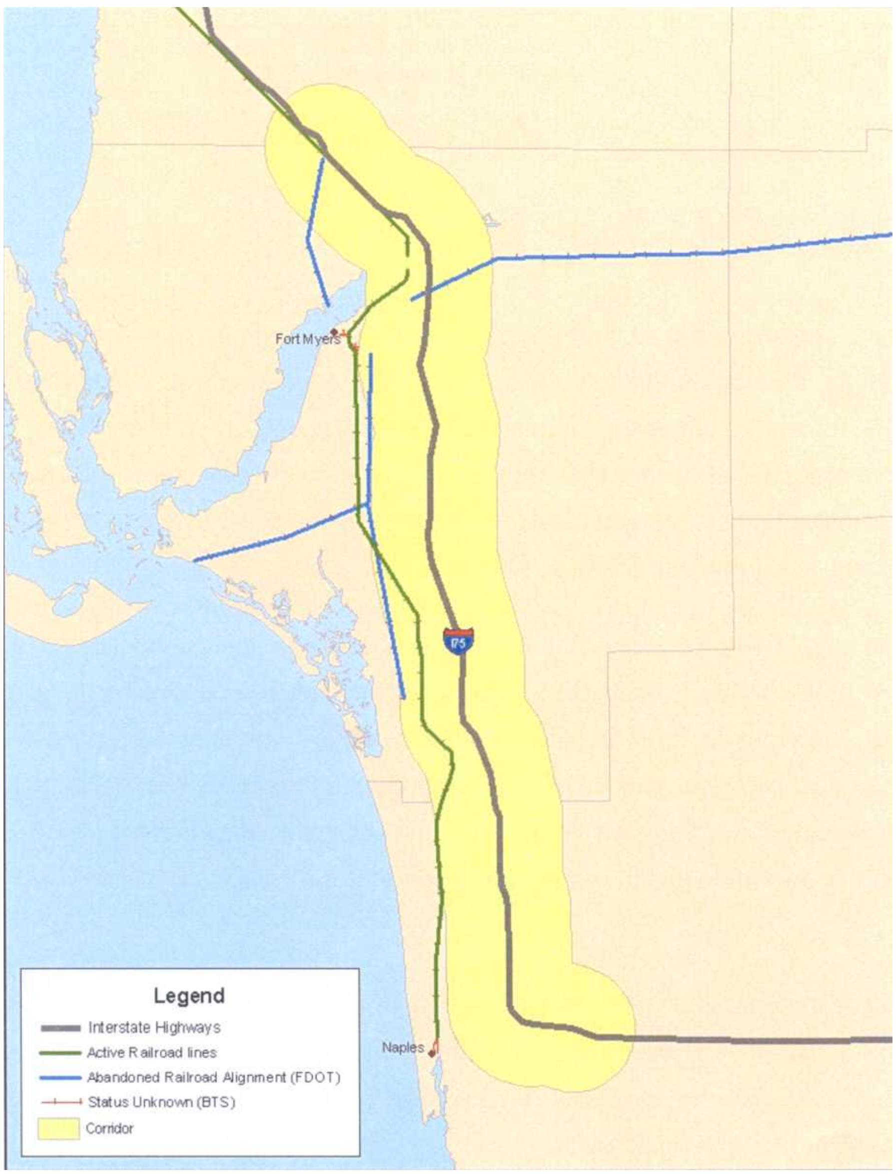
Some detailed modeling and origin and destination work would be required to determine if a time saving advantage could, in fact, be gained. The other complicating issue associated with this potential opportunity is that the east side of the loop provides more direct access to the JAXPORT facilities northeast of the downtown area.

Corridor 3 - Interstate Route 75 from Naples to Ft. Myers

Description

The I-75 corridor from Naples to Ft. Myers, Florida generally scored from 7 to 8 on the GIS Between Cities Model, and scored highest north of Immokalee Road and south of Colonial Boulevard. The corridor (see Map 5.05) stretches for approximately 36 miles.

Map 5.05.
Corrider 3 - I-75 from Naples to Ft. Myers



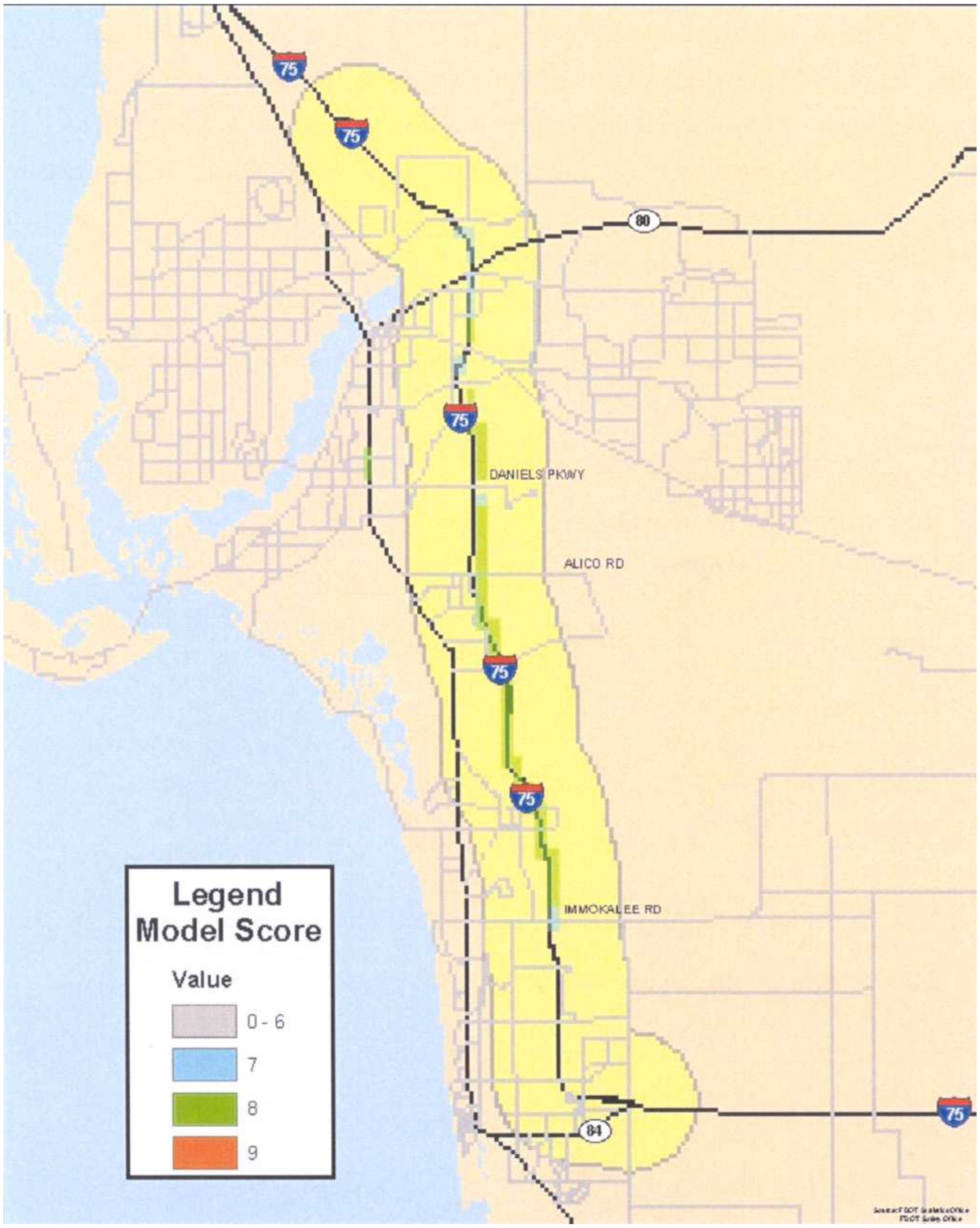
Interstate Route 75 from the toll plaza in Collier County in the south is a rural freeway that has four 12-foot lanes with a 91-foot median. The same cross-section continues through Lee County. The three miles of I-75 between State Road 951 and Pine Ridge Road are designated as urban. As I-75 continues from Collier County into Lee County, the urban/rural designation varies until Bonita Beach Road at which point it is designated rural. The rural designation continues throughout Lee County except for two miles between Luckett Road and the Calooshatchee River. At the Collier/Lee County line, the median decreases to 88-feet and then flares to 182-feet within the next several miles before it returns to 88-feet at Cork Screw Road. Throughout the remainder of Lee County, the median is generally 80-feet wide. Corridor 3 is illustrated in Table 5.06 and detailed in Map 5.06.

Table 5.06. Corridor 3 Roadway Description -- I-75 from Naples to Ft. Myers

Location	Designation	Lane Configuration	Median Width
Toll Plaza in Collier County	Rural	4 – 12’	91’
Between SR 951 and Pine Ridge Rd	Urban		
Collier County into Lee County	Rural/Urban		
Bonita Beach Road	Rural		
Between Luckeett Rd and Calooshatchee	Urban		
River			
Collier County/Lee County line			88’
Beyond Lee County line			182’
Cork Screw Rd			88’
Remainder of Lee County			80’
Maximum		4 – 12’	182’
Minimum		4 -- 12’	80’

Source: Straight Line Diagrams for FDOT District 1, FDOT, 2002.

Map 5.06.
Corridor 3 - I-75 from Naples to Ft Myers
Between Cities Model



Characteristics

The region served by this corridor can be characterized as an area in transition. The traditional agricultural and mining uses to the east of the interstate are giving way to large-scale, low-density residential development. Strip commercial development stretching south from Ft. Myers along

U.S. 41 contributes to the only parallel route to the interstate operating an extremely low level of service, particularly during peak travel periods. The recreational travel peak months also contribute heavily to congestion in the area west of the interstate.

Uses of I-75 seemed to be a mix of interstate through traffic, localized commercial uses, commuter traffic and recreational travelers. The operating characteristics of agricultural and mining trucks are not as appropriate for a high-speed facility as are those for an "over the road" tractor and trailer combination. During times of citrus harvest, the increases in these kinds of vehicles affect the highway's performance. This traffic mix, along with high AADT on a four-lane highway causes this section to rank high among the corridors examined across the state.

Annual Average Daily Traffic on this section of I-75 ranges from a high of 70,000 in the vicinity of Daniels Parkway near the Southwest Florida Regional Airport in Ft. Myers in Lee County to a low of 27,000 in Collier County near exit 15, County Road 951. Exit 15 is the last exit prior to Everglades Parkway toll plaza. The lowest percentage of trucks in the corridor was 12% (8,064) in Lee County on I-75 from Alico Road to Daniels Parkway. The highest percentage was 19% (5,713) and occurred in Lee County from Bayshore Road north to the Charlotte County line. The lowest volume of trucks (3,578) occurred in Collier County from Pine Ridge Road south to the Everglades Parkway toll plaza. The highest truck volume occurred in the Ft. Myers urban area and was reported as 8,774. Corridor 3 characteristics are presented in Table 5.07.

Table 5.07. Corridor 3 Traffic Characteristics – I-75 Naples to Ft. Myers

Corridor Ranking	Highest Score of 8	North of Immokalee Rd, CR 846 and South of Colonial Blvd, SR 884
AADT High	70,000	Daniels Pkwy near SW Regional Airport in Lee County
AADT Low	27,000	Near Exit 15, CR 951, in Collier County
Truck % High	19% - 5,713	Bayshore Rd north in Lee County to Charlotte County line
Truck % low	12% - 8,064	From Alico Rd to Daniels Pkwy in Lee County
Truck Volume High	8,774	Ft. Myers urban area in Lee County
Truck Volume Low	3,578	Pine Ridge Rd to Everglades Pkwy toll plaza in Collier County

Source: RCI Database, FDOT Statistics Office, 2000.

The widening of I-75 through most of the corridor (22 of the 36 miles) identified is programmed in the currently adopted FDOT Work Program for construction in FY 2003, and construction is also programmed for three interchange improvements. The widening (if it occurs in the median) will reduce the existing right of way availability considerably (perhaps 56 feet will remain)

Opportunities

The only apparent opportunity in the corridor from Naples to Ft. Myers is to widen I-75 to the "inside" and create exclusive truck lanes. Without the proposed widening now programmed for preliminary engineering, there seems to be sufficient median width (minimum of 80 feet) to consider a fully separated exclusive truck facility. Once the widening is completed, it is doubtful that the corridor will score as high on the GIS model because the level of service will improve. The remaining median width after the widening will still afford a future opportunity to provide exclusive lanes and perhaps even a separated facility.

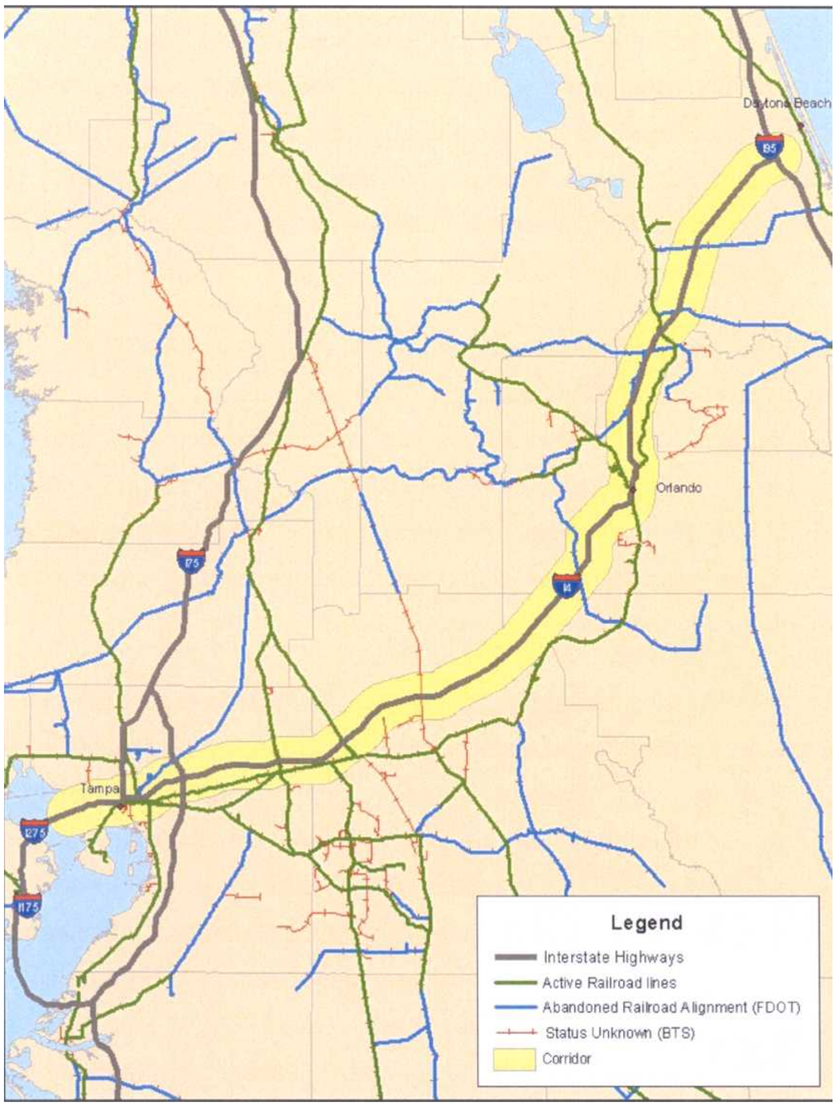
No available under-used railroad rights of way to service the north/south truck movement were apparent in the study. Any further consideration of exclusive truck facilities in this corridor should not be contemplated without an understanding if its relationship with the I-75 Venice to Valdosta, Georgia, corridor.

Corridor 4 – I-4 from Tampa through Orlando to Daytona Beach

Description

The I-4 corridor from Tampa through Orlando to Daytona Beach generally scored between 7 and 8 on the GIS Between Cities Model. Interstate 4 scored highest at its western most end (actually a portion I-275) at a score of 9. The corridor (see Map 5.07) is 139 miles from Tampa to Daytona Beach.

Map 5.07.
Corridor 4 - I-4 from Tampa through to Daytona



Interstate Route 275 (the portion of I-275 that runs east and west from the western terminus of I-4 is considered in this corridor) at Armenia Avenue in Tampa is an urban freeway that has six 12-

foot lanes with a 32-foot paved median with a barrier. Beyond the Armenia interchange, it increases to as many as nine 12-foot lanes and as few as four 12-foot lanes approaching 21st Street where the configuration includes two westbound and three eastbound lanes with a 44-foot median. At 40th Street, the cross-section is four 12-foot lanes with a 64-foot median. Interchange spacing is very close, making a reserved lane not very practical. The median decreases to 40-feet at US 301, and rural classification goes into effect for three miles between exits 11 and 14. Eastbound and westbound commercial vehicle weigh stations are located just prior to exit 11 in Hillsborough County.

At the Polk County line, the urban roadway consists of eight 12-foot lanes with a 166-foot median. At Polk Parkway, the roadway decreases to six 12-foot lanes, and at State Road 546 the roadway decreases again to four 12-foot lanes with a 40-foot median. The median increases to 66-feet at Lakeland Hills Boulevard and continues at that width through Exit 20 where the urban designation changes to rural. Eastbound and westbound rest areas are located at County Road 557-A in Polk County. Median width varies from 66-feet to 300-feet between Exit 21 and the Osceola County line.

The cross-section continues into Osceola County with a 92-foot median. At County Road 545, the median decreases to 56-feet and rural designation changes to urban. Median width varies from 56-feet to 372-feet through a series of interchanges starting at exit 24. Just beyond exit 25, roadway lanes increase to six 12-foot lanes with a 44-foot median as the roadway continues into Orange County. Beyond exit 26, the roadway increases to eight 12-foot lanes with a 64-foot median. The number of lanes varies between six and eight, and median width varies from 16-feet to 165-feet throughout the remainder of Orange County.

There are six 12-foot lanes entering Seminole County that increase to eight and return to six within two miles. Eastbound and westbound rest areas are located along the section in Seminole County where the median ranges from 40-feet to 64-feet in width on this urban roadway. At exit 50, lanes decrease to five and then four. Near the Volusia County line, the roadway consists of four 13-foot lanes with a 12-foot median with a barrier wall. The bridge entering Volusia County has four 12-foot lanes and a four-foot median including a barrier wall. Median width increases to 64-feet after the bridge and varies from 64-feet to 400-feet prior to exit 53A. Prior to exit 54, the road's designation becomes rural. After exit 56, median width varies from 64-feet to 120-feet. An eastbound rest area is located within two miles of exit 57. Beyond exit 57, median width varies as much as 400-feet. The segment ends at I-95, exit 58. Interchange spacing is typical of an urban interstate with access points less than one mile apart in the cities of Tampa and Orlando. Corridor 4 is described in Table 5.08. Along the I-4 corridor, the inside travel lane is designated as an HOV lane during the morning and evening peak traffic periods around the Orlando area.

Table 5.08. Corridor 4 Roadway Description – I-4 from Tampa through Orlando to Daytona Beach

Location	Designation	Lane Configuration	Median Width
I-4 at Armenia Ave	Urban	6 – 12’	32’ Paved with Barrier
Beyond Armenia Interchange		4 to 9 – 12’	
21st Street		2 W/B and 3 E/B	44’
40th Street		4 – 12’	64’
US 301	Rural		40’
E/B and W/B Commercial Weigh Stations at Exit 11			
Exit 14	Urban		
Polk County line		8 – 12’	166’
Polk Parkway		6 – 12’	
SR 546		4 – 12’	40’
Lakeland Hills Blvd			66’
Exit 20	Rural		
E/B and W/B Rest Areas			
Exit 21 to Osceola County line			66’ – 300’
Osceola County			92’
CR 545	Urban		56’
From Exit 24 to Exit 25			56’ – 372’
Beyond Exit 25 into Orange County		6 – 12’	44’
Beyond Exit 26		8 – 12’	64’
Through Orange County		6 to 8 – 12’	16’ – 165’
Seminole County		6 – 12’	
For One Mile		8 – 12’	
		6 – 12’	40’ – 64’
E/B and W/B Rest Areas			
Exit 50		4 – 12’	
Near Volusia County line		4 – 13’	12’ with Barrier Wall
Bridge Entering Volusia County		4 – 12’	4’ with Barrier Wall
Beyond Bridge to Exit 53A			64’ – 400’
Exit 54	Rural		
Exit 56			64’ – 120’
E/B Rest Area			
Beyond Exit 57			Varies up to 400’
Segment Ends at Exit 58			
Maximum		9 – 12’	400’
Minimum		4 – 12’	4’ with Barrier Wall

Source: Straight Line Diagrams for FDOT Districts 1, 5, & 7, FDOT, 2002.

Characteristics

This corridor, although not nearly the longest that emerged from the GIS screening, changes character dramatically over its nearly 140 miles. It is heavy with commuter and recreational traffic for most of its length. It also serves as one of only a few through freeway routes in Orlando and Tampa. In Tampa, only the Crosstown Expressway provides additional limited access east-west connectivity. In Orlando the nearly completed eastern bypass alternative of Route 417 will provide another option for those using I-4 through the urbanized area.

Annual Average Daily Traffic ranges from a high of 179,000 between Michigan Street and Gore Street just south of the East-West Expressway in Orlando in Orange County to a low of 26,500 at the terminus of I-4 in Volusia County. The lowest truck percentage was 2% (1,672) and lowest truck volume was 1,672, both of which occurred in Volusia County close to the terminus of I-4. The highest truck percentage occurred in Polk County east of Lakeland and was 21% (11,097). The highest truck volume occurred on I-4/I-275 between Ashley and Armenia and equaled 22,027. The second highest area of 21,319 was reported in downtown Orlando between Michigan Avenue and Gore Street. Corridor 4 characteristics are presented in Table 5.09 and Map 5.08.

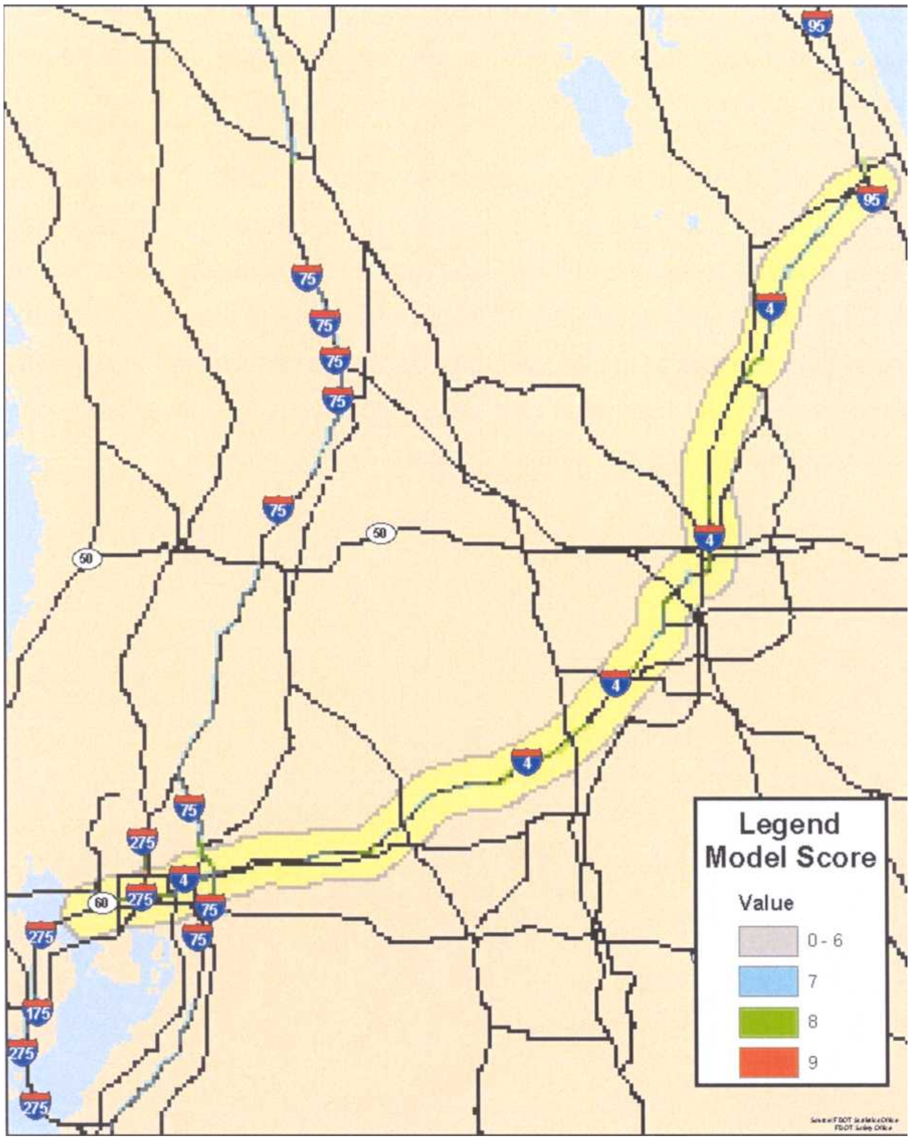
Table 5.09. Corridor 4 Traffic Characteristics - I-4 Tampa through Orlando to Daytona Beach

Corridor Ranking	Generally 7-8 with one score of 9	Highest score of 9 occurred in Tampa in area of I-275
AADT High	179,000	Between Michigan St and Gore St south of East-West Expwy in Orange County
AADT Low	26,500	I-4 terminus in Volusia County
Truck % High	21% - 11,097	East of Lakeland in Polk County
Truck % Low	2% - 1,672	I-4 terminus in Volusia County
Truck Volume High	22,027	I-4/I-275 between Ashley and Armenia in Hillsborough County
Truck Volume Low	1,672	I-4 terminus in Volusia County

Source: RCI Database, FDOT Statistics Office, 2000.

With the Port of Tampa on one end, massive distribution and significant manufacturing uses in Polk County, and the intense development of all kinds in the greater Orlando area, this corridor will continue to present challenges to the transportation professionals. The role of commercial traffic along this critical Florida corridor should not be overlooked. The Orlando International Airport is very close to the Ft. Lauderdale facility for the number two air cargo airport in the state. While the Port of Tampa may rank lower than others in the state, when ordered by the value of cargo, in terms of pure tonnage it is the highest. Over 25 million tons of phosphate alone move through the Port. Fuel products including the aviation fuel for the Tampa and Orlando airports, are also important commodities that are handled at Port of Tampa.

Map 5.08.
Corridor 4 - I-4 from Tampa to Daytona
Between Cities Model



The FDOT adopted Work Program includes an aggressive capacity enhancement program for the corridor in addition to the significant investments recently made on I-4 in District 7. In District 5, virtually every section of the highway has additional lanes either programmed for construction or under study in the current Work Program period. As the studies for the corridor proceed, High Occupancy and Toll Lanes (HOT Lanes) are being evaluated as well.

Opportunities

Opportunities for facilitating easier truck movement on the Tampa end of the corridor will be discussed in a section that follows that addresses the "Within Cities" findings. While the corridor is long and very complex, some opportunities may present themselves to help in the movement of trucks. The "take a lane" option does not seem feasible, and the median is not of an adequate and consistent width across the entire corridor to consider a simple solution.

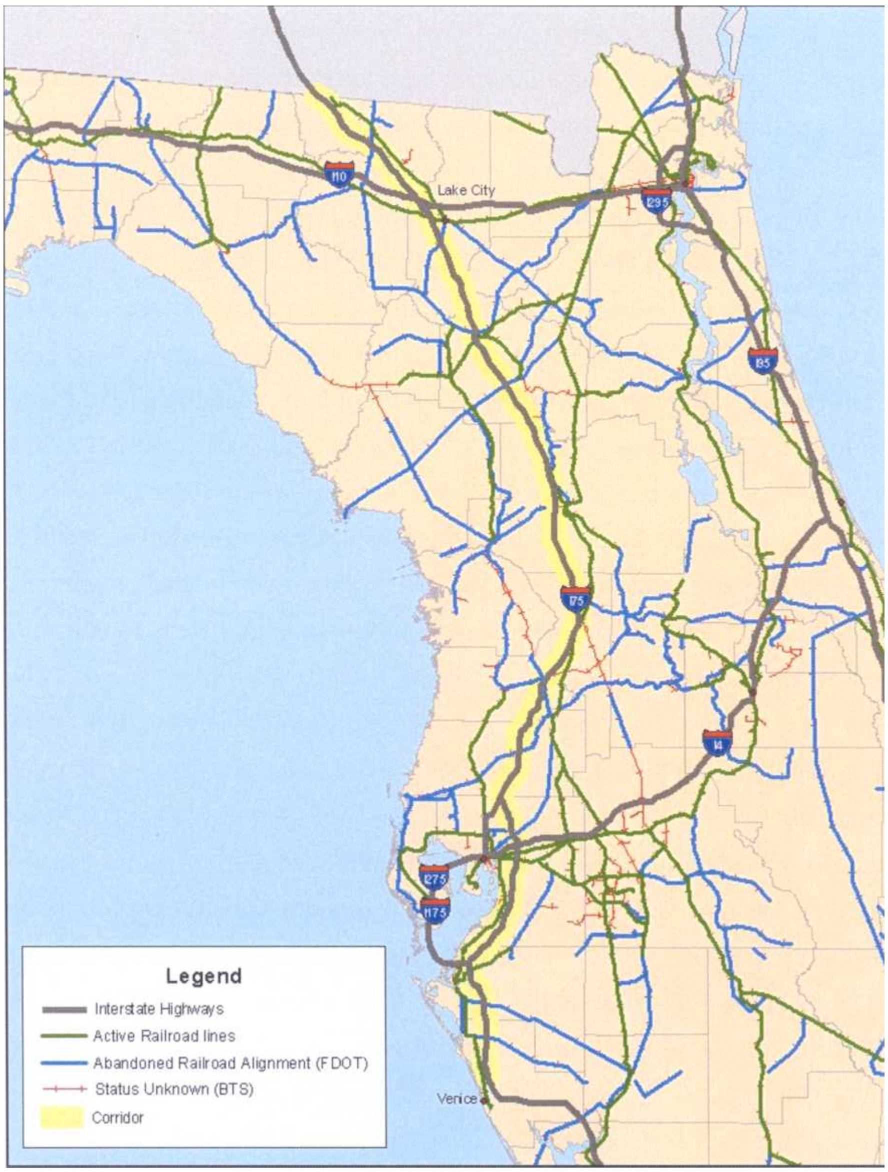
The HOT Lane Study being conducted on a portion of I-4 in the Orlando area may need to consider movement of trucks as well as commuters. It is possible to consider allowing commercial vehicles in these lanes, and an "off-peak" use of this potential facility may warrant further review. In addition, the High Speed Rail concepts that are being examined for the corridor may be expanded to include a look at freight movement as well as passengers. It is possible that a "total transportation corridor" could emerge as a viable future solution to the growing demands for this corridor and could include accommodation for an exclusive truck facility.

Corridor 5 - I-75 from Venice to the Florida State Line

Description

The I-75 corridor from Venice north to the Florida/ Georgia State line rated between 7 and 8 on the GIS Between Cities Model. The corridor (see Map 5.09) scored highest at three locations (Venice, I-4 and at U.S. 27) along the 270 miles.

Map 5.09.
Corridor 5 - I-75 from Venice to Florida State Line



Interstate Route 75 within Corridor 5 serves both a heavy demand for interstate through movement as well as handling significant commuter traffic around the Tampa and Ocala areas. Its interchanges with Interstate Route 10, U.S. Route 301, and Florida's Turnpike are all critical linkages for truck traffic. As mentioned in Chapter 2 of this report, the Florida and Georgia Departments of Transportation investigated the corridor for an exclusive truck facility in the late 1970's. Based on the traffic data obtained for this study, it appears that projections for the Florida section of the interstate were conservative. Truck percentages exceed 40% on the most northern section of I-75 and AADT is well over 100,000 on a highway that was predicted to reach 65,000 AADT when the study was done.

At its southern section, the highway alternates from a rural to urban interstate. In Venice, there are four 12-foot lanes with two 10-foot paved outside shoulders and two 2-foot inside shoulders. Throughout Sarasota County, the median width ranges from 87 feet to 290 feet. The roadway widens to six 12-foot lanes in Sarasota County south of Clark Road, State Route 72. It remains six lanes through Manatee County to Hillsborough County with the exception of widening at the I-275/I-75 interchange area. Median width varies in Manatee County from 91 feet to 312 feet with a typical median of 90 feet. Six 12-foot lanes, two 10-foot shoulders outside, and two 2-foot shoulders inside continue with the narrowest median of 88 feet from Manatee line to Alafia River. At the Alafia River, the interstate increases to eight 12-foot lanes and at milepost 381 increases to ten 12-foot lanes. The highway's cross section varies through the interchanges with US 301, Cross-town Expressway, and State Route 60, where this urban interstate settles into a six-lane highway with an 88-foot wide median. At State Route 581, Fowler Avenue, the interstate narrows to four lanes and continues to the Pasco County line. The four-lane interstate continues through Pasco, Hernando, and Sumter counties with a consistent median width of 64 feet until Florida's Turnpike intersects I-75. North of Florida's Turnpike in Sumter County, the roadway is characterized as a six lane rural interstate with a 40-foot median and continues in this configuration through Marion County to the Alachua County line. A weigh station is located just south of State Route 484 in Marion County. North and southbound rest areas are located south of State Route 121 in Alachua County. The six-lane interstate continues through Alachua, Columbia, and Suwannee counties with a minimum 40-feet median. North and southbound rest areas are located at milepost 413 in Columbia County. The six-lane rural interstate continues through Hamilton County with a 40-foot median consistently available to the Georgia State line. In Hamilton County, I-75 houses an agricultural inspection station and a commercial vehicle weight and safety inspection facility. Corridor 5 is outlined in Table 5.10.

Table 5.10. Corridor 5 Roadway Description – I-75 from Venice to Florida State Line

Location	Designation	Lane Configuration	Median Width
Southern Section	Rural to Urban		
Venice		4 – 12'	
Through Sarasota County			87' – 290'
South of SR 72		6 – 12'	
Within Manatee County			91' – 300'
Manatee County line to Alafia River			88'
At Alafia River		8 – 12'	
Milepost 381		10 – 12'	
SR 60		6 – 12'	88'
SR 581 to Pasco County line		4 – 12'	
Through Pasco, Hernando, and Sumter Counties		4 – 12'	64'
From Intersection with Florida Tpk through Marion County	Rural	6 – 12'	40'
Commercial Weigh Station South of SR 484			
N/B and S/B Rest Areas South of SR 121			
Through Alachua, Columbia, Suwannee, and Hamilton Counties to Georgia State line		6 – 12'	40'
N/B and S/B Rest Areas in Columbia County			
Agricultural Inspection Station and Commercial Vehicle Weight and Safety Inspection Facility in Hamilton County			
Maximum		10 – 12'	300'
Minimum		4 – 12'	40'

Source: Straight Line Diagrams for FDOT Districts 2, 5, & 7, FDOT, 2002.

Characteristics

Annual Average Daily Traffic ranges from a high of 110,000 at the I-4 interchange in Tampa in Hillsborough County to a low of 25,000 between US Route 129 and State Route 6 in Hamilton County. The lowest percent of trucks was 10% (7,681) and occurred in Manatee County from University Parkway across the Manatee River to US 301. The lowest total number of trucks was 6,219 and occurred in Hillsborough County from US 301 north to the LeRoy Selmon Expressway. It appears that truck traffic destined for the Port of Tampa and its environs, is dispersing on several routes west of I-75 into the city. These alternate routes to the use of Interstate 4 (U.S. 301, State Route 60, and Causeway Boulevard) may have had heavier use during the study period given that I-4 to the west of I-75 was under construction to add lanes.

The highest percentage of trucks on this corridor equaled 41% (10,500) and was reported north of I-10 to State Road 136 spanning Suwannee and Columbia counties. The highest volume of trucks was 14,701 located just north of the Florida Turnpike from State Road 44 to County Road

484 spanning both Marion and Sumter counties. Corridor 5 characteristics are presented in Table 5.11 and Map 5.10.

Table 5.11. Corridor 5 Traffic Characteristics – I-75 from Venice to the Florida State line

Corridor Ranking	Generally 7-8	Scores of 8 reported around Venice, north and south of I-4/I-75, and south of US 27
AADT High	110,000	I-4 interchange in Tampa in Hillsborough County
AADT Low	25,000	Between US 129 and SR 6 in Hamilton County
Truck % High	41% - 10,500	North of I-10 to SR 136 in Suwannee and Columbia Counties
Truck % Low	10% - 7,681	University Pkwy across Manatee River to US 301 in Manatee County
Truck Volume High	14,701	North of Florida Tpk from SR 44 to CR 484 in Marion and Sumter Counties
Truck Volume Low	6,129	US 301 north to LeRoy Selmon Expwy in Hillsborough County

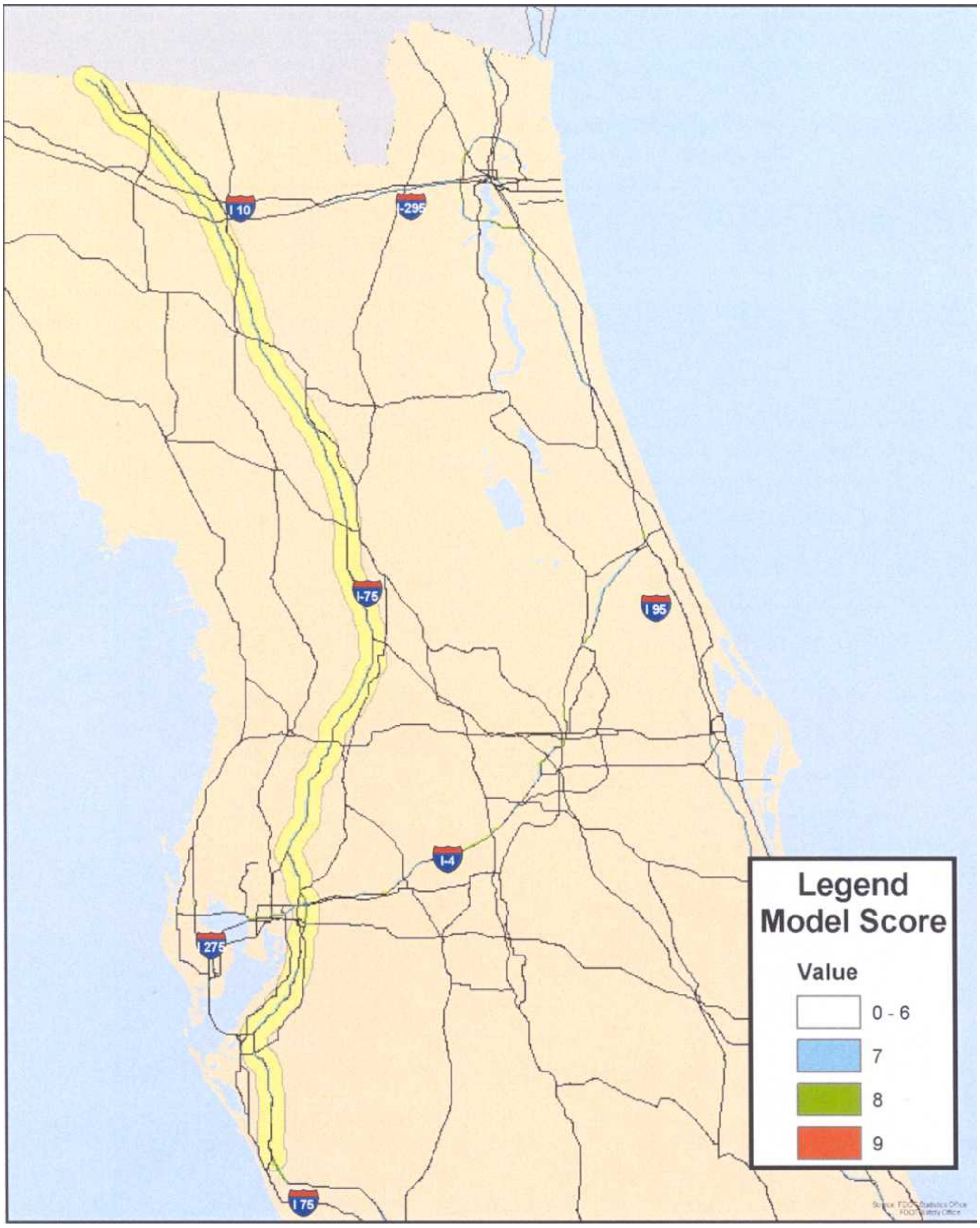
Source: RCI Database, FDOT Statistics Office, 2000.

The FDOT 2002 to 2006 Adopted Work Program indicates widening for I-75 is programmed for construction in Hillsborough and Pasco Counties to achieve a six-lane section. Additional projects include completion of the widening in Marion County and additional lanes for nine miles in Columbia County and nine miles in Hamilton County.

Opportunities

Based on the apparent available median, it appears that an exclusive facility (marked lane or separated lane) may be feasible for most of the length of the southern section of the corridor. Once north of Sumter County, however, the reported median width averages only 40 feet. While that width is theoretically enough to add two additional 12- or 13-foot wide lanes, additional room for “oversized inside” shoulders for trucks and a striped buffer to gain separation may be problematic. Like most of the other corridors examined, the highway median is rapidly being consumed for “mixed use” lane capacity additions. Given that the section of I-75 north of Florida’s Turnpike may be able to be widened once more within the existing right of way, and the truck mix is in this area is one of the highest found in the study, the “last widening” should be considered for exclusive truck use.

Map 5.10.
Corridor 5 -I-75 from Venice to the Florida State line
Between Cities Model

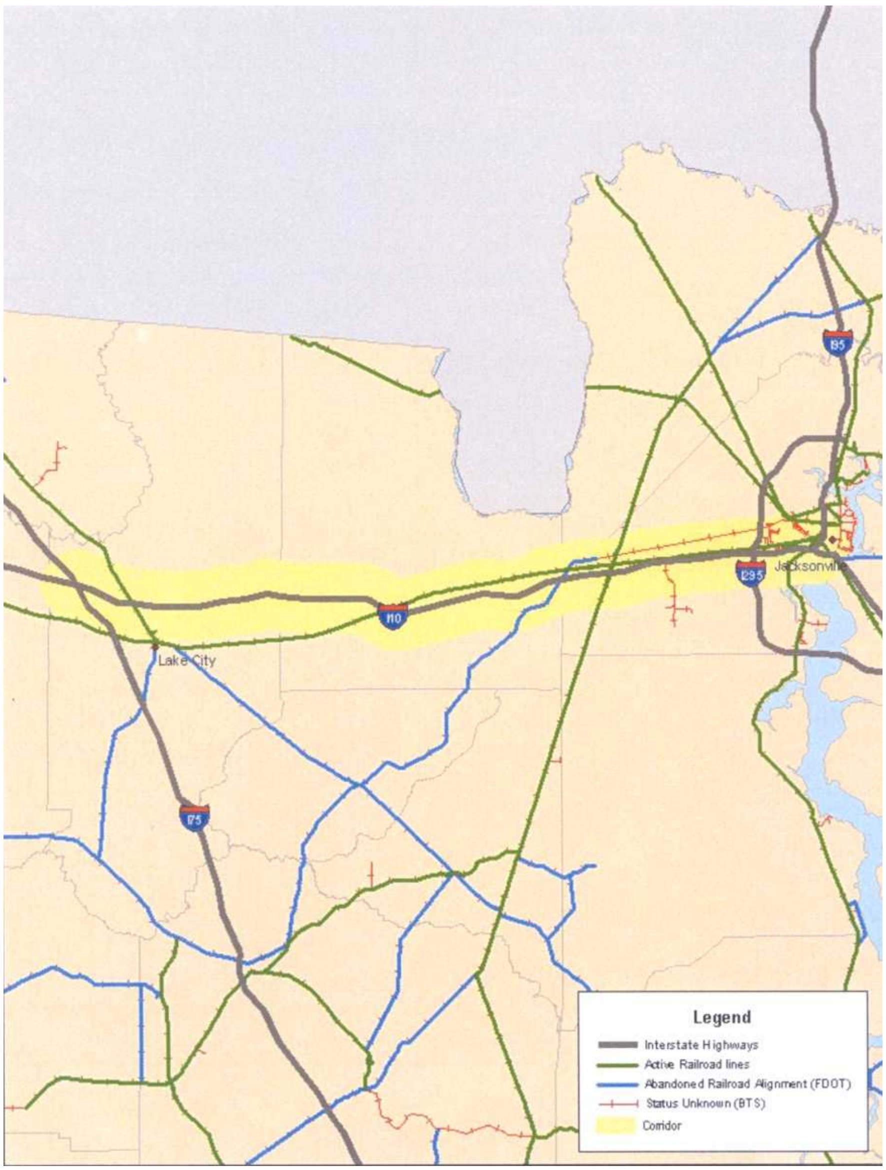


Corridor 6 - Interstate Route 10 from Lake City to Jacksonville

Description

The Interstate Route 10 corridor from Lake City to Jacksonville (60 miles) consistently scored seven on the GIS Between Cities Model. The corridor (see Map 5.11) did score of a nine on I-295 north and south of the I-10 and I-295 interchange in Jacksonville.

Map 5.11.
Corridor 6 I-10 from Lake City to Jacksonville



The identified corridor stretches for approximately 60 miles from Lake City in Columbia County to Jacksonville.

The Highway moving from west to east begins as a rural interstate. From Lake City to the Baker County line, there are four 12-foot lanes with a 64-foot grass median, two 12-foot outside shoulders, and two 2-foot inside paved shoulders. From the Columbia/Baker County line through Nassau County, the configuration includes four 12-foot lanes with a 65-foot grass median, and two 10-foot outside shoulders with varying inside shoulders on the entire segment. Eastbound and westbound rest areas are located in Baker County, just west of County Route 235. The cross-section continues through Duval County; however, the functional classification changes from rural to urban near the rest areas located westbound at mile point 351 and eastbound at mile point 352 in Duval County.

At I-295, the cross-section changes to six 12-foot lanes with a 16-foot median, and two 4-foot paved inside shoulders with speed limit posted at 55 mph. As the highway approaches its terminus at I-95 at the east, close interchange spacing exists, and the roadway varies from ten to six lanes with a metal median barrier. Corridor 6 is described in Table 5.12.

Table 5.12. Corridor 6 Roadway Description – I-10 from Lake City to Jacksonville

Location	Designation	Lane Configuration	Median Width
Beginning in the West	Rural		
From Lake City to Baker County line		4 – 12’	64’
From Columbia/Baker County line through Nassau County		4 – 12’	65’
E/B and W/B Rest Areas West of CR 235			
E/B and W/B Rest Areas at Milepost 351/352 in Duval County	Urban		
At I-295		6 – 12’	16’
Terminus at I-95 at the East		6 to 10 – 12’	Metal Barrier
Maximum		10 – 12’	65’
Minimum		4 – 12’	Metal Barrier

Source: Straight Line Diagrams for FDOT District 2, FDOT, 2002.

Characteristics

Interstate Route 10 provides the primary east-west access across all of northern Florida. Interstate 10’s 369 miles connect Pensacola, Tallahassee, and Jacksonville with significant truck interchange points at I-75 in Lake City, U.S. 301 in Baldwin and I-95/I-295 in Jacksonville. The route links the ports of Pensacola, Panama City, and Jacksonville to rest of the state and to the states west of Florida.

Annual Average Daily Traffic for the portion of I-10 studied ranges from a low of 17,300 in the vicinity of U.S. 90 in Baker County to a high of 157,500 in central Jacksonville near the terminus of I-10 at I-95 in Duval County. Truck percentages range from 2% of AADT (1,000-3,000) to 40% (7,000-10,000) with the highest percentage from County Route 228 to U.S. 301 near Jacksonville. This stretch is also one of the highest areas in terms of truck volumes, reported at 10,792. The lowest percentage, 2%, is located east of I-295 in Jacksonville with this section also having the lowest truck volumes of 1,387. Corridor 6 characteristics are presented in Table 5.13 and Map 5.12.

Table 5.13. Corridor 6 Traffic Characteristics – I-10 from Lake City to Jacksonville

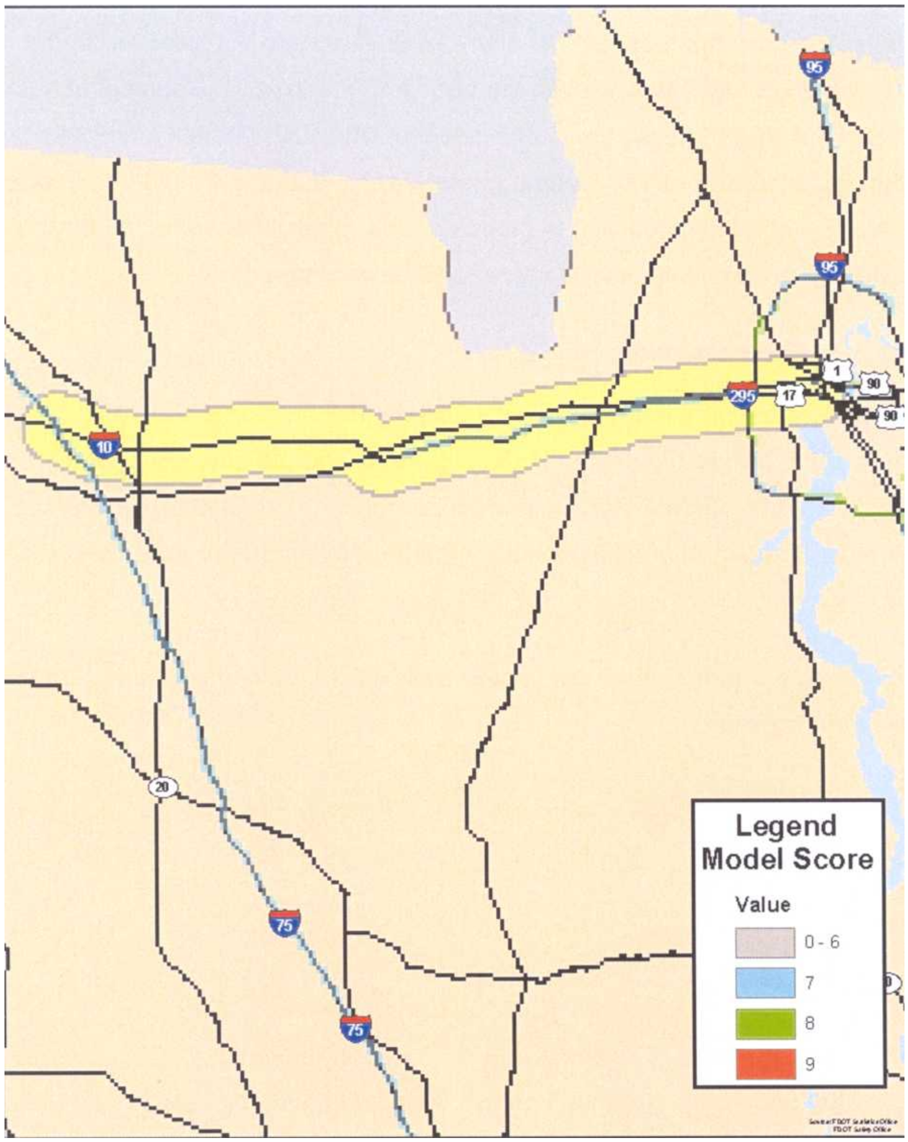
Corridor Ranking	All 7 except one score of 9	Highest score occurred Immediately north of I-10 and I-295
AADT High	157,500	I-10 at I-95 in central Jacksonvillle in Duval County
AADT Low	17,300	US 90 in Baker County
Truck % High	40% - 7,000-10,000	I-10 from CR 228 to US 301 in Duval County
Truck % Low	2% - 1,000-3,000	Within I-295 in Jacksonville east to I-10 terminus in Duval County
Truck Volume High	10,792	I-10 from CR 228 to US 301 in Duval County
Truck Volume Low	1,387	East of I-295 in Jacksonville in Duval County

Source: RCI Database, FDOT Statistics Office, 2000.

For the section identified from GIS Between Cities model, the CSX Railroad and U.S. 90 parallel the roadway for most of its length. In addition to the rail facilities described earlier in Jacksonville, there is also a major rail yard located near the interchange of U.S. 301 and I-10. In the vicinity of U.S. 301, several regionally significant distribution centers have been recently constructed. In addition, new business parks north of U.S. 90 under construction include significant distribution facilities as well. Industrial redevelopment of a military base (Cecil Field) is also served by I-10, albeit indirectly.

Although the score of the corridor falls off toward the west of the I-10 / U.S. 90 interchange, researchers identified the corridor to I-75 to include a logical western terminus of the corridor and to account for the truck traffic that may using other routes to move south towards Gainesville.

Map 5.12.
Corridor 6 - 1-10 from Lake City to Jacksonville
Between Cities Model



Opportunities

For its length, the corridor has sufficient median width (60+) to accommodate even a separated facility within the existing right of way. Few highway overpasses exist from I-295 to I-75 that would require modification, and little vertical curvature exists throughout this portion of I-10. An I-10 National Freight Study, is examining potential improvements to facilitate the movement of cargo from California to Jacksonville. More importantly, the additional knowledge that is gained about commodity flow on Florida's section of I-10 and its relationship with the U.S. will assist in a further understanding of the needs.

It should be noted that while existing conditions and the variables used in the model resulted in the scoring of the corridor to drop east of I-75, there other factors to consider for the remaining 300 miles of I-10. Although AADT is lower and the truck AADT is lower, the percent of trucks, the highway grades, and the type of trucks bear consideration. Although Interstate highway grade is not a very relevant factor for the rest of Florida, in the "Panhandle" this should be considered in any future consideration of accommodating truck traffic. The significant number of logging trucks with their unique performance characteristics should also be considered.

Summary of Between Cities Corridors

The preceeding discussion of the six Between Cities corridors includes detailed narrative describing the region, the physical attributes of the highways, and the potential opportunities that researchers discovered for accommodating commercial traffic. Table 5.14 provides a quick reference to the most relevant characteristics of all six corridors as well as a synopsis of the potential opportunities.

This table should provide a quick reference for the Between Cities corridors and a convenient presentation for comparing them.

Table 5.14. Overview of Corridors

	Description					Characteristics						
		Lane Configuration		Median Width			AADT		Truck %		Truck Volume	
Corridor	Designations	Maximum	Minimum	Maximum	Minimum	Ranking	High	Low	High	Low	High	Low
1 - I-95 from Miami to Titusville	Urban-Rural-Urban	10 - 12'	4 - 12'	468'	Barrier Wall	highest score 9	303,000	22,500	21% - 5,674	6% - 12,495	21,650	2,133
2 - I-95 from Daytona to Jacksonville	Urban-Rural-Urban-Rural-Urban	9 - 12'	4 - 12'	250'	Barrier Wall	generally 7 - 8	125,000	22,500	25% - 7,000-9,000	5% - 4,779	11,053	4,218
3 - I-75 from Naples to Ft. Myers	Rural-Urban-Rural/Urban-Rural-Urban	4 - 12'	4 - 12'	182'	80'	highest score 8	70,000	27,000	19% - 5,713	12% - 8,064	8,774	3,578
4 - I-4 from Tampa through Orlando to Daytona Beach	Urban-Rural-Urban-Rural-Urban-Rural	9 - 12'	4 - 12'	400'	4' with Barrier Wall	7 - 8 with one 9	179,000	26,500	21% - 11,097	2% - 1,672	22,027	1,672
5 - I-75 from Venice to Florida State line	Rural-Urban-Rural	10 - 12'	4 - 12'	300'	40'	generally 7 - 8	110,000	25,000	41% - 10,500	10% - 7,681	14,701	6,219
6 - I-10 from Lake City to Jacksonville	Rural-Urban	10 - 12'	4 - 12'	65'	Metal Barrier	7 except one 9	157,500	17,300	40% - 7,000-10,000	2% - 1,000-3,000	10,792	1,387

	Opportunities			
1 - I-95 from Miami to Titusville	Route long-haul trucks to Fl Tpk	HOV lanes available to trucks in off-peak hours	I-95 and Fl Tpk operated as one facility in north	20-mile separate median facility through St. Lucie, Indian River, and Brevard Counties
2 - I-95 from Daytona to Jacksonville	Covert existing N/S mixed use lane through Jacksonville to truck-only lane	Establish exclusive truck land on one side of loop		
3 - I-75 from Naples to Ft. Myers	Widen I-75 to inside and create exclusive truck lanes			
4 - I-4 from Tampa through Orlando to Daytona Beach	Allow commercial vehicles to use potential HOT lanes on I-4 in Orlando area	Off-peak use of potential HOT lanes by commercial vehicles		
5 - I-75 from Venice to Florida State line	Exclusive truck-only facility (marked lane or separated lane) on southern section of corridor	Last "widening" on northern section reserved for exclusive truck use		
6 - I-10 from Lake City to Jacksonville	Corridor has sufficient width to accommodate even a separated facility within existing ROW	Consideration should be given to 300 miles of I-10 east of I-75		

WITHIN CITIES MODEL

The scores for the within cities model were lower scores; however, this is not to suggest the importance of the routes identified by this model are less critical than those identified in the between cities model. The different variables used and their associated weightings account for these differences. As in the Between Cities Model, the Within Cities scores are a ranking of relativity, that is, the scores represent a highway or highway segment's position to all other highways on the State Highway System. Based on the model scores, the areas of Miami, Jacksonville, and Tampa were examined more closely for potential opportunities to enhance freight mobility through the use of exclusive truck facilities.

This model attempts to find areas of need to carry freight "the last mile." While much attention is usually given to through and interstate movements of freight, often a critical constraint is moving from an intermodal transfer point to a higher level of the transportation system. The National Highway System Connectors (NHS Connector) recognizes these critical links and the problems often associated with provision of quality service for the "last mile."

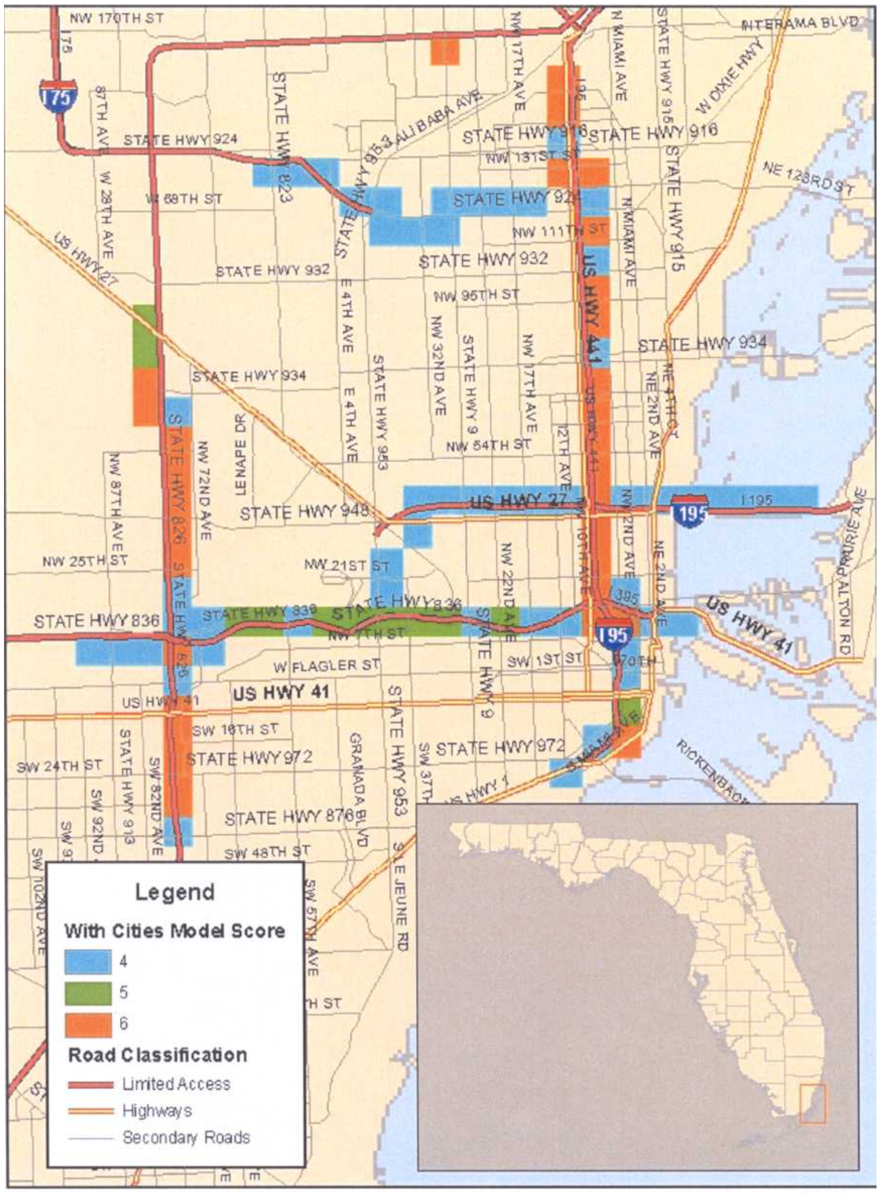
What follows are brief discussions concerning each of the three areas.

Site 1- Miami

The Miami area has scores varying between 4-6. The Miami area actually constitutes areas in both Miami and Fort Lauderdale (see Maps 5.13 and 5.14). The presence of the ports and airports in the region contributes to the high scores in the area. Around the Miami International Airport, the highest scores occur on I-95 south of the Palmetto Expressway interchange south to the East-West Expressway. The truck volume on this stretch of I-95 is 14,248. The total volume for the segment is 191,500, giving the segment a truck percentage of 7. To the west of the airport on the Palmetto Expressway, the model generated scores of 6 from U.S. 27 south to 40th Road (State Hwy 876). The truck volume for this segment is 10,885, and the percent of trucks is 5%. Overall, the segment of the Palmetto Expressway has nearly 200,000 daily vehicles. South of the airport, on the East-West Expressway, the model generated scores of 4 and 5. These scores occurred between I-95 and the Palmetto Expressway and just west of the Palmetto Expressway. The area includes many identified truck terminals and several intermodal facilities.

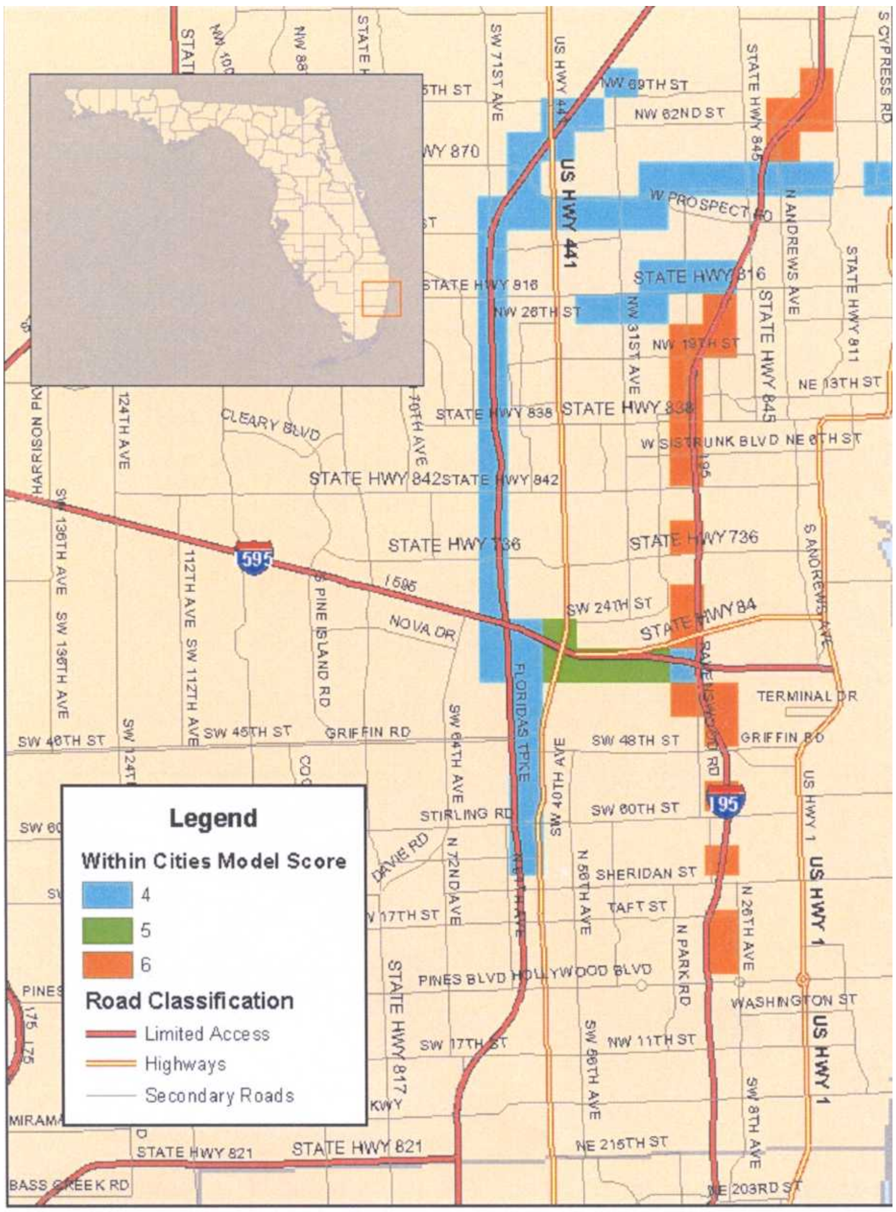
In the area near the Ft Lauderdale airport, the model recorded scores of 4 through 6. A near continuous segment with a score of 6 occurred on I-95 from south of the interchange with I-595 to the intersection of I-95 and State Highway 816. The truck volume along this stretch of I-95 ranges from over 18,500 to 22,000 daily trucks, which constitutes 7% of the total traffic. The segment on I-595 between I-95 and the Florida Turnpike has a score of 5. This segment had

Map 5.13.
Site 1, Miami and Ft Lauderdale
Within Cities Model (Miami Area)



truck volumes of 10,770 representing nearly 7% of the traffic. The model scored the Florida Turnpike a 4. This segment of the Turnpike is south of the I-595 interchange and continues north until it intersects with US Highway 441. For this segment of the Turnpike, the traffic volumes are 74,000 vehicles, and the truck volumes range around 3,800 to 4,000, constituting a truck percentage slightly below 6%. Additionally, part of State Highway 870, between the Turnpike and I-95, scored a 4 by the Within Cities Model. The truck volume for this segment is 2,042, constituting 3% of the total traffic.

Map 5.14.
Site 1, Miami and Ft Lauderdale
Within Cities Model
(FT Lauderdale Area)



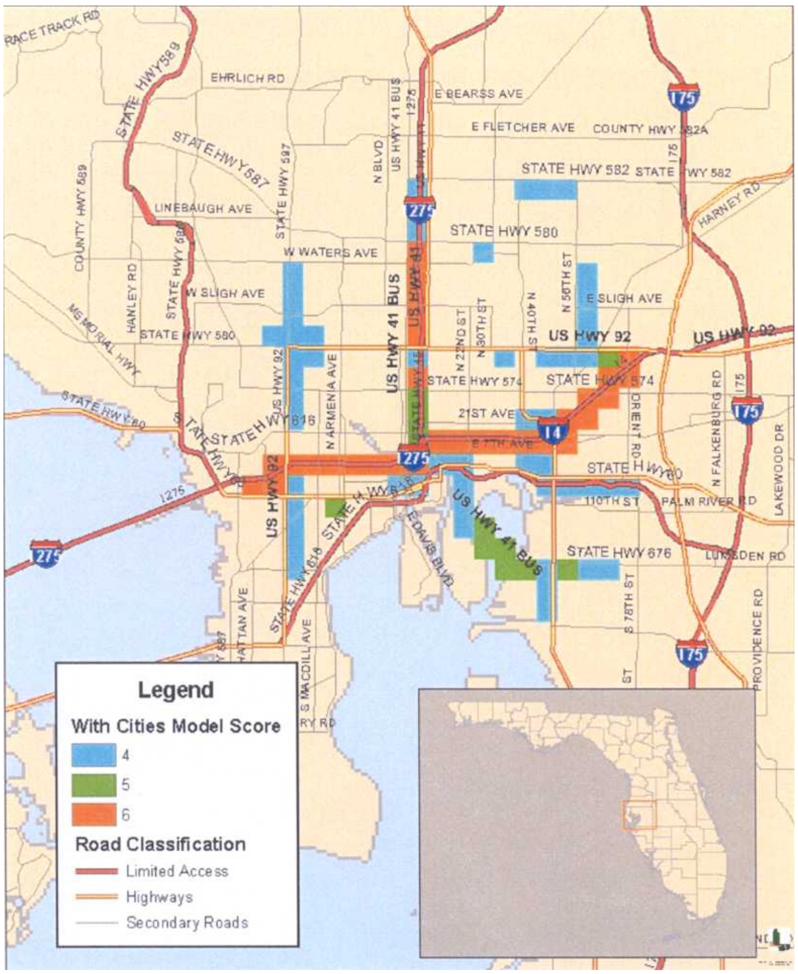
The need to establish more efficient north-south access was established in the discussion of Corridor 1 (Miami to Titusville) and is further demonstrated in this analysis. The need that emerges as different in this model is the east-west demand. The intense distribution activity that has developed (and continues to develop) in the areas in Miami west of the airport along the 72nd Avenue/Palmetto Expressway generates significant truck traffic. The ability of this traffic to move to and from the major port facilities of Miami and Miami International Airport is impeded by the lack of any free flow east to west facility.

The concept of a truck tunnel in and out of the Port of Miami has been studied for some time and would alleviate some of the congestion depending on its western terminus. Because this new proposed facility would not extend far enough west to the distribution centers in the area wewst of the airport, additional east-west capacity for commercial traffic may still be warranted. Although extremely expensive and not easily constructed, perhaps an elevated facility on one of the east-west toll roads, SR 112 or SR 836, for use by automobiles and the existing at-grade lanes reserved for trucks is viable for at least study.

Site 2 - Tampa

In Tampa, Interstate Routes 4 and the east-west portion of I-275 scored a 6 in the Within Cities Model (see Map 5.15). This high score continues eastward on I-4 west of US Highway 301 to Orient Road. The truck volume on that segment is approximately 15,000, constituting between 11% and 14% of the total traffic.

Map 5.15.
Site 2, Tampa Within Cities Model



At the interchange of I-275 and the Veterans/State Highway 60 Interchange, the truck volume is approximately 19,500, and the truck percentage is between 10% and 11%. North of the I-275 and I-4 interchange on I-275, the model scored the segments between 4-6. North of State

Highway 580, the model scored a 6. The truck volume on that segment ranges from 10,000 to 20,000, with truck percents from 8% to 14%.

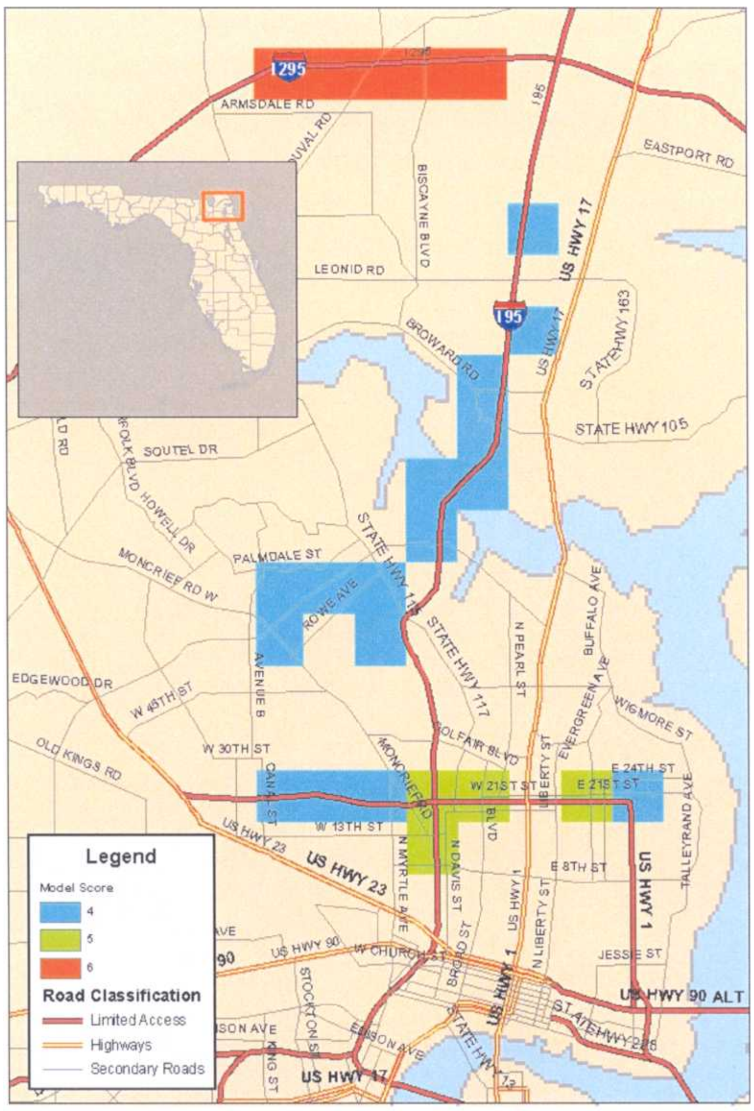
The high scores on the Interstates in Tampa are not unique to this model. The Between Cities Model also scored these sections as some of the highest in the state. What is different and significant in this Within Cities look at Tampa is the relatively high scoring and length of a corridor leading out of the port area towards the Interstate via Causeway Boulevard. These characteristics, combined with the examination of the I-75 corridor in the Between Cities model, seem to indicate the need for more direct expressway access to the area around Tampa's port.

Currently, truck traffic moving to and from the port that is destined for all points other than west, must wind its way through the local system. A project that may provide relief to this situation is the proposed I-4 connector with the Crosstown Expressway (SR 618). The connector will allow easier movement from areas in south Tampa to the Interstate 4/275 corridor. Perhaps special accommodation for Port of Tampa truck traffic could be incorporated into the design of this project. This could potentially remove additional truck traffic from city streets and provide added east-west access via the Crosstown as well as create the connection to directly to Interstate 4.

Site 3 - Jacksonville

The Within Cities Model for Jacksonville (see Map 5.16) indicates that the northwest section of Interstate 295 scored 6 with a truck volume of 12,911 and a truck percentage of 29%. U.S. 1 (20th Street Expressway) and a small portion of I-95 both scored 5 with truck volumes of 8,000 daily and 13 percent truck traffic. Other high scoring segments include other portions of U.S. 1 in Jacksonville and the northern sections of I- 95 near Dunn Avenue that had between 5,000 and 5,500 trucks daily with the mix of trucks ranging from 7 to 11 percent.

Map 5.16.
Site 3, Jacksonville Area Within Cities Model



The Jacksonville Between Cities Model discussion dealt with the potential for I-295. This section is, however, the highest scoring segment in this urban area, and its proximity to Jacksonville International Airport has driven its score above other sections of I-295. The site-specific need that this model attempts to locate seems to be for the U.S. 1 area from the port activity along Tallyrand Avenue to I-95. The opportunities outlined in the Between Cities discussion of the Jacksonville area would seem to have little potential impact on what appears to be a local access issue. Perhaps an Origin and Destination truck study along with detailed interviews with operators using this corridor are in order (unless a recent study has been done). This would be required before any recommendation could be made for this area, particularly given that the model used in this study only dealt with state highways. The nature of the Tallyrand access area requires detail for the local street system as well as the SHS.

Summary of Within Cities Sites

Table 5.15 summarises the characteristics, scoring, and opportunities for the Miami, Tampa, and Jacksonville Within Cities sites.

Table 5.15 Overview of Sites

Site 1 - Miami			Site 2 - Tampa			Site 3 - Jacksonville		
Score: 4-6	Truck Volume	Truck %	Score: 6	Truck Volume	Truck %	Score: 6	Truck Volume	Truck %
Around Miami International Airport; highest scores I-95 south of Palmetto Parkway interchange south to East-West Expressway	14,248	7%	I-4 and E/W portion of I-275 easyward on I-4 west of U.s. 301 to Orient Road	15,000	11-14%	NW Section of I-295	12,911	29%
Score: 9	Truck Volume	Truck %	Score: 6	Truck Volume	Truck %	Score: 5	Truck Volume	Truck %
West of Airport of Palmetto Expressway from U.S. 27 south to 40th Road (State Route 876)	10,885	5%	I-275 and Veterans/State Highway 60 interchange	19,500	10-11%	U.S. 1 (20th Street Expressway); small portion of I-95	8,000	13%
Score: 4-5			Score: 4-6			Other high scoring segments	Truck Volume	Truck %
South of Airport on East-West Expressway between I-95 and Palmetto Expressway and just west of Palmetto Expressway			North of I-275 and I-4 interchange on I-275			Portions of U.S. 1 in Jacksonville; northern sections of I-95 near Dunn Avenue	5,000-5,500	7-11%
Scores: 4-6, Ft Lauderdale Airport								
Score: 6	Truck Volume	Truck %	Score: 6	Truck Volume	Truck %			
On I-95 from south of I-595 to I-95/SR 816	18,550-22,000	7%	North of State Highway 580	10,000-20,000	8 - 14%			
Score: 5	Truck Volume	Truck %						
On I-595 between I-95 and Florida Turnpike	10,770	7%						
Score: 4	Truck Volume	Truck %						
Florida Turnpike south of I-595 interchange north until U.S. 441	3,800-4,000	5%						
Score:4	Truck Volume	Truck %						
Part of State Highway 870 between Florida Turnpike and I-95	2,042	3%						
Significant east-west demand in Miami west of airport along 72nd Avenue/Palmetto Expressway; ability to move to and from major port facilities of Miami and Miami International Airport impeded by lack of any free flow east to west facility			Relatively high scoring and length of a corridor leading out of the port area toward the interstate via Causeway Boulevard results in a need for more direct expressway access to the area around Tampa's port			Site specific need: U.S. 1 area from port activity along Tallyrand Avenue to I-95		
Opportunities			Opportunities			Opportunities		
Truck Tunnel would alleviate some congestion dependent upon its western terminus; study potential for elevated facility on an E/W toll road for autos with existing at-grade for trucks.			Proposed I-4 connector with Crosstown Expressway may provide relief to truck traffic moving to/from the port destined for points other than west; incorporate special accommodation for Port of Tampa truck traffic into design.			Between cities opportunities fail to impact this local access issue; conduct origin & destination truck study with detailed interviews of operators using area; analysis limited due to study parameters based on State Highways only.		

Chapter 6

ADDITIONAL CONSIDERATIONS

Reserved Truck Lanes and Truckways in Florida

The GIS models, as developed, provide the user with a great deal of flexibility in describing the area to be studied. During the initial stages of input, data that are not only highly specific but also broad based will provide a final product that is more reflective of the areas surveyed. The more current, accurate, and comprehensive traffic data, the more clearly the output of the model will reflect actual traffic movement within the segment studied. Every attempt should be made to obtain actual traffic counts for vehicles by type. Identification of peak travel periods and the volume relationship between trucks and non-trucks will also improve the quality of the model's output. These rules apply as well when predicting future traffic. I-75 in west Central Florida is an example of a unique mix of interstate through-traffic, localized commercial traffic, commuter traffic, and recreational traffic. A single variable, such as the seasonal citrus harvest, which increases the use of the interstate by agricultural trucks, can diminish highway capacity. Future traffic projections based on consistent, well-documented trends will enhance the validity of the model's results.

Identifying why a driver chooses one route over another is as important as the current route the truck is using. Interviews with shippers and drivers and compilation of origin and destination data will yield this type of information. As noted earlier in the report, new distribution centers have sprung up in a variety of areas and are "too new" to be identified on existing maps or listed in other resources. Every attempt must be made not only to identify the location of distribution centers but also to determine the common routes of travel to and from the centers. The nature of commodity flow into and out of areas is also a significant piece of information. While the Port of Tampa may not lead the state in value of cargo handled, 25 million tons of phosphate, and the aviation fuel for Tampa and Orlando Airports that move through the port must be counted in the equation. Shifts in commodity flow on the road, in the air, and at seaports dictate truck movements within and across state boundaries.

The nature of the routes, as they exist today, as well as planned changes and new routes to be added in the future are critical in forecasting need. Trucks typically choose the path of least resistance with the driver attempting to reach a destination as quickly as possible with minimal disruption. As indicated in Chapter 5, the opening of the southern connection of State Route 9A to mainline I-95 on the south side of Jacksonville will provide north/south traffic three alternative routes through the city. Detailed modeling and origin/destination work are required to determine any time saving advantages.

Variables that can serve as roadblocks to the driver include the roadway's Level of Service (LOS), truck crash rate, and adjacent land use, which all affect capacity and flow. The FDOT has developed a new way to calculate LOS that offers far more accuracy than the existing methodology. In addition, FDOT has a current contract with the University of Florida to develop truck LOS for the entire state. Integration of truck LOS and the results of the improved LOS methodology into the GIS modeling process are significant steps in insuring quality output. Safety is a notable issue within FDOT, and continual upgrades in roadway characteristics are made to enhance safety. While the use of 1998 and 1999 data was appropriate to determine the efficacy of the models under development, timely truck crash information is critical in evaluating the potential of selected segments. Construction of facilities and changes in the disposition of land adjacent to roadways are also vital pieces of information to be included in the modeling process.

After evaluating the suitability of segments on the state highway system for reserved truck lanes, a variety of factors must be used to evaluate further each of the specific sites. Factors for evaluation include: availability of existing rights of way, interchange spacing, existing lane restrictions, proximity to alternative routes, and closeness to roadway services, such as rest areas and commercial vehicle inspection stations.

Chapter 5 of the report details the variance in median width through six Between Cities corridors; long expanses of uninterrupted median were rare. The absence of available right of way could preclude the creation of additional capacity in any form. Close interchange spacing with multiple access points could also decrease the possibility of expanding throughput capacity or by-passing a recently constructed weigh station or service area could also eliminate the alternative route. Fatal flaws, such as these, along with sensitive environmental issues often serve as the final test in determining project potential.

Chapter

7

CONCLUSIONS & RECOMMENDATIONS

Reserved Truck Lanes and Truckways in Florida

OVERVIEW

The product of this research project is a methodology to identify problem areas on a highway system associated with the movement of freight by truck that may be appropriate for special use lanes or exclusive facilities. The product is a GIS-based model-building tool created from an off-the-shelf ESRI software package. The methodology included several truck-related criteria and is designed to be easy-to-use and adaptable to specific localized conditions. Each criterion is entered into the model as a percentage, and users of the model are able to adjust the percentages according to their particular need. End users will also be able to add or withdraw criteria as the individual scenario warrants.

By applying the methodology and reviewing the corridors for other considerations, six Between Cities corridors emerge as having the highest potential in Florida. In addition, there are at least three specific areas where an accommodation for commercial traffic may be warranted as well. While the methods employed here may have direct use in Florida, more refined input data that will be available shortly would increase the reliability of the results.

What is clear is that a process to screen an entire highway system first and the application of more detailed analysis is a recommended approach for establishing a “short list” of those areas where the use of exclusive truck lanes or truckways may be suitable.

SUMMARY OF FINDINGS

Specific findings for the areas that emerged from employing the methodology were discussed in Chapter 5. There are, however, generalized findings as well. Because of the weightings given in the GIS model, most of Florida’s Interstate System emerged as the most suitable highways for consideration of exclusive truck facilities. The most obvious opportunities to create a truck exclusive facility are where the need seems apparent and the right of way exists to create new lanes for a facility as opposed to “taking” a lane from existing users. The typical cross sections of facilities were presented in Chapter 2 from the TTI Study. An ideal separated facility would provide for ease of passing and adequate shoulders for disabled trucks. This kind of a facility, if it were to be constructed in the median, would most appropriately be situated in areas where interchanges are far enough apart to avoid the long weave sections that would be required for entering and exiting trucks and require approximately 60-feet of right of way. This separate facility type seems to fit only the Interstate 10 corridor west of Interstate 295. Although the interchange spacing seems appropriate on Interstate 75 north of Tampa, long sections of the northern part of the corridor have insufficient median.

A four-lane facility of this type was estimated to cost roughly $6 million per mile in 1987. Updating that cost to 2002 dollars, using the Consumer Price Index for the transportation sector, yields a per mile cost of nearly $9 million, translating into a ballpark estimate of $540 million for the 60 miles of I-10 from I-275 to Lake City. There are also rural portions of the two Interstate 95 corridors where this kind of facility would fit, although it could not continue to as logical a terminus as the I-10 route. There are less expensive alternatives. A three-lane facility, with an alternating passing lane is estimated at under $6 million per mile, and adding a lane that is signed and marked (and not physically separated) would cost significantly less.

Not having peak hour traffic counts for the entire SHS makes it difficult to apply the Janson and Rothi economic feasibility test also referenced in Chapter 2. Their work indicated that to warrant a barrier separated exclusive truck facility, a highway should have a peak hour volume in excess of 1,800 vehicles per lane per hour, off peak volumes of 1,200 vehicles per lane per hour, and traffic be comprised of at least 30 percent trucks. FDOT might consider running this analysis on the highest scoring Between Cities highway segments, although it appears that from this body of work that areas that exceeded 30 percent trucks do not have the AADTs that indicate such high peak hour per lane volumes.

As mentioned in the national case studies, although many agencies have and are studying exclusive roadways for trucks, the only facility close to a true truckway is the 33.5-mile, “dual-dual” section of the New Jersey Turnpike. Although there are sections of Florida’s Interstate System that rival the highest traffic sections of the Turnpike, the percent of trucks in these areas are lower than the 15 percent on average that New Jersey reports; however, with the continued growth in all traffic, and the demand for truck movement not appearing to cease any time soon, the traffic profiles will approach those of New Jersey. From public policy and public perception standpoints, it may more advisable to create traffic separation by excluding trucks from “express lanes.” The precedent for truck lane restrictions is already set. This approach also advantages both constituencies while avoiding the perception that heavy public investment is being made only for one industry.

An interesting, yet not surprising finding, is the inverse relationship of high truck percentages to high overall AADT. The relationship is indicated in Figure 7.01 and was generally found in the 6 Between Cities Corridors.

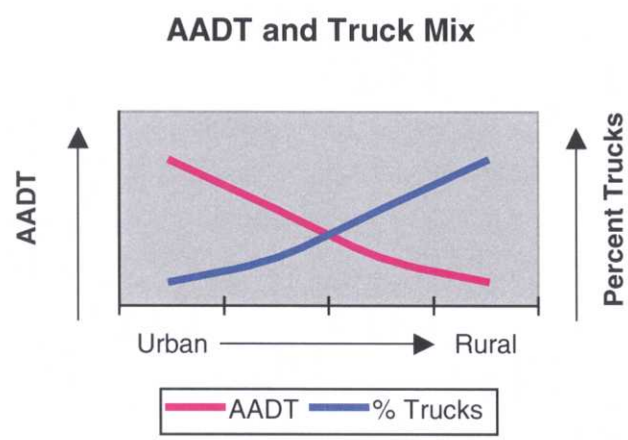


Figure 7.01. Relationship of Truck Percentage to AADT

Source: RCI Database, FDOT Statistics Office, 2000.

The outcome of the abandoned railroad alignment investigation in the state, outlined in Appendix B, allowed researchers to speculate about potential short, medium, and long-range opportunities to improve truck movement in Florida. For example, a recently abandoned 13-mile line from Leesburg to Wildwood may potentially contribute to improvements at one of the highest truck volume areas in the state (the confluence of Florida's Turnpike and Interstate Route 75). Other abandoned lines in and around Bartow may play a role in site-specific improvements related to US 27 in Polk County. The abandoned Florida East Coast Railway alignment from Okeechobee through Ft. Drum to Geneva might also be a factor in north-south movements. It is important to note, however, that these examples are purely hypothetical. A great deal of additional investigation is necessary to determine the true extent to which abandoned rail alignments could be a factor in improving truck movements throughout Florida.

A system-wide approach to looking at this issue may present some additional opportunities not specifically addressed in the methodology employed in this study. Without the benefit of detailed origin and destination information for commercial traffic, it is difficult to understand how much of the demand for truck capacity on a particular route is a function of the fact that an interstate exists to facilitate movement. Said another way, can one assume that the truck traffic moving along I-95 would be somewhere else if similar speeds and access to origins and destinations were provided?

The most efficient way to serve the distribution of traffic, or most commodities requiring a fixed infrastructure, is by way of grid. It may be prudent to give consideration to creating a system of “truck-friendly” highways to make any desired movement more efficient. The system could rely on existing state highways and minimize the need for new construction on new location. A cursory review of the SHS does indicate that the base system is in place and few critical gaps would have to be closed. It does not seem feasible to create exclusive truck facilities along all of the six Between Cities corridors. Perhaps a hybrid solution of creating exclusive lanes or separate facilities where they are warranted and can be constructed, combined with the creation of truck “backbone” for the state is a more prudent solution. Map 7.01 shows the concept of such a system.

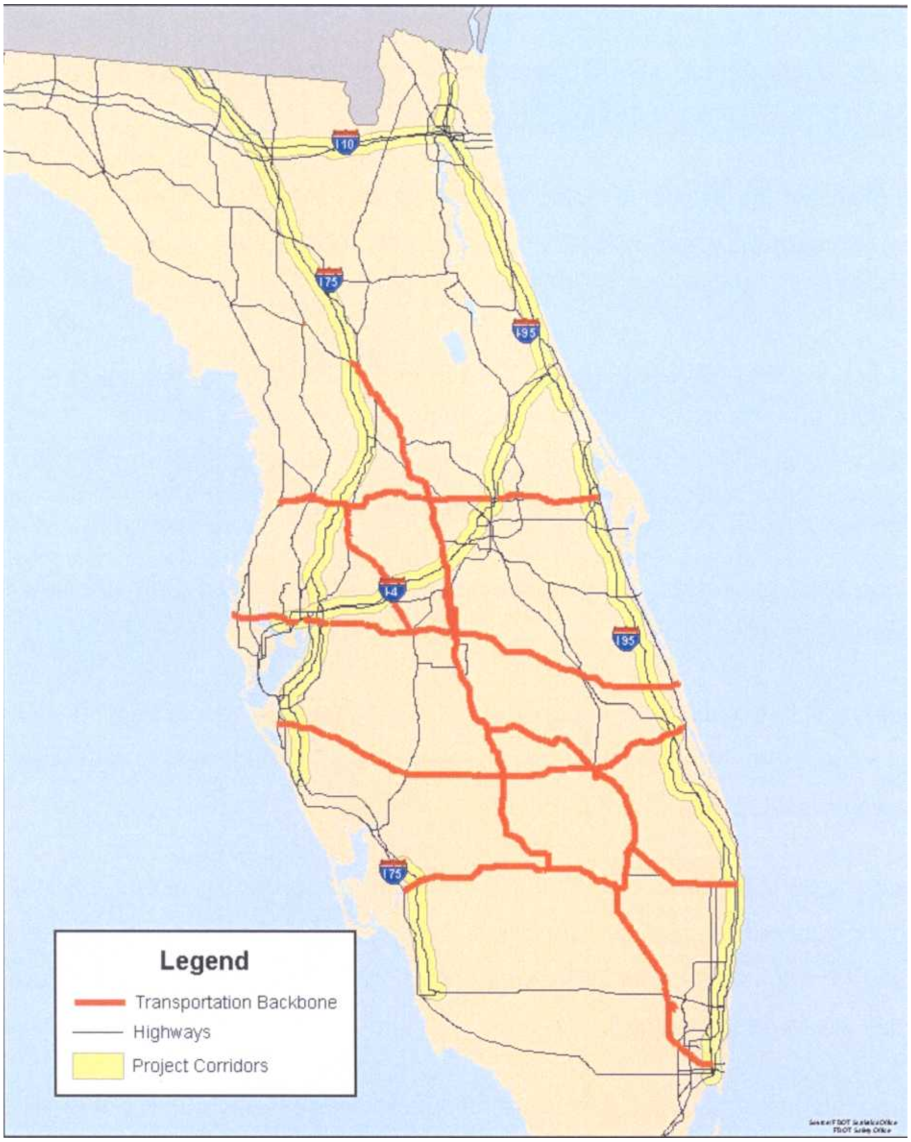
The backbone would rely on the existing state highway network of U.S. Routes 27 and 441 in south Florida and Florida’s Turnpike to Wildwood to create an alternative for north-south movement. Major east-routes could include State Routes 80, 70, 60, and 50 to accommodate connections to the north-south spine from the coastal interstates. The same concept could be applied in the “panhandle” where north-south connections to I-10 from Pensacola (for example) could be treated in the same manner. Future improvements to all of these facilities could be made with major truck movements in mind. The “truck grid” or backbone could evolve over time within the context of a plan to provide maximum connectivity and alternatives to the congested urban sections of the Interstate System.

The grid system described here is for illustrative proposes only and is conceptual. The characteristics of and the plans for these connectors were not examined in detail in this study. The concept of providing a combination of truck lanes on appropriate sections of the interstates along with the grid does, however, seem to merit consideration.

METHODOLOGY IMPROVEMENTS

While the Suitability Models that were run for this study seemed to be accurate in screening the State Highway System for areas of high truck impacts, to be a more useful planning tool, the model inputs should be forecasts. Future traffic projections with estimates of percent trucks along with land use plan data that indicate zones of development targeted for Intermodal or distribution and warehousing would help planners to predict where the areas of suitability will be (as opposed to where they exist today).

Map 7.01. Non-interstate Transportation Backbone



Further, the new Levels of Service that are being developed are more accurate than those used in this study. University of Florida researchers are developing a truck level of service measure for FDOT. This too would be an extremely helpful input to the GIS screening tool. Truck count data were suspect, being derived in many cases from actual counts of two or less days in a year. Better truck crash data are being developed and should be available as early as the summer of 2002. Last, the Florida site visits and fieldwork verified that the while the data for truck terminals accurately depicted where in a region this activity was prominent, the data are in need of updating.

RECOMMENDATIONS

- The results of this study should be immediately shared with those working on the Interstate 10 National Freight Study as input.

- A briefing should be provided to those involved with the detailed work of the FDOT Strategic Intermodal System (SIS) Plan Development to facilitate incorporation of these results.

- If the FDOT is interested in pursuing the concept of exclusive truck facilities further, forecast data and the more refined inputs mentioned above should be run through the GIS screen. Classified traffic counts, the “new” LOS data, and the truck crash rates would all be helpful along with peak hour volume per lane.

- The Florida Strategic Freight Network database should be updated (perhaps as a part of the SIS work).

- The addition of left exits and entrances in future interstate reconstruction should be carefully considered given that this design element is an impediment to any special use of a highway’s inside lanes.

- Prior to consideration of capital-intensive solutions to providing more efficient truck movements, a review of potential operational changes should take place. Times of day restrictions for trucks, use of HOV lanes in the off-peak periods, and truck exclusivity by time of day are three examples.

- Future improvements to a designated set of “truck facilities” should be made with truck measurements in mind. A “truck grid” or backbone could evolve over time within the context of a plan to provide maximum connectivity and alternatives to the congested urban sections of the Interstate System.

- Further analysis on the economics of providing exclusive truck facilities is warranted. Decision-makers require information on the financial relationships between the high cost of providing truck-only facilities and the potential savings due to safety improvements and less pavement damage on “non-truck” routes.

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Appendix

A

SUITABILITY SCALES

Reserved Truck Lanes and Truckways in Florida

Table A.01 Suitability Scale

	Between Cities Model			Within Cities Model			Regional Model		
Factor	Weight	Input Variables	Scale Value	Weight	Input Variables	Scale Value	Weight	Input Variables	Scale Value
Truck Crash	5%	0-0.1996	1	5%	0-0.1996	1	5%	0-0.1996	1
		>0.1996	9		>0.1996	9		>0.1996	9
Level of Service	15%	A+B	1	10%	A+B	1	10%	A+B	1
		C	2		C	2		C	2
		D	3		D	3		D	3
		E	5		E	5		E	5
		F	9		F	9		F	9
Percent Trucks	5%	0.006-0.11	1	20%	0.006-0.11	1	10%	50.006-0.11	1
		0.11-0.17	5		0.11-0.17	5		0.11-0.17	5
		0.17-0.21	7		0.17-0.21	7		0.17-0.21	7
		0.21-0.33	8		0.21-0.33	8		0.21-0.33	8
		0.33-0.754	9		0.33-0.754	9		0.33-0.754	9
Truck Volume	75%	0-1965	1	30%	0-1965	1	50%	50-1965	1
		1965-4071	3		1965-4071	3		1965-4071	3
		4071-6935	5		4071-6935	5		4071-6935	5
		6935-14475	8		6935-14475	8		6935-14475	8
		14475-23002	9		14475-23002	9		14475-23002	9
Truck Terminal				9%	0-5	5	7%	0-5	5
					5-7	7		5-7	7
					7-9	9		7-9	9
TOFC				9%	5-7	5	6%	5-7	5
					7-9	7		7-9	7
					9-9	9		9-9	9
Ports				8%	0-1	1	6%	0-1	1
					2	2		2	2
					3	3		3	3
					4	4		4	4
					8	8		8	8
					9	9		9	9
Airports				9%	1-2	1	6%	1-2	1
					2-3	2		2-3	2
					3-5	3		3-5	3
					5-9	5		5-9	5
					9-9	9		9-9	9

Appendix
B

INVESTIGATION OF ABANDONED RAIL ALIGNMENTS IN FLORIDA

Reserved Truck Lanes and Truckways in Florida

As discussed earlier, the City of Boston converted an underutilized railroad alignment into an exclusive roadway for commercial vehicles (see Figure B.01). The desire to improve truck traffic flow associated with a large, urban-area construction project motivated this action. Although access to the roadway may not remain limited to commercial vehicles beyond the project period, the initial concept represents a unique and innovative use of an available transportation resource. This utilization of an existing railroad right of way prompted the FDOT Systems Planning Office to expand the scope of work associated with contract number BC353 RPWO #16 to include an investigation by CUTR of abandoned rail alignments in Florida.

Figure B.01. The Boston Haul Road was created from an underutilized railroad alignment.

For this task, CUTR completed an inventory of abandoned and inactive railroad alignments in Florida. Researchers examined county maps compiled and maintained by the FDOT Rail Office, which indicate abandoned rail alignments in the State. CUTR also examined literature and interviewed FDOT state and district-level rail officials, as well as industry and interest group representatives to learn more about the history and process of railroad abandonment.

BACKGROUND INFORMATION

In 1935, over 5,000 miles of active railroad lines existed in Florida. During the 65 years that followed, almost half of that alignment was abandoned. As of this writing, there are 2,873 miles of active rail lines in the State[34] (see Figure B.02). (The total reflects the most recent abandonment, a 13-mile line from Wildwood to Leesburg by Florida Midland Railroad.) Figure B.02 also shows that the rate of abandonment increased significantly after 1980. This occurred because the smaller "family line" railroads, such as the Seaboard and Atlantic Coast Line (ACL), began a process of merging their operations. As many alignments became redundant, the less active and/or less profitable parallel lines were eliminated. The resulting corporation, CSX, now controls the majority of active rail lines in Florida.

Figure B.02. Active Railroad Miles in Florida: 1935 - present
Source: Florida Rail System Plan, Florida Department of Transportation Rail Office. 1978, 1982, 1984, 1988, 1996, 2000.

ABANDONMENT PROCESS

Abandonment of active railroad alignments is managed at the federal level. The Interstate Commerce Commission (ICC) governed the abandonment process until its dissolution in 1995. The Surface Transportation Board (STB) assumed responsibility for approving petitions for abandonment.[35] Specific details of the process, which includes a formal application, filing fees, system map generation, public hearings, and appeals, are not included here. They are available from the STB Office of Public Services or online at (http://www.stb.dot.gov/publications/abbook.htm).

State transportation officials and industry representatives agree that financial considerations are the major driver in a rail operator's decision to abandon an active line. During the abandonment process, the STB weighs the costs involved to maintain an active rail line against the public need for service. Rail customers, be they passengers or shippers, have the opportunity to make a case against abandonment. However, in no instance will a railroad line be forced to continue operating a line that causes an unreasonable financial burden. In fact, according to the FDOT Rail Office, the rate of abandonment approval in Florida over the past 20 years has been 100%.

Some railroad transportation officials suggest that the abandonment process is prohibitive, and operators may be inclined to leave an alignment inactive, rather than complete the official process. Although a line may be used infrequently, it is still classified as active until the official abandonment process is completed. In some cases, lines are sold rather than abandoned. For example, CSX sold eight rail lines in northern Florida to short-line operators. Local interest groups may also act to save a specific line. Such was the case for the alignment from Ft. Myers to Arcadia.

Once abandonment has been officially approved, the railroad operator is free to dispose of the alignment. In most cases, the track and ties are immediately pulled up and sold, recycled, or destroyed. In Florida, the FDOT usually has the first opportunity to purchase the property (although there is no official agreement). In some cases, a "quick claim deed" is used to purchase the entire alignment. Under this arrangement, some portions of the alignment may have reverted to an easement holder, but the Department quickly assumes ownership of the remaining land. The FDOT will then work to purchase the reverted portions.

Once the FDOT has assumed ownership of the alignment, it seeks to manage and maintain the property in a way that will provide the highest level of safety and benefit to the public and protect the integrity of the corridor. Common uses for abandoned alignments include recreational trails, utility corridors, and highway capacity improvements. In most cases, the Department is interested in maintaining the alignment as a transportation corridor. For example, abandoned rail alignments were reused to construct Highway 1 in the Florida Keys, portions of Metrorail and TriRail, and the busway in Miami-Dade County. District offices and other departments are given the opportunity to provide input on potential uses for the property. In particular, the FDOT has a Memorandum of Understanding with the Florida Department of Environmental Protection (DEP) to facilitate the Rails-to-Trails program within the state. The Department may also decide to sell or lease the land, or to donate it to local governments (such as in the case of the alignment that is now the Pinellas Trail).

FLORIDA ABANDONED RAIL ALIGNMENT INVENTORY

The FDOT Central Rail Office maintains a book of county highway maps that indicate abandoned rail alignments in Florida.[36] The alignments are shown as "known" or "approximate." Maps are updated as new information is received. CUTR prepared copies of the maps for each of the 67 counties in the state and obtained the 2000 FDOT map of active rail lines in the state.[37] The information was compared with the 1999 Bureau of Transportation Statistics (BTS) railroad database.[38] CUTR used the BTS database to generate a base GIS map of railroad alignments. Using the FDOT Rail Office information, rail alignments were then coded as active or abandoned. In some instances, railroad alignments appearing on the BTS map were not accounted for by the FDOT. Such alignments were coded as BTS-only, status unknown. On the advice of CSX representatives, CUTR obtained *SPV's Comprehensive Railroad Atlas of North America (Southeast Edifion)*[39], which also shows active and abandoned railroad alignments. Researchers compared all sources and coded any remaining lines accordingly. The finalized railroad alignment inventory maps are found at the end of this Chapter. The database created to provide these maps has been forwarded to FDOT and can be accessed by using GIS software. Figure B.03 is an illustration of what the user of the database will see when retrieving information on a specific segment of rail that has been inventoried.

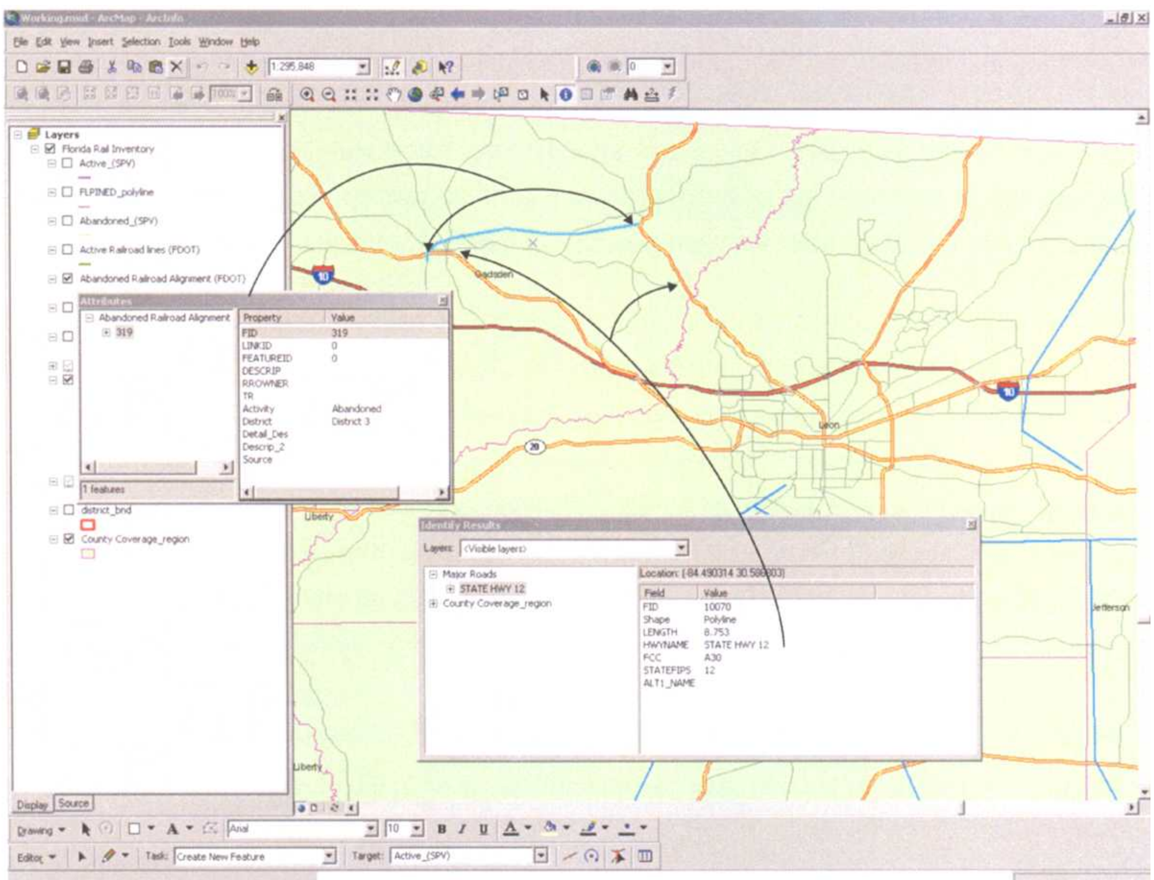


Figure B.03. Illustration of rail inventory database.

ANALYSIS

Although the FDOT Rail Office maps used for this inventory indicate abandoned alignments, in most cases researchers were unable to determine when the line was abandoned, who the current owner is, and what the current use of the property is. In many cases, the alignments have been paved over for use as a roadway, converted into a recreational trail, or the current owner has built a structure on them. For example, researchers attempted to locate the abandoned Atlantic Coastline Railroad alignment in Collier and Hendry counties. The alignment was not immediately apparent in the City of Immolkalee, while south of the city it appeared that the property was incorporated into improvements made to State Route 29 (see Figure B.04). Figure B.05 shows the alignment at Sears (north of Immokalee in Hendry County). The line is visible, but is not identified.

Figure B.04. Abandoned railroad alignment adjacent to Florida State Route 29, south of Immokalee.

Figure B.05. Abandoned railroad alignment at Sears in Hendry County, Florida.

Further investigation is needed to determine whether or not a specific alignment is available for use as a facility to improve truck movements. No abandoned rail alignment was found in some critical areas, including Broward County. Several priorities for the reuse of rail alignments have long been established, and facilitating the movement of freight is not among them. In particular, the Rails-to-Trails effort is well organized and enjoys strong public support. Additionally, the rate of abandonment in Florida has tapered off considerably in recent years. As such, the potential to utilize abandoned rail alignments as exclusive truck facilities may be quite limited. However, opportunities for short-range, site-specific facilities may become apparent now that the concept has been identified.

ABANDONED RAIL ALIGNMENT INVENTORY

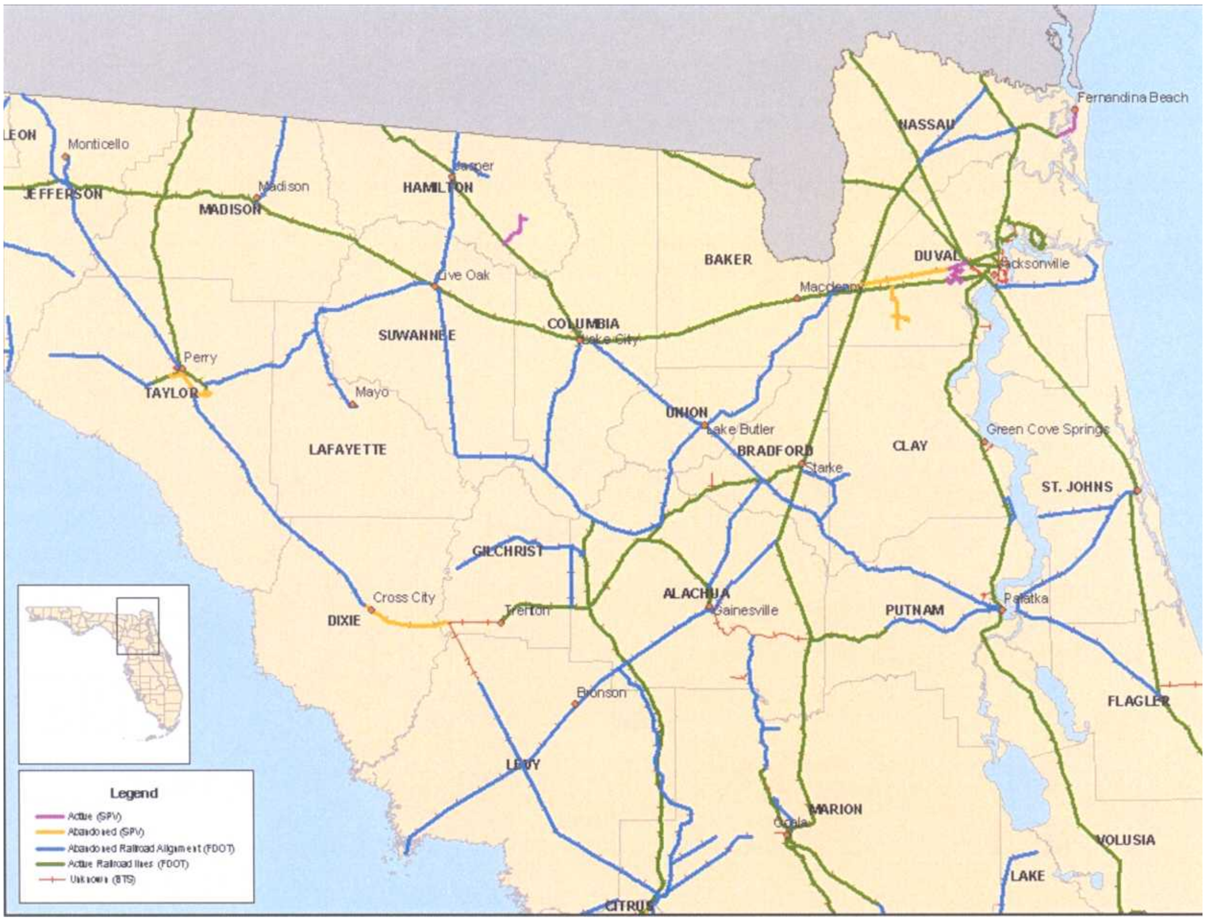
Reserved Truck Lanes and Truckways in Florida

- **Florida Rail System: Active & Abandoned Alignments, Mapped by FDOT District**

- **Rail System with Study Corridors**

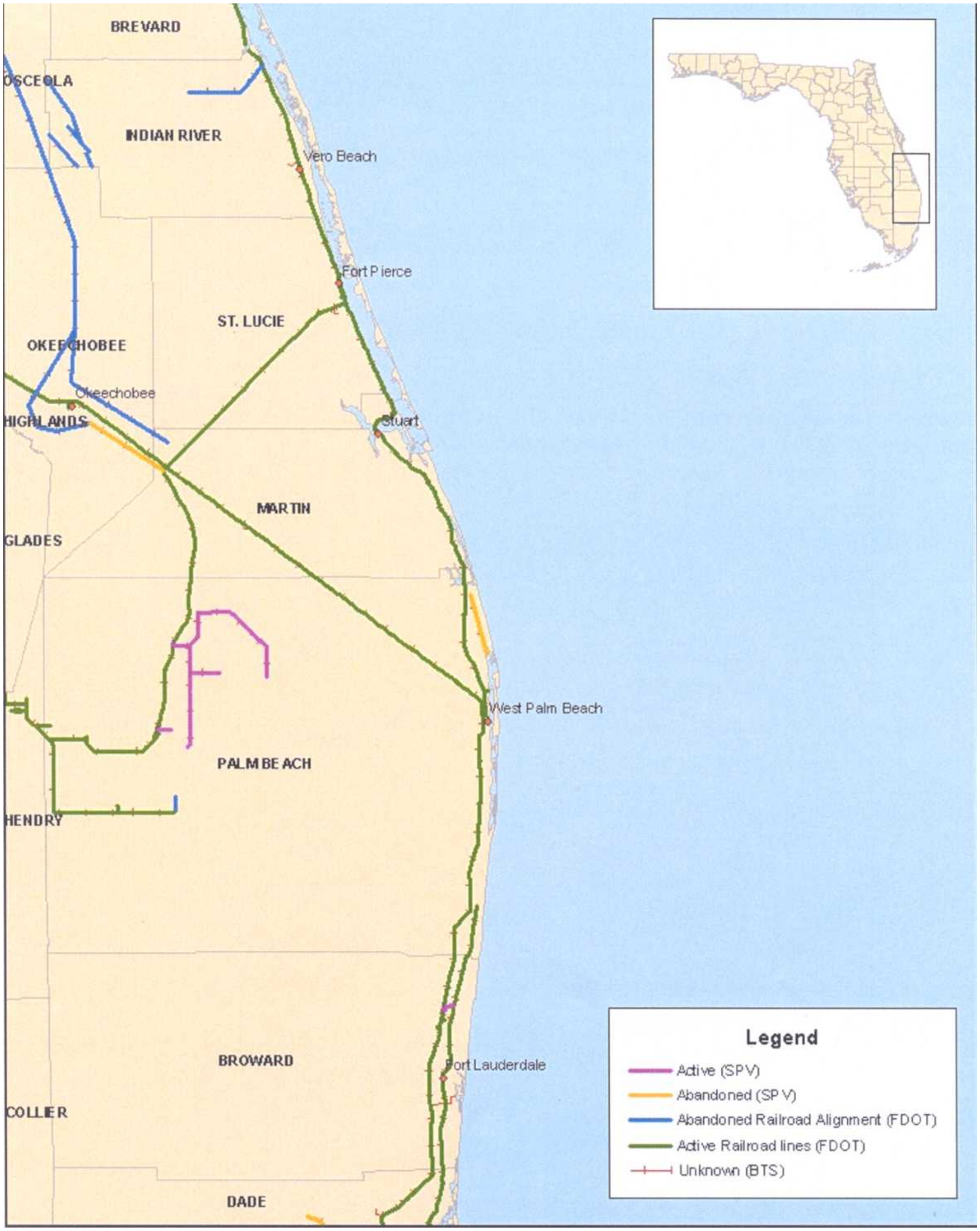
Map B.01. Abandoned Rail Alignment Inventory: FDOT District 1

Map B.02 Abandoned Rail Alignment Inventory: FDOT District 2



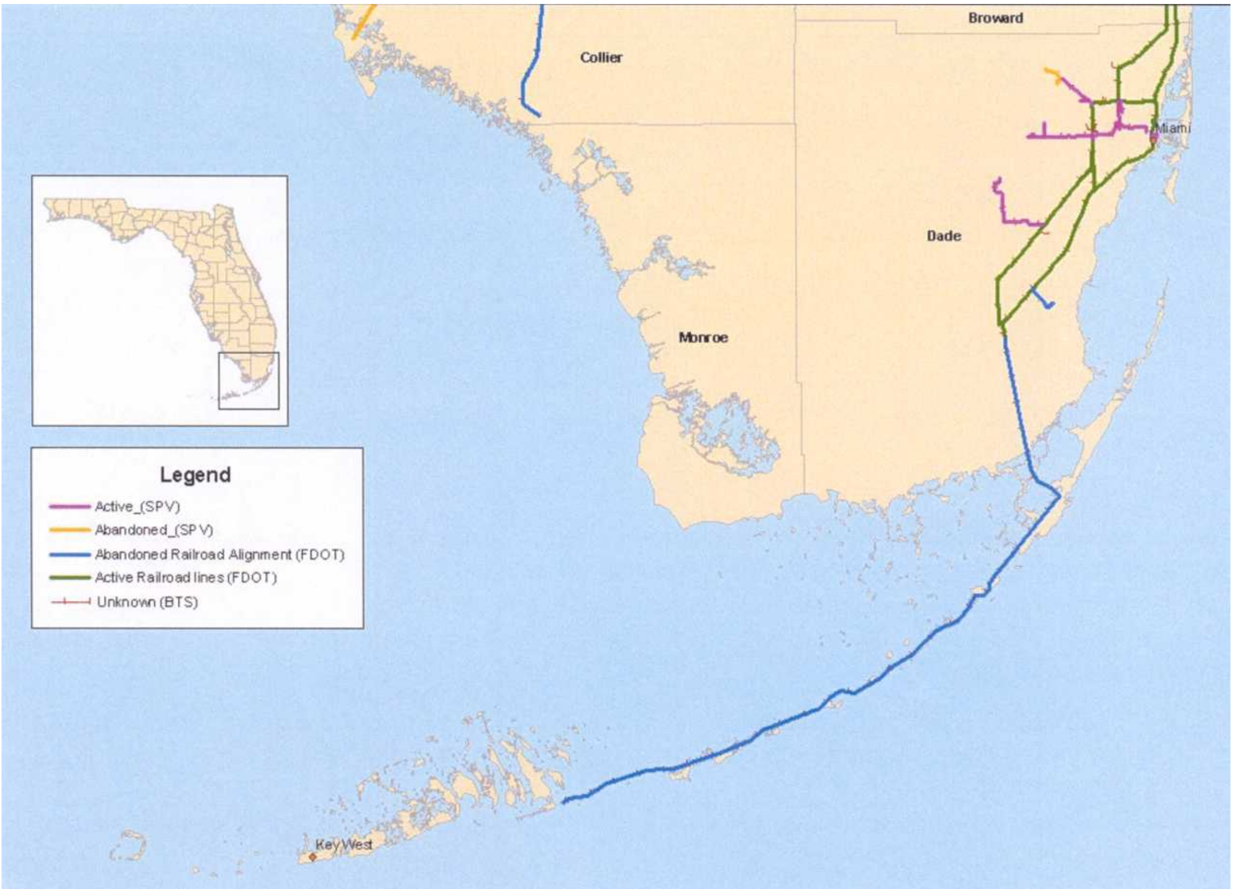
Map B.03. Abandoned Rail Alignment Inventory: FDOT District 3

Map B.04. Abandoned Rail Alignment Inventory: FDOT District 4



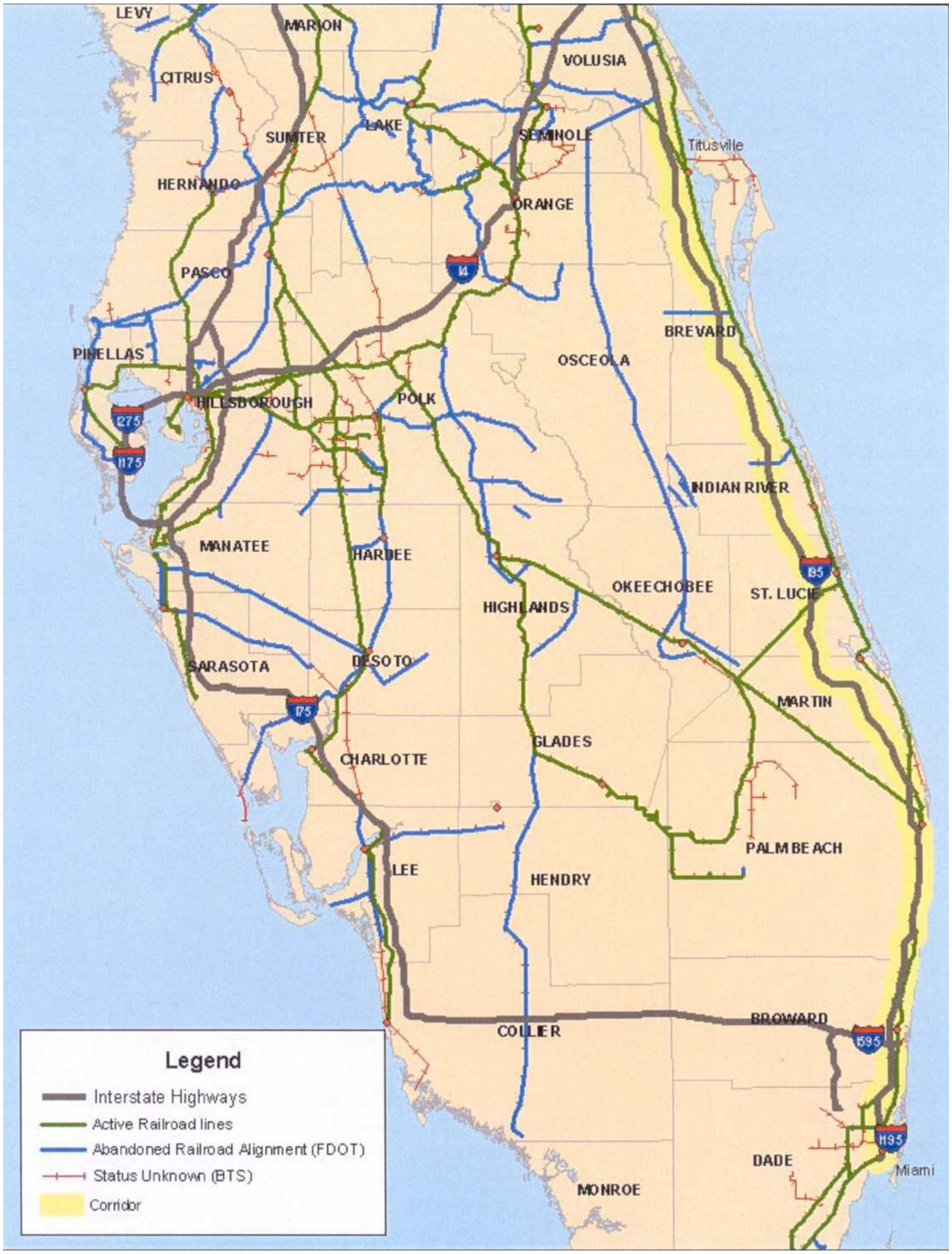
Map B.05. Abandoned Rail Alignment Inventory: FDOT District 5

Map B.06. Abandoned Rail Alignment Inventory: FDOT District 6



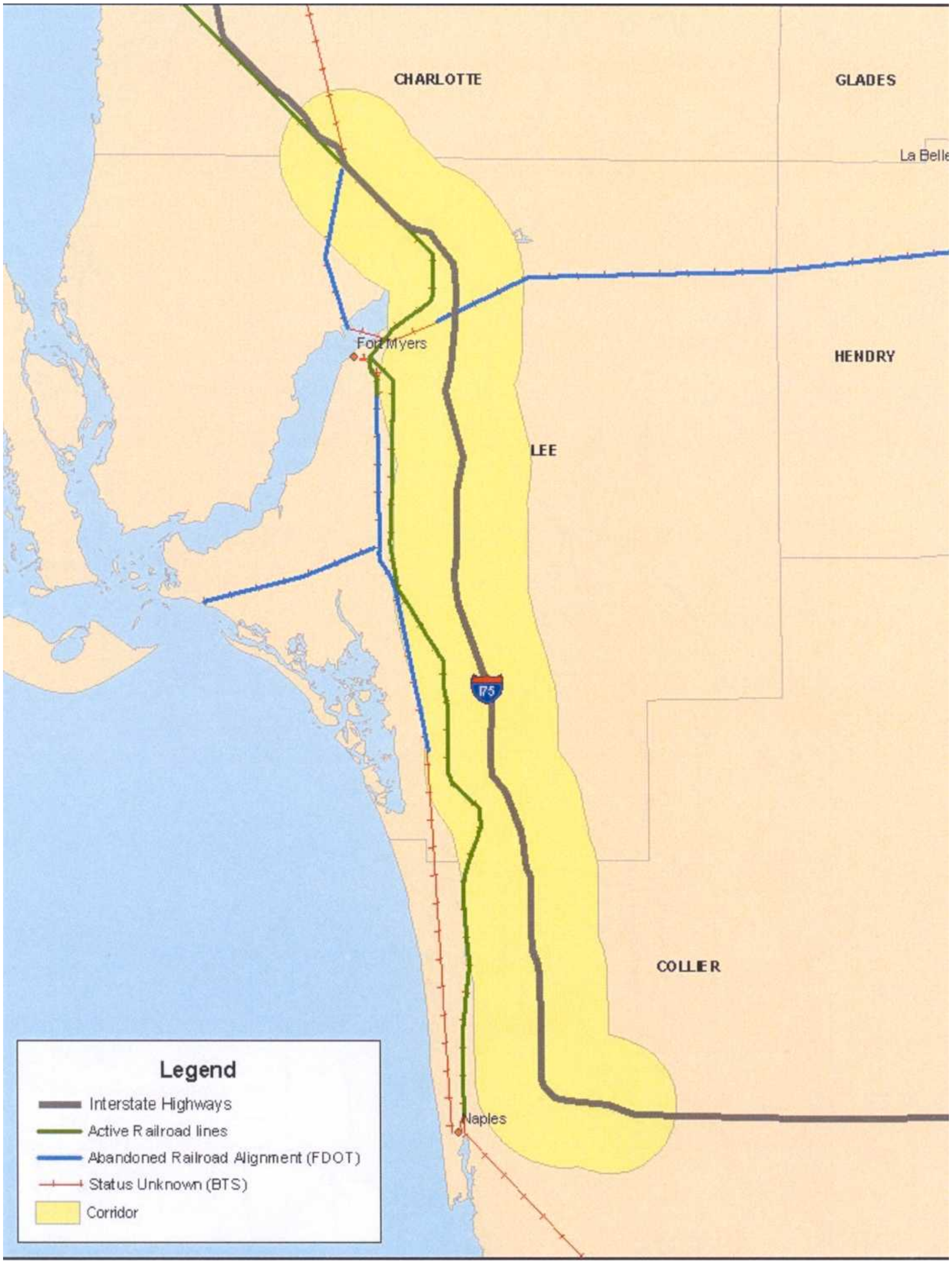
Map B.07. Abandoned Rail Alignment Inventory:
FDOT District 7

Map B.08.
Corridor 1 I-95 from Miami to Titusville

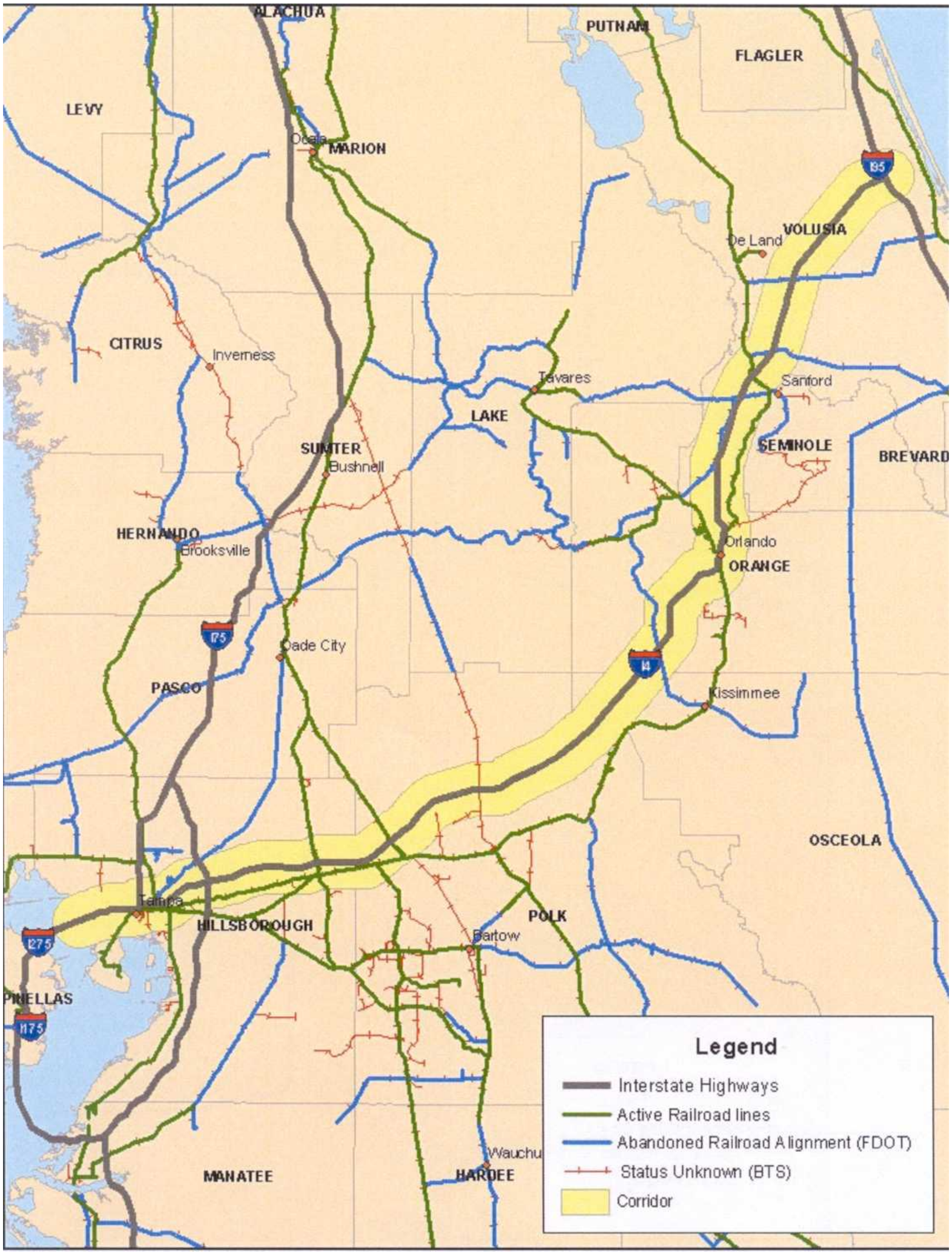


Map B.09.
Corrider 2 I-95 from Daytona to Jacksonville

Map B.10.
Corrider 3 I-75 from Naples to Ft. Myers



Map B.11.
Corridor 4 I-4 from Tampa through to Daytona



Map B.12.
Corridor 5 I-75 from Venice to Florida State Line

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Map B.13.
Corridor 6 I-10 from Lake City to Jacksonville

Appendix C

DIFFERENTIAL TRUCK AND AUTOMOBILE SPEED LIMITS

Reserved Truck Lanes and Truckways in Florida

As a method for dealing with increasing truck traffic and the potential safety and operational issues, several states have historically instituted different maximum speed limits. These differential speed limits or (DSL) have been widely debated as to their contributions to enhanced highway safety.

According to information form several sources (including US DOT, the American Trucking Association, and other motorist interest groups) ten states currently impose different maximum speed limits on the Interstate System within their states. In addition, of those ten states, six also use DSLs on other primary highways. The Florida Department of Transportation asked the Center for Urban Transportation Research, in a supplemental agreement to the main contract for the Potential of Truckways and Exclusive Lanes for Trucks in Florida, to perform a cursory review of the issue of DSLs.

Specifically, the request was to determine which of the states employ DSLs and to identify peer states that have, and to gather data on the effectiveness and costs associated with implementation of different speed limits for trucks and automobiles.

BACKGROUND

It is understood and fully accepted in the transportation safety field that crash severity increases exponentially with speed. What has been and continues to be argued is whether speed differential contributes to higher crash rates than absolute speed. There has been extensive research on this subject, particularly in light of the repeal of the national interstate speed limit of 55 mph in 1987. The Surface Transportation and Uniform Relocation Assistance Act allowed states to raise the speed limits on rural interstates from the 55 mph national speed limit that had been imposed as a result of the “energy crisis” of the 1974. Within 18 months of being eligible, nearly 90 percent of the nation's rural interstates had the speed limit raised to 65 mph. By 1995 the 65 mph limit had been abolished and states were free to establish maximum limits.

Two studies are referenced in this paper often and provide a solid background on the issue. They are *Safety Impacts of Different Speed Limits for Cars and Trucks* by Harkey and Mera in 1994 for the Federal Highway Administration, and *Impact of Differential Speed Limits on Highway Speeds* by Garber and Gadiraju in 1991 for the AAA Foundation for Traffic Safety. Although this work was done prior to the lifting of the 65 mph speed limit, it establishes a firm foundation for an understanding of the issues involved when contemplating a DSL.

Proponents of DSLs argue that:

- the shear mass of a large truck makes reduced stopping distance a clear reason for posting a slower limit,
- posting a lower speed limit will reduce overall truck speeds, and
- speed differential is less significant than overall speed in enhancing safety.

Those opposed to differential speed limits argue that:

- enforcement is problematic,
- greater speed differential contributes to higher crash rates,
- sight distances are greater for operators than for auto drivers allowing for better reaction, and
- speed limits should be set a level that are safe and reasonable for the majority of traffic.

PRIOR RESEARCH

The two research studies mentioned looked at various sites and states in the U.S. where DSLs had been employed. Both tried to establish relationships and trends relating to speed compliance and safety by looking varying degrees of differential. Garber and Gadiraju made extensive use of "before and after" studies. A summary of the findings of these studies includes the following:

- An actual speed differential of 6 mph was observed given a posted 10 mph differential.
- A higher posted speed limit for automobiles raised the level of compliance.
- A differential speed limit of 65 mph/ 55mph did not reduce crash rates.
- A differential speed limit of 65 mph/ 55mph increases speed variance and interaction in the traffic stream.
- Slower truck average speeds were found when a 10 mph differential was instituted – a 5 mph difference in posted maximum speed yielded little change.

- Truck speed variation was more pronounced where truck speed limits are set higher.
- Automobile speed variation was unaffected by DSL.
- "In the differential speed limit states, the car-truck rear-end collisions were more likely..."
- Speed variance was lowest when the posted maximum speed limit was within 10 mph of the highway's design speed.

It should be noted that other studies that were reviewed sometimes showed conflicting results from those listed here.

CURRENT STATE SPEED LIMITS

As mentioned, currently 10 states employ DSLs. The differential for interstates ranges from 5 mph in Arkansas and Indiana to a 15 mph difference for automobiles and trucks in California and Michigan. The remaining six states—Idaho, Illinois, Montana, Ohio, Oregon and Washington—have instituted a 10 mph spread. Table C.01 lists the states and the Interstate Highway speed limits.

Table C.01. Interstate Highway Speed Limits

State	Auto Speed Limit	Truck Speed Limit	Differential
Alabama	70	70	-
Alaska	65	65	-
Arizona	75	75	-
Arkansas	70	65	5
California	70	55	15
Colorado	75	75	-
Connecticut	65	65	-
D.C.	55	55	-
Delaware	65	65	-
Florida	70	70	-
Georgia	70	70	-
Hawaii	55	55	-
Idaho	75	65	10
Illinois	65	55	10
Indiana	65	60	5
Iowa	65	65	-
Kansas	70	70	-
Kentucky	65	65	-
Louisiana	70	70	-
Maine	65	65	-

State	Auto Speed Limit	Truck Speed Limit	Differential
Maryland	65	65	-
Massachusetts	65	65	-
Michigan	70	55	15
Minnesota	70	70	-
Mississippi	70	70	-
Missouri	70	70	-
Montana	75	65	10
Nebraska	75	75	-
Nevada	75	75	-
New Hampshire	65	65	-
New Jersey	65	65	-
New Mexico	75	75	-
New York	65	65	-
North Carolina	70	70	-
Ohio	65	55	10
Oklahoma	75	75	-
Oregon	65	55	10
Pennsylvania	65	65	-
Road Island	65	65	-
South Carolina	70	70	-
South Dakota	75	75	-
Tennessee	70	70	-
Texas	70	70	-
Utah	75	75	-
Vermont	65	65	-
Virginia	65	65	-
Washington	70	60	10
West Virginia	70	70	-
Wisconsin	65	65	-
Wyoming	75	75	-

Source: American Trucking Association Internet Website,
www.truckline.com/safetynet/reference/speed_limit.html (current as of 2/01/01)

Nine states have a maximum speed limit of 75 mph for both automobiles and trucks, and 14, mostly southern states including Florida, have a 70 mph limit with no differential. The most frequently occurring situation is a common 65 mph speed limit for both trucks and autos. All of the northeastern states are in this category.

COMPARISON OF FLORIDA WITH PEER STATES

To select a group of peer states for Florida, a statistical cluster analysis was performed. The analysis uses several relevant variables to group states by their statistical commonalities. For the DSL comparison, the following variables were chosen:

- Percent of the state's land area that is urban
- Percent of the state's population that is urban
- Gross state product per capita
- Annual vehicle miles traveled in rural areas

Percent trucks of the annual vehicle miles traveled in rural areas

- Annual vehicle miles traveled in urban areas
- Percent trucks of the annual vehicle miles traveled in urban areas
- Total state vehicle miles traveled per capita
- Rural highway lane miles
- Urban highway lane miles

The results of the analysis are depicted in the illustration shown in Figure C.01. The states closest to Florida graphically are the closest statistically. Conversely, based on these variables, the states not as similar are further away on the x-axis of the graph. The closer a state is to another on the "tree" is important.

A closeup of the "Florida Cluster" shown in Figure C.02 reveals that New York, Georgia, Michigan, Ohio, Pennsylvania, and Illinois are most similar based on the variables selected. New York is the closest statically, given that it and Florida form a unique group or cluster. Of the peer states, the closest statistically to Florida that currently employ DSLs are Ohio and Michigan. These two states were contacted, and transportation representatives were interviewed. (Other states were contacted but the summary of the peers observations and comments are summarized here.)

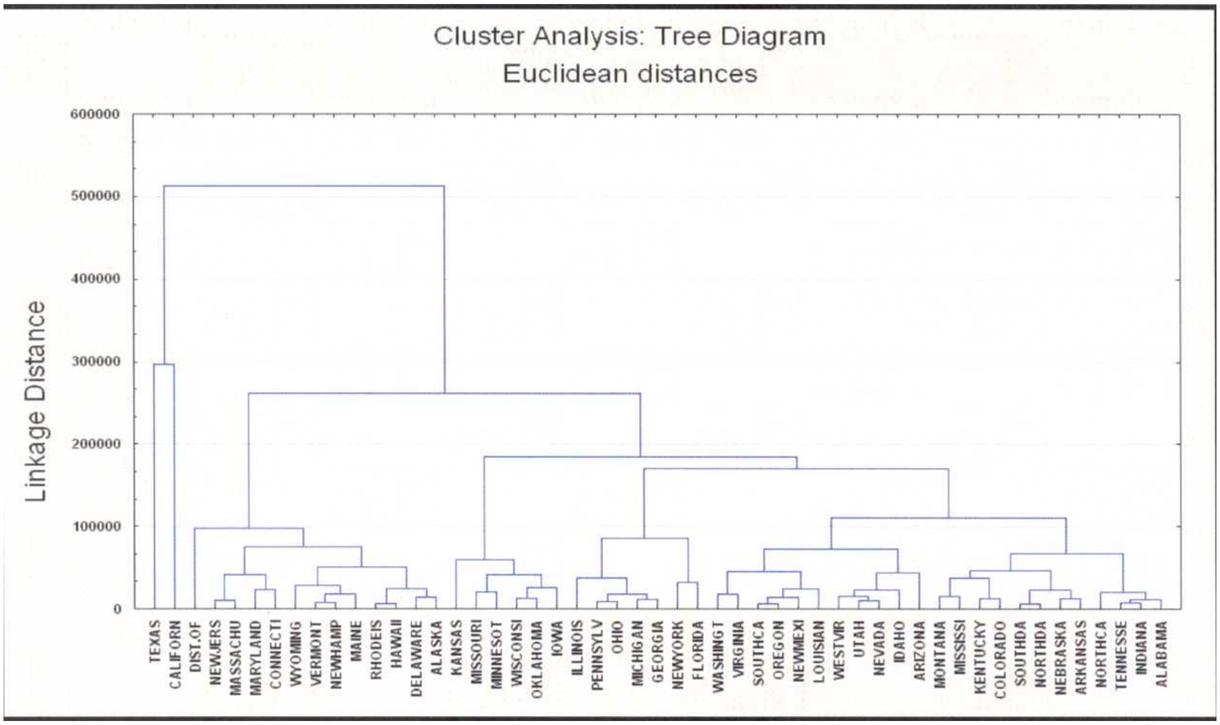

Figure C.01. Cluster Analysis: Tree Diagram

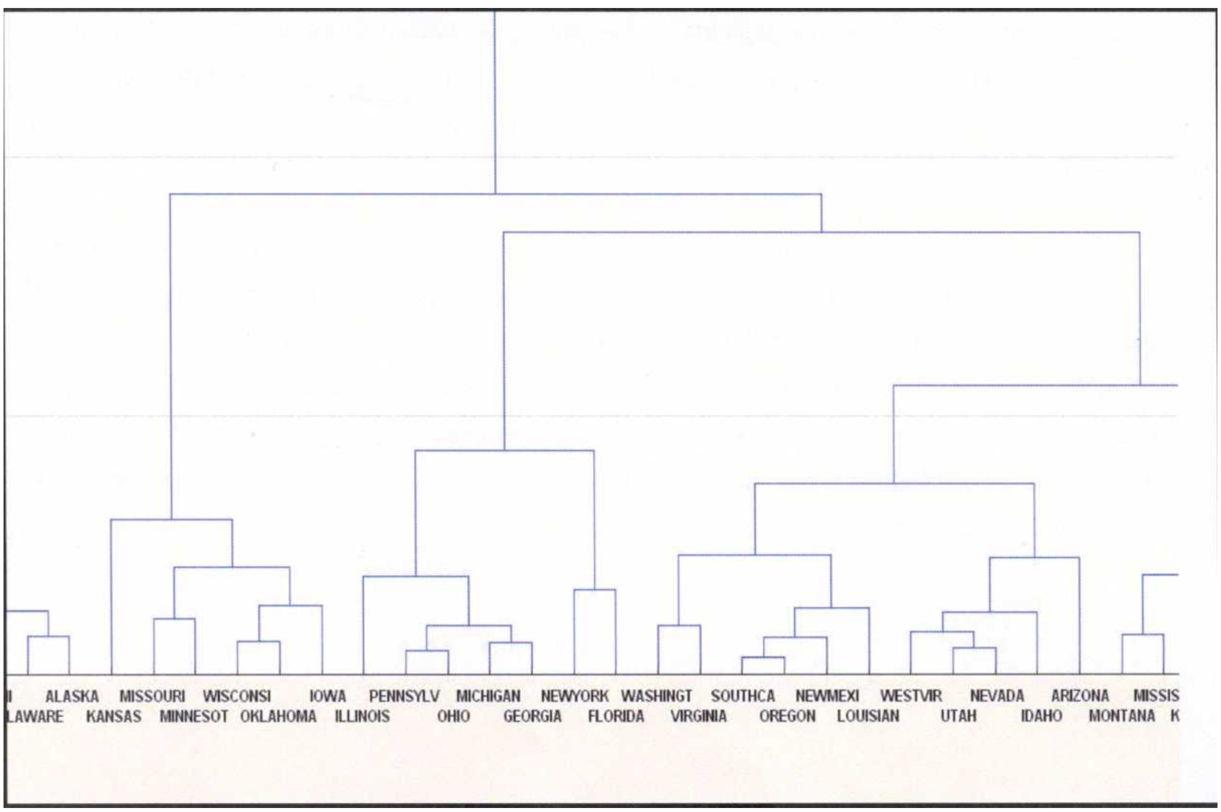

Figure C.02. Cluster Analysis Florida Group

The first observation is that none of the peer states using DSLs are in close geographic proximity. There is merit to consistency of speed limits of contiguous states in terms of driver expectations. One of the peer states, Illinois, employs the use of a DSL on highways other than Interstates. A review of all 50 states and the District of Columbia (see Table C.02) shows that only six states apply the DSL to other primary highways: California, Michigan, Montana, Ohio, and Texas.

Table C.02. Peer State Speed Limits

State	Interstate Auto Speed Limit	Interstate Truck Speed Limit	Interstate Differential	Other Primary Auto Speed Limit	Other Primary Truck Speed Limit	Other Primary Differential
Georgia	70	70	-	65	65	-
New York	65	65	-	65	65	-
Michigan	70	55	15	55	55	-
Ohio	65	55	10	55	55	-
Illinois	65	55	10	65	55	10
Florida	70	70	-	65	65	-

Source: American Trucking Association Internet Website, www.truckline.com/dafetynet/reference/speed_limit.html (current as of 02/01/01)

None of the peer states uses a 5 mph DSL differential, and three have Interstate maximum speeds for trucks of 55 mph. Only Florida and Georgia have a 70 mph speed limit for trucks on the rural Interstates.

The states contacted indicated that a certain degree of enforcement tolerance seemed to have softened any strong recent resistance by the motor carrier industry to the lower limits. It seems that the enforcement priority is given to gross violators of any speed limit. There have been recent unsuccessful attempts to close the 15 mph differential in Michigan.

The states interviewed indicated that the only costs associated with implementation of a DSL are the costs of signing and additional enforcement. None had attempted to capture those costs or to quantify the potential cost avoidance of slower trucks.

If a state were to contemplate a DSL in conjunction with a "blind eye" towards enforcement, one wonders as to the relevance of the exercise. Further, based on the available research, including the studies cited here, information on the variance of truck speeds, the relationship of the mean truck speed to the highway design speed, and the current speed differential between trucks and automobiles would need to be clearly understood. Perhaps this is the subject of further research.

It is interesting that of the five statistically closest the states to Florida, three of them are using DSLs on the Interstates and one of them on other primary highways as well.

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