I-95 Traffic Methodology Technical Report

SKETCH INTERSTATE PLAN (SIP) FOR INTERSTATE 95 (I-95)

From the Indian River / Brevard County Line to the Florida / Georgia State Line

JANUARY 2010

Prepared for:

FDOT
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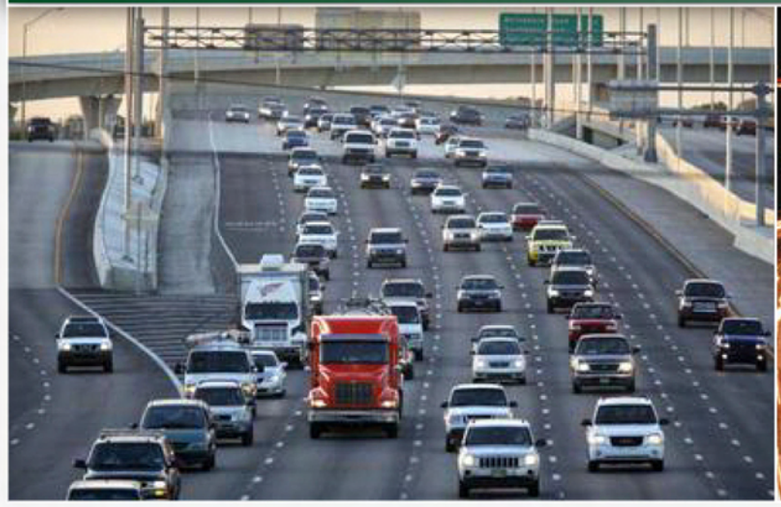

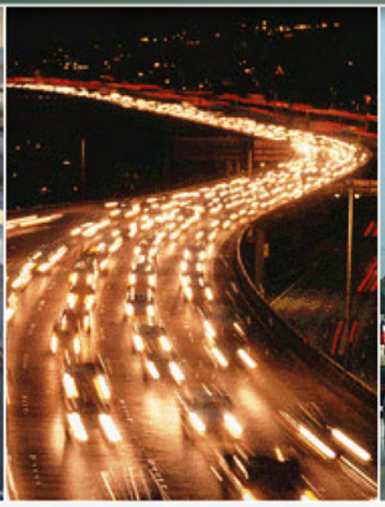

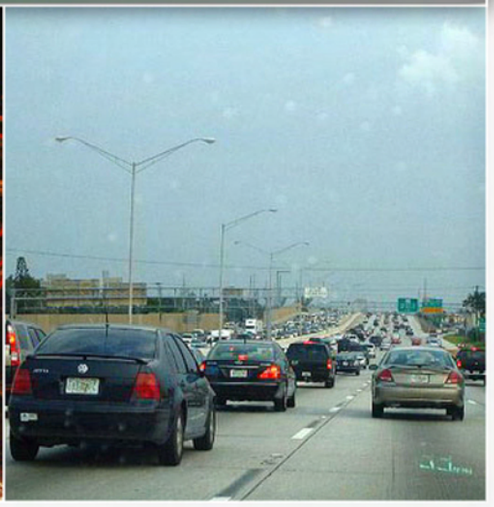

I-95 Sketch Interstate Plan (SIP) Traffic Methodology Technical Report

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1.0 Introduction

TranSystems has been contracted by the Florida Department of Transportation (FDOT) to develop a Sketch Interstate Plan (SIP) for the I-95 corridor from the Indian River County / Brevard County border at the southern limit to the Georgia border at the northern limit (**Figures 1, 1A, 1B & 1C**). This interstate corridor traverses through six counties and two FDOT Districts (2 and 5) and includes over 220 miles of freeway mainline and 64 existing interchanges. In order to develop a plan for the corridor, horizon year traffic volumes are necessary; these volumes can be used to determine the number and types of lanes needed throughout segments of the study corridor. Several data sources are currently available for developing these traffic volumes. Additionally, while there are no set criteria for the evaluation of truck only lanes, several agencies have evaluated them in the past and developed rules-of-thumb. The purpose of this report is to present a review of the traffic data available from these sources, to determine the desired methodology for creating the best future year traffic forecast to meet the objectives of this study, and to identify the method or methods available for assessing the demand and justification for truck only lanes on I-95. After much research on the part of TranSystems and continual dialogue with FDOT technical staff, this final version of the I-95 Traffic Methodology Technical Report represents the culmination of these efforts to date. This version of the document has been condensed down from earlier versions in response to the development of an agreed upon traffic methodology through the hard work, support and coordination among FDOT Central Office, District 2 and District 5 representatives. The methodology, findings and guidance provided herein also represent the foundation from which the subsequent future conditions analyses and other tasks have been based.

2.0 Background

The Interstate Highway System (IHS) was begun in the 1950's during the Eisenhower administration as a means to transport people and goods over long distances. Later, FDOT designated I-95 as part of the Florida Intrastate Highway System (FIHS), which is a series of interstates, the turnpike system, and major highways within the state. One key role of the interstate/intrastate system is to provide a high-speed network of roadways for long distance travel and the movement of freight. For that reason FDOT developed the Strategic Intermodal System (SIS), a conglomeration of the state's key airports, shipping ports, space port, rail facilities, and highways, of which I-95 is included. I-95 is the primary interstate route on the east coast of the United States, providing access from Miami, FL to the United States/Canadian border, and passing through, or near, some of the most populated cities in the country, such as Miami and Jacksonville, FL; Richmond, VA; Baltimore, MD; Philadelphia, PA; and New York City, NY. As with much of the country, there are several shipping ports along the Atlantic coast within the State of Florida that generate substantial freight traffic. The location of I-95 makes it a primary north-south artery in the interstate network and a key component of the national freight network.

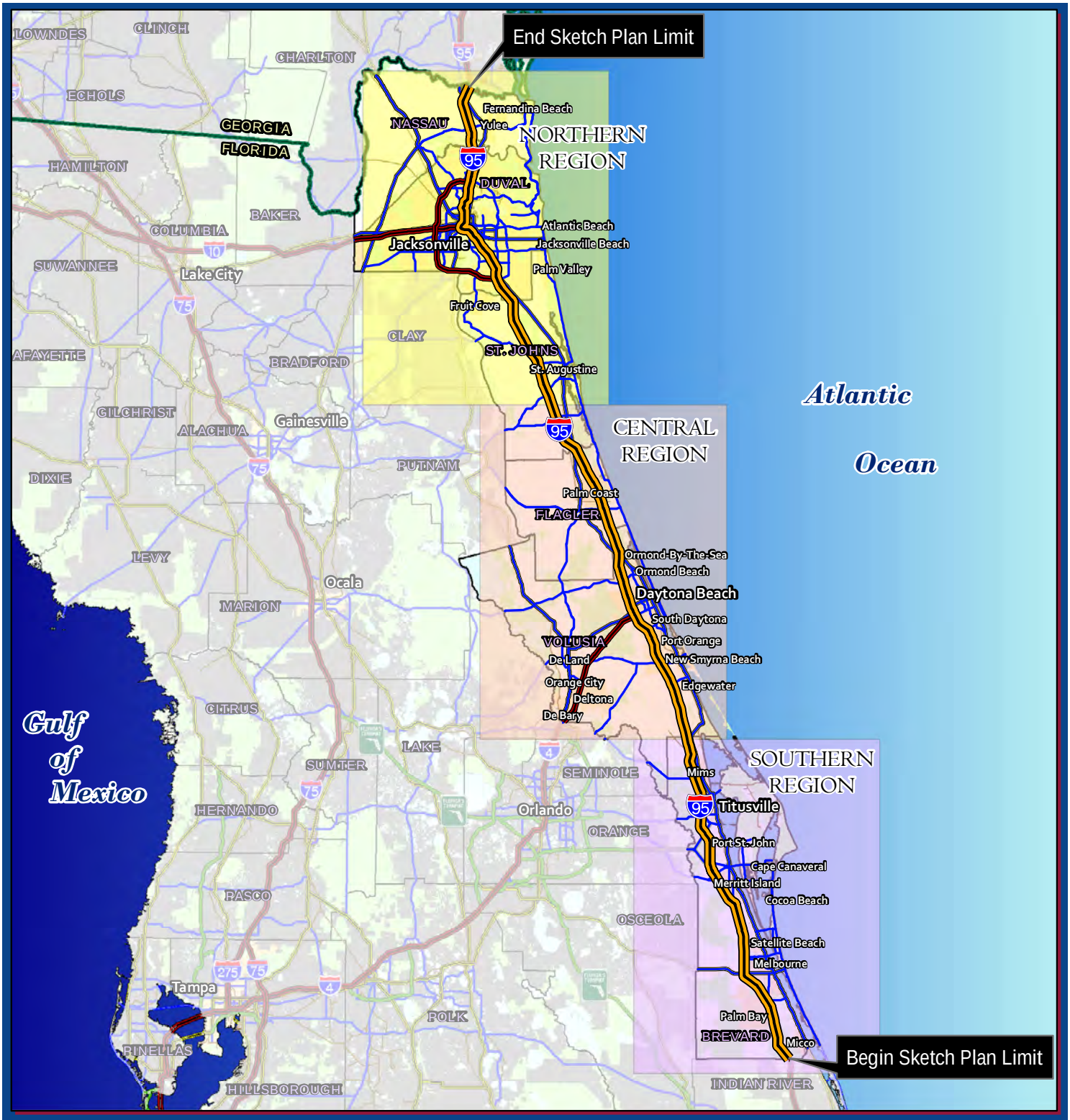
3.0 Data Gathering Methodology

Data needs were identified for the SIP that would be necessary to evaluate existing and future operations within the study corridor. **Figure 2** details the data needed, sources available for this data, and the intent for the data. Data sources were determined for the needs based on information provided by FDOT and through additional research conducted by TranSystems.

4.0 Existing Traffic Volumes

Existing year traffic volumes are necessary for multiple reasons. They provide a base year for traffic growth, aid in evaluating existing operating conditions, and are used for the development of crash rates.

The primary source used for these volumes at the time this memorandum was initiated was the Florida Traffic Information 2007 DVD; however, TranSystems found that there were some gaps in the information provided on the DVD. To complete the development of existing traffic volumes, recent volume data was extracted from current FDOT TranStat GIS files and other projects. **Figures 3-A – 3-E**, located in Appendix A, illustrate existing year count volumes using schematic diagrams of the study area.



LEGEND

- I-95 Sketch Interstate Plan Project Limit
- Northern Region
- Central Region
- Southern Region

Transportation Network

- Interstate Highway
- Toll Road
- U.S. Highway
- State Route
- Railroad

Other Layers

- City and Town Limits
- Ocean
- Lakes and Rivers
- County Boundary
- State Boundary
- Public Lands
- I-95 SIP Study Area

I-95 Sketch Interstate Plan (SIP)

Figure 1 - I-95 SIP Project Limits Region Key Map

NOTES:

1) 64 Interchanges within I-95 SIP Project Limits

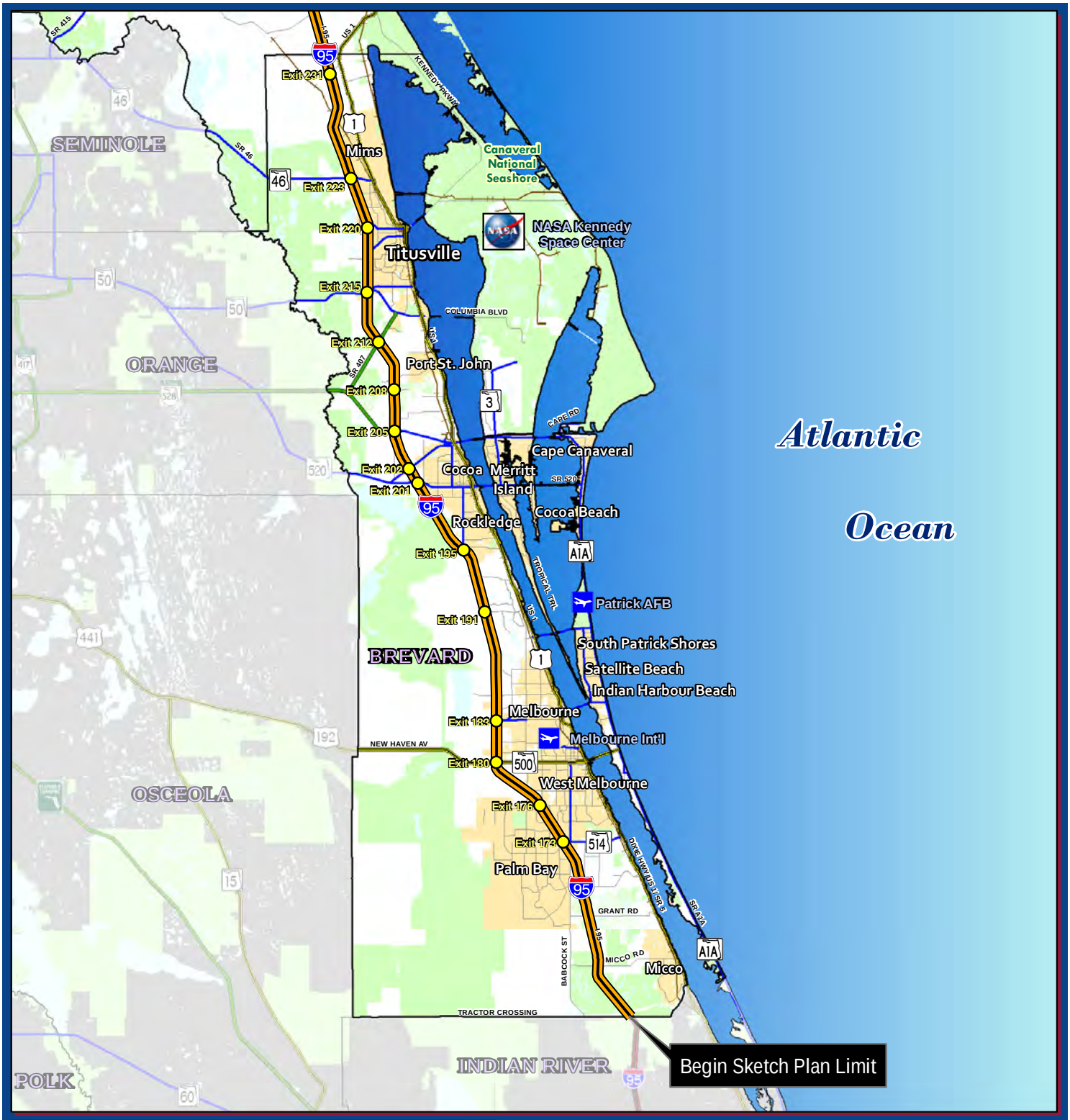
2) 222.1 Centerline Miles for I-95 SIP Project Limits

This map is intended for planning purposes only.

Source: FDOT, and TranSystems.

0 15 30 60 Miles

N



LEGEND

I-95 Sketch Interstate Plan Project Limit

Transportation Network

- Interstate Highway
- Toll Road
- U.S. Highway
- State Route
- Other Roads
- Railroad

Other Layers

- Interchange Exit
- Airport Facility
- City and Town Limits
- Ocean
- Lakes and Rivers
- County Boundary
- State Boundary
- Public Lands

I-95 Sketch Interstate Plan (SIP)

Figure 1-A - I-95 SIP Project Limits (Southern Region)

NOTES:

1) 64 Interchanges within I-95 SIP Project Limits

2) 222.1 Centerline Miles for I-95 SIP Project Limits

This map is intended for planning purposes only.

Source: FDOT, and TranSystems.

0 2.5 5 10 Miles

N

LEGEND

I-95 Sketch Interstate Plan Project Limit

Transportation Network

- Interstate Highway
- Toll Road
- U.S. Highway
- State Route
- Other Roads
- Railroad

Other Layers

- Interchange Exit
- Airport Facility
- City and Town Limits
- Ocean
- Lakes and Rivers
- County Boundary
- State Boundary
- Public Lands

I-95 Sketch Interstate Plan (SIP)

Figure 1-B - I-95 SIP Project Limits (Central Region)

NOTES:

1) 64 Interchanges within I-95 SIP Project Limits

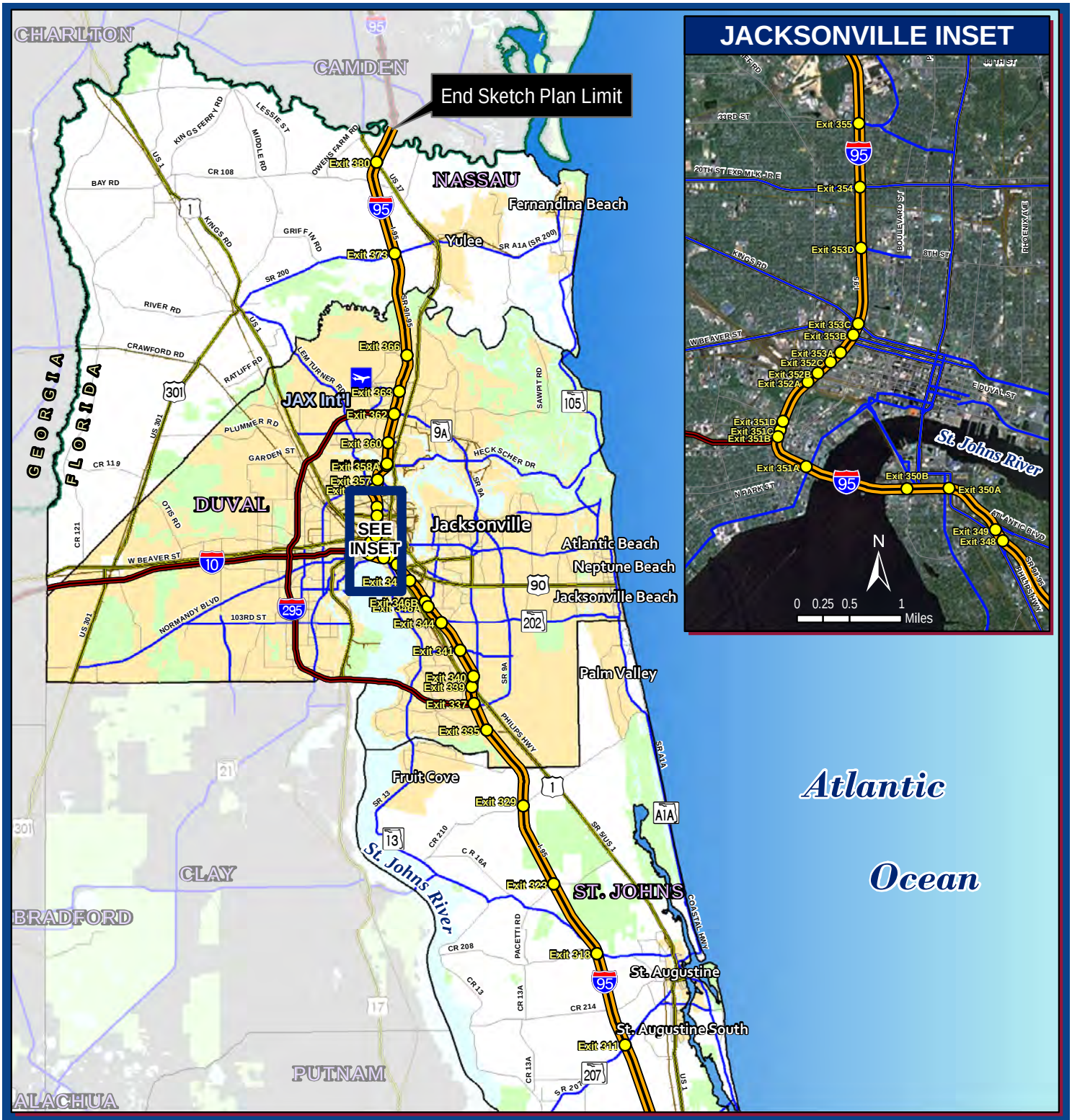
2) 222.1 Centerline Miles for I-95 SIP Project Limits

This map is intended for planning purposes only.

Source: FDOT, and TranSystems.

0 2.5 5 10 Miles

N



LEGEND

- I-95 Sketch Interstate Plan Project Limit

Transportation Network

- Interstate Highway
- Toll Road
- U.S. Highway
- State Route
- Other Roads
- Railroad

Other Layers

- Interchange Exit
- Airport Facility
- City and Town Limits
- Ocean
- Lakes and Rivers
- County Boundary
- State Boundary
- Public Lands

I-95 Sketch Interstate Plan (SIP)

Figure 1-C - I-95 SIP Project Limits (Northern Region)

NOTES:

1) 64 Interchanges within I-95 SIP Project Limits

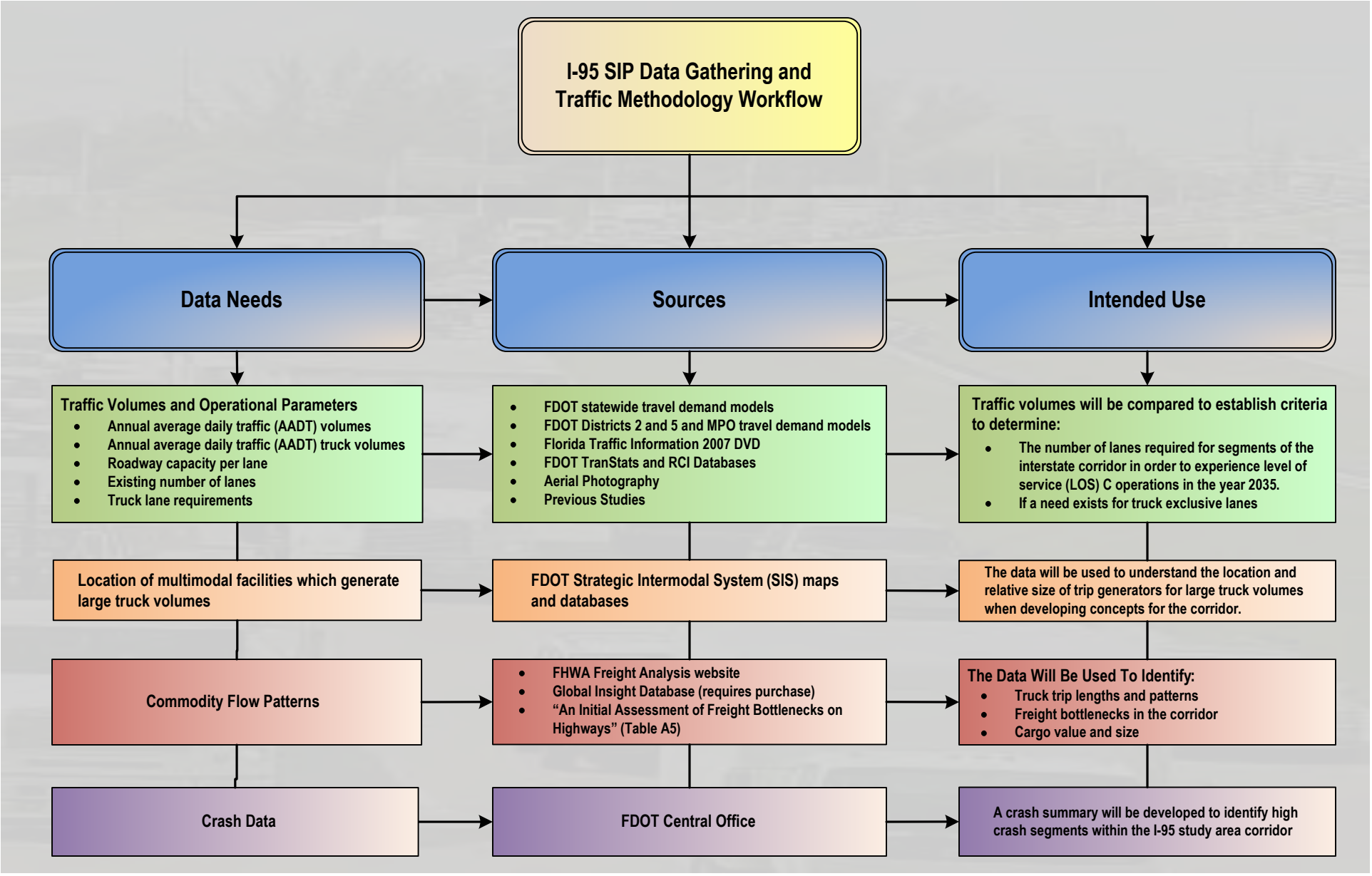
2) 222.1 Centerline Miles for I-95 SIP Project Limits

This map is intended for planning purposes only.

Source: FDOT, and TranSystems.

Figure 2

I-95 Sketch Interstate Plan (SIP) Data Gathering Methodology Workflow



5.0 Traffic Forecasts

The year 2035 was identified as the I-95 SIP horizon year, which recommendations will be based upon. Therefore, 2035 annual average daily traffic (AADT) volumes must be forecasted to identify projected lane calls for the I-95 mainline corridor. Multiple forecast methods have been considered for use in this project as described below. A series of data sources are presented from the original set of available data along with an updated discussion reflecting new information made available from Districts 2 and 5, which ultimately was used to arrive at a preferred forecasting methodology.

First Source/Method – Existing Counts

The first method calculates a future traffic volume based on the existing traffic counts and traffic projections from the Florida Traffic Information 2007 DVD. The DVD provides AADT information for historic counts from the year 2007 back to 1993. Also included are traffic projections through the year 2017. These AADT values are evaluated to determine a linear regression, which can be extrapolated to forecast 2035 AADTs. In addition to total AADT, a 2035 truck AADT could also be computed for each location. This methodology is similar to the processes described in FDOT's Project Traffic Forecasting Handbook for instances when a travel demand model is not available.

Second Source/Method – Statewide Model

The second method uses model runs for 2000 and 2035 from the Florida statewide travel demand model. The year 2000 model run is for comparison purposes and to detail changes in traffic patterns, while the 2035 model run represents the horizon year. The model runs included truck AADT data, as well; therefore, 2035 truck AADTs can also be computed using this data source. FDOT provided TranSystems with two model sets. The first represents an all-or-nothing (referred to simply as unconstrained) route assignment method. In this method the model runs a single iteration and vehicles utilize the route that would provide them with the quickest travel time to their destination based on distance and allowable speeds. The unconstrained model does not account for the other vehicles in the network and segments, which will be capacity constrained, thus slowing travel times. The second FDOT model output provided from the statewide model was for the constrained condition. In the constrained condition, the model runs several iterations to calculate capacity constraints and re-direct traffic until the best route decisions are selected based on equilibrium in travel times.

Third Source/Method – Regional Models

The third method uses regional travel demand models to forecast 2035 AADT volumes. In the northern section of the study area, the First Coast Metropolitan Planning Organization maintains the Northeast Regional Planning Model (NERPM). This travel demand model was used to obtain traffic volume forecasts within the FDOT District 2 region. NERPM model run outputs were provided to TranSystems in GIS format for the years 2000 (base) and 2030 (future), which can be extrapolated to forecast 2035 AADT volumes. Similarly travel demand model outputs were provided for the Central Florida Regional Planning Model (CFRPM), which encompasses 2000 (base) and 2025 (future) volumes for FDOT District 5. The AADT volumes from CFRPM were also used to predict 2035 AADTs based on linear extrapolation. This is similar to the approach used to generate design traffic from the CFRPM for the I-95 Systems Operational Analysis Report as described in the 2005 Final Technical Memorandum submitted to District 5. The CFRPM 2025 outputs did not include truck projections, and cannot be used to project a truck AADT, but NERPM outputs include the necessary data to forecast a truck AADT. A constant truck percentage based on the CFRPM 2000 model is the source of truck data presented in this document for that source. This is a limitation in the use of the regional model projections. Initially,

TranSystems was provided with constrained model results from NERPM and CFRPM, which were considered in the earlier version of this report. Ultimately, through discussions with FDOT Districts 2 and 5, all-or-nothing results were also supplied by NERPM and CFRPM for their respective models to generate constrained and unconstrained 2035 traffic projections. This supplemental information is described later as it relates to the development of a preferred traffic forecasting methodology.

Fourth Source/Method – Forecasted Traffic Volumes from Previous Study

TranSystems was also provided forecasted traffic volumes from FDOT District 2's I-95 Master Plan, which provided limited information used for comparison as the fourth method. The traffic volumes projected for the Master Plan were last updated in a report titled I-95 Design Traffic Report Update – Exit 298 US 1 to Exit 345 Bowden Road, dated January 2008. This report includes traffic volumes for a segment of I-95 that overlaps 47 miles of the study area for the sketch interstate plan. The provided data only included total vehicles; truck AADTs or percentages were not provided. It should also be noted that TranSystems obtained from FDOT District 2 a draft copy of I-95 Master Plan Update Travel Demand Forecast Methodology, December 2008. This document builds upon previous NERPM forecasting and focused on I-95 between San Diego Road in Duval County and the Flagler County line, which is nominally the same study limits as those identified in the January 2008 report noted above. While this latest document also consulted other data sources in the preparation of travel demand forecasts for the I-95 Master Plan Update, the baseline year 2035 AADTs were consistent with the NERPM traffic volumes from the January 2008 report. For future reference, FDOT District 2 is also considering a master plan for the segment of I-95 from I-10 in downtown Jacksonville to the Georgia state line; however, TranSystems was not able to factor this upcoming study into the traffic methodology evaluation for the I-95 SIP project.

The following information serves as background, much of which was developed prior to the receipt and consideration of the regional unconstrained model results. To illustrate the four methods discussed above, eleven sample locations within the study area have been identified to show how the forecasted volumes compare. These eleven locations were chosen to illustrate representative locations within the study area. Four of the locations surround a key systems interchange to identify traffic flow to and from I-95 as well as on the interstate facility itself. The sample locations are as follows:

1. I-95 North of Malabar Road, Brevard County, District 5
2. I-95 South of I-4/SR 400, Volusia County, District 5
3. I-95 North of LPGA Boulevard, Volusia County, District 5
4. I-95 North of International Golf Parkway, St. Johns County, District 2
5. I-95 North of Emerson Street, Duval County, District 2
6. I-95 South of 20th Street/MLK Parkway/US 1, Duval County, District 2
7. I-95 North of 20th Street/MLK Parkway/US 1, Duval County, District 2
8. I-95 South of I-295, Duval County (North of Jacksonville) , District 2
9. I-95 North of I-295, Duval County (North of Jacksonville) , District 2
10. I-295 West of I-95, Duval County (North of Jacksonville) , District 2
11. I-295 East of I-95, Duval County (North of Jacksonville) , District 2

The 2035 total and truck AADT volumes from the forecast methods for each sample location are compared in **Table 1**. *Method 3b* has been added in Table 1 to

illustrate the regional unconstrained model data. It is evident that the sets of resultant volumes are vastly different and must represent different assumptions pertaining to future roadway improvements, commercial development, population and employee growth trends, travel patterns, etc; however, compared to the 2007 existing AADT volumes, the traffic volumes shown here indicate extensive traffic growth on the I-95 corridor as a whole, growth that will need mitigation in order to avoid excessive congestion and a rise in crash frequency. It should be noted that at some locations the traffic volumes are higher in the constrained model results than in the unconstrained model results. From the sample locations, this occurrence appears more often in the statewide model results than with the regional models. This general observation does not seem expected at first, as the casual observer would expect a freeway at or near capacity to draw more traffic when the capacity becomes unlimited, but the discrepancy does make sense. In an unconstrained model not only does the freeway have no set capacity, but the rest of the links in the network also have no capacity. Therefore, a parallel route may look more desirable now that it is unconstrained. This is typical in areas where there are many short trips or a portion of longer trips can be made from a parallel high-speed facility such as Route 1. While travel demand forecasts represent a best effort to project future travel patterns and traffic volumes, this information illustrates the complexity involved with the forecasting process and the underlying uncertainty that comes along with each attempt to quantify future demand using a combination of historical data, land development patterns, economic factors and other ever-changing (dynamic) trends.

Table 1. 2035 Forecasted Volume Comparison

Location	Total or Truck	AADT							
		Method 1	Method 2a	Method 2b	Method 3a	Method 3b	Method 4	Mean	% Dev
Location 1 - I-95 North of Malabar Road, Brevard County	Total	111,496	94,759	80,624	108,628	126,454		104,392	14%
	Truck	22,091	24,861	23,427	16,417	13,843		21,699	17%
Location 2 - I-95 South of SR 400/I-4, Volusia County	Total	99,208	57,450	94,009	99,493	134,658		96,964	23%
	Truck	18,401	21,904	28,743	6,945	10,057		18,998	48%
Location 3 - I-95 North of LPGA Boulevard, Volusia County	Total	129,122	98,749	173,175	116,073	179,920		139,408	25%
	Truck	39,104	32,310	44,821	11,780	17,696		32,004	45%
Location 4 - I-95 North of International Golf Parkway, St. Johns County	Total	150,530	92,063	144,099	105,591	106,942	146,200	124,238	21%
	Truck	16,541	28,315	36,206	14,265	14,687		22,003	43%
Location 5 - I-95 North of Emerson, Duval County	Total	203,408	105,908	266,145	141,467	328,302		209,046	39%
	Truck	23,545	34,653	58,027	18,624	35,397		34,049	52%
Location 6 - I-95 South of 20th Street/MLK Parkway/US 1, Duval County	Total	154,591	117,878	256,733	115,206	259,474		180,776	41%
	Truck	13,108	20,330	36,644	16,417	31,398		23,579	48%
Location 7 - I-95 North of 20th Street/MLK Parkway/US 1, Duval County	Total	160,925	126,036	248,473	110,706	288,814		186,991	38%
	Truck	15,595	19,596	33,723	15,080	30,690		22,937	42%
Location 8 - I-95 South of I-295, Duval County	Total	97,596	95,575	159,861	87,865	144,326		117,045	30%
	Truck	12,664	11,634	16,040	12,961	19,547		14,569	14%
Location 9 - I-95 North of I-295, Duval County	Total	152,213	133,572	183,026	113,548	160,256		148,523	20%
	Truck	21,444	14,763	18,097	15,221	21,593		18,224	18%
Location 10 - I-295 West of I-95, Duval County	Total	133,454	50,416	50,505	73,627	75,921		76,785	51%
	Truck	5,331	15,221	10,397	5,524	7,885		8,872	51%
Location 11 - SR 9A East of I-95, Duval County	Total	130,592	71,840	57,992	69,440	69,298		79,832	40%
	Truck	23,086	18,097	10,509	5,413	10,329		13,487	55%
Location 12 - I-95, North of SR 50	Total	88,014	88,900	68,720	87,742	107,940		88,263	12%
	Truck	7,430	8,387	7,161	8,276	6,853		7,621	8%

Method 1 - linear regression of historical and projected AADTs
Method 2 - FDOT statewide travel demand model: (a) - constrained, (b) - unconstrained
Method 3 - extrapolated from NERPM and CFRPM: (a) - constrained, (b) - unconstrained
Method 4 - FDOT District 2 I-95 Master Plan

Curves illustrating the total AADT volume projections based on the methods for each sample location are presented in **Figure 4** (Appendix B). Note that these projections were based on available data prior to the inclusion of the regional unconstrained model output. Therefore, the NERPM and CFRPM data points are representative of the constrained model results. This information has been retained in this revised version of the I-95 Traffic Methodology Report as a source of background and foundational information. For each method, the historic total AADT volumes are shown to illustrate the projected

growth pattern. Level-of-service (LOS) is a qualitative measure, which identifies the operating conditions of the freeway based on density; these values range from LOS A (free-flow operations) to LOS F (failure). FDOT has identified LOS C (freedom to maneuver is noticeably restricted) as their goal for this project; therefore, also included in **Figure 4** (**4-A – 4-K**) are the thresholds for the total number of lanes required on the freeway segment to reach LOS C operations. The LOS C thresholds illustrated are from *FDOT's Quality/Level of Service Handbook*, which accounts for number of lanes, type of facility, speed, and area classification. The figures can be interpreted that once the AADT appears above a line representing a set number of lanes, that number of lanes will be insufficient to provide LOS C operations. For example, if the 2035 forecasted volume appears above the "6 Lanes" line and below the "8 Lanes" line, an eight lane freeway segment will be necessary to maintain LOS C operations. The figures illustrate that the existing number of lanes available at these sample locations will be insufficient for 2035. In every case, all of the 2035 volumes exceed the LOS C threshold for the existing number of lanes. Only three locations were found to operate at LOS C today. These locations are:

- I-95 North of LPGA Boulevard, Volusia County, District 5
- I-95 North of International Golf Parkway, St. Johns County, District 2
- I-95 North of I-295, Duval County (north of Jacksonville) , District 2

Similar charts were created to compare the truck AADTs within the I-95 study corridor. They are provided as **Figure 5 (5-A – 5-K)**, shown in Appendix C. Additionally, truck percentages were obtained for each focus location in the study area and are presented in **Table 2**. The truck percentages show great variability among the data sources. The models appear to have vastly different assumptions in many areas pertaining to truck trips.

Also, the identified focus locations were evaluated to determine if consistent growth rates could be identified amongst the available data. Similar growth rates could add validity. A summary of the growth rates are provided in **Table 3.** The growth rates presented are annual linear growth rates, as they are more consistent with the linear regression methodology used for the historic counts. The historical count growth rates presented in the table are referenced to the year 2007 AADT volumes, while the other growth rates are referenced to the base year model provided. For this reason, the numbers cannot be compared directly, but more in terms of scale and relation. The growth rates obtained from the different sources seem to be relatively consistent with the only exceptions occurring at locations 10 and 11. These two locations are located on the bypass routes around the City of Jacksonville, which have experienced a substantial amount of flux with the recent completion of large sections of the roadway network. The discrepancies in the growth rates at these locations can be attributed to how much of the route was complete in the base model network and the large short-term historical growth on the route as 9A becomes more feasible as more sections become open to traffic.

Table 2. 2035 Truck Percentages

	Location	Historical Count Extrapolation	FDOT Statewide Travel Demand Model		Local Travel Demand Model		I-95 Master Plan	All Sources		Constrained Models	
			Constrained	Unconstrained	Constrained	Unconstrained		Average	Std. Dev.	Average	Std. Dev.
1	I-95 North of Malabar Road, Brevard County, District 5	19.81%	26.24%	29.06%	12.38%	10.95%		19.7%	8.1%	16.5%	8.4%
2	I-95 South of SR 400/I-4, Valusia County, District 5	18.55%	38.13%	30.57%	6.98%	7.47%		20.3%	13.9%	17.5%	17.8%
3	I-95 North of LPGA Boulevard, Valusia County, District 5	30.28%	32.72%	25.88%	10.15%	9.84%		21.8%	11.0%	17.6%	13.1%
4	I-95 North of International Golf Parkway, St. Johns	10.99%	30.76%	25.13%	13.51%	13.73%	No Data Avail.	18.8%	8.6%	19.3%	9.9%
5	I-95 North of Emerson Street, Duval County, District 2	11.58%	32.72%	21.80%	13.16%	10.78%	No Data Avail.	18.0%	9.3%	18.9%	12.0%
6	I-95 South of 20th Street/MLK Parkway/US 1, District 2	8.48%	17.25%	14.27%	14.25%	12.10%		13.3%	3.2%	14.5%	2.6%
7	I-95 North of 20th Street/MLK Parkway/US 1, District 2	9.69%	15.55%	13.57%	13.62%	10.63%		12.6%	2.4%	13.3%	2.5%
8	I-95 South of I-295, Duval County (North of Jacksonville), District 2	12.98%	12.17%	10.03%	14.75%	13.54%		12.7%	1.8%	13.5%	1.3%
9	I-95 North of I-295, Duval County (North of Jacksonville), District 2	14.09%	11.05%	9.89%	13.40%	13.47%		12.4%	1.8%	12.6%	1.4%
10	I-295 west of I-95, Duval County (North of Jacksonville), District 2	3.99%	22.88%	20.59%	7.50%	10.39%		13.1%	8.3%	13.6%	8.2%
11	SR 9A east of I-95, Duval County (North of Jacksonville), District 2	17.68%	16.72%	18.12%	7.79%	14.91%		15.0%	4.2%	13.1%	4.7%
12	I-95 North of SR 50	8.44%	9.43%	10.42%	9.43%	6.35%		8.8%	1.5%	8.4%	1.8%

Table 3. Traffic Forecasting Source Growth Rates

	Location	Historical Count Extrapolation	FDOT Statewide Travel Demand		Northeast Regional Planning Model		Central Florida Regional Planning		I-95 Master Plan	All Sources		Constrained Models	
			Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained		Average	Std. Dev.	Average	Std. Dev.
1	I-95 North of Malabar Road, Brevard County, District 5	3.12%	2.28%	2.05%			3.33%	4.35%		3.03%	0.92%	2.81%	0.74%
2	I-95 South of SR 400/I-4, Valusia County, District 5	2.76%	0.86%	1.98%			2.45%	4.32%		2.47%	1.26%	1.66%	1.12%
3	I-95 North of LPGA Boulevard, Valusia County, District 5	2.75%	1.26%	3.54%			1.65%	4.13%		2.67%	1.22%	1.46%	0.28%
4	I-95 North of International Golf Parkway, St. Johns County, District 2	3.69%	2.06%	3.57%	3.10%	3.18%			2.24%	2.97%	0.68%	2.58%	0.74%
5	I-95 North of Emerson Street, Duval County, District 2	2.26%	0.88%	1.85%	0.76%	5.53%				2.26%	1.94%	0.82%	0.08%
6	I-95 South of 20th Street/MLK Parkway/US 1, District 2	1.03%	0.48%	1.31%	0.72%	5.21%				1.75%	1.96%	0.60%	0.17%
7	I-95 North of 20th Street/MLK Parkway/US 1, District 2	1.20%	0.71%	1.51%	0.55%	6.04%				2.00%	2.29%	0.63%	0.11%
8	I-95 South of I-295, Duval County (North of Jacksonville), District 2	2.05%	1.89%	2.72%	1.59%	4.45%				2.54%	1.15%	1.74%	0.21%
9	I-95 North of I-295, Duval County (North of Jacksonville), District 2	2.47%	1.62%	2.64%	1.60%	3.43%				2.35%	0.77%	1.61%	0.01%
10	I-295 west of I-95, Duval County (North of Jacksonville), District 2	4.05%	1.28%	2.93%	0.80%	0.91%				1.99%	1.43%	1.04%	0.34%
11	SR 9A east of I-95, Duval County (North of Jacksonville), District 2	4.27%	2.11%	3.24%	0.48%	0.47%				2.11%	1.68%	1.30%	1.15%
12	I-95 North of SR 50, District 5	4.10%	8.19%	5.68%	2.85%	4.16%				5.00%	2.05%	5.52%	3.78%

6.0 Traffic Forecast – Selected Methodology

Based on the available data, simply using a forecast of the historical counts did not make sense as it fails to account for fluctuations in the network as some areas expect their growth patterns to increase over time, while others may expect a drop-off. Also, the AADTs for any single model do not always appear logical or consistent when viewing the overlay of data throughout Figure 4; moreover, some of the models predict 2035 volumes that are actually less than existing year numbers. Additionally as discussed earlier, the statewide travel demand model run under unconstrained conditions did not always provide the highest AADT for a segment due to parallel routes. While this was also observed with the regional unconstrained model results, the statewide data generated more instances of this occurrence.

Another limitation was found after reviewing FDOT's Project Traffic Forecasting Handbook, which states that the statewide model should only be used for rural areas. Much of the area within this study area is urban so caution was used in referencing the statewide model results in many instances. The statewide model is, however, a more comprehensive source of truck data due to limited regional model data.

Based on these findings, the CFRPM and NERPM unconstrained models seem to best reflect the conditions in their local jurisdictions. Due to their development process and intended usage, these models more accurately reflect the regional traffic patterns and anticipated growth. With FDOT's desire to know the worst case scenario ("What are the maximum number of lanes needed if everyone who wants to use I-95 does?"), it is more reasonable to use the unconstrained traffic data.

As background and to summarize recent events in the past few months, in late 2009, concurrence was reached by FDOT and the project team to utilize the regional travel demand models to forecast 2035 Annual Average Daily Traffic (AADT) volumes. Unconstrained model runs were utilized for this purpose. In the northern section of the study area, the First Coast Metropolitan Planning Organization maintains the Northeast Regional Planning Model (NERPM). This travel demand model was used to obtain traffic volume forecasts within the FDOT District 2 region. NERPM model run outputs were provided in GIS format for the years 2000 and 2030, which, were then extrapolated to forecast 2035 AADT volumes. Similarly, in the southern section of the study area travel demand model outputs were provided for the Central Florida Regional Planning Model (CFRPM), which encompasses 2005 and 2025 volumes for FDOT District 5. The AADT volumes from the CFRPM were also used to predict 2035 AADTs based on linear extrapolation. With FDOT's desire to know the worst case scenario in terms of demand, unconstrained modeling forecasts will be used over constrained output results for future year conditions to determine the number of lanes required on the I-95.

It is important to note that the District 2 unconstrained model for 2030, which was used to project the 2035 traffic volumes, had predicted unreasonably high traffic volumes for the I-95 corridor within the City of Jacksonville. It was also noticed in the model that traffic was being pulled from the major parallel corridors (i.e., US 1, US 17, etc.) onto I-95. District 2 expressed their concerns about over-assigning traffic to I-95, particular through downtown Jacksonville. In response to these concerns, both the constrained and unconstrained model outputs were checked randomly at two locations in Duval County. The constrained model run for 2000 and 2030 showed an average annual growth rate of less than 1 percent in Duval County. The unconstrained model runs for 2000 and 2030 indicated an annual growth rate of less than two percent. Therefore, the model traffic volumes will be manually adjusted in Duval County as part of the future traffic projections.

While the Florida Traffic Information 2007 DVD was used herein to obtain existing year traffic volumes, it is likely that the 2008 update will be used, where applicable and appropriate, to better reflect existing year conditions for analysis and comparison purposes. It is always challenging to use the most current data available on a project that spans multiple years, so TranSystems intends to make this adjustment where practical. Reference to year 2009 data or newer will not be reflected in this exercise, unfortunately, due to timing and the critical path nature associated with establishing a baseline methodology and subsequent data set.

7.0 Truck Only Lanes

Truck only lanes are often considered as a way to increase roadway capacity and reduce travel time delay along interstate corridors that service large volumes of trucks, such as the I-95 corridor. These truck only lanes provide a separate facility to accommodate the trucks freeing up capacity on the burdened existing lanes. The exclusive lanes also allow for greater truck capacity during the peak hours, as freight companies often try to avoid these congested areas during commuter peak periods; a dedicated facility would allow them to use the peak hours more readily. Truck only lanes must provide a measurable time savings, before the benefit is truly realized.

7.1 Truck Only Lanes – Types

A review of available documentation shows that there are several concepts that have been constructed or considered within the United States. These concepts range in size, location, access, and operational parameters.

Truck only lanes can be a single lane, but for several reasons this is often considered a poor solution. Within the nation's trucking fleet there are vehicles and payloads with a wide range of operational characteristics. Some trucks can travel at typical freeway speeds, while others may not have the horsepower or may be hauling a large load that prohibits traveling at high speed; these lower speed trucks would inhibit the operations of the faster trucks and reduce the capacity of the roadway facility. A single lane facility, if separated by a barrier, would not have a means to provide bypass around a disabled vehicle unless wide shoulders are provided. Additionally, maintenance operations in the truck only lane would likely close the facility if it were only one lane wide. For these reasons it is often best to consider a two lane truck only facility for managing truck traffic along interstate corridors.

To maintain the integrity of the truck only lanes, typical practice is to have the lanes separated by a physical boundary, whether that be elevating the lanes due to lack of available right-of-way or keeping the lanes at-grade separated by a concrete divider or median. A physical barrier provides an element of safety as well that is missing if the truck only lanes are identified by pavement marking alone.

Access is another consideration when evaluating truck only lanes. Often with separated high occupancy vehicle (HOV) lanes, the traffic exits the facility at a set crossover location and crosses the local lanes to access an interchange and makes a similar movement to enter the HOV facility from an interchange. Heavy trucks are much larger and have less maneuverability, which would make these movements unsafe for traffic in the general purpose lanes. To mitigate this unsafe condition, the truck only facility would require its own access ramps at interchanges; this would likely limit the ingress and egress points for trucks as it would not be feasible to construct costly ramps at every interchange.

Some states, such as Georgia, California, and Indiana, have investigated a couple operational variances pertaining to truck only lanes. One practice that has been considered is using the same separated facility to accommodate trucks and HOV traffic. However, this concept is often rejected by the engineering

community due to the reduced safety for the passenger cars. Research has shown the most deadly crashes are those between a passenger vehicle and a large truck; placing the HOV traffic on a facility that is likely greater than 50% trucks will increase the likelihood of these crashes. Funding is often a concern for the construction of these facilities causing some states to consider tolling the truck only lanes. The consideration that typically coincides with this determination is whether the facility should become mandatory causing all freight vehicles to pay a toll for use of the facility rather than provide an option of using the free general purpose lanes. Trucking associations seem to be split based on the tolling issue as their drivers already pay tax on fuel for roadways, but the truck only lanes provide a less disrupted flow. If the travel time is substantially shorter as a result of the facility, the use of tolling can be an easier sell to implement.

7.2 Truck Only Lanes – Operational Need

There are no set standards of practice available to determine the need for or benefits of truck only lanes; however there are a series of recommended guidelines often cited in truck only lane studies. These guidelines were established in a report produced for the National Technical Information Service titled "*Feasibility of Exclusive Facilities for Cars and Trucks*" (April 1990). The report recommended that three criteria should be met in order for the addition of truck only lanes. These recommendations assume the construction of two truck lanes in each direction.

- Truck volumes exceed 30% of the daily vehicle mix
- Peak hour volumes exceed 1,800 vehicles per lane-hour
- Off-peak hour volumes exceed 1,200 vehicles per lane-hour

These guidelines provide a starting point, but do not directly address whether the benefit of their installation is worthwhile. Truck only-lanes have been found to be most effective when they span long distances rather than providing for short trips. An evaluation of select link analyses (origin-destination pattern data) from the statewide model, if available, could provide a more insightful grasp on the length of truck trips within the I-95 study corridor. It is unknown if this data is available for the statewide model.

Studies have reasoned that the expected carrying capacity for a truck only lane should be approximately 800 vehicles per lane-hour. This value seems sensible as the average freeway lane has a maximum capacity of approximately 2000 vehicles per lane-hour; heavy trucks are often twice as long or longer and have less responsive operating characteristics.

7.3 Truck Only Lanes – Truck Regulations

Consideration will need to be given to the use of tandem trucks on truck only lanes. Their dimensions require the construction and operation of the facility to be accommodating. Currently standard tandems are permitted on the State Highway System unless otherwise posted due to safety or geometric constrain. Standard tandems are defined as tandem truck unit where neither the semitrailer nor trailer exceeds 28 feet.

7.4 Truck Only Lanes – Location Determination and Proposed Approach

Since comprehensive truck data could not be extracted across the entire study corridor using the regional travel demand models, it is recommended that the statewide model serve as a single source of truck projections along I-95. Calculated truck AADT volumes will be evaluated using the 30% of total

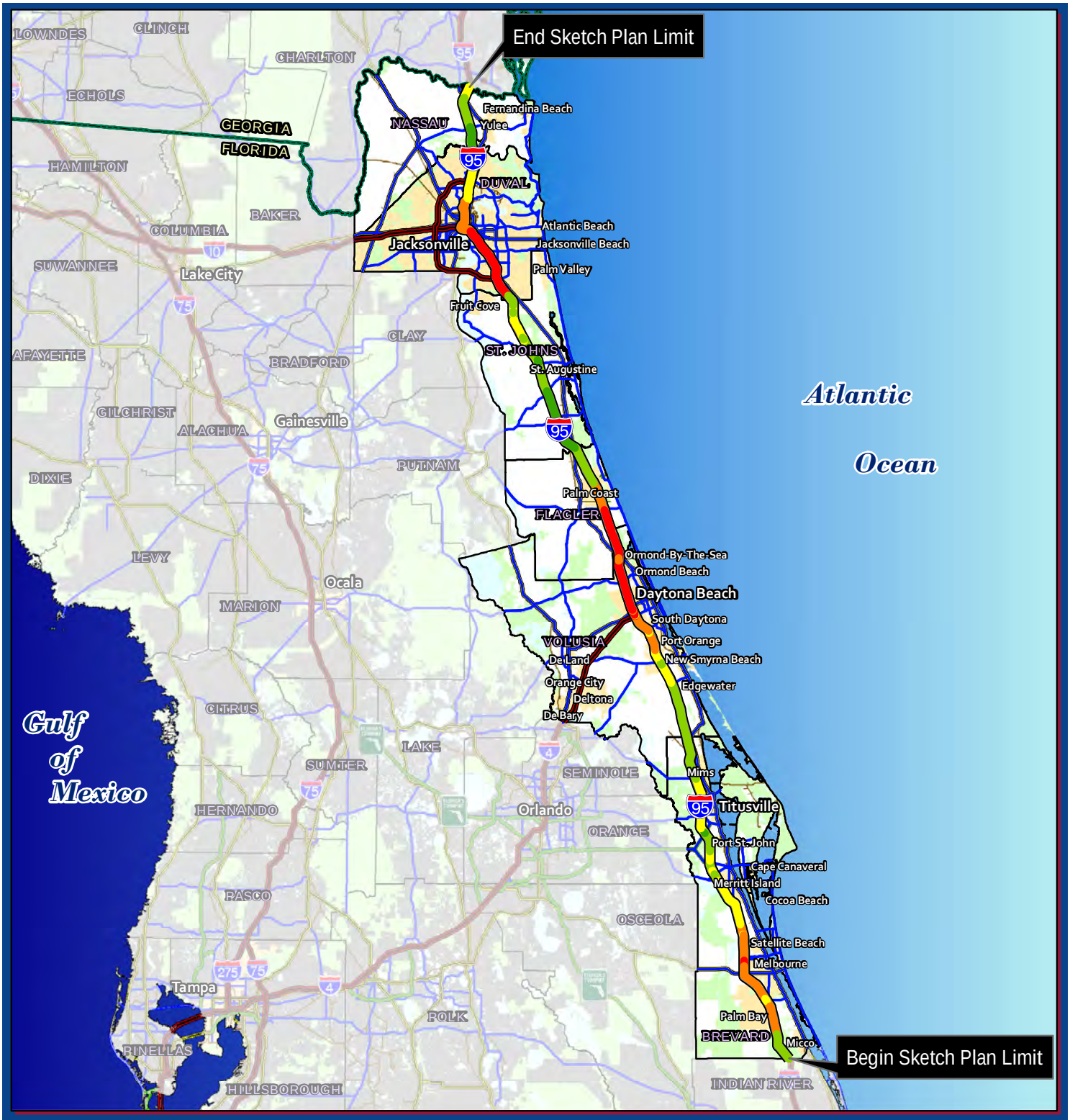
daily traffic criteria set above. If any segments are found to be in excess of the 30% criteria, TranSystems will request, from FDOT, a record summary report for a count location in the vicinity. This data will be used to create design year hourly volumes. Should the hourly volumes be found to also meet the criteria indentified above in this document, it will be considered further. Those segments that meet all earlier requirements will then be evaluated to determine if the need covers a distance that seems reasonable from a mobility traffic flow (origin-destination) perspective, as the lanes will not properly service truck traffic if they extend only a short distance. Ultimately, FDOT will need to make a policy decision on the criteria to be used in determining the need for truck lanes, not only on this portion of I-95, but system-wide. Many factors such as cost, freight mobility, right-of-way and maintenance must be factored into this decision.

8.0 Conclusions

To conduct the I-95 Sketch Interstate Plan, traffic volume projections representing the project's 2035 horizon year are required. Multiple data were provided by FDOT for use in generating 2035 annual average daily traffic volumes. As described above, the regional unconstrained travel demand models were determined to be the most appropriate source for establishing future year demand. This conclusion was reached after searching through various other sources and soliciting feedback from FDOT Central Office, District 2 and District 5. Both Districts agreed to provide unconstrained model data to TranSystems for use in developing year 2035 projections. These supplemental model runs from the Northeast Regional Planning Model and the Central Florida Regional Planning Model will be extrapolated out to year 2035 using growth rates obtained between the base year and future year models. This methodology seemed to garner support from Districts 2 and 5, and represents the unconstrained projections at a more local/regional level, rather than fully relying on the statewide model results.

Truck percentages obtained from the statewide model will be used to obtain truck percentages and truck AADT in the network. This is due to an absence of truck data from the Central Florida Regional Planning Model. While the statewide model is likely better suited to address truck demand in the rural areas, its application across the entire study area has been recommended for consistency is the data source. These calculated values from the statewide model will be used, as necessary, for traffic analyses and truck lane determinations.

A review of truck only lanes was performed to determine the proper configuration, number of lanes, and operational characteristics. Based on studies performed in other states, it was determined that truck only facilities operate best when they are physically separated from and running parallel to the general purpose lanes of the freeway. These facilities should include at least two lanes in each direction and have independent ramps to cross streets to avoid trucks crossing several lanes to enter and exit the freeway; from a traffic engineering and safety perspective, these practices make solid sense and should be followed in any facilities planned as a result of future analyses. Three volume criteria have also been widely used in determining where truck only lanes should be included, and have been adopted for use in this project, as discussed in this document. The primary parameter, recommended for use in the initial screening, is to establish whether or not the truck traffic represents more than 30% of the daily traffic on a particular segment of the freeway.



LEGEND

2035 Projected Lane Calls to Satisfy FDOT LOS Facility Standards

- 11 - 12 Lanes
- 9 - 10 Lanes
- 7 - 8 Lanes
- 5 - 6 Lanes
- 4 Lanes

Transportation Network

- Interstate Highway
- Toll Road
- U.S. Highway
- State Route
- Other Roads
- Railroad

Other Layers

- I-95 Sketch Interstate Plan Project Limit
- Interchange Exit
- Commercial Airport
- City and Town Limits
- Ocean
- Lakes and Rivers
- County Boundary
- State Boundary
- Public Lands

I-95 Sketch Interstate Plan (SIP)

Figure 6 - Preliminary I-95 SIP 2035 Projected Lane Calls (# Lanes Required to Satisfy LOS)

NOTES:

2035 Projected total lane calls were developed based upon the FDOT 2009 Quality/Level of Service Handbook and followed FDOT LOS facility segmentation guidelines.

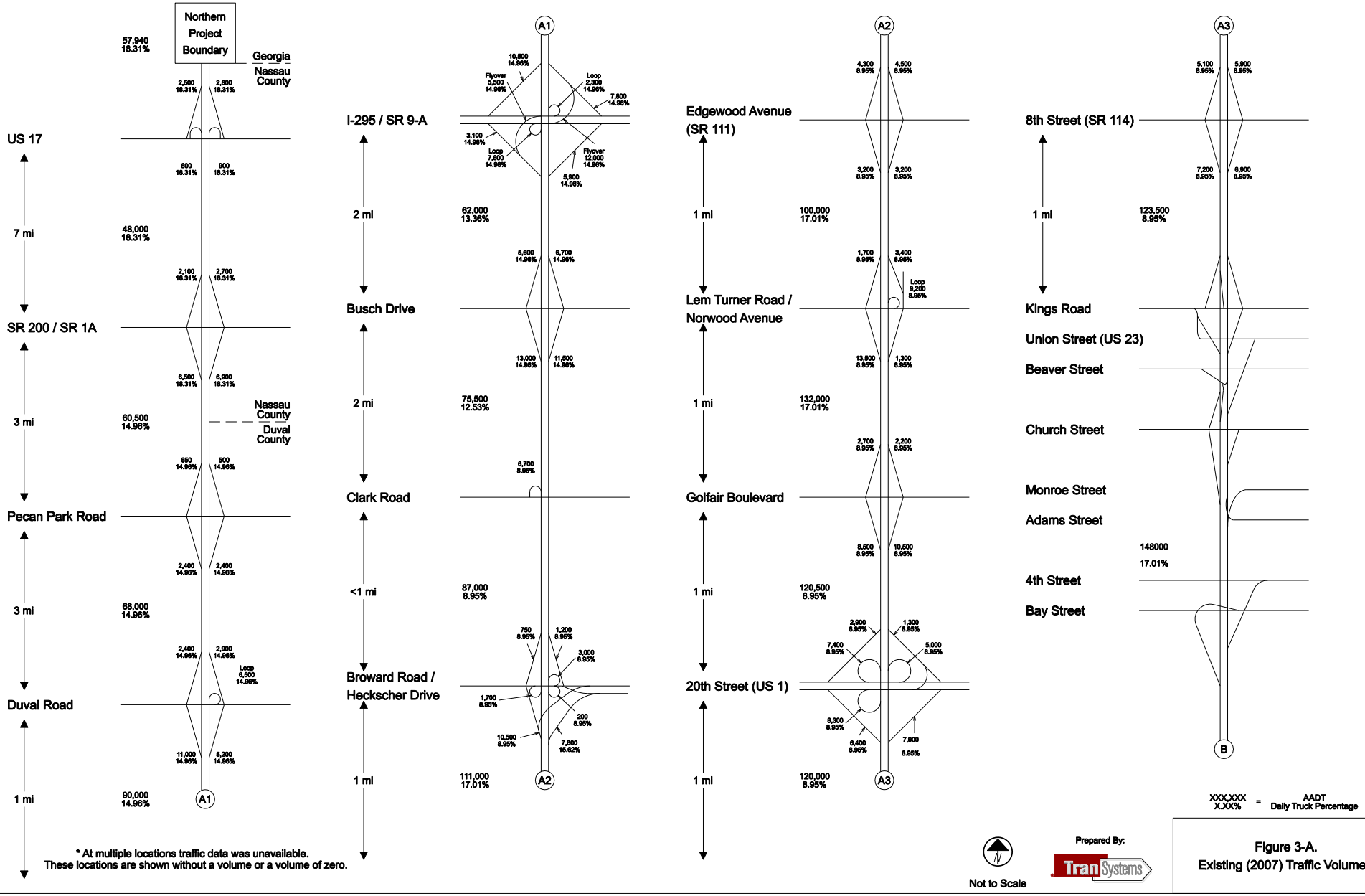
This map is intended for planning purposes only.

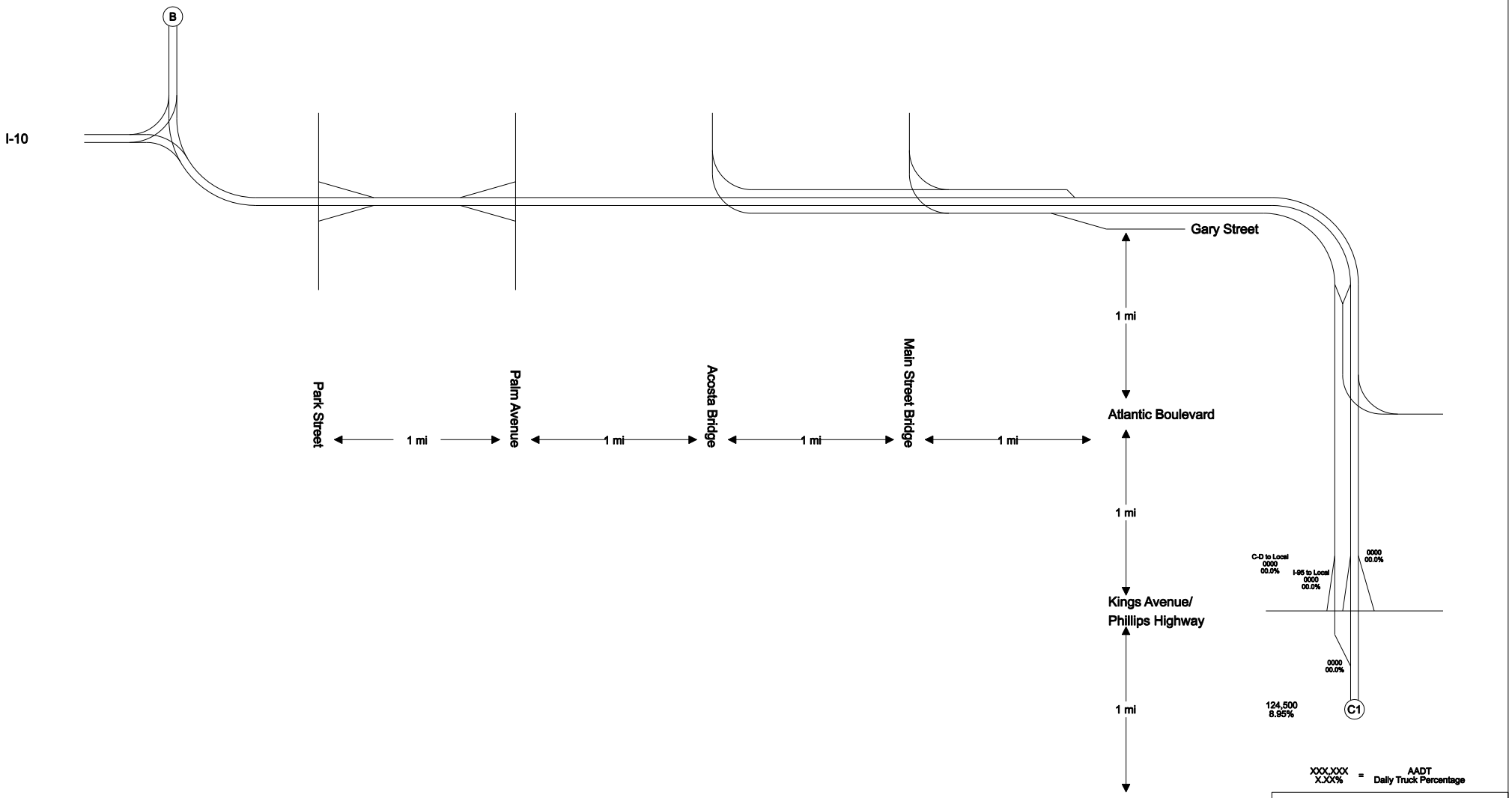
Source: FDOT, and TranSystems.

0 15 30 60 Miles

N

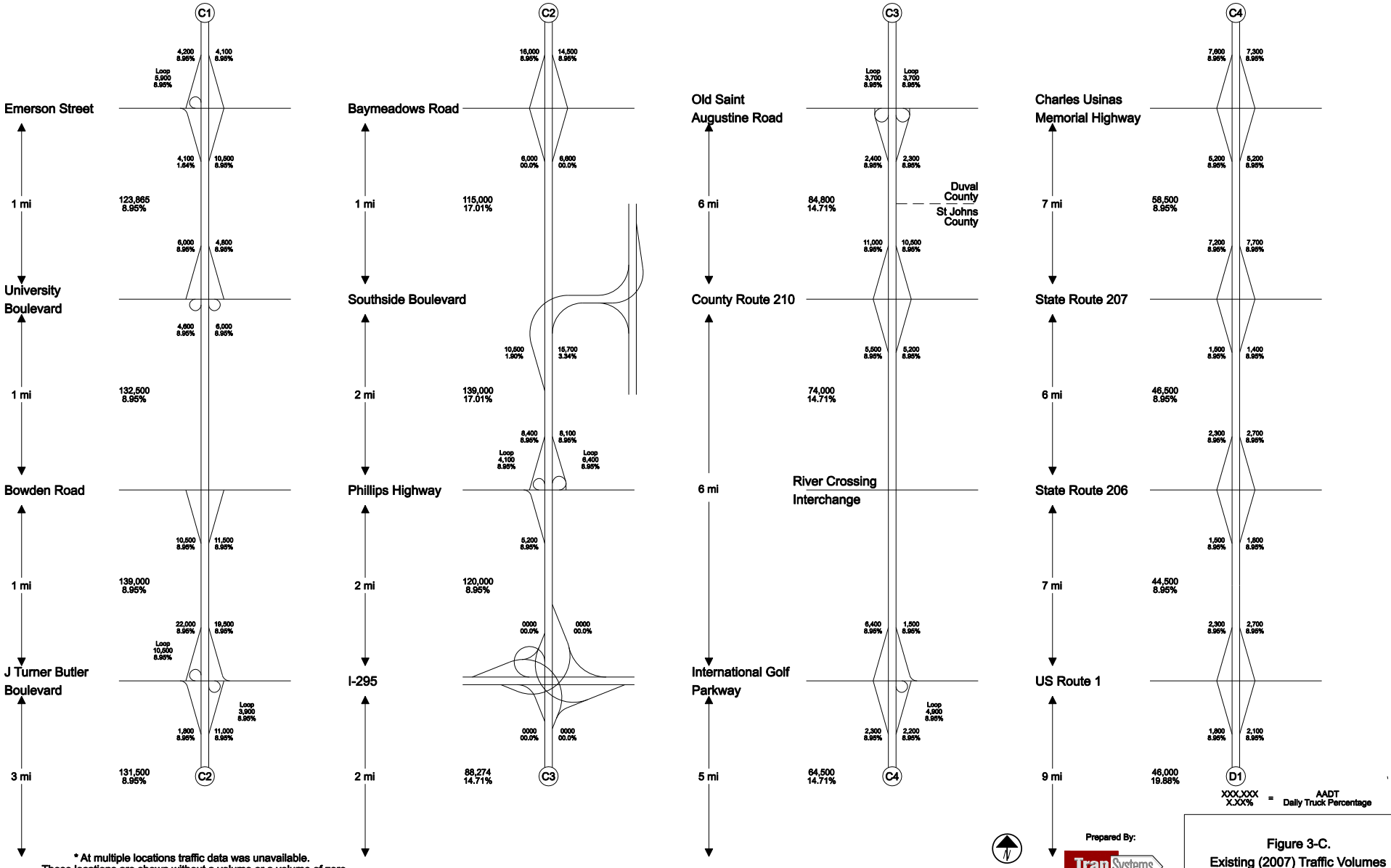
APPENDIX A

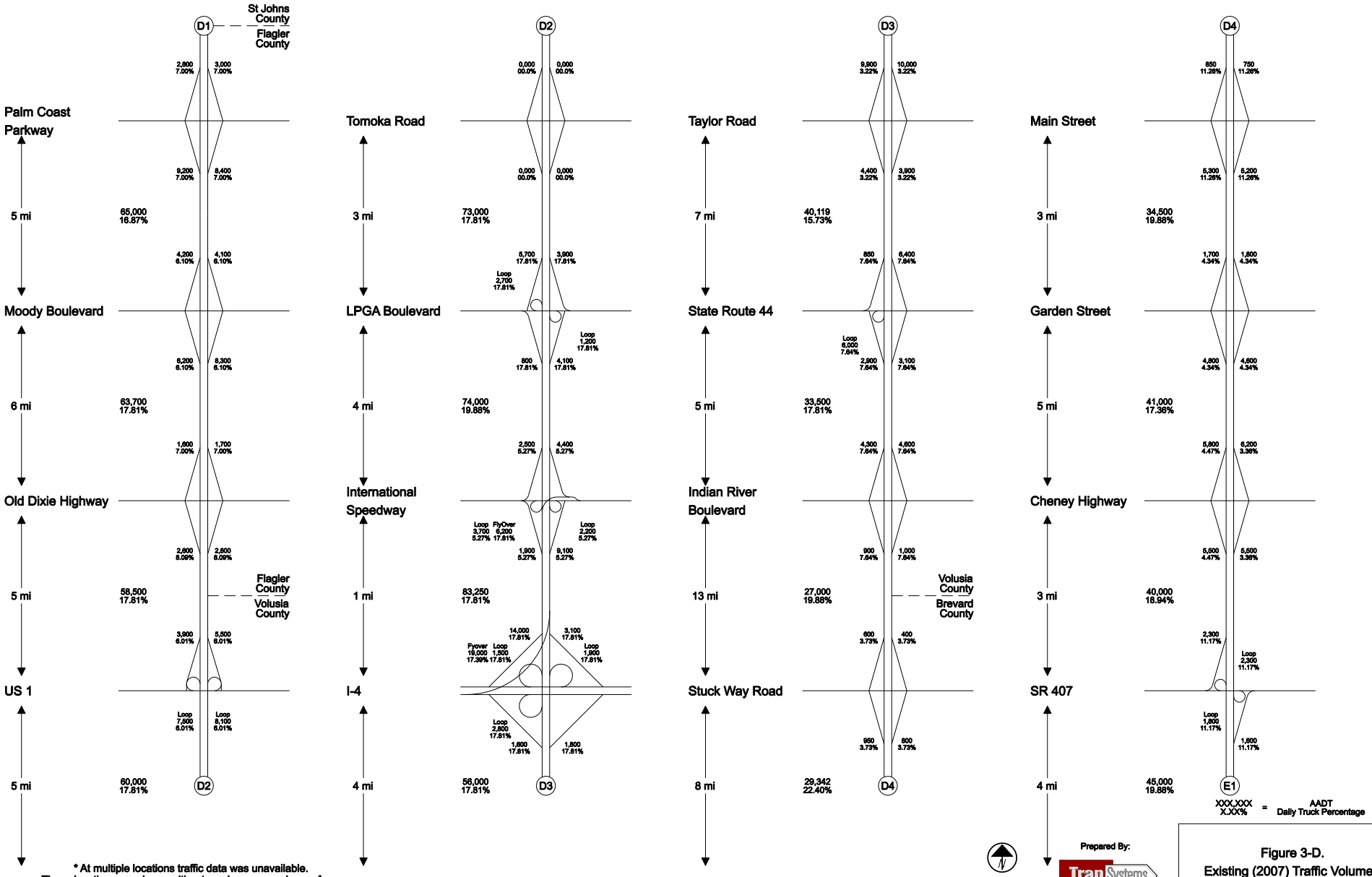

Northern Project Boundary
Georgia
Nassau County
US 17
7 mi
SR 200 / SR 1A
3 mi
Nassau County
Duval County
Pecan Park Road
3 mi
Duval Road
1 mi
57,940 18.31%
48,000 18.31%
60,500 14.96%
68,000 14.96%
90,000 14.96%
A1
I-295 / SR 9-A
2 mi
Busch Drive
2 mi
Clark Road
<1 mi
Broward Road / Heckscher Drive
1 mi
62,000 13.36%
75,500 12.53%
87,000 8.95%
111,000 17.01%
A2
Edgewood Avenue (SR 111)
1 mi
Lem Turner Road / Norwood Avenue
1 mi
Golfair Boulevard
1 mi
20th Street (US 1)
1 mi
100,000 17.01%
132,000 17.01%
120,500 8.95%
120,000 8.95%
A3
8th Street (SR 114)
1 mi
Kings Road
Union Street (US 23)
Beaver Street
Church Street
Monroe Street
Adams Street
4th Street
Bay Street
123,500 8.95%
148000 17.01%
B
XXX,XXX = AADT
X.XX% = Daily Truck Percentage
* At multiple locations traffic data was unavailable.
These locations are shown without a volume or a volume of zero.
Not to Scale
Prepared By:
TranSystems
Figure 3-A.
Existing (2007) Traffic Volumes



* At multiple locations traffic data was unavailable.
These locations are shown without a volume or a volume of zero.

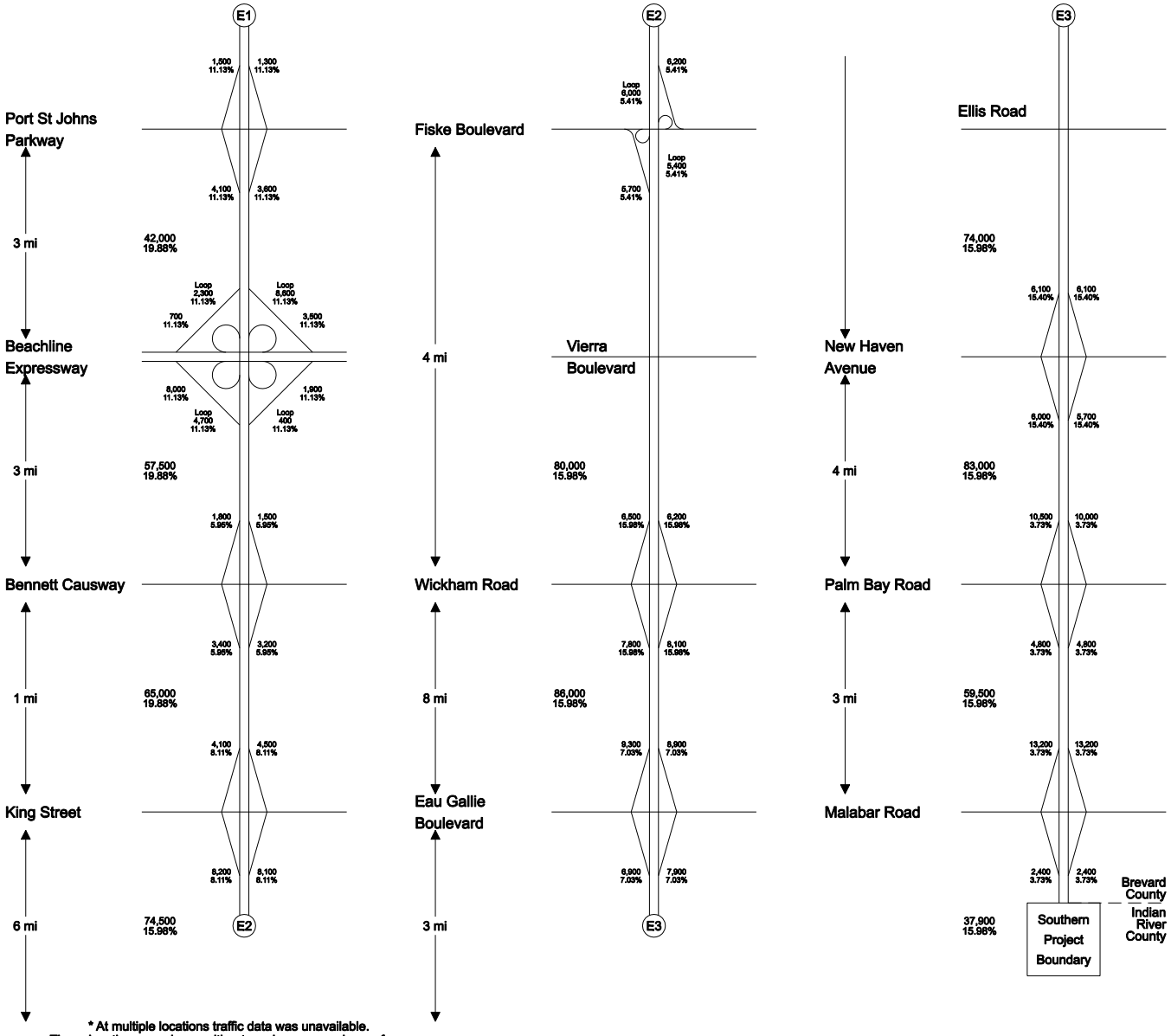
Figure 3-B.
Existing (2007) Traffic Volumes


C1
Emerson Street
4,200 8.95%
4,100 8.95%
Loop 5,900 8.95%
4,100 1.64%
10,600 8.95%
1 mi
123,865 8.95%
6,000 8.95%
4,800 8.95%
University Boulevard
4,600 8.95%
6,000 8.95%
1 mi
132,500 8.95%
Bowden Road
10,500 8.95%
11,500 8.95%
1 mi
139,000 8.95%
22,000 8.95%
19,500 8.95%
Loop 10,500 8.95%
J Turner Butler Boulevard
Loop 3,900 8.95%
1,800 8.95%
11,000 8.95%
3 mi
131,500 8.95%
C2
C2
16,000 8.95%
14,500 8.95%
Baymeadows Road
6,000 00.0%
6,600 00.0%
1 mi
115,000 17.01%
10,500 1.90%
15,700 3.34%
Southside Boulevard
2 mi
139,000 17.01%
8,400 8.95%
8,100 8.95%
Loop 4,100 8.95%
Loop 6,400 8.95%
Phillips Highway
5,200 8.95%
2 mi
120,000 8.95%
0000 00.0%
0000 00.0%
I-295
0000 00.0%
0000 00.0%
2 mi
88,274 14.71%
C3
C3
Loop 3,700 8.95%
Loop 3,700 8.95%
Old Saint Augustine Road
2,400 8.95%
2,300 8.95%
6 mi
84,800 14.71%
Duval County
St Johns County
11,000 8.95%
10,500 8.95%
County Route 210
5,500 8.95%
5,200 8.95%
6 mi
74,000 14.71%
River Crossing Interchange
6,400 8.95%
1,500 8.95%
International Golf Parkway
Loop 4,900 8.95%
2,300 8.95%
2,200 8.95%
5 mi
64,500 14.71%
C4
C4
7,600 8.95%
7,300 8.95%
Charles Usinas Memorial Highway
5,200 8.95%
5,200 8.95%
7 mi
56,500 8.95%
7,200 8.95%
7,700 8.95%
State Route 207
1,600 8.95%
1,400 8.95%
6 mi
46,500 8.95%
2,300 8.95%
2,700 8.95%
State Route 206
1,500 8.95%
1,800 8.95%
7 mi
44,500 8.95%
2,300 8.95%
2,700 8.95%
US Route 1
1,800 8.95%
2,100 8.95%
9 mi
46,000 19.88%
D1
XXX,XXX = AADT
X.XX% Daily Truck Percentage
* At multiple locations traffic data was unavailable.
These locations are shown without a volume or a volume of zero.
Not to Scale
Prepared By:
TranSystems
Figure 3-C.
Existing (2007) Traffic Volumes



* At multiple locations traffic data was unavailable.
These locations are shown without a volume or a volume of zero.

Figure 3-D.
Existing (2007) Traffic Volumes



* At multiple locations traffic data was unavailable.
These locations are shown without a volume or a volume of zero.

XXX,XXX = AADT
X.XX% = Daily Truck Percentage

Not to Scale

Prepared By: TranSystems

Figure 3-E.
Existing (2007) Traffic Volumes

APPENDIX B

Figure 4-A. I-95 North of Malabar Road, Brevard County
Existing: 4 Lanes

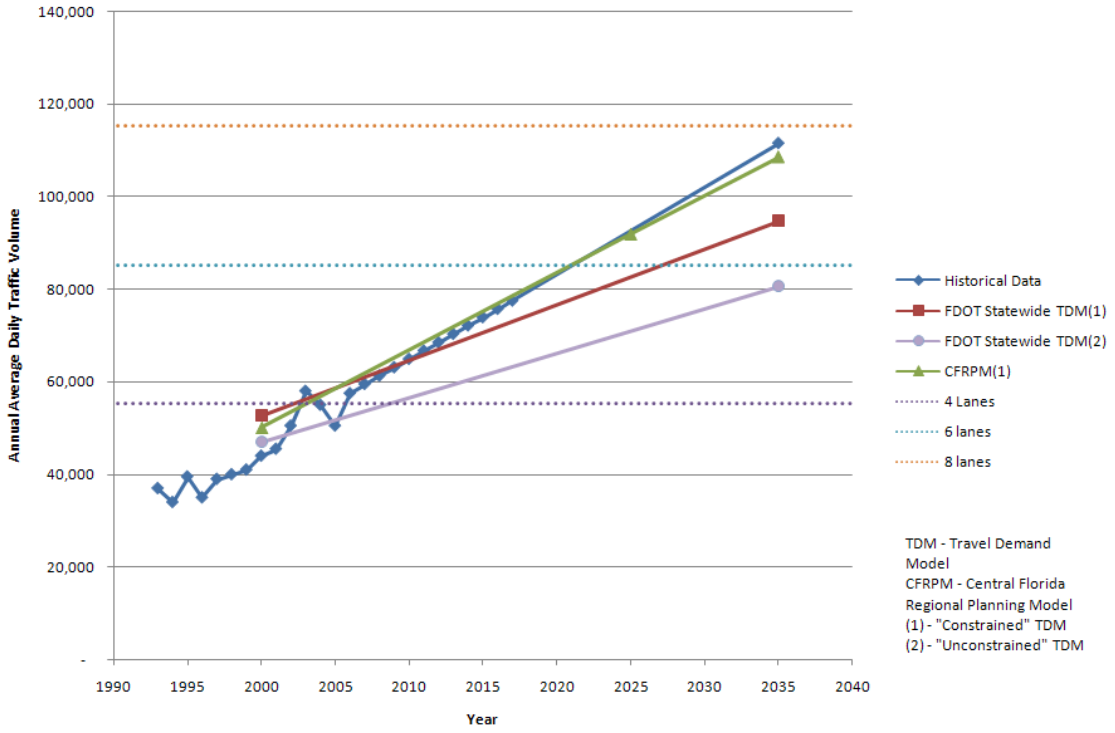


Figure 4-B. I-95 South of SR 400, Volusia County
Existing: 4 Lanes

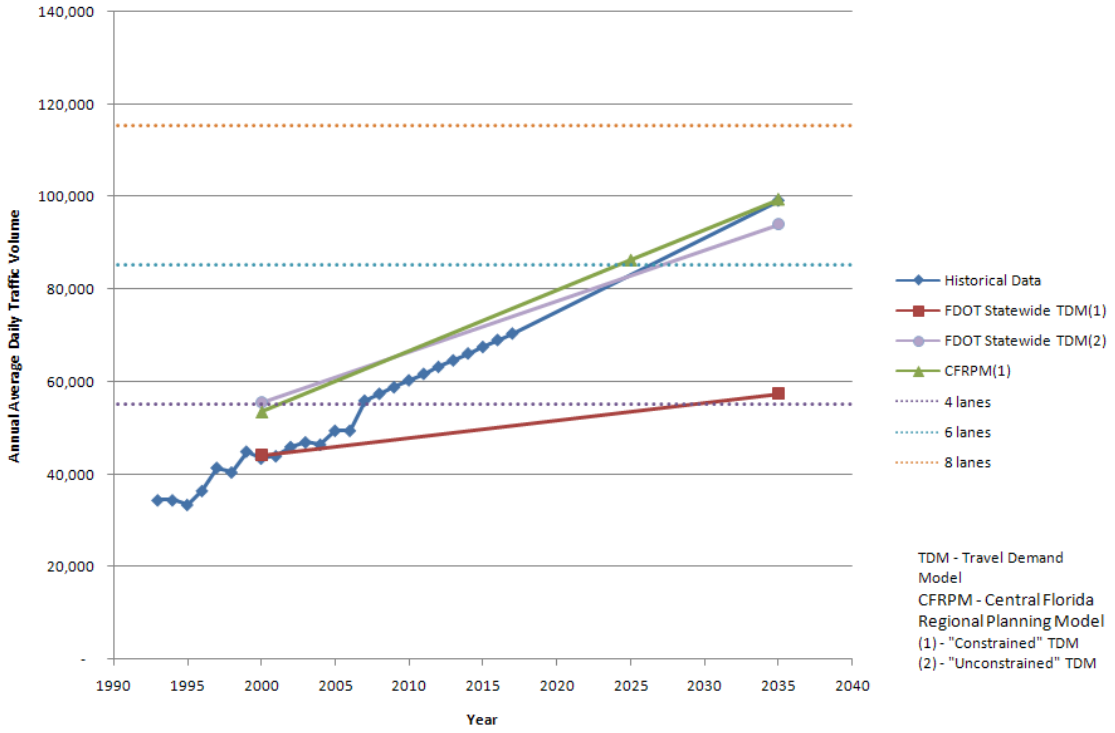


Figure 4-C. I-95 North of LPGA Boulevard, Volusia County
Existing 6 Lanes

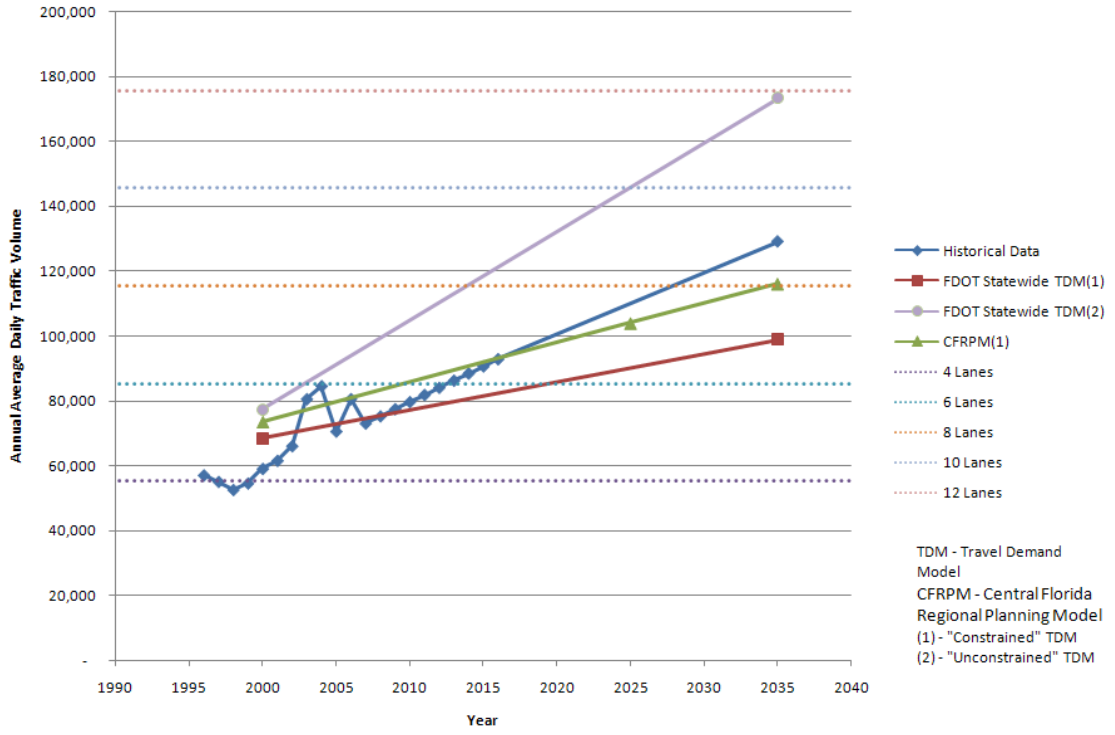


Figure 4-D. I-95 North of International Golf Parkway, St. Johns County
Existing: 6 Lanes

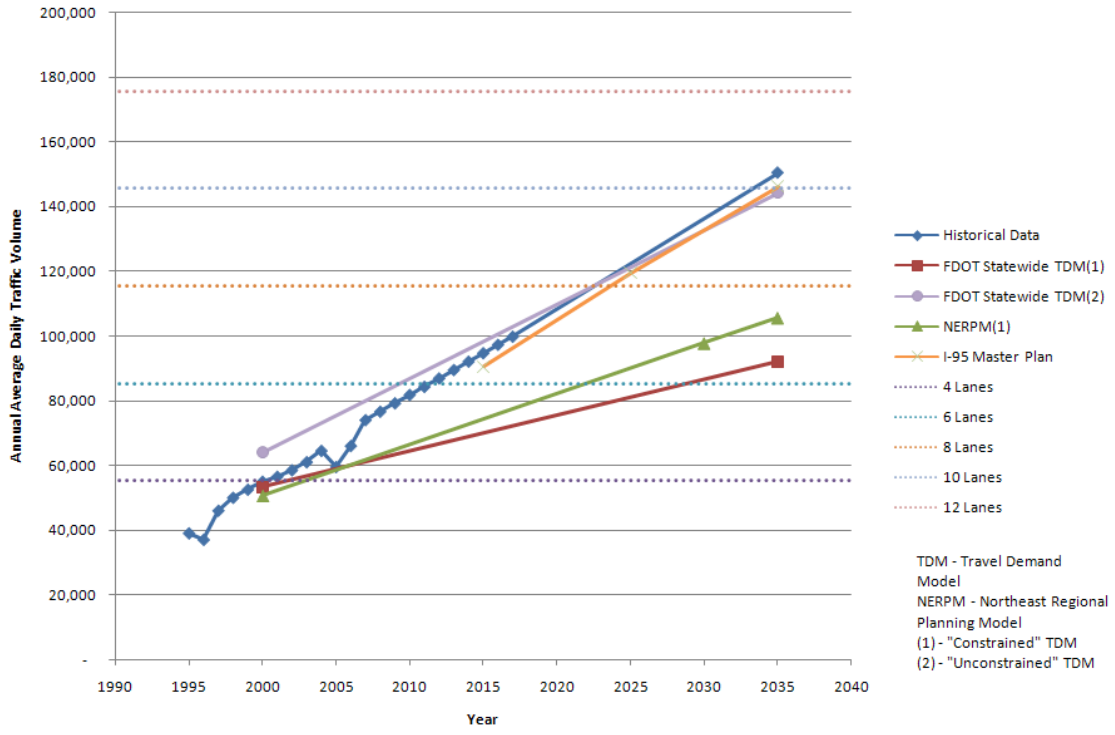


Figure 4-E. I-95 North of Emerson Street, Duval County
Existing: 6 Lanes

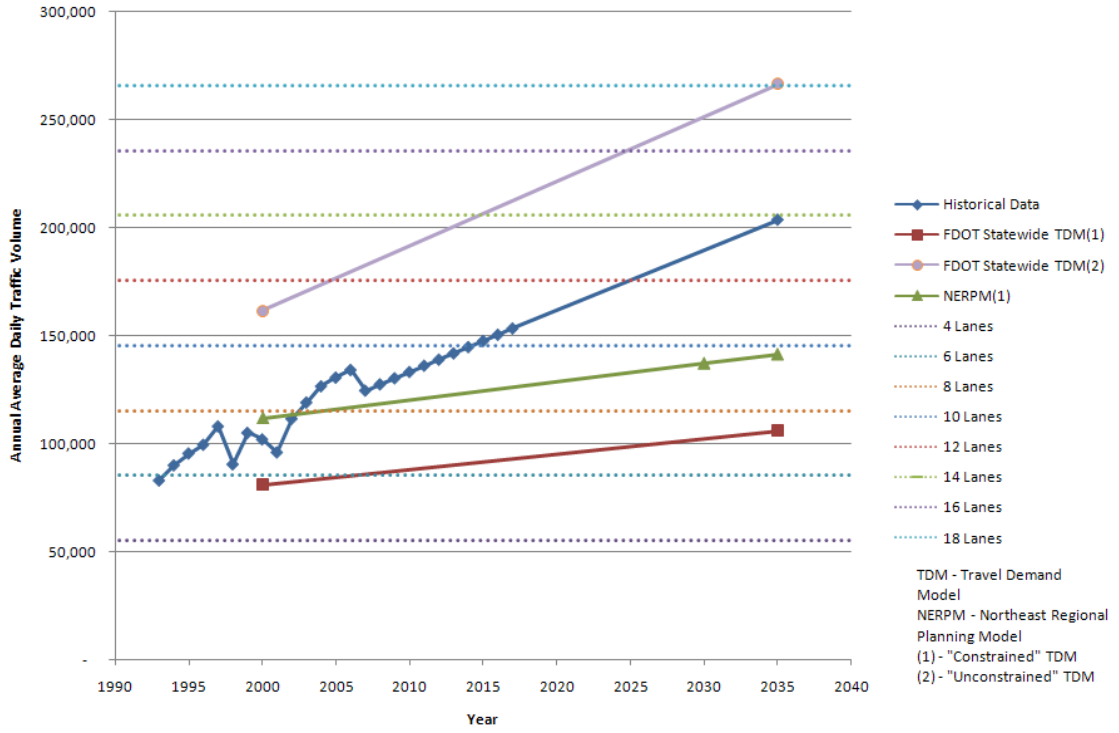


Figure 4-F. I-95 South of 20th Street, Duval County
Existing: 6 Lanes

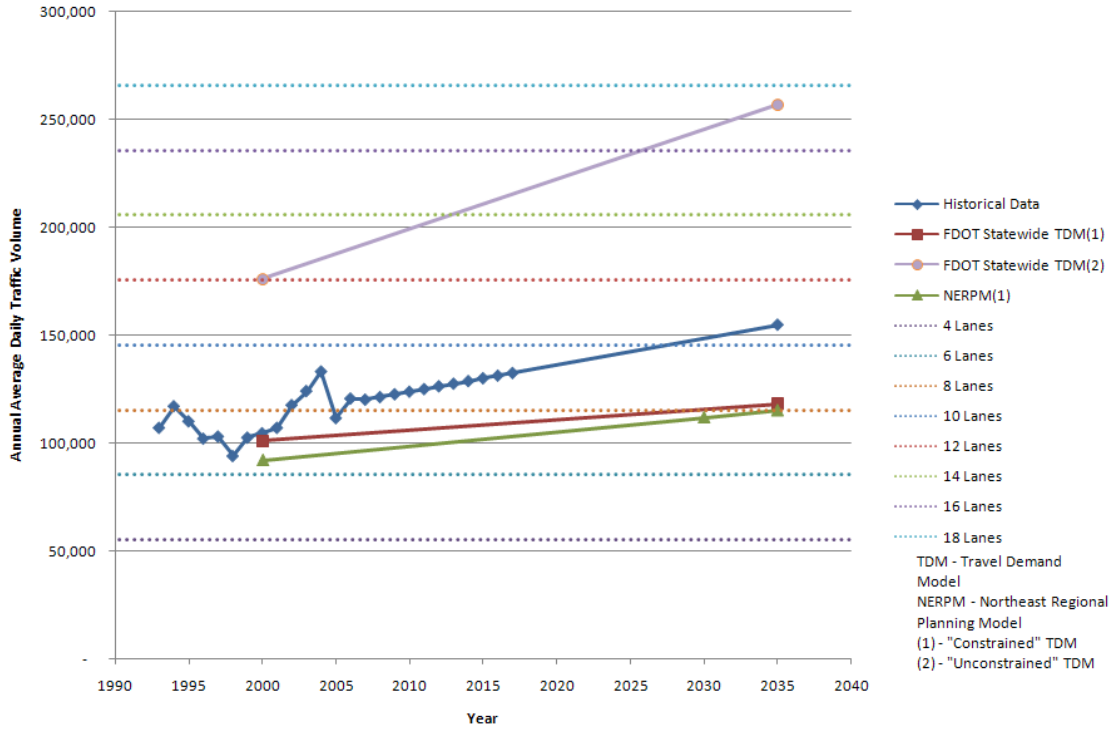


Figure 4-G. I-95 North of 20th Street, Duval County
Existing: 6 Lanes

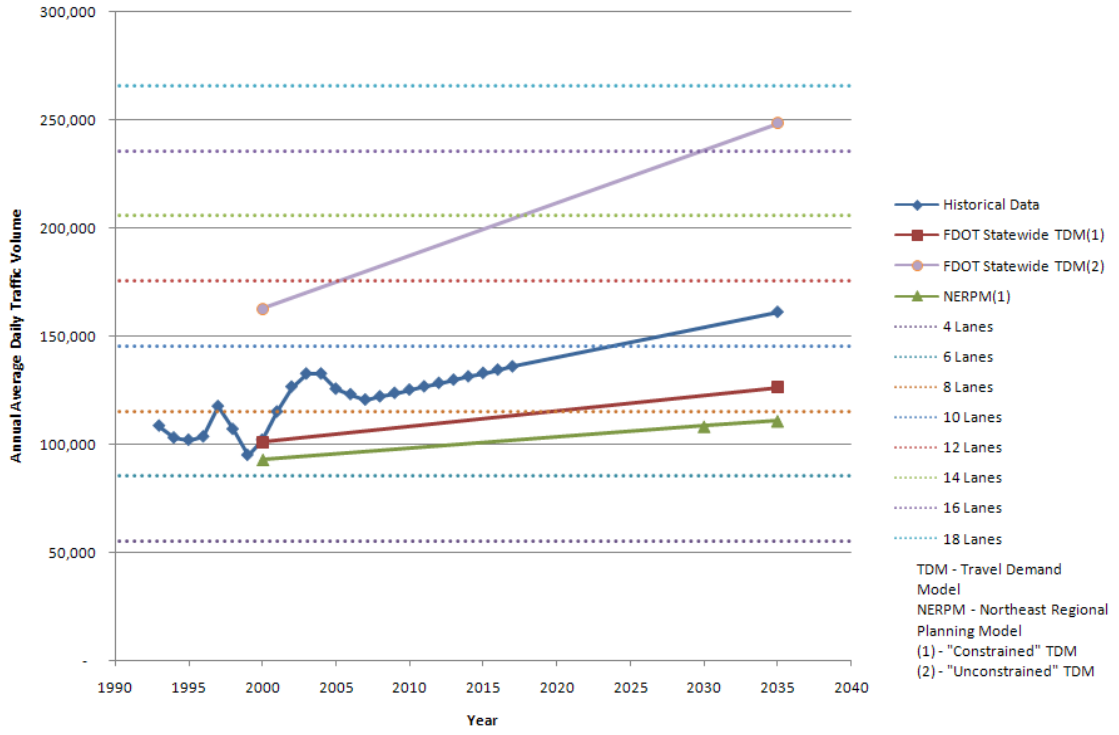


Figure 4-H. I-95 South of I-295, Duval County (North of Jacksonville)
Existing: 6 Lanes

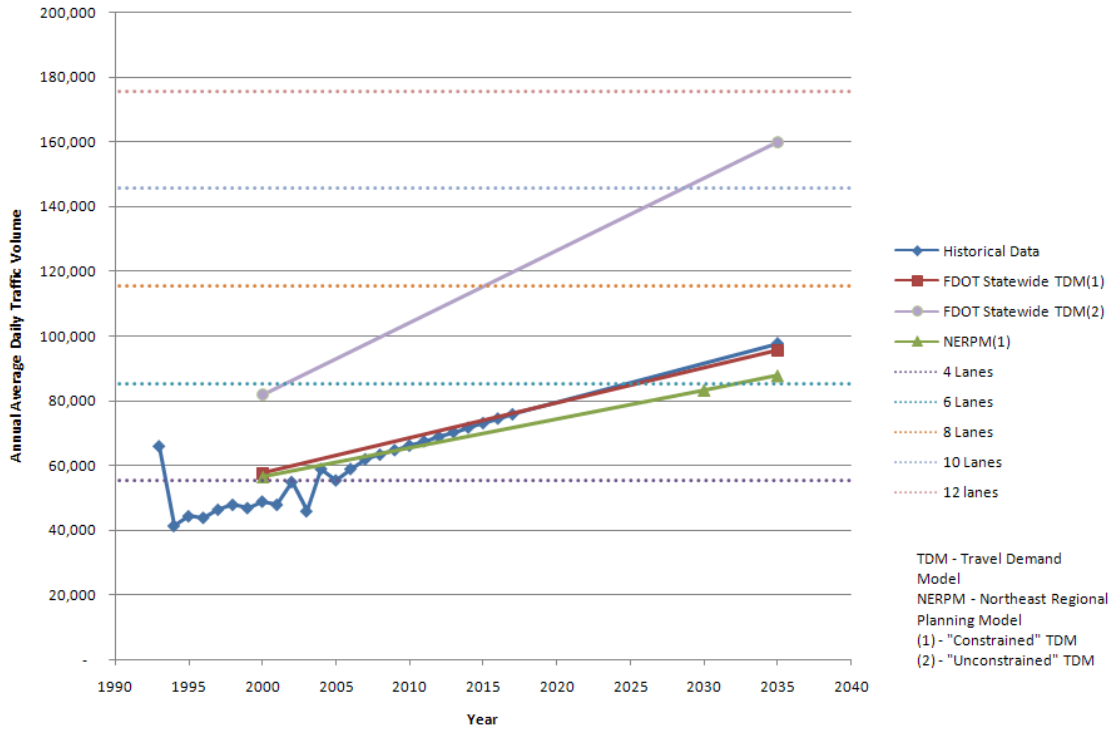


Figure 4-I. I-95 North of I-295, Duval County (North of Jacksonville)
Existing: 6 Lanes

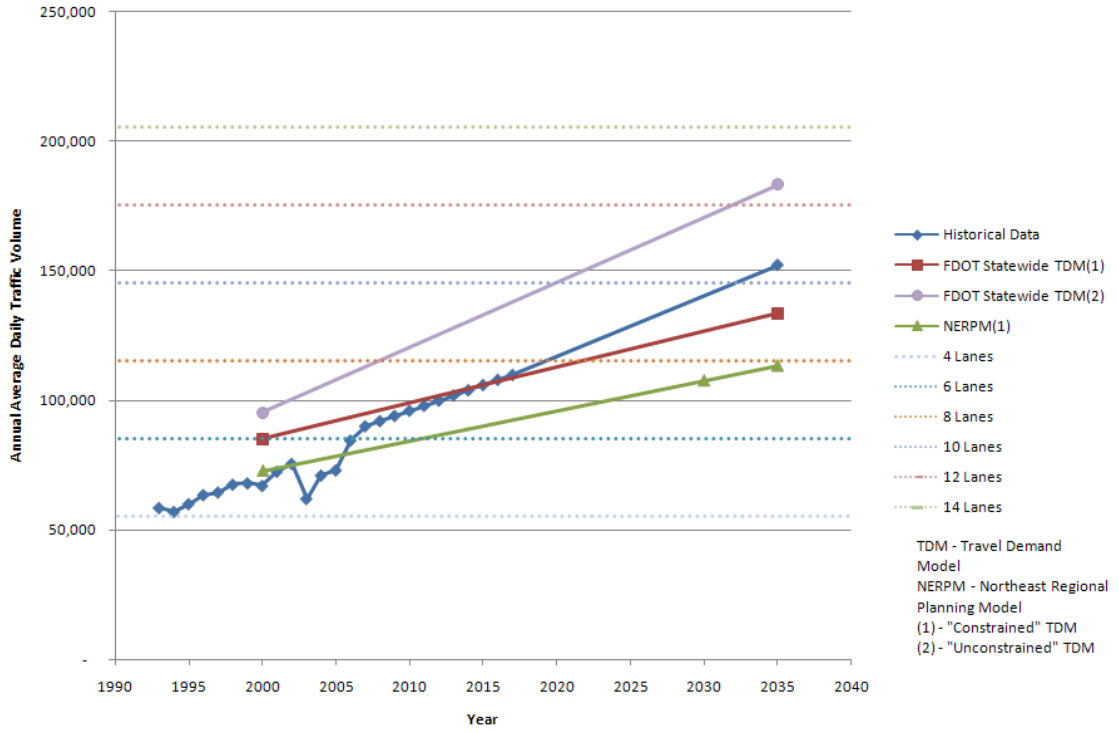
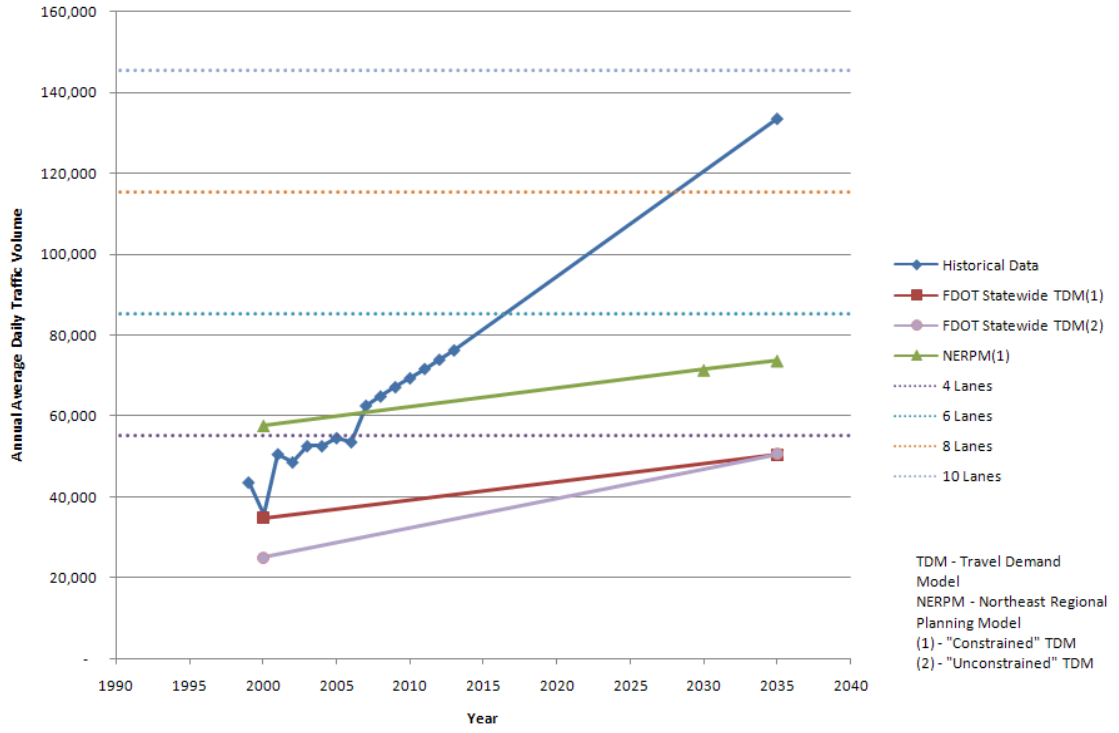


Figure 4-J. I-295 West of I-95, Duval County (North of Jacksonville)
Existing: 4 Lanes



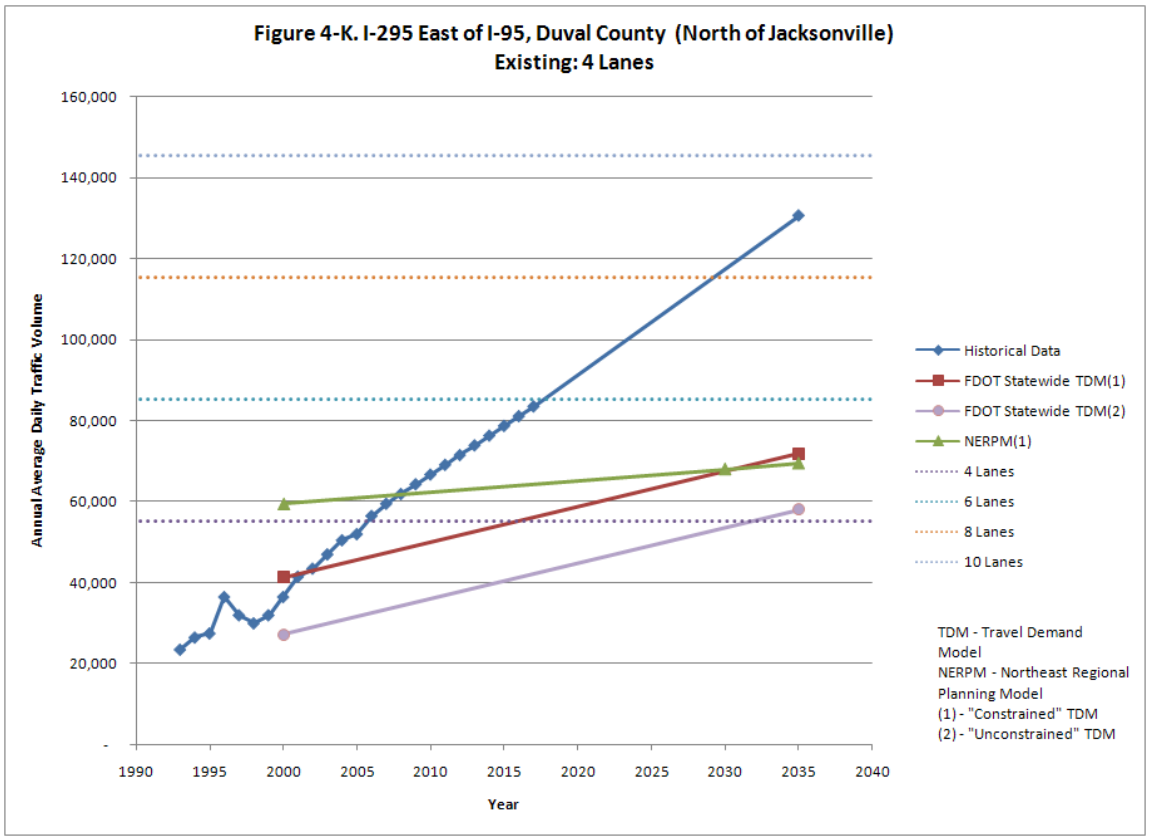


Figure 4-K. I-295 East of I-95, Duval County (North of Jacksonville)
Existing: 4 Lanes
Annual Average Daily Traffic Volume
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
Year
Historical Data
FDOT Statewide TDM(1)
FDOT Statewide TDM(2)
NERPM(1)
4 Lanes
6 Lanes
8 Lanes
10 Lanes
TDM - Travel Demand Model
NERPM - Northeast Regional Planning Model
(1) - "Constrained" TDM
(2) - "Unconstrained" TDM

APPENDIX C

Figure 5-A. I-95 North of Malabar Road, Brevard County

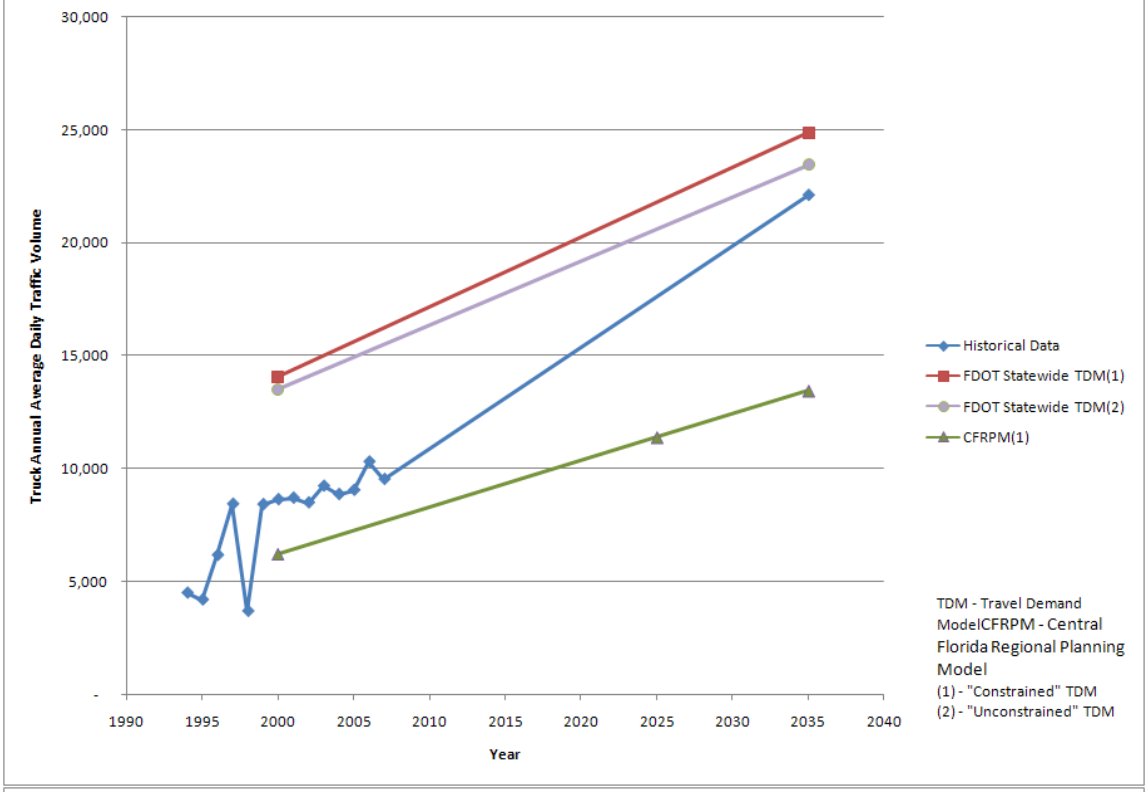


Figure 5-B. I-95 South of SR 400, Volusia County

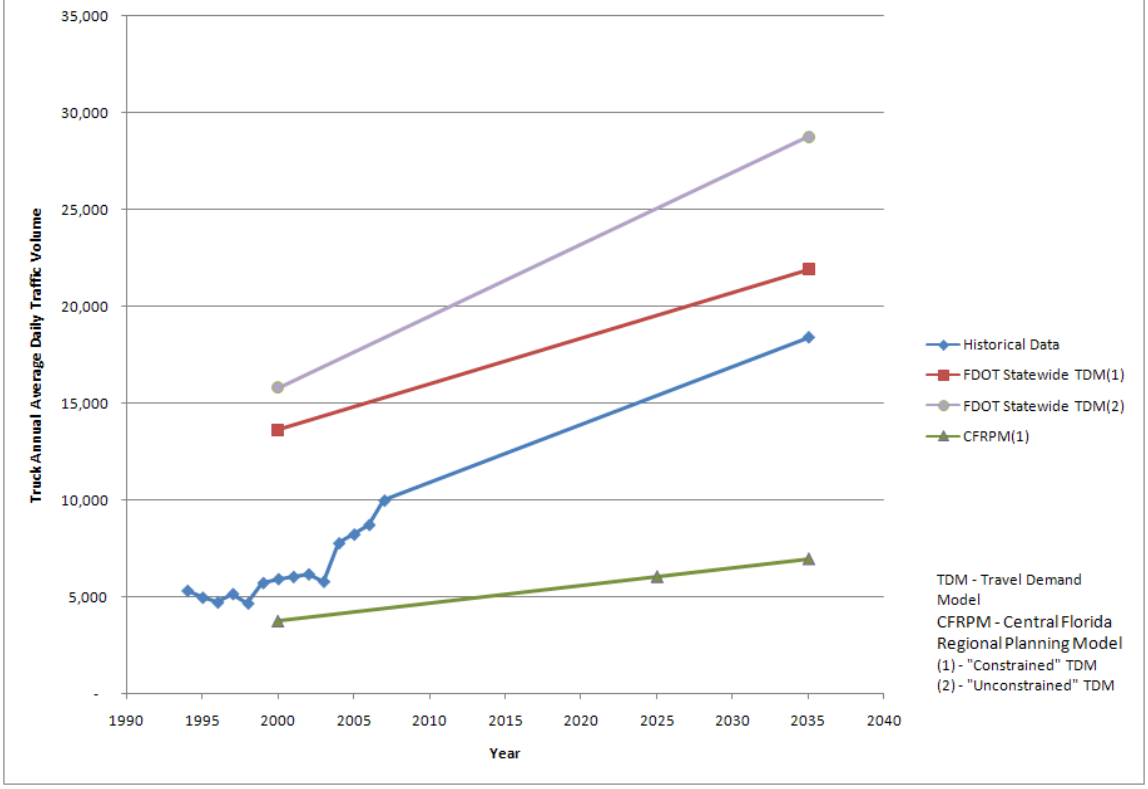


Figure 5-C. I-95 North of LPGA Boulevard, Volusia County

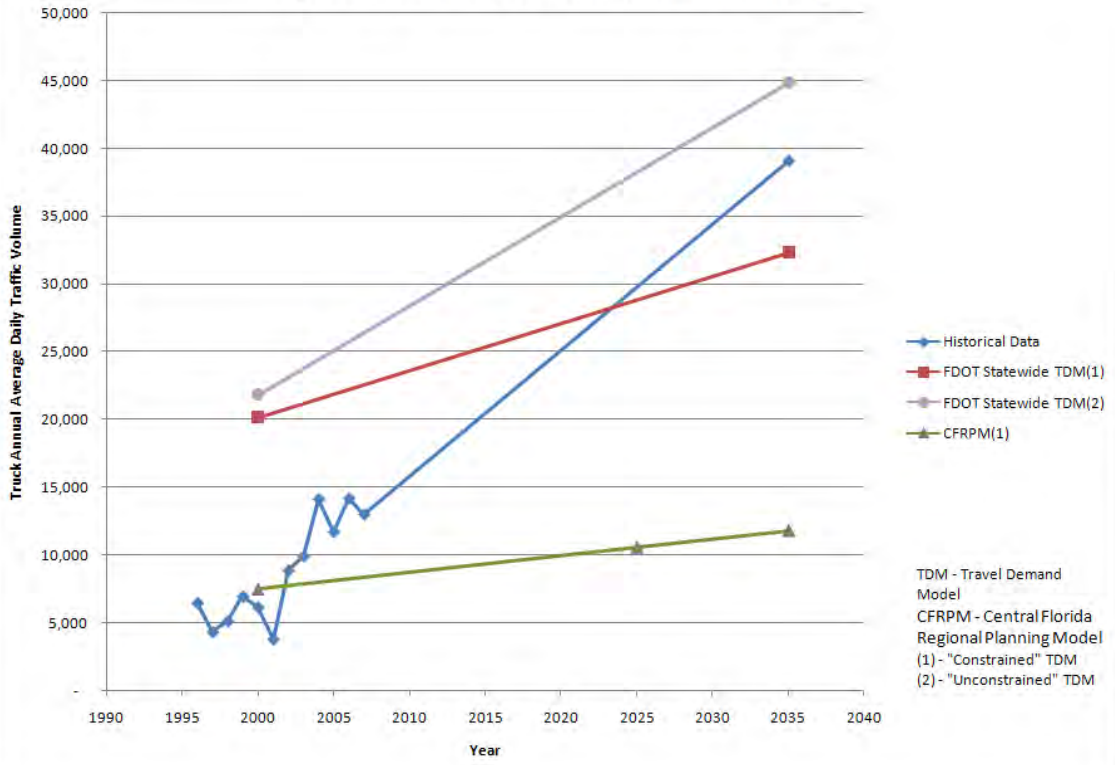


Figure 5-D. I-95 North of International Golf Parkway, St. Johns County

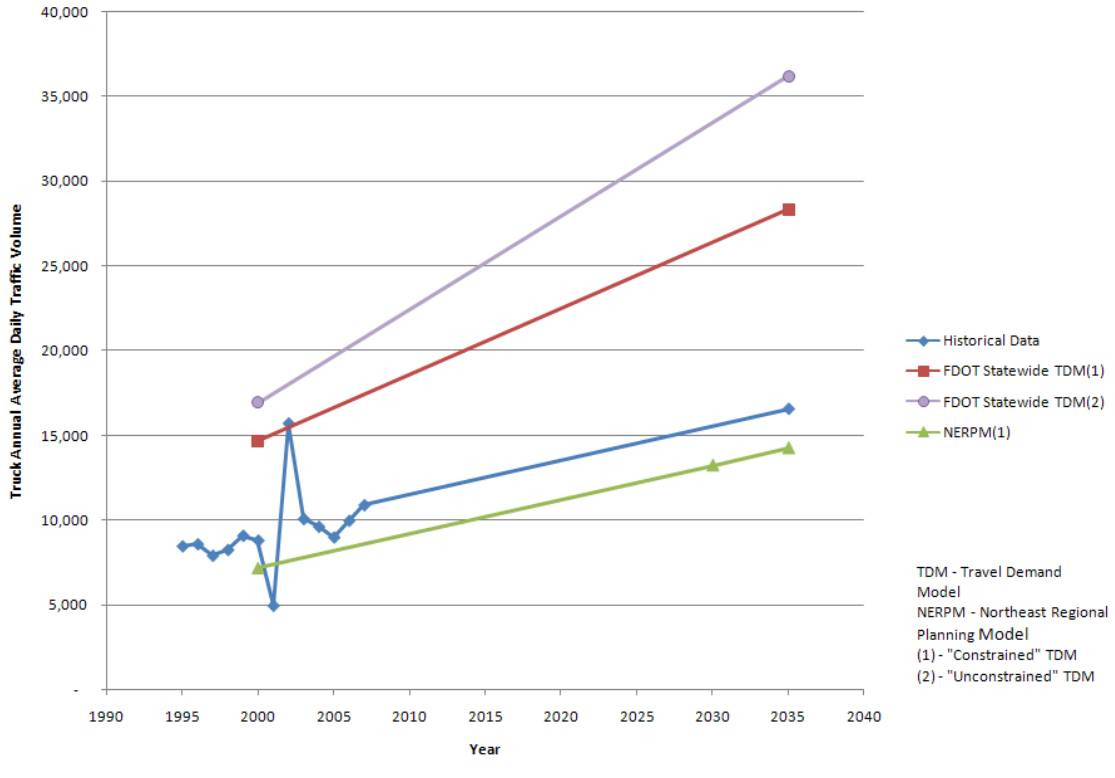


Figure 5-E. I-95 North of Emerson Street, Duval County

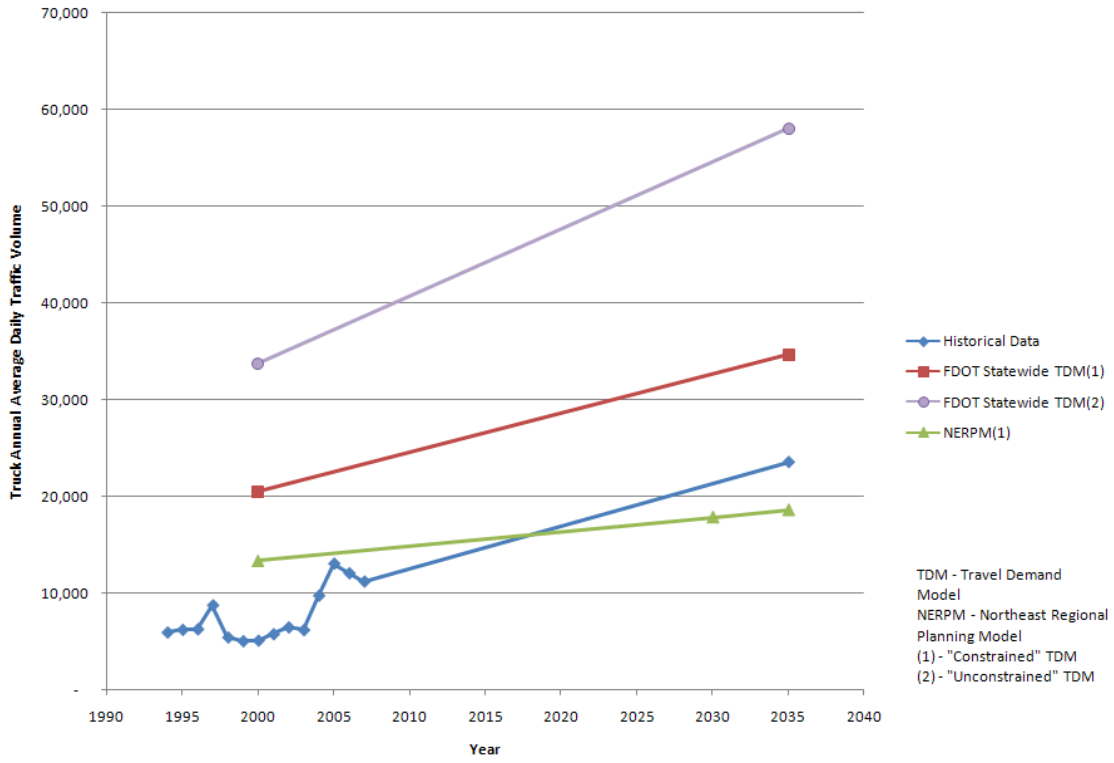


Figure 5-F. I-95 South of 20th Street, Duval County

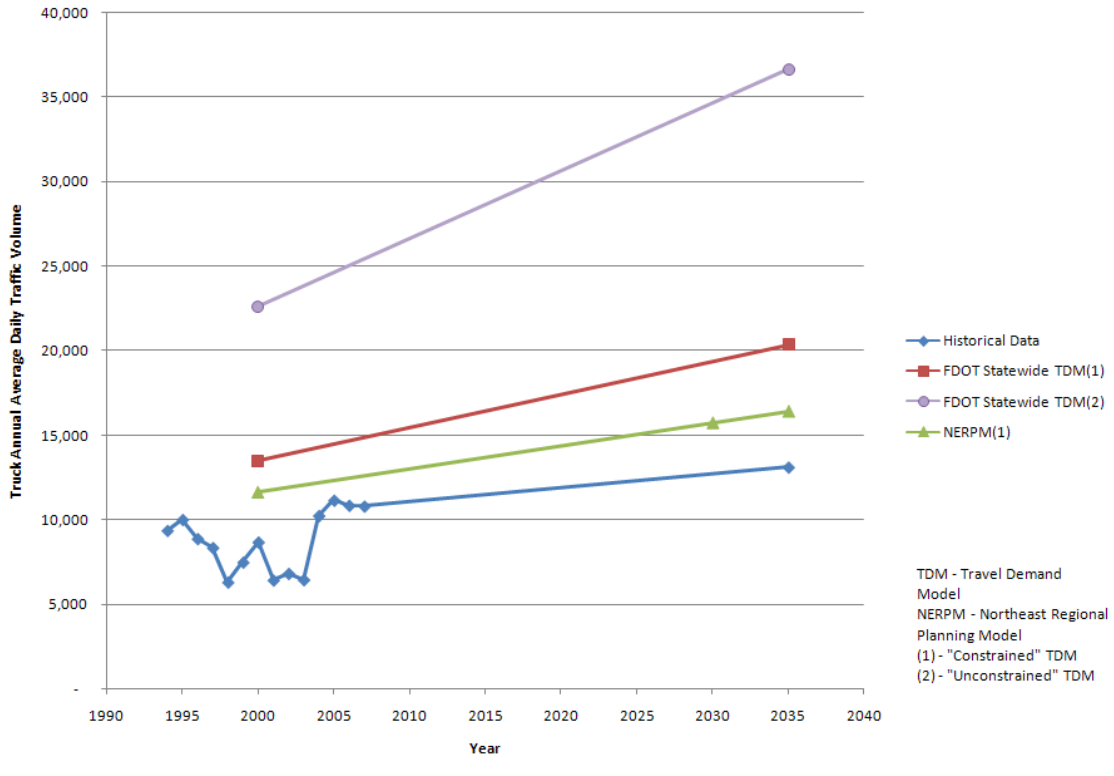


Figure 5-G. I-95 North of 20th Street, Duval County

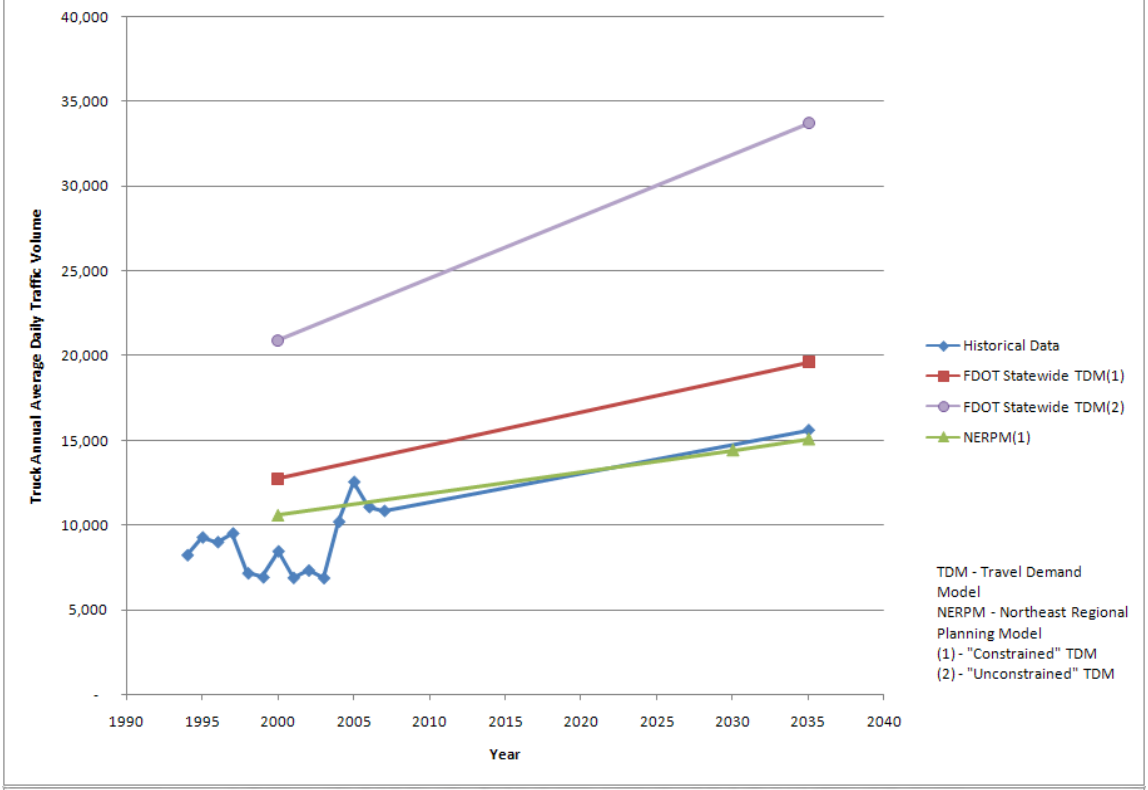


Figure 5-H. I-95 South of I-295, Duval County (North of Jacksonville)

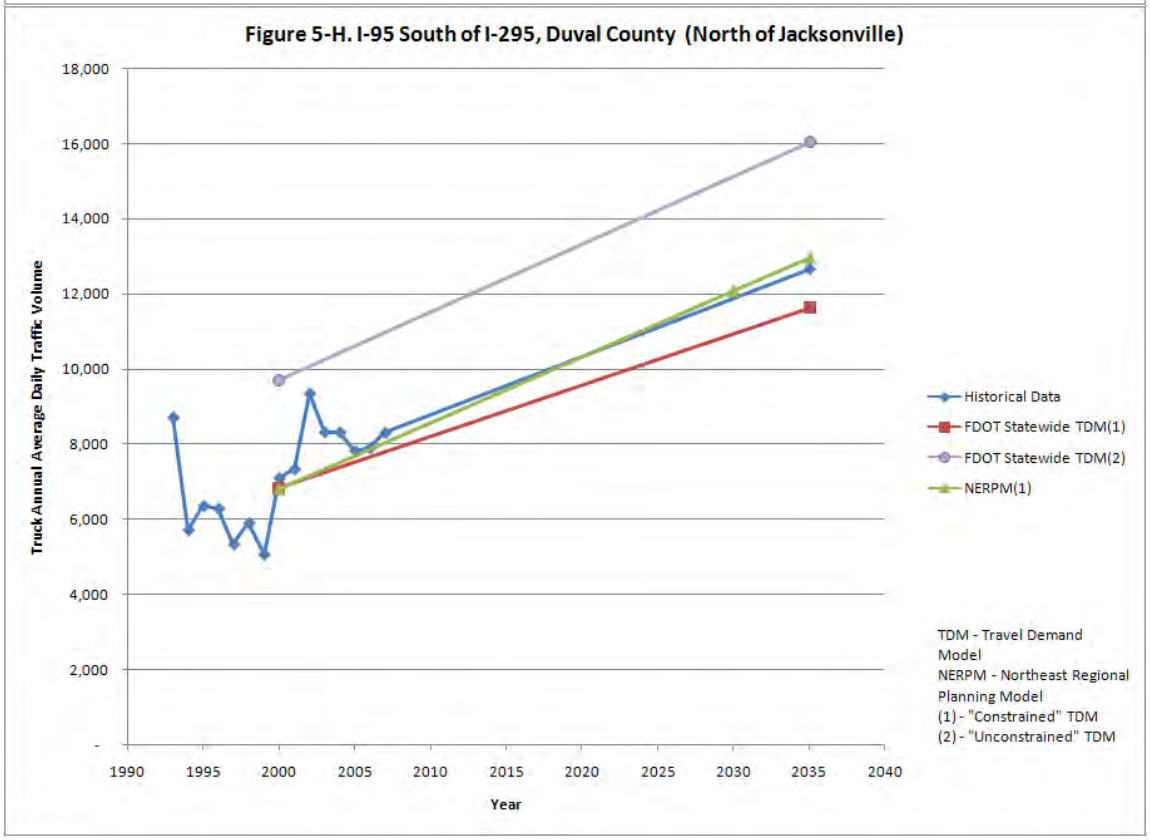


Figure 5-I. I-95 North of I-295, Duval County (North of Jacksonville)

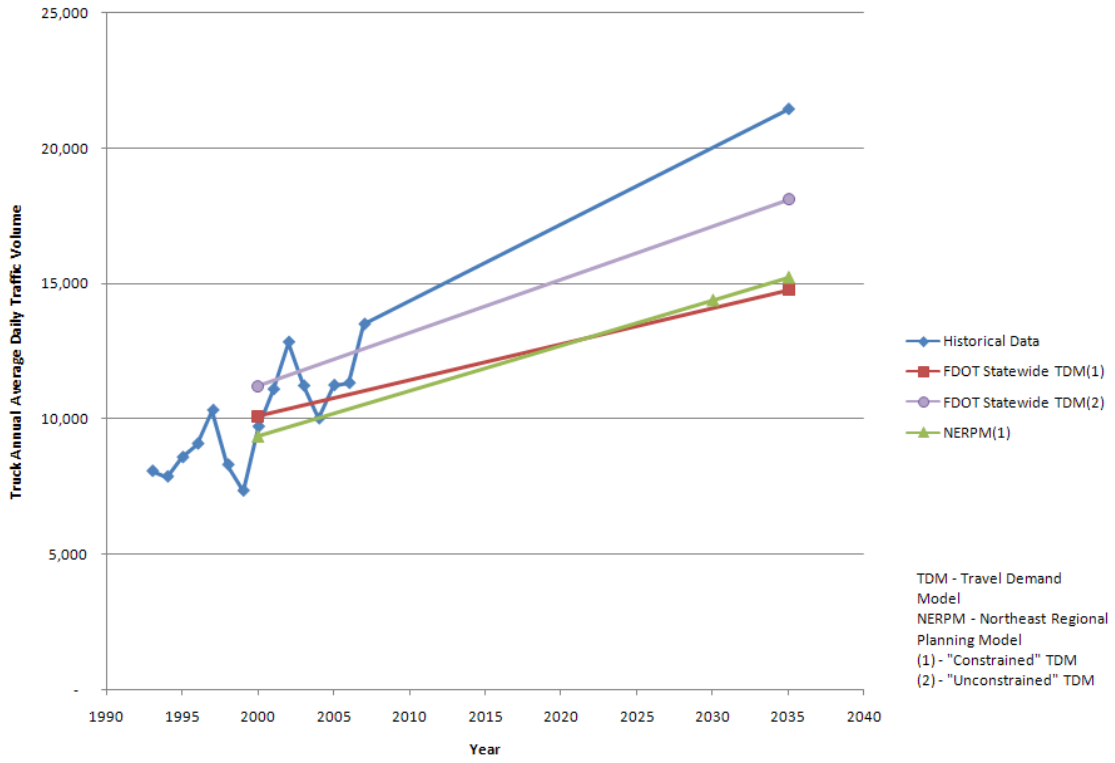
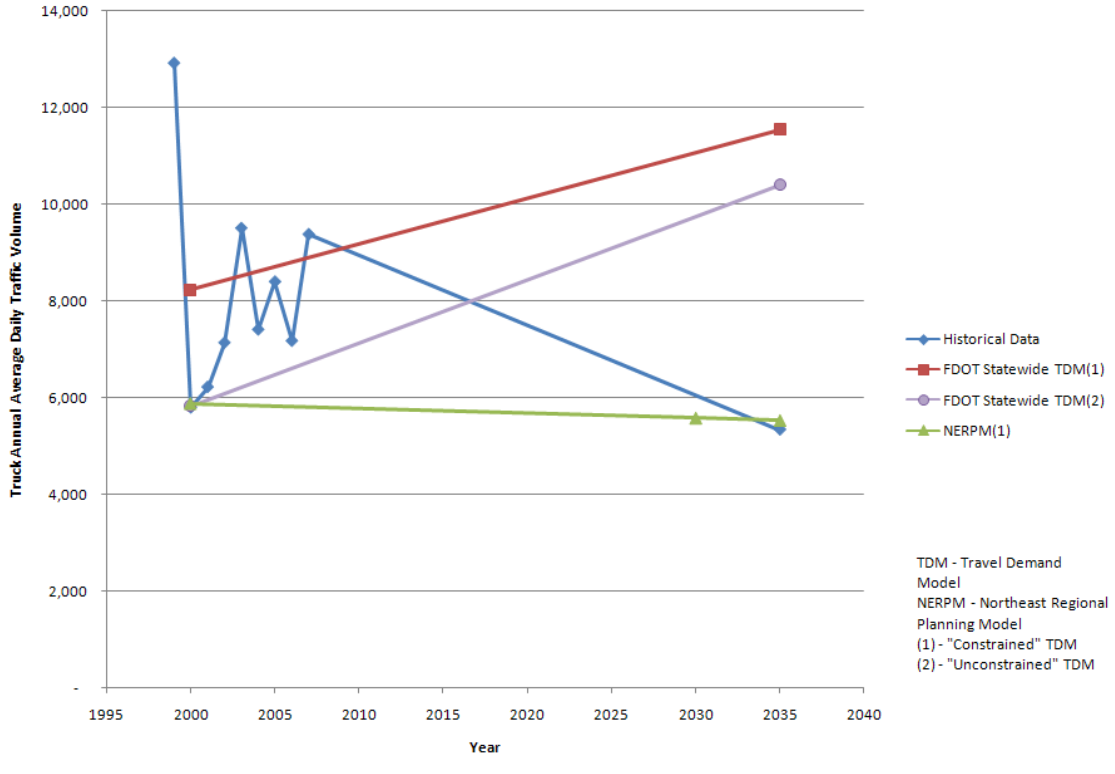


Figure 5-J. I-295 West of I-95, Duval County (North of Jacksonville)



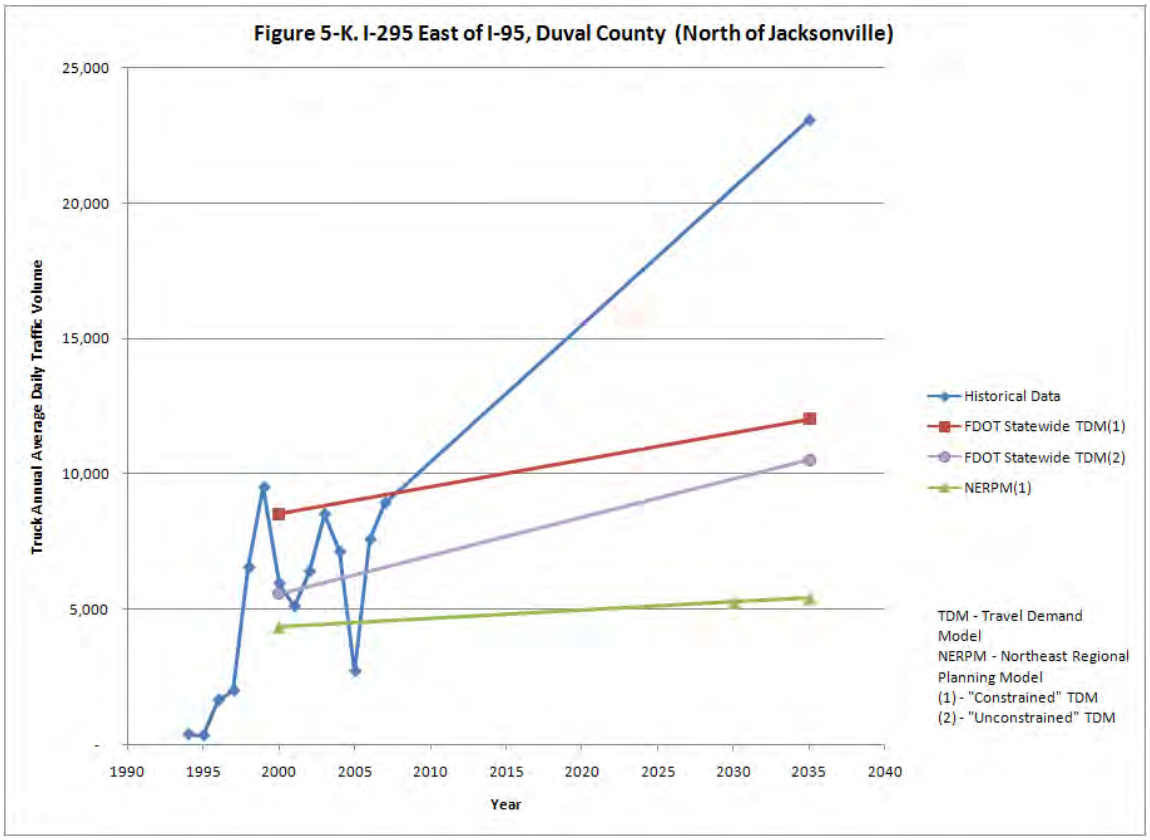


Figure 5-K. I-295 East of I-95, Duval County (North of Jacksonville)
Truck Annual Average Daily Traffic Volume
25,000
20,000
15,000
10,000
5,000
-
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
Year
Historical Data
FDOT Statewide TDM(1)
FDOT Statewide TDM(2)
NERPM(1)
TDM - Travel Demand Model
NERPM - Northeast Regional Planning Model
(1) - "Constrained" TDM
(2) - "Unconstrained" TDM