FREIGHT MOBILITY AND TRADE PLAN

Technical Memorandum 2
Freight Conditions and Performance

Date here

CONTENTS

FIGURES

TABLES

LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
ATRI	American Transportation Research Institute
FO	Functionally Obsolete
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FMTP	Freight and Mobility Trade Plan
FTP	Florida Transportation Plan
HPMS	Highway Performance Monitoring System
IRI	International Roughness Index
LAL	Lakeland Linder International Airport
MPO	Metropolitan Planning Organization
NBI	National Bridge Inspection
NHCRP	National Highway Cooperative Research Project
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
PTI	Truck Planning Time Index
RCI	Roadway Characteristics Inventory
SD	Structurally Deficient
SHS	State Highway System
TAMP	Transportation Asset Management Plan
TEU	Twenty-foot Equivalent Units
TMC	Traffic Message Channel
TMT	Truck Miles Traveled
TPM	Transportation Performance Management
TTTR	Truck Travel Time Reliability
VHD	Vehicle Hours of Delay
VHD/M	Vehicle Hours of Delay per Segment Mile
VHT	Vehicle Hours Traveled
VHU	Vehicle Hours of Unreliability
VHU/M	Vehicle Hours of Unreliability per Segment Mile
VMT	Vehicle Miles Traveled
WIM	Weigh-in-Motion

Introduction

Florida's freight systems and assets are essential to the efficient movement of goods and commodities across all modes within the state. This technical memorandum evaluates and documents the condition and performance of the state's freight transportation systems and assets described in the "Systems and Assets Technical Memorandum." The performance measures included in this document are consistent with the Florida Department of Transportation's (FDOT) Source Book, FDOT Transportation Asset Management Plan (TAMP), Transportation Performance Management (TPM) federal performance measures, Florida Transportation Plan (FTP) goals, Freight and Mobility Trade Plan (FMTP) objectives, and Highway Performance Monitoring System (HPMS). These measures indicate whether Florida's transportation system is achieving the objectives outlined in this plan and show whether progress is being made toward federal and organizational goals. Measures included in this document are categorized by mode: highway, rail, seaport, and aviation. Additionally, performance measures required by the Federal Highway Administration (FHWA), such as bridge and pavement conditions, are also summarized. A summary of every applicable performance measure and condition is provided, including their definitions, data sources, and outcomes. Further, certain performance metrics and conditions outlined here are suggested for use in the context of prioritizing freight projects. These performance metrics pertain primarily to highways, as the focus is on the National Highway Freight Program. Technical Memorandum 6 elaborates on the metrics and methodology used in freight project prioritization.

Freight and Freight Related Measures Appraisal

This document plays a pivotal role within the FMTP as it delineates the current performance measures and conditions, which are drawn from available data and derived from the existing measures established by FDOT and the federal programs mentioned below.

Highway Performance Monitoring System (HPMS)

- Contains system information on all public roads, and information on characteristics of arterial and collector functional systems.
- The data are used extensively in the assessment of highway system condition, performance, and investment needs.

FDOT Transportation Asset Management Plan (TAMP)

The principal objectives for asset management are:

- Ensure the safety and security of transportation customers.
- Minimize damage to infrastructure from vehicles.
- Achieve and maintain a state of good repair for the transportation assets.
- Reduce the vulnerability and increase the resilience of critical infrastructure to impacts from sea level rise, extreme weather, and events.

Florida Transportation Plan (FTP)

The 2020 Florida Transportation Plan Vision element outlines seven key goals. FMTP goals align with these FTP goals and the targeted performance measures in this technical memorandum are useful to satisfy these goals, as follows:

- Safety and security for Florida's residents, visitors, and businesses
- Agile, resilient, and quality transportation infrastructure
- Connected, efficient, and reliable mobility for people and freight
- Transportation choices that improve equity and accessibility
- Transportation solutions that strengthen Florida's economy
- Transportation solutions that enhance Florida's environment
- Transportation systems that enhance Florida's communities

FDOT Source Book

The FDOT Source Book is the trusted source for measuring the performance of Florida's multimodal transportation system. It reports on several facets of performance including:

- Mobility: how people and goods are moved.
- External Factors: how the needs of traveling public are impacted by the changes outside of the transportation systems.
- Infrastructure: how transportation assets are being managed.
- Safety: how safely people travel through the state.

Highway Performance

The different highway performance measures outlined in this technical memorandum are listed below:

- Combination Truck Miles Traveled
- Percent of Empty Trucks
- Combination Truck Planning Time Index
- Truck Bottlenecks
- Highway Pavement Conditions
- Bridge Conditions
- Highway (Truck) Safety
- Truck Parking Utilization
- Truck Detention Time

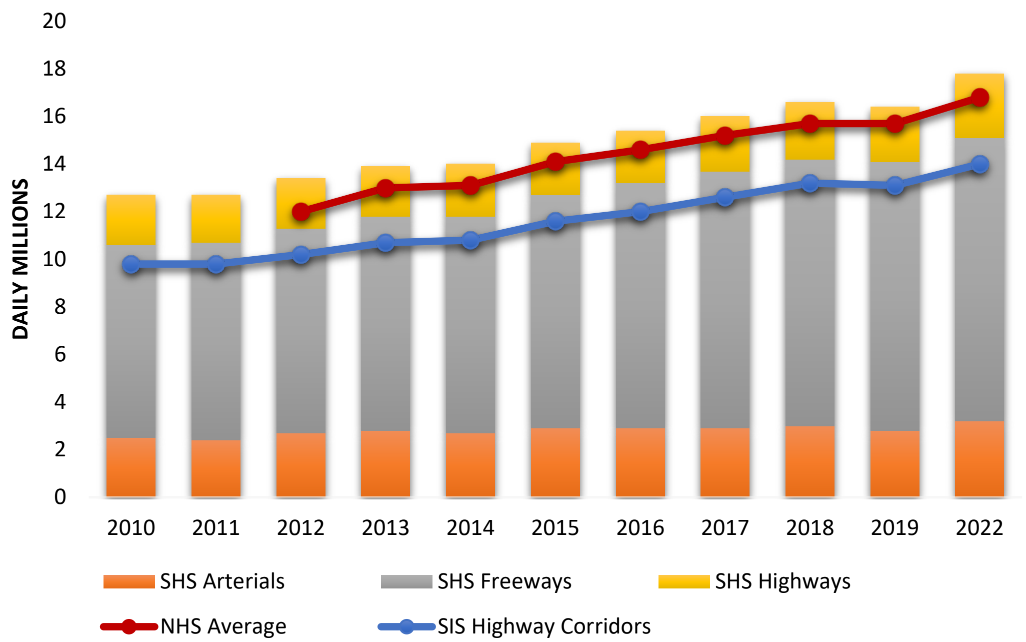
Combination Truck Miles Traveled

Combination Truck Miles Traveled (TMT) is computed by multiplying daily Vehicle Miles Traveled (VMT) by the combination truck factor. The combination truck factor is provided on a county-by-county basis and represents the proportion of heavy vehicles that are combination trucks (Classes 8-13).

$$Combination\ Truck\ Miles\ Traveled = \sum Segment\ Length \times Volume \times Combination\ Truck\ Factor$$

Figure 1 provides the annual trends of average daily CTMT for different facility types in the state. The number of daily combination truck miles traveled on Florida's State Highway System (SHS) has been steadily increasing since 2010. Truck miles traveled increased by 40.16 percent from 2010 to 2022. In 2022, there were 17.8 million average daily truck miles traveled, a 7.88 percent increase from 2019. Figure 2 depicts a statewide map for Annual Average Daily Truck Traffic (AADTT) in 2022 along major roadways in the state. Figure 3 depicts a statewide map of percentage changes in AADTT from 2015 to 2022.

Figure 1 | Average Daily Combination Truck Miles Traveled by Facility Type in Florida



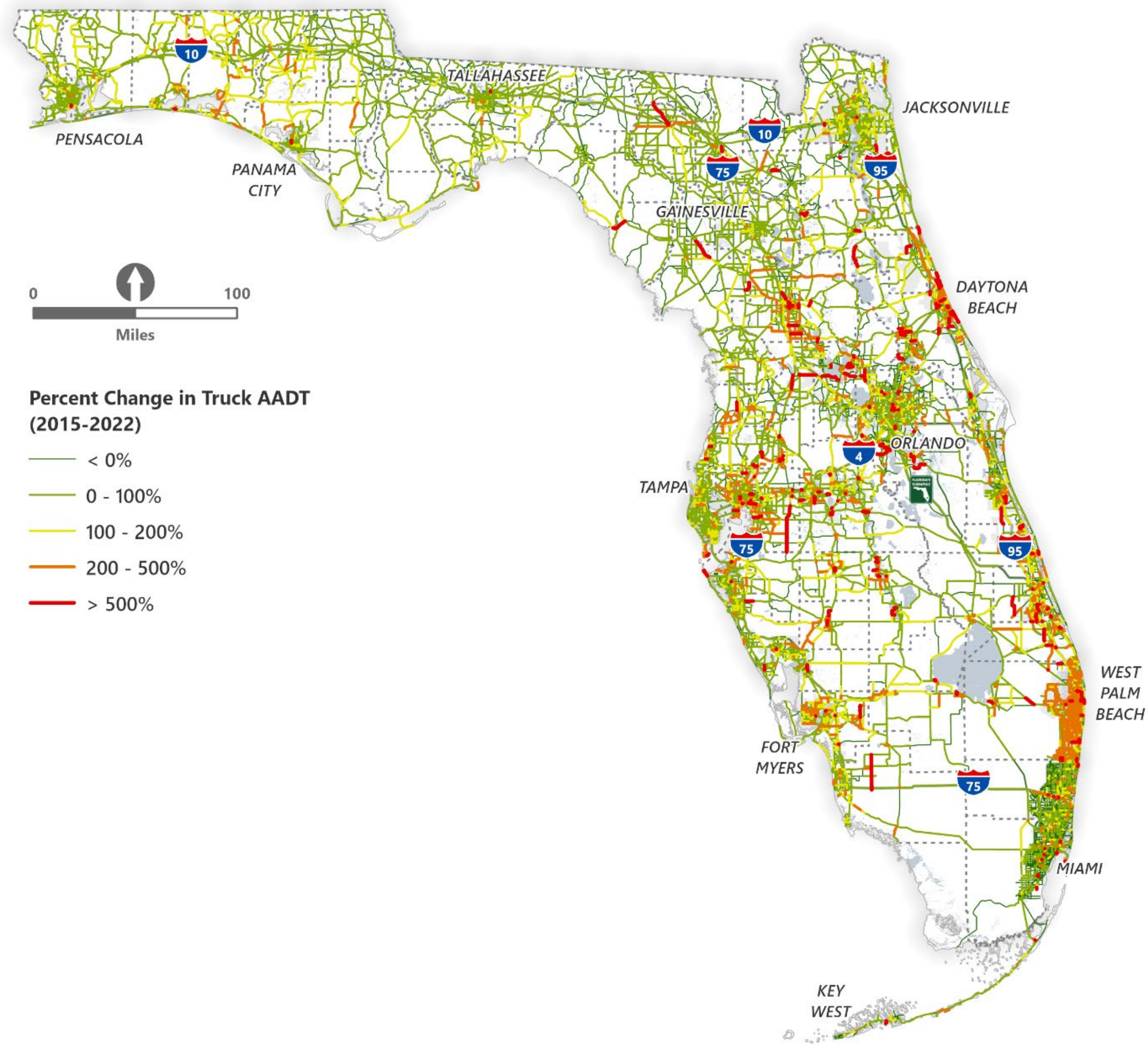
Data Source: *FDOT Source Book*

**No analysis available for years 2020 and 2021*

Figure 2 | Annual Average Daily Truck Traffic (2022)

***Data Source**: FDOT Transportation Data and Analytics Office*

Figure 3 | Percent Change in Annual Average Daily Truck Traffic (2015-2022)

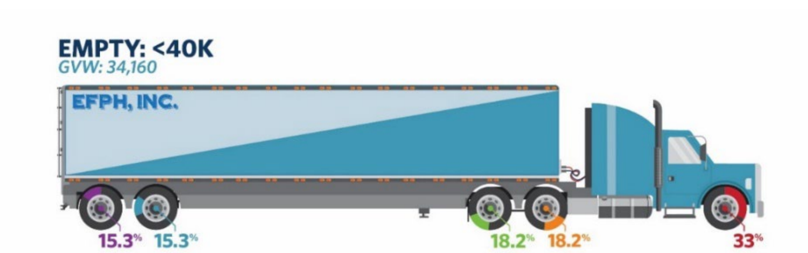


***Data Source**: FDOT Transportation Data and Analytics Office*

Percent of Empty Trucks

The truck empty haul measure discussed in this section utilizes Weigh-in-Motion (WIM) data spanning the years 2015 to 2022. The dataset comprises individual records of trucks passing through each WIM site within the state, containing information such as date, time, travel direction, travel lane, gross vehicle weight, vehicle class, vehicle length, axle spacing, and axle weights for each truck. Based on a 2018 study done by Transportation Data and Analytics, it has been determined that if the gross vehicle weight is less than 40,000 lbs., it is categorized as "empty." Figure 4 illustrates a typical example of a Class 9 empty truck. An analysis of the distribution of truck traffic by vehicle class at these sites reveals that Class 9 trucks are responsible for hauling 75 percent of the total tonnage passing through the WIM sites in Florida. As a result, the analysis of empty trucks primarily concentrates on Class 9 vehicles.

Figure 4 | Class 9 Truck Axle Weight Load Distribution



***Data Source**: FDOT Transportation Data and Analytics Office*

As depicted in Table 1, the three WIM sites (I-10, I-75, and I-95) located near the state border exhibit a notable disparity in the proportion of empty trucks entering the state versus those exiting. The findings suggest that Florida functions primarily as a consumer state, resulting in a higher prevalence of empty trucks departing from the state.

Table 1 | Percentage of Empty Class 9 Trucks by Direction of Travel (2015-2022)

Year	I-95		I-10		I-75	
	Out of State	In-State	Out of State	In-State	Out of State	In-State
2015	40.97%	14.97%	28.07%	17.23%	N/A	N/A
2016	38.20%	13.23%	29.12%	16.93%	N/A	N/A
2017	37.14%	11.53%	29.64%	16.88%	47.93%	11.06%
2018	34.94%	9.35%	28.84%	22.16%	N/A	N/A
2019	32.29%	9.52%	30.50%	18.33%	N/A	N/A
2020	29.50%	8.02%	28.21%	16.18%	16.37%	10.74%
2021	65.00%	53.77%	31.94%	16.81%	19.20%	11.59%
2022	44.75%	N/A	37.26%	15.17%	43.77%	15.49%

*N/A – Data not available/collected.

***Data Source**: FDOT Transportation Data and Analytics Office*

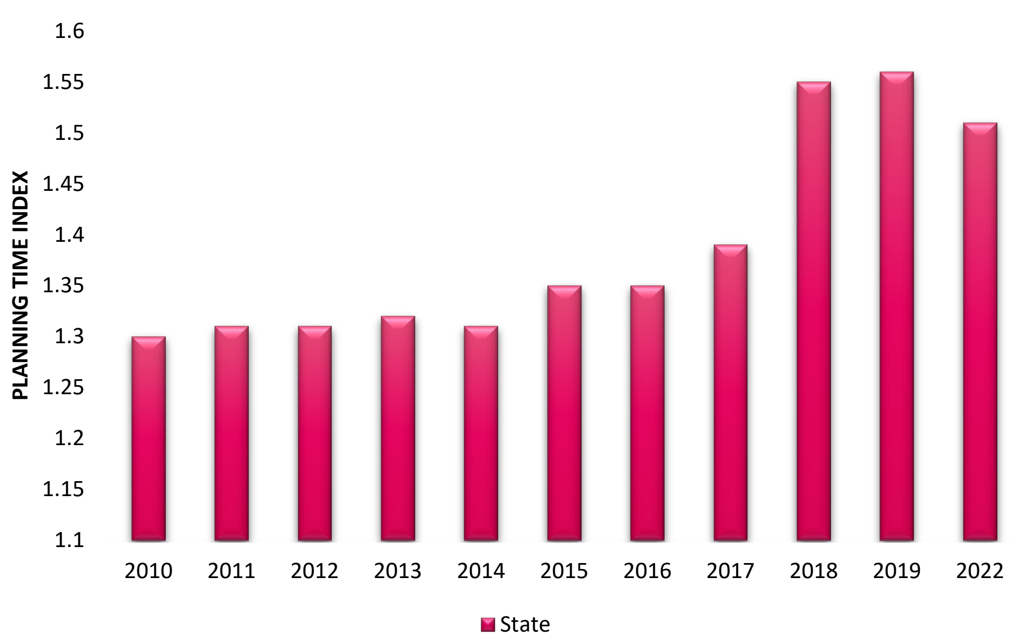
Combination Truck Planning Time Index

As per the FDOT Source Book, the combination truck planning time index (PTI) is defined as ratio of the 95th percentile peak period travel time to the free flow travel time. This measure represents the additional time that a shipper should budget to ensure on-time arrival 95 percent of the time. The reporting period is the peak period (4:00 p.m. to 6:00 p.m.) for the urbanized areas of the seven largest Florida Metropolitan Planning Organizations (MPO) and the peak hour (hour with the highest hourly factor) for other urbanized areas and elsewhere. For this measure: the higher the PTI, the less reliable, and the lower the PTI, the more reliable on-time truck shipments are.

$$PTI = \frac{Travel\ Time_{95th\ percentile}}{Travel\ Time_{free-flow}}$$

Figure 5 provides the annual trends of this index for the state. From 2010 to 2022, combination truck PTI during peak hour increased from 1.30 to 1.51. For a trip that would take 10 minutes in free-flow conditions, the 95th percentile travel time is 15.1 minutes with a PTI of 1.51. The shipper needs to plan an additional 5.1 minutes for the trip to arrive on time.

Figure 5 | Peak Hour Combination Truck Planning Time Index (2010-2022)



*Includes Freeways only | *No analysis available for years 2020 and 2021.*

Data Source: *FDOT Source Book*

Truck Bottlenecks

The roadway segments that rank highest in recurring congestion or in non-recurring congestion are defined as truck bottlenecks in the state of Florida. Appendix A explains the methodology for identifying truck bottlenecks and additional analysis outcomes. Recurring congestion is quantified as the number of hours of travel above the free flow conditions, defined as the Vehicle Hours of Delay (VHD). Non-recurring congestion, quantified as the number of Vehicle Hours of Unreliability (VHU) accumulated in each segment, was calculated as the difference between the 95th percentile travel time and the average travel time. These congestion measures are explained in more detail in Appendix A. The objective of the analysis was to describe the recurring and non-recurring congestion during a regular weekday. It is important to distinguish these two measures because research shows that freight users are more concerned with non-recurring congestion than recurring congestion. Motor carriers can easily schedule deliveries to consider recurring congestion; however non-recurring congestion is difficult to predict, which could lead to delays and later deliveries. This causes disruptions for not only the motor carrier, but also for the receiver. One of the most important factors in modern-day supply-chains is being on-time, which becomes much more difficult with high levels of non-recurring congestion. Figure 6 depicts the state's top 10 truck bottlenecks (for recurring or non-recurring congestion), and the top 100 truck bottlenecks (for recurring or non-recurring congestion) in 2021. Table 2 provides the top 10 truck bottlenecks for recurring and non-recurring congestion in 2021.

The top recurring bottlenecks in the state are along I-4 near I-275 interchange. The top non-recurring bottleneck in the state is along U.S 27 near Florida Interchange. The I-4, Central Florida, and major highways in Miami-Dade County are also among the top 10 truck bottlenecks. It is important to note that the American Transportation Research Institute (ATRI) publishes a list of the top 100 bottlenecks in the country every year. In 2023, the ATRI study identified that the 73rd top truck bottleneck in the U.S. is in Florida. It is in Tampa along I-4 and I-275. The same truck bottleneck is one of the top-ranked in the state as per the analysis conducted in this plan. It should be noted that the methodology and data sources used to assess truck bottlenecks by ATRI differs from the study described here. As such, the results of each study vary. Future work should determine the causes of each truck bottleneck identified in this plan.

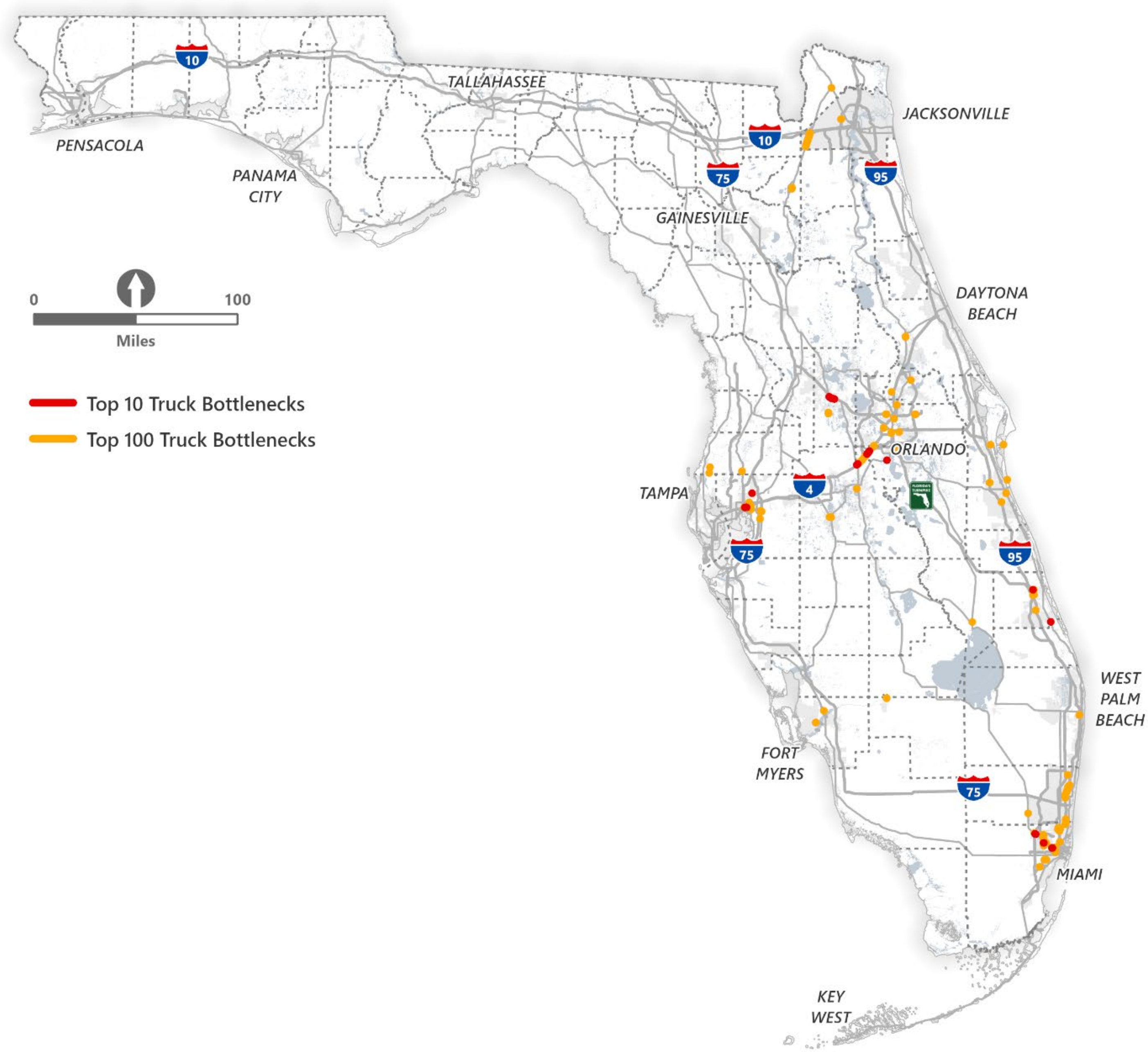
Table 2 | Top 10 Truck Bottlenecks for Recurring and Non-Recurring Congestion (2021)

Rank	Recurring Congestion		Non-Recurring Congestion	
	Roadway Section	County	Roadway Section	County
#1	I-4 W near I-275 interchange*	Hillsborough	US-27 S – eastbound direction near Florida Turnpike interchange	Lake
#2	I-4 W near SR 429 interchange - southbound	Osceola	I-4 Eastbound near US 27 interchange	Polk
#3	I-4 Eastbound near US 27 interchange	Polk	NW 36th St westbound near Miami International Airport	Miami-Dade
#4	I-4 W near I-275 interchange*	Hillsborough	W Okeechobee Rd eastbound at Turnpike interchange	Miami-Dade
#5	W Okeechobee Rd westbound at Turnpike interchange	Miami-Dade	E Fowler Ave near Temple Terrace	Hillsborough
#6	W Okeechobee Rd eastbound at Turnpike interchange	Miami-Dade	US-27 S – eastbound direction near Florida Turnpike interchange	Lake
#7	I-4 W near I-275 interchange*	Hillsborough	NW Jensen Beach Blvd eastbound near North River Shores	Martin
#8	Orange Ave eastbound near I-95 interchange	St Lucie	Orange Ave eastbound near I-95 interchange	St Lucie
#9	NW 36th St westbound near Miami International Airport	Miami-Dade	I-4 W near SR 429 interchange - southbound	Osceola
#10	NW 74th St near MetroRail Palmetto Station	Miami-Dade	S John Young Pkwy	Osceola

Data Source: *FHWA National Performance Measurement Research Data Set and FDOT Freight and Rail Office*

** The three segments of I-4 W are in proximity to the I-275 interchange but constitute successive corridor segments. It's important to note that these segments are distinct and not identical to each other.*

Figure 6 | Florida's Major Truck Bottlenecks (2021)



Data Source: *FDOT Freight and Rail Office (2021)*

Highway Pavement Conditions

The FHWA regulations (23 CFR 490 Subpart C) define the national performance management measures for assessing the condition and reporting on targets established for the pavements on the National Highway System (NHS). The measures are:

- Percentage of Interstate pavements by lane mile in Good condition
- Percentage of Interstate pavements by lane mile in Poor condition
- Percentage of non-Interstate NHS pavements by lane mile in Good condition
- Percentage of non-Interstate NHS pavements by lane mile in Poor condition

Table 3 shows the FHWA's criteria for assessing pavement condition. The pavement performance measures refer to the percentage of pavement classified as in Good or Poor condition based on ratings for roughness (IRI), cracking percent, rutting, and faulting. The segment of pavement is considered to be in Good condition if all three metrics (IRI, cracking percent, and rutting or faulting) meet the criteria for Good. The segment is considered to be in Poor condition if two of the three metrics are rated to be Poor; and Fair if the segment does not meet the criteria for either Good or Poor condition.

Table 3 | Pavement Condition Criteria (FHWA)

Rating Factors	Good	Fair	Poor
IRI (in/mile)	< 95	95-170	>170
Cracking Percent	<5	5-10 (CRCP) 5-15 (Jointed) 5-20 (Asphalt)	>10 (CRCP) >15 (Jointed) >20 (Asphalt)
Rutting (in) for asphalt only	<0.2	0.2-0.4	>0.4
Faulting (in) for jointed only	<0.1	0.1-0.15	>0.15

Data Source: *FDOT Source Book*
Continuously Reinforced Concrete Pavements - CRCP

Table 4 presents the targets for the pavement assets. The Department's target for the SHS is mandated by statute (s., 334.046). In accordance with the federal regulations, the Department established statewide targets in coordination with the state's MPOs, to the extent practicable, for each FHWA pavement performance measure. The condition/performance of the NHS pavement assets is assessed by FHWA based on these targets.

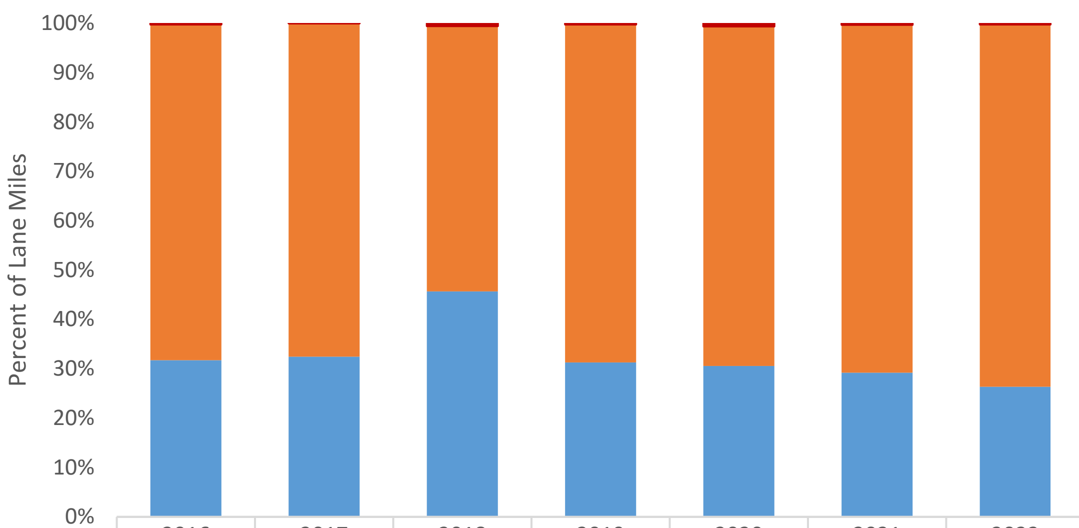
Table 4 | FDOT Pavement Targets

FHWA Performance Measure	2023 Target
% of Interstate pavement by lane mile in good condition.	60.0%
% of Interstate pavement by lane mile in poor condition.	5.0%
% of non-Interstate NHS pavement by lane mile in good condition.	40.0%
% of non-Interstate NHS pavement by lane mile in poor condition.	5.0%

Data Source: *Transportation Asset Management Plan (TAMP), 2022*

Figure 7a and Figure 7b present the condition of the NHS pavement in Florida based on FHWA performance measures. Overall, pavement on the NHS is in Good and Fair condition with a relatively small fraction recorded as in Poor condition. For calculating % of NHS pavements in Good/Fair/Poor Condition, sections with bridges, unpaved surfaces, "other" surface types and missing data (any of IRI, Cracking %, Rutting or Faulting) are excluded. A section can have missing, invalid or unresolved data (any of IRI, Cracking %, Rutting or Faulting) due to roadway under construction, data not collected, etc.

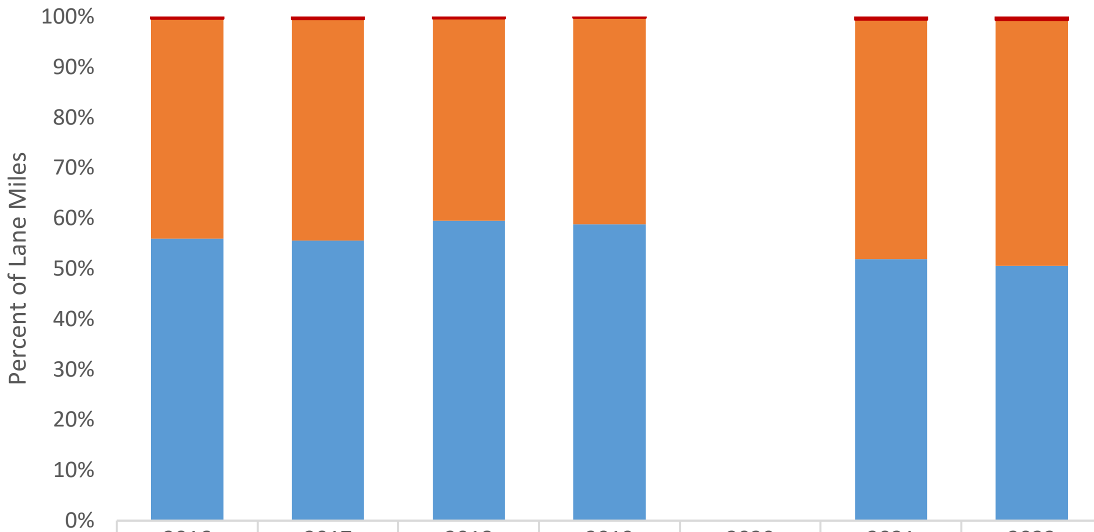
Figure 7a | NHS Interstate Pavement Condition



	2016	2017	2018	2019	2020	2021	2022
Poor	0.24%	0.01%	0.57%	0.23%	0.61%	0.29%	0.25%
Good	68.00%	67.51%	53.73%	68.45%	68.80%	70.49%	73.39%
Fair	31.77%	32.48%	45.70%	31.32%	30.59%	29.21%	26.36%

Data Source: *FDOT Source Book*

Figure 8b | Non-Interstate - NHS Pavement Condition

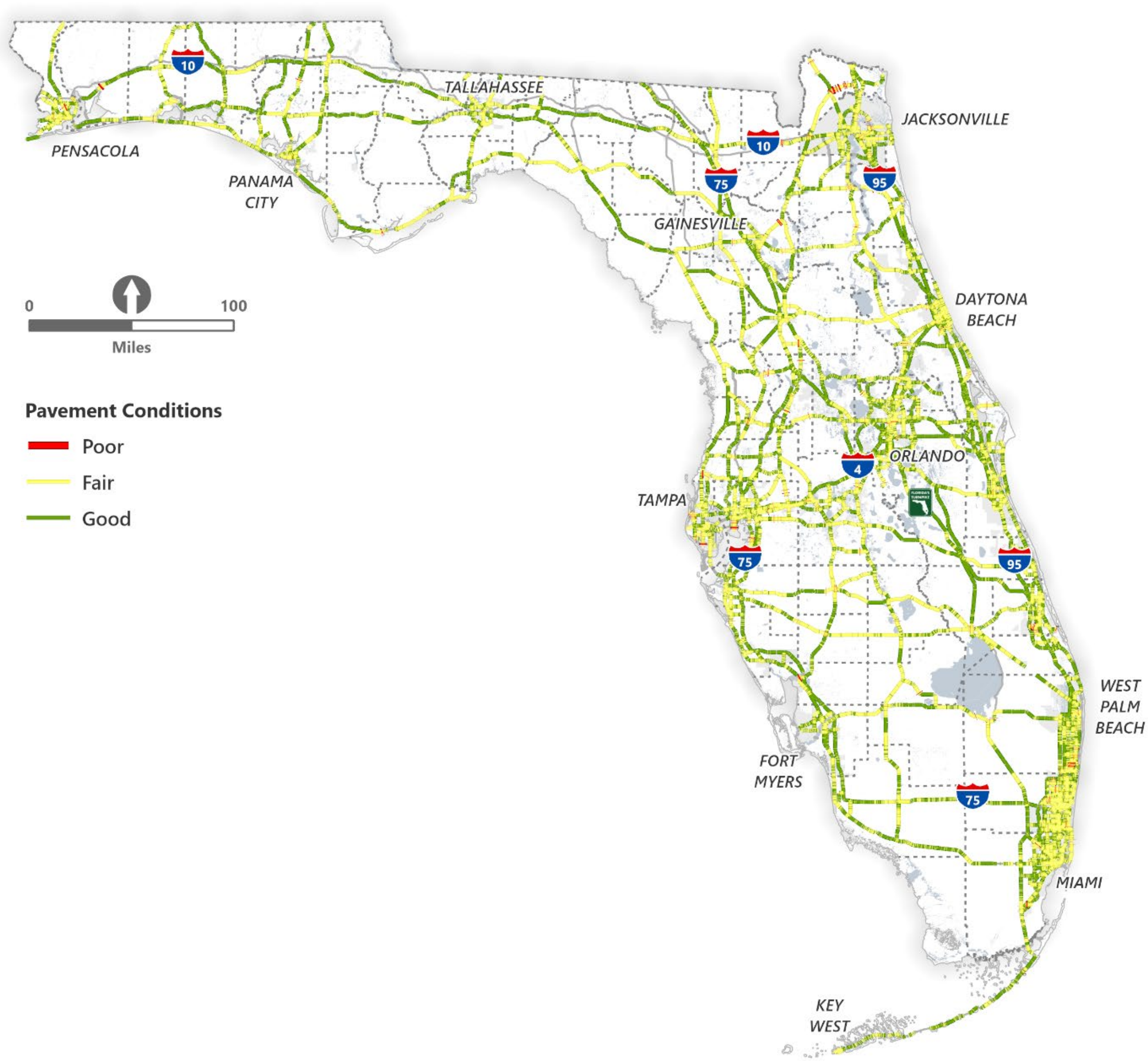


	2016	2017	2018	2019	2020	2021	2022
Poor	0.39%	0.46%	0.37%	0.20%	0.00%	0.62%	0.64%
Good	43.64%	43.98%	40.10%	40.96%	0.00%	47.50%	48.78%
Fair	55.97%	55.56%	59.53%	58.84%	0.00%	51.87%	50.57%

Data Source: *FDOT Source Book*

Figure 8 depicts a statewide map of pavement conditions for the NHS as per FHWA ratings in 2021. The statistics indicate that the state performs very well for pavement conditions with a few issue areas highlighted on the map.

Figure 9 | Florida's Pavement Conditions (2021)



Data Source: *Federal Highway Administration (FHWA)*

Bridge Conditions

The FHWA regulations (23 CFR 490 Subpart D) define the national performance management measures for assessing the condition and reporting on the targets established for bridges on the NHS. The measures are:

- Percentage of NHS bridges by deck area in Good condition.
- Percentage of NHS bridges by deck area in Poor condition.

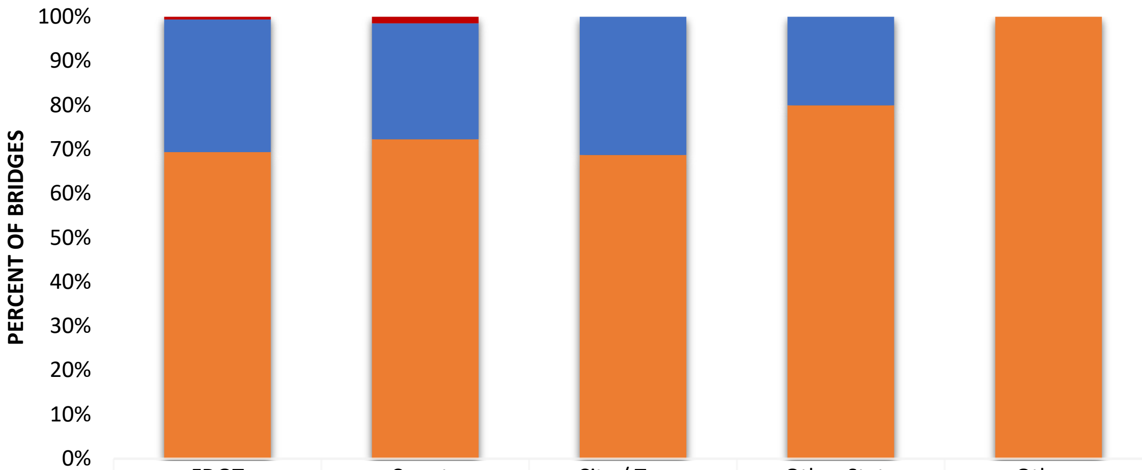
The FHWA uses the National Bridge Inspection (NBI) rating as its primary performance measure for the condition of bridges. However, as shown in Table 5, the rating criteria varies from what is used by the Department. The FHWA considers bridges to be in Good condition if the NBI rating is greater than or equal to 7; Fair condition if the NBI rating is 6 or 5; and Poor condition if the NBI rating is 4 or less. Table 5 shows the targets for the bridge assets. The Department's target for the SHS is mandated by statute (s., 334.046) and in accordance with the federal regulations, the Department established statewide targets in coordination with the state's MPOs, to the extent practicable, for each NHS pavement and bridge performance measure. The condition/performance of the NHS bridge assets will be assessed by FHWA based on these targets.

Table 5 | FHWA NHS Bridge Targets

FHWA Performance Measure	2023 Target
Percent of NHS bridges by deck area in good condition.	50%
Percent of NHS bridges by deck area in poor condition.	10%

Figure 9 depicts the NHS structural condition by maintenance responsibility. For FDOT-owned NHS bridges, 69.41 percent of the total NHS deck area is in Good condition and less than 1 percent is in Poor condition. This demonstrates the state's bridges are in a state of good repair, and do not exhibit signs of structural deterioration.

Figure 10 | NHS Structural Condition by Maintenance Responsibility

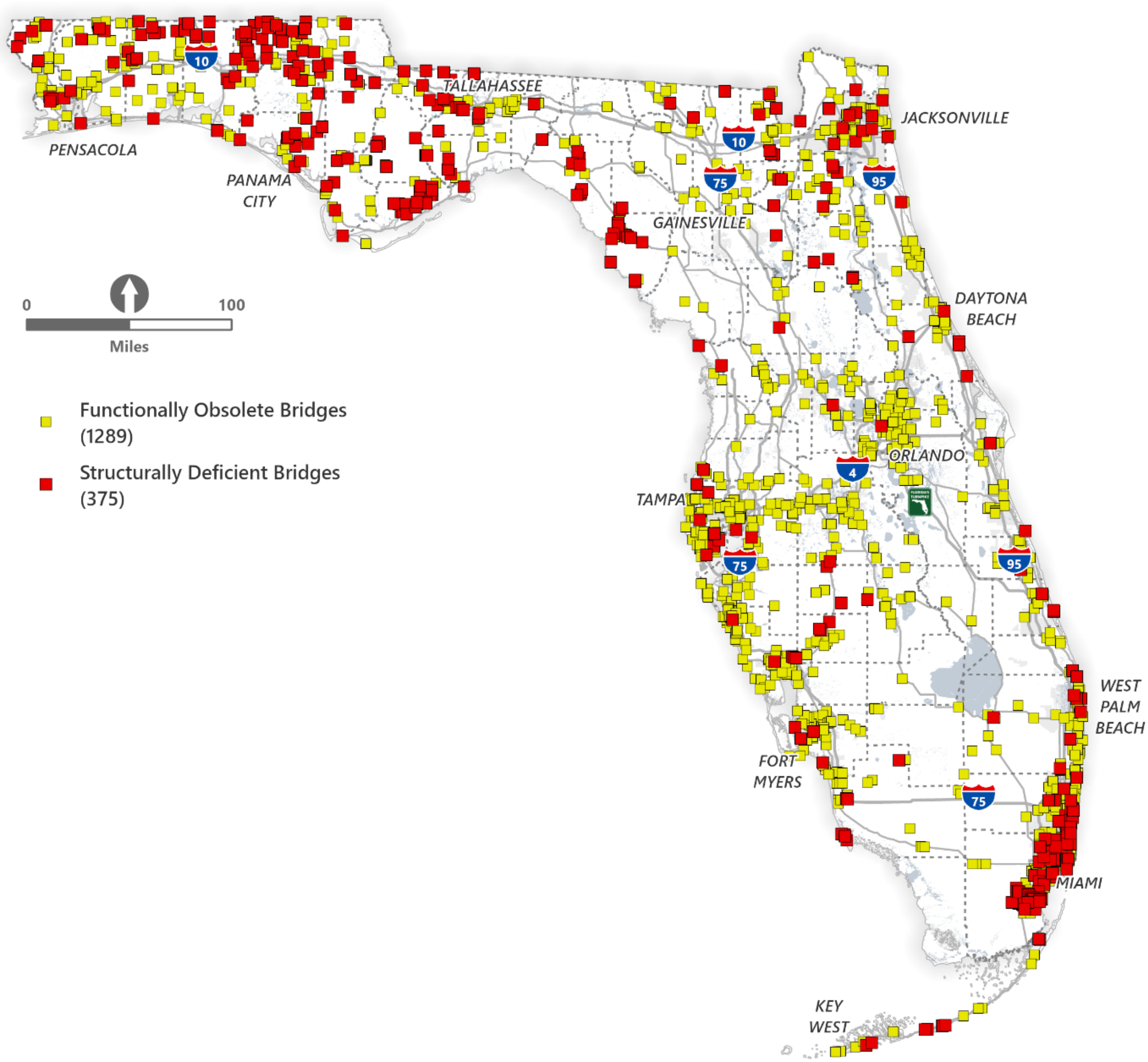


	FDOT	County	City / Town	Other State	Others
Poor	0.62%	1.46%	0.00%	0.00%	0.00%
Fair	29.96%	26.28%	31.25%	20.00%	0.00%
Good	69.41%	72.26%	68.75%	80.00%	100.00%

Data Source: *2022 FDOT Transportation Asset Management Plan*

Figure 10 depicts all structurally deficient (SD) and functionally obsolete (FO) bridges in the state of Florida. FO means that the bridge design is outdated. For example, narrow shoulders, narrow lanes, or older traffic barriers can induce the functionally obsolete classification. Functionally obsolete bridges are scheduled for replacement or rehabilitation as budgets permit. There were 1,289 such bridges in Florida as of 2022. SD means that one of the NBI structural condition states is 4—Poor, or worse, for Deck, Superstructure, Substructure, or Culvert. For a description of NBI terms, see the (Bridge Management System Coding Guide). Structurally deficient bridges are recommended for repair, or scheduled for replacement; meanwhile, they are posted as necessary for load restrictions, or closed. As per 2022 National Bridge Inventory, there are 375 structurally deficient bridges in the state.

Figure 11 | Florida's Functionally Obsolete and Structurally Deficient Bridges (2022)



Data Source: *National Bridge Inventory*

FDOT's core bridge measure is the percent of bridges on the SHS meeting FDOT standards. The target is to have at least 90 percent of bridges maintained by the Department achieve a NBI rating of 6 or higher to meet the mandate of 334.046(4), F.S.

Highway (Commercial Vehicles) Safety

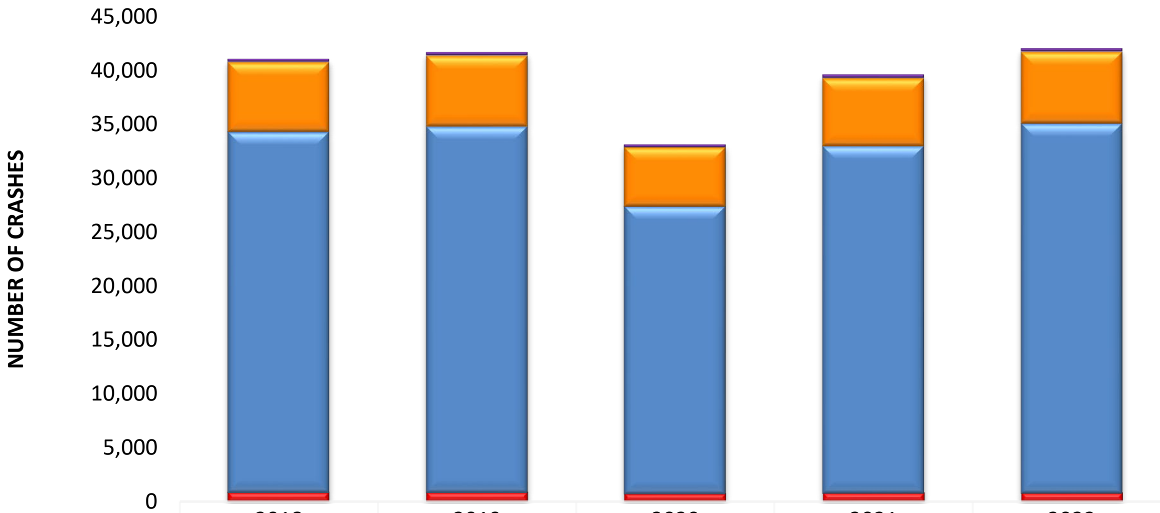
The assessment of highway safety with respect to commercial vehicles is conducted in this analysis through the utilization of three distinct performance metrics, each of which is defined below:

- *Number of Commercial Vehicle Fatalities:* The total number of fatalities on Florida's roadways as a direct result of a traffic crash involving a commercial vehicle within 30 days of the crash occurrence.
- *Number of Commercial Vehicle Injuries:* The total number of injuries from traffic crashes involving a commercial vehicle that occur on Florida's roadways.
- *Number of Commercial Vehicle Crashes that resulted in Injury or Fatality:* The total number of traffic accidents on Florida's roadways involving a truck that resulted in an injury or/and fatality.

Figure 11 illustrates the categorization of commercial vehicle crashes by severity type, while Figure 12 presents data on the fatalities and injuries associated with commercial vehicles. Between 2018 and 2022, Florida's roadways witnessed 197,513 commercial vehicle collisions, leading to 1,465 fatalities. The number of fatalities in crashes involving commercial vehicles has shown an upward trend, with a 14.4 percent increase in fatalities, rising from 292 fatalities in 2018 to 334 fatalities in 2022.

Figure 13 shows the areas in Florida with the highest concentration of commercial vehicle crashes. Major metropolitan areas such as Tampa, Orlando, Jacksonville, and Miami-Fort Lauderdale have higher occurrences of truck crashes. Unsurprisingly, urban areas have more occurrences of truck crashes than rural areas.

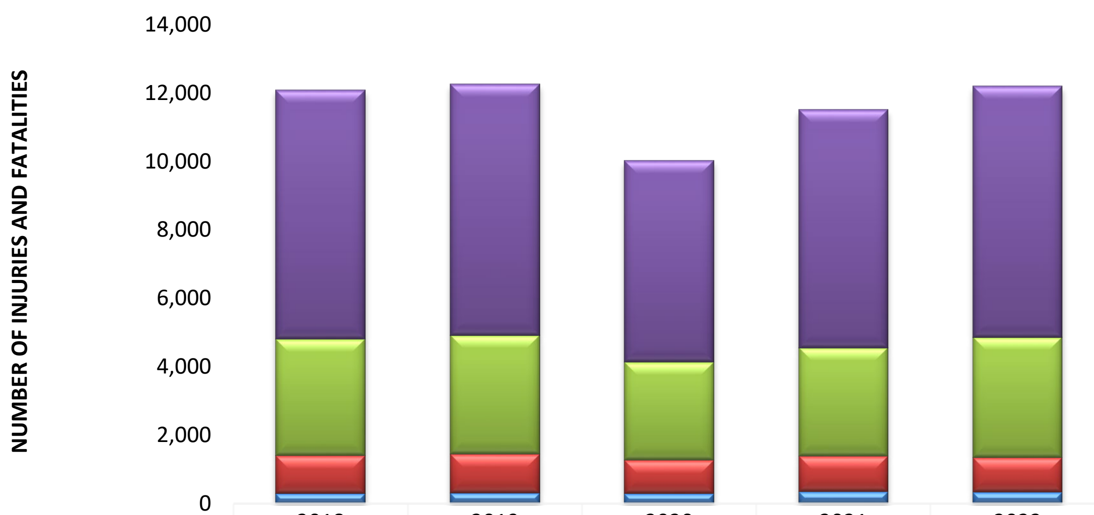
Figure 12 | Commercial Vehicle Crashes by Severity Type (2018-2022)



	2018	2019	2020	2021	2022
Fatality	270	283	283	327	302
Injury	6,470	6,559	5,512	6,292	6,640
No Injury	33,422	33,969	26,667	32,207	34,285
Serious Injury	864	843	746	788	784

Data Source: *Signal Four Analytics. 2023*

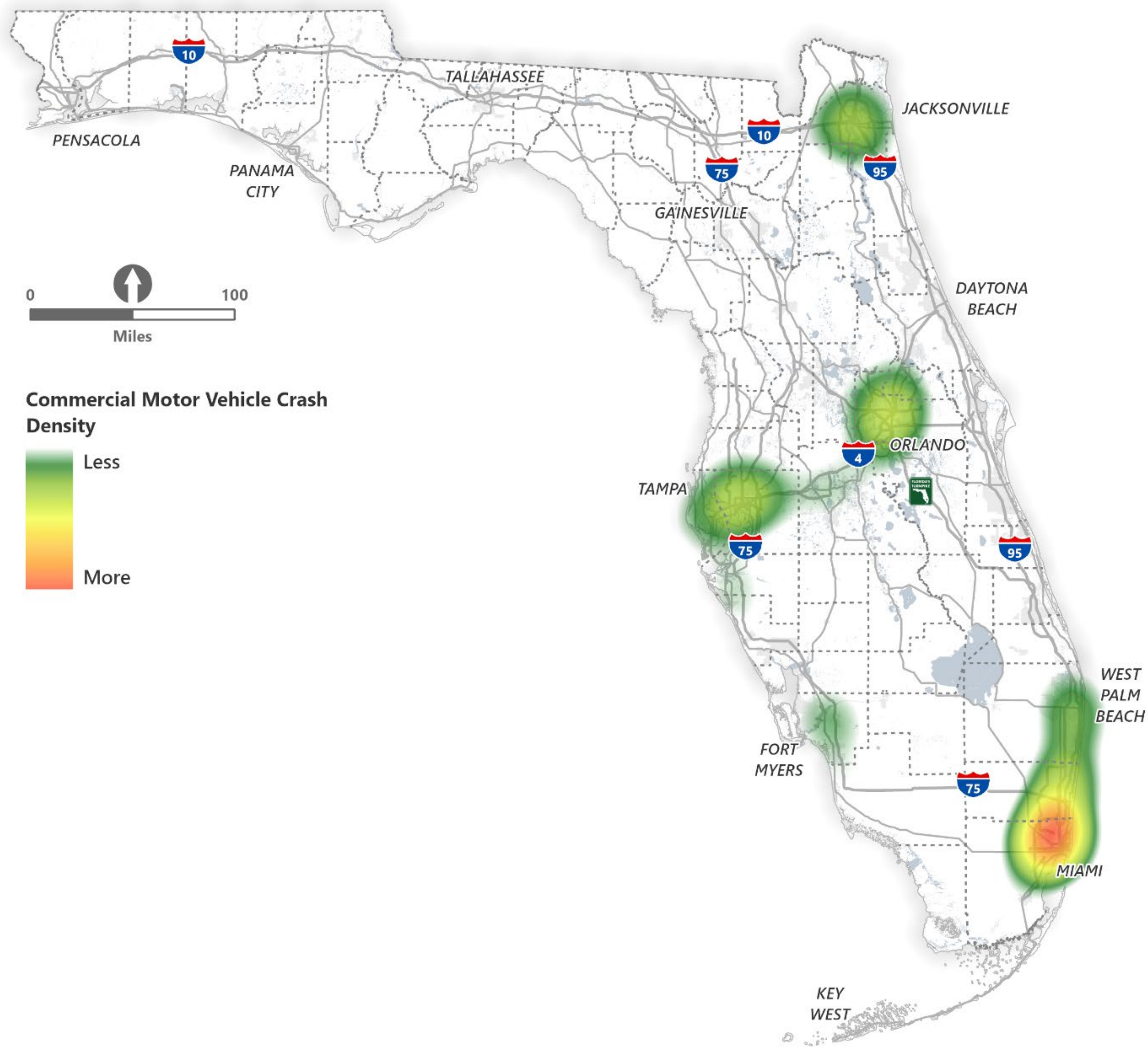
Figure 13 | Number of Fatalities and Injuries Involving Commercial Vehicles (2018-2022)



	2018	2019	2020	2021	2022
Possible Injuries	7,284	7,346	5,891	6,961	7,336
Non-Incapacitating Injuries	3,411	3,467	2,868	3,162	3,523
Incapacitating Injuries	1,107	1,142	969	1,037	1,010
Fatalities	292	312	301	358	334

Data Source: *Signal Four Analytics, 2023.*

Figure 14 | Florida's Truck Crash Hot Spots (2018-2022)



Data Source: *Signal Four Analytics, 2023*

Truck Parking Utilization

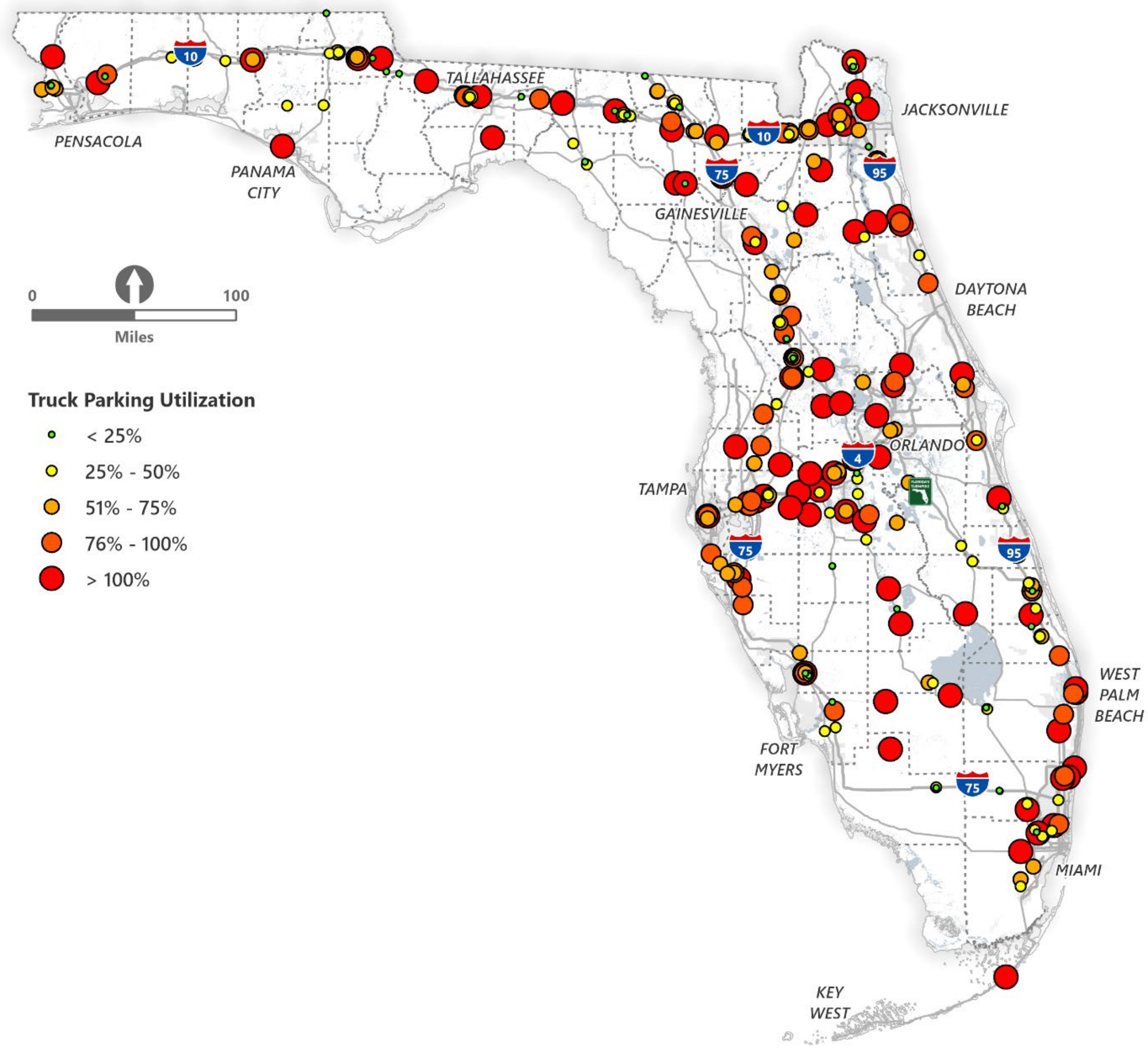
The identification of all truck parking locations was part of the previous technical memorandum. The utilization of each truck parking location in the state was determined through an analysis of truck GPS data (ATRI). The methodology and outcomes of this analysis are detailed in a comprehensive 2019 report. The analysis defines truck parking utilization as the percentage of total parked trucks (adjusted for an expansion factor) at a specific hour of the day relative to the total truck parking spaces at that location. This approach offers insights into how truck parking activity varies throughout the day for various facility types and geographic areas. The computation of this measure relies on hourly utilization datasets and supply information.

Figure 14 presents the truck parking utilization for individual locations across the state. The findings clearly highlight that private locations exhibit higher utilization throughout the day compared to public locations. Figure 15 identifies major areas of concern by considering both highly utilized truck parking locations and locations with a high density of unauthorized truck stops. These different figures collectively underscore that truck parking is a significant issue in the state of Florida, necessitating both traditional and innovative solutions to address this problem.

Since this statewide analysis was last conducted in 2019, FDOT Districts have initiated more than 30 separate truck parking studies and projects that have looked at the issue from the district, region, corridor, and facility levels. The efforts have focused on identifying the existing supply and demand of public and private truck parking spaces, identification of potential sites that can be expanded or converted to truck-only parking facilities, and the development of concepts and projects to increase parking capacity.[1] Another statewide analysis will be conducted in 2024.

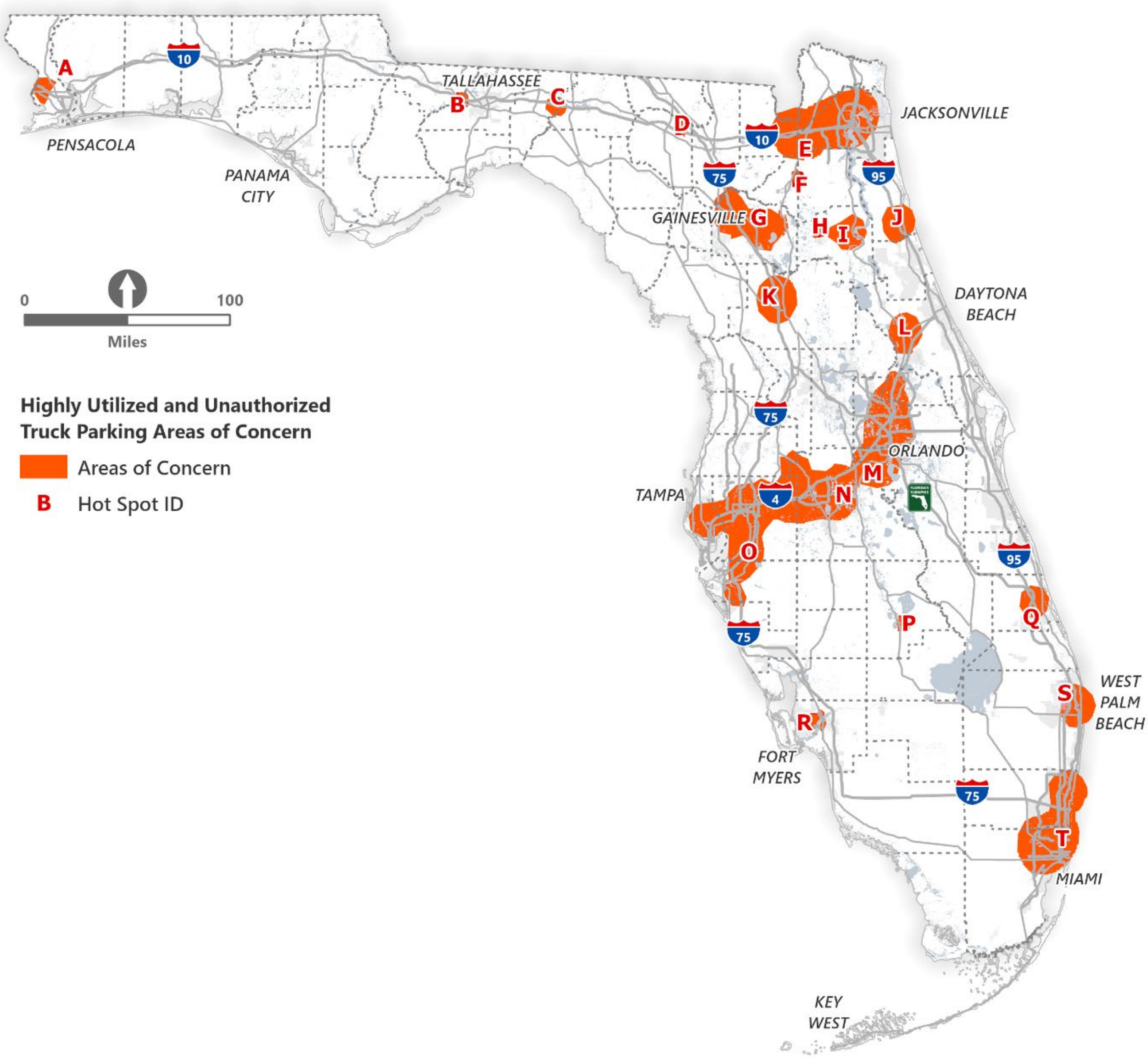
[1] *FDOT Truck Parking Implementation Study, 2023*

Figure 15 | Truck Parking Utilization



Data Source: *FDOT Transportation Data and Analytics, 2019*

Figure 16 | Truck Parking Areas of Concern



Data Source: *FDOT Transportation Data and Analytics, 2019*

Truck Detention Time

Truck detention times measure the average wait times at docks or facilities for freight pickup and delivery, incurring costs for carriers due to idle time. Since carriers are often paid per mile driven, this idling is non-revenue generating and impacts their bottom line. Detention also disrupts operational efficiency by causing scheduling issues for drivers, potentially leading to missed loads. Calculating truck detention times involves using geofencing and telematics on trucks to monitor detention at specific locations. This analysis assesses detention times across various time frames, geographic areas, and industries in Florida.

Table 6 presents the annual average truck detention times at three major Florida seaports (Port of Jacksonville, Port of Miami, and Port of Tampa Bay). Notably, there was a significant increase in truck detention times at Port Tampa Bay, although it is important to mention that these times decreased after spiking in 2020-2021. The table also outlines the annual average truck detention durations for various facility types in Florida. Among these, truck detention times have risen for facility categories such as Apparel Retail, Distributors, Industrial Machinery, Internet & Direct Marketing Retail, and Soft Drinks.

Table 6 | Annual Average Truck Detention Time (mins) for different facility types and Seaports

Facilities	2018	2019	2020	2021	2022
JAXPORT	151	109	125	126	135
Port Miami	118	131	127	131	133
Port Tampa Bay	112	117	161	185	120
Air Freight & Logistics	118	125	120	137	141
Apparel Retail	143	175	151	146	158
Automobile Manufacturers	98	109	118	108	110
Automotive Retail	128	137	135	129	126
Computer & Electronic Retail	125	109	97	102	129
Department Stores	142	107	155	169	133
Distributors	181	176	156	172	186
Diversified Metals & Mining	146	210	112	104	134
Food Distributors	155	165	161	179	174
Home Improvement Retail	146	147	139	128	121
Industrial Machinery	65	64	94	111	165
Internet & Direct Marketing Retail	171	169	150	168	175
Oil & Gas Refining & Marketing	115	129	135	125	120
Soft Drinks	113	145	158	168	183
Specialty Stores	173	166	139	137	139

Rail Performance

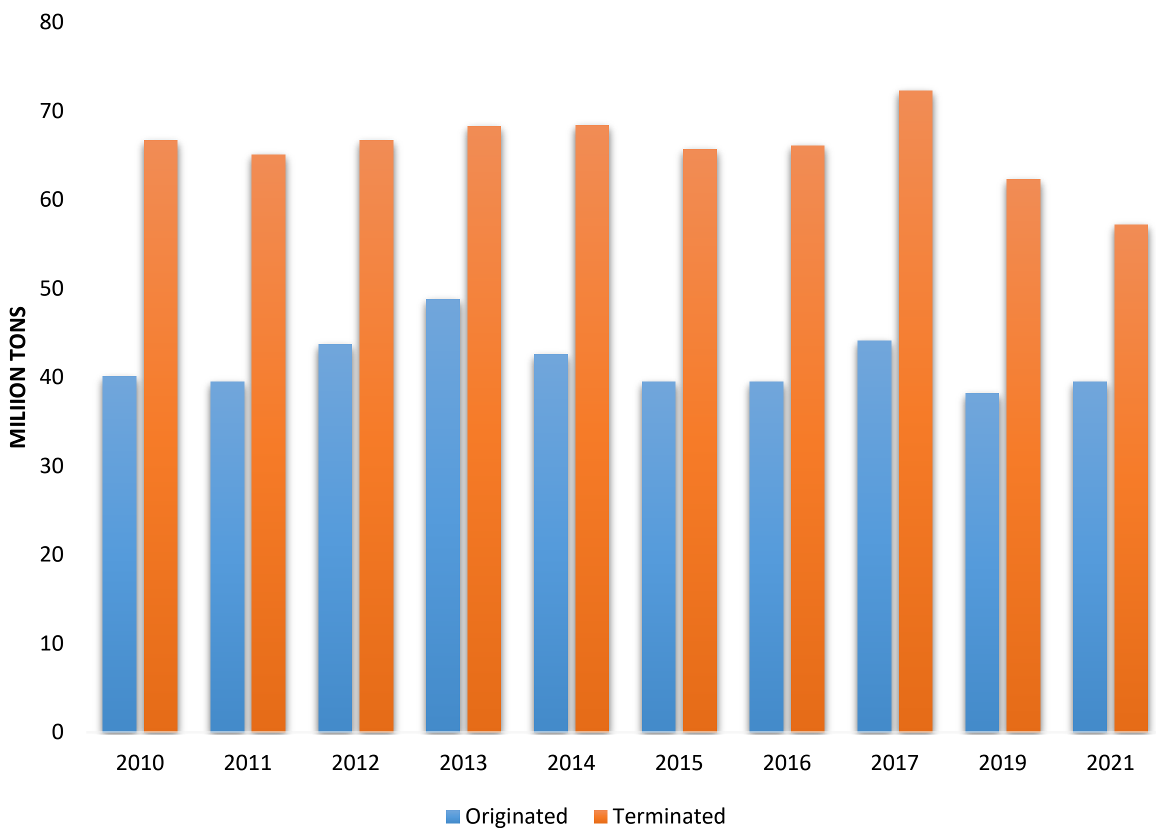
Two different rail performance measures outlined in this technical memorandum are listed below:

- Rail Tonnage
- Rail Safety

Rail Tonnage

In 2021, Florida ranked 11th in the country with 39.5 million originated rail tons, and 7th with 57.2 million rail terminated tons, according to the Association of American Railroads data. On the other hand, Florida ranked 11th in the country with 639,400 originated rail carloads, and ranks 8th with 990,400 terminated rail carloads. The statistics emphasize the state being a consumer state (Figure 16). Figures 17 and 18 provide a breakdown of commodity shares for rail traffic originating and terminating in Florida, respectively.

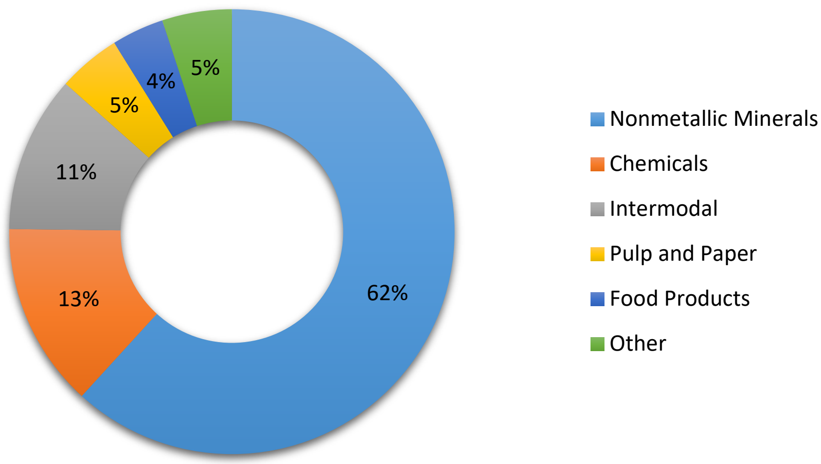
Figure 17 | Florida Rail Tonnage Trends



** 2018 and 2020 data is not published*

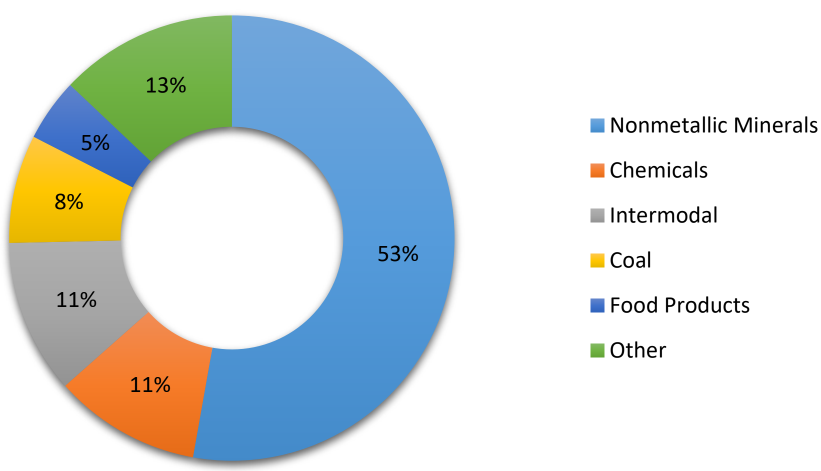
***Data Source:** Association of American Railroads and FDOT Source Book, 2021*

Figure 18 | 2021 Major Rail Commodities Originating in Florida (based on tons)



Data Source: *Association of American Railroads, 2021*

Figure 19 | 2021 Major Rail Commodities Terminating in Florida (based on tons)

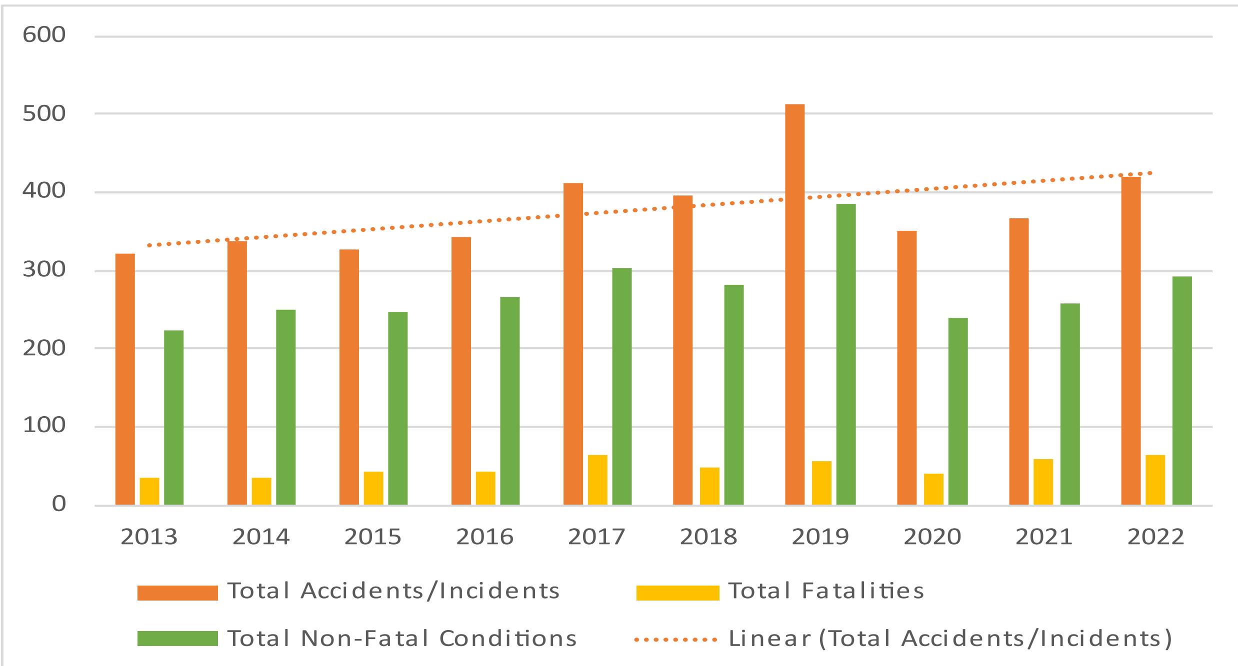


Data Source: *Association of American Railroads, 2021*

Rail Safety

The following is a statistical review of rail safety in Florida over the 2013 to 2022 period. It addresses the rail incident trends and provides details as to the type of rail incidents, those affected, and the cause. Figure 19 displays the total rail incidents in Florida over a 10-year timeframe. Florida experienced an upward trend of rail incidents totaling 3,790 occurrences between 2013 and 2022. This period saw a total of 2,748 injuries and 485 deaths.

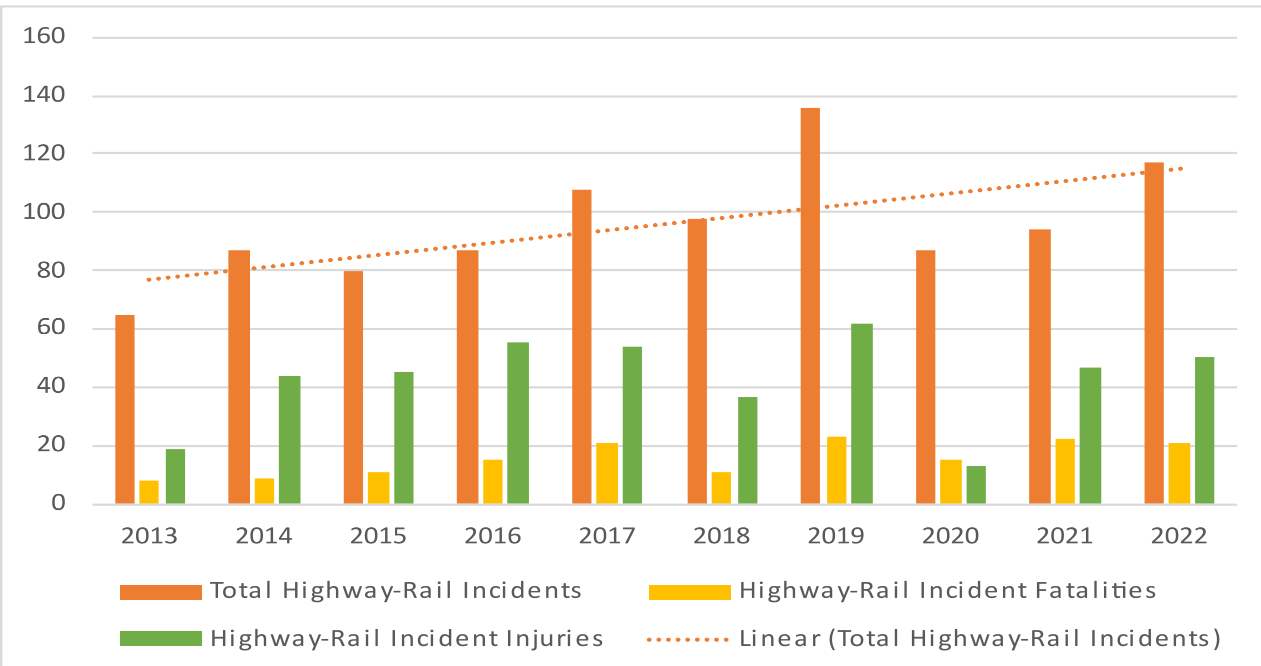
Figure 20 | Total Rail Incidents in Florida, 2013-2022



Data Source: *FRA Office of Safety Analysis, 2023*

Figure 20 shows the number of highway-rail grade crossing incidents, fatalities, and injuries that have occurred at Florida's grade crossings over the past decade. During that time period, 959 of the 3,790 incidents occurred at a highway-railroad grade crossing. The figure shows that the number of incidents occurring at crossings has also been trending upward. Florida ranked number four in most highway-rail grade crossing incidents in the U.S. in 2022, with 117 incidents, 21 fatalities, and 50 injuries.

Figure 21 | Total Highway-Rail Grade Crossing Incidents in Florida, 2013-2023



Data Source: *FRA Office of Safety Analysis, 2023*

Seaport Performance

The seaport throughput performance measures, based on tonnage and Twenty-foot Equivalent Units (TEUs), are summarized in this section.

Seaport Tonnage and TEU

Seaport tonnage quantifies the international and domestic waterborne tons of cargo handled at Florida's public deep-water seaports. This measure includes all types of cargo handled at a seaport, namely liquid bulk cargo, containerized cargo, dry bulk cargo, and breakbulk cargo. The tonnage, TEUs data pertaining to various seaports were obtained from the Florida Seaport Mission Plan of 2023.

Table 7 provides an overview of the total tonnage movements at various Florida Seaports, along with a breakdown of significant cargo categories. Florida's seaports moved 22.4 M tons of dry bulk, 54.9 M tons of liquid bulk, 9 M tons of breakbulk, and 26.2 M tons of containerized cargo, totaling 112.5 M tons and 4.3 M TEUs in all in 2022. In the state of Florida, Port Tampa Bay claims the top position for total tonnage, dry bulk, and liquid bulk operations. JAXPORT leads in breakbulk tonnage in the state, while Port Miami secures the number one spot for containerized movements (in state).

Table 7 | Waterborne Cargo Types Handled by Florida Seaports (by Tonnage in 2022)

Florida Seaport	Dry Bulk	Liquid Bulk	Break bulk	Containerized Cargo	Total Tonnage	TEU
Port of Pensacola	86.6%	0.0%	13.2%	0.2%	421,438	678
Port Panama City	48.8%	1.1%	40.9%	9.5%	2,023,431	54,792
Port Tampa Bay	30.1%	64.0%	3.5%	2.4%	34,428,184	178,637
SeaPort Manatee	21.0%	59.0%	7.5%	12.8%	10,790,964	177,108
Port Miami	0.0%	0.0%	0.0%	100.0%	9,853,645	1,197,664
Port Everglades	6.8%	65.3%	1.0%	26.8%	27,351,508	1,107,546
Port of Palm Beach	22.6%	15.4%	4.1%	57.9%	2,560,462	262,233
Port Canaveral	33.4%	50.8%	15.7%	0.1%	6,564,851	2,050
JAXPORT	21.2%	27.0%	24.3%	27.6%	18,160,342	1,319,304
Port of Fernandina	1.5%	0.0%	80.7%	17.8%	371,180	10,042
Statewide	**19.9%**	**48.8%**	**8.0%**	**23.3%**	**112,532,005**	**4,310,054**

** The ports of Fort Pierce, Key West, St. Joe, and St. Pete did not report cargo tonnage for 2022. Additionally, the ports of Citrus and Putnam did not provide data for 2022*

Data Source: *Individual Seaports, all data is provided in fiscal year.*

Aviation Performance

The aviation throughput performance, based on tonnage, is summarized in this section.

Aviation Tonnage

In 2022, approximately 3.3 million tons of air cargo flowed through the airports in Florida, according to the most recent data available from the Bureau of Transportation Statistics. This marks a 21 percent increase in tonnage since 2018. Tables 8 and 9 provide a list of the primary freight airports, both in terms of origin and destination. Among these, Miami International Airport stands out as the largest airport in Florida in terms of aviation cargo traffic. Other significant airports can be found in major cities such as Orlando, Tampa, Fort Lauderdale, and Jacksonville. Remarkably, there has been a substantial change in the movement of cargo tonnage at Lakeland Linder International Airport (LAL) in Florida. This shift can be primarily credited to the introduction of an Amazon Air regional air hub at LAL. The presence of several nearby facilities integrated into Amazon's delivery network has significantly contributed to this development.

Table 8 | Top 5 Freight Origin Airports (tons)

Florida Airports	2018	2019	2020	2021	2022
Miami International Airport	846,349	811,541	871,184	985,794	992,387
Orlando International Airport	109,037	114,753	99,369	100,177	92,422
Tampa International Airport	101,234	107,378	118,030	106,089	110,223
Fort Lauderdale-Hollywood International Airport	58,455	58,877	46,659	58,286	53,565
Jacksonville International Airport	40,756	44,136	45,815	43,690	40,842
Lakeland Linder International Airport	-	-	17,031	64,638	69,119

Data Source: *Bureau of Transportation Statistics, accessed in 2023.*

Table 9 | Top 5 Freight Destination Airports (tons)

Florida Airports	2018	2019	2020	2021	2022
Miami International Airport	1,189,185	1,191,681	1,281,049	1,371,926	1,455,877
Orlando International Airport	137,305	144,168	112,393	113,628	123,123
Tampa International Airport	110,618	112,823	126,805	111,253	123,106
Fort Lauderdale-Hollywood International Airport	69,407	61,696	45,967	58,355	60,015
Jacksonville International Airport	45,178	47,788	51,651	53,278	49,879
Lakeland Linder International Airport	-	-	19,173	63,453	78,782

Data Source: *Bureau of Transportation Statistics, accessed in 2023.*

Spaceport Performance

The number of launches from Florida's Space Coast has risen significantly in recent years, from 19 in 2017 to 72 in 2023, an increase of 279 percent during that period.

The number of payloads describes the amount of military, civil, and commercial cargo launched into space. Commercial payloads may include cargo, crew, scientific experiments, and other equipment. Payload weight is the mass carried aboard exclusive of that necessary for operation and flight. Table 10 shows that the number of commercial payloads has experienced a remarkable surge, soaring from 12 in 2017 to 1,506 in 2023, marking an astounding 12,550 percent growth. Likewise, payload weight grew from 170,047 pounds in 2017 to 2,051,940 in 2023, representing a 1,206 percent increase. Commercial payloads began increasing significantly in 2019 with the SpaceX Starlink constellation and SpaceX Transporter multi-payload rideshare missions. Two other commercial space companies that have launched from Florida are Blue Origin and United Launch Alliance.

Table 10 | Number of Payloads and Pounds of Payloads

Year*	Number of Payloads			Weight*
	DoD	Civil (NASA, NOAA...)	Commercial	
2017	6	1	12	170,047
2018	7	3	12	175,763
2019	30	2	131	239,774
2020	6	2	853	694,970
2021	6	2	1,109	740,798
2022	5	2	1,616	1,289,926
2023	6	1	1,506	2,051,940

Data Source: *FDOT Source Book*

**Measured in pounds at sea level on Earth*

Appendix A. Truck Bottleneck Analysis Methodology and Outcomes

National Performance Management Research Data Set (NPMRDS)

Federal guidance published January 18, 2017 (23 CFR Part 490 – Subpart F) established, for the first time, a freight-specific performance measure – Truck Travel Time Reliability (TTTR). TTTR scores must be calculated annually for interstate highways and reported to the U.S. Department of Transportation (USDOT) along with other required HPMS information annually. Starting in 2018, USDOT requires the measure to be calculated yearly, reporting values for the previous calendar year. This measure is calculated using the National Performance Management Research Data Set (NPMRDS). NPMRDS is developed by the FHWA to provide a comprehensive picture of travel times throughout the National Highway Network for passenger vehicles and trucks. NPMRDS is a probe dataset commissioned by the FHWA, available for free to departments of transportation and metropolitan planning organizations.

NPMRDS data were obtained for Florida from January 1, 2021, to December 31, 2021. These data contained approximately 335.3 million observations of vehicle travel times on the NHS. NPMRDS segments the NHS in Florida into 15,652 segments identified by a Traffic Message Channel (TMC) code. The travel time records cover the entire analysis period of one year at a resolution of 15 minutes.

Because of the breadth and detail of NPMRDS data, users are not limited to only the calculation of the Federal TTTR metric. NPMRDS allows for analyzing other travel time-based performance metrics like those explored in this analysis to identify primary bottlenecks or chokepoints on the state's highway freight infrastructure.

Performance Measurement Methodology

The methodology used for the bottleneck analysis follows the recommendation of National Highway Cooperative Research Project (NHCRP) 07-24: *Estimating the Value of Truck Travel Time Reliability*. NHCRP Project 07-24 recommends methodologies for estimating recurring and non-recurring congestion from NPMRDS data.

The analysis aims to describe the locations of recurring and non-recurring congestion during an average weekday in 2021 in the Florida transportation system. While both measures are essential information for carrier operations, regular congestion patterns can be avoided, while event-driven instances of congestion are less predictable and more disruptive. Research suggests that freight users care much more about non-recurring congestion. Arriving on time is the most important factor in modern-day supply chains, and it becomes much more difficult under conditions where non-recurring congestion occurs at higher levels.

The NPMRDS data were filtered to exclude weekends and federal holidays in 2021, including New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Juneteenth, Labor Day, and the Thanksgiving and Christmas holidays. Truck and highway operations on these days are likely to be different than on an average weekday.

For each segment and each hour of the day, several travel metrics were calculated.

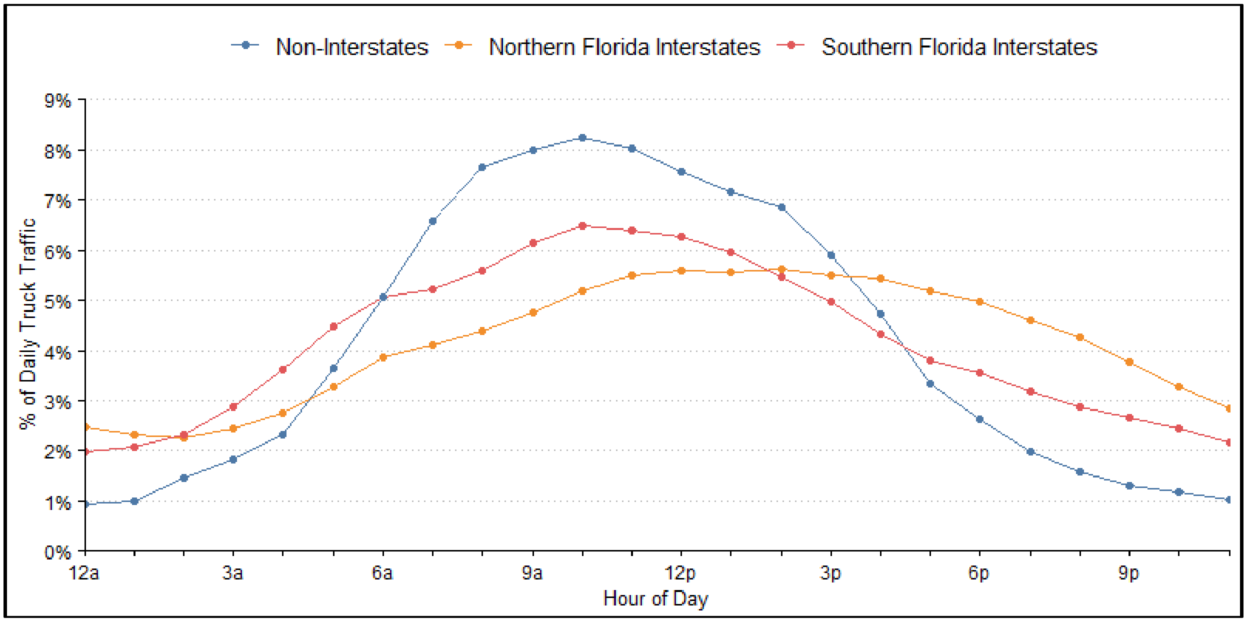
- $\bar{\tau}_h$ - The average travel time during the hour h
- $10\%_\tau$ – The 10th percentile travel time across all hours of the day; representative of a segment's free flow travel time
- $95\%\tau_h$– The 95th percentile travel time during hour h. This represents how slow the speed of travel on the segment can be within the hour 5 percent of the time. The 95th percentile travel time is often used in congestion metrics to represent unreliable conditions.

For each segment, the truck VMT was calculated as

$$VMT = \sum_{\forall h} l\, T_h \qquad (1)$$

where ι represents the length of the segment and τ_h represents the hourly truck volume. Hourly Truck volumes were obtained from the NPMRDS network shapefile which contains Annual Average Daily Traffic (AADT) for each segment. The two-way AADTs from NPMRRDS were converted to unidirectional volumes by dividing them by two. Hourly volumes were estimated by multiplying the segment AADTs by one of three hourly factors representing the assumed share of truck volume per hour of the day. Hourly factors were estimated using Florida WIM data (2022) from locations across Florida. Distributions were generalized separately for interstates in north Florida, interstates in south Florida, and all other lower functional class roadways whose related stations followed similar hourly patterns (Figure A-1).

Figure A-1 | Hourly Factors



Like VMT, the Vehicle Hours Traveled (VHT) was calculated for each segment as

$$VHT = \sum_{\forall h} \bar{\tau}_h \, \mathrm{T}_h$$

Recurring congestion was quantified as the number of hours of travel above the free flow conditions, defined as the VHD. VHD was estimated by comparing average travel times to the free flow travel time and multiplying by the hourly truck volume, summing totals by segment.

$$VHD = \sum_{\forall h} (\bar{\tau}_h - 10\%\tau_h) \, \mathrm{T}_h$$

Non-recurring congestion, quantified as the number of VHU accumulated in each segment, was calculated as the difference between the 95th percentile travel time and the average travel time. This measure, first introduced in NCHRP 07-245, sums the hours of uncertainty truck face throughout the day. This measure is preferred to often-used travel time indices or buffer indices for unreliability because it is additive and captures only time spent under non-recurring congestion.

$$VHU = \sum_{\forall h} (95\%\tau_h - \bar{\tau}_h) \, \mathrm{T}_h$$

To compare the VHD and VHU across segments, calculations were normalized by segment mileage; this prevents segments from being labeled as a bottleneck just because they are long.

Additionally, the average speed of all trucks on each segment was calculated as

$$V = VMT/VHT$$

and the average miles of travel per hour of unreliability was calculated as

$$\mathrm{U} = VMT/VHU$$

Using NPMRDS to Identify Top Truck Bottlenecks

As described, the two key performance measures calculated for this analysis are:

- Vehicle (Truck) Hours of Delay per Segment Mile (VHD/M)
- Vehicle (Truck) Hours of Unreliability per Segment Mile (VHU/M)

The continuous measures range from near zero to values higher than 225 VHD/M and 445 VHU/M for the least reliable segments with the most delay. There are no specific cutoff points at which the metrics indicate that delay or unreliability are acceptable or unacceptable. Therefore, it is recommended that the metrics be used in three ways:

1. To identify the segments in Florida's NHS with the highest VHD/M and VHU/M as leading candidates for further attention or interventions.
2. To identify the concentrations of the highest VHD/M and VHU/M segments by county and by route/road number; and
3. To examine the relative performance of Florida's NHS in each region, identifying segments that are performing better or worse than average, to highlight the most significant challenges and opportunities at the regional level.

Data reduction

To avoid including segments in the analysis of truck bottlenecks that may rank highly due to an outlier observation in NPMRDS speeds, poor data density, or a conflation error in the NPMRDS network, three criteria were used for excluding 378 segments from final rankings and reporting. Segments with more than ten hours where the congested travel times were estimated from less than 50 NPMRDS observations, or a V value of less than five, or a U value of less than five were withheld from being ranked.

Highest VHD/M and VHU/M segments

The VHD/M and VHU/M metrics were calculated for 15,634 TMC segments in Florida, and this document reports the 150 highest VHD/M and 150 highest VHU/M values. The top 150 VHD/M segments are considered leading Recurring Congestion Bottlenecks and have significant truck volumes and the most considerable differences between average travel times and free flow speeds (Table A-1). The top 150 VHU/M segments can be considered leading Non-Recurring

Congestion Bottlenecks and have significant truck volumes along with congested travel times that be much worse than average travel times, causing unreliability for system users (Table A-2).

Table A-1 | Leading Recurring Truck Congestion Bottlenecks

Rank	Road Name	Direction	County	VHD/M
1	I-4 W	W	Hillsborough	225.8
2	I-4 W	S	Osceola	206.8
3	I-4 E	E	Polk	193.1
4	I-4 W	W	Hillsborough	187.5
5	W Okeechobee Rd	W	Miami-Dade	184.5
6	W Okeechobee Rd	E	Miami-Dade	179.8
7	I-4 W	W	Hillsborough	178.9
8	Orange Ave	E	St Lucie	174.1
9	NW 36th St	W	Miami-Dade	172.1
10	NW 74th St	W	Miami-Dade	170.2
11	NW 36th St	W	Miami-Dade	162.1
12	W Okeechobee Rd	W	Miami-Dade	151.1
13	SR-826 E	E	Miami-Dade	150.4
14	Palmetto Expy	S	Miami-Dade	150.1
15	I-95 S	S	Broward	150.0
16	Florida's Tpke S	S	Miami-Dade	148.9
17	Palmetto Expy	S	Miami-Dade	148.1
18	SR-826 S	S	Miami-Dade	147.7
19	US-27 S	E	Lake	147.2
20	Unity Blvd	N	Miami-Dade	144.5
21	SR-826 N	N	Miami-Dade	143.4
22	E Okeechobee Rd	W	Miami-Dade	142.6
23	W Okeechobee Rd	W	Miami-Dade	138.8
24	I-95 S	S	Broward	138.2
25	Palmetto Expy	S	Miami-Dade	135.6
26	I-4 W	W	Hillsborough	135.4
27	SR-826 N	N	Miami-Dade	135.2
28	NW 36th St	E	Miami-Dade	135.0
29	NA	N	Orange	134.8
30	SR-826 S	S	Miami-Dade	127.1
31	Palmetto Expy	N	Miami-Dade	126.7
32	NW 74th St	E	Miami-Dade	125.7
33	I-95 S	S	Miami-Dade	125.4
34	NW 74th St	E	Miami-Dade	125.0
35	Palmetto Expy	N	Miami-Dade	124.9

Rank	Road Name	Direction	County	VHD/M
36	Palmetto Expy	S	Miami-Dade	124.5
37	Orange Blossom Trl S	N	Orange	122.3
38	NW 36th St	E	Miami-Dade	121.5
39	Orange Blossom Trl S	N	Orange	120.9
40	NW 36th St	W	Miami-Dade	120.6
41	E Fowler Ave	W	Hillsborough	120.2
42	W Okeechobee Rd	W	Miami-Dade	119.6
43	I-95 S	S	Broward	119.1
44	NW Jensen Beach Blvd	E	Martin	118.7
45	SR-826 N	N	Miami-Dade	117.0
46	Pritchard Rd	W	Duval	114.5
47	I-95 S	S	Broward	113.0
48	SR-826 S	S	Miami-Dade	112.7
49	I-4 E	E	Polk	112.4
50	NW 36th St	E	Miami-Dade	112.3
51	NW 74th St Conn	W	Miami-Dade	111.9
52	I-95 S	S	Miami-Dade	111.1
53	I-4 W	S	Osceola	111.0
54	NW 74th St Conn	E	Miami-Dade	110.3
55	I-95 S	S	Miami-Dade	110.2
56	E Okeechobee Rd	W	Miami-Dade	109.7
57	I-95 S	S	Miami-Dade	109.3
58	W Okeechobee Rd	W	Miami-Dade	109.1
59	I-95 S	S	Miami-Dade	108.4
60	NW 27th Ave	N	Miami-Dade	107.8
61	Okeechobee Rd	W	St Lucie	107.0
62	I-4 E	N	Osceola	105.8
63	US-27 N	N	Broward	105.1
64	I-95 S	S	Broward	104.5
65	I-95 S	S	Miami-Dade	104.5
66	W Brandon Blvd	E	Hillsborough	104.3
67	I-95 S	S	Broward	103.5
68	N 50th St	S	Hillsborough	103.2
69	N Broadway Ave	S	Polk	103.1
70	NW 27th Ave	S	Miami-Dade	102.0
71	NW 27th Ave	S	Miami-Dade	100.9
72	Eau Gallie Blvd W	W	Brevard	100.8
73	NW 27th Ave	N	Miami-Dade	100.2
74	US-98 N	N	Polk	99.5
75	I-4 W	S	Osceola	99.3

Rank	Road Name	Direction	County	VHD/M
76	I-95 S	S	Broward	99.1
77	Orange Ave	E	St Lucie	98.6
78	I-95 S	S	Broward	97.8
79	W Okeechobee Rd	E	Miami-Dade	97.7
80	SW 88TH ST	W	Miami-Dade	97.6
81	E Osceola Pkwy	E	Osceola	97.3
82	NW 27th Ave	N	Miami-Dade	95.8
83	Land O Lakes Blvd	N	Pasco	95.5
84	Palmetto Expy	S	Miami-Dade	94.7
85	E Fowler Ave	E	Hillsborough	94.3
86	W Sunrise Blvd	W	Broward	93.9
87	East-West Expy	E	Orange	93.9
88	SW 40th St	W	Miami-Dade	93.5
89	W Kaley St	E	Orange	93.2
90	East-West Expy	W	Orange	93.0
91	SR-826 E	E	Miami-Dade	93.0
92	NW 7th Ave Ext	E	Miami-Dade	92.9
93	W Okeechobee Rd	W	Miami-Dade	92.9
94	N Woodland Blvd	S	Volusia	92.8
95	N 50th St	S	Hillsborough	92.6
96	US-301 N	N	Hillsborough	92.5
97	N 50th St	N	Hillsborough	91.6
98	I-95 N	N	Broward	90.6
99	Unity Blvd	N	Miami-Dade	89.9
100	NW 36th St	W	Miami-Dade	89.7
101	E Busch Blvd	W	Hillsborough	89.6
102	N Atlantic Ave	S	Brevard	89.4
103	NA	S	Brevard	89.3
104	NW 27th Ave	S	Miami-Dade	89.2
105	NW 27th Ave	S	Miami-Dade	89.1
106	Del Prado Blvd S	N	Lee	88.9
107	I-95 Express Ln S	S	Broward	88.9
108	Del Prado Blvd S	S	Lee	88.7
109	NW 27th Ave	N	Miami-Dade	88.5
110	NW 74th St	W	Miami-Dade	88.0
111	Boggy Creek Rd	W	Orange	87.8
112	Orange Ave	W	St Lucie	87.7
113	I-4 E	N	Orange	87.7
114	I-95 N	N	Broward	87.3
115	45th St	E	Palm Beach	87.2

Rank	Road Name	Direction	County	VHD/M
116	US-17-92	N	Volusia	86.5
117	Florida's Tpke S	S	Miami-Dade	86.2
118	I-95 S	S	Broward	85.8
119	45th St	W	Palm Beach	85.4
120	45th St	W	Palm Beach	85.0
121	E Okeechobee Rd	E	Miami-Dade	84.4
122	SR-33	N	Lake	84.4
123	SW 10th St	W	Broward	84.1
124	NW 79th St	E	Miami-Dade	83.4
125	I-4 W	S	Orange	83.3
126	SR-826 E	E	Miami-Dade	82.8
127	N 22nd St	N	Hillsborough	81.8
128	SW 10th St	E	Broward	81.7
129	E Oakland Park Blvd	E	Broward	81.0
130	SR-434 E	E	Seminole	81.0
131	I-4 E	N	Orange	80.7
132	I-95 S	S	Broward	80.5
133	I-4 W	S	Orange	80.1
134	Palmetto Expy	S	Miami-Dade	80.1
135	SW 40th St	E	Miami-Dade	79.1
136	NW 79th St	W	Miami-Dade	78.5
137	1st St	S	Manatee	78.4
138	Palmetto Expy	S	Miami-Dade	78.0
139	SW 88th St	W	Miami-Dade	78.0
140	Forest Hill Blvd	E	Palm Beach	77.9
141	S Biscayne Blvd	E	Miami-Dade	77.8
142	SR-826 E	E	Miami-Dade	77.8
143	Brickell Ave	N	Miami-Dade	77.7
144	SW 88th St	E	Miami-Dade	77.4
145	NW 27th Ave	S	Miami-Dade	77.3
146	NW 72nd Ave	N	Miami-Dade	76.8
147	Hollywood Blvd	W	Broward	76.8
148	SW 40th St	E	Miami-Dade	76.4
149	I-95 S	S	Broward	76.3
150	W Commercial Blvd	E	Broward	75.5

Table A-2 | Leading Non-Recurring Truck Congestion Bottlenecks

Rank	Road Name	Direction	County	VHD/M
1	US-27 S	E	Lake	444.7
2	I-4 E	E	Polk	398.3
3	NW 36th St	W	Miami-Dade	340.8
4	W Okeechobee Rd	E	Miami-Dade	325.9
5	E Fowler Ave	E	Hillsborough	289.0
6	US-27 S	E	Lake	282.8
7	NW Jensen Beach Blvd	E	Martin	278.4
8	Orange Ave	E	St Lucie	275.6
9	I-4 W	S	Osceola	273.8
10	S John Young Pkwy	W	Osceola	269.7
11	NA	N	Orange	265.7
12	Palmetto Expy	S	Miami-Dade	257.6
13	Del Prado Blvd S	S	Lee	255.4
14	East-West Expy	E	Orange	253.9
15	East-West Expy	W	Orange	253.3
16	E Fowler Ave	W	Hillsborough	252.6
17	Orange Ave	E	St Lucie	251.2
18	NA	S	Brevard	245.9
19	NA	S	Pasco	245.8
20	NW 36th St	W	Miami-Dade	243.4
21	NA	N	Brevard	243.1
22	SR-33	N	Lake	241.3
23	NW 36th St	W	Miami-Dade	240.3
24	Land O Lakes Blvd	N	Pasco	240.2
25	I-95 N	N	Broward	238.7
26	N Broadway Ave	S	Polk	237.4
27	US-98 N	N	Polk	233.9
28	Florida's Tpke S	S	Miami-Dade	233.1
29	I-95 N	N	Broward	230.7
30	Eau Gallie Blvd W	W	Brevard	223.3
31	Us-301 N	N	Hillsborough	222.8
32	I-95 S	S	Broward	221.2
33	Forest Hill Blvd	E	Palm Beach	221.0
34	Florida's Tpke S	S	Miami-Dade	219.6
35	I-95 N	N	Broward	219.4
36	NW 36th St	E	Miami-Dade	219.3
37	NW 7th Ave Ext	E	Miami-Dade	219.1

Rank	Road Name	Direction	County	VHD/M
38	E Hickpochee Ave	E	Hendry	217.9
39	S Temple Ave	N	Bradford	217.1
40	I-95 S	S	Broward	214.3
41	SR-826 S	S	Miami-Dade	214.1
42	Okeechobee Rd	W	St Lucie	211.8
43	NA	S	Brevard	211.6
44	W Okeechobee Rd	W	Miami-Dade	211.5
45	NW 27th Ave	N	Miami-Dade	211.1
46	NW 74th St	E	Miami-Dade	210.9
47	NW 74th St	E	Miami-Dade	210.3
48	NA	N	Pasco	210.1
49	Landstreet Rd E	E	Orange	207.7
50	US-301 N	N	Duval	206.3
51	Robert J Conlan Blvd NE	E	Brevard	205.8
52	Orange Ave	W	St Lucie	205.6
53	SR-826 S	S	Miami-Dade	205.2
54	NW 36th St	E	Miami-Dade	205.2
55	US-27 S	S	Polk	205.1
56	US-27 N	N	Broward	204.5
57	NW 41st St	W	Miami-Dade	204.5
58	S Kings Rd	W	Nassau	203.6
59	NW 79th St	W	Miami-Dade	201.8
60	W Kaley St	E	Orange	201.5
61	I-95 N	N	Broward	201.3
62	Pine Island Rd	W	Lee	199.5
63	Palmetto Expy	S	Miami-Dade	198.8
64	I-4 E	N	Orange	198.1
65	W Okeechobee Rd	W	Miami-Dade	197.2
66	East-West Expy	W	Orange	196.8
67	E Lake Mary Blvd	W	Seminole	196.0
68	I-95 N	N	Broward	195.9
69	I-95 N	N	Broward	195.8
70	Palmetto Expy	S	Miami-Dade	195.6
71	US-27 N	W	Lake	195.5
72	I-95 S	S	Broward	195.3
73	SR-434 E	E	Seminole	194.4
74	Del Prado Blvd S	N	Lee	194.1
75	N Powerline Rd	S	Broward	193.5
76	SR-70	E	Okeechobee	193.0

Rank	Road Name	Direction	County	VHD/M
77	I-95 S	S	Broward	193.0
78	SW 88th St	W	Miami-Dade	192.8
79	Pritchard Rd	W	Duval	192.7
80	I-4 W	W	Hillsborough	189.9
81	N Woodland Blvd	S	Volusia	188.6
82	NW 36th St	W	Miami-Dade	188.5
83	I-95 S	S	Broward	188.1
84	Unity Blvd	N	Miami-Dade	185.4
85	I-95 Express Ln S	S	Broward	184.3
86	SR-826 E	E	Miami-Dade	184.0
87	I-4 W	W	Hillsborough	183.7
88	Mitchell Blvd	S	Pasco	183.6
89	St Lucie West Blvd	W	St Lucie	183.4
90	NW 27th Ave	N	Miami-Dade	181.9
91	E Okeechobee Rd	W	Miami-Dade	181.3
92	NW 27th Ave	N	Miami-Dade	181.3
93	N Atlantic Ave	S	Brevard	181.0
94	SW 88TH ST	W	Miami-Dade	180.6
95	Eau Gallie Blvd E	E	Brevard	180.5
96	S 50th St	S	Hillsborough	180.2
97	N 40th St	N	Hillsborough	179.8
98	Palmetto Expy	S	Miami-Dade	178.5
99	I-95 N	N	Broward	177.7
100	S Kirkman Rd	N	Orange	177.2
101	US-27 S	S	Polk	177.1
102	SR-60 W	W	Polk	176.9
103	NW 27th Ave	N	Miami-Dade	176.4
104	45th St	W	Palm Beach	176.4
105	NW 27th Ave	N	Miami-Dade	176.2
106	E Osceola Pkwy	E	Osceola	175.6
107	NW 27th Ave	S	Miami-Dade	175.3
108	SW 177th Ave	S	Miami-Dade	175.2
109	SR-826 N	N	Miami-Dade	174.6
110	N 50th St	S	Hillsborough	174.4
111	N Powerline Rd	S	Broward	173.7
112	Lee Rd	W	Orange	173.5
113	W Okeechobee Rd	W	Miami-Dade	172.9
114	I-95 S	S	Miami-Dade	172.2
115	W Okeechobee Rd	E	Miami-Dade	172.2

Rank	Road Name	Direction	County	VHD/M
116	Eau Gallie Blvd W	E	Brevard	172.0
117	W Kaley St	E	Orange	171.8
118	I-4 E	E	Polk	171.4
119	SR-826 E	E	Miami-Dade	171.1
120	45th St	W	Palm Beach	169.9
121	King St	E	Brevard	169.1
122	NW 72nd Ave	N	Miami-Dade	167.5
123	Doral Blvd	W	Miami-Dade	166.9
124	NW 27th Ave	S	Miami-Dade	166.7
125	I-4 E	N	Orange	166.5
126	NW 27th Ave	S	Miami-Dade	166.3
127	E Magnolia St	E	Desoto	166.2
128	NA	E	Hillsborough	166.1
129	S Orange Blossom Trl	N	Orange	165.6
130	NW 72nd Ave	S	Miami-Dade	165.5
131	US-17-92	N	Volusia	165.2
132	N Powerline Rd	N	Broward	164.8
133	NW 36th St	E	Miami-Dade	164.7
134	Palmetto Expy	S	Miami-Dade	164.5
135	SR-60 E	E	Polk	164.2
136	I-95 S	S	Broward	163.5
137	I-95 N	N	Broward	163.0
138	NW 27th Ave	S	Miami-Dade	162.9
139	Heckscher Dr	W	Duval	162.7
140	East-West Expy	W	Orange	162.1
141	I-95 S	S	Broward	161.8
142	Palmetto Expy	N	Miami-Dade	161.5
143	I-95 S	S	Miami-Dade	161.1
144	W Okeechobee Rd	W	Miami-Dade	161.0
145	NW 27th Ave	N	Miami-Dade	160.8
146	Unity Blvd	N	Miami-Dade	160.4
147	I-4 E	N	Orange	159.7
148	SR-826 E	E	Miami-Dade	158.5
149	S Kings Rd	E	Nassau	158.4
150	E Oakland Park Blvd	W	Broward	157.8

Concentration of Highest VHD/M and VHU/M Segments

The top 150 VHD/M and VHU/M segments show a strong tendency to cluster in a limited number of counties (Figure A-2 / Figure A-3).

- Miami-Dade County has 49 percent of the top 150 recurring and 35 percent of the top 150 non-recurring bottlenecks
- Broward County has 14 percent of the top 150 recurring and 14 percent of the top 150 non-recurring bottlenecks
- Hillsborough County has 9 percent of the top 150 recurring and 6 percent of the top 150 non-recurring bottlenecks
- Orange County has 7 percent of the top 150 recurring and 9 percent of the top 150 non-recurring bottlenecks
- Brevard and Polk County had 6 percent and 5 percent of the top 150 non-recurring bottlenecks.
- Other Counties which included at least 1 percent of the state's top recurring or non-recurring bottlenecks included Osceola, St. Lucie, Palm Beach, Volusia, Lee, Lake, Pasco, Duval, Nassau, and Seminole counties.

Figure A-2 | Share of Top 150 Recurring Truck Congestion Bottlenecks by County

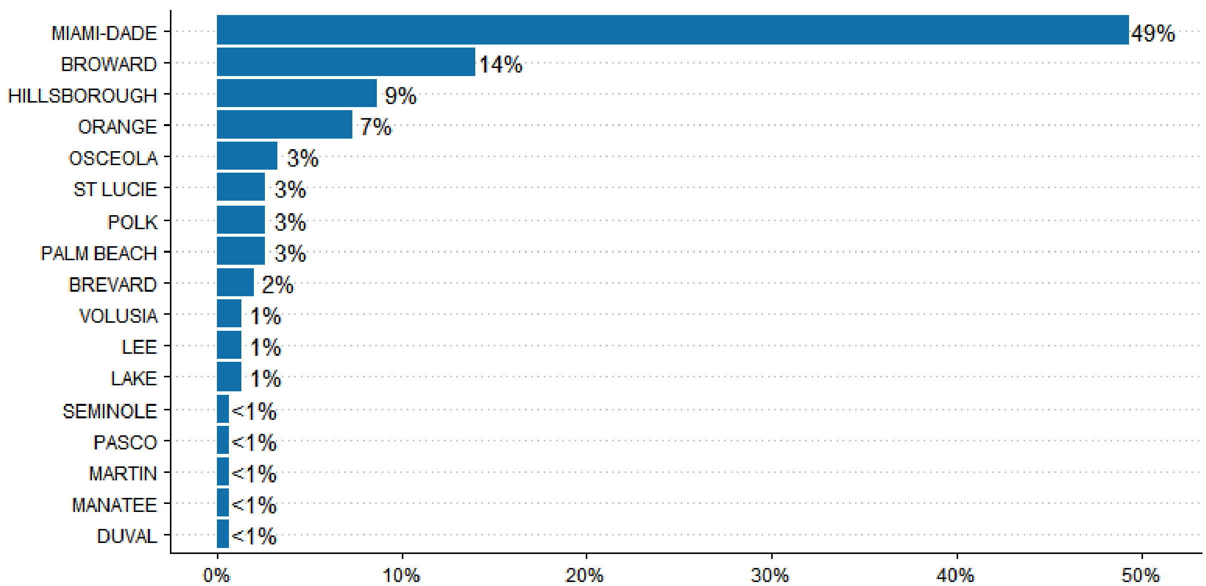
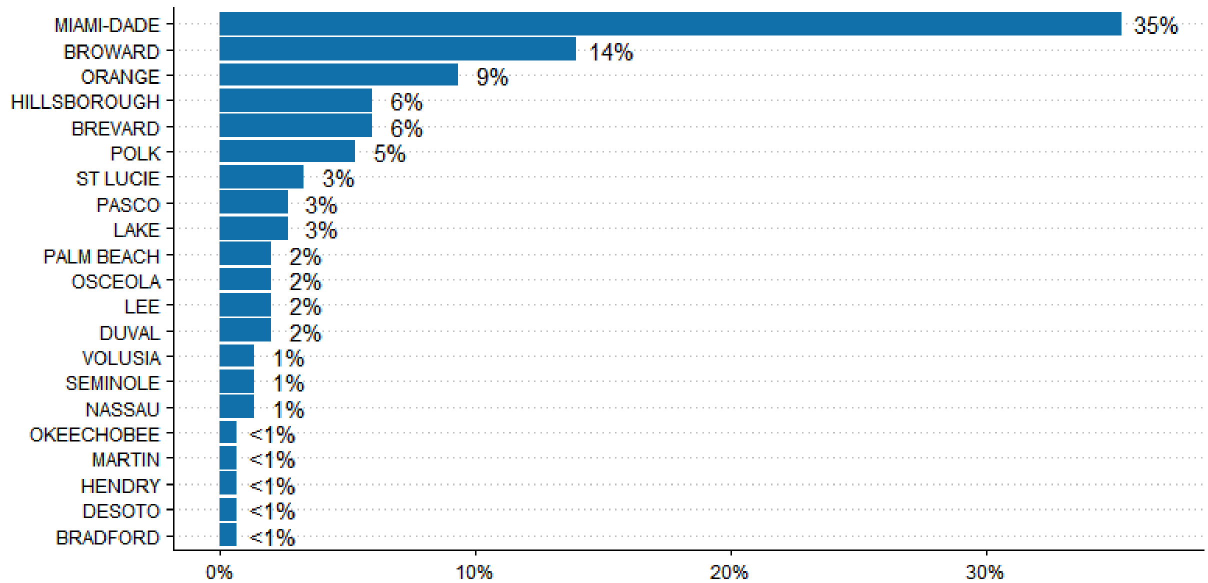


Figure A-3 | Share of Top 150 Non-Recurring Truck Congestion Bottlenecks by County



As shown in Table A-3, the highest share of the Top 150 recurring bottleneck locations are found in:

- Miami-Dade County on NW 27th Ave, Palmetto Expressway, W, Okeechobee Road, NW 36th St, I-95 South, NW 74th St, and SR-826 E
- Broward County on I-95 South
- Hillsborough County on I-4 West

Table A-3 | Share of Top 150 Recurring Truck Congestion Bottlenecks by County and Road

County	Road Name	% of Top 150
Miami-Dade	NW 27th Ave	6%
Miami-Dade	Palmetto Expy	6%
Miami-Dade	W Okeechobee Rd	5%
Miami-Dade	NW 36th St	5%
Miami-Dade	I-95 S	4%
Miami-Dade	NW 74th St	3%
Miami-Dade	SR-826 E	3%
Miami-Dade	E Okeechobee Rd	2%
Miami-Dade	SR-826 N	2%
Miami-Dade	SR-826 S	2%
Miami-Dade	SW 40th St	2%
Miami-Dade	SW 88th St	2%
Miami-Dade	Florida's Tpke S	1%

County	Road Name	% of Top 150
Miami-Dade	NW 74th St Conn	1%
Miami-Dade	NW 79th St	1%
Miami-Dade	Unity Blvd	1%
Miami-Dade	Brickell Ave	<1%
Miami-Dade	NW 72nd Ave	<1%
Miami-Dade	NW 7th Ave Ext	<1%
Miami-Dade	S Biscayne Blvd	<1%
Broward	I-95 S	7%
Broward	I-95 N	1%
Broward	SW 10th St	1%
Broward	E Oakland Park Blvd	<1%
Broward	Hollywood Blvd	<1%
Broward	I-95 Express Ln S	<1%
Broward	US-27 N	<1%
Broward	W Commercial Blvd	<1%
Broward	W Sunrise Blvd	<1%
Hillsborough	I-4 W	3%
Hillsborough	N 50th St	2%
Hillsborough	E Fowler Ave	1%
Hillsborough	E Busch Blvd	<1%
Hillsborough	N 22nd St	<1%
Hillsborough	Us-301 N	<1%
Hillsborough	W Brandon Blvd	<1%
Orange	East-West Expy	1%
Orange	I-4 E	1%
Orange	I-4 W	1%
Orange	Orange Blossom Trl S	1%
Orange	Boggy Creek Rd	<1%
Orange	W Kaley St	<1%
Osceola	I-4 W	2%
Osceola	E Osceola Pkwy	<1%
Osceola	I-4 E	<1%
St Lucie	Orange Ave	2%
St Lucie	Okeechobee Rd	<1%
Polk	I-4 E	1%
Polk	N Broadway Ave	<1%
Polk	US-98 N	<1%
Palm Beach	45th St	2%
Palm Beach	Forest Hill Blvd	<1%

County	Road Name	% of Top 150
Brevard	Eau Gallie Blvd W	<1%
Brevard	N Atlantic Ave	<1%
Volusia	N Woodland Blvd	<1%
Volusia	US-17-92	<1%
Lee	Del Prado Blvd S	1%
Lake	SR-33	<1%
Lake	US-27 S	<1%
Seminole	SR-434 E	<1%
Pasco	Land O Lakes Blvd	<1%
Martin	NW Jensen Beach Blvd	<1%
Manatee	1st St	<1%
Duval	Pritchard Rd	<1%

As shown in Table A-4, the highest share of the Top 150 non-recurring bottleneck locations are found in:

- Miami-Dade County on NW 27th Ave, NW 36th St, Palmetto Expressway and W Okeechobee Road
- Broward County on I-95 North and I-95 South
- Orange County on the East-West Expressway

Table A-4 | Share of Top 150 non-Recurring Truck Congestion Bottlenecks by County and Road

County	Road Name	% of Top 150
Miami-Dade	NW 27th Ave	7%
Miami-Dade	NW 36th St	5%
Miami-Dade	Palmetto Expy	4%
Miami-Dade	W Okeechobee Rd	4%
Miami-Dade	SR-826 E	2%
Miami-Dade	Florida's Tpke S	1%
Miami-Dade	I-95 S	1%
Miami-Dade	NW 72nd Ave	1%
Miami-Dade	NW 74th St	1%
Miami-Dade	SR-826 S	1%
Miami-Dade	SW 88th St	1%
Miami-Dade	Unity Blvd	1%
Miami-Dade	Doral Blvd	<1%
Miami-Dade	E Okeechobee Rd	<1%

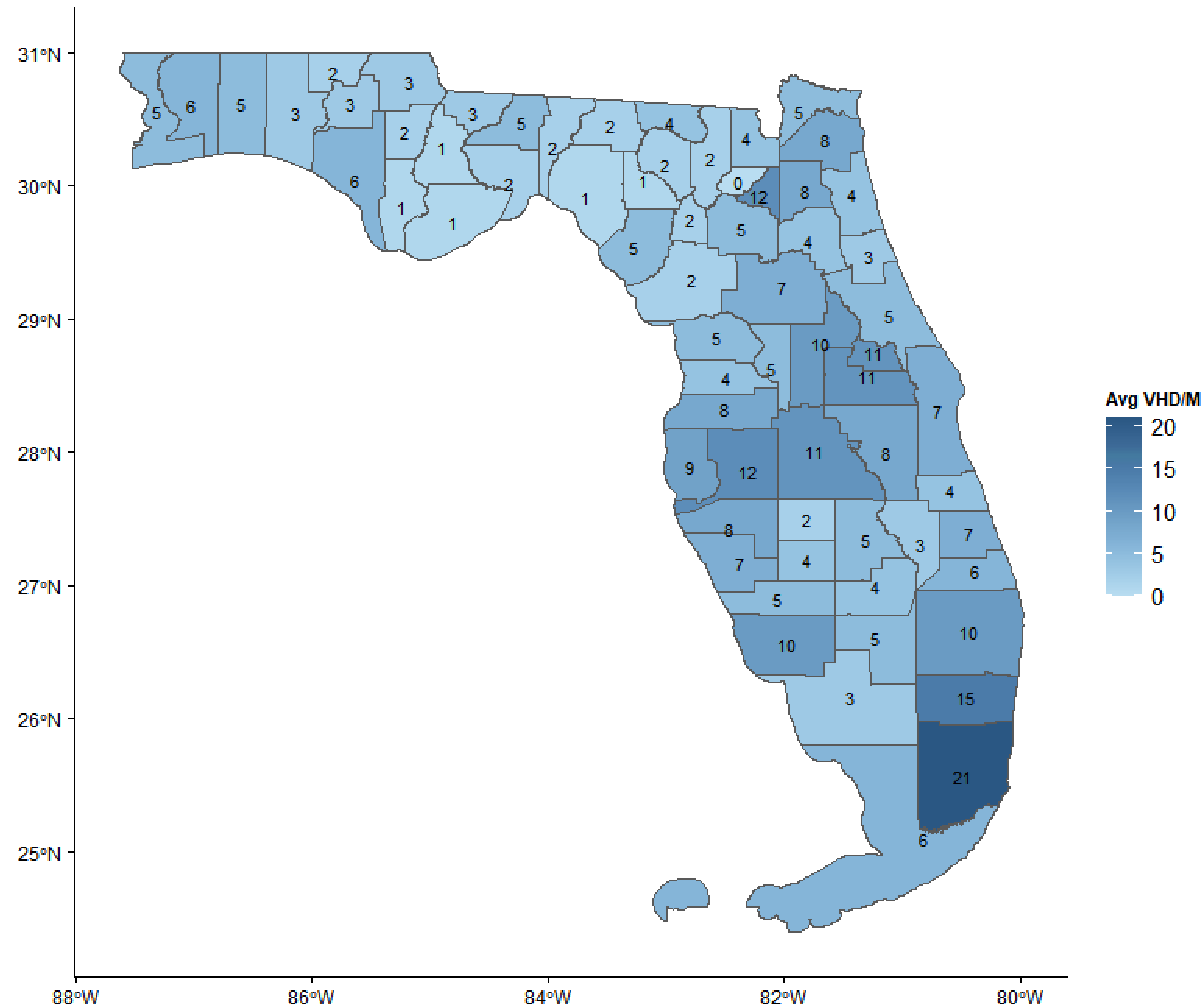
County	Road Name	% of Top 150
Miami-Dade	NW 41st St	<1%
Miami-Dade	NW 79th St	<1%
Miami-Dade	NW 7th Ave Ext	<1%
Miami-Dade	SR-826 N	<1%
Miami-Dade	SW 177th Ave	<1%
Broward	I-95 N	5%
Broward	I-95 S	5%
Broward	N Powerline Rd	2%
Broward	E Oakland Park Blvd	<1%
Broward	I-95 Express Ln S	<1%
Broward	US-27 N	<1%
Orange	East-West Expy	3%
Orange	I-4 E	2%
Orange	W Kaley St	1%
Orange	Landstreet Rd E	<1%
Orange	Lee Rd	<1%
Orange	S Kirkman Rd	<1%
Orange	S Orange Blossom Trl	<1%
Hillsborough	E Fowler Ave	1%
Hillsborough	I-4 W	1%
Hillsborough	N 40th St	<1%
Hillsborough	N 50th St	<1%
Hillsborough	S 50th St	<1%
Hillsborough	US-301 N	<1%
Brevard	Eau Gallie Blvd W	1%
Brevard	Eau Gallie Blvd E	<1%
Brevard	King St	<1%
Brevard	N Atlantic Ave	<1%
Brevard	Robert J Conlan Blvd Ne	<1%
Polk	I-4 E	1%
Polk	US-27 S	1%
Polk	N Broadway Ave	<1%
Polk	SR-60 E	<1%
Polk	SR-60 W	<1%
Polk	US-98 N	<1%
St Lucie	Orange Ave	2%
St Lucie	Okeechobee Rd	<1%
St Lucie	St Lucie West Blvd	<1%
Pasco	Land O Lakes Blvd	<1%

County	Road Name	% of Top 150
Pasco	Mitchell Blvd	<1%
Lake	US-27 S	1%
Lake	SR-33	<1%
Lake	US-27 N	<1%
Palm Beach	45th St	1%
Palm Beach	Forest Hill Blvd	<1%
Osceola	E Osceola Pkwy	<1%
Osceola	I-4 W	<1%
Osceola	S John Young Pkwy	<1%
Lee	Del Prado Blvd S	1%
Lee	Pine Island Rd	<1%
Duval	Heckscher Dr	<1%
Duval	Pritchard Rd	<1%
Duval	US-301 N	<1%
Volusia	N Woodland Blvd	<1%
Volusia	US-17-92	<1%
Seminole	E Lake Mary Blvd	<1%
Seminole	SR-434 E	<1%
Nassau	S Kings Rd	1%
Okeechobee	SR-70	<1%
Martin	Nw Jensen Beach Blvd	<1%
Hendry	E Hickpochee Ave	<1%
Desoto	E Magnolia St	<1%
Bradford	S Temple Ave	<1%

Regional Performance

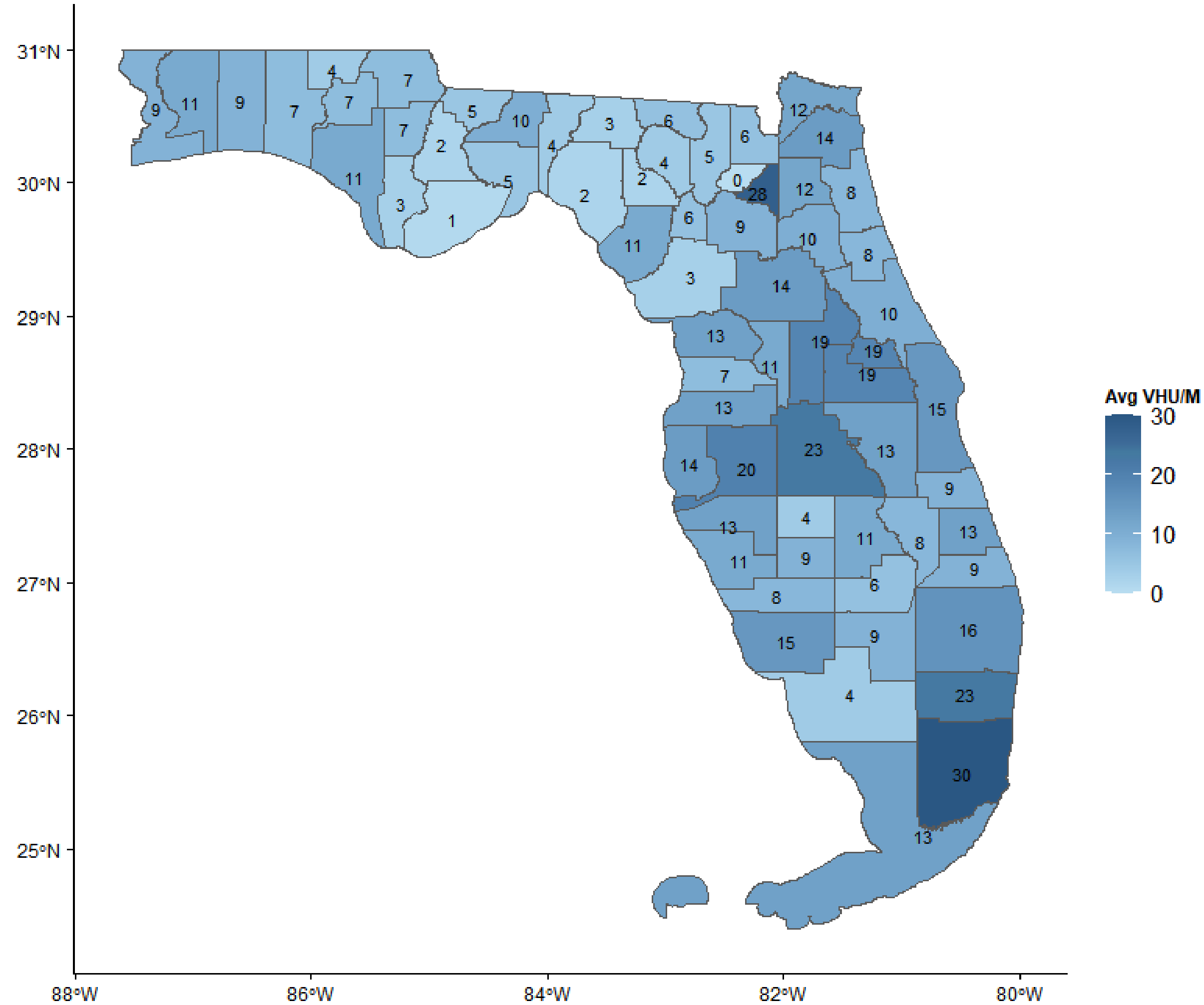
Figure A-4 illustrates the sum of all VHD divided by the sum of all segment miles in each of Florida's counties, providing a general measure of how recurring bottlenecks are distributed throughout the state. The highest average VHD/M, by far, is in Miami-Dade (21), followed by Broward, Bradford, Hillsborough, and Orange counties.

Figure A-4 | County-Wide Average VHD/M (Intensity of Recurring Congestion)



Similarly, Figure A-5 shows the sum of all VHU divided by the sum of all segment miles in each of Florida's counties, providing a general measure of how non-recurring bottlenecks are distributed throughout the state. The highest average VHU/M, is again in Miami-Dade (30), followed by Bradford, Broward, Polk, Hillsborough, and Orange counties.

Figure A-5 | County-Wide Average VHU/M (Intensity of Non-Recurring Congestion)



To illustrate the distribution of non-recurring congestion in more detail, links with a VHU/M value greater than the median VHU/M of 27 were mapped statewide in Figure A-6. Clusters of bottlenecks are shown throughout the state and in more detail in the highly congested Miami area in Figure A-7.

Figure A-6 | Segments with >= 27 VHU/M (Non-recurring congestion)

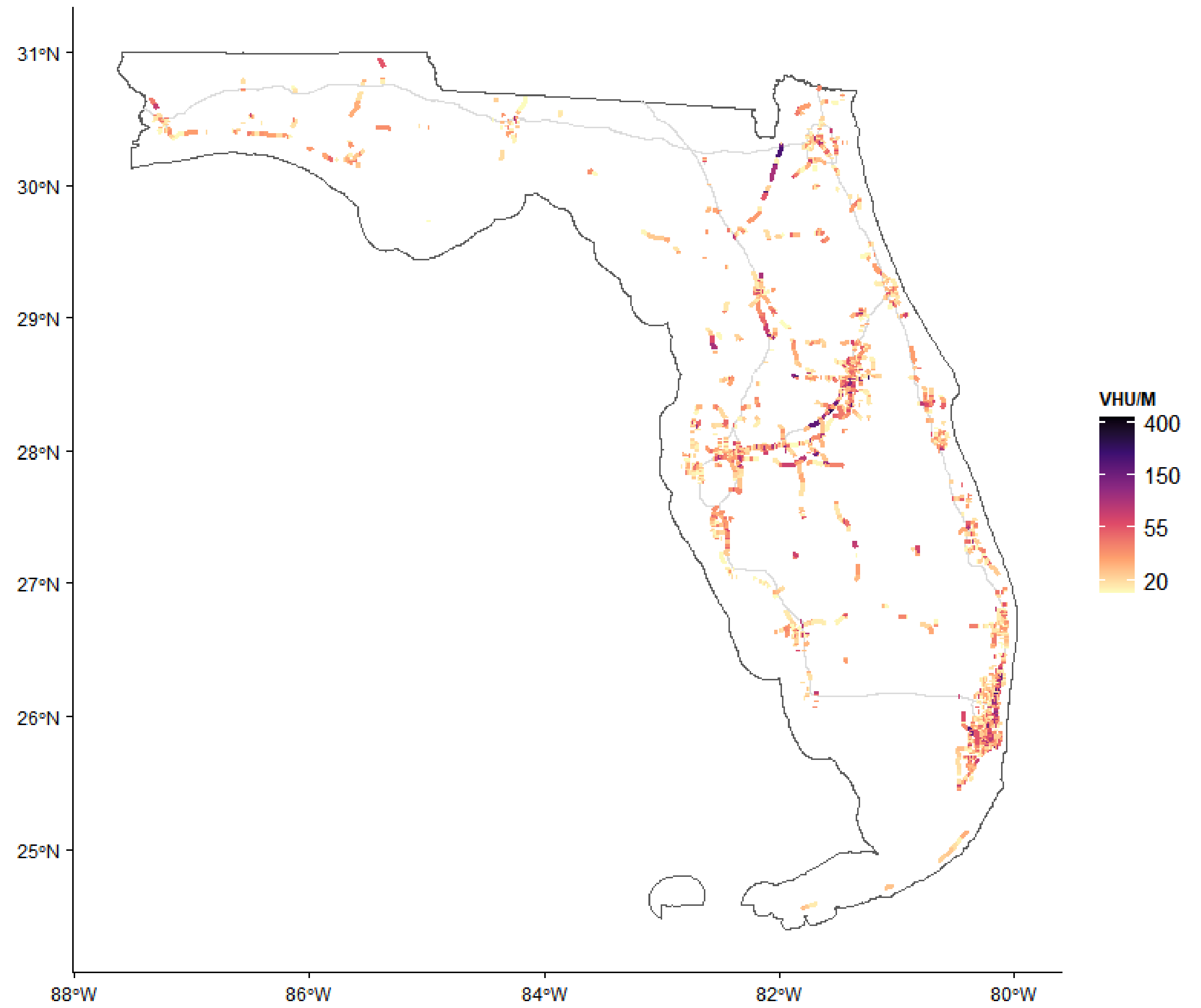
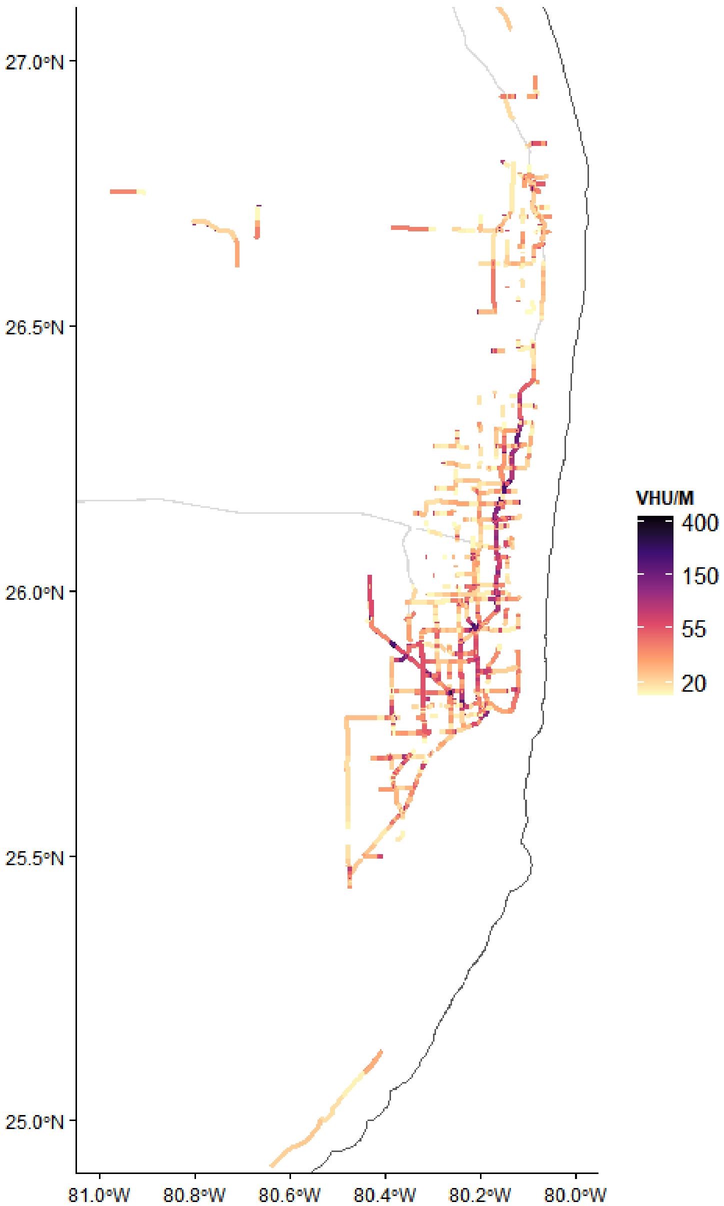


Figure A-7 | Segments with >= 27 VHU/M (Non-recurring congestion) Miami-Dade, Broward Region



FMTP24

FREIGHT MOBILITY AND TRADE PLAN

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FDOT