Statewide Bluetooth Data Collection

presented by

Thomas Hill

Florida Department of Transportation

State Transportation Systems Modeling Division

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Purpose

- To develop and **test the feasibility** of deploying a statewide monitoring network across Florida
- To focus on **freight activity** between Florida's seaports, regions and across the stateline
- To test the feasibility of isolating and monitoring **cruise passenger trips** across the state

Specific Objectives

- Identify **Origins/Destinations** from Florida's most active seaports
- Provide data to assist in the **calibration and validation of Florida's Statewide Freight Model**
- Develop a **robust dataset** for use in regional and interregional corridor studies
- Collect data for **performance measurement**

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Data Collection Units

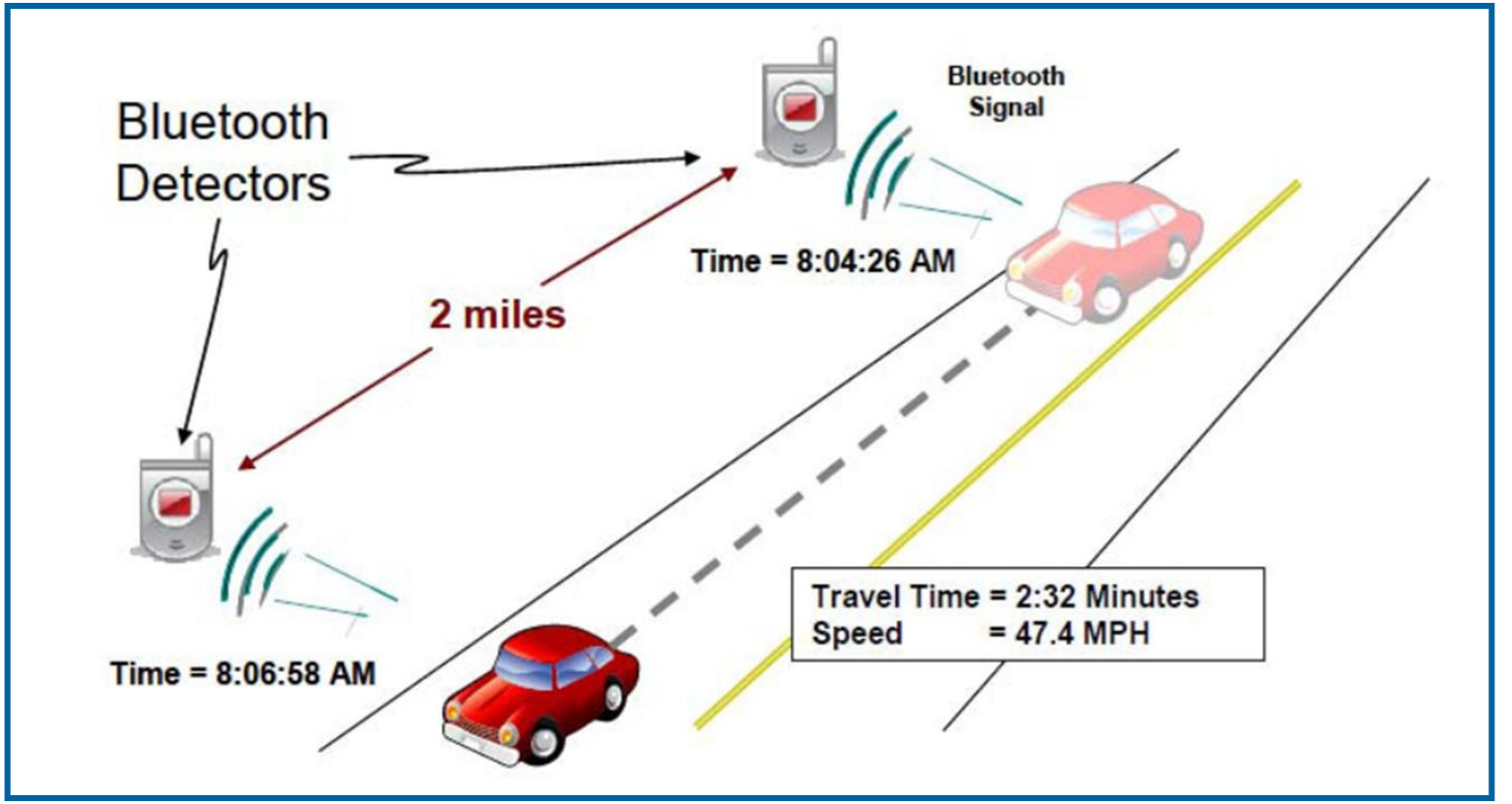
⇨ Most Popular: Wireless audio (headsets and hands-free connectivity)

Accurate measurement points and real-time travel times ⇦

Device Used in the Study

- Equipped with:
  - Global Positioning System (GPS)
  - Global System for Mobile (GSM) communications
  - Solar to battery power
  - Storage capacity for data records

Data Collection

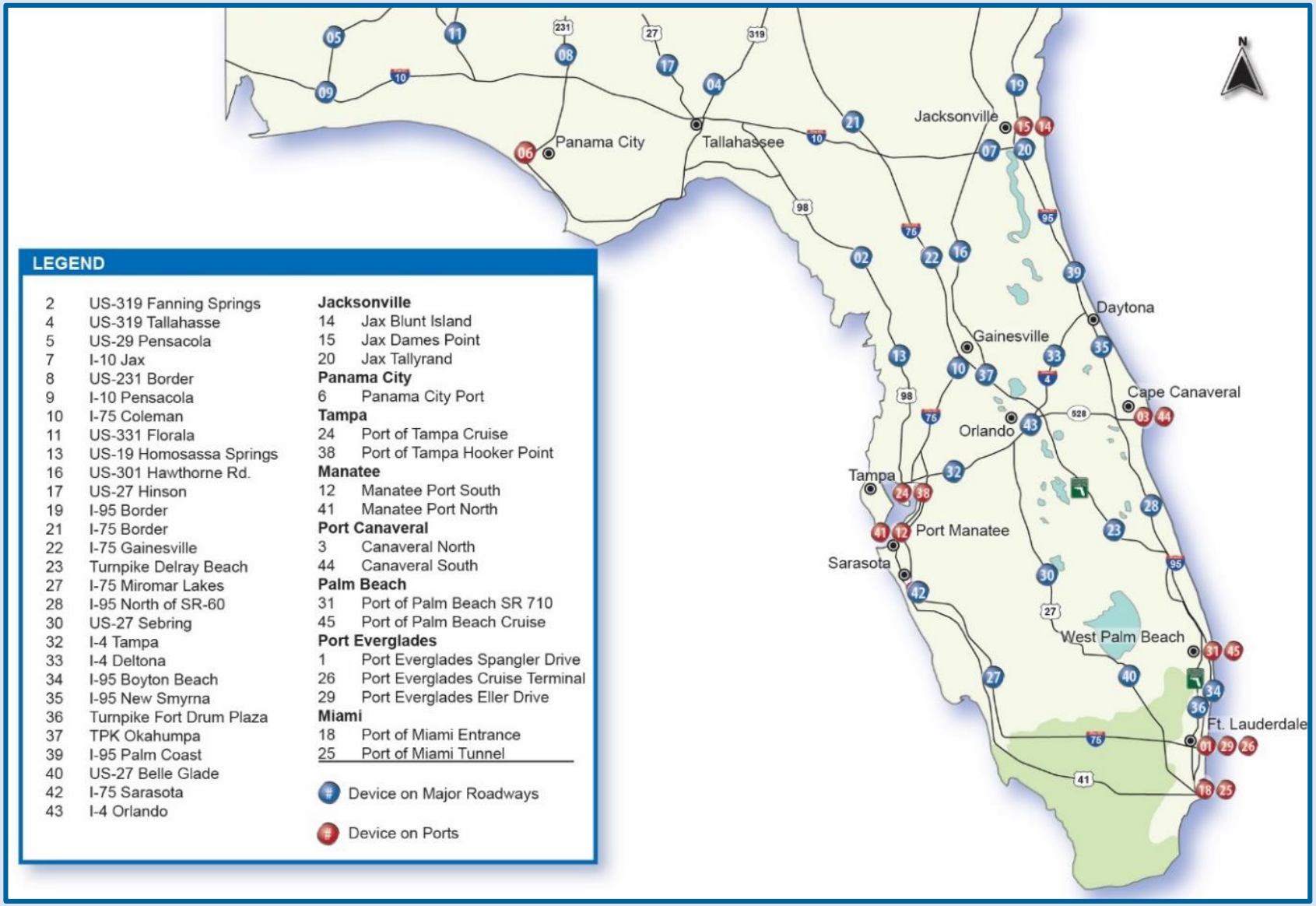


MAC addresses were truncated to the last 6 characters to mitigate privacy concerns

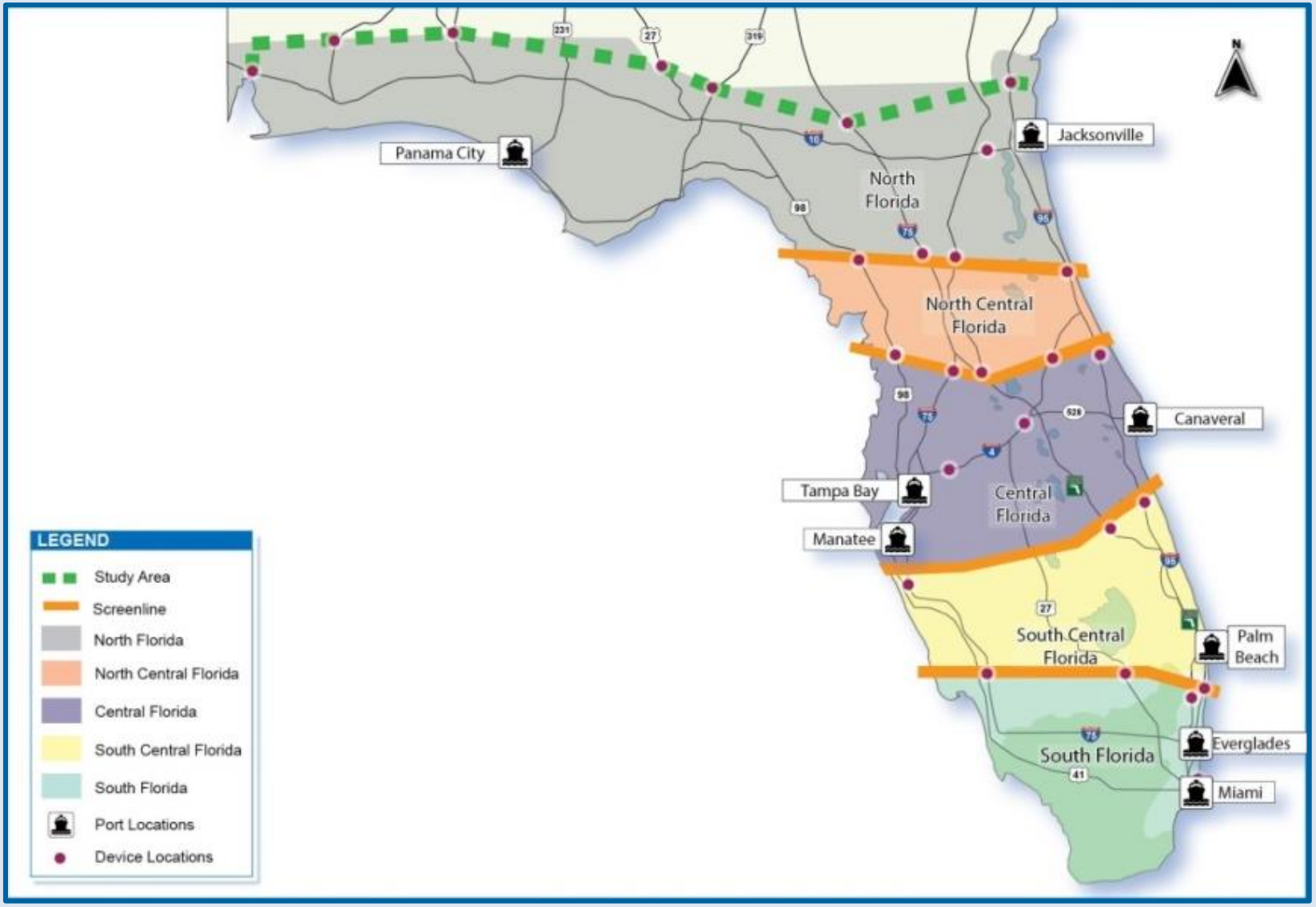
Deployment

- 45 Detection Devices located along the State Highway System at TTMS where possible
- 8 Seaports
  - Port Canaveral
  - Port Everglades
  - JAXPORT
  - Port Manatee
  - PortMiami
  - Port of Palm Beach
  - Port Panama City
  - Port Tampa Bay
- 4 Screenlines to detect North/South movements

Statewide Detection Locations



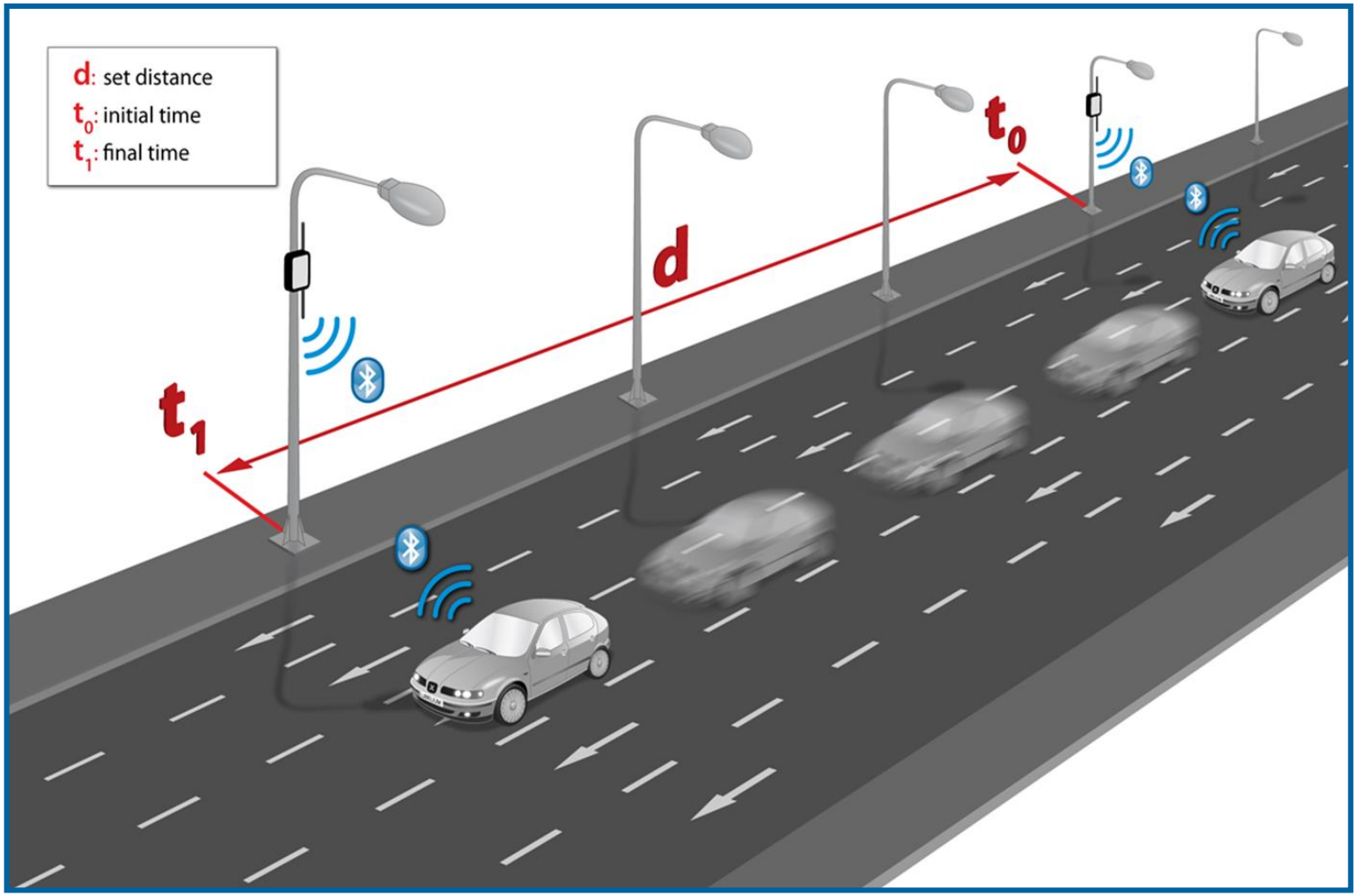
Regions Outlined by Screenlines



Challenges

- Deployment covering a large geographic area that ranged from Pensacola to Miami (670+ miles) and from Jacksonville to Southwest Florida (450+ miles)
- Identifying truck and cruise traffic from MAC addresses and site locations
- Filtering and calibrating a data base with millions of records of data to identify reasonable estimates of truck movements and cruise passenger vehicles

Data Filtering



Data Calibration

- Observed heavy truck and general traffic by field technicians
- Current and historic TTMS and PTMS data

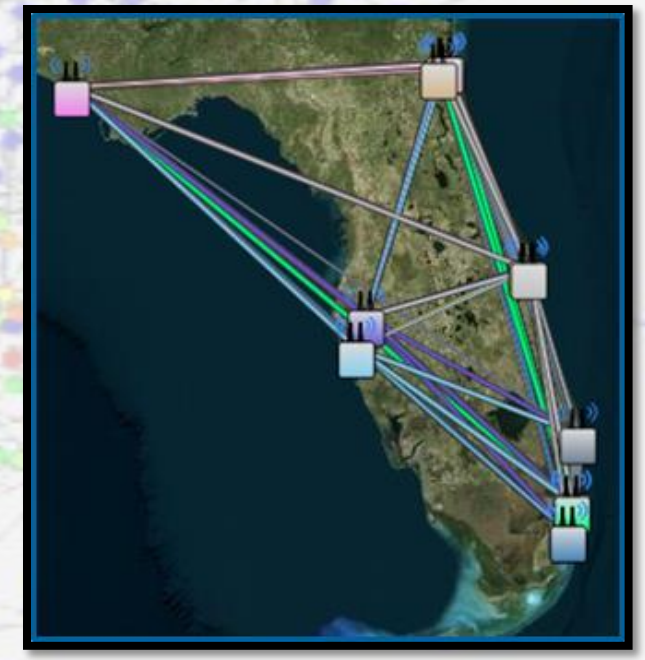
1 Hour Bi-Directional Volume Counts Comparison				Observed Traffic				Device Data	
#	Location	Date	Start Time	Non-Heavy Trucks	Heavy Trucks	Total Volume	% Heavy Trucks	Blue Mac Data Records	Blue Mac % Captured
1	I-95 New Smyma	9/22/2015	10:00AM	1,589	325	1,914	17.0%	158	8%
2	I-95 Palm Coast	9/22/2015	8:30AM	2,737	518	3,255	15.9%	273	8%
3	I-4 Deltona	9/22/2015	12:00PM	4,257	510	4,767	10.7%	333	7%
4	I-4 Orlando	9/22/2015	3:00PM	9,664	352	10,016	3.5%	544	5%
5	TPK Okahumpa	9/22/2015	6:00PM	1,355	314	1,669	18.8%	204	12%
6	I-75 Coleman	9/23/2015	10:30AM	1,622	556	2,178	25.5%	219	10%
7	US-19 Homosassa Springs	9/23/2015	2:00PM	1,278	46	1,324	3.5%	92	7%
8	I-4 Tampa	9/23/2015	5:30PM	4,464	337	4,801	7.0%	255	5%
9	Port of Tampa #1	9/24/2015	8:45AM	133	247	380	65.0%	37	10%
10	Port of Tampa #2 Parking Lot	9/24/2015	10:45AM	532	17	549	3.1%	60	11%

- Video detection/MIOVision
- Reasonability review

Data Analysis

Four analyses were selected to test the purposes of the study

1. Interstate stateline crossings to seaports
2. Seaports to five most heavily traveled paths
3. Seaport to seaport activity
4. Cruise passenger vehicle monitoring to/from three cruise ports



Interstate Crossings to Seaports

PortMiami

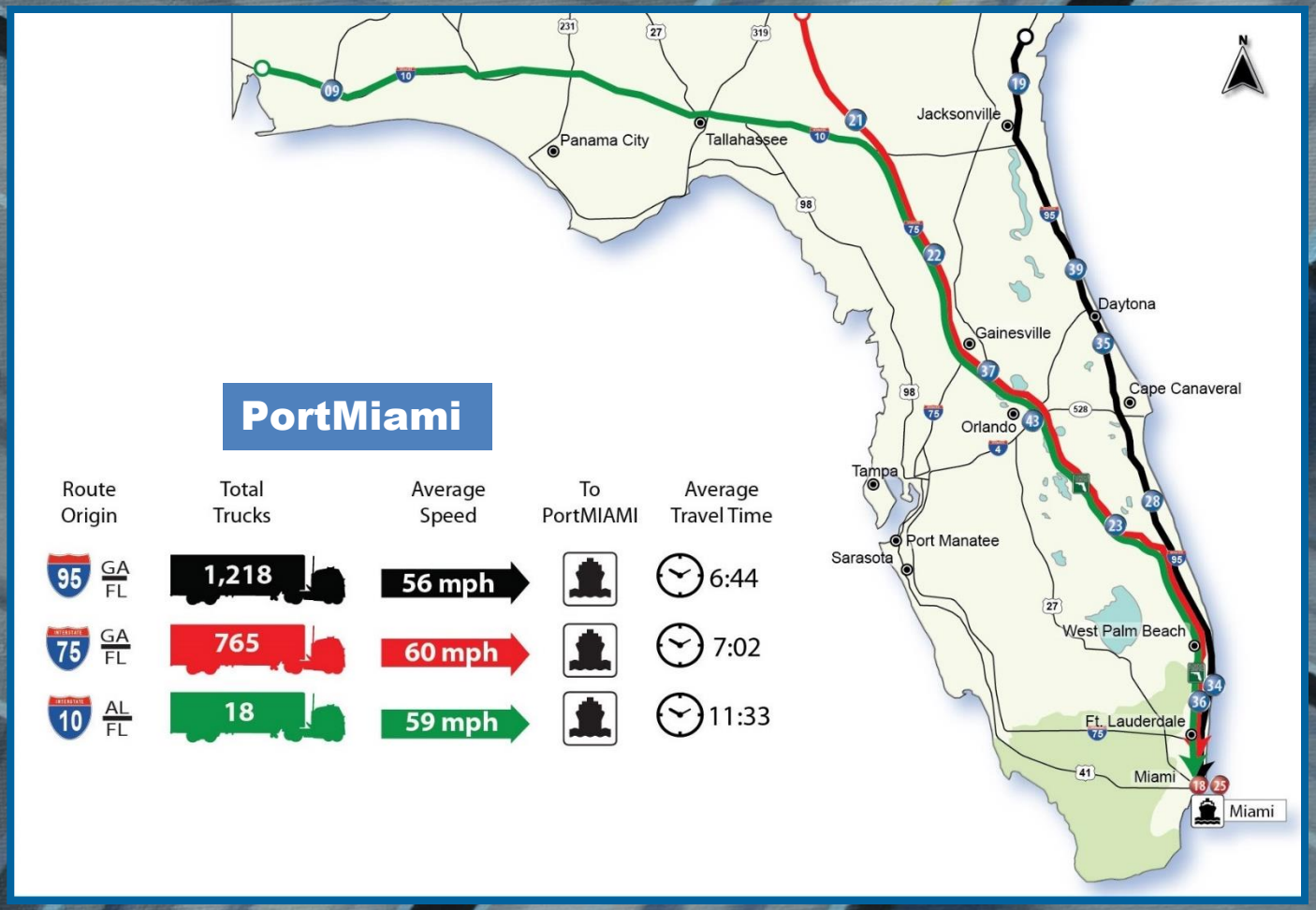
From I-95 Stateline to PortMiami				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
19-I-95 Jax Bdr	17.0%	141,261	N/A	N/A	N/A
39-I-95 Palm Cst	15.1%	59,274	58.0%	56	85
35-I-95 N Smyrna	15.0%	25,628	23.8%	65	33
28-I-95 N SR 60	11.9%	17,765	5.6%	64	94
34-I-95 Bynt Bch	5.5%	7,450	7.3%	65	94
Port of Miami		1,218	4.4%		
25-Tunnel	100.0%	1,047		34	98
18-Bridge	100.0%	171		31	107
From I-95 Stateline to PortMiami				56	404

From I-75 Stateline to PortMiami				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
21-I-75 at Border	26.9%	148,269	N/A	N/A	N/A
22-I-75 Gainesville	9.7%	33,649	77.3%	67	85
37-TPK N Okmpka	16.2%	17,765	10.7%	68	51
23-TPK Ft D Plaza	17.2%	6,166	7.8%	66	105
36-TPK Delray Bch	8.5%	2,569	2.4%	64	96
Port of Miami		765	1.2%		
25-Tunnel	100.0%	616		37	85
18-Bridge	100.0%	149		25	126
From I-75 Stateline to PortMiami				60	422

From I-10 Stateline to PortMiami				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
09-I-10 Pensacola	14.4%	90,482	N/A	N/A	N/A
22-I-75 Gainsville	9.7%	5,331	94.1%	59	356
37-TPK N Okmpka	16.2%	3,735	1.8%	68	51
23-TPK Ft D Plaza	17.2%	1,519	2.4%	66	105
36-TPK Delray Bch	8.5%	676	0.9%	64	96
Port of Miami		18	0.7%		
25-Tunnel	100.0%	12		37	85
18-Bridge	100.0%	6		25	126
From I-10 Stateline to PortMiami				59	693

* From previous to current location

Interstate Crossings to Seaports



Interstate Crossings to Seaports

Port Everglades

From I-95 Stateline to Port Everglades				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
19-I-95 Jax Bdr	17.0%	141,261	N/A	N/A	N/A
39-I-95 Palm Cst	15.1%	59,370	58.0%	56	85
35-I-95 N Smyrna	15.0%	25,737	23.8%	65	33
28-I-95 N SR 60	11.9%	17,867	5.6%	64	94
34-I-95 Bynt Bch	5.5%	7,543	7.3%	65	94
Port of Everglades		3,974	2.5%		
1-Spangler Dr	100.0%	196		40	51
29-Eller Dr	100.0%	3,778		35	60
From I-95 Stateline to Port Everglades				58	366

From I-75 Stateline to Port Everglades				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
21-I-75 at Border	26.9%	148,269	N/A	N/A	N/A
22-I-75 Gainesville	9.7%	32,641	78.0%	67	85
37-TPK N Okmpka	16.2%	17,765	10.0%	68	51
23-TPK Ft D Plaza	17.2%	6,166	7.8%	66	105
36-TPK Delray Bch	8.5%	2,569	2.4%	64	96
Port of Everglades		1,700	0.6%		
1 - Spangler Dr	100.0%	61		39	51
29 - Eller Dr	100.0%	1,639		45	44
From I-75 Stateline to Port Everglades				64	381

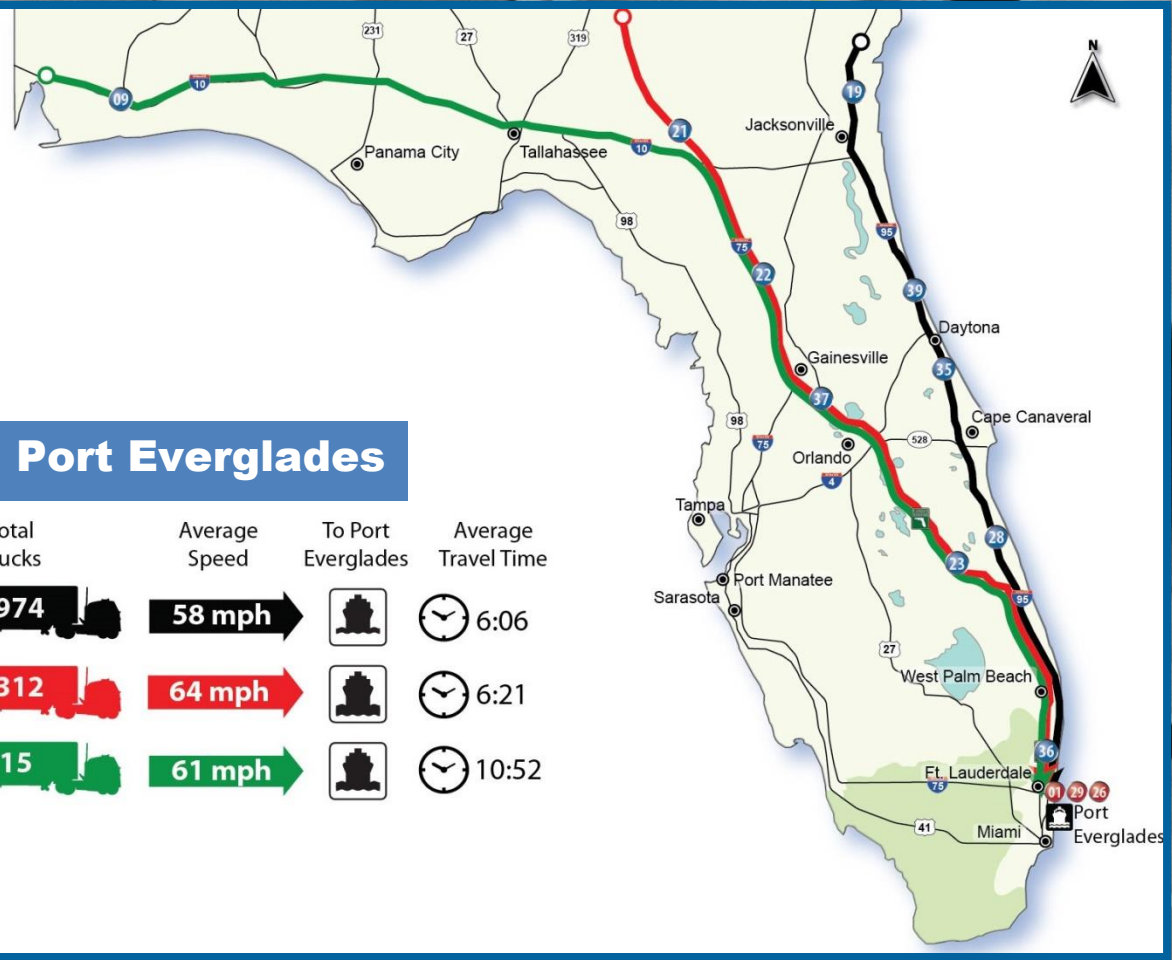
From I-10 Stateline to Port Everglades				85%tile	Avg
			% Origin	Speed*	Time*
Detection Site(s)	% Trucks	# Trucks	Dropoff*	(mph)	(mins)
09-I-10 Pensacola	14.4%	90,482	N/A	N/A	N/A
22-I-75 Gainesville	9.7%	5,339	94.1%	59	356
37-TPK N Okmpka	16.2%	3,746	1.8%	68	51
23-TPK Ft D Plaza	17.2%	1,532	2.4%	66	105
36-TPK Delray Bch	8.5%	687	0.9%	64	96
Port of Everglades		215	0.5%		
Spangler Dr	100.0%	20		39	51
Eller Dr	100.0%	194		45	44
From I-10 Stateline to Port Everglades				61	652

* From previous to current location

Interstate Crossings to Seaports

Port Everglades

Route Origin	Total Trucks	Average Speed	To Port Everglades	Average Travel Time
I-95 GA/FL	3,974	58 mph		6:06
I-75 GA/FL	1,312	64 mph		6:21
I-10 AL/FL	215	61 mph		10:52

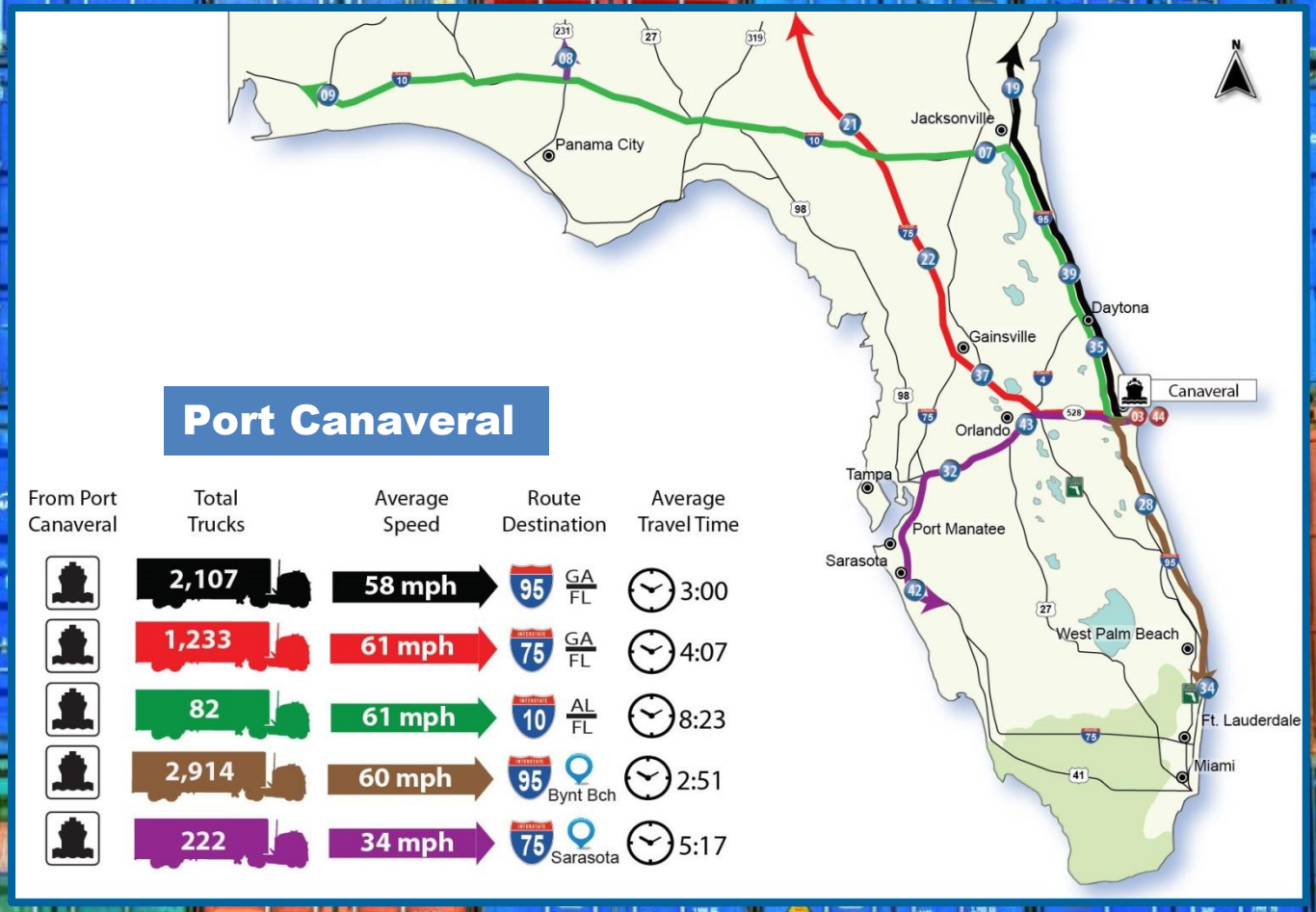


Interstate Crossings to Seaports

Observations

- I-10, I-75 and I-95 truck movements into the state interacted with all eight seaports
- Freight traffic dropped significantly within the first and/or second region along the recorded path
- More than half the trucks entering the state do not extend beyond the North Florida and North Central Florida regions
- A majority of the trucks leaving from the 8 seaports reached their destinations within the seaport of origin's region or an adjacent region

Seaports to Heavily Traveled Paths



Port Canaveral

From Port Canaveral	Total Trucks	Average Speed	Route Destination	Average Travel Time
	2,107	58 mph	95 GA FL	3:00
	1,233	61 mph	75 GA FL	4:07
	82	61 mph	10 AL FL	8:23
	2,914	60 mph	95 Bynt Bch	2:51
	222	34 mph	75 Sarasota	5:17

Seaports to Heavily Traveled Paths

Port Manatee

From Port Manatee	Total Trucks	Average Speed	Route Destination	Average Travel Time
	705	45 mph	I-95 GA FL	5:20
	1,533	51 mph	I-75 GA FL	4:52
	842	44 mph	I-4 Orlando	2:20
	143	21 mph	19 Fanning	7:38
	1,383	50 mph	I-75 Miromar Lakes	2:03

Seaports to Heavily Traveled Paths

Observations

- All of the seaports showed long distance trip interactions and had market reach into all five regions of the state
- JAXPort has a very large number of vehicles detected in the study
- The tables in the report show similar results to the truck traffic entering the state from I-10, I-75 and I-95 where majority of the trucks from all of the ports reached destinations within one or two of the regions identified for this study

Seaport to Seaport

Observations

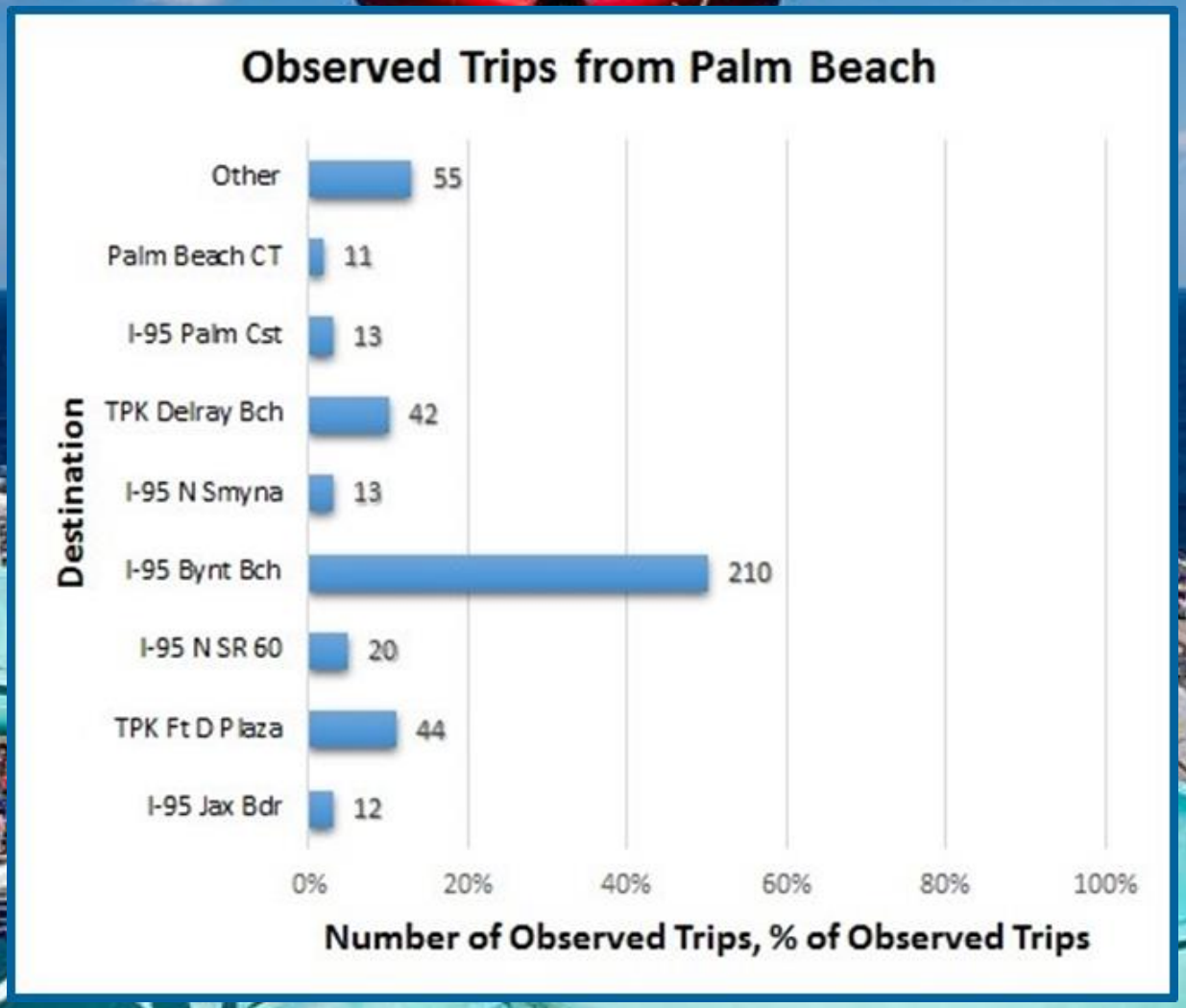
- Most significant activity occurred between ports in the same or adjacent regions
- Most notable interactions were between PortMiami and Port Everglades and Port Manatee and Port Tampa Bay
- Evidence of long distance interactions was most associated with JAXPORT

Cruise Passenger Vehicles

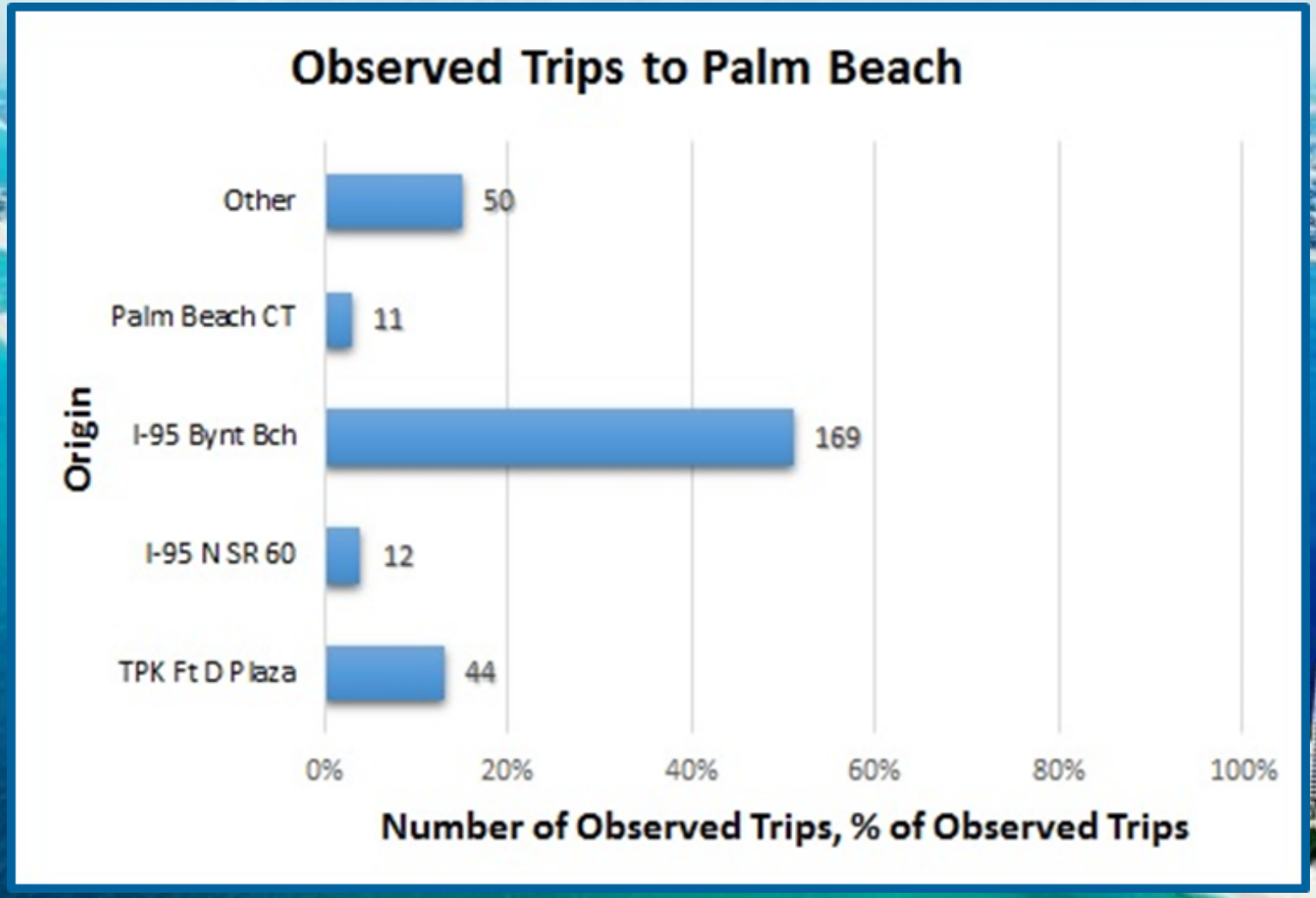
Observations

- Florida's cruise industry has a deep reach across the five regions of the state
- Isolating cruise traffic in dedicated cruise ship parking locations was more successful than in mixed-traffic parking locations
- Detections from Port Tampa Bay and Port of Palm Beach, with dedicated cruise parking should more reliably provide cruise passenger activity over the 35 day period as compared to Port Everglades, which had shared-use parking

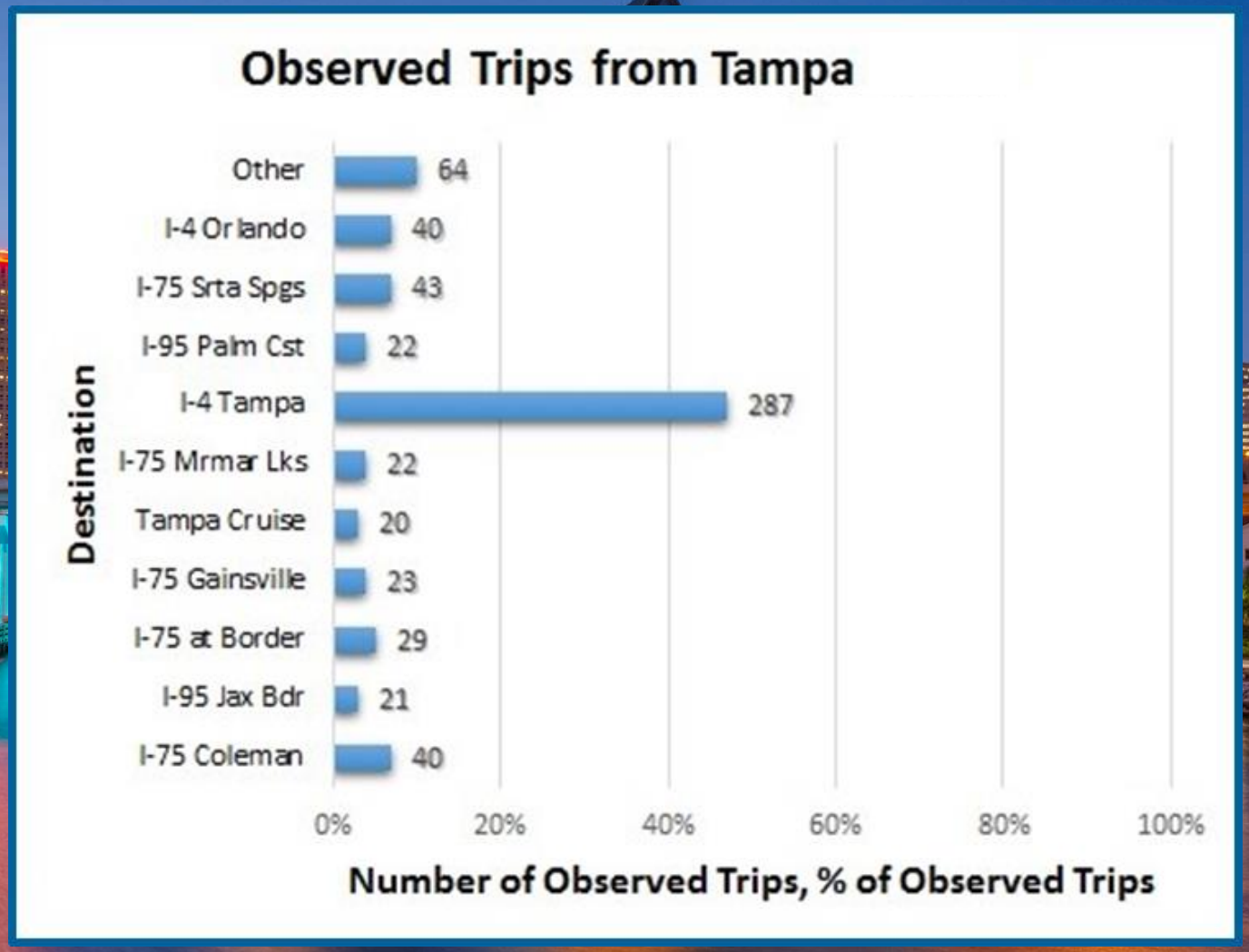
Cruise Passenger Vehicles



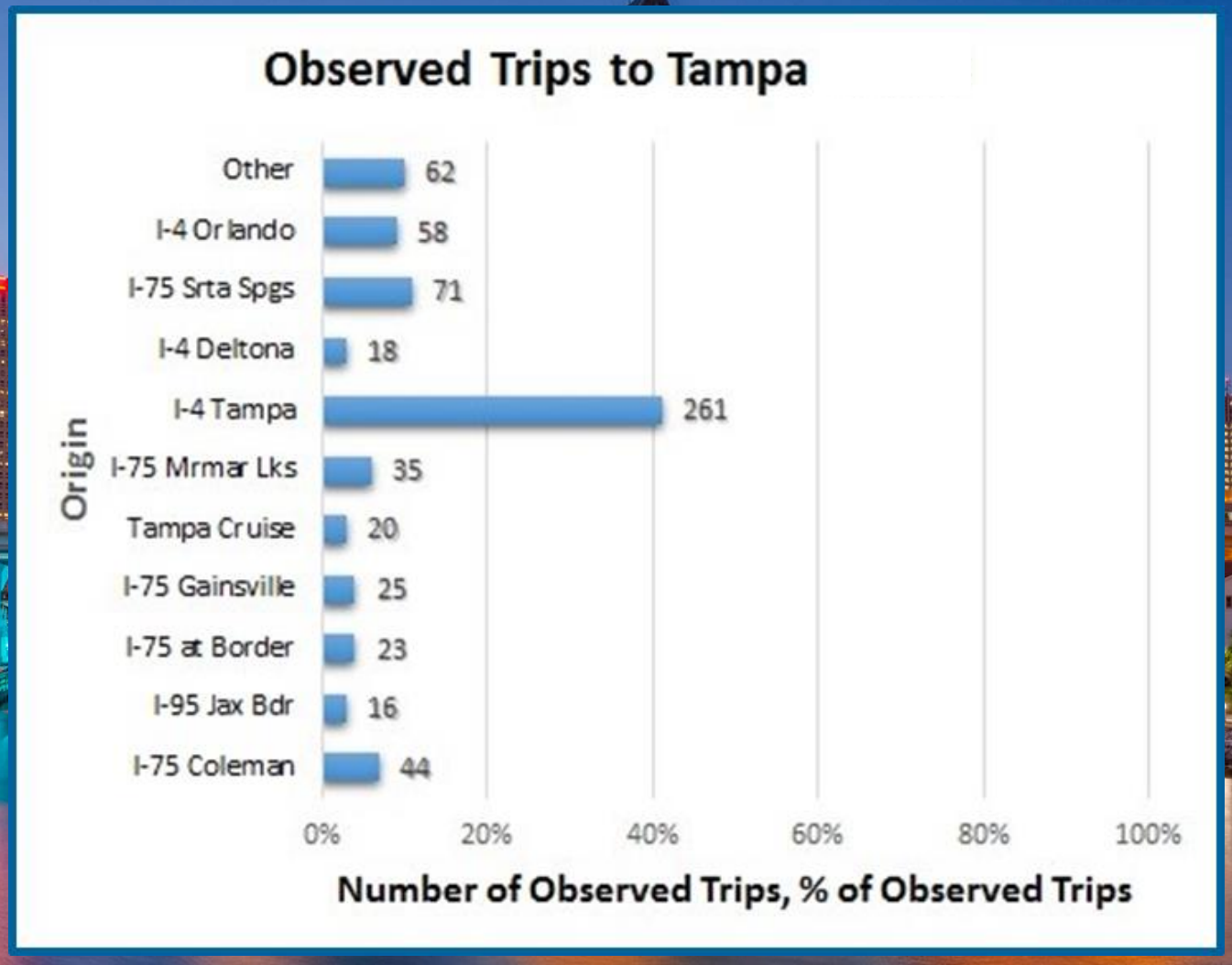
Cruise Passenger Vehicles



Cruise Passenger Vehicles



Cruise Passenger Vehicles



Overall Speed Observations

- Average travel speeds consistently ranged from the high 50 to low 60 miles per hour (mph) on roadway connections from region to region
- Average travels speeds slowed for the first/last trip link to/from the seaports
  - The reductions in speeds to the 40 mph range reflected congestion, as the seaports are typically located in highly urbanized areas
  - The South Florida area experienced the lowest speeds where interactions between Port Everglades and PortMiami averaged 10 mph

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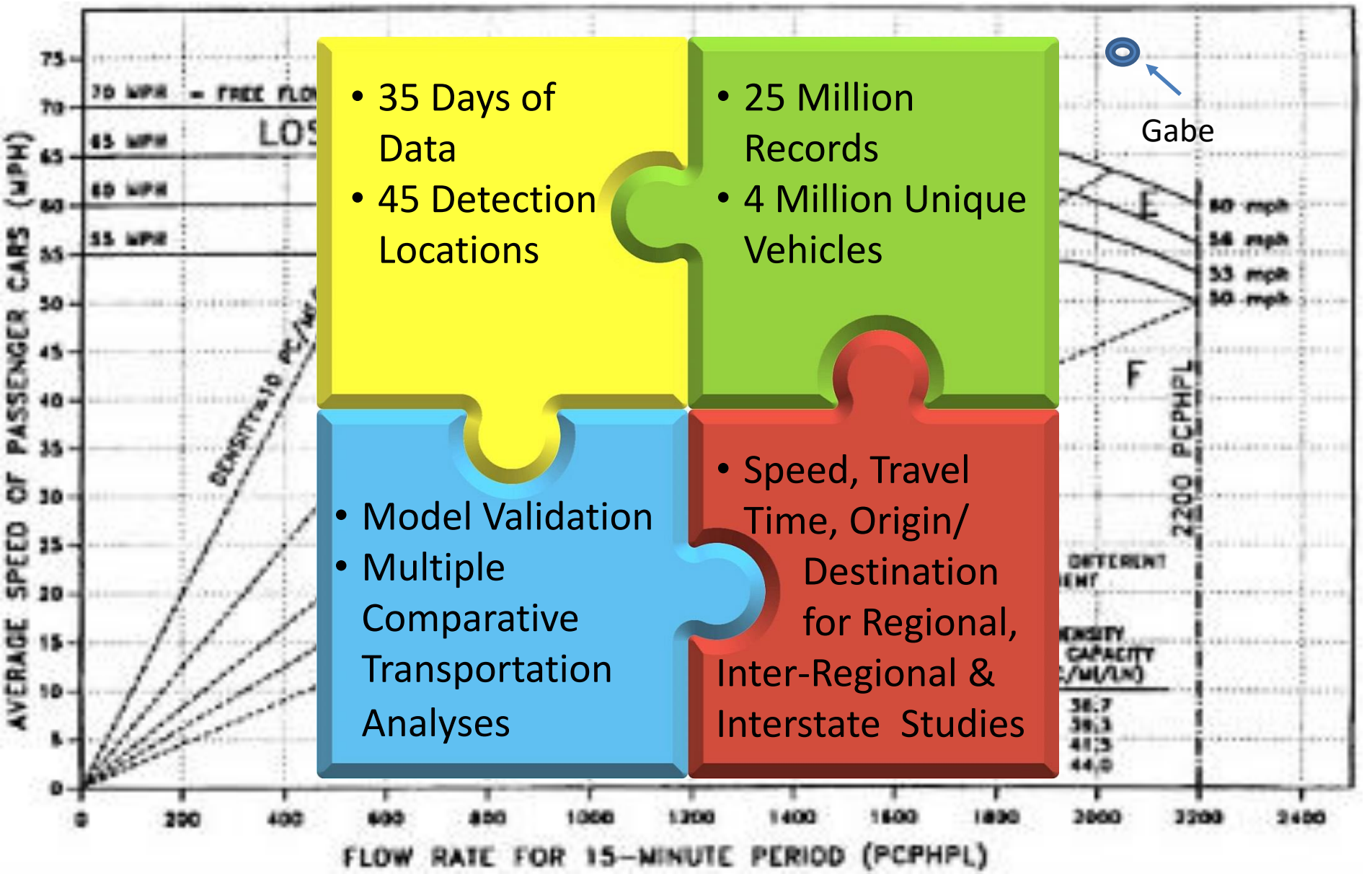
Resulting Data Set



- 35 Days of Data
- 45 Detection Locations

- 25 Million Records
- 4 Million Unique Vehicles

- Model Validation
- Multiple Comparative Transportation Analyses

- Speed, Travel Time, Origin/ Destination for Regional, Inter-Regional & Interstate Studies

Recommendations

- Leverage the extent of the statewide deployment
  - Connect to other state systems and national collaborations, such as the I-95 Corridor Coalition
  - Explore opportunities with neighboring states to track freight movement across state lines
    - Florida DOT: 900+ Bluetooth units deployed statewide

Recommendations

- Invest in a unified and permanent system of Bluetooth devices throughout the state
- Include additional sites south of Port Everglades and PortMiami to identify southbound freight distribution from these ports
- Include a relocation of low activity sites and/or additional sites to identify east/west movements
- Include additional cruise sites to further isolate cruise activity and collect a more robust data set

Recommendations

- Develop a protocol for uniform Bluetooth data delivery
- Develop in-house filters and GIS applications that fit Florida's needs for evaluation and performance measurement
- Investigate the potential implementation of a rail traffic data collection system to assess rail traffic flows through the state and from the ports

Recommendations

- Utilize this 2015 data set as a baseline for future comparative purposes, including pre- and post-Panama Canal expansion analyses
- Identify flows to/from agglomerations of Distribution and Intermodal Logistic Centers, major SIS Airport Cargo facilities and connectors

Benefits to the State

- **Freight Modeling**
  - Data to calibrate freight trip lengths
  - Data to enhance and validate development of Florida's Statewide Freight Model
- **Emergency and Incident Management**
  - Support evacuation monitoring by providing real-time data regarding traffic flow on evacuation routes
  - Provide accurate representation of travel times and average speeds

Benefits to the State

- **Florida Freight and Mobility Trade Plan**
  - Tracking and providing a better understanding of truck flows and volume and truck freight movements between urban areas
  - Analyzing efficiency and reliability of major freight corridors and last mile connections
  - Assess preparedness of the freight transportation system to accommodate future increases in trade or to compete with other states for additional cargo

Benefits to the State

- **Performance Measures**

- Supports F.A.S.T. Act requiring use of advanced technology to improve the safety and efficiency of the National Freight Network
- Offers the ability to enhance transportation performance reporting by adding dynamic information on transportation system performance

Benefits to the State

- **Strategic Intermodal System**
  - Assist in prioritizing SIS multi-modal investments
- **Tourism**
  - Provides key data sets to the Seaports and VisitFlorida, giving them the ability to leverage cruise and tourism marketing and business development as well as tourism-related investments
  - Prioritize future infrastructure investments

Questions?

Thomas Hill

FDOT, Systems Traffic Models Manager

850.414.4924

thomas.hill@fdot.gov