



# Truck GPS Data for Freight Planning

*presented to*

**Florida Model Task Force, Orlando**

*presented by*

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**University of South Florida (USF)**

**American Transportation Research Institute**

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# Acknowledgements

- **FDOT Systems Planning Office**
  - Frank Tabatabaee
- **American Transportation Research Institute (ATRI)**
  - Jeff Short
  - Dave Pierce
  - Lisa Park
  - Dan Murray
- **Graduate Students from University of South Florida**
  - Aayush Thakur
  - Anissa Nur Irmania & Jonathan Koons





# Background

- Significant growth in freight movement calls for improved freight planning and decision processes
- Major challenge: Inadequate data!
- Recent efforts to exploit technology for data collection
  - GPS-based automatic vehicle monitoring and location (AVM) & AVL) data



## The ATRI-FPM Initiative

- Joint venture by ATRI and FHWA
- A national system for monitoring freight performance measures on key corridors
- Based on satellite data from trucking companies who use GPS technologies to monitor their fleet



# Project Objectives

- Investigate the use of ATRI-FPM data for freight performance measurement and planning in Florida
- Develop methods for the following applications with the data
  1. Derive freight performance measures for Florida's highways
  2. Derive a truck-trip database (from ATRI-FPM data) to understand the characteristics of truck travel in Florida
  3. Derive truck trip OD tables for the Florida Statewide Model



# Freight Performance Measurement with ATRI-FPM GPS data



## Contributors

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Lisa Park, ATRI

Speeds  
Reliability measures  
Congestion Measures



# APPLICATIONS OF ATRI'S DATA FOR THE STATE OF FLORIDA

- Average Highway Speeds
- Reliability Measurements
- Analysis of Chokepoints
- Measures of Corridor Demand and Freight Activity Intensity
- Truck Flow Analysis
- Origin and Destination Estimates
- Other Analysis



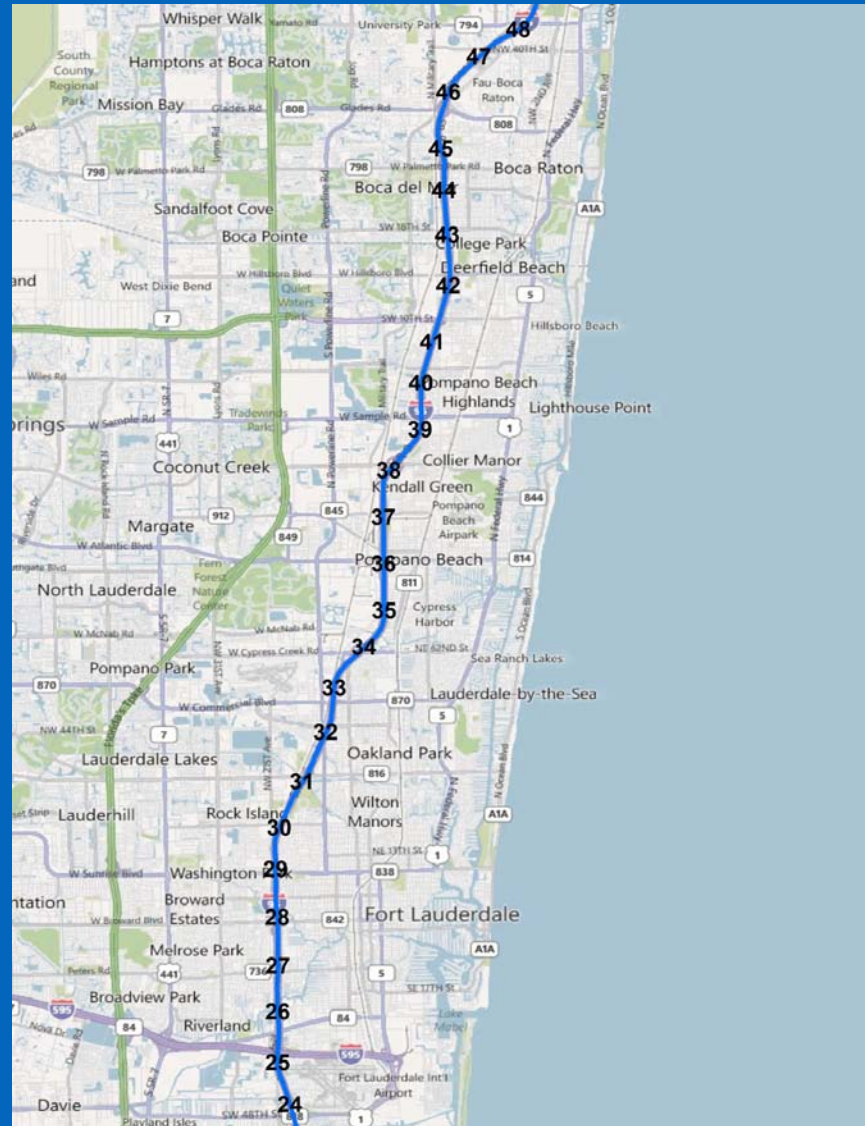
# Application One: Average Highway Speeds

- Data are processed through a series of software programs to generate measures
- Those measures are plotted along a corridor map in a GIS environment
- Data can be analyzed both in terms of space mean speed and spot mean speed





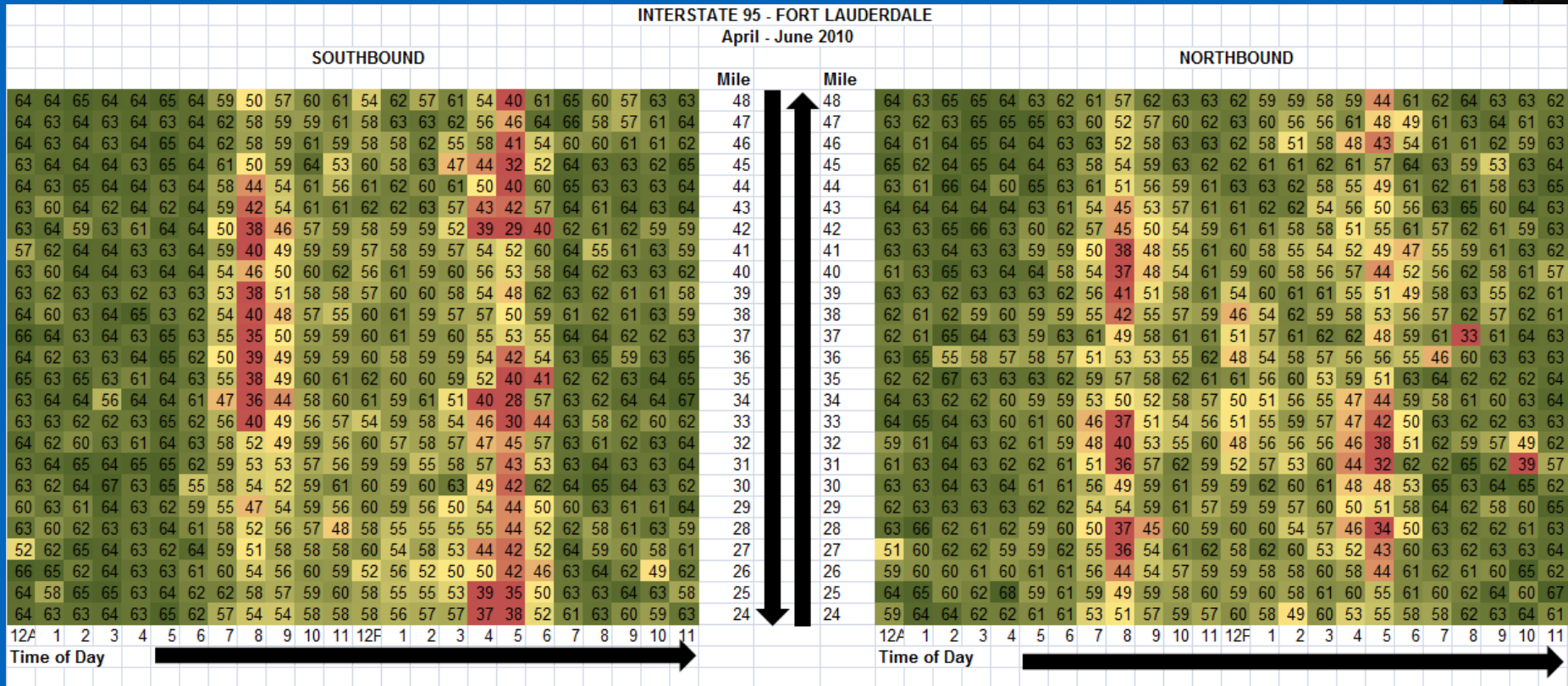
# Application One: Average Highway Speeds



Sample Study Area, I-95 Miles 24-48.



# Application One: Average Highway Speeds



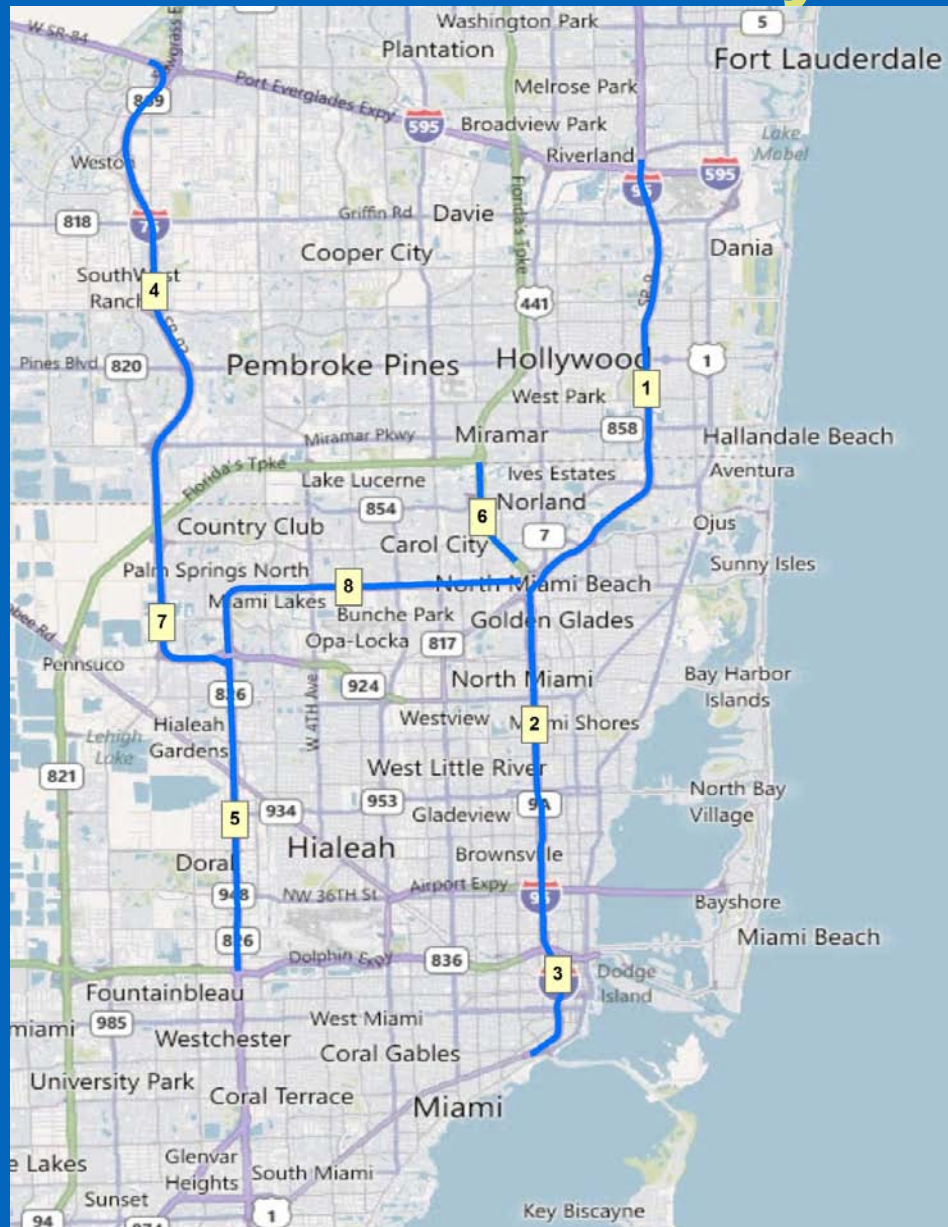
Average Speeds by Hour, I-95 Miles 24-48



# Application Two: Reliability Measures

- For both space and spot mean speed calculations, relevant reliability measures include the Travel Time Index (TTI) and Planning Time Index (PTI)
- TTI is the ratio of the average speed for a given highway segment at a particular time of day to the functional free flow speed of the same segment of highway.
- PTI is the ratio of the “worst-case scenario” average travel speed for a given highway segment at a particular time of day to the functional free flow speed of the same segment of highway.

# Application Two: Reliability Measures



Location of Study Corridors



# Application Two: Reliability Measures

Miami, FL - April-June 2010

Polyline	Freeway Section (sorted from most congested to least congested)	Length (mi)	Travel Time Index				Planning Time Index			
			Morning Peak (6a-9a)	Midday (9a-4p)	Evening Peak (4p-7p)	Average Peak Period	Morning Peak (6a-9a)	Midday (9a-4p)	Evening Peak (4p-7p)	Average Peak Period
1	I-95 NB: SR 91 to SR 84	12.2	1.16	1.10	1.18	1.17	1.69	1.35	2.04	1.82
	I-95 SB: SR 84 to SR 91	12.2	1.12	1.16	1.36	1.19	1.68	1.77	3.12	2.12
2	I-95 NB: I-195 to SR 91	8.2	1.09	1.17	2.07	1.68	1.38	2.40	10.00	6.56
	I-95 SB: SR 91 to I-195	8.2	1.36	1.27	1.33	1.36	3.41	2.93	4.16	3.49
3	I-95 NB: US 1 to I-195	5.1	1.21	1.18	1.65	1.38	3.17	1.64	4.31	3.62
	I-95 SB: I-195 to US 1	5.1	1.25	1.18	1.39	1.27	3.13	2.24	4.57	3.31
4	I-75 NB: SR 821 to I-595	13.3	1.04	1.05	1.15	1.06	1.11	1.15	1.66	1.21
	I-75 SB: I-595 to SR 821	13.3	1.09	1.06	1.09	1.09	1.35	1.16	1.28	1.33
5	SR 826 NB: SR 836 to I-75	8.3	1.12	1.18	1.86	1.53	1.50	1.67	5.20	3.56
	SR 826 SB: I-75 to SR 836	8.3	1.28	1.31	1.51	1.32	2.18	2.57	7.59	3.10
6	SR 91 NB: SR 821 to SR 852	2.9	1.35	1.18	1.29	1.33	3.15	2.30	3.97	3.36
	SR 91 SB: SR 852 to SR 821	0.3	1.29	1.21	1.17	1.26	5.96	4.15	1.81	4.93
7	I-75 NB: SR 826 to SR 821	4.9	1.05	1.05	1.08	1.06	1.10	1.08	1.10	1.10
	I-75 SB: SR 821 to SR 826	4.8	1.42	1.15	1.08	1.30	6.65	2.91	1.29	4.73
8	SR 826 EB: I-75 to I-95	8.3	1.35	1.15	1.21	1.31	2.94	1.58	2.74	2.88
	SR 826 WB: I-95 to I-75	8.3	1.40	1.23	1.32	1.38	3.42	2.28	3.64	3.46

Travel Time Index and Planning Time Index for Eight Miami Corridors





# Application Three: Analysis of Chokepoints

- Analysis of chokepoints can offer a better understanding of when, where and possibly why, congestion is occurring
- Study areas are often no more than 4 miles across, and are assessed in one hour increments
- Further analysis would provide quantification of which segments or directions of an interchange have the worst congestion

# Application Three: Analysis of Chokepoints

## 2009 Bottleneck Analysis of 100 Freight Significant Highway Locations

### Tampa, FL: I-4 at I-275

#### Bottleneck Summary

The bottleneck location is shown in Figure 1.  
The speed profile is shown in Figure 2.

Average Speed	45
Peak Average Speed	36
Nonpeak Average Speed	50
Nonpeak/Peak Speed Ratio	1.37
Congestion Index	260,041
Ranking (out of 100)	49



Figure 1: Location Map

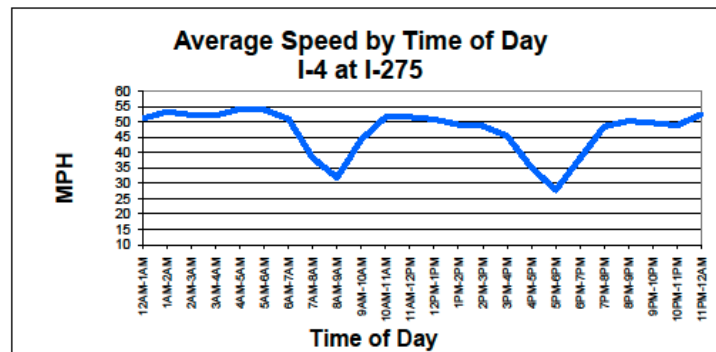


Figure 2: Speed Profile



# Application Four: Measures of Corridor Demand and Freight Activity Intensity

- Relative volume relationships between corridors.
- Freight Intensity Index: derived by dividing the number of position reads by the length of the segment.
- Data is indexed with the highest freight intensity receiving a value of 100.
- The FPM data can also be used to explore regional freight activities by determining the number of truck position data points contained within each county and dividing that figure by the length of the roadway segments in the county.

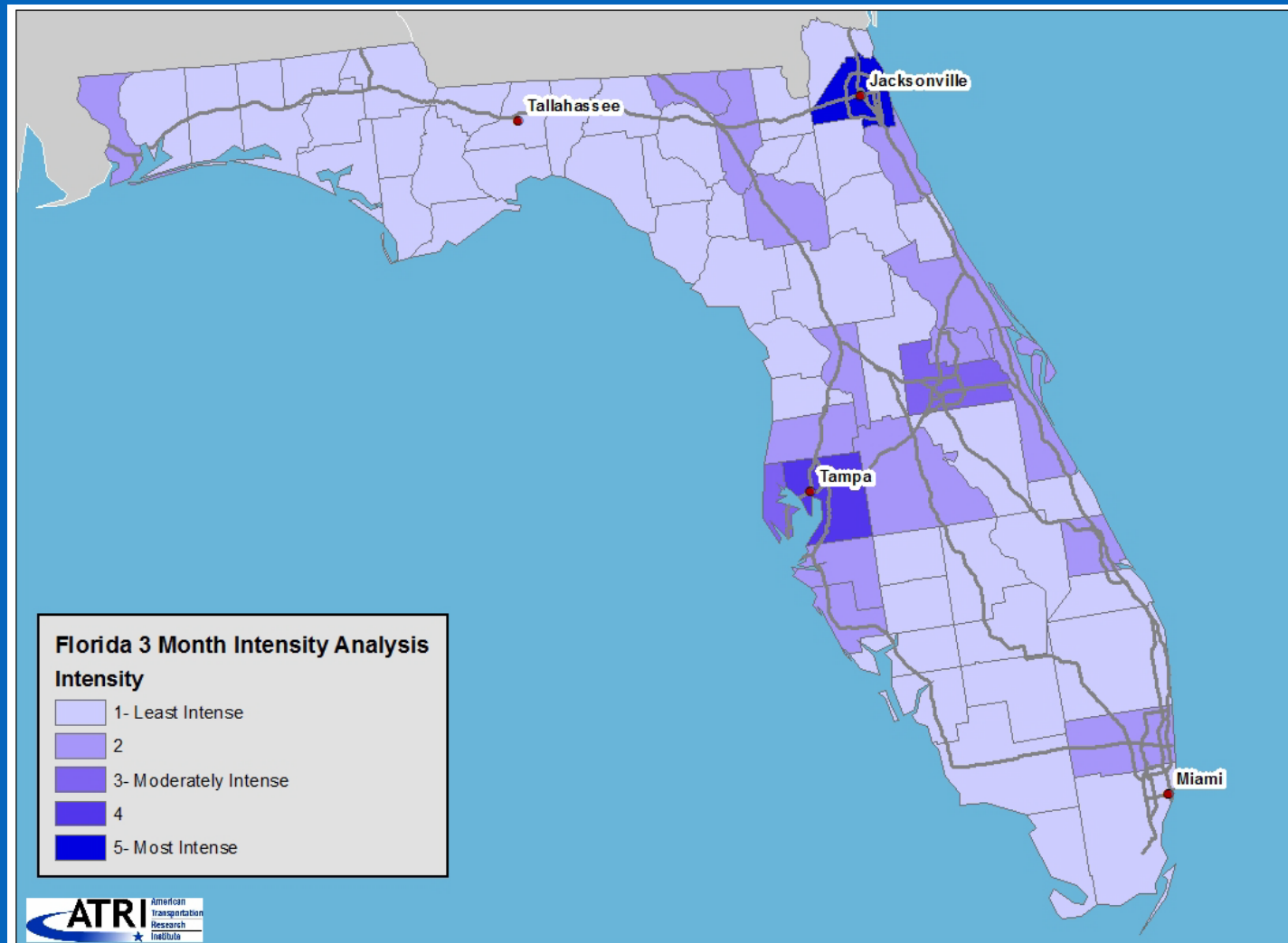
## A horizontal strip of six images illustrating different modes of transport: shipping containers, a truck, a highway, a cyclist, a tram, and an airplane.



FLORIDA  
MODEL  
TASK  
FORCE



# Application Four: Measures of Corridor Demand and Freight Activity Intensity



Freight Intensity Analysis by County



# Application Five: Truck Flow Analysis

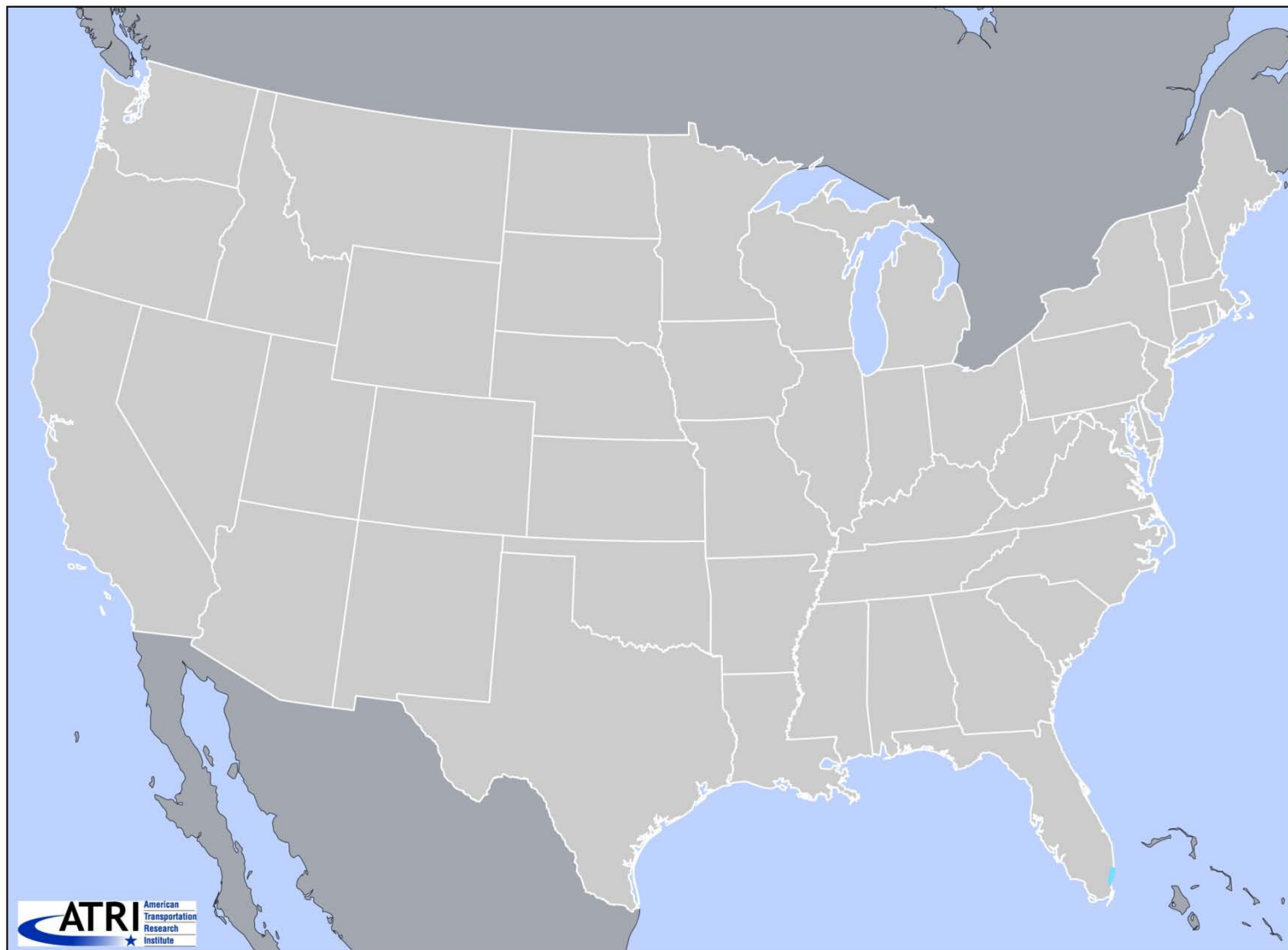
- Identify freight movement trends between geographic areas
- Insight into what routes are taken between two locations

**Sample of more than 1,000 trucks that originated in, or were traveling through, Miami on a given day; the traced paths after 7 days of truck movement are shown in red, as well as the percentage of the truck population that entered each state.**



# Miami

## 1,000 Truck Sample





# 1,000 Trucks After 24 Hours







# Same 1,000 Trucks After 48 Hours





# Same 1,000 Trucks After 72 Hours



# Same 1,000 Trucks After 5 Days





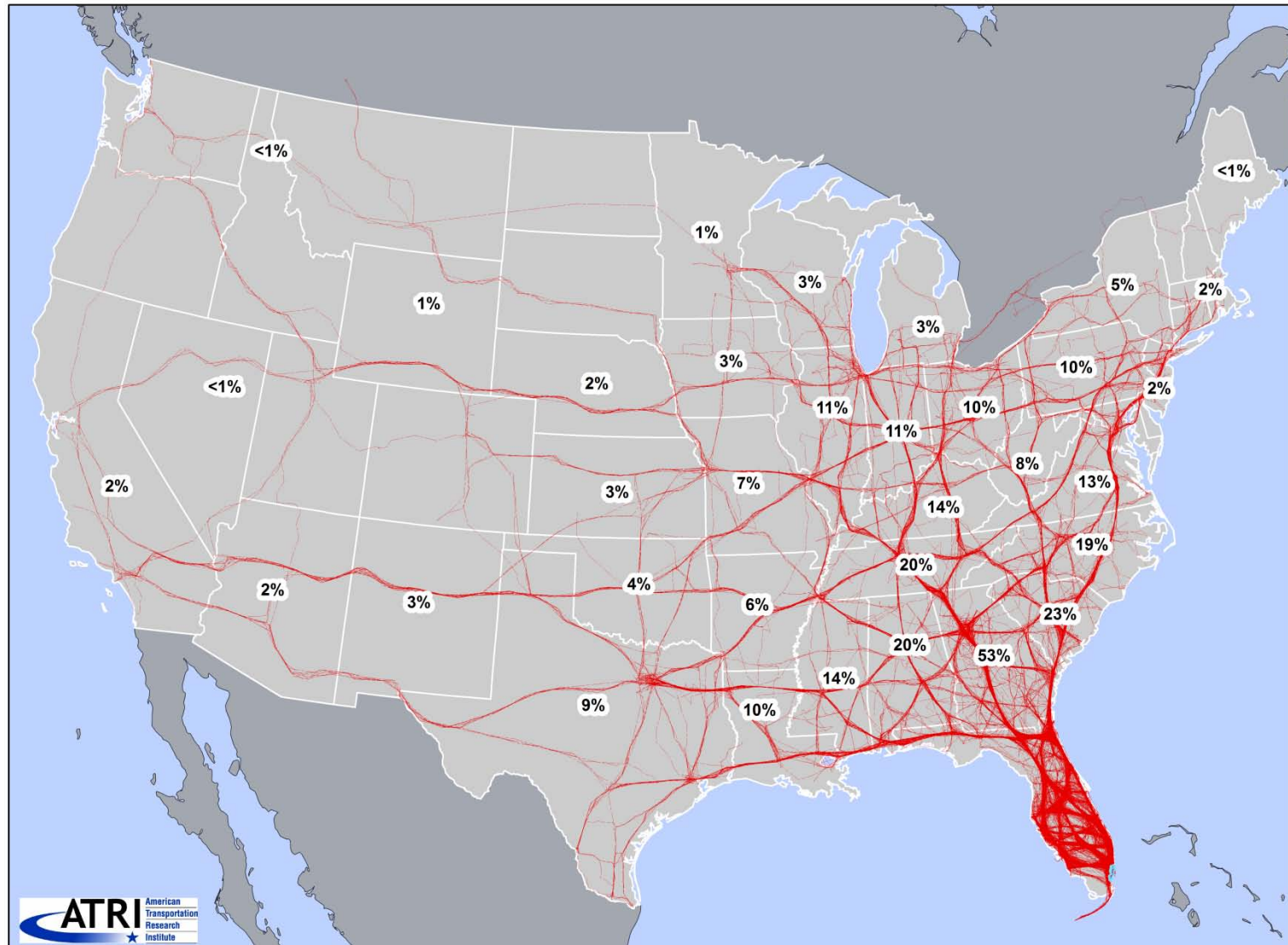
# Same 1,000 Trucks After 7 Days



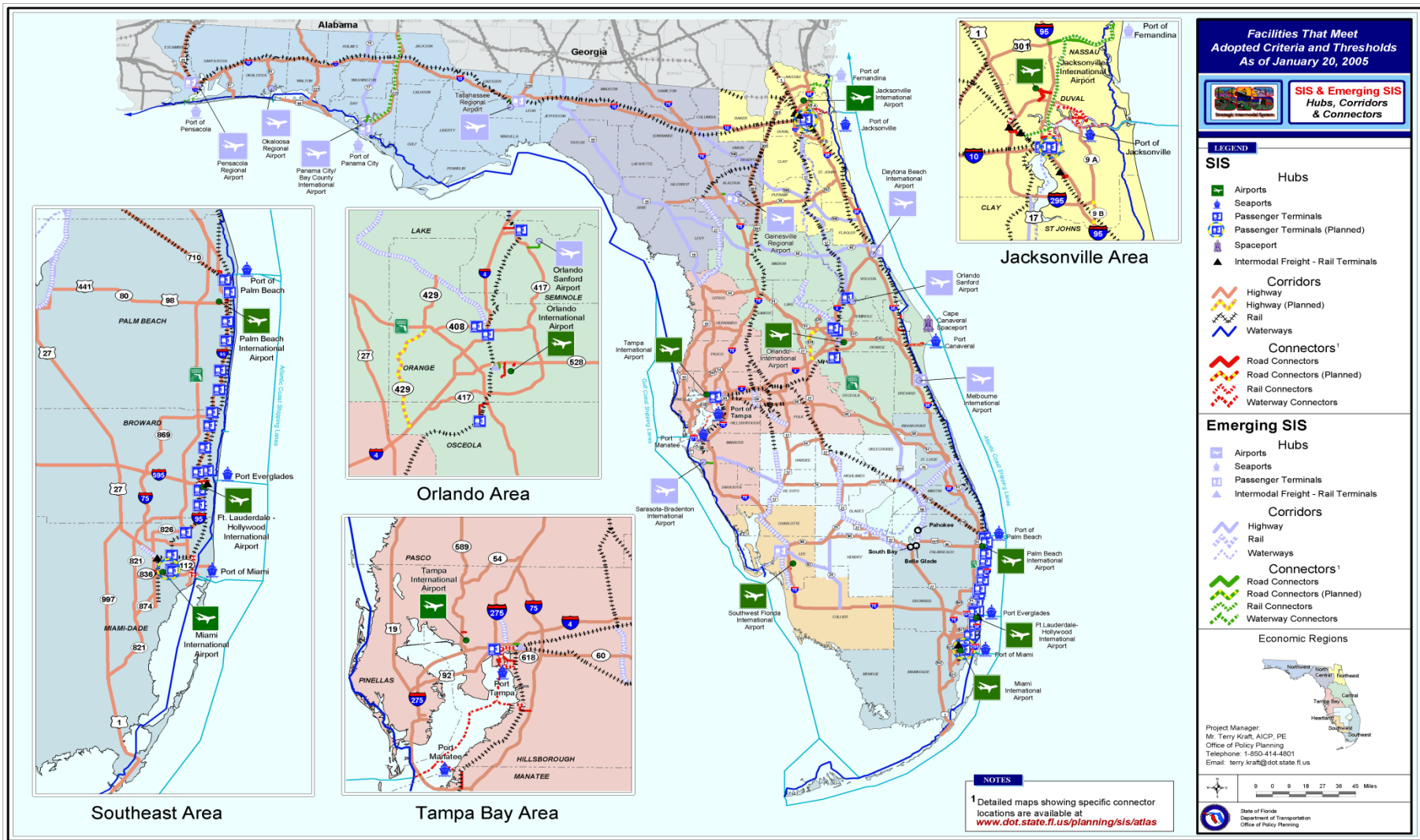




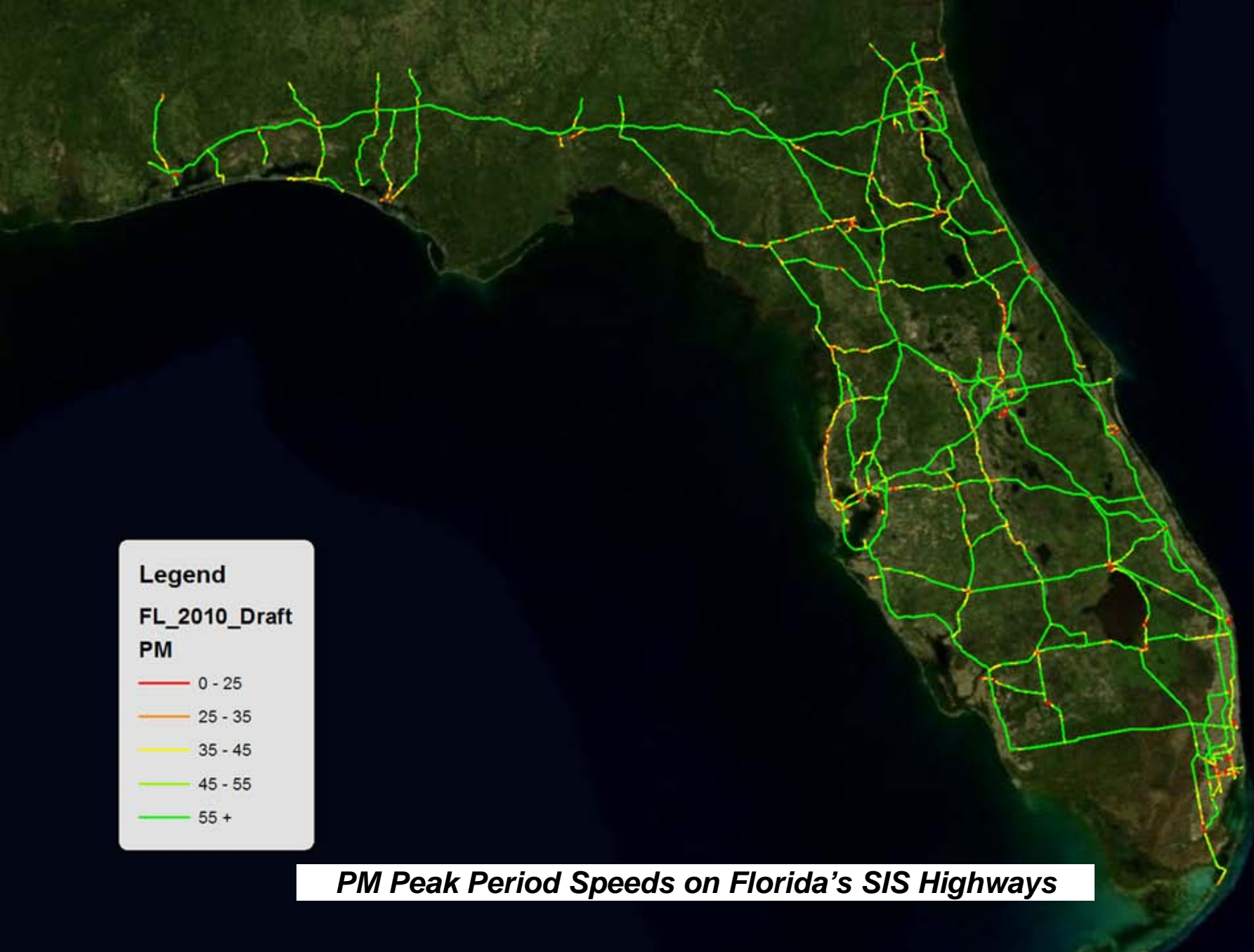
# Same 1,000 Trucks After 7 Days



# Focus of Performance Measurement on Florida's Strategic Intermodal System (SIS)







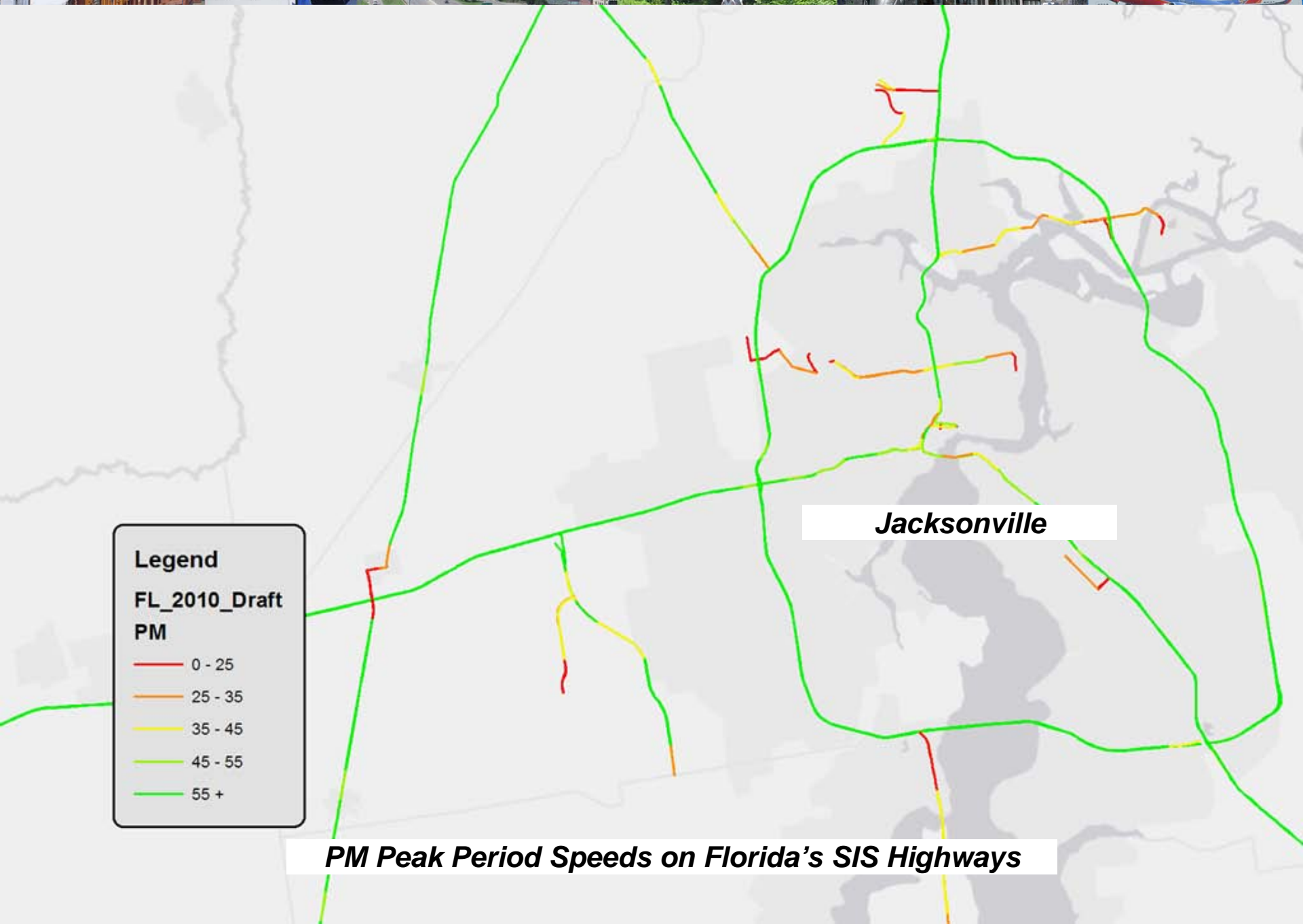
**Legend**

**FL\_2010\_Draft**

**PM**

	0 - 25
	25 - 35
	35 - 45
	45 - 55
	55 +

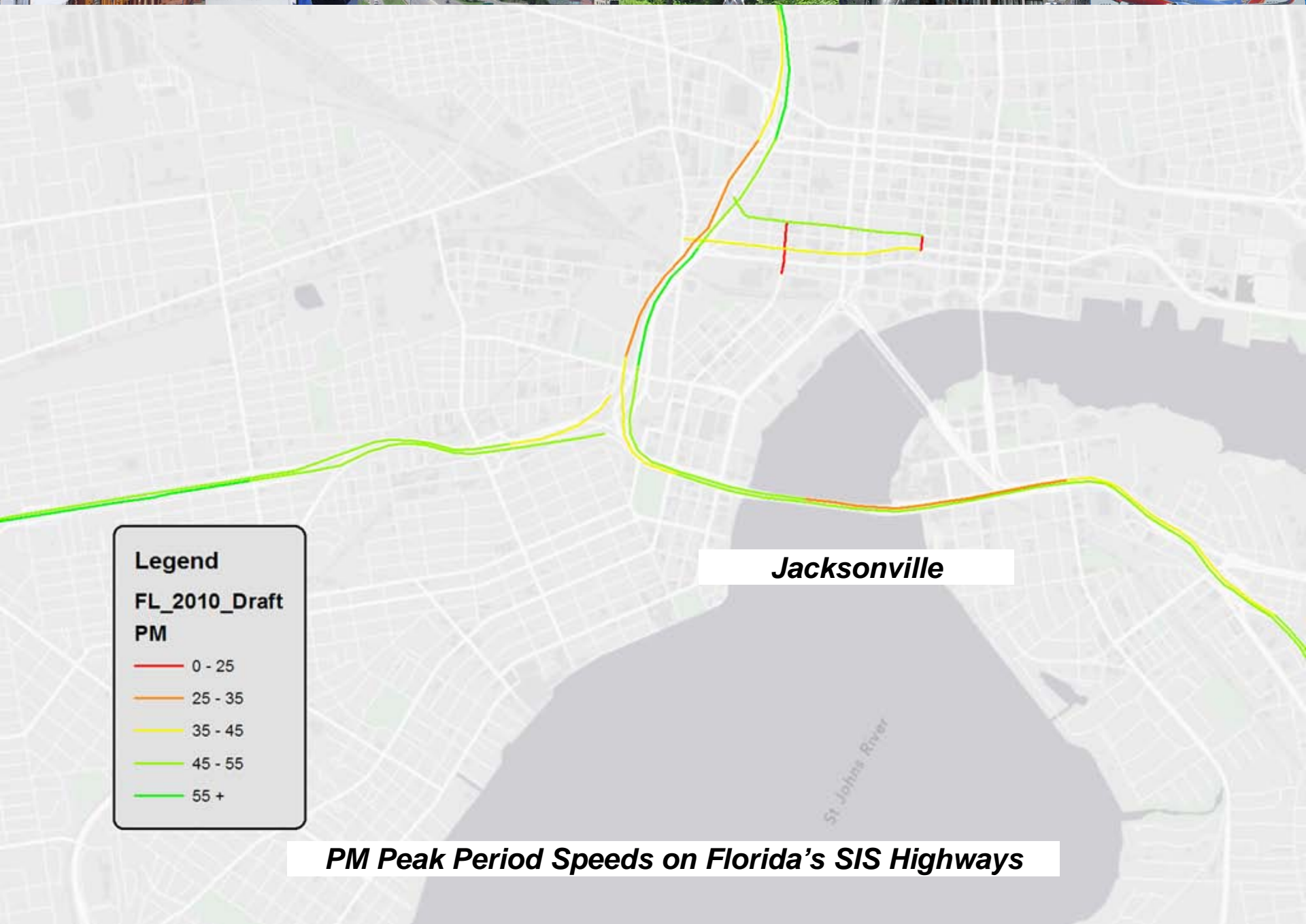
***PM Peak Period Speeds on Florida's SIS Highways***

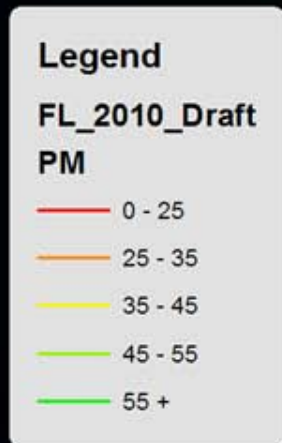


**Jacksonville**

***PM Peak Period Speeds on Florida's SIS Highways***







***PM Peak Period Speeds on Florida's SIS Highways***





**Miami**

**Legend**

**FL\_2010\_Draft  
PM**

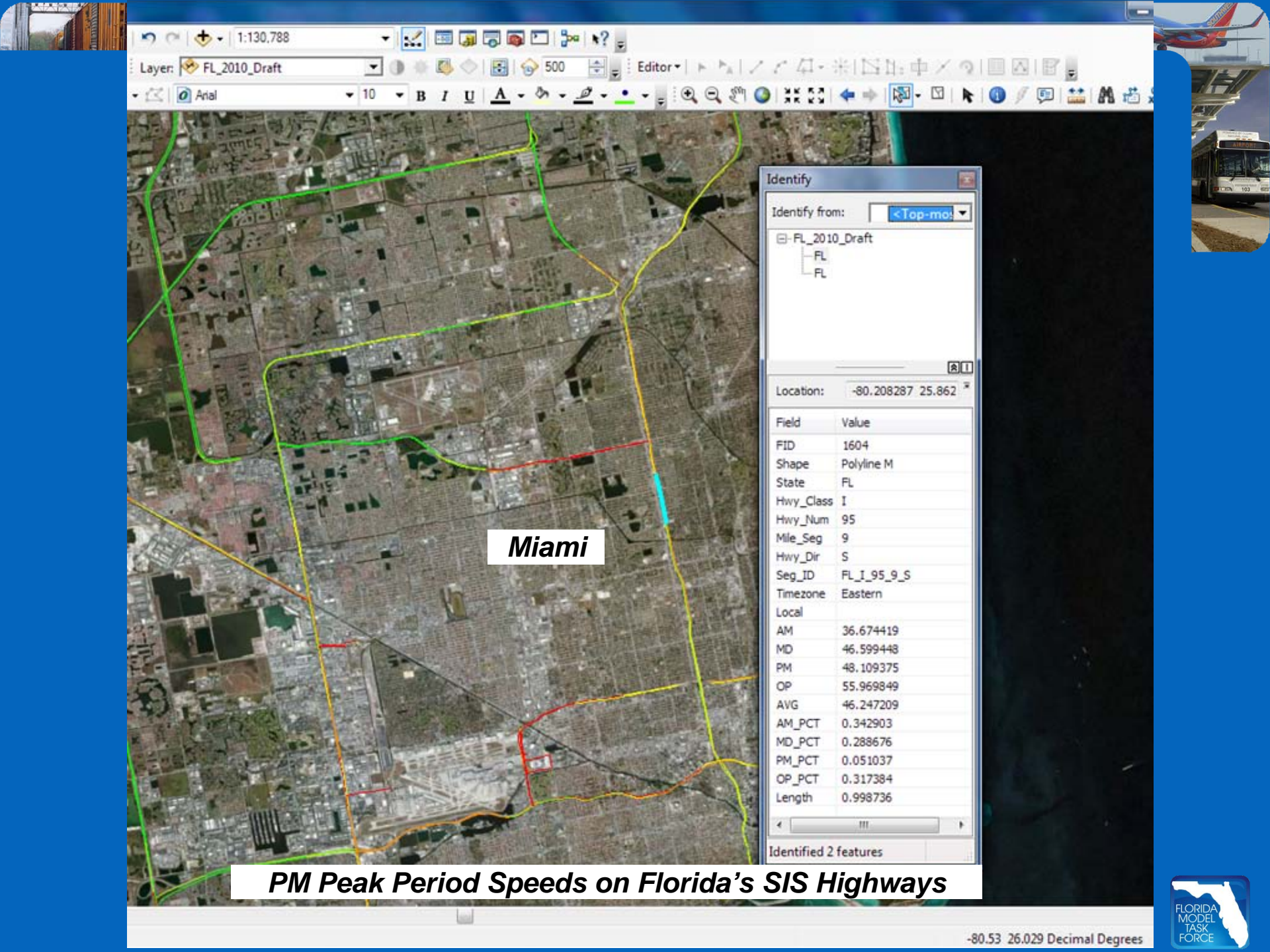
- 0 - 25
- 25 - 35
- 35 - 45
- 45 - 55
- 55 +

***PM Peak Period Speeds on Florida's SIS Highways***







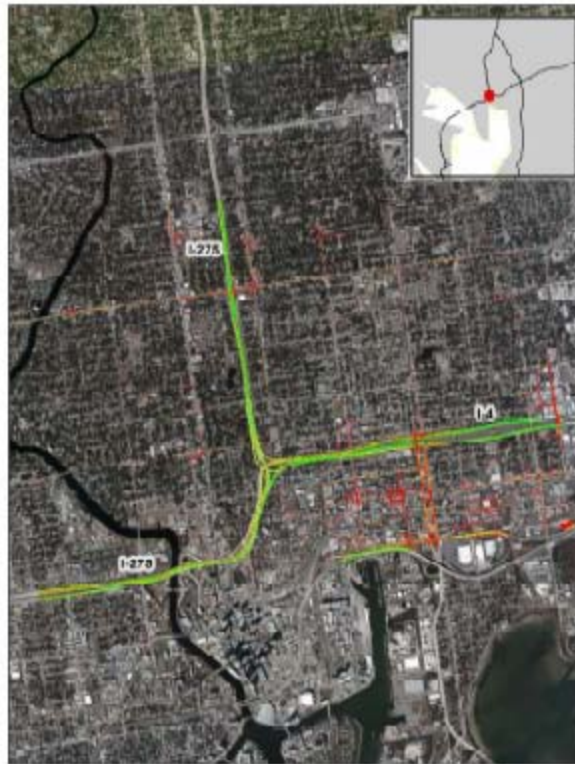


Miami

**PM Peak Period Speeds on Florida's SIS Highways**

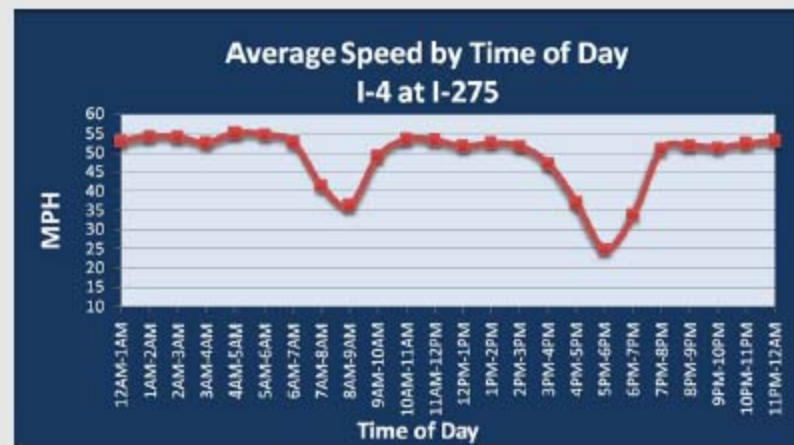
# Bottleneck Analysis

## Tampa, FL: I-4 at I-275



### Summary

National Ranking by Congestion Index	93
Average Speed	47
Peak Average Speed	38
Nonpeak Average Speed	52
Nonpeak/Peak Ratio	1.37

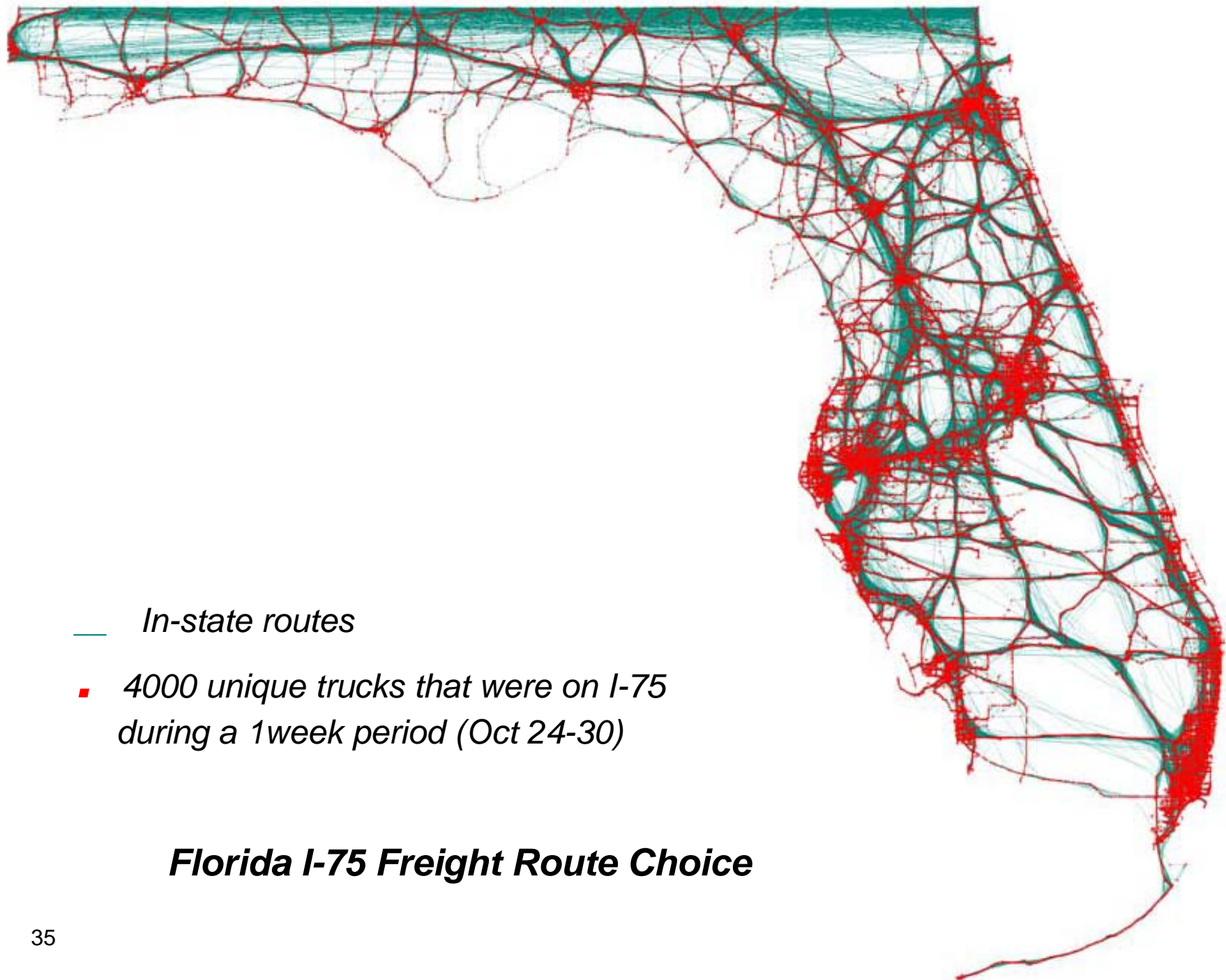






— *In-state truck routes in the data*

## ***Florida I-75 Freight Route Choice Illustration***

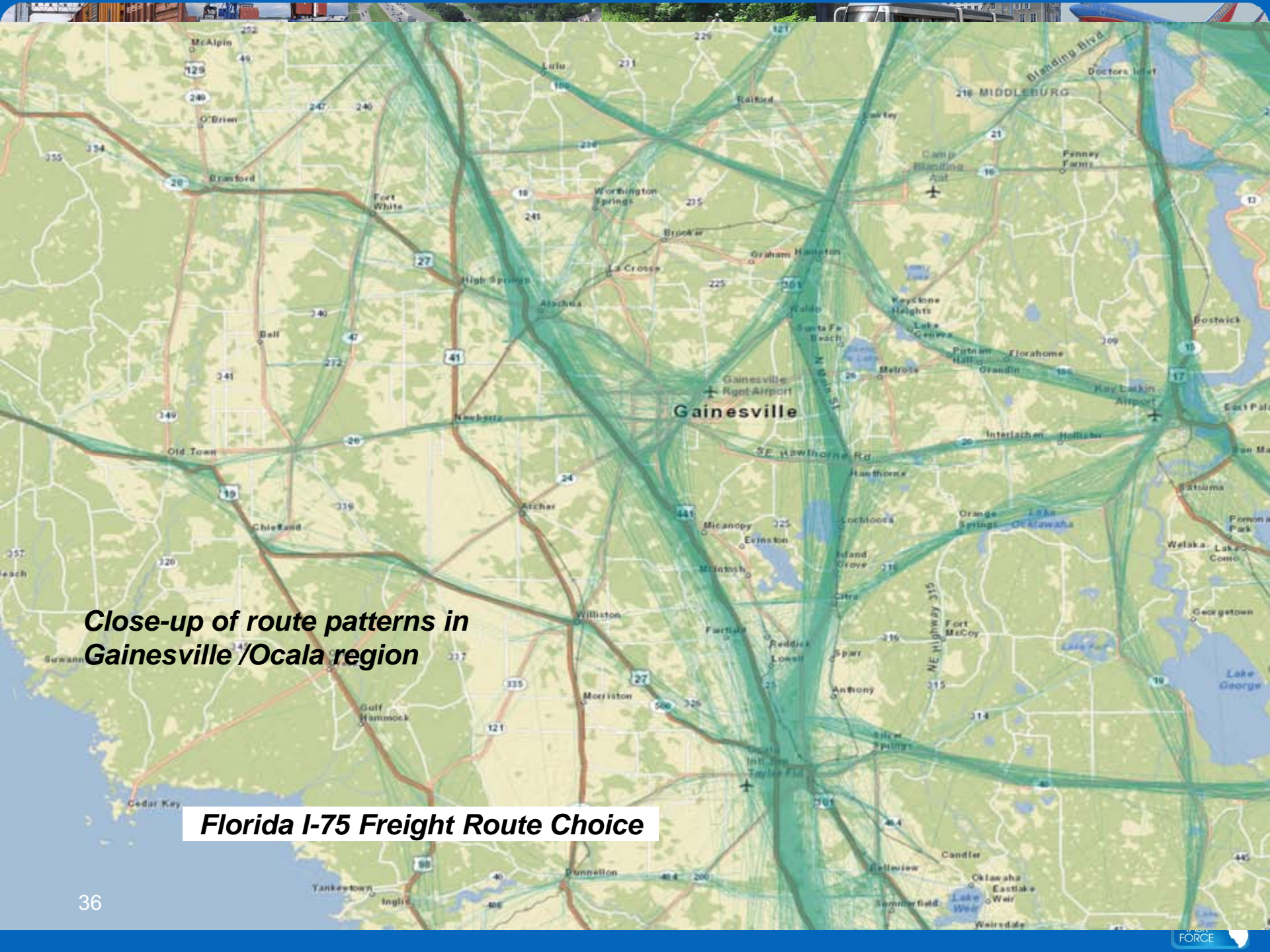


*In-state routes*

- 4000 unique trucks that were on I-75 during a 1week period (Oct 24-30)

## ***Florida I-75 Freight Route Choice***

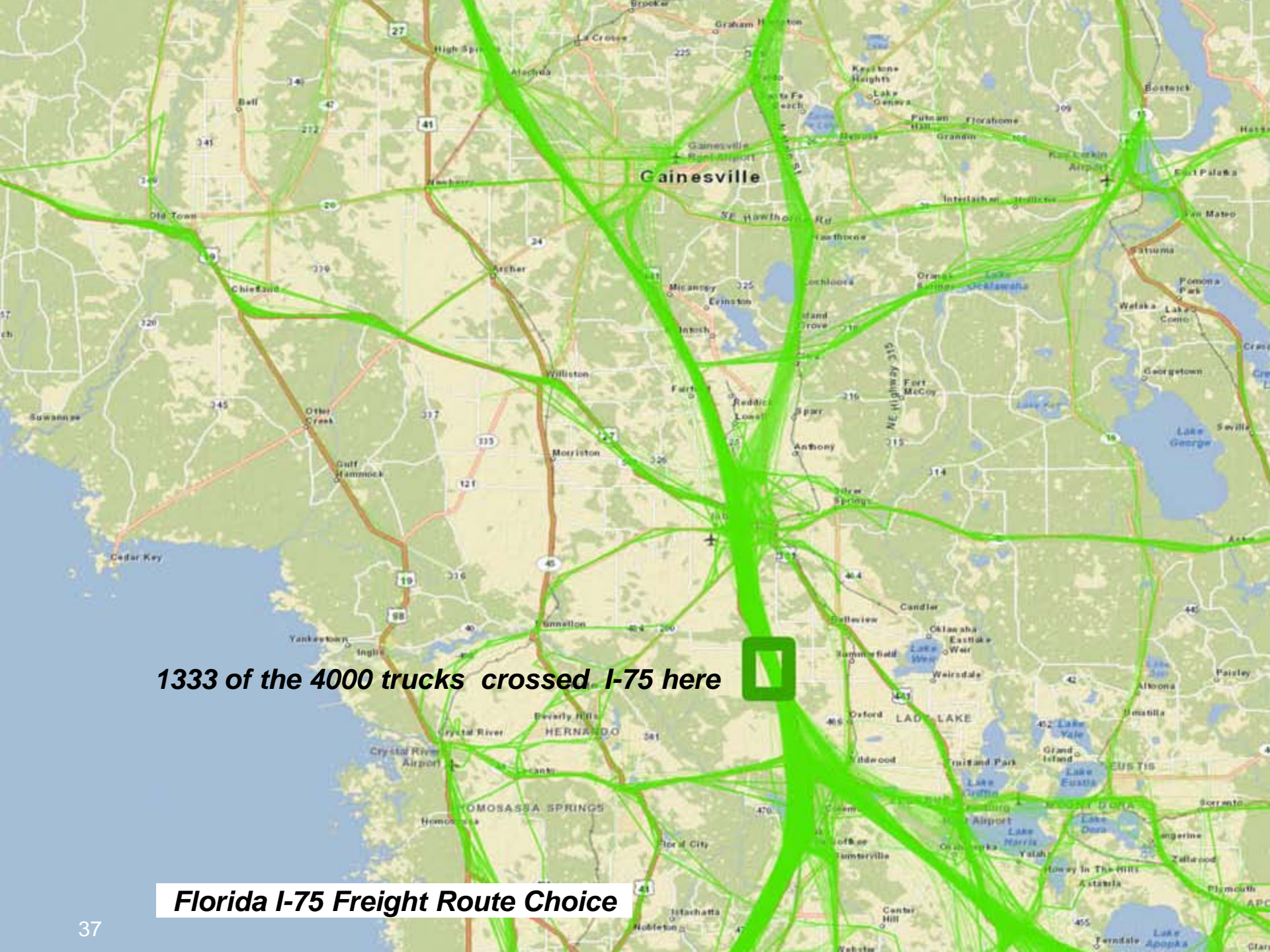




**Close-up of route patterns in Gainesville/Ocala region**

**Florida I-75 Freight Route Choice**



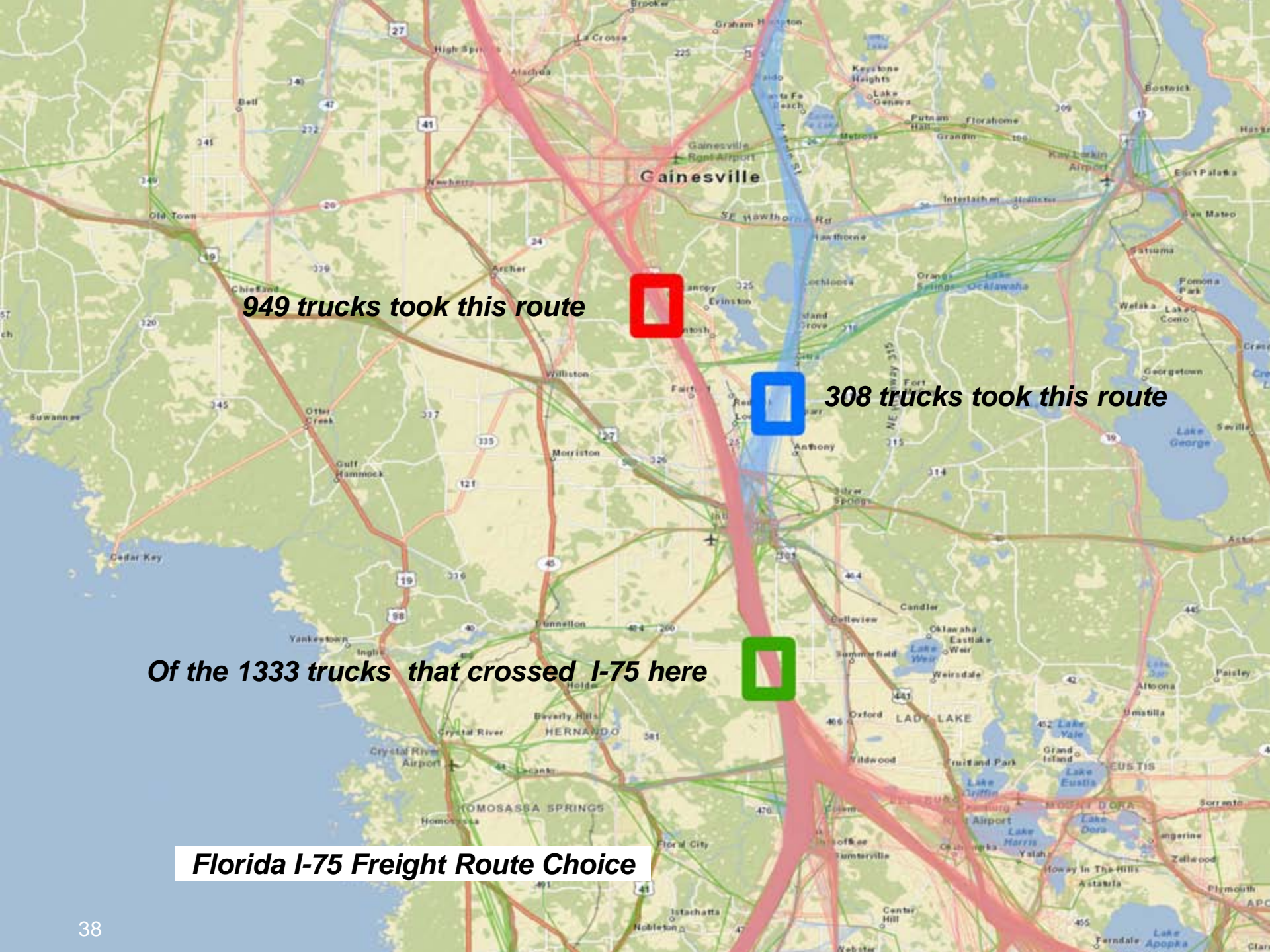


***1333 of the 4000 trucks crossed I-75 here***



***Florida I-75 Freight Route Choice***





***949 trucks took this route***



***308 trucks took this route***



***Of the 1333 trucks that crossed I-75 here***



***Florida I-75 Freight Route Choice***



# Project Objectives

- Investigate the use of ATRI-FPM data for freight measurement and planning in Florida
  - **Derive freight performance measures for Florida's highways**
  - **Derive a truck-trip database from ATRI-FPM data**
    - **Convert GPS data streams to truck trips, and analyze truck travel characteristics in Florida**
    - **Billions of GPS data points!**
    - **Needed to simplify the problem (Seasonality of truck flows)**
  - **Derive truck trip OD tables for the Florida Statewide Freight model**

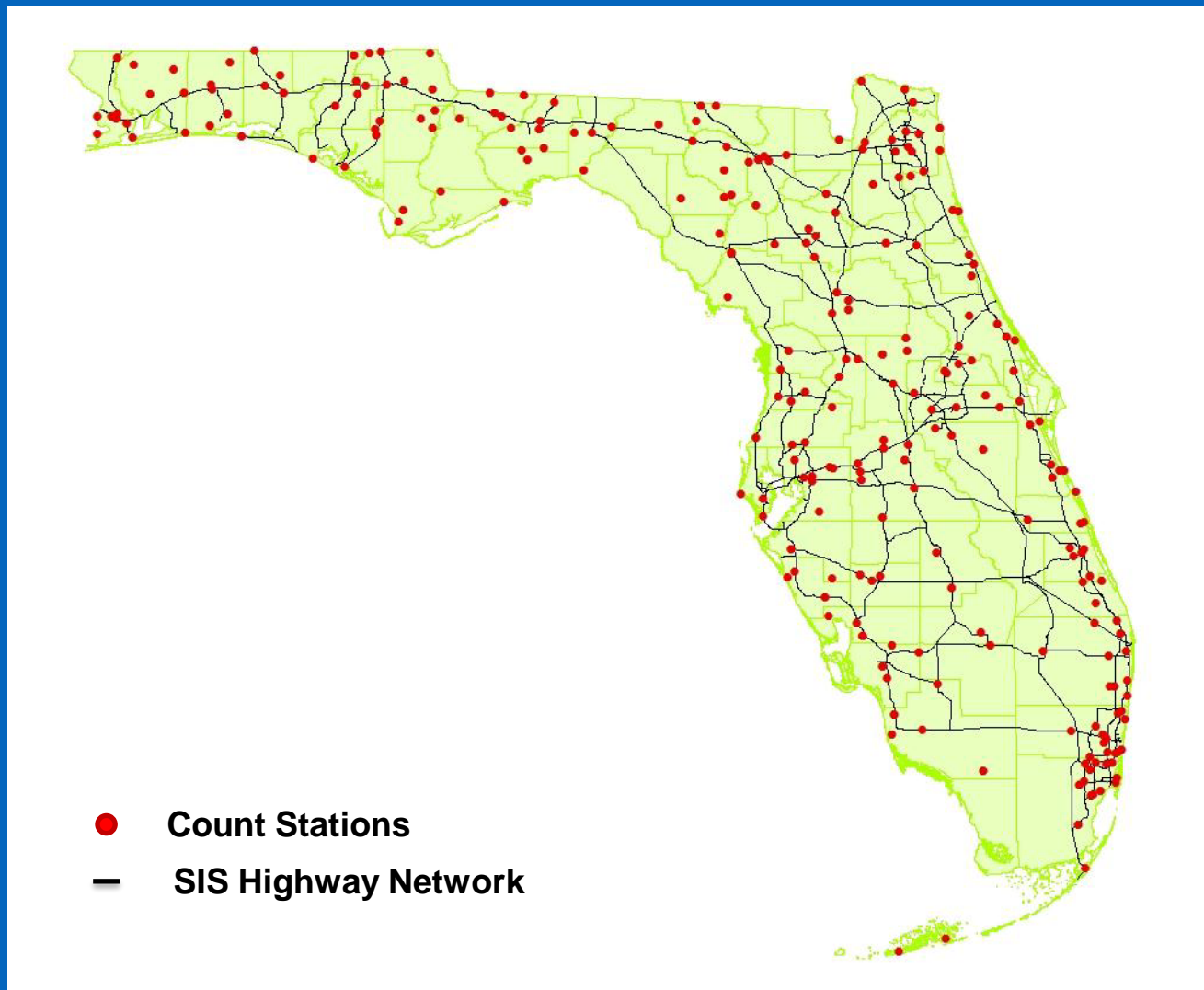




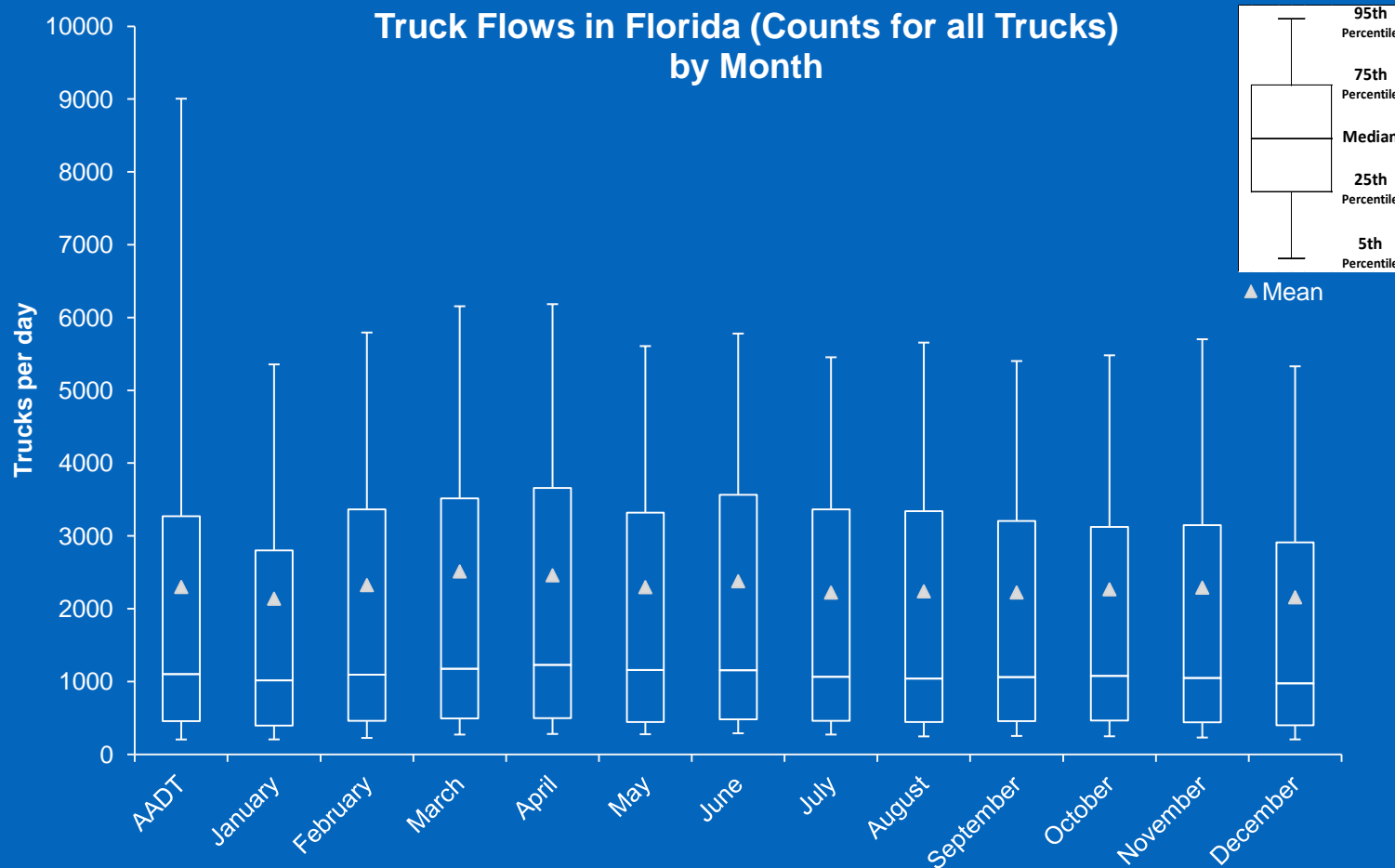


# Seasonality in the Florida Truck Count Data

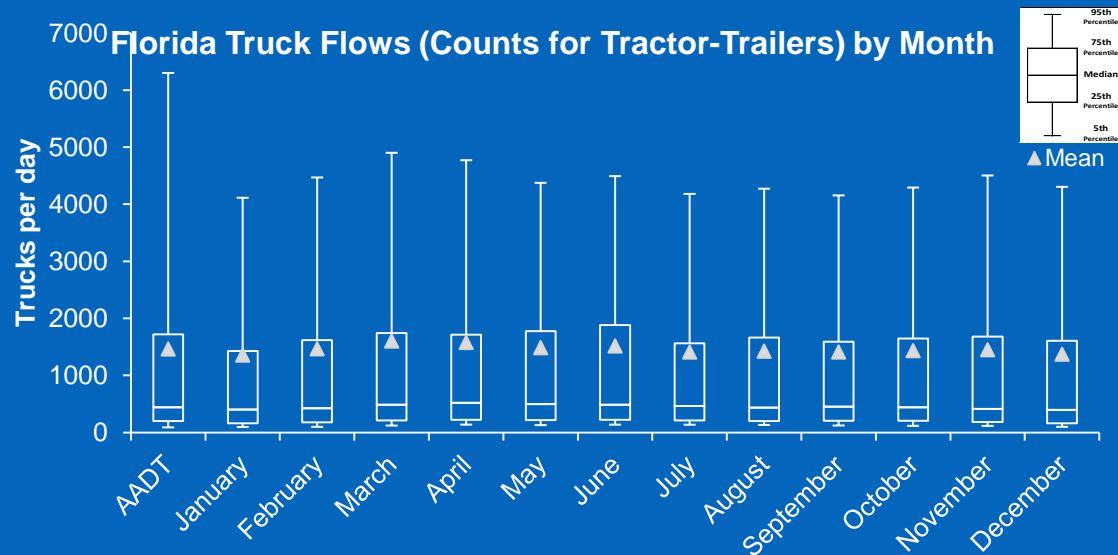
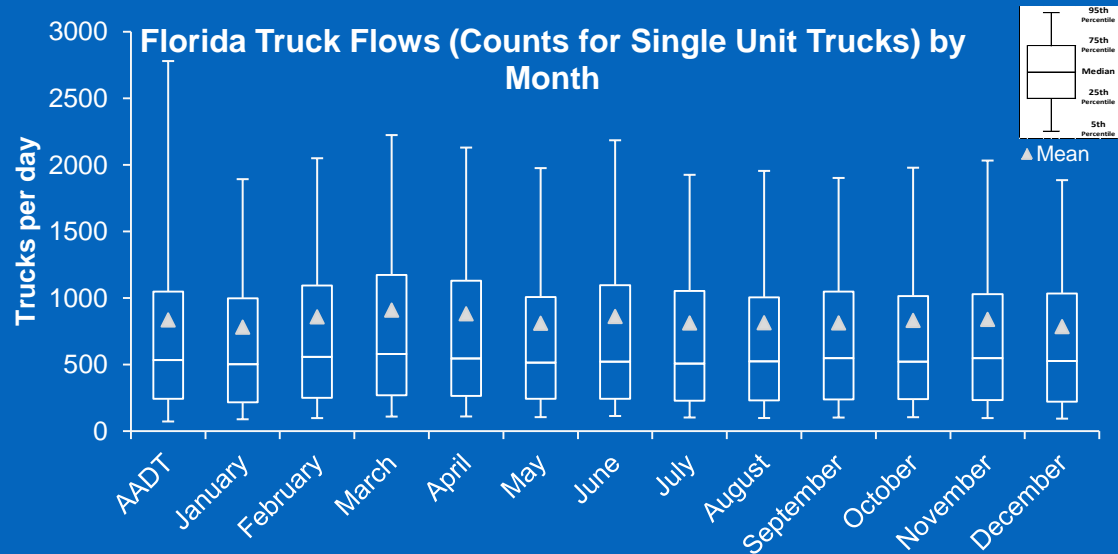
## Vehicle Count Station Locations in Florida



# Truck Counts by Month of the Year



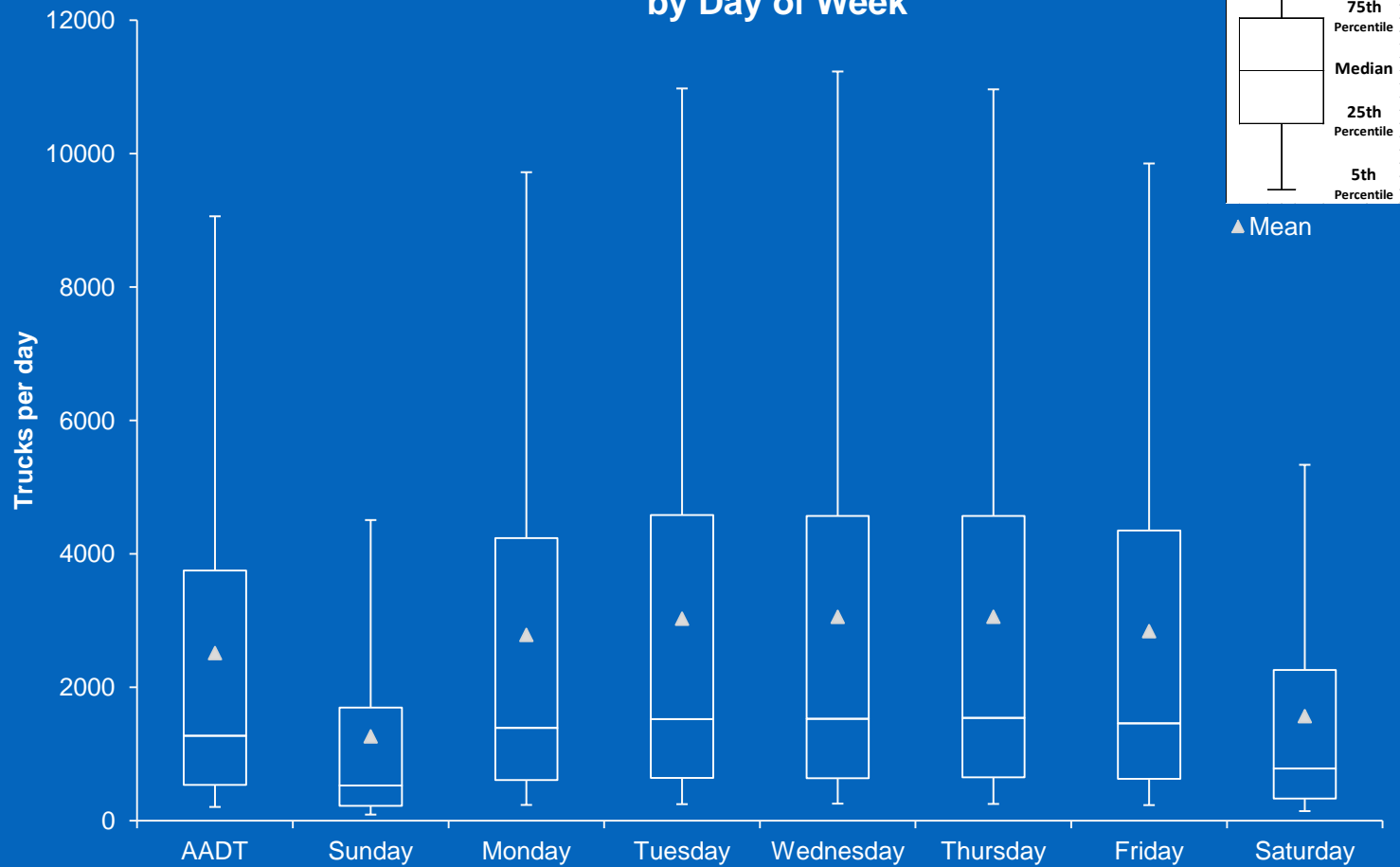
# Truck Counts by Month of the Year





# Truck Counts by Day of Week

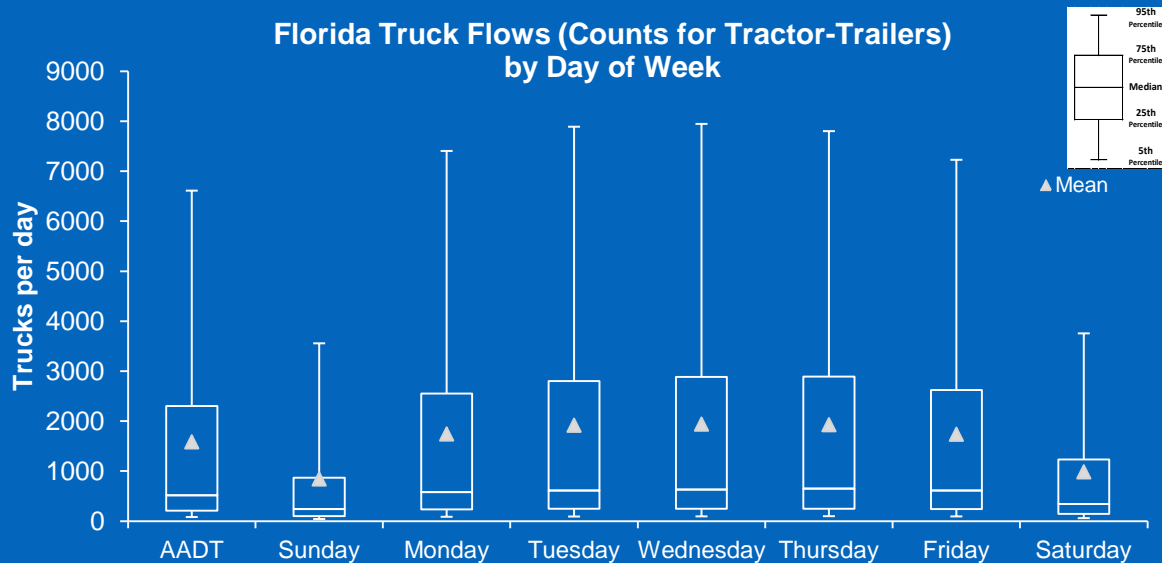
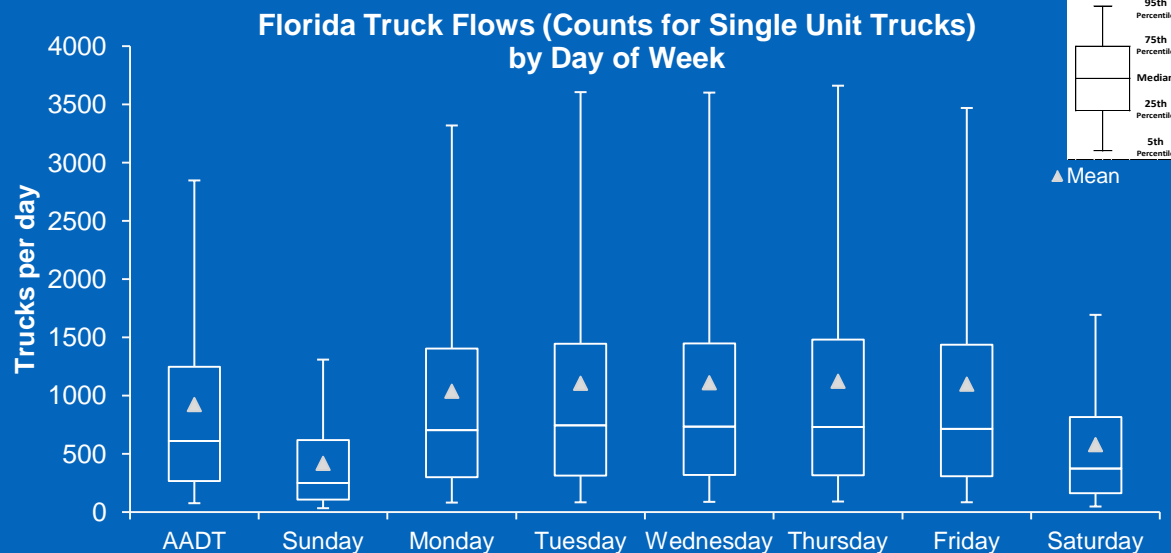
Florida Truck Flows (Counts for all Trucks)  
by Day of Week







# Truck Counts by Day of Week

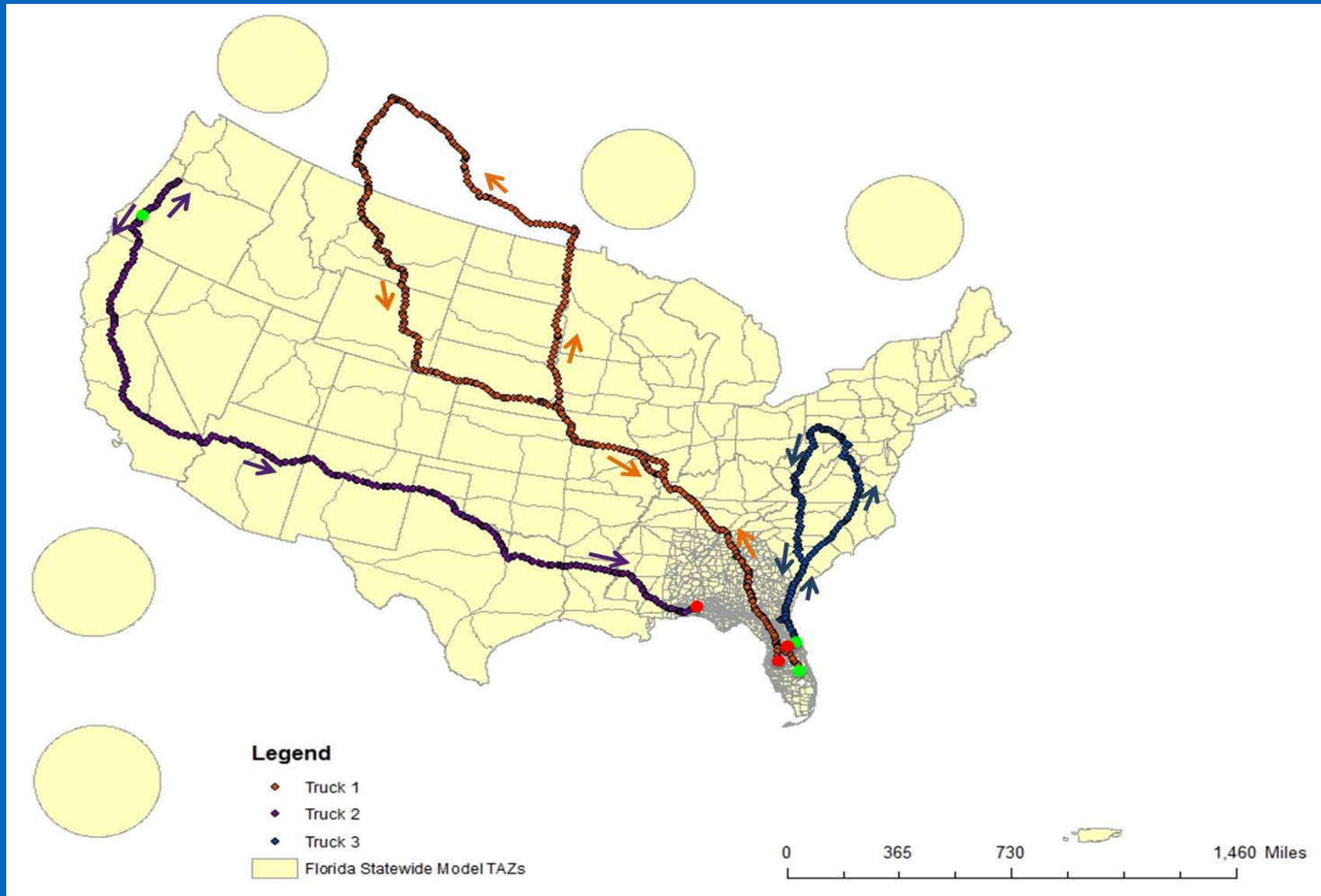




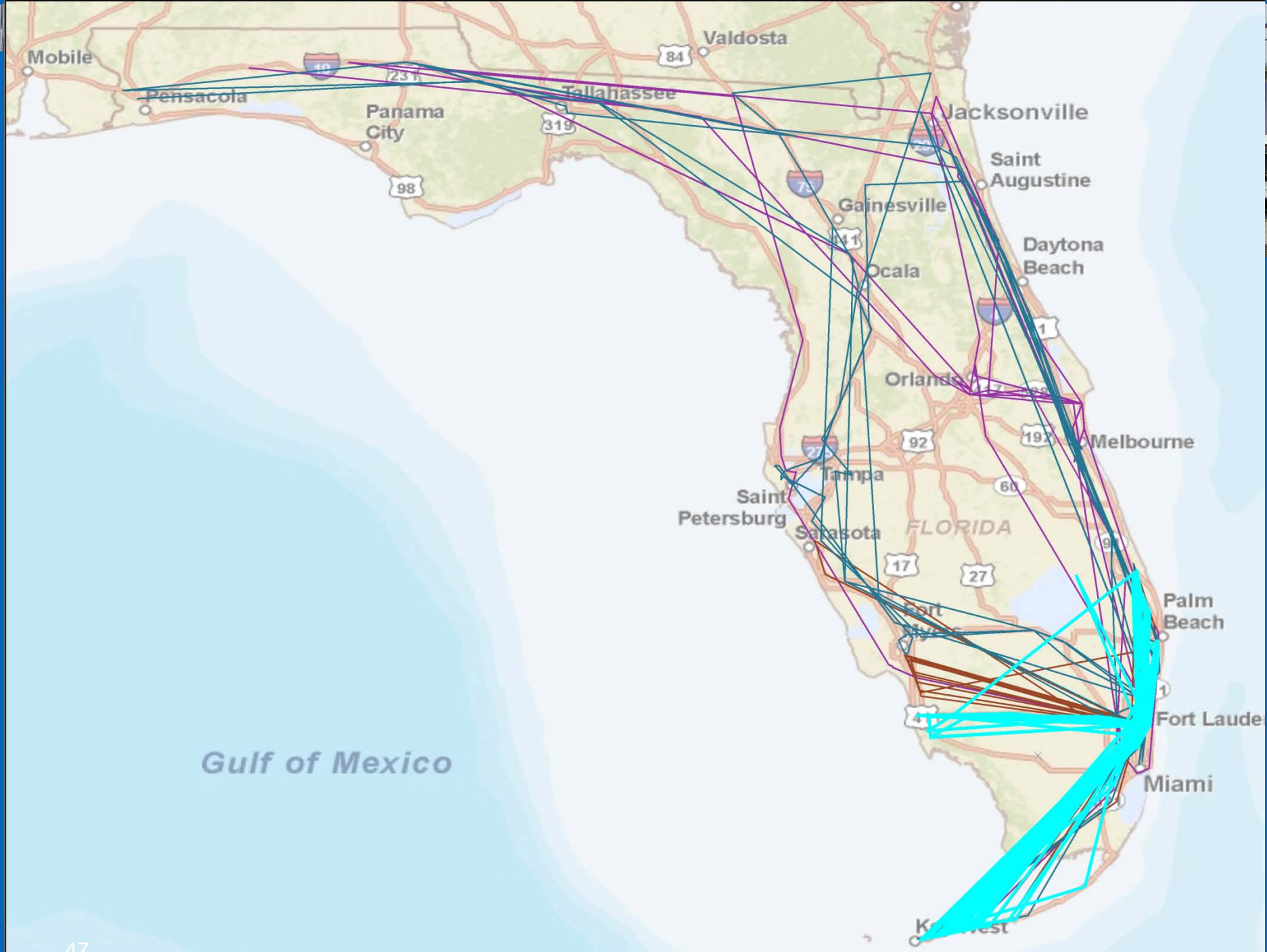
# Conversion of GPS Data Streams to Truck Trips

- **Seasonality analysis of the truck count data suggests**
  - Seasonal variation not significant
  - Weekday vs. weekend differences
- **Experience with one week of GPS data**
  - Take all trucks that were in Florida at any time during 1 week
  - Start with GPS traces of those trucks within Florida (1.5 Million traces)
  - Then trace those trucks outside Florida as well (4.35 Million traces)
  - Initial results in next slides
- **Next step: Derive trips from multiple weeks of data (2-3 months)**

# Examples of truck movements in the data







# Distance vs. Time between Consecutive GPS Points: 1 Week GPS Data within and Outside Florida

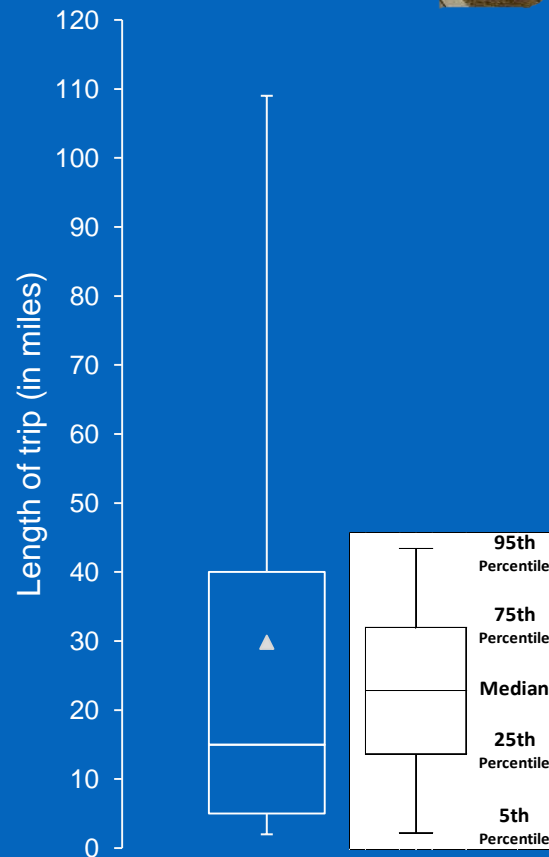
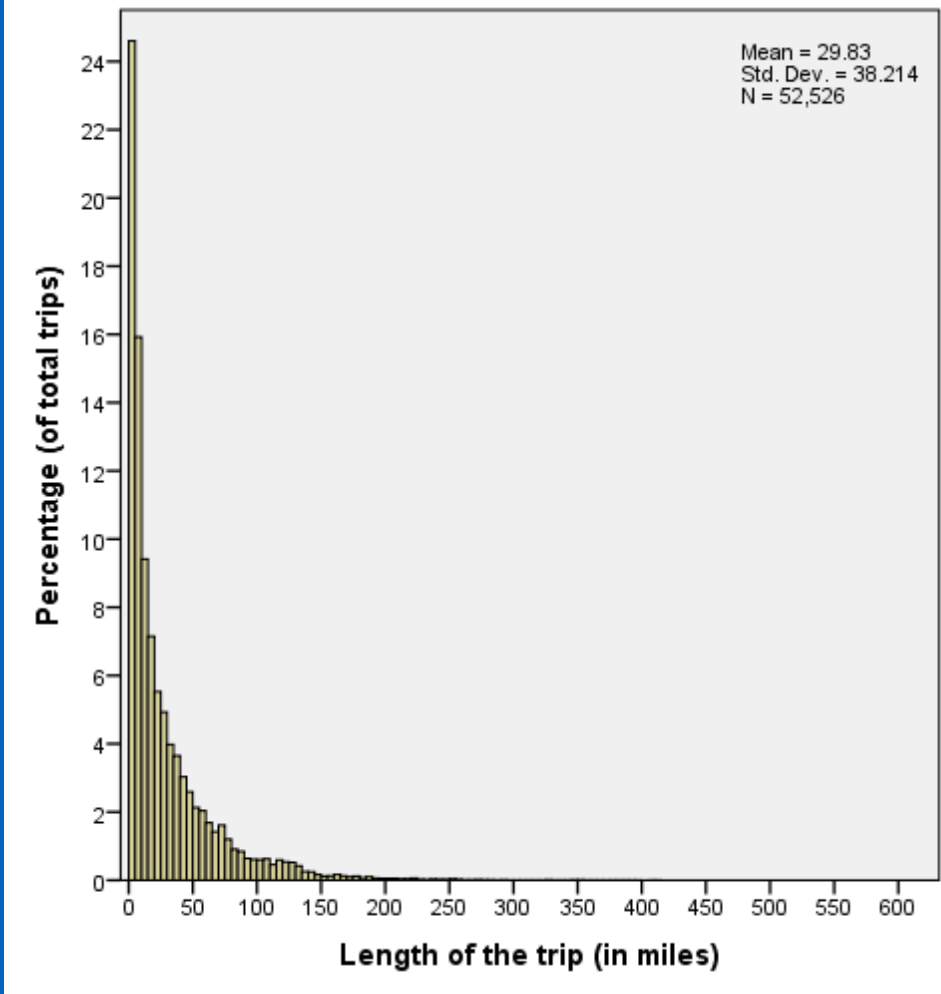
Time difference between 2 consecutive points (in minutes)

Distance between 2 consecutive points (in miles)

	0 - 0.1	0.1 - 1	1 - 3	3 - 5	5 - 10	10 - 15	15 - 20	20 - 30	30-70	70-150	150-400	> 400	Total	Cum%
0 - 1	408082	248830	2627	9	9	4	2	2	0	0	0	3	659570	15.55%
1 - 3	191717	172206	105488	10472	12	6	1	3	4	1	2	3	479919	26.87%
3 - 5	115523	222730	361660	274138	228827	21	2	1	1	0	0	2	1202907	55.23%
5 - 10	162734	83541	140623	102754	126394	11514	89	10	2	1	0	4	627666	70.03%
10 - 15	97722	19032	60694	52723	116597	94761	66965	4304	7	0	2	0	512809	82.13%
15 - 30	144120	11117	38492	36323	88716	74971	85088	9602	1266	1	2	2	489703	93.67%
30 - 60	84714	1616	1076	734	1421	950	862	1209	1930	407	86	1	94601	95.90%
60 - 120	54409	1095	597	375	484	282	195	277	779	320	233	2	58730	97.29%
120-240	47938	596	319	166	226	100	63	84	182	80	217	3	49972	98.47%
240-420	31531	294	157	94	120	63	33	37	60	23	104	2	32588	99.24%
420-720	22346	345	179	106	146	76	53	43	92	33	88	17	23575	99.79%
720-2880	8062	136	58	28	38	18	12	16	52	23	82	24	8609	100.00%
>2880	177	2	3	1	1	1	2	0	3	1	1	5	200	100.00%
Total	1369075	761540	711973	477923	562991	182767	153367	15588	4378	817	362	68	4240849	
Cum%	32.28%	50.24%	67.03%	78.30%	91.57%	95.88%	99.50%	99.87%	99.97%	99.97%	99.99%	100.00%		



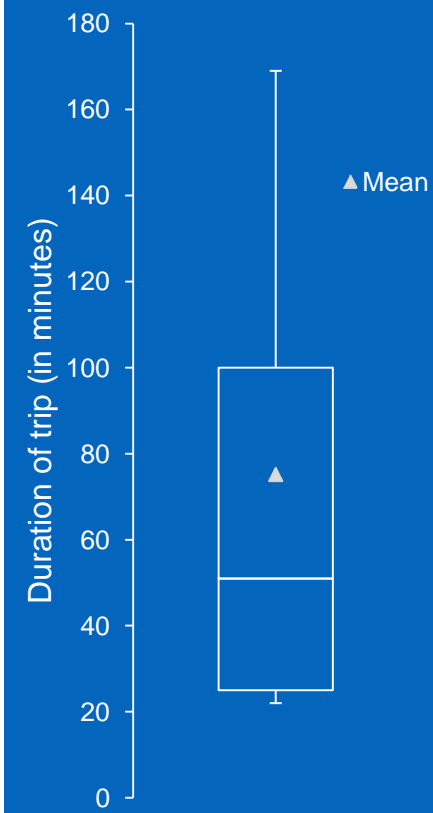
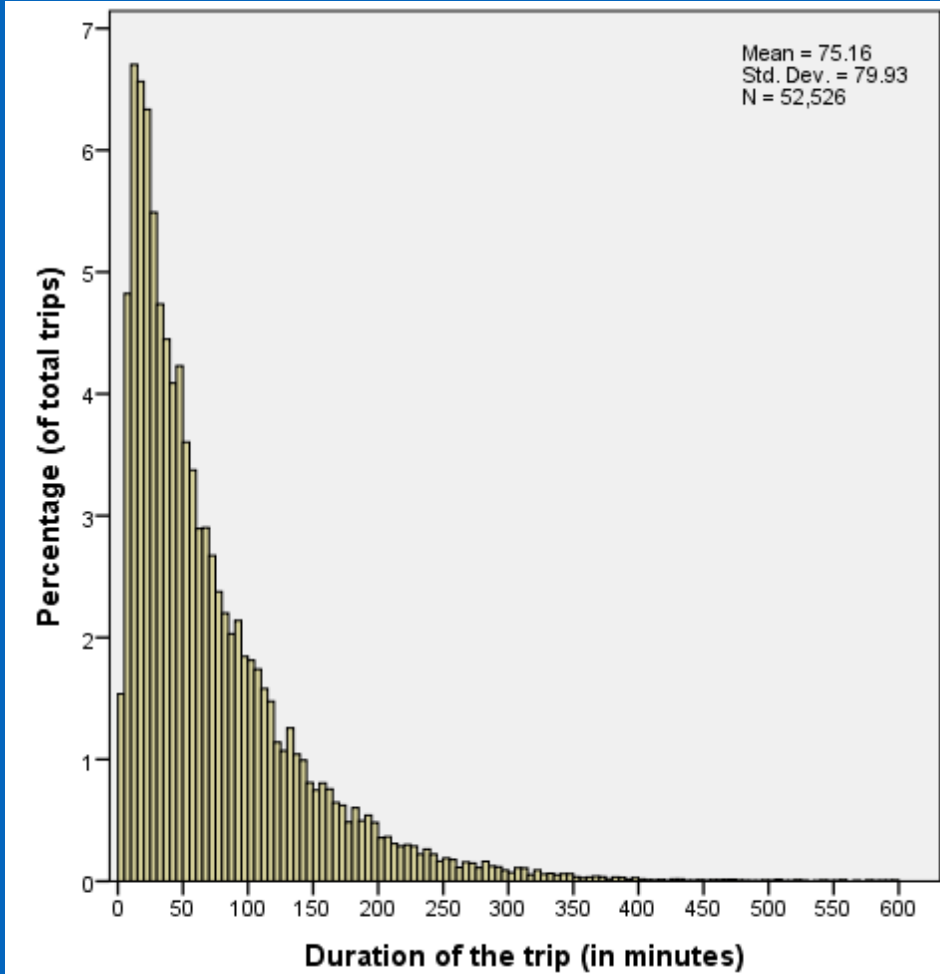
# Trips Extracted from 1 Week Data within Florida: Trip Length Distribution





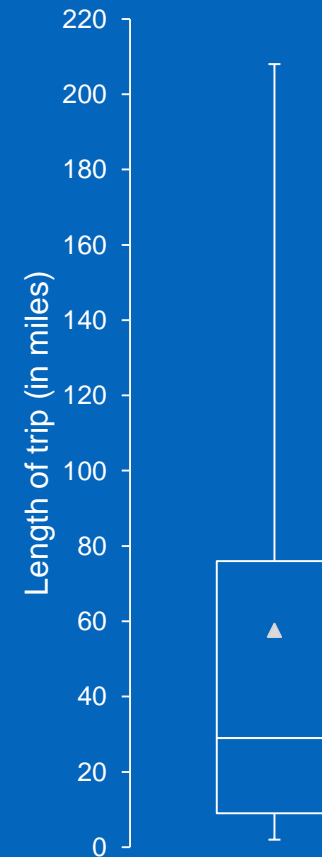
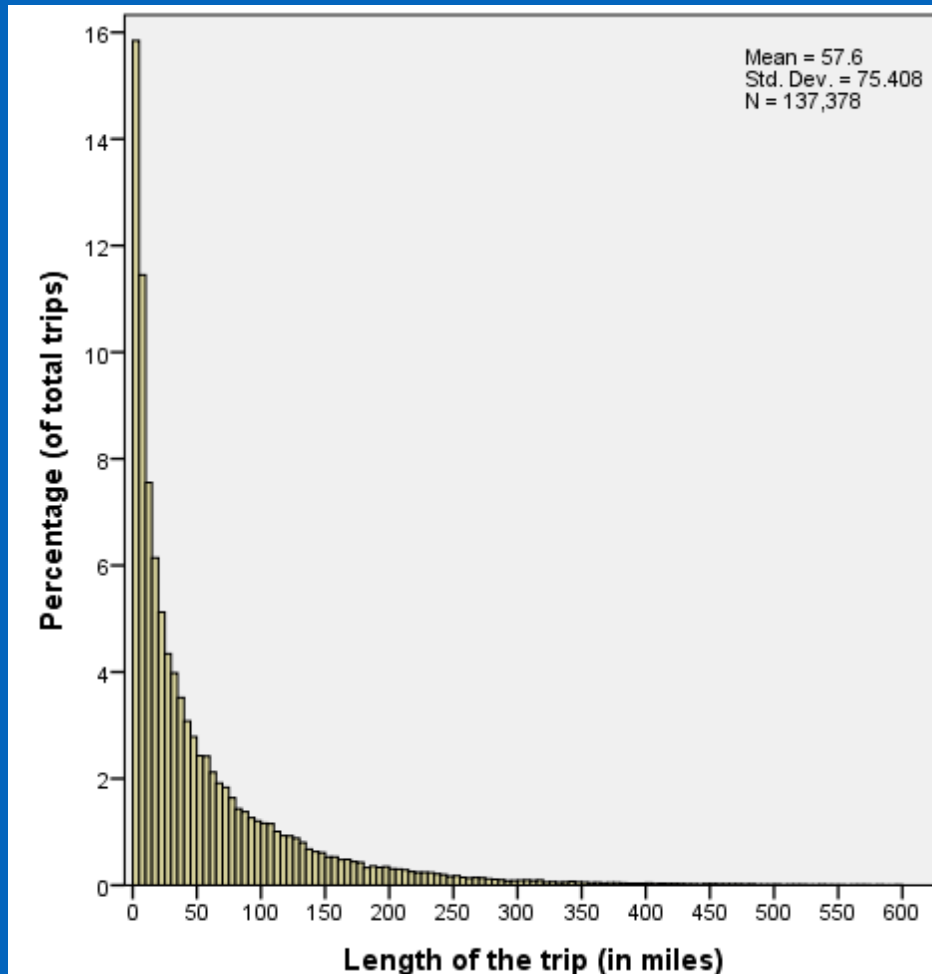


# Trips Extracted from 1 Week Data within Florida: Trip Duration Distribution



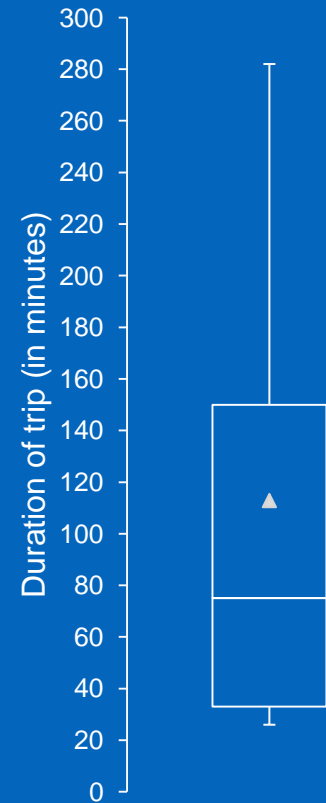
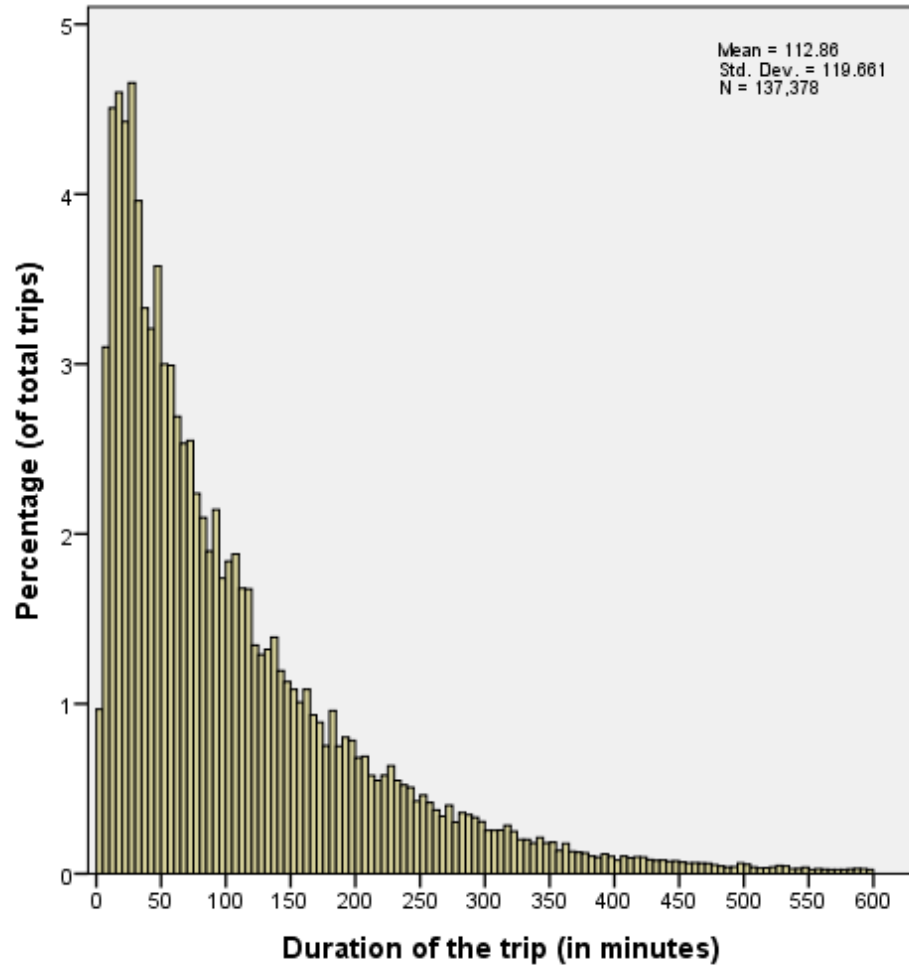


# Trips Extracted from 1 Week Data within & Outside FL: Trip Length Distribution



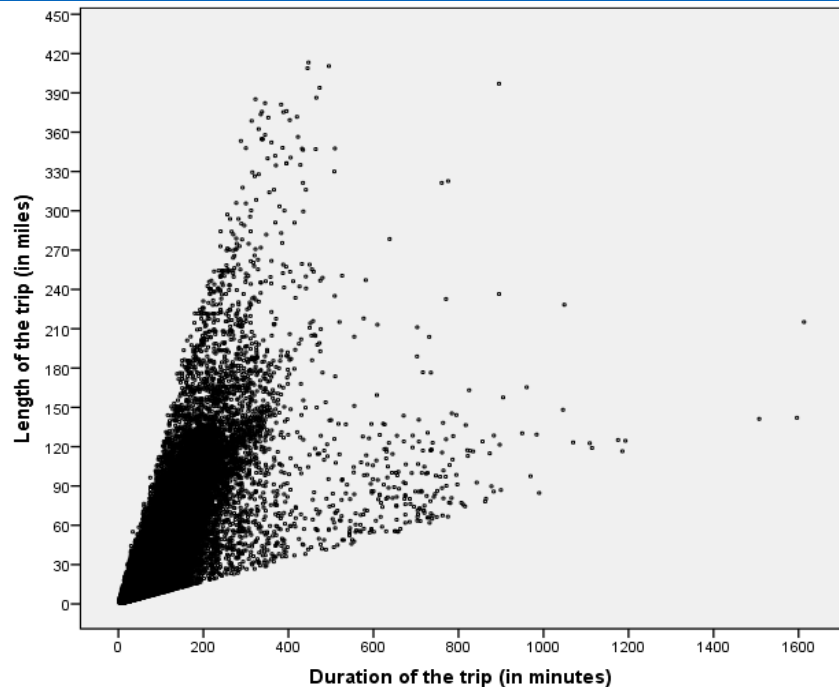


# Trips Extracted from 1 Week Data within & Outside FL: Trip Duration Distribution

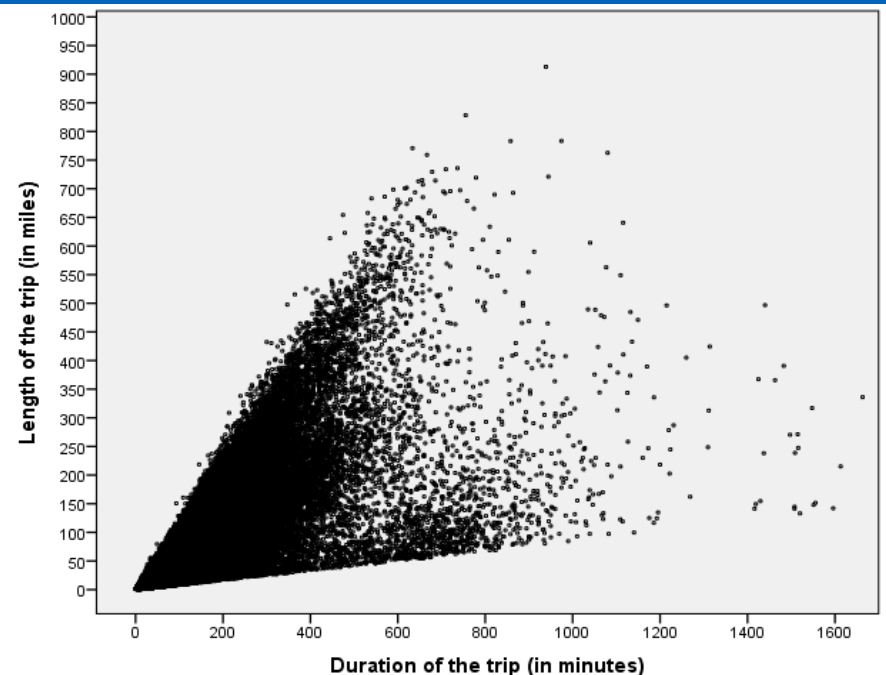




# Scatter Plots – Trip length vs. Trip duration



For 1-week dataset within Florida (52526 trips)  
Speeds range from 5mph to 65mph



For 1-week dataset within & outside Florida (137378 trips)  
Speeds range from 5mph to 70mph



# Conversion of GPS Data Streams to Truck Trips

- **Next steps on deriving a truck trip database**
  - **Validate and refine the algorithm**
  - **Overlay the trips onto land-use GIS layers to refine trips data**
  - **Derive trips from multiple weeks of data (2-3 months)**





# Project Objectives

- Investigate the use of ATRI-FPM data for freight measurement and planning in Florida
  - Derive freight performance measures for FL highways
  - Derive a truck-trip database from ATRI-FPM GPS data
  - Derive truck trip OD tables for the Florida Statewide Freight model
    - The trips derived from the GPS data is a sample (large sample)
    - Need a way to arrive at the population of truck flows
    - Exploring the use of different data sources and methods
      - The 100% truck count data, and OD estimation methods
      - Linking truck flows with commodity flows (e.g., Transearch)
      - Parcel/TAZ-level industry employment data







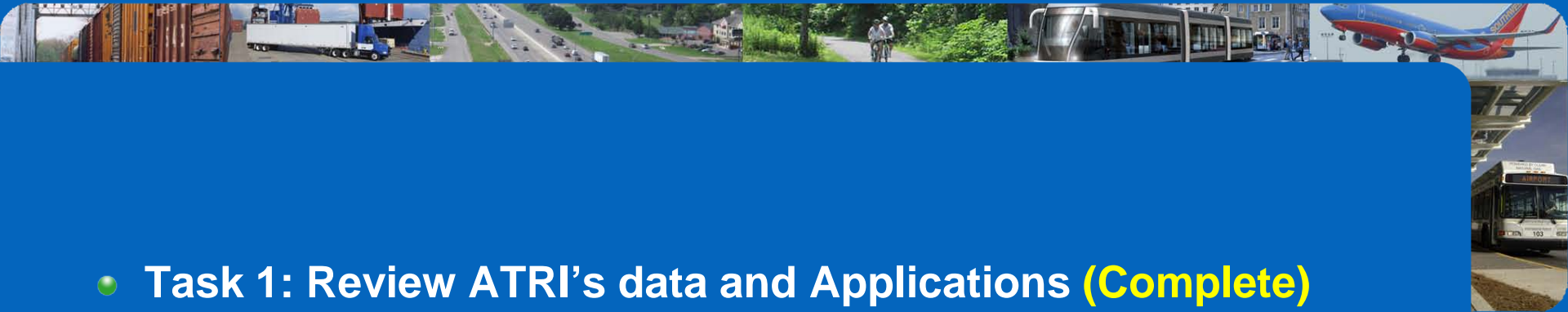
# Thank You

## Questions/Discussion



## Additional Slides (for Q&A)

Task	Schedule
1. Review ATRI's truck GPS (i.e., ATRI-FPM data) & applications	May 2011 – Aug 2011
2. Review other data sources that ATRI-FPM data can supplement, and how ATRI-FPM data can be combined w/ other data sources.	July 2011 – Oct 2011
3. Derive freight performance measures for Florida's highways	Sept 2011 – Nov 2011
4. Derive a truck trip database from ATRI's truck GPS data	Nov 2011 – April 2012
5. Analyze truck trip database to understand truck travel in FL	April 2012 – June 2012
6. Investigate ways to relate commodity flows with truck flows	June 2012 – Oct 2012
7. Derive a truck trip OD table for a reasonable level of geography	Sept 2012 – Dec 2012
8 and 9. Final research report, review by FDOT, and revisions	Dec 2012 – April 2013

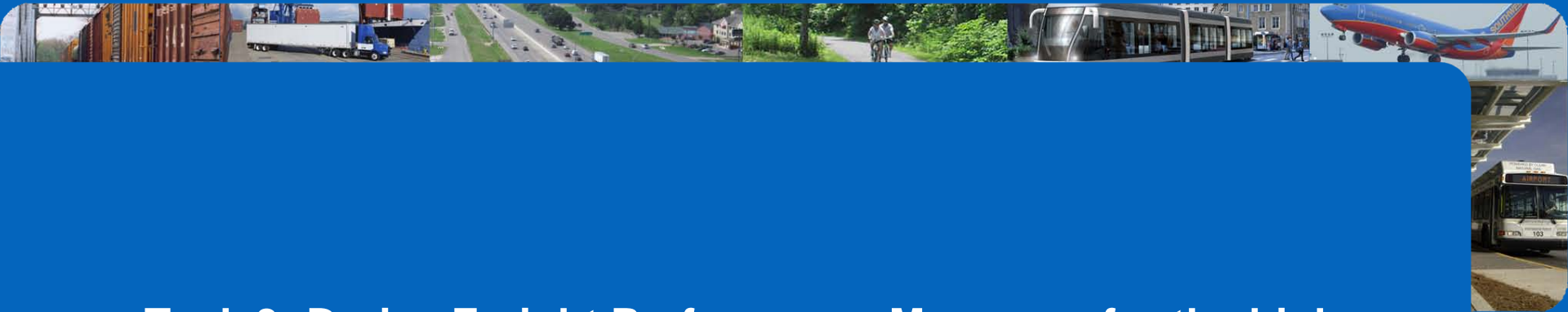


- **Task 1: Review ATRI's data and Applications (Complete)**
  - **Review ATRI's truck GPS data and applications**
    - Materials describing the data
    - Review of the data in Florida
    - Synthesis of the data applications
  - **Meeting between USF, ATRI, and FDOT**
    - Identify subsets of data for further applications
    - Identify the geographical/network/temporal scope for applications
  - **Other Administrative**
    - Kick-off meeting
    - mechanism to transfer large datasets between ATRI & USF
    - Non-disclosure agreement between ATRI and USF





- **Task 2: Review other freight data sources that can be used in conjunction with ATRI's truck GPS data (Complete)**
  - **Data reviewed**
    - Commodity flow data (e.g., Transearch, FAF)
    - Traffic counts, ITS data, local survey data
  - **Literature reviewed**
    - Work with Freight GPS data
    - NCHRP/NCFRP reports
    - Freight-exclusive conference proceedings
    - Work within Florida (e.g., disaggregation of FAF)

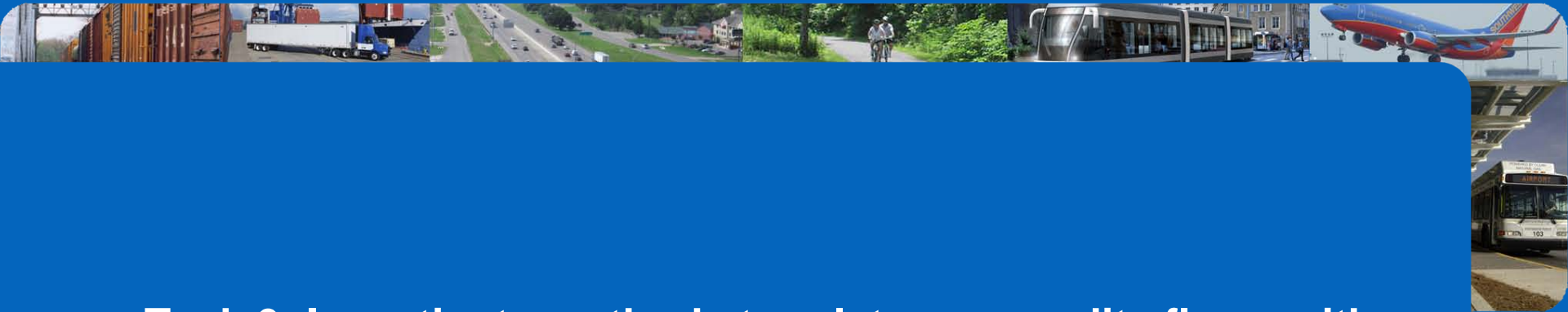


- **Task 3: Derive Freight Performance Measures for the highway network in Florida (ongoing, ATRI is the lead)**
  - **Performance measures**
    - Speeds
    - Reliability measures
    - Congestion measures
  - **Geographical, network, and Temporal scope**
    - Florida's SIS network
    - Peak travel months
    - Different time periods of the day



- **Task 4: Derive a truck trip database from the ATRI-FPM data (ongoing, USF is the lead)**
  - GPS data streams are being converted into “trips”
    - Identify trip end locations, determine non-congestion stops, stops at signals
    - Trip start and end times, trip distance, speed, dwell time
  - Will result in the following:
    - Algorithms to convert the GPS data streams to truck trips
    - A truck trip database for Florida
- **Task 5: Analyze the truck trip database**
  - Analyze the truck trip travel characteristics such as trip distances, trip travel times, speeds, time of day, dwell time, etc.
  - Compare the above characteristics to those from available truck trip data (e.g., survey data)





- **Task 6: Investigate methods to relate commodity flows with truck flows**
  - Develop relationships between commodity flows and truck flows at an aggregate-level for which both commodity flow and truck flow data is available
  - The above relationships can be used to derive truck flows at a disaggregate level (using commodity flows at disaggregate level)
  - Other methods being reviewed as well
- **Task 7: Derive a 2010 year truck trip OD table for the Florida Statewide model**
- **Tasks 8 and 9: Final report, and revisions.**



# Deliverables

- Kick-off meeting
- Quarterly progress reports
- Technical Memorandum-1 (Review of the applications of ATRI data)
- **Freight performance measures for FL**
- **Truck trip database for Florida**
- **Truck flow OD table for Florida**
- Final research report
- Project closure meeting

FLORIDA DEPARTMENT OF TRANSPORTATION  
RESEARCH CENTER

PROJECT SCHEDULE

Project Title	Using Truck Fleet Data in Combination with Other Data Sources for Freight Modeling and Planning																								FY	2011	Month	April
FDOT Project No.																												
Research Agency	University of South Florida																											
Principal Investigator	Dr. Abdul Pinjari																											
RESEARCH TASK	2012												2013												ESTIMATED % COMPLETION			
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April				
Task 1: Review ATRI-FPM data & applications																												
Task 2: Review other data sources that ATRI data can supplement																												
Task 3: Derive freight performance measures for Florida																												
Task 4: Derive truck trip database from ATRI-FPM data																												
Task 5: Analyze truck trip database to understand truck travel in FL																												
Task 6: Investigate methods to relate commodity flow data w/ truck flow data																												
Task 7: Derive truck trip OD table for Florida																												
Task 8: Document research activities in final report																												
Task 9: Revise final report																												
Project Kick-off Meeting																												
Quarterly Progress Reports																												
Tech Memo #1: Review of ATRI data in Florida																												
Tech Memo #2: Freight performance measures in FL																												
Truck trip database for Florida																												
Truck flow table for Florida for year 2010																												
Draft final report																												
Revised final report																												
Project closeout meeting																												
Overall % Complete Projected	3%	6%	11%	17%	23%	28%	34%	38%	42%	46%	50%	55%	58%	63%	67%	71%	77%	83%	87%	92%	96%	97%	98%	100%				
Overall % Complete Actual																												



**Truck Trip Origin Destination Identification Algorithm**

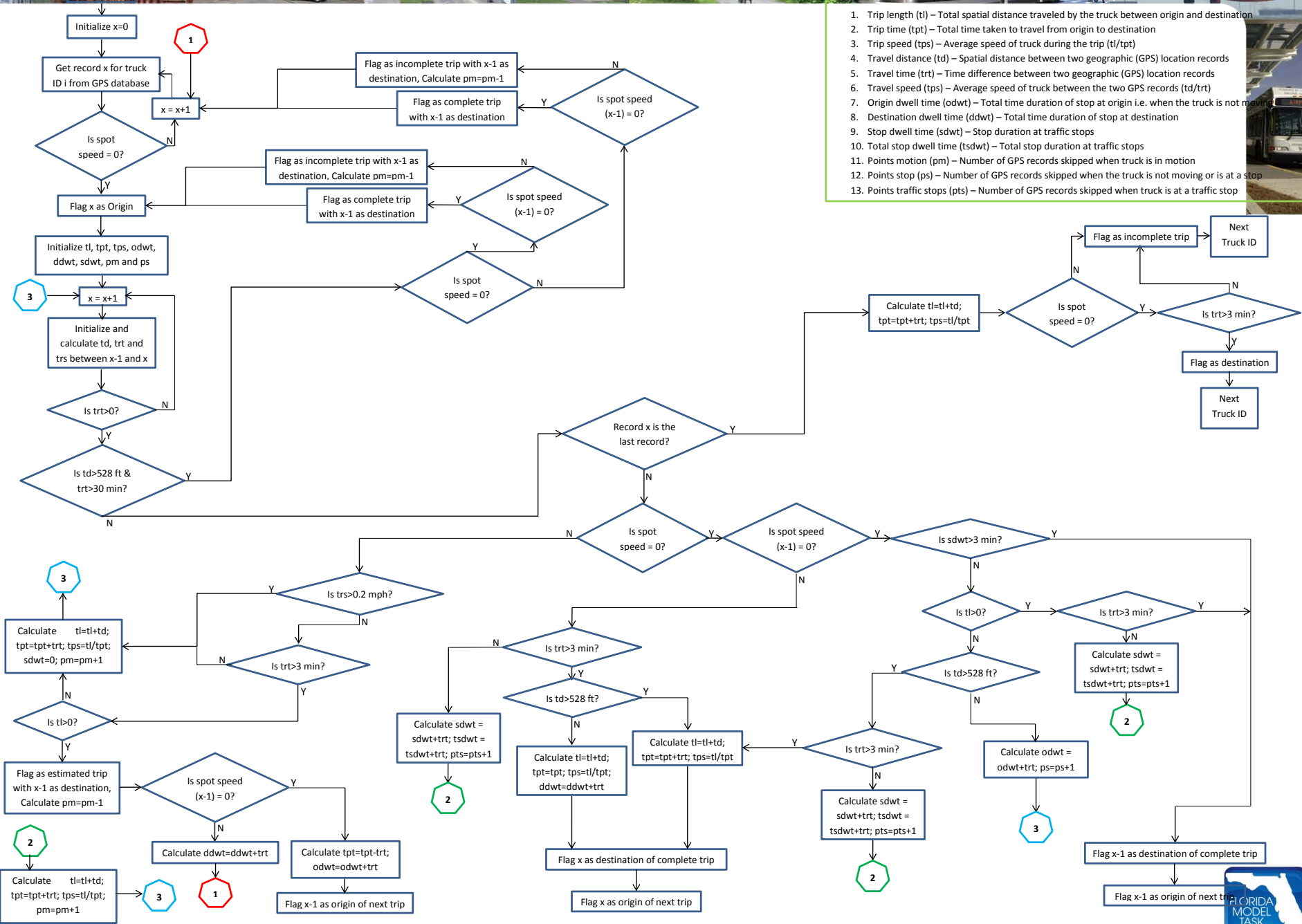
```

graph TD
    Start([Truck ID = i]) --> Init[Initialize x=0]
    Init --> GetRecord[Get record x for truck ID i from GPS database]
    GetRecord --> IsSpotSpeed0{Is spot speed = 0?}
    IsSpotSpeed0 -- Y --> FlagOrigin[Flag x as Origin]
    IsSpotSpeed0 -- N --> Xplus1[x = x+1]
    Xplus1 --> GetRecord
    Xplus1 -- 1 --> FlagIncomplete1[Flag as incomplete trip with x-1 as destination, Calculate pm=pm-1]
    FlagIncomplete1 --> IsSpotSpeed0
    FlagOrigin --> IsSpotSpeed1{Is spot speed (x-1) = 0?}
    IsSpotSpeed1 -- Y --> FlagComplete1[Flag as complete trip with x-1 as destination]
    IsSpotSpeed1 -- N --> FlagIncomplete2[Flag as incomplete trip with x-1 as destination, Calculate pm=pm-1]
    FlagComplete1 --> IsSpotSpeed0
    FlagIncomplete2 --> IsSpotSpeed2{Is spot speed (x-1) = 0?}
    IsSpotSpeed2 -- Y --> FlagComplete2[Flag as complete trip with x-1 as destination]
    IsSpotSpeed2 -- N --> IsSpotSpeed1
    FlagComplete2 --> IsSpotSpeed0
  
```

**Legend:**

1. Trip length (tl) – Total spatial distance traveled by the truck between origin and destination
2. Trip time (tpt) – Total time taken to travel from origin to destination
3. Trip speed (tps) – Average speed of truck during the trip (tl/tpt)
4. Travel distance (td) – Spatial distance between two geographic (GPS) location records
5. Travel time (trt) – Time difference between two geographic (GPS) location records
6. Travel speed (tps) – Average speed of truck between the two GPS records (td/trt)
7. Origin dwell time (odwt) – Total time duration of stop at origin i.e. when the truck is not moving
8. Destination dwell time (ddwt) – Total time duration of stop at destination
9. Stop dwell time (sdwt) – Stop duration at traffic stops
10. Total stop dwell time (tsdwt) – Total stop duration at traffic stops
11. Points motion (pm) – Number of GPS records skipped when truck is in motion
12. Points stop (ps) – Number of GPS records skipped when the truck is not moving or is at a stop
13. Points traffic stops (pts) – Number of GPS records skipped when truck is at a traffic stop

1. Trip length (tl) – Total spatial distance traveled by the truck between origin and destination
2. Trip time (tp<sub>t</sub>) – Total time taken to travel from origin to destination
3. Trip speed (tps) – Average speed of truck during the trip (tl/tp<sub>t</sub>)
4. Travel distance (td) – Spatial distance between two geographic (GPS) location records
5. Travel time (trt) – Time difference between two geographic (GPS) location records
6. Travel speed (tps) – Average speed of truck between the two GPS records (td/trt)
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# Trips Extracted from 1 Week Data within Florida

## Trip length Vs. Trip Duration

		Length of trip (in miles)														
		1 - 3	3 - 5	5 - 10	10 - 15	15 - 20	20 - 30	30 - 50	50 - 70	70 - 100	100 - 150	150 - 200	200 - 300	300 - 400	> 400	Total
Duration of the trip (in minutes)	1 - 3	17	0	0	0	0	0	0	0	0	0	0	0	0	0	17
	3 - 5	732	57	2	0	0	0	0	0	0	0	0	0	0	0	791
	5 - 10	2043	389	96	5	0	0	0	0	0	0	0	0	0	0	2533
	10 - 15	2088	949	443	36	5	0	0	0	0	0	0	0	0	0	3521
	15 - 30	2415	2647	3208	919	307	135	28	0	0	0	0	0	0	0	9659
	30 - 60	94	1494	3836	2667	1857	1936	917	55	4	0	0	0	0	0	12860
	60 - 90	0	0	717	970	1127	2136	2315	705	151	5	0	0	0	0	8126
	90 - 120	0	0	61	260	309	840	2071	1085	621	110	0	0	0	0	5357
	120 - 180	0	0	0	89	132	363	1333	1494	1323	673	101	4	0	0	5512
	180 - 240	0	0	0	0	19	56	172	305	650	856	172	78	0	0	2308
	240 - 300	0	0	0	0	0	19	51	62	152	399	144	103	4	0	934
	300 - 420	0	0	0	0	0	6	53	48	61	186	127	57	33	0	571
	420 - 540	0	0	0	0	0	0	15	18	16	24	10	21	12	3	119
	540 - 720	0	0	0	0	0	0	3	37	50	34	4	6	0	0	134
	720 - 1440	0	0	0	0	0	0	0	9	29	32	4	4	3	0	81
	1440 - 2880	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3
	Total	7389	5536	8363	4946	3756	5491	6958	3818	3057	2321	562	274	52	3	52526

# Trips Extracted from 1 Week Data within & Outside FL

## Trip length Vs. Trip Duration

		Length of trip (in miles)														
		1 - 3	3 - 5	5 - 10	10 - 15	15 - 20	20 - 30	30 - 50	50 - 70	70 - 100	100 - 150	150 - 200	200 - 300	300 - 400	> 400	Total
Duration of the trip (in minutes)	0 - 1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	1 - 3	81	10	0	0	0	0	0	0	0	0	0	0	0	0	91
	3 - 5	1080	134	21	0	0	0	0	0	0	0	0	0	0	0	1235
	5 - 10	3332	643	260	23	0	0	0	0	0	0	0	0	0	0	4258
	10 - 15	3540	1586	874	153	38	2	0	0	0	0	0	0	0	0	6193
	15 - 30	4053	4633	6069	2202	950	635	253	0	0	0	0	0	0	0	18795
	30 - 60	174	2496	6986	5277	4057	5017	3213	336	11	0	0	0	0	0	27567
	60 - 90	0	0	1386	1987	2321	4445	6098	2810	839	19	0	0	0	0	19905
	90 - 120	0	0	130	545	671	1771	4566	3231	2697	775	3	0	0	0	14389
	120 - 180	0	0	0	190	333	848	3235	4119	4643	4362	1013	42	0	0	18785
	180 - 240	0	0	0	0	65	194	592	1048	2376	3469	1937	1086	1	0	10768
	240 - 300	0	0	0	0	0	71	174	247	739	1891	1315	1702	150	1	6290
	300 - 420	0	0	0	0	0	22	167	157	341	999	1191	1440	926	179	5422
	420 - 540	0	0	0	0	0	0	53	94	108	168	204	493	340	416	1876
	540 - 720	0	0	0	0	0	0	9	146	162	194	92	170	115	269	1157
	720 - 1440	0	0	0	0	0	0	0	14	111	161	100	119	55	69	629
	1440 - 2880	0	0	0	0	0	0	0	0	0	5	1	5	4	0	15
	Total	12263	9502	15726	10377	8435	13005	18360	12202	12027	12043	5856	5057	1591	934	137378