JOINT FLORIDA
Model Task Force & Transportation
Data and Analytics Workshop

FTO FORECASTING & TRENDS OFFICE
FDOT TDA TRANSPORTATION DATA & ANALYTICS

Performance Output Online Dashboard Visualization Tool

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Outline

- **Data Driven Performance-based Planning and Programming**
  - Where we were?
  - Goals and Objectives?
  - How are we going to get there?
  - How effective it is?
- **Travel Demand Models and Performance Measures**
  - Monitor and Predict Mobility and Congestion
- **Online Dashboard Visualization Tool**
  - Multiscale Performance Measures
  - Historical and Current Performance Measures
- **Future Performance Measures**
  - 5-10 Years
  - 25-30 Years
- **Summary**

Data Driven Performance-based Planning and Programming

- FHWA's framework for performance-based planning and programming

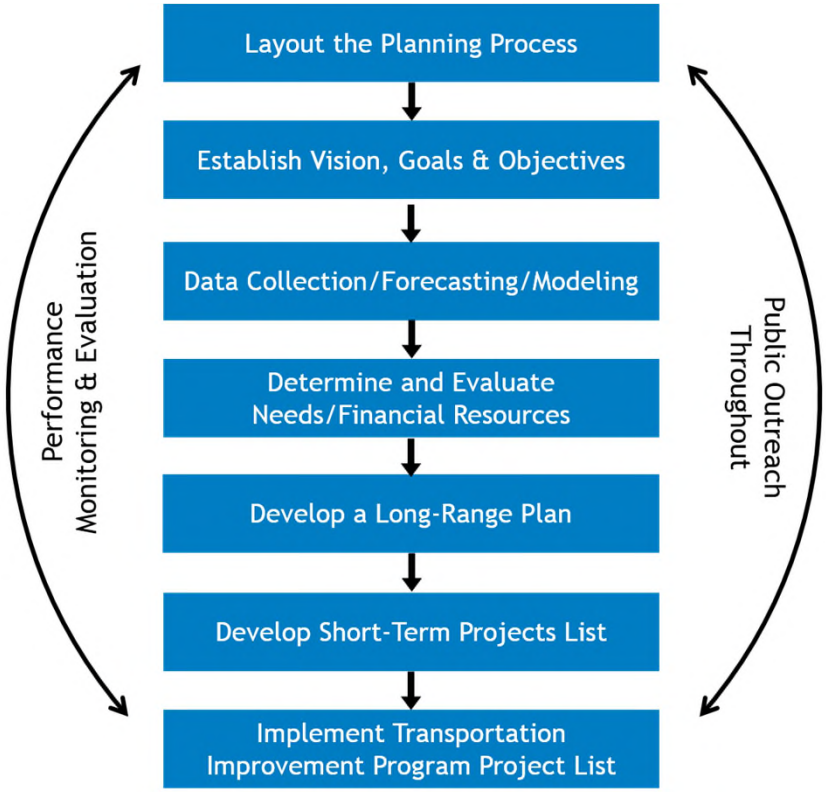
Source: Figure was copied from Performance Based Planning and Programming Guidebook, FHWA, 2013.

Travel Demand Model and Performance Measures

- Travel Demand Model is a program or set of computer programs and data to forecast traffic flows on the transportation system.

- Transportation analysis performance measures are quantitative estimates on the performance of a transportation facility, service, program, system, scenario or project with respect to policies, goals and objectives.

Travel Demand Model and Performance Measures



Source: Figure was copied from https://www.sjtpo.org/planning/.

Travel Demand Model and Performance Measures

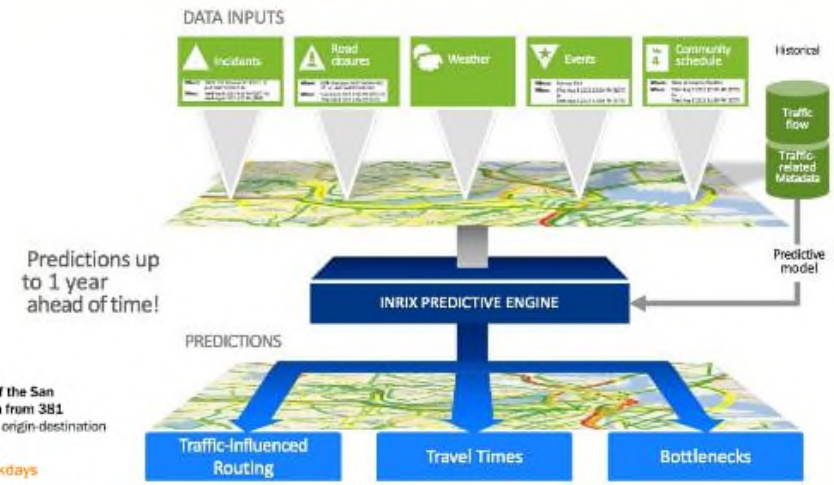
- **Travel Demand Model main outputs:**
  - Traffic Volume
  - V/C
  - VMT
  - O-D

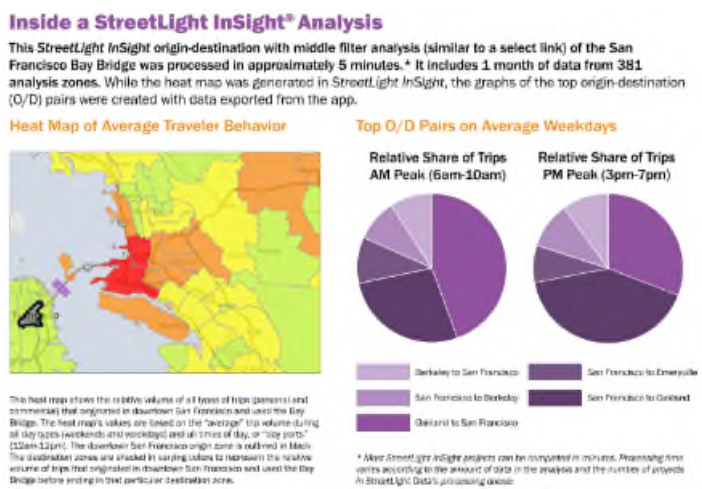
- **Performance Measures in following areas:**
  - Mobility
  - Reliability
  - Accessibility
  - Safety
  - Other Multimodal Performance Measures
  - Infrastructure

Travel Demand Model and Performance Measures

Transportation data sources

- Traffic Counts
- Probe Speed Data
- O-D Data
- Roadway Data
- Model Output Data
- Census Data
- Land Use Data
- Other Data Sources



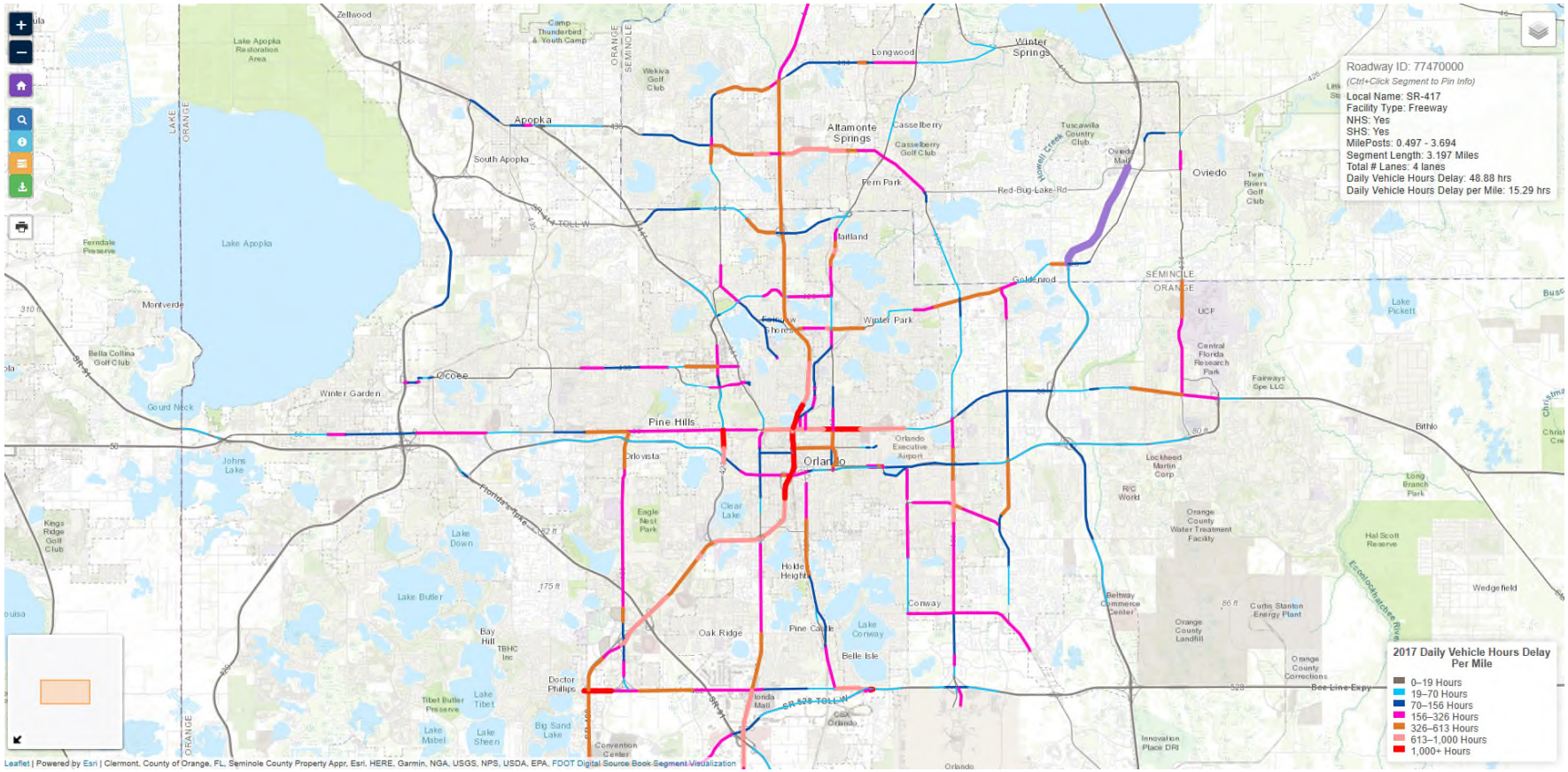


Online Dashboard Visualization Tool

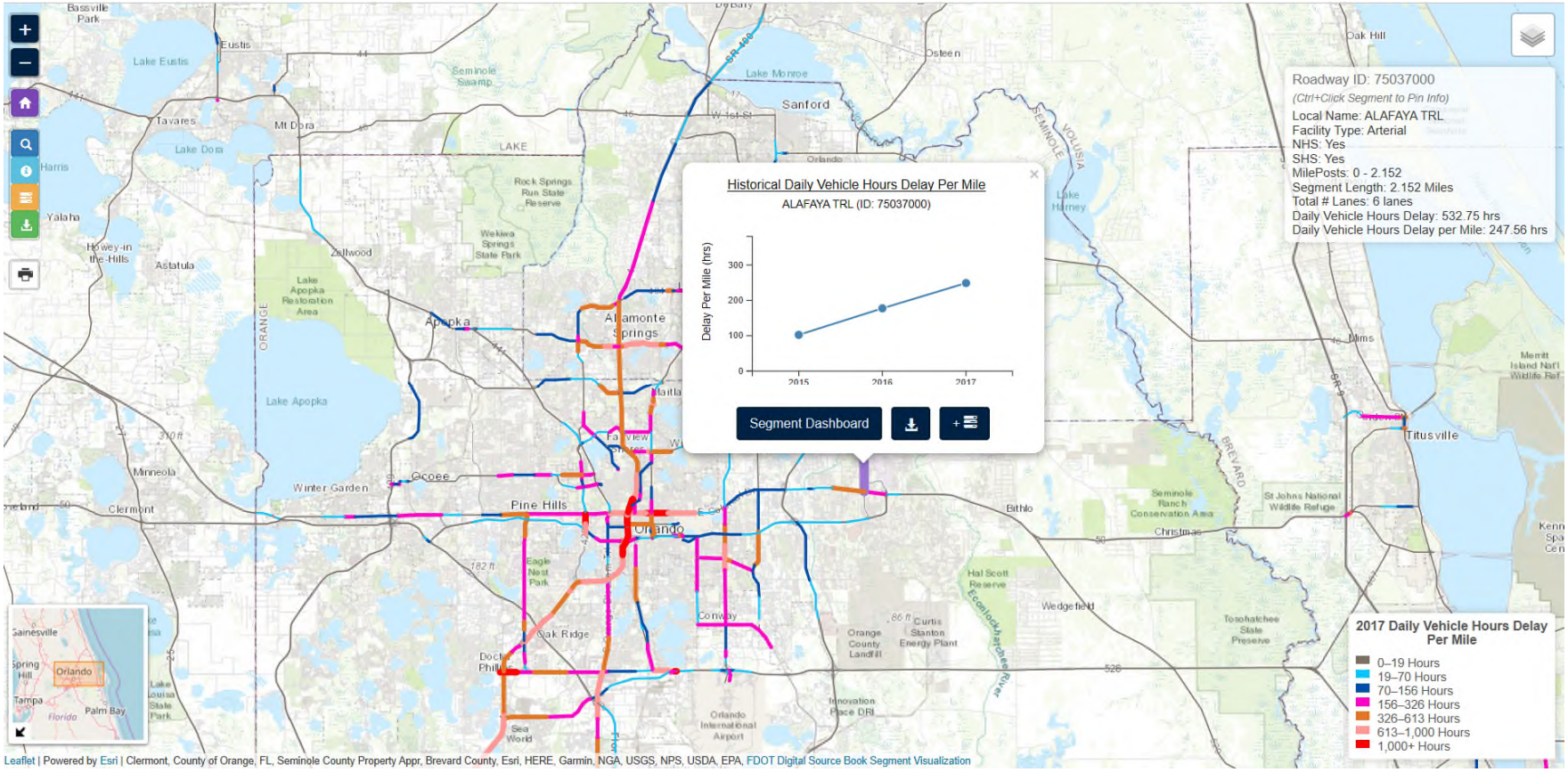
Online Dashboard Visualization Tool

- Online accessible and GIS based
- Visualization of performance measures results
- External users
- Interactive and scalable website development
  - For example, model outputs may be visualized with other geospatial information.

Online Dashboard Visualization Tool



Online Dashboard Visualization Tool



Online Dashboard Visualization Tool

- Website for segment level visualization
  - http://fdotsourcebook.com/performance-measures/segment-level-visualization

Multiscale Performance Measurement

- Performance measures could be reported on state, district, MPO, county, corridor or segment level.

- https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/fto/sourcebook/2019sourcebook.pdf

Multiscale Performance Measurement

MOBILITY PERFORMANCE MEASURES

All Vehicle
- Vehicle Miles Traveled
- Person Miles Traveled
- % Travel Meeting LOS Targets
- % Miles Meeting LOS Targets
- Travel Time Reliability
  - On-Time Arrival
  - Planning Time Index
- Average Travel Speed
- % Travel Achieving the Speed Limit
- Vehicles per Lane Mile
- % Travel Heavily Congested
- % Miles Heavily Congested
- Hours Heavily Congested
- Vehicle Hours of Delay
- Person Hours of Delay
- Job Accessibility – Auto

Aviation
- Tonnage
- Value of Freight
- Passenger Boardings
- Departure Reliability

Pedestrian/Bicycle
- % Pedestrian Facility Coverage
- % Bicycle Facility Coverage
- % Population within 1 mile of Bicycle Facilities

Rail
- Passengers
- On-Time Arrival
- Tonnage

Seaport
- Passenger Movements
- Tonnage
- Twenty-Foot Equivalent Units
- Value of Freight

Spaceport
- Launches

Transit
- Revenue Miles
- Passenger Trips
- Revenue Miles between Failures
- Weekday Span of Service
- Resident Access to Transit
- Job Accessibility – Transit
- Passenger Trips per Revenue Mile

Truck
- Combination Truck Miles Traveled
- Truck Miles Traveled
- Combination Truck Tonnage
- Combination Truck Ton Miles Traveled
- Value of Freight
- Travel Time Reliability
  - On-Time Arrival
  - Planning Time Index
- Combination Truck Hours of Delay
- Combination Truck Average Speed
- Combination Truck Cost of Delay
- Truck Empty Backhaul Tonnage

SAFETY-RELATED MEASURES
- Number of Fatalities
- Number of Serious Injuries
- Rate of Fatalities
- Rate of Serious Injuries
- Motorcyclist Fatalities and Serious Injuries
- Pedestrian Fatalities and Serious Injuries
- Bicyclist Fatalities and Serious Injuries
- Safety Belt Usage

Multiscale Performance Measurement

VEHICLE HOURS OF DELAY

Vehicle hours of delay was estimated on an hourly basis by determining the difference between delay threshold travel time and actual travel time along a facility. Delay threshold travel time/speed is considered the additional travel time experienced by a motorist beyond what would be experienced under uncongested conditions. The definition of uncongested conditions was defined as level of service "B". Delay estimation considers unserved demand from the preceding hours for the time periods between 7:00 a.m. and 10:00 a.m. and between 4:00 p.m. and 7:00 p.m.

Calculation

Σ (Daily or Peak Travel Time-Travel Time at LOS B) × Vehicle Volume

Reporting Periods

Peak Hour | Peak Period | Daily | Yearly

Observation

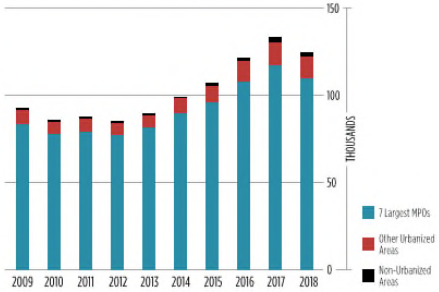
In general, delay along Florida's SHS decreased by 7% during the peak hour from 2017 to 2018. The daily decrease in vehicle hours of delay was in the range of 16%. However, SIS highway corridors and SHS freeways experienced an increase in delay. The probe data to calculate delay fluctuates from year to year. These fluctuations may not be entirely from changes to roadway operations.

Sources

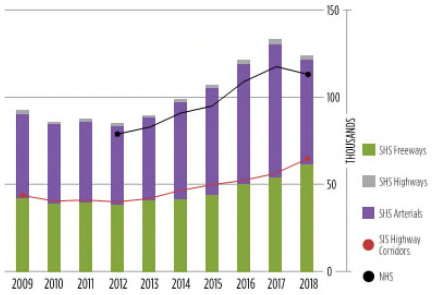
FDOT – *Traffic Characteristics Inventory*

HERE Technologies – *Travel Time Data*

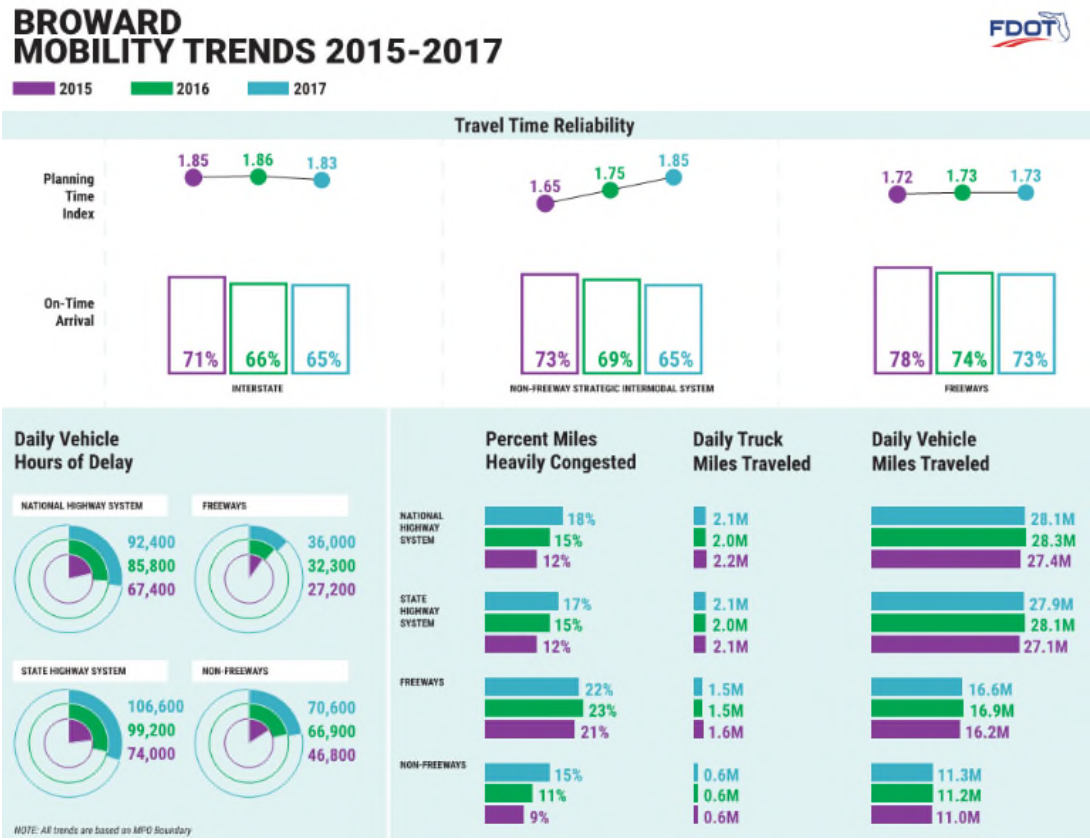
VEHICLE HOURS OF DELAY ON STATE HIGHWAY SYSTEM BY AREA DURING PEAK HOUR



VEHICLE HOURS OF DELAY BY FACILITY TYPE DURING PEAK HOUR



Multiscale Performance Measurement



Multiscale Performance Measurement

2014 MIAMI TO FT. LAUDERDALE I-95 CORRIDOR PERFORM

From U.S. 1 to I-595

AADT	Million Miles Traveled		Average Speed		Delay			F
	Peak Hour/ Period	Daily	Peak Hour/ Period	Daily	Peak Hour/ Period	Daily	Yearly	% Combination Truck
220,112	0.90	5.46	45.6	52.2	9.2	31.1	11,350	2
With a max of 319,000	millions of miles		miles per hour		thousands of hours			percent

Corridor Performance

Corridor Length
23.4 miles

Peak Period
TTR 71%
TTI_{95th} 2.08

Daily
TTR 85%
TTI_{95th} 1.88

Facility Performance

FLA Turnpike to I-595					
Length 10.2 miles	Peak Period:	TTR 83%	TTI_{95th} 2.18	Average Speed 50.8 MPH	
AADT 240,297	Daily:	TTR 93%	TTI_{95th} 1.62	Average Speed 54.9 MPH	
NW 119th Street to FLA Turnpike					
Length 3.4 miles	Peak Period:	TTR 9%	TTI_{95th} 2.54	Average Speed 34.4 MPH	
AADT 217,559	Daily:	TTR 75%	TTI_{95th} 2.09	Average Speed 48.5 MPH	
SR 112 to NW 119th Street					
Length 5.0 miles	Peak Period:	TTR 94%	TTI_{95th} 1.37	Average Speed 52.6 MPH	

Future Performance Measures

Future Performance Measures (5-10 Years)

- Volume projections
  - Developed future traffic volume projections along segments of the State Highway System (SHS)
    - 2024 and 2029
    - Three growth scenarios: high, medium, and low
  - Methodology
    - Collected Historical AADT from 2010 to 2018
    - Segment volume projection by regression
      - Low projections used logarithmic method
      - Medium projections used linear method
      - High projections used exponential method

Future Performance Measures (5-10 Years)

2018 VMT	Year	Forecast Scenario	Total Forecasted VMT	Growth Percentage
334 Million	2024	2024 Low	**341 Million**	**2%**
		2024 Medium	**378 Million**	**13%**
		2024 High	**394 Million**	**18%**
	2029	2029 Low	**346 Million**	**3%**
		2029 Medium	**415 Million**	**24%**
		2029 High	**460 Million**	**38%**

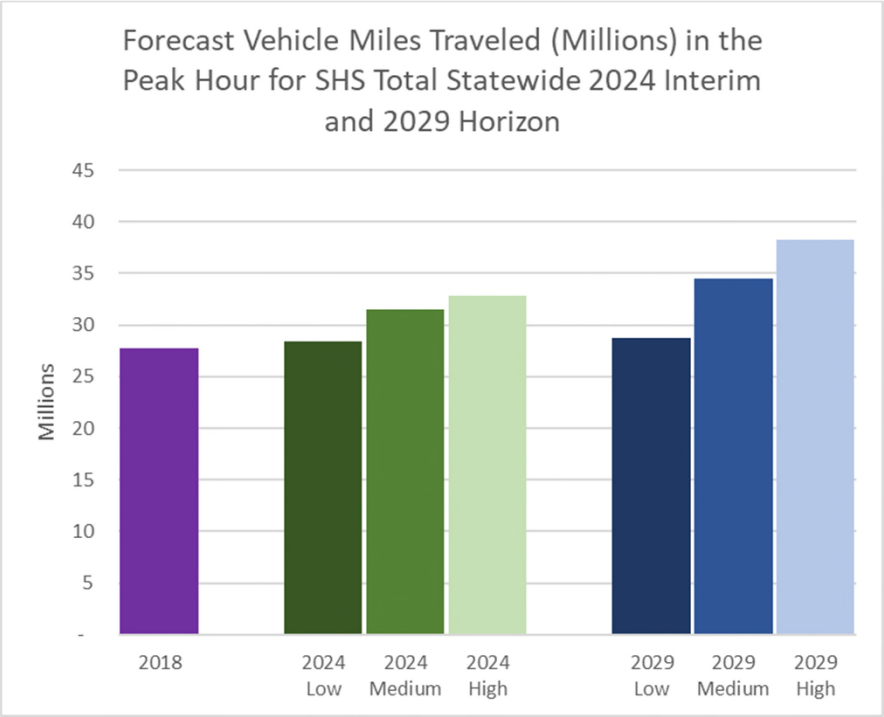
Future Performance Measures (5-10 Years)

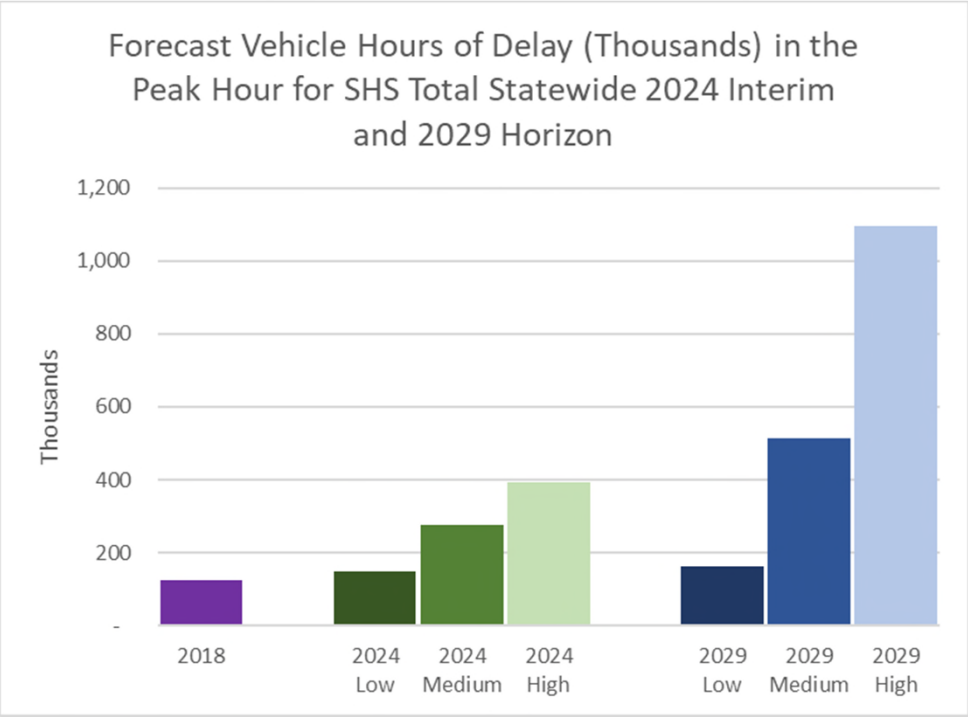
- Using the volume projection data sets, performance measures based on modeled speeds were developed for
  - 2018 scenario
  - 2024 low, medium, and high scenarios
  - 2029 low, medium, and high scenarios

- Growth rates for performance measures were developed between the 2018 and the 2024 horizon years for three scenarios using low, medium, and high projections.

- The growth rates were applied to the 2018 Source Book performance measures using probe speeds, and then summarized into the tables/charts.

Future Performance Measures (5-10 Years)





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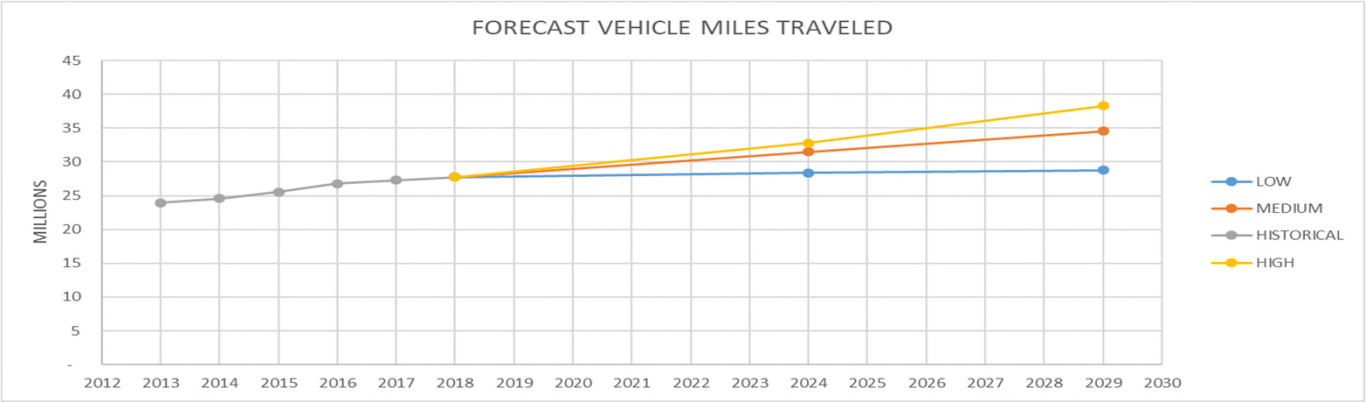
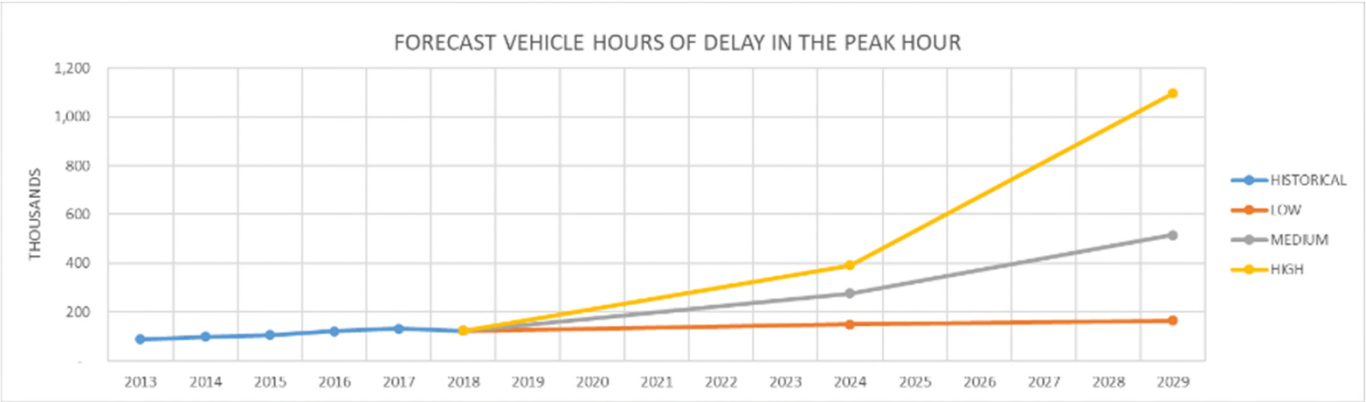
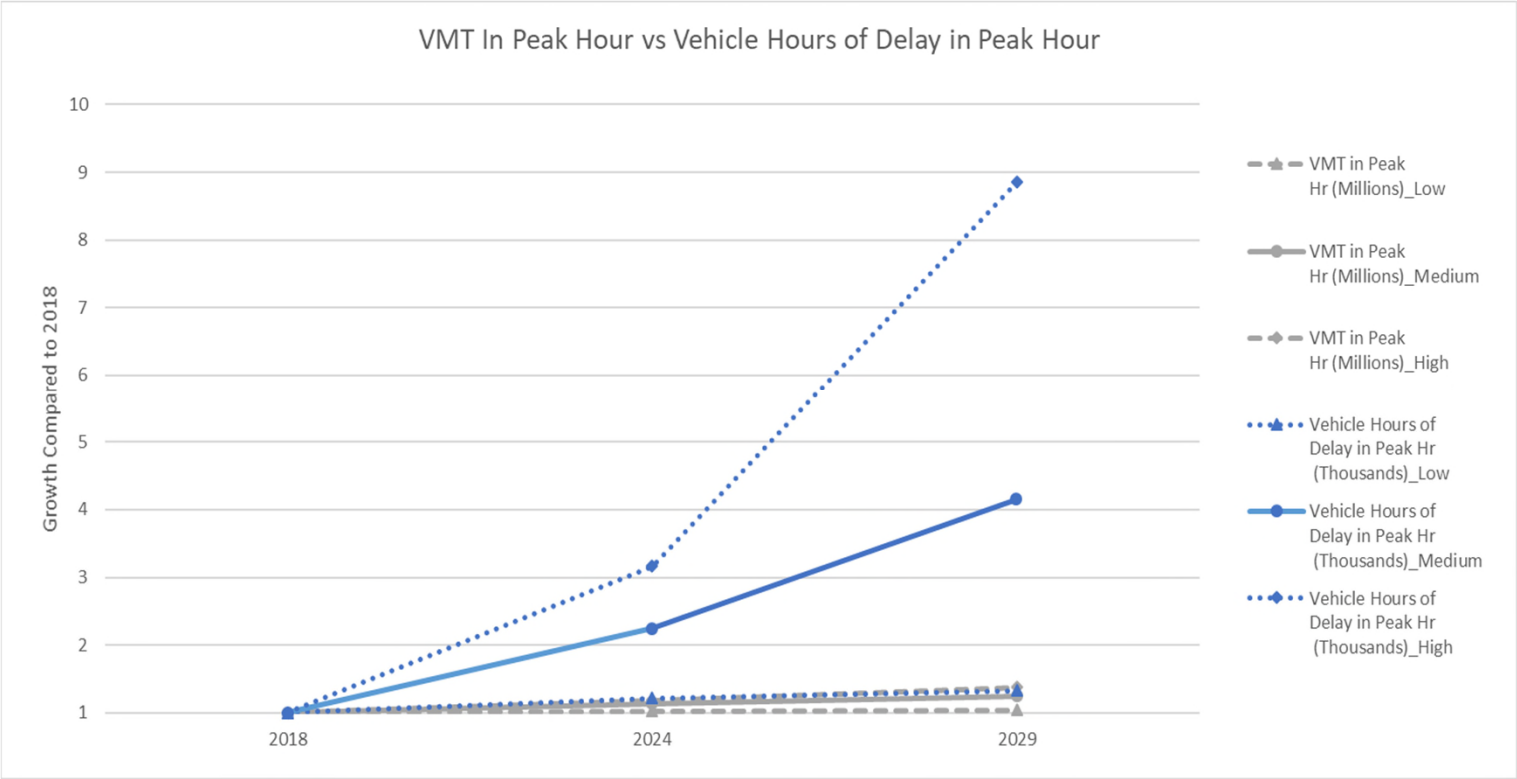




Future Performance Measures (5-10 Years)



Future Performance Measures (25-30 Years)

- The SERPM 7.0 and TCRPM 4 model outputs were used in FDOT D4.
  - 2040 cost feasible scenario

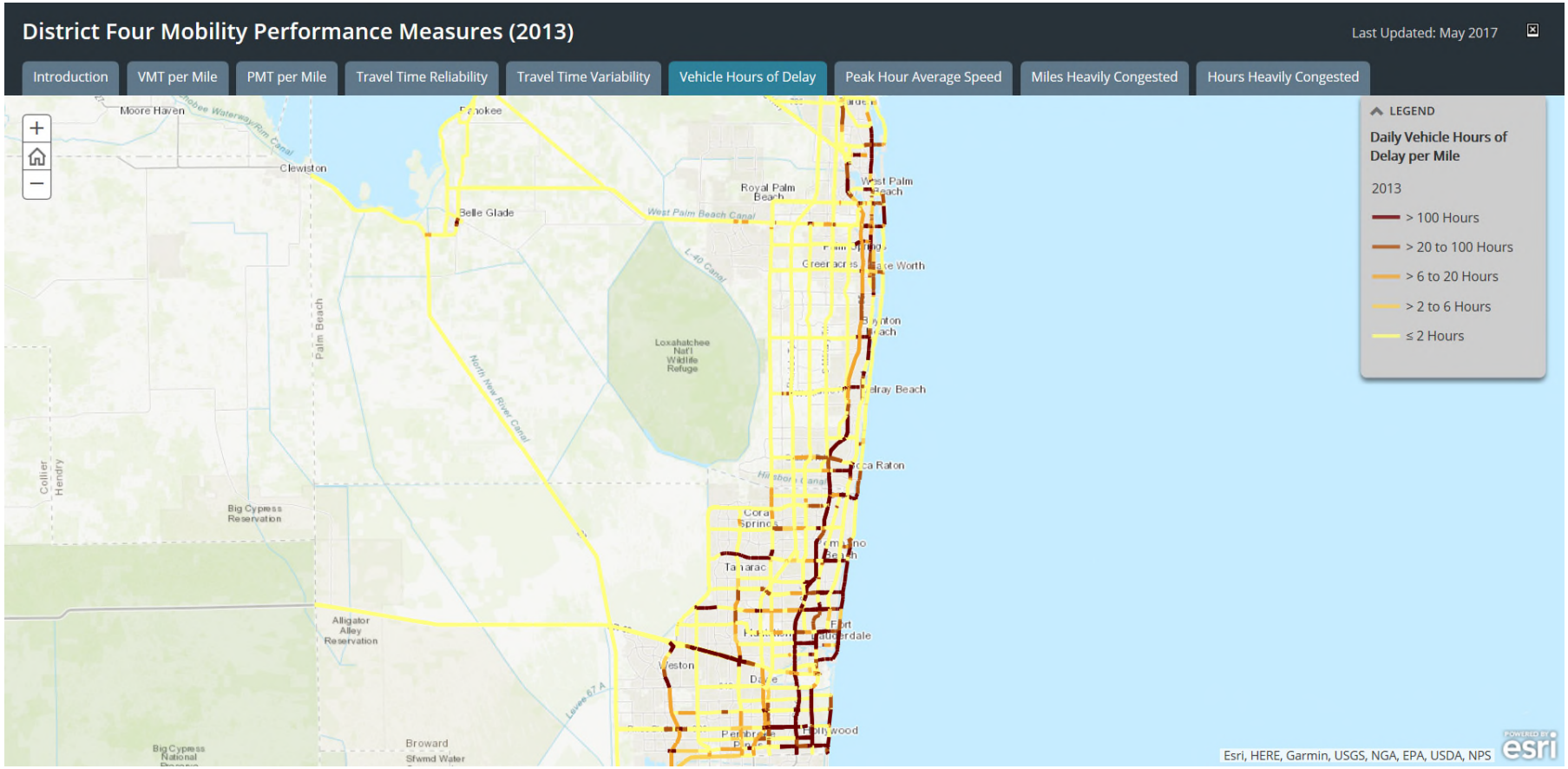
- The methodology for calculating projected mobility performance measures is consistent with the predictive methodology used in the FDOT 2014 Source Book.

- 2040 performance measures were developed for State Highway System (SHS) and National Highway System (NHS)

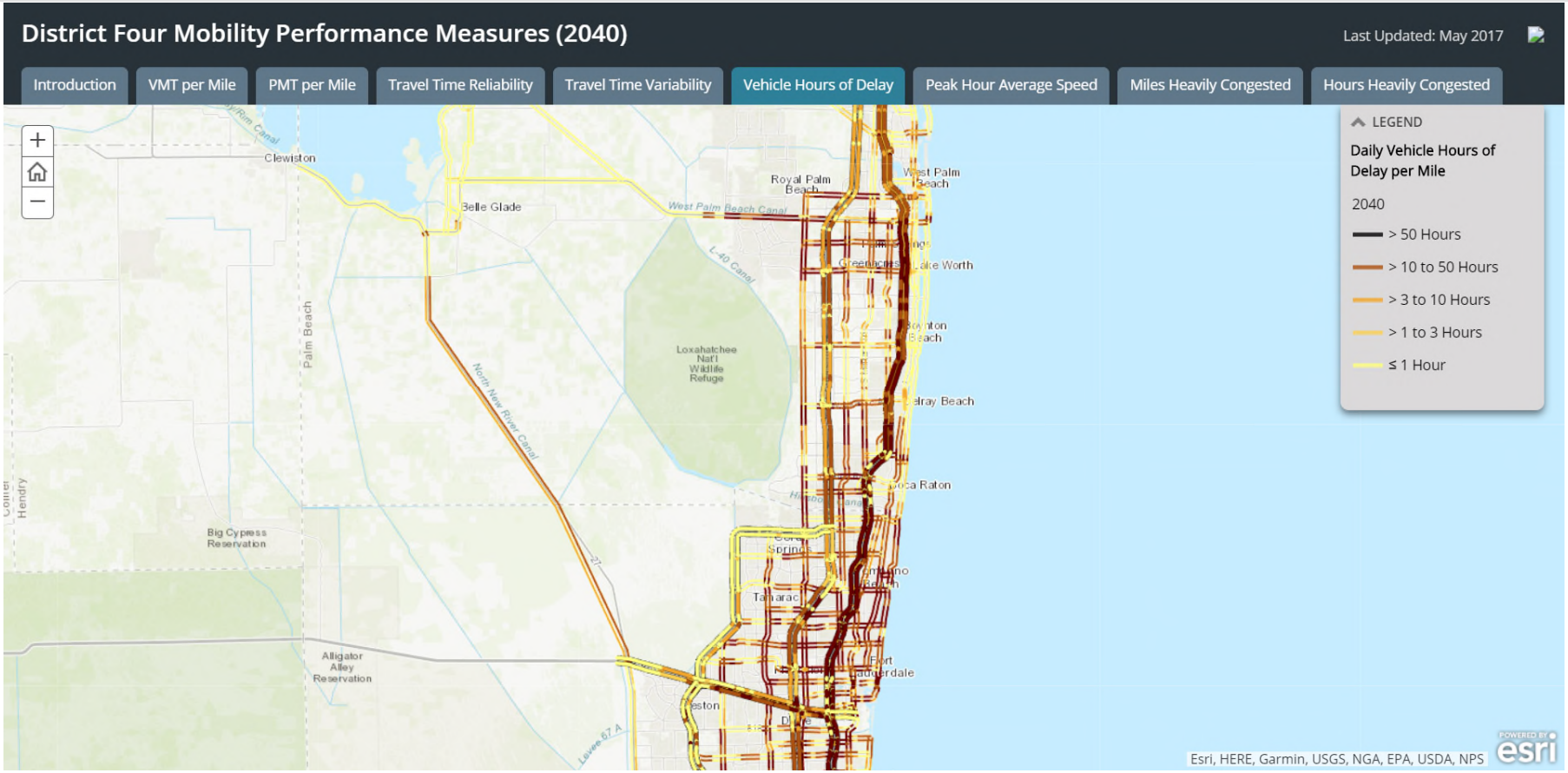
Future Performance Measures (25-30 Years)

- A series of mobility performance measures were developed:
  - Vehicle Miles Traveled
  - Person Miles Traveled
  - Travel Time Reliability
  - Travel Time Variability
  - Vehicle Hours of Delay
  - Average Travel Speed
  - Percentage of Miles Severely Congested
  - Hours Severely Congested

Future Performance Measures (25-30 Years)



Future Performance Measures (25-30 Years)



Summary

MONITOR PERFORMANCE

QUANTIFY DECISIONS

ACHIEVE GOALS

IMPROVE OUTCOMES

THANK YOU!