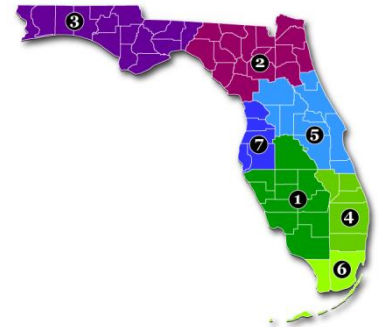




Florida's Approach to Maximizing Advances in Data and Technology for Performance Management

June 2, 2015





Topics

- 1. Florida's MPM Program
- 2. Data needs and sources
- 3. Use of measured data vs modeled
- 4. Mobility Performance Measures System
- 5. Plans for next year



Topics

- 1. Florida's MPM Program
- 2. Data needs and sources
- 3. Use of measured data vs modeled
- 4. Mobility Performance Measures System
- 5. Plans for next year



Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

POLICY

Effective: December 22, 2014
Office: Policy Planning
Topic No.: 000-525-052-a

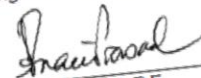
PERFORMANCE MANAGEMENT / MEASUREMENT

It is the policy of the Florida Department of Transportation (FDOT) to link performance measures to planning and programming decision making. This informs decisions and provides feedback on transportation system performance, agency operations and program outcomes. Performance management also encompasses asset management and performance measurement reflecting the department's priorities for accountability and stewardship of resources.

As FDOT executes performance management, we will continue to improve its department-wide application, by:

- Regularly reporting on performance measures spanning the department's operations including, but not limited to, transportation system performance measures, production measures and mission related measures.
- Establishing and maintaining transportation system performance core measures that align with our mission, priorities, and long-term goals
- Building performance measures into our plans and programs to advance performance-based planning and programming practices
- Establishing and tracking future performance targets as beneficial and feasible
- Collaborating among Central Office and District Office staff, including a yearly performance measurement workshop to begin an annual cycle of performance report development
- Collaborating with MPOs, transit operators and other stakeholders as appropriate for a coordinated approach to performance measurement
- Consistently reporting and communicating performance results.

Because performance management generally, and performance measurement specifically relies on reliable data, FDOT program and office managers are responsible to coordinate the measures they use to achieve consistent reporting of measures.


Ananth Prasad, P.E.
Secretary



FDOT Performance Measures Policy

- Effective Dec 22, 2014

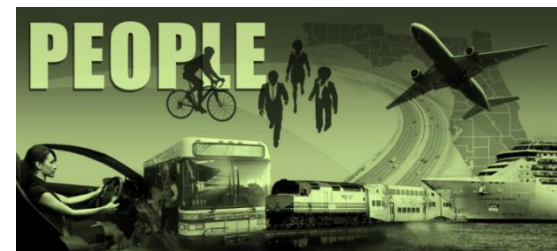
“It is the policy of FDOT to link performance measures to planning and programming decision making.”

- Offices required to coordinate for consistent reporting
- Actions
 - Regularly report
 - Establish and track targets
 - Collaborate with MPOs

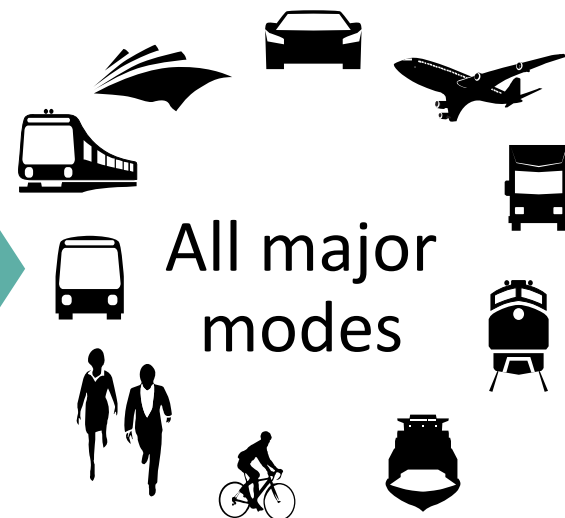


Features of Florida's Statewide Mobility Performance Measures

www.FloridaMPMs.com



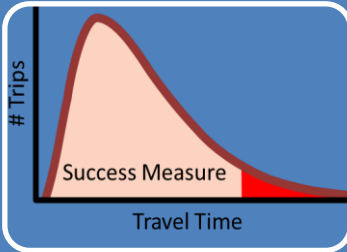
People and
Freight



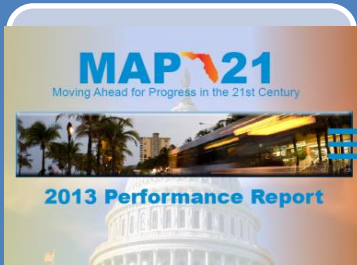
For
FDOT
purposes,
and MAP-21



MPM Program Plan Goals



Develop and improve measures and reporting techniques



Report on mobility measures for MAP 21 and statewide reporting purposes



Provide guidance on mobility performance measures (MPMs) to State and MPO stakeholders



MPM Program

GOALS	OBJECTIVES	STRATEGIES
I. Develop and improve measures and reporting techniques	Develop and update measures, analytic and reporting techniques for measures in every mode (freight, auto, transit, pedestrian, bicycle) regularly	Conduct research related to data, analytic techniques and reporting
		Implement national research at the state level
		Create and maintain definitions of terms
II. Report on mobility measures for MAP 21 and statewide reporting purposes	To report on a larger set of measures at the statewide level and meet all requirements for MAP 21 reporting.	Produce Multimodal Performance Measures Source Book annually
		Maintain measure definitions
		Maintain data and analytic technique documentation
		Report on MAP 21 measures as requested
III. Provide guidance on mobility performance measures (MPMs) to State and MPO stakeholders	<p>Educate, collaborate, and communicate the outcomes and activities of the MPM program to all stakeholders</p> <p>Stakeholders include modal, planning, operations, PD&E and ITS offices within Central Office and districts, management at FDOT and MPOs</p>	Conduct consistent outreach
		Develop and administer technical guidance for Florida's MPM
		Develop and administer training



















































































Mobility Performance Measures Reporting



<http://www.FloridaMPMs.com/SourceBook.htm>

Multimodal Mobility Performance Measures Matrix 2015

	MODE	QUANTITY	QUALITY	ACCESSIBILITY	UTILIZATION
People	Auto/Truck	Vehicle Miles Traveled    Person Miles Traveled   	% Travel Meeting Los Criteria    % Miles Meeting Los Criteria   Travel Time Reliability    Travel Time Variability    Vehicle Hours Of Delay    Person Hours Of Delay    Average Travel Speed  	<i>In Development – To Be Reported In 2015</i>	% Miles Severely Congested   % Travel Severely Congested    Hours Severely Congested    Vehicles Per Lane Mile 
	Transit	Passenger Miles Traveled  Passenger Trips 	Average Headway 		
	Pedestrian		Level Of Service (LOS) 	% Sidewalk Coverage 	
	Bicycle		Level Of Service (LOS) 	% Bike Lane/Shoulder Coverage 	
	Aviation	Passengers 	Departure Reliability 	Highway Adequacy (LOS)  	Demand To Capacity Ratios 
	Rail	Passengers 	Departure Reliability 		
	Seaports	Passengers 		Highway Adequacy (LOS)  	
Freight	Truck	Combination Truck Miles Traveled  Truck Miles Traveled  Combination Truck Tonnage  Combination Truck Ton Miles Traveled  Value of Tonnage 	Travel Time Reliability  Travel Time Variability  Combination Truck Hours Of Delay  Combination Truck Average Travel Speed 		% Miles Severely Congested   Vehicles Per Lane Mile  Combination Truck Backhaul Tonnage 
	Aviation	Tonnage 		Highway Adequacy (LOS)  	
	Rail	Tonnage 		Highway Adequacy (LOS)   Active Rail Access 	
	Seaports	Tonnage  Twenty-Foot Equivalent Units 		Highway Adequacy (LOS)   Active Rail Access 	

Reporting Periods:  = Peak Hour  = Peak Period  = Daily  = Yearly |

Bold = FDOT Map-21-Recommended Measure



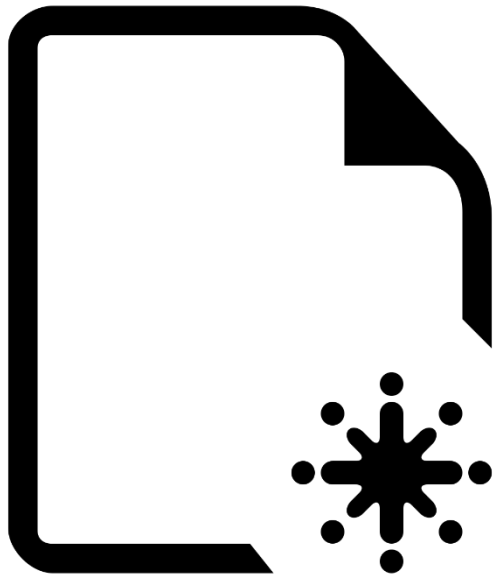
Statewide Mobility Performance Measures Team Purpose

To provide guidance and support to FDOT and the state's MPOs on multimodal mobility performance measures including reporting for internal and MAP-21 purposes

Consensus on approach and measures



MPM Consensus Document



- Recommended mobility performance measures
 - People
 - Freight
- Roles of Central Office, Districts, and MPOs
- Definitions



FDOT Central Office Roles

Central
Office

District
Office

MPO

Coordinate statewide efforts on MPM Program

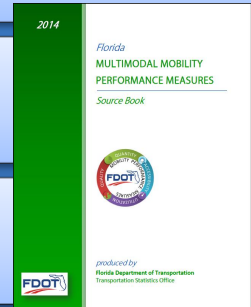
Produce and report on statewide MAP-21 measures

Produce annual TranStat Source Book

Provide additional MPMs

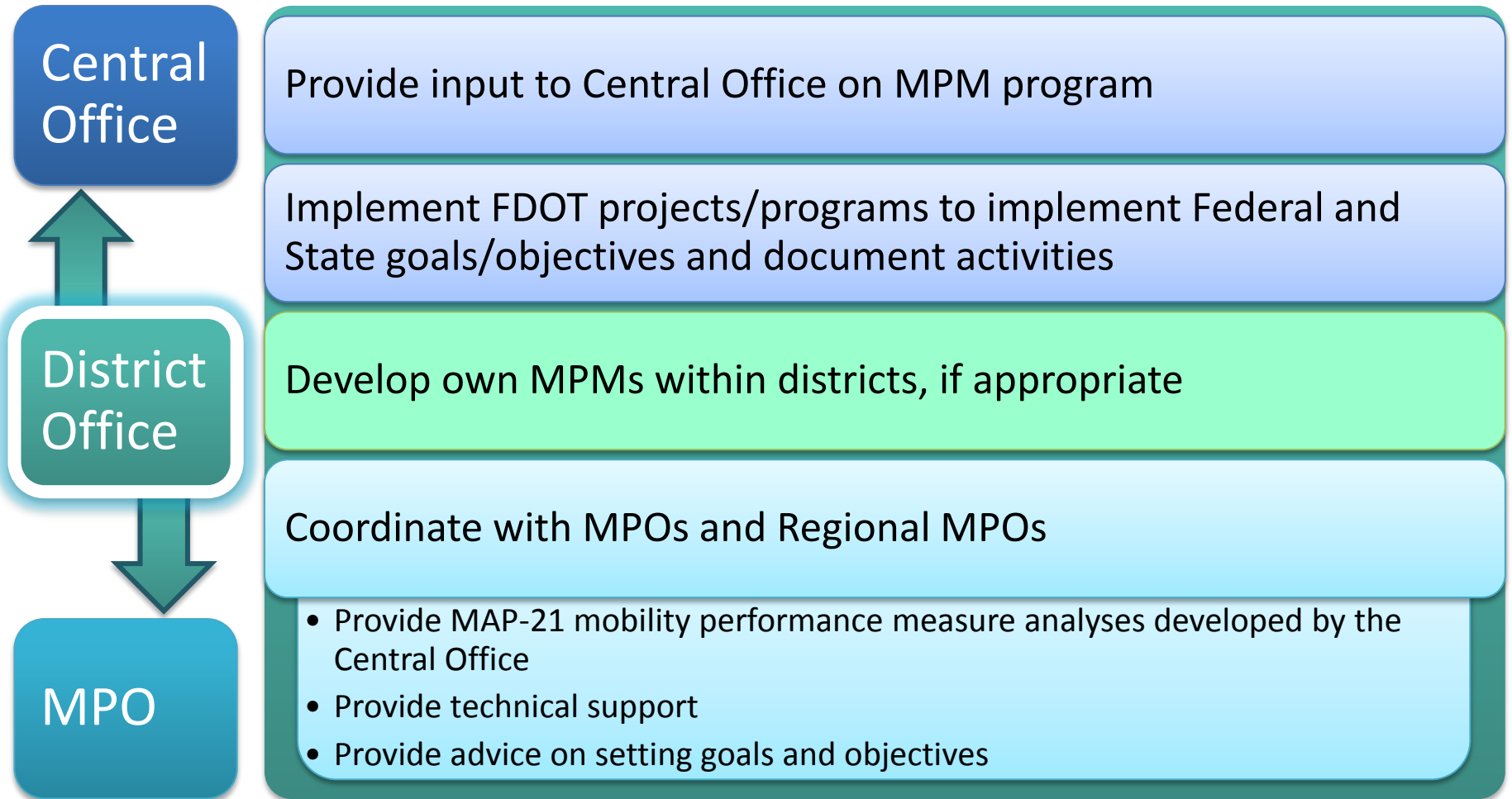
Lead development of targets and support MPOs

Develop and provide training in 2015





FDOT District Offices Roles





MPOs Roles

Central
Office



District
Office



MPO



U.S. Department
of Transportation
**Federal Highway
Administration**

- Comply with MAP-21
 - Use calculated results provided by FDOT, if desired
 - Report to FHWA/FDOT as required
 - Develop performance targets
 - Include in LRTPs and Congestion Management Plans to evaluate alternatives, programming/prioritization of projects
- Develop own MPMs, if appropriate
- Coordination with other MPOs, if appropriate



MAP-21 Timing

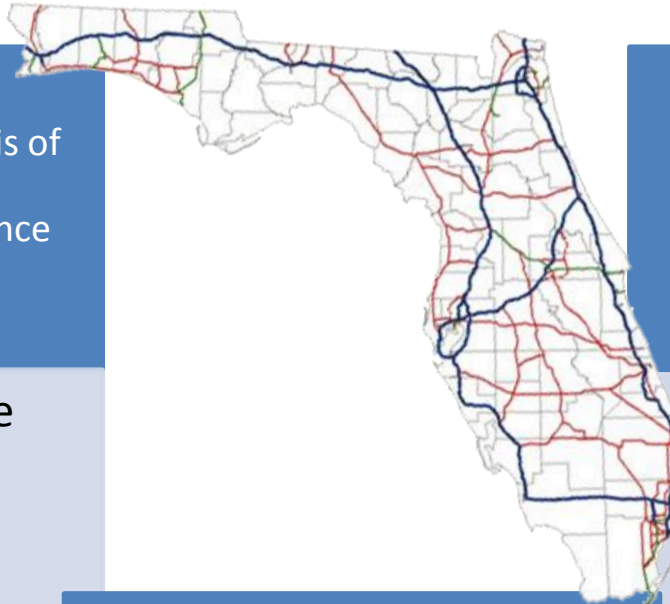


U.S. DOT by April 2014, in consultation with State DOTs, MPOs, and other stakeholders, will promulgate rulemaking that establishes measures

Now – June 2015
Possibly – September 2015



FDOT's Intent



FDOT will provide an analysis of **all** required MAP-21 mobility performance measures

- For the **state** as a whole

not by Districts

- Each **MPO**

has the option to use or not

Comparable measurements for road networks

- MAP-21 networks
- State Highway System

Areawide groupings

- Urbanized boundaries
- Planning boundaries
- County boundaries
- Regional boundaries



Topics

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Primary Data Needs

	Delay	Travel Time Reliability/Variability
Measure	Vehicle Hours of Delay	% of Travel >45 mph on Freeways (Reliability) 95 th Percentile Travel Time Index (Variability)
Coverage	State Highway System	Limited Access Facilities
Inputs	<ul style="list-style-type: none"> • Traffic Volume • Travel Time/Speed 	Travel Time/Speed
Source	<ul style="list-style-type: none"> • FDOT Planning Traffic • Models 	Models
Database	<ul style="list-style-type: none"> • Traffic • Roadway 	Traffic, Roadway
Reports	Source Book MAP-21 Annual Performance Report	Source Book MAP-21 Annual Performance Report



Mobility Data Challenges and Opportunities

- **Primary data needs** = roadway characteristics, traffic volume, speed
- **Transitioning from modeled to measured data**
 - Travel time, speed, and volume data can be collected automatically by roadside or probe devices
 - Past methodology based on theoretical models and assumptions



Possible Data Sources Evaluated

- Possible field measured data sources
 - Video Image Detection
 - Microwave Radar
 - Bluetooth
 - Toll Tag Readers
 - GPS vehicle probe data from private vendors
 - HERE/NPMRDS
 - INRIX
 - TomTom



Data Source Criteria

- Data Coverage – Need State Highway System
- Data completeness – At least 30% complete
- Data reported by individual TMC at 5 minute intervals throughout the entire calendar year
 - Delivered in tabular and GIS shapefile
- Mean travel time and speed
 - Status flag to indicate normal operations, periods of low traffic flow, inoperable status or unavailable data, etc.



Data Source Criteria, cont.

- Quality indicator that reflects the confidence in the estimate of mean travel time and speed
- Network conflation/data integration
 - Connect field measured speed/travel time data to other data sources
- Separate speed for passenger cars, trucks, and all vehicles



Chosen Option

- Archive of HERE ITS real time data + NPMRDS
 - Minimum additional cost to Department
 - HERE ITS data
 - NPMRDS data for
 - Truck data on NHS
 - Verifying HERE's data processing and imputation algorithms

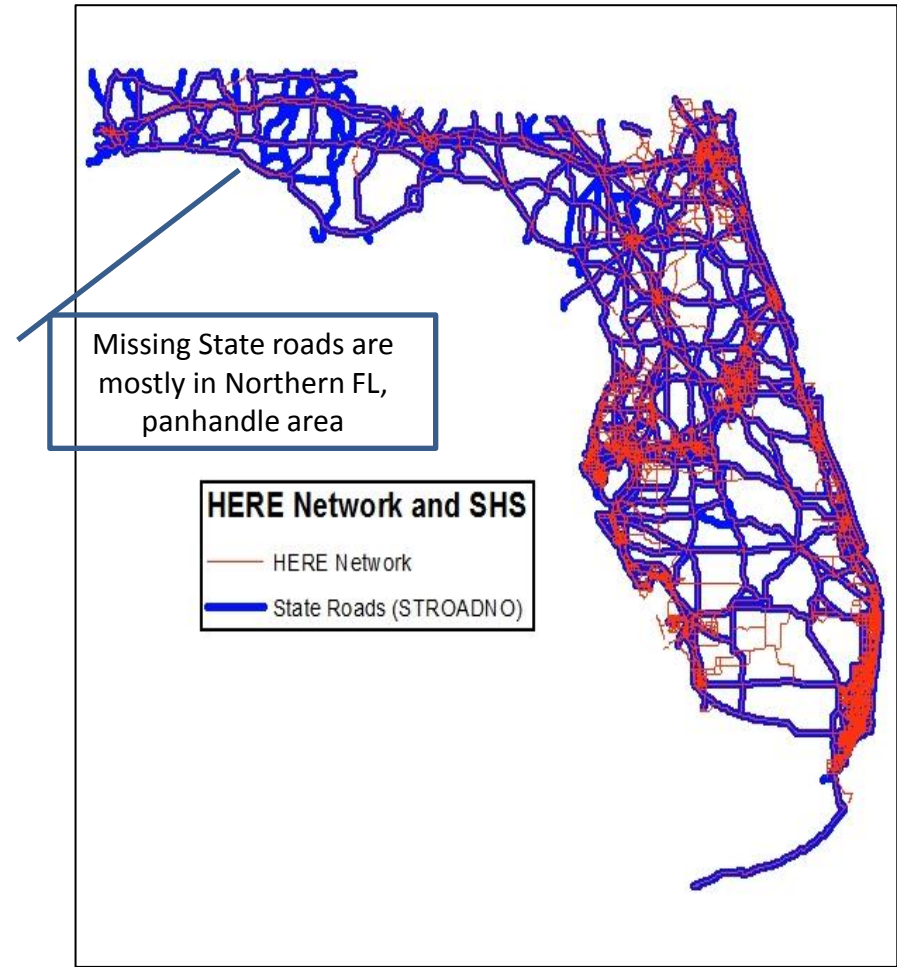


Major Drawbacks

- Not every road of SHS has corresponding TMC
- TMC network not geographically aligned with FDOT base map
- Higher initial cost
- Different results from modeled data will result in differences when analyzing trends

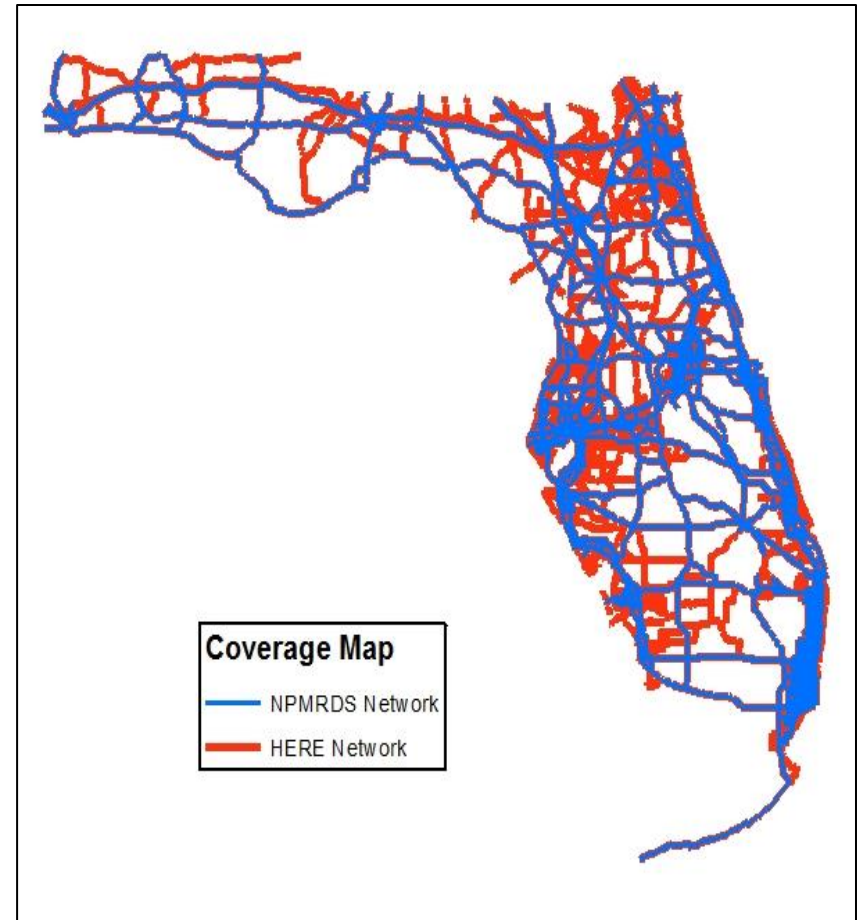
Data Coverage

- SHS - 12,086 centerline
- HERE ITS
 - 24,874 TMCs
 - 228,430 links
 - Data gaps over time filled by vender
 - No separate truck speed



Data Coverage

- NPMRDS
 - NHS - 8147 centerline
 - 11,733 TMCs
 - Raw data
 - Separate truck speed





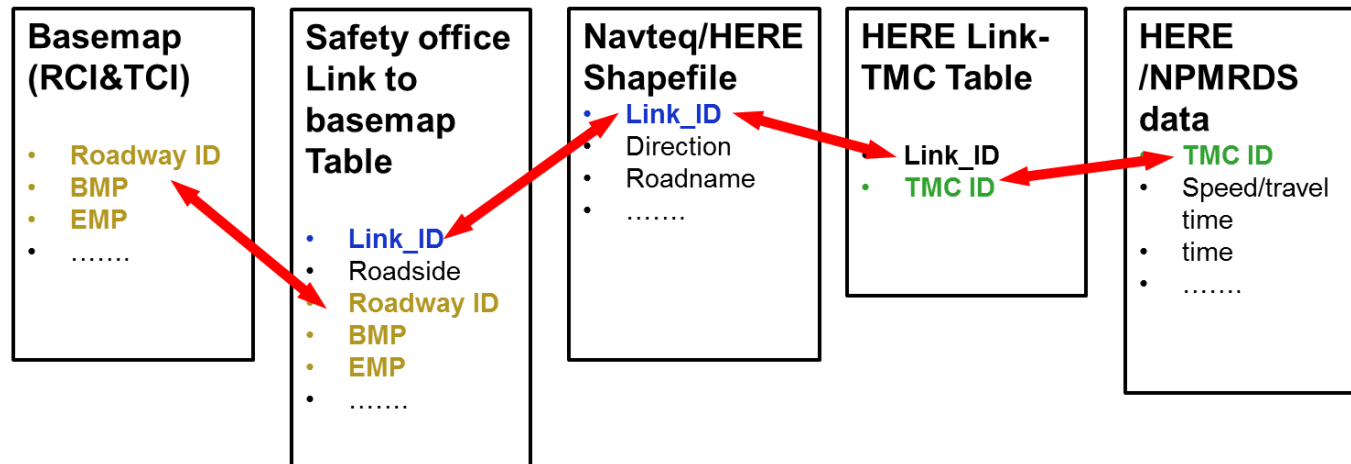
Approach for Missing Data

- Factored-up method: route travel time = sum of travel times from available samples X ratio of route length divided by length of TMCs with data
- Travel times from previous and next timestamps
- Travel times from neighboring TMC links
- Historical averages, free-flow speeds, or speed limits, will also be considered
- For state roads not covered in HERE:
 - Develop speed estimation model/default speeds from measured data of similar facilities by area type, facility type, volume, time of day, etc.



Conflation

- ✓ Field measured speed data from private vendor
 - ✓ 5 minutes average travel time
 - ✓ Separate car and truck data
 - ✓ Reported on TMC network
- ✓ GIS map conflation to connect to other FDOT data
 - ✓ Roadway characteristics (RCI)
 - ✓ Traffic characteristics (TCI)





Continuing Challenges

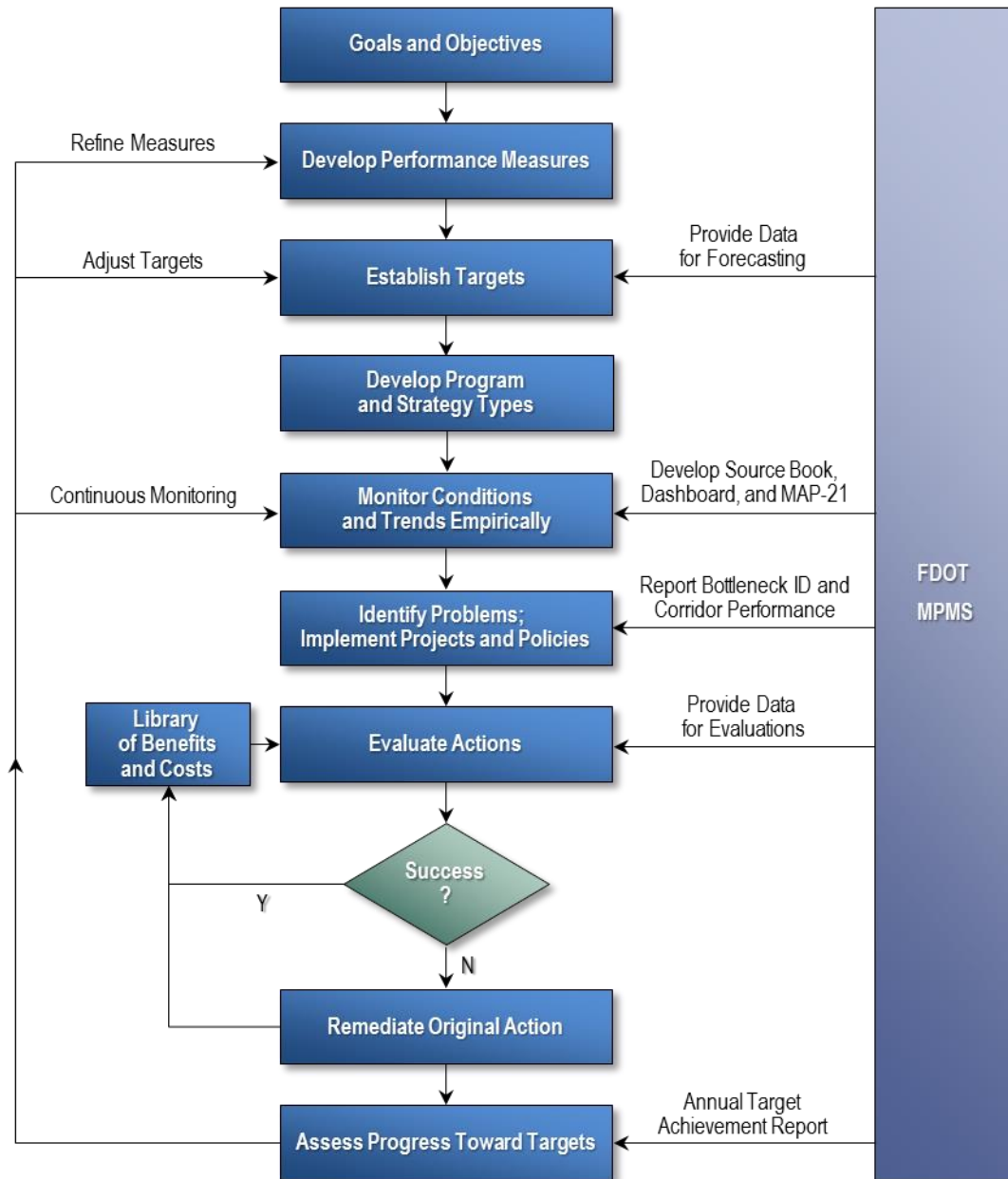
- Access to archived data – Go directly to the source
- Stakeholder doubt in results – Consider applying factors
- Be prepared for changing maps and coverage – Plan ahead and set standards
- Details, Details, Details – Know when good enough is good enough



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Figure 1. The MPMS Supports FDOT's Performance Management Process





Mobility Performance Monitoring System

- Automated data collection process from various sources in FDOT
- Storage capability to store and maintain large amounts of data
- Processing capabilities that will provide data quality checks, perform needed calculations and provide capabilities to access and manipulate data from the different sources



Mobility Performance Monitoring System

- Query and reporting capabilities that will provide information in formats required by the Source Book and other customized formats
- A maintenance process to maintain the software, hardware and links to data sources



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MPM Source Book

TAMPA TO ORLANDO I-4 CORRIDOR PERFORMANCE

From I-275 to SR 408

New Content

AADT	Vehicle Miles Traveled		Average Speed		Delay			Freight (Daily)		
111,800	Peak Hour/Period	Daily	Peak Hour/Period	Daily	Peak Hour/Period	Daily	Yearly	% Combination Truck	Combination Truck VMT	Combination Truck Delay
With a max of 152,300	1.24	8.88	57.5	66.1	2.44	7.5	2,740	5	0.53	474
	millions of miles		miles per hour		thousands of hours			percent	million miles	hours

Corridor Performance

Corridor Length
82.2 miles

Peak Hour/Period
TTR 88% TTI_{95th} 2.00

Daily
TTR 98% TTI_{95th} 1.16

Congestion Analysis

% of Travel Meeting LOS Criteria

Peak Hour/Period: 58.4%
Daily: 90.0%

% of Travel Severely Congested

Peak Hour: 16.8%
Daily: 5.3%

Facility Performance

1. I-275 to I-75

Length
8.3 miles

AADT
134,000

2. I-75 to US 27

Length
46.2 miles

AADT
92,200

3. US 27 to US 192

Length
9.4 miles

AADT
103,500

4. US 192 to FLA Turnpike

Length
12.4 miles

AADT
152,300

5. FLA Turnpike to SR 408

Length
6.1 miles

AADT
152,000

Peak Hour/Period: TTR 85% TTI_{95th} 2.51 **Average Speed** 48.9 MPH

Daily: TTR 98% TTI_{95th} 1.08 **Average Speed** 60.1 MPH

Peak Hour/Period: TTR 94% TTI_{95th} 1.38 **Average Speed** 61.5 MPH

Daily: TTR 99% TTI_{95th} 1.08 **Average Speed** 67.0 MPH

Peak Hour/Period: TTR 97% TTI_{95th} 1.14 **Average Speed** 62.0 MPH

Daily: TTR 99% TTI_{95th} 1.09 **Average Speed** 67.8 MPH

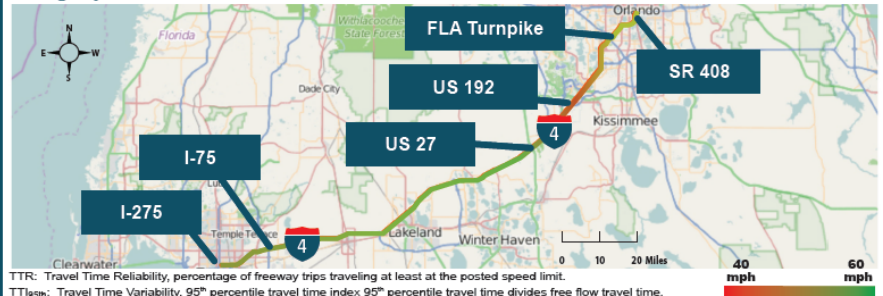
Peak Hour/Period: TTR 71% TTI_{95th} 2.52 **Average Speed** 43.9 MPH

Daily: TTR 96% TTI_{95th} 1.43 **Average Speed** 59.1 MPH

Peak Hour/Period: TTR 90% TTI_{95th} 4.02 **Average Speed** 48.3 MPH

Daily: TTR 98% TTI_{95th} 1.09 **Average Speed** 63.6 MPH

Average Speed for Peak Period



2013 MODAL PERFORMANCE SUMMARY

QUANTITY

TRANSIT ANNUAL PASSENGER TRIPS

Annual number of passenger boardings on the transit vehicles. A trip is counted each time a passenger boards a transit vehicle. Thus, if a passenger has to transfer between buses to reach a destination, the passenger is counted as making two passenger trips.

270 MILLION PASSENGERS

SEAPORT

Annual number of passengers embarking on cruise ships at Florida ports.

14.1 MILLION PASSENGERS

105 MILLION TONS

AVIATION

The total number of revenue passengers boarding aircraft, includes both originating and connecting passengers.

69 MILLION PASSENGERS

RAIL

Tons of freight carried by rail mode originated or terminated in Florida.

52 MILLION TONS

QUALITY

AVIATION RELIABILITY

Departure reliability at Florida airports is defined as "on time" if the flight departs less than 15 minutes after the scheduled time shown in the carriers' Computerized Reservations Systems (CRS).

75%

ACCESSIBILITY

PERCENT BIKE LANE/ SHOULDER COVERAGE

The percentage of centerline miles of SHS (nonfreeway) facilities that have bike lanes, paved shoulders, or shared pathways available to bicyclists.

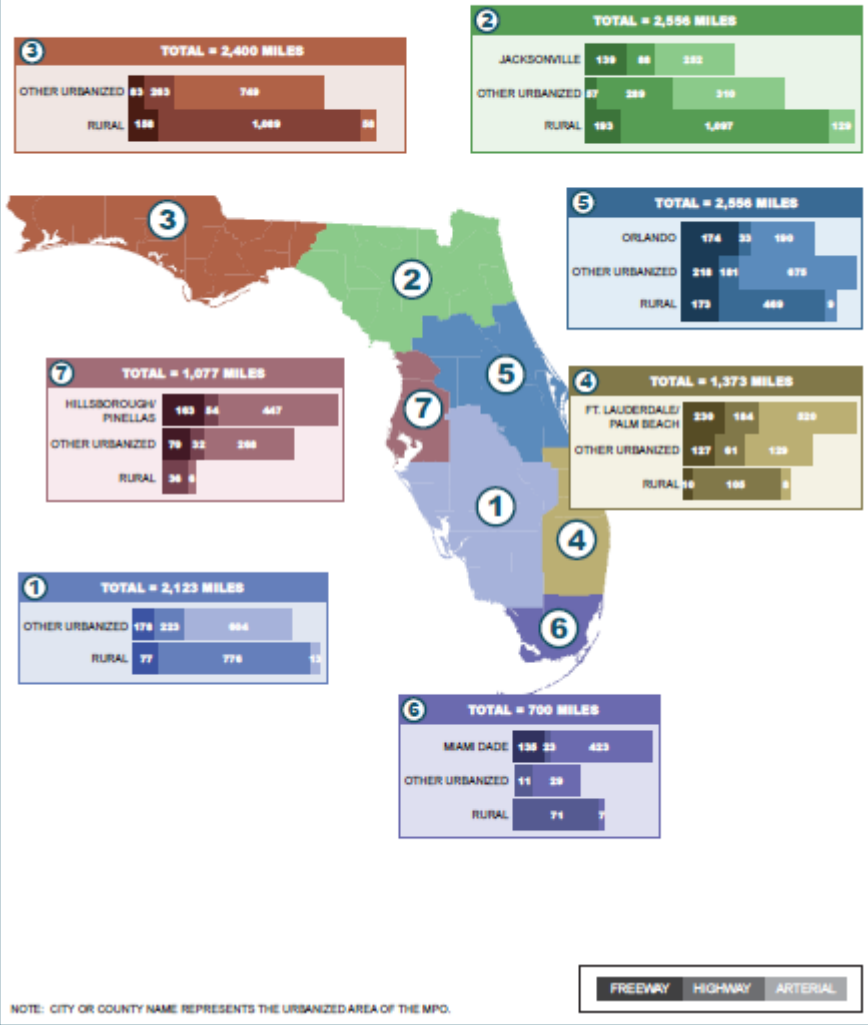
59.6%

PERCENT OF SIDEWALK COVERAGE

The percentage of centerline miles of SHS (nonfreeway) facilities in urban areas (5,000+ population) that have sidewalks and/or shared pathways available to pedestrians.

72.2%

FLORIDA ROADWAY SYSTEM



MIAMI TO FT. LAUDERDALE I-95 CORRIDOR PERFORMANCE

From U.S. 1 to I-595

AADT	Million Miles Traveled		Average Speed		Delay			Freight (Daily)		
	Peak Hour/ Period	Daily	Peak Hour/ Period	Daily	Peak Hour/ Period	Daily	Yearly	% Combination Truck	Combination Truck VMT	Combination Truck Delay
211,800 <i>With a max of 241,900</i>	0.89	5.67	34.1	55.6	3.84	11.9	4,330	5	0.26	749
	<i>millions of miles</i>		<i>miles per hour</i>		<i>thousands of hours</i>			<i>percent</i>	<i>million miles</i>	<i>hours</i>

Corridor Performance

Corridor Length

23.4 miles

Peak Period

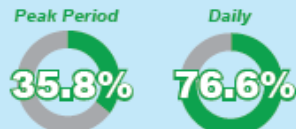
TTR **55%** TTI_{95th} **2.63**

Daily

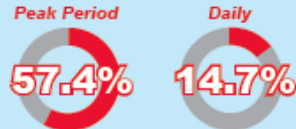
TTR **92%** TTI_{95th} **1.89**

Congestion Analysis

% of Travel Meeting LOS Criteria



% of Travel Severely Congested



Facility Performance

1. FLA Turnpike to I-595

Length 10.2 miles	Peak Period: TTR 31% TTI _{95th} 3.38 Average Speed 25.7 MPH
AADT 241,900	Daily: TTR 88% TTI _{95th} 2.18 Average Speed 51.9 MPH

2. NW 119th Street to FLA Turnpike

Length 3.4 miles	Peak Period: TTR 71% TTI _{95th} 2.73 Average Speed 38.7 MPH
AADT 216,900	Daily: TTR 91% TTI _{95th} 2.08 Average Speed 55.4 MPH

3. SR 112 to NW 119th Street

Length 5.0 miles	Peak Period: TTR 98% TTI _{95th} 1.14 Average Speed 57.9 MPH
AADT 207,800	Daily: TTR 100% TTI _{95th} 1.10 Average Speed 62.0 MPH

4. SR 836 to SR 112

Length 1.6 miles	Peak Period: TTR 61% TTI _{95th} 2.19 Average Speed 40.4 MPH
AADT 220,000	Daily: TTR 92% TTI _{95th} 1.91 Average Speed 56.8 MPH

5. US 1 to SR 836

Length 3.2 miles	Peak Period: TTR 54% TTI _{95th} 2.01 Average Speed 42.4 MPH
AADT 113,800	Daily: TTR 94% TTI _{95th} 1.73 Average Speed 59.1 MPH

Average Speed for Peak Period



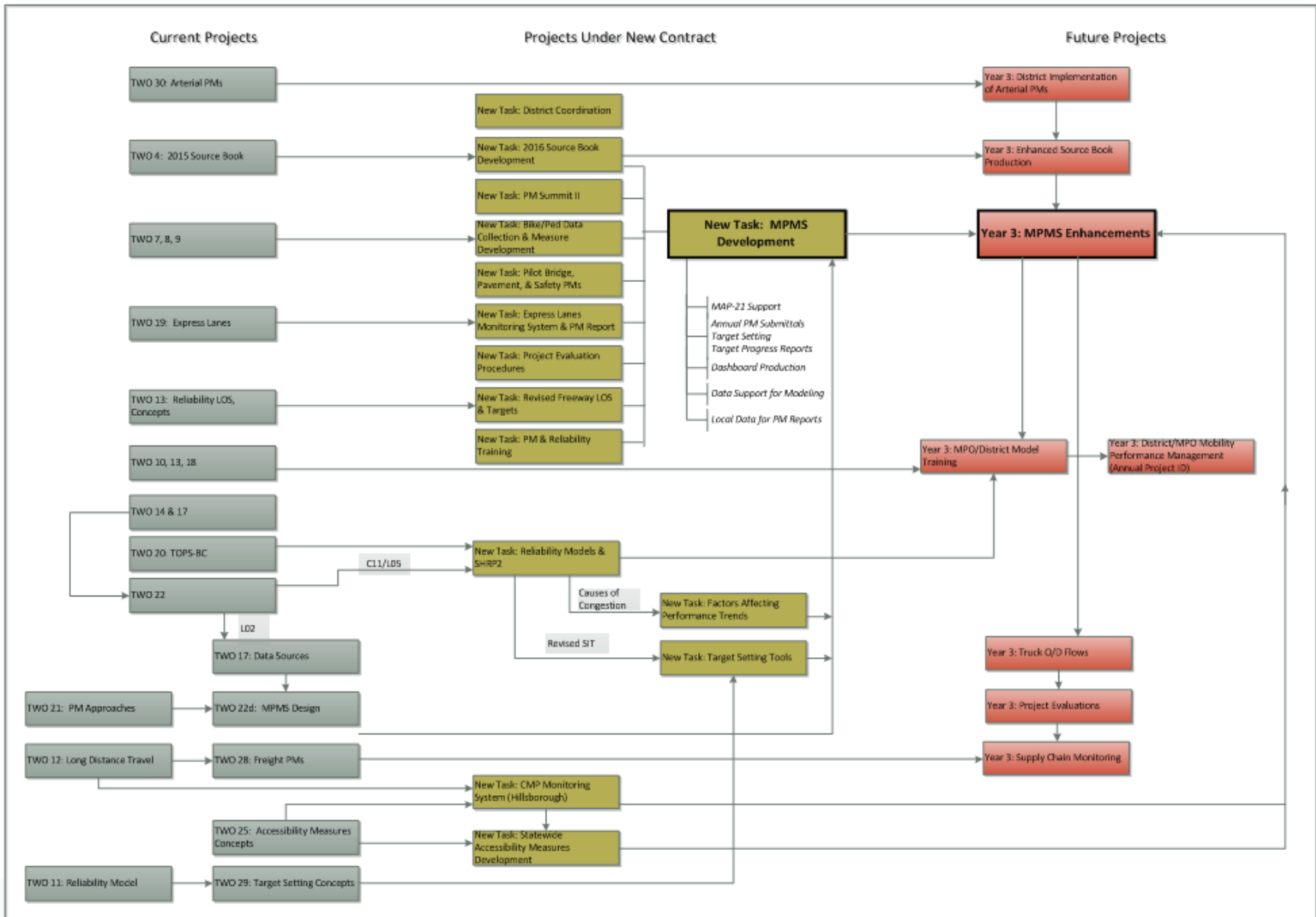
TTR: Travel Time Reliability, percentage of freeway trips traveling at least at the posted speed limit.

TTI_{95th}: Travel Time Variability, 95th percentile travel time index 95th percentile travel time divides free flow travel time.





Mobility Performance Measures System





MPM Website

<http://www.FloridaMPMs.com/>



Home

Program
Information

MPM Source Book

Meetings, Members,
Materials

Work Products

Contact

Florida's Mobility Performance Measures