

FDOT Mobility Performance Measures Program

Consensus Items

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Table of Contents

1.0	Introduction	1-1
2.0	Summary of Outreach	2-1
3.0	Consensus Items	3-1
3.1	Purpose of a Mobility Performance Measures Program	3-1
3.2	Multimodal Mobility Performance Measures	3-1
3.3	Reporting of Mobility Information.....	3-2
	Multimodal Mobility Performance Measures Source Book.....	3-2
	MAP-21	3-2
3.4	Roles of Central Office, Districts and MPOs.....	3-3
3.5	Definitions	3-4
3.6	Future Direction.....	3-4
A.	Current 2017 Mobility Performance Measures Matrix	A-1
B.	Definitions	B-1

1.0 Introduction

The Florida Department of Transportation has a Mobility Performance Measures (MPM) program to develop and report on multimodal mobility performance measures. The objective of the program is to develop and regularly update measures, analytic and reporting techniques for measures in every mode (freight, auto/truck, transit, pedestrian, bicycle) and to ensure they are in accordance with state of the art practices and national guidelines related to mobility performance measurement.

The program can be described through several key components as follows:

- Purpose of a Mobility Performance Measures Program
- Performance measures from a multimodal perspective
- Reporting and sources of data
- Roles of Central Office, Districts and MPOs
- Definitions
- Future direction

The details of these components have been discussed with various groups including FDOT Central and District offices and MPOs throughout the State. This report documents the outreach process and presents the results of the consensus-building process in terms of agreed upon elements of the six key components above.

2.0 Summary of Outreach

The proposed purpose, measures, definitions, mechanisms for reporting, roles and plans for future direction of the MPM program have been presented and discussed over the last five years with the following groups.

- FDOT Mobility Performance Measures Team
- Florida Metropolitan Planning Organization Advisory Council (MPOAC)
- Mobility Performance Measures Summits
- FDOT Travel Time Reliability Coordination Group - Multimodal Coordination Team
- FDOT Districts 1, 2, 3, 4, 5, 6, 7, and Turnpike Planning, Modal Development and Operations Offices

3.0 Consensus Items

The following items summarize the MPM program and they consider all comments received and discussed with stakeholders.

3.1 PURPOSE OF A MOBILITY PERFORMANCE MEASURES PROGRAM

The purpose of the MPM program at FDOT is to:

- Develop statewide MPMs for use by transportation and other partners across the State
- Help ensure consistency in understanding and approach by the State and MPOs through a consensus-building process
- Help comply with MAP-21 requirements related to mobility measures
- Help in evaluating alternatives and prioritizing projects in planning and programming processes

It is understood that the Forecasting and Trends Office within FDOT is responsible for reporting on the MPMs annually for the State through the FDOT *Multimodal Mobility Performance Measures Source Book*. Other offices and MPOs can use the measures and results in their own planning and programming processes. Note that MAP-21 is primarily a highway-oriented bill, and as such, the MPMs are largely oriented to the auto and truck modes. Future iterations may evolve with increased emphasis on other modes such as transit, aviation, and rail.

3.2 MULTIMODAL MOBILITY PERFORMANCE MEASURES

Multimodal mobility performance measures represent one aspect of FDOT's overall performance measures program. A matrix of MPMs will be reported on regularly. The matrix includes freight and people components and is divided into four dimensions of mobility: quantity, quality, accessibility, and utilization. Appendix A contains the current measures proposed to be reported in 2017. The current measures are shown for people (highway (auto/truck), transit, pedestrian, bicycle, aviation, rail and seaports) and freight (auto/truck, aviation, rail, seaports.) The four dimensions stratify the measures and reporting periods (peak hour, peak period, daily and yearly) are indicated for each measure. The matrix indicates which measures FDOT is proposing to be reported for MAP-21 purposes in bold type. Additional measures will be added as they are developed.

The measures are provided as recommendations. An agency may wish to revise how the measures are reported, for example: Vehicle miles travelled *per capita*.

3.3 REPORTING OF MOBILITY INFORMATION

Multimodal mobility performance measures are currently reported in FDOT's *Multimodal Mobility Performance Measures Source Book*. When FHWA finalizes the required MAP-21 measures, FDOT will also report on and provide measures to the Districts and MPOs as described below in the MAP-21 section.

Multimodal Mobility Performance Measures Source Book

The primary source of information and analysis is the *Multimodal Mobility Performance Measures Source Book*. The *Source Book* is intended to be published every September. It is anticipated that MPOs and District offices will refer to and use the *Source Book* for their own reporting.

The measures are provided by facility and area types as appropriate. Most measures are reported for National Highway System (NHS), Interstate, State Highway System (SHS), Strategic Intermodal System (SIS), freeways, non-freeways and by state and urbanized, county, planning and regional boundaries.

Auto and freight travel time reliability and variability are provided only on freeways for the state, and urbanized, county, planning and regional boundaries.

For more information, please refer to <http://www.dot.state.fl.us/planning/statistics/sourcebook/>

In 2017, FDOT will provide the MPOs with a state of the system analysis similar to FDOT's Source Book. The measures reported for the individual MPOs will align with other performance measures reported by FDOT, with particular emphasis on those measures in the Source Book. Through this effort, the Metropolitan Planning Organization Advisory Committee (MPOAC), partner organizations, and other stakeholders will be able to access these measures to report on the collective MPO system in Florida or specific regions. Approximately 15 performance measures will be selected for each of Florida's 27 MPOs based on feedback from the MPOs and MPOAC staff. It is FDOT's intent to report on all the measures required by MAP-21 (see below section), additional measures will be reported annually and others at 2 to 5 year intervals, such that 10 measures will be provided in any given year. The majority of measures will be available yearly. In the event new data is not available annually or the indicator shows minimal annual movement, measures will be reported at longer intervals.

MAP-21

The Department's intent is to supply the MPOs with data for all required MAP-21 mobility performance measures. In November 2015, the then Transportation Statistics Office provided the following to districts to transmit to the MPOs in

anticipation of required MAP-21 reporting. When the rules from the MAP-21 are finalized, the list will be changed and updated.

- Vehicle Miles Traveled (daily and peak hour)
- Combination Truck Miles Traveled (yearly)
- % Travel Meeting LOS Criteria (peak hour, peak period, daily)
- Travel Time Reliability - People (peak hour, peak period, daily)
- Delay (peak period, daily, yearly)
- Travel Time Reliability – Freight (peak period)
- Combination Truck Delay (daily)

It is FDOT’s intent to provide these for the State as a whole, by National Highway System, Interstate, all freeways and non-freeway facility types for each MPO area and for groups of urbanized areas served by more than one MPO. (“FHWA smoothed urbanized area” boundaries will be used.) In addition, information will also be provided on the SIS, SHS, and for each county of an urbanized area. Note that measures will not be provided by district.

3.4 ROLES OF CENTRAL OFFICE, DISTRICTS AND MPOs

FDOT and MPOs will be responsible for developing/reporting on their own:

- Multimodal mobility performance measures
- Performance targets
- Performance plans

The consensus measures and definitions contained in this document are designed for use by all stakeholders.

The FDOT Central Office Forecasting and Trends Office will:

1. **Coordinate statewide efforts** on MPM Program.
 - a. Lead the development and update of the measures and analysis techniques
 - b. Be the primary/office source of mobility measures for Florida
 - c. Conduct and share research activities and District case studies through the State with all stakeholders
 - d. Field technical questions from Districts and MPOs
2. **Produce and report on statewide MAP-21 measures** – This will be done in compliance with MAP-21 and will include the development of performance targets and performance plans. The reports and information will be provided to Central Office Transportation and Data Analytics Office for the Highway

Performance Monitoring System, and to the MPOs directly (with a copy to the Districts). Coordination with Office of Policy Planning MPO Coordinator will also occur.

3. **Produce the annual *Multimodal Mobility Performance Measures Source Book*** every September. The measures and reporting periods are shown in the proposed 2017 MPM Matrix (Appendix A).
4. **Provide additional MPMs** on a case-by-case basis (as requested).
5. **Lead the development of mobility measure targets** at the State level and **support MPOs** in their target development.
6. **Develop and provide training.**

FDOT District Offices will:

1. **Provide input** to Central Office on the MPM program
2. **Coordinate with MPOs and MPO Alliances**
3. **Provide technical support**
4. **Implement FDOT projects/programs** to implement Federal and State goals/objectives and document those activities.
5. **Develop own MPMs** within and across districts, as appropriate.
6. Share MPM data with other partners

MPOs will:

1. **Develop and use their own MPMs**, as appropriate.
2. **Comply with MAP-21.**
 - a. Use calculated results provided by FDOT, if desired
 - b. Develop performance targets
 - c. Report to FHWA as required
 - d. Include measures in long range transportation plans (LRTPs) and congestion management plans (CMPs) to evaluate alternatives
 - e. Coordinate with other MPOs, as appropriate

3.5 DEFINITIONS

A set of MPM-related definitions is included in Appendix B. It is recommended these FDOT definitions be used as much as possible for statewide consistency.

3.6 FUTURE DIRECTION

In addition to the roles and responsibilities listed above, FDOT Central Office will take the lead on the following activities:

- Refine the MPMs and coordinate with the stakeholder groups
- Develop and deliver a Training and Users Guide on multimodal mobility performance measures and performance based planning
- Conduct research related to application of Strategic Highway Research Program (SHRP2)
- Coordinate development of targets and address issues related to timing and other planning documents
- Investigate the linking of the Source Book with FDOT's Trends and Conditions process so that a more comprehensive "Source Book" is implemented

A. Current 2017 Mobility Performance Measures Matrix

Mode	QUANTITY	Reporting Period				QUALITY	Reporting Period				ACCESSIBILITY	Reporting Period				UTILIZATION	Reporting Period							
		PH	PP	D	Y		PH	PP	D	Y		PH	PP	D	Y		PH	PP	D	Y				
PEOPLE	Auto/ Truck	Vehicle Miles Traveled					% Travel Meeting LOS Criteria	X	X	X		Time Spent Commuting					% Travel Heavily Congested	X	X	X				
				X		X	% Miles Meeting LOS Criteria	X	X															
							Travel Time Reliability	X	X	X					X									
							Travel Time Variability	X	X	X														
							Vehicle Hours of Delay	X		X	X													
							Person Hours of Delay	X		X	X													
							Average Travel Speed	X	X															
	Person Miles Traveled	X	X					Vehicle Fatalities and Serious Injuries (new)				X	Number of Jobs Accessible by Auto (new)				X	Hours Heavily Congested			X	X		
								Vehicle Crash Rates (new)				X												
							X									X						X		
	Transit	Revenue Miles (new)				X	Revenue Miles between Failures (new)				X	Weekday Span of Service				X	Passenger Trips Per Revenue Mile				X			
		Passenger Trips				X										X								
	Pedestrian						Level of Service (LOS)	X				% Sidewalk Coverage				X								
							Pedestrian Fatalities and Serious Injuries (new)				X													
Bicycle						Level of Service (LOS)	X				% Bike Lane/Shoulder Coverage				X									
						Bicyclist Fatalities and Serious Injuries (new)				X														
Aviation	Passengers				X	Departure Reliability				X					Demand to Capacity Ratios				X					
Rail	Passengers				X	Departure Reliability				X														
Seaports	Passengers				X																			
PEOPLE & FREIGHT	Auto/ Truck														% Miles Heavily Congested	X	X							
	Aviation										Highway Adequacy (LOS)	X			Vehicles Per Lane Mile	X								
	Rail										Highway Adequacy (LOS)	X												
	Seaports										Highway Adequacy (LOS)	X												
FREIGHT	Truck	Combination Truck Miles Traveled			X		Travel Time Reliability	X	X	X						Combination Truck Backhaul Tonnage				X				
		Truck Miles Traveled		X			Travel Time Variability	X	X	X														
		Combination Truck Tonnage				X	Combination Truck Hours of Delay			X														
		Combination Truck Ton Miles Traveled				X	Combination Truck Average Travel Speed	X	X															
		Value of Freight			X		Combination Truck Cost of Delay				X													
	Aviation	Tonnage				X																		
		Value of Freight				X																		
	Rail	Tonnage				X						Active Rail Access				X								
		Value of Freight				X																		
	Seaports	Tonnage				X						Active Rail Access				X								
Twenty-foot Equivalent Units					X																			
	Value of Freight				X																			

PH= peak hour; PP=peak period; D=daily; Y=yearly

B. Definitions

95th percentile travel time - The travel time that is higher than 94% of observations or equivalently lower than 4% of the average speed observations (also known as planning time index).

Accessibility (a dimension of mobility) - conceptually the ease in engaging in activities; ability to reach desired destinations, activities, goods, and services - performance measures typically associated with this mobility dimension are:

- Time, distance or cost to reach a destination
- Modal choices/alternatives
- Connectivity
- Number of transfers (transit)

Auto (automobile) - a highway travel mode that includes motor vehicle traffic including motorcycles, passenger cars, and four tire, single units (FHWA Vehicle Category Classification, Classes 1- 3 (See Appendix D)).

Auto/Truck - a combination of the auto and truck modes (FHWA Vehicle Category Classification Classes 1-13).

Average travel speed - The length of the highway segment divided by the average travel time of all vehicles traversing the segment, including all stopped delay times.

Aviation - mode relating to the transportation of people and goods by aircraft.

Benchmark - a common reference point used for comparisons for performance measures practices.

Bicycle - a mode comprised of vehicles with two wheels tandem, propelled by human power.

Bikeway - a bicycle path physically separated from motorized traffic by an open space or barrier, either within the highway right-of-way or within an independent right-of-way.

Bottleneck - a segment of a transportation network that consistently experiences significant operational problems such as oversaturated congestion.

Buffer Time Index - a travel time reliability performance measure defined by the ratio of an actual travel time (typically the 95th percentile travel time) to the average travel time. Conceptually represents the extra travel time (or time cushion) travelers must add to their average travel time when planning trips to ensure on-time arrival (note: this measure is not recommended for statewide reporting of travel time reliability or in project prioritization).

Bus – a highway travel mode operated by rubber-tired vehicles that follow fixed routes and schedules along roadways (FHWA Vehicle Category Classification Class 4).

Capacity (for auto/truck modes) – the maximum number of vehicles that reasonably can be expected to traverse a point or a uniform section of roadway during a given time period under prevailing conditions.

Capacity (for other modes) – To be added in future.

Combination truck – a truck consisting of a tractor and trailer (FHWA Vehicle Category Classification Classes 8-13).

Congestion (congested conditions) (for the auto/truck modes) – a condition in which traffic demand causes crowding of vehicles.

Adjectives describing the severity of congestion are:

- Mild
- Moderate
- Heavy
- Severe

Adjectives describing the types of congestion are:

- Non-recurring
- Recurring

Container – a large, standard sized metal box into which cargo is packed for shipment. (see definition of twenty-foot equivalent unit)

Context measure – see Indicator.

Corridor (for auto/truck modes) – (1) a set of essentially interrelated, parallel transportation facilities for moving people and goods between two points; (2) a geographic area used for the movement of people and goods; (3) highway, rail line, waterway, bikeway and other exclusive-use facilities that connect major origin/destination markets.

Delay (for auto/truck modes) – (1) additional travel time beyond some norm (e.g., LOS C in urbanized areas, LOS B elsewhere) experienced by a traveler; (2) any additional travel time experienced by a traveler.

Delay (for other modes) – to be added in future.

Demand – the number of persons or vehicles desiring to use a mode or facility.

Demand to capacity ratio – see volume to capacity ratio.

Enplanements – passenger boardings at airports.

Facility (for auto mode) – a length of roadway composed of points and segments.

Free flow speed (for auto/truck modes) – the average speed of vehicles on a given segment, measured under low-volume conditions, when drivers are free to drive at their desired speed and are not constrained by the presence of other vehicles or downstream traffic control devices; typically 5 mph over the posted speed limit.

Free flow time (for auto/truck modes) – the average time spent by vehicles traveling at the free flow speed over a facility length.

Freeway – a multilane, divided highway with at least two lanes for exclusive use of traffic in each direction and full control of ingress and egress.

Freight – any commodity being transported.

Goal – the description of a desired outcome. The purpose toward which an endeavor is directed, integral to organization mission. (e.g., provide safe and secure transportation across modes.)

Heavy congestion (for auto/truck modes on freeways) – a situation in which average travel speeds are in the range from 20-44 mph.

Heavy vehicle (truck and bus modes) – a vehicle meeting FHWA Vehicle Category Classification Classes 4-13.

Highway – a general term for denoting a public way for purposes of vehicular and people travel, including the entire area within the right-of-way.

Highway modes – methods of motorized and non-motorized travel that may utilize a highway, specifically auto, bicycle, bus, pedestrian, and truck.

Indicator (also known as context measure) – a type of mobility performance measure which is used to identify relevant background conditions and trends.

Intermodal – related to the connection between two or more modes of transportation.

Lane miles – The product of the centerline miles and the number of lanes.

Level of service (LOS) – a quantitative stratification of the quality of service to a typical traveler of a service or facility into six letter grade levels, with “A” describing the highest quality and “F” describing the lowest quality.

Mild congestion (for auto/truck modes on freeways) – a situation in which average travel speeds are in the range from 55-59 mph.

Mobility – the movement of people and goods.

Mobility performance measure – a metric that quantitatively describes something about one of the four dimensions of mobility (quantity, quality, accessibility, utilization). Measures can be considered as one of two types:

- a mobility metric directly tied to achieving a goal or objective or used in a decision making process; or
- an indicator or context measure which is used to identify relevant background conditions and trends

Mode – a means of moving people or goods.

Moderate congestion (for auto/truck modes on freeways) - a situation in which average travel speeds are in the range from 45-54 mph.

Motor carrier – a firm engaged in providing commercial motor freight or long distance trucking.

Multimodal – more than one travel mode including potentially the four highway modes (auto/truck, bicycle, bus/transit, and pedestrian), aviation, rail, and seaports.

National Highway System (NHS) - Includes the Interstate Highway System as well as other roads important to the nation’s economy, defense, and mobility

Non-recurring congestion (for auto/truck modes) – congestion caused by unexpected disruptions or other events, particularly lane blocking incidents.

Objective – A specific, quantifiable statement that clearly relates to a goal; states a desired direction (e.g., reduce the rate of injuries).

On-time arrival - A travel time reliability performance measure defined by a designated travel time (typically, for freeways based on a 45 mph speed or 1.33 travel time index); conceptually represents a trip that arrives within a defined travel time.

Paratransit (or demand response) - Forms of transportation service that are more flexible and personalized than conventional fixed route, fixed schedule transit service; typically utilized to accommodate passengers who are older or disabled and unable to use the fixed route service.

Passengers (for aviation, rail, seaports, transit modes) – people in a vehicle making use of a mode.

Peak hour – (1) the hour in which the greatest amount of travel occurs (typically considered 5:00-6:00 p.m. on a weekday); (2) the hour in which the greatest amount of travel occurs for a mode.

Peak period – (1) a multi-hour period in which travel is greatest and (2) for the auto mode in large urbanized areas the two-hour weekday time period of 5:00-7:00 p.m. at which congestion is typically highest.

Pedestrian - an individual traveling on foot.

Performance based planning – application of performance management principles to transportation system policy and investment decisions.

Performance measure – a metric that quantifies an agency’s progress in meeting stated goals and objectives.

Planning time index - a travel time reliability performance measure defined by the ratio of an actual 95th percentile travel time to the free flow travel time. Conceptually represents the congested travel time travelers must spend compared to an uncongested travel time to arrive at their destination on time 95% of the time

(a value of 3.00 indicates a traveler should allow 60 minutes to make an important trip that takes 20 minutes in uncongested traffic).

Quality (a dimension of mobility) - conceptually how well people or goods are being transported – performance measures typically associated with this mobility dimension are:

- Average travel speed
- Travel time reliability
- Vehicle delay
- Level of service

Quality of service – a user based perception of how well a service or facility is operating.

Quantity (a dimension of mobility) - conceptually the number of people or goods being transported – performance measures typically associated with this mobility dimension are:

- Person trips
- Person miles traveled
- Vehicle miles travel
- Truck miles traveled
- Tonnage

Rail - Relating to the transportation of people and goods by train.

Recurring congestion (for auto mode) – the routine presence of congestion on a facility.

Reliability – see travel time reliability.

Seaport - relating to the transportation of people and goods by waterborne vessels.

Severe congestion (for auto/truck modes on freeways) - a situation in which average travel speeds are below 20 mph.

Single unit truck - a truck without a trailer (FHWA Vehicle Category Classification Classes 5-7).

Stable flow – a flow of traffic on freeways, which is not stop-and-go.

Strategic Intermodal System (SIS) – Florida’s transportation system composed of facilities and services of statewide and interregional significance, including appropriate components of all modes.

System – a combination of facilities or services forming a network or being selected for analysis.

Target – a value of a performance measure representing the level of desired performance reflecting an agency’s goals and objectives.

Throughput – the maximum number of people or vehicles that reasonably can be expected to traverse a point or a uniform transportation facility section during a given time period under prevailing conditions.

Transit – a travel mode in which vehicles (including busses, streetcars, light rail, metro rail, and commuter rail) stop at regular intervals along the roadway or exclusive right-of-way to pick up and drop off passengers.

Travel time – the total time spent getting from one point to another.

Travel time index - a performance measure defined by the ratio of an actual travel time to the free flow travel time. Conceptually represents the congested travel time travelers must spend compared to an uncongested travel time.

Travel time reliability – (1) the percent of trips that succeed in accordance with a predetermined performance standard for time or speed; and/or (2) the variability of travel times that occur on a facility or a trip over a period of time – frequently used performance measures are:

- Buffer index
- On-time arrival
- Planning time index
- Travel time index

Travel time variability – see travel time reliability.

Truck – a vehicle engaged primarily in the transport of goods and materials (FHWA Vehicle Category Classification Classes 5-13; excludes “pick-up trucks”).

Twenty-foot equivalent unit – the eight-foot by eight-foot by twenty-foot intermodal container used as a basic measure used for container cargo.

Urban - An area with a population of at least 5,000 people.

Urbanized area - An area with a population of at least 50,000 people.

Utilization (a dimension of mobility) - conceptually how efficiently the system is being used- performance measures typically associated with this mobility dimension are:

- Volume to capacity ratios
- Percent miles severely congested
- Percent travel severely congested

Vehicle – a motorized mode of transportation.

Vehicle miles traveled (for auto/truck modes) – the total number of miles traveled by vehicles using a highway system.

Volume to capacity ratio – the ratio of demand to capacity.