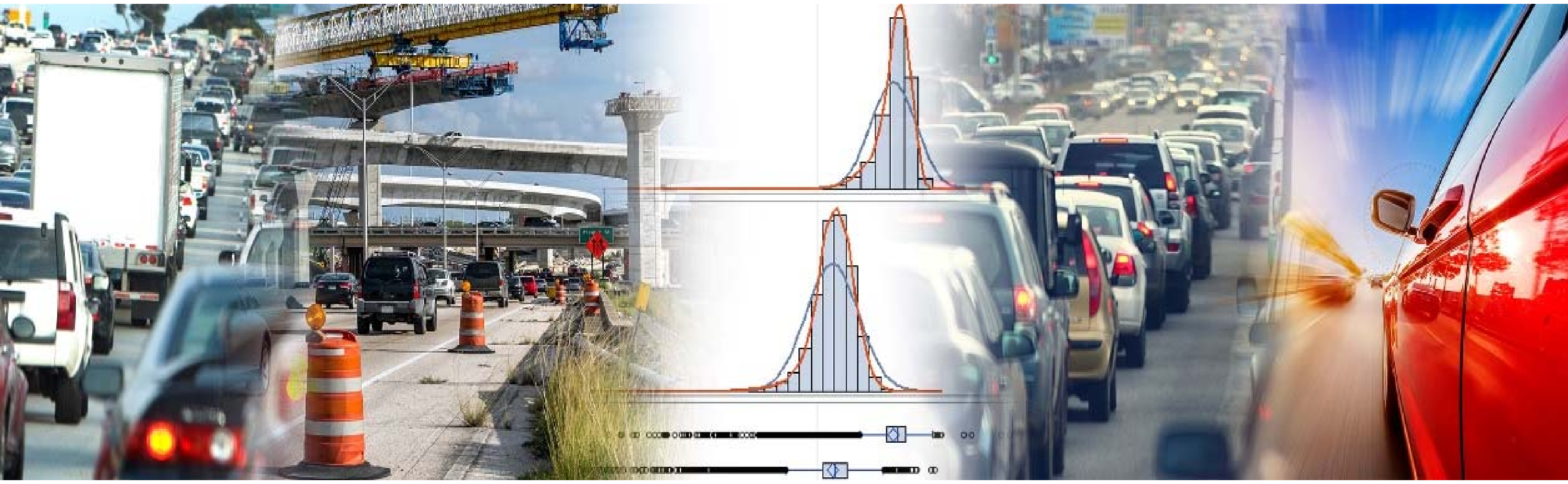
GUIDE Planning for Travel Time Reliability



Florida Department of Transportation

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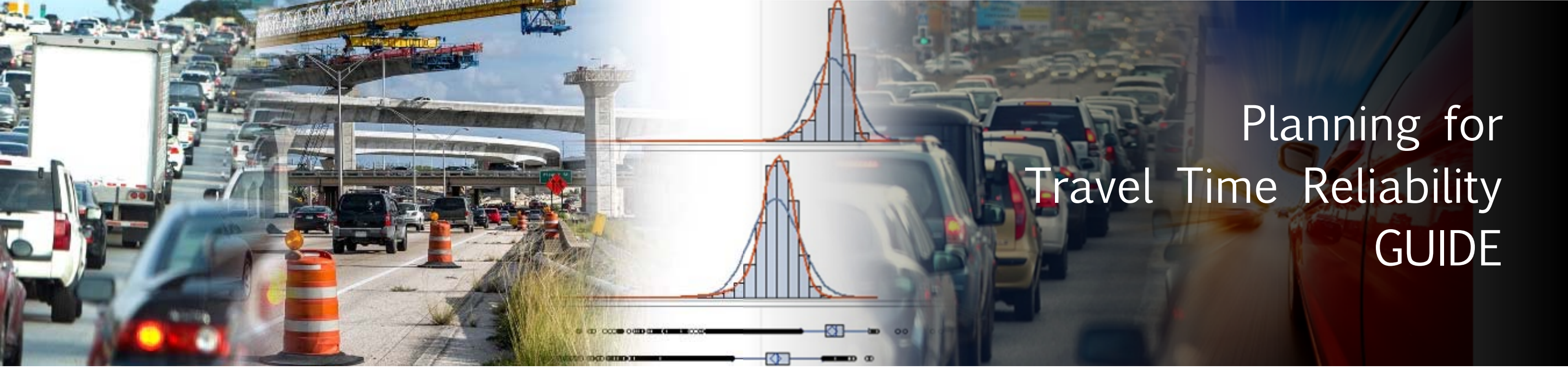

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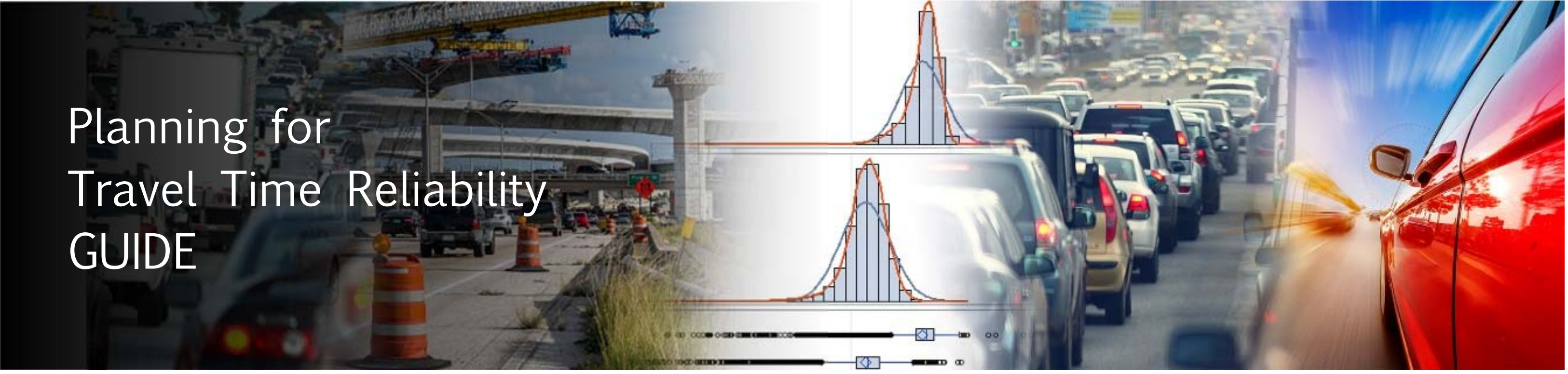

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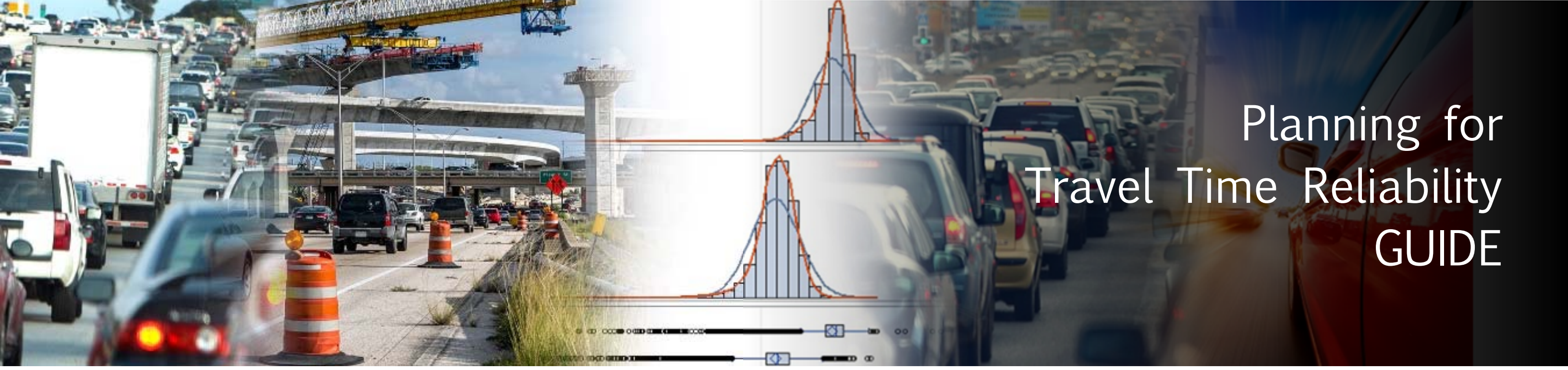


Executive Summary

Travel Time Reliability (TTR) has emerged as a crucial aspect to understanding the traveler's experience; hence, monitoring and planning for reliability have become important activities for State DOTs. In addition, the Moving Ahead for Progress in the 21st Century Act (MAP-21) emphasizes a national performance based planning process with a focus on performance measures and in particular, travel time reliability. Through its robust Mobility Performance Measures Program, the Florida Department of Transportation (FDOT) has been a pioneer in developing performance measures that address reliability. Likewise, the agency has developed a mature Transportation Systems Management & Operations (TSM&O) program and is currently working to maximize efforts to incorporate TSM&O improvements into planning and corridor studies.

Building upon these achievements, this Planning for Travel Time Reliability Guide seeks to provide FDOT employees and consultants with tools to better understand how travel time reliability is incorporated in FDOT's planning process for capacity expansion, the planning process for operational improvements, where there are opportunities for collaboration and tools for incorporating travel time reliability, and how to fund improvements that address travel time reliability.

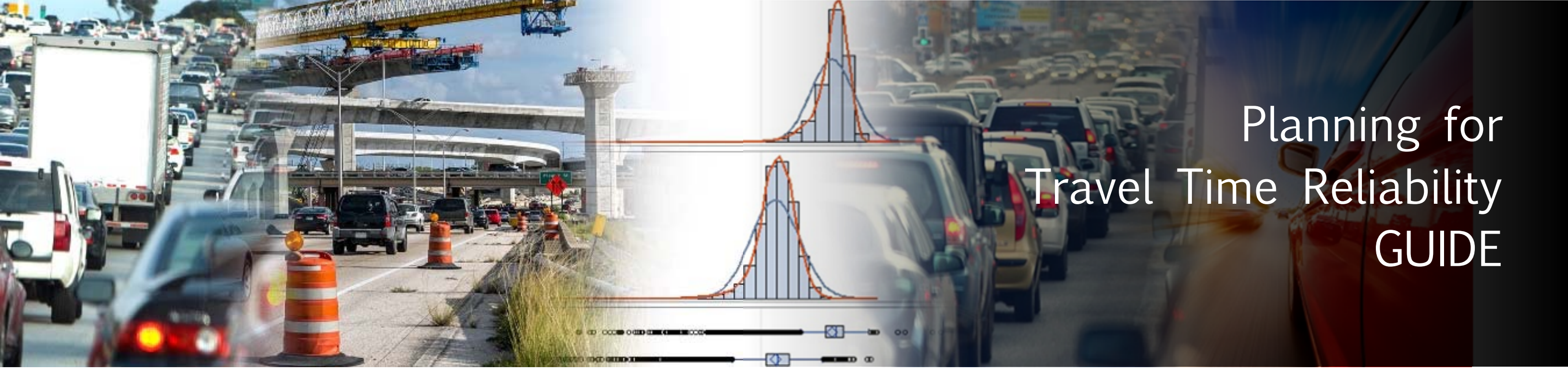
Section 1 – Introduction - Sets the context in which this Guide is developed, addresses its intended audience, and explains the purpose of this Guide.

Section 2 – Performance Measures - Presents the different performance measures that address travel time reliability, summarizes the Mobility Performance Measures Program and how it incorporates travel time reliability. It also describes the performance monitoring efforts by the FDOT Operations Office.

Section 3 – Planning Processes - Describes FDOT's planning and programming processes that are in place to add capacity and operational improvements, identifying where and how travel time reliability can be better incorporated.

Section 4 – Funding Sources - Explains the intricate funding mechanisms available to fund projects, with a focus on funding for operational improvements. Findings are that these processes are complicated and although there are eligible funding sources, there does not appear to be consistent awareness by Department personnel of the funds available or application of funding availability. In addition, funding Operations and Maintenance (O&M) has been a challenge for some districts. At the time of this writing, Central Office is working on securing more consistent O&M funding sources.

Section 5 – Tools - Presents methods for adapting FDOT's current traffic analysis toolset to produce reliability estimates and to account for the effect of operations projects. It addresses the relationship between reliability and capacity expansion, explores capacity equivalencies for operational improvements, introduces various analytical tools, and addresses benefit-cost analysis for reliability.



Introduction 1

The purpose of this Planning for Travel Time Reliability Guide is to provide a reference of tools, methods and funding mechanisms for applying travel time reliability (TTR) performance measures in planning and programming within the Florida Department of Transportation (FDOT). The concept of travel time reliability is crucial for planning, evaluating and managing operations projects because measures of travel time reliability are able to reflect changes in performance because of key causes of unreliable travel such as fluctuating demand, incidents, weather, events and work zones.

Projects that include improvements to address TTR can take many forms. While capacity projects do in fact improve TTR, operations projects are usually significantly less resource intensive and more cost-effective. For the purpose of this Guide, operations projects are defined as those included in Transportation Systems Management and Operations (TSM&O). TSM&O is an integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system. For the purposes of this Guide, operations projects can be defined as:

- TSM&O arterial strategies: including Advanced Traffic Management Systems (ATMS) consisting of Intelligent Transportation System (ITS) and software investments; Active Arterial Management, such as adaptive traffic control and dynamic signal retiming for special events; and multimodal projects such as transit signal priority and queue jump projects.

- TSM&O freeway oriented improvements including variable speed limits; hard shoulder running; ramp signals; and managed lanes.

- Others that apply to both freeways and arterials including Incident Management, severe incident response vehicles, rapid incident scene clearance and work zone traffic management and provision of weather and traveler information.

FDOT has taken great strides in the development and coordination of mobility performance measures over the past several years – including extensive research on travel time reliability. FDOT has a mature TSM&O program and is working towards incorporating TSM&O into planning and corridor studies. This Guide builds on the current efforts and assembles all relevant topics to ensuring operations is fully evaluated with travel time reliability as a measure in the planning and programming processes.

The primary audience for this Guide is intended to be FDOT employees and consultants working in District or Central Office Planning, TSM&O and Traffic Operations offices. Other offices involved in planning and programming TSM&O projects such as within Intermodal Systems Development (ISD), Project Development and Environment (PD&E), Design, and Work Program may also find this Guide informative. This Guide may also be of interest to Metropolitan Planning Organization's (MPO's) within Florida.

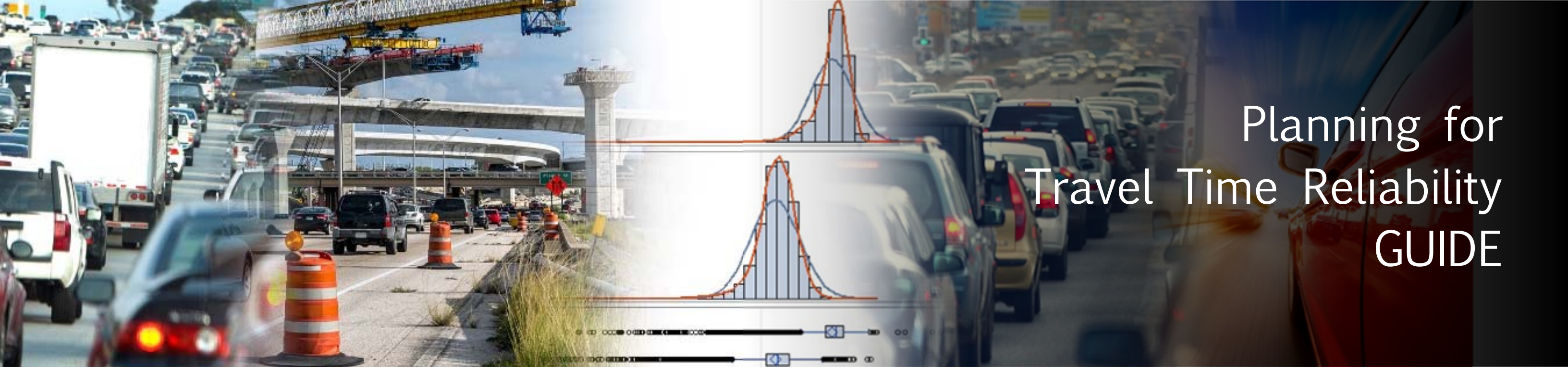
The research to develop this Guide was conducted under a contract executed by the FDOT Office of Data and Analytics and funded by FHWA under the second Strategic Highway Research Program (SHRP2). This Guide essentially implements SHRP L05: Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes for FDOT.

> This guide addresses some of the key gaps and challenges currently faced by planners and operators in using travel time reliability to assess, incorporate, and program operations projects.

This Guide is not intended to be a step-by-step description of how to conduct planning studies or analyses with travel time reliability. Instead, it addresses some of the key gaps and challenges currently faced by planners, engineers, and operators in using travel time reliability to assess, incorporate, and program operations projects. This Guide also provides reference to other relevant planning and operations documents within FDOT.

The remainder of the Guide is organized in the following sections:

- **Section 2 - Performance Measures** – Description of travel time reliability measures and how they are used in FDOT
- **Section 3 - Planning Processes** – Brief description of planning process and studies at Central and District Planning office levels – with a focus on where and how travel time reliability can be incorporated
- **Section 4 - Funding Sources** – Description of funding categories eligible for operations projects
- **Section 5 - Tools** – Description of analysis tools, applicability and how to best incorporate travel time reliability
- **Appendix A. Resources** – Resources within FDOT on this topic (TSM&O Strategic Plan, TSM&O Blueprint, etc.)
- **Appendix B. Programming Processes** – Additional detail regarding FDOT Work Program processes.



Performance Measures 2

Definition

According to SHRP L05 (Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes): “The reliability of the transportation system refers to the uncertainty or variability that system users experience in the time it takes to travel from one place to another – from home to work, from producer to consumer, and from any location to another.”

Travel time reliability is the ability to reach a destination on time and can be assessed using different approaches. For automobiles, travel time reliability can be represented by the percent of trips that succeed in accordance with a predetermined performance standard for time or speed (e.g. percent of traffic above 45 MPH). It can also be a measure that captures the variability of travel times occurring on a facility or a trip over a period of time – frequently used performance measures of variability are median travel time index (TTI_{50}), planning time index (TTI_{95}), and buffer index.

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For automobiles, travel time reliability can be represented by the percent of trips that succeed in accordance with a predetermined performance standard for time or speed (e.g. percent of traffic above 45 MPH).

This section discusses how travel time reliability measures are used within the Department.

Mobility Performance Measures Program

In an effort to monitor performance and ensure accountability, FDOT has been a pioneer in transportation performance management and has maintained a Mobility Performance Measures Program for nearly 20 years. As part of this effort FDOT Office of Data and Analytics publishes a yearly Multimodal Mobility Performance Measures Source Book, a compendium of current and historical multimodal data and analysis describing the performance of Florida's transportation system. Its purpose is to be the primary source of mobility performance measures results for the State of Florida.

These mobility performance measures are used to report system performance to FDOT management, FHWA, and the public. The measures and derived data are also used by other FDOT offices to conduct capacity analyses, assess project impacts, and refine project designs. The Source Book is published annually and represents data and analysis for the State Highway System (SHS), which includes the Strategic Intermodal System (SIS). Major modes considered in the Source Book are automobile, aviation, bicycle, pedestrian, transit, and truck. The Source Book uses the four primary dimensions of mobility as defined by FDOT's Mobility Performance Measures Program:

QUANTITY of travel

How much freight is moved and how many people are served

QUALITY of travel

How good or bad the travel experience is

ACCESSIBILITY provided by the transportation system

The ease in engaging in activities

UTILIZATION of a facility or service

How much of the transportation system is used/available

- The quantity of the travel (how much freight is moved and how many people are served);
- The quality of travel (how good or bad the travel experience is);
- The accessibility provided by the transportation system (the ease in engaging in activities); and,
- The utilization of a facility or service (how much of the transportation system is used/available).

There are two types of reliability measures reported for the Mobility Performance Measures Program, each reported for automobiles and combination trucks: Travel Time Reliability and Travel Time Variability. Prior to 2015, these measures were calculated based on transportation models. However, starting in 2015 they have been computed using field-measured speed data from vendors. These are reported for freeway facilities; while there are plans to expand the reporting to include arterials and freeways, the quality of the field-measured data is not at a maturity level to develop meaningful measures—especially when looking at trend analyses.

Travel Time Reliability is been defined as (1) the percent of travel at least 45 mph in the urbanized areas of the state's seven largest MPOs, and (2) the percent of travel above 5 mph under the posted speed limit for other areas. ***Travel Time Variability*** is defined as the 95th percentile travel time index (TTI_{95}) divided by free flow travel time (posted speed limit plus 5 mph). The measure, also known as planning time index, essentially reflects how much additional time a traveler should budget to ensure on-time arrival 95 percent of the time. For example, a value of two means it will take a traveler twice as long to make a trip than under no congestion. For more information, refer to the *Multimodal Mobility Performance Measures Source Book* Appendix A.

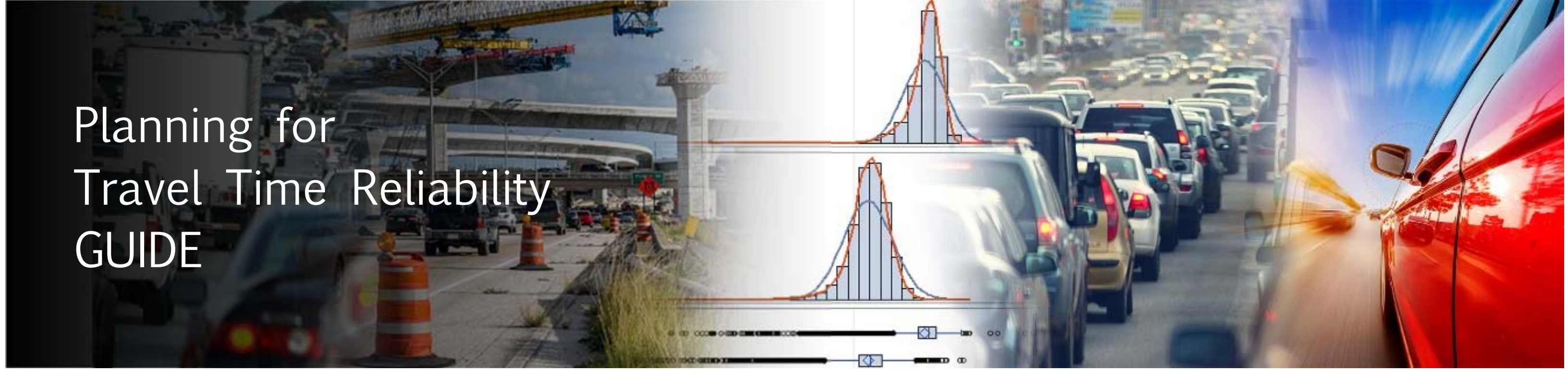
Performance Measures for Operations

The FDOT Central Office Operations Office has been collecting and reporting on operations performance measures on ITS managed freeways for the past 10 years. Beginning in 2004 the Operations Office initiated the Intelligent Transportation Systems (ITS) Performance Measures Program by collecting available output data, Road Ranger stops, 511 calls and ITS miles managed from each District. As the statewide SunGuide software was installed in the District Transportation Management Centers (TMCs) in 2006, the Operations Office began to collect measured data and report three outcome measures: travel time reliability, incident duration and customer satisfaction. Travel time reliability is reported to the Florida Transportation Commission (FTC) as the planning time index for ITS managed corridors in each District. The planning time index (PTI) as defined by FDOT Central Office Operations Office is the 95th percentile travel time divided by free-flow travel time. Roadway segments that consistently show congestion and unreliable travel times are tracked and reported quarterly.

Several districts have been collecting, reporting, and/or monitoring travel time reliability on arterials. For example, District 4 reports Mean Travel Time Index as well as 80th and 95th percentile Travel Time Index for key arterial corridors in their monthly Performance Measures Dashboard.

Before-And-After Studies

There has been increased interest in before-and-after studies from the FDOT executive leadership as a tool to assess the impact of transportation projects. The agency has thus taken steps to develop these studies. In early 2015, the Office of Transportation Statistics conducted a before-and-after study of the PortMiami Tunnel. Using TTI_{95} as well as average speed, this study addressed conditions before and after the opening of the port. Before-after studies addressing travel time reliability, such as the one conducted for the PortMiami Tunnel, are expected to become more prevalent moving forward.



Express Lanes

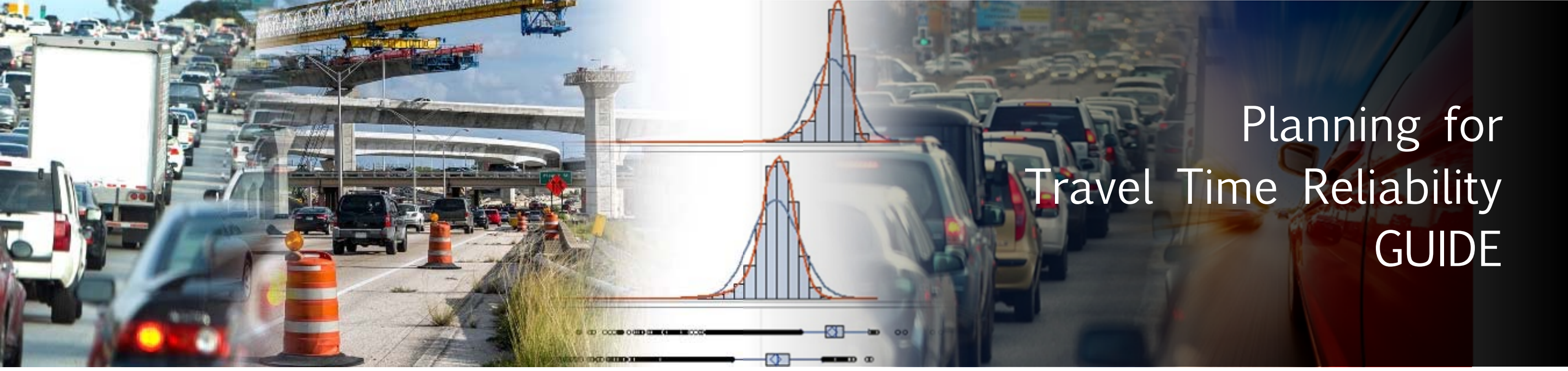
The Department measures the performance of express lanes on a regular basis. The Statewide Express Lanes Team approved the use of the following travel time reliability measures to both the express lanes and general-purpose lanes: on-time arrival (percentage travel at least 45 mph) and travel time variability (TTI_{95}). The Department's Express Lanes Handbook will soon include a chapter related to use of these measures.

Map-21/FAST Act Performance Measures

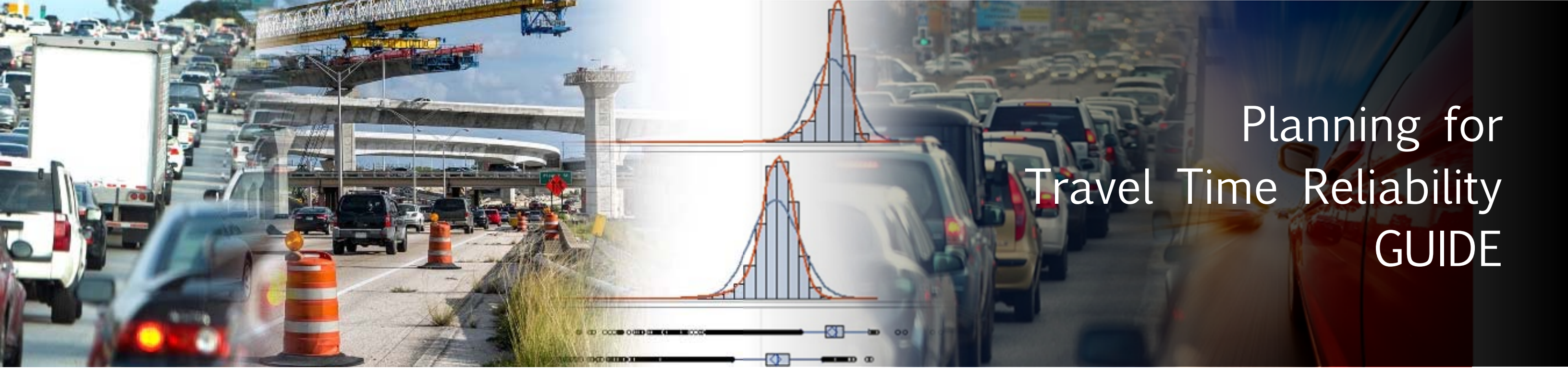
In April of 2016, FHWA published the Notice of Proposed Rulemaking (NPRM) on system performance, freight movement, and the Congestion Mitigation and Air Quality Improvement Program (CMAQ). This NPRM asks State DOTs to compute various performance measures, including two reliability measures—one for automobile and the other for freight. Table 1 shows the proposed metrics for each area, along with its computation, the threshold value for reporting purposes, and the resulting performance measures. Whether these measures stay the same for the final rule or not, the Department is prepared to report them when the rule becomes effective.

Table 1 Proposed Federal Performance Reporting Requirements

Part 490 Subpart	Proposed Metric	Metric Computation	Threshold	Proposed Performance Measures
E: Performance of the National Highway System (NHS)	Level of Travel Time Reliability (LOTTR)	$\frac{80^{th} \text{ percentile travel time}}{50^{th} \text{ percentile travel time}}$	LOTTR < 1.50 for the reporting segment = reliable	Percent of the Interstate System providing for Reliable Travel Times
	Peak Hour Travel Time Ratio (PHTTR)	$\frac{\text{Peak hour travel time}}{\text{Desired travel time}}$	PHTTR < 1.50 for the reporting segment = Meets Expectations	
F: Freight Movement	Truck Travel Time Reliability (TTTR)	$\frac{95^{th} \text{ percentile travel time}}{50^{th} \text{ percentile travel time}}$	TTTR < 1.50 for the reporting segment = reliable	Percent of the Interstate System Mileage providing for Reliable Truck Travel Times
	Average Truck Speed	Average annual speed of trucks traveling through the reporting segment	Avg Speed > 50.00 mph for segment = Uncongested	



Part 490 Subpart	Proposed Metric	Metric Computation	Threshold	Proposed Performance Measures
G: CMAQ Traffic Congestion	Excessive Delay	Threshold Travel Time – Average Travel Time	Travel time at each segment equivalent of 35 mph	Annual Hours of Excessive Delay Per Capita
			Travel time at each segment equivalent of 15 mph	
H: CMAQ On-Road Mobile Source Emissions	Annual Tons of Emission Reductions by project for each applicable criteria pollutant and precursor	Kg/day project reductions x 0.4026	-	2- and 4-year Total Emission Reductions for each applicable criteria pollutant and precursor



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Planning and Programming Processes

Planning for Travel Time Reliability (TTR) at FDOT occurs during many steps of its planning and programming processes. SHRP L05 (Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes) suggests that TTR should be considered in all of the following planning and programming products:

- State and Metropolitan long-range transportation plans (LRTP), which include a range of approaches, especially for states;
- Congestion management processes (CMP);
- Corridor, area, modal and other similar studies that examine any portion of the transportation system;
- State Transportation Improvement Programs (STIP) or MPO Transportation Improvement Programs (TIP);
- State or regional efforts to plan for operations generally or to plan for special events, extreme weather, and other similar efforts;
- Project development processes (i.e., planning studies, PD&E studies, and design);
- Environmental reviews;
- Project construction and work zone planning; and
- System operations and management.

A gap analysis regarding the incorporation of TTR in FDOT's entire planning and programming processes revealed a need for guidance related to two key processes: (1)

applying TTR in tools used to analyze and predict reliability, and (2) funding for the types of projects yielding the most benefit in terms of TTR (operations projects.)

This Planning for Travel Time Reliability Guide focuses on these two key processes and provides tools, techniques and information to the Central and District Offices to ensure that operations projects can be implemented to improve TTR in Florida.

In order to understand how operations projects can be incorporated into FDOT's existing processes, one must understand how all types of projects are planned and programmed. There are many paths for operations projects to evolve. For example, The Traffic Engineering and Operations Office plans for statewide Intelligent Transportation System (ITS) and arterial projects with dedicated funding. Operations projects may also evolve as strategies on the Strategic Intermodal System (SIS) as part of the statewide and District corridor planning studies. At the District and MPO levels, projects evolve as part of the Five Year Work Program process. Funding depends on whether projects or strategies are on arterials or freeways, on or off the State Highway System, within the ITS Ten Year Plan, and whether they are on the Strategic Intermodal Systems (SIS).

While planning, programming and funding are closely related, funding categories are covered separately in Section 4 because the topic of funding was identified as a key gap to incorporating TTR within FDOT.

A gap analysis regarding the incorporation of TTR in FDOT's entire planning and programming processes revealed a need for guidance related to two key processes:

(1) applying TTR in tools used to analyze and predict reliability; and

(2) funding for the types of projects yielding the most benefit in terms of TTR (operations projects.)

The four sections below describe how the programming process is currently structured within the Department and the fifth section describes additional opportunities for considering TTR in the processes. The sections are as follows:

the Department's programming process documentation;

the importance of the Strategic Intermodal System (SIS) and its higher priority in project selection;

the planning process for capacity improvements;

the planning process for operations improvements; and

an overview of the planning and programming processes and identifies imbedded opportunities to better incorporate TTR.

Programming Process

The Department has an open, transparent, and thorough approach to project selection and work program development, coupled with statutory guidance requiring investment in maintenance and preservation before capacity programs.

The Department's project selection and prioritization process, for the most part, follows the statutorily mandated transportation planning process. Florida receives transportation funding from Federal, State and local sources. The priorities for transportation projects are set by the entity that has authority over the funding. For example, local sources of funding are normally tied to specific projects, and the Department has little flexibility to direct how they are spent. Federal and State transportation funds are specifically directed by law how they may be spent. Projects requiring local matches must be programmed based on timing of matching funds availability or not funded if matching funding is not available.

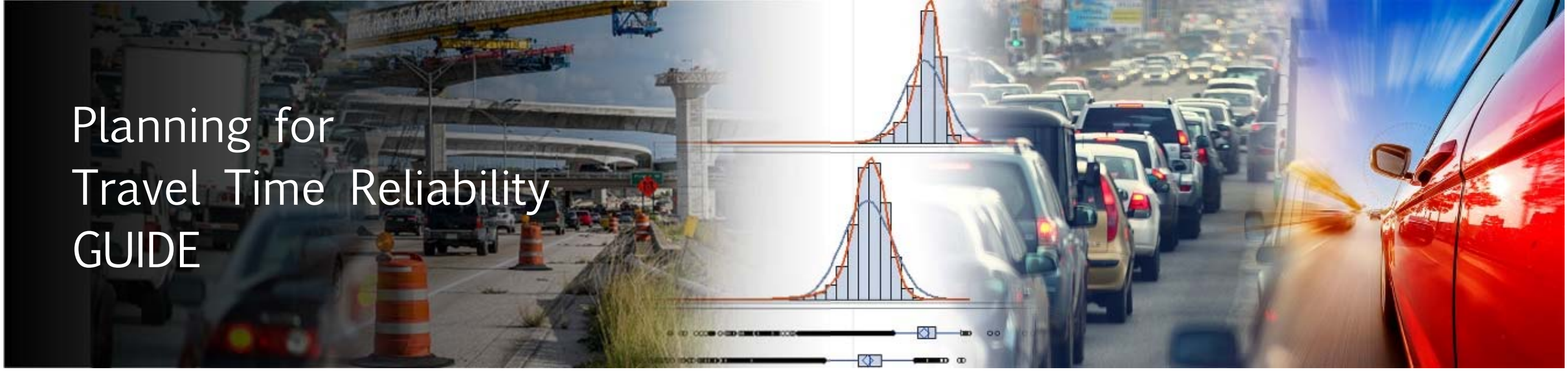
Planning documents define priorities, beginning with the Transportation Improvement Program (TIP). Each MPO adopts its TIP and updates it annually. Annually, the Department's Districts play an integral role in working with the MPOs/TPOs and other transportation partners to develop, identify and review projects, and find and program appropriate funding for eligible projects in the Five Year Work Program. The development of the Work Program involves extensive coordination with local governments and other city and county officials. Public hearings are held in each of the seven Districts, and a statewide public hearing is held by the Florida Transportation Commission (FTC).

For more information regarding Programming and the Department's Work Program Process, refer to Appendix B.

Strategic Intermodal System

A critical element of Florida's project selection and prioritization process is the SIS (Strategic Intermodal System), a network of highways, railways, transit lines, airports, seaports and spaceports that forms the critical arteries for interstate and interregional commerce. SIS facilities are classified as "hubs" (nodes of activity such as train stations and airports), "corridors" (such as highways), "intermodal connectors" (facilities which themselves would not deserve SIS status but connect two SIS facilities), and "military access facilities".

Under state law, at least 50 percent of *new* discretionary funds must be directed at SIS facilities, which can be classified either simply as "SIS," meaning that they currently serve the functions of a SIS facility, or as "Emerging SIS," indicating that they are projected to serve these functions in the near future (and could do so if SIS funds were invested). The Department enhances this goal by targeting up to 75 percent of *new* discretionary funding be



allocated to the SIS. The term “new discretionary highway capacity funds” means any funds available to the Department above the prior year funding level for capacity improvements, which the Department has the discretion to allocate to highway projects.

The 2014 Strategic Intermodal System (SIS) Funding Eligibility Guidance (http://www.fdot.gov/planning/systems/programs/mspi/pdf/SISFundingGuidance1.4.pdf) includes the following excerpt of the Project Eligibility Matrix related to SIS highway connectors and corridors.

Table 2 Project Eligibility Matrix as Related To SIS Highway Connectors and Corridors

SIS Project Categories	Projects Eligible for Funding	Projects Not Eligible for Funding
Capacity Projects	Planning, design, right-of-way, and construction of additional lanes; new facilities; enlarged bridges; intersection/interchange modifications; special use lanes	Re-surfacing, lighting, landscaping, maintenance

It should be noted that “operations” or “Transportation Systems Management & Operations (TSM&O)” projects are not listed in either column. However, it is not necessary to provide specific clarification because **operations projects that are assumed to improve capacity are eligible to be funded with SIS dollars. There is sufficient flexibility for funding operations projects with SIS capacity funding.**

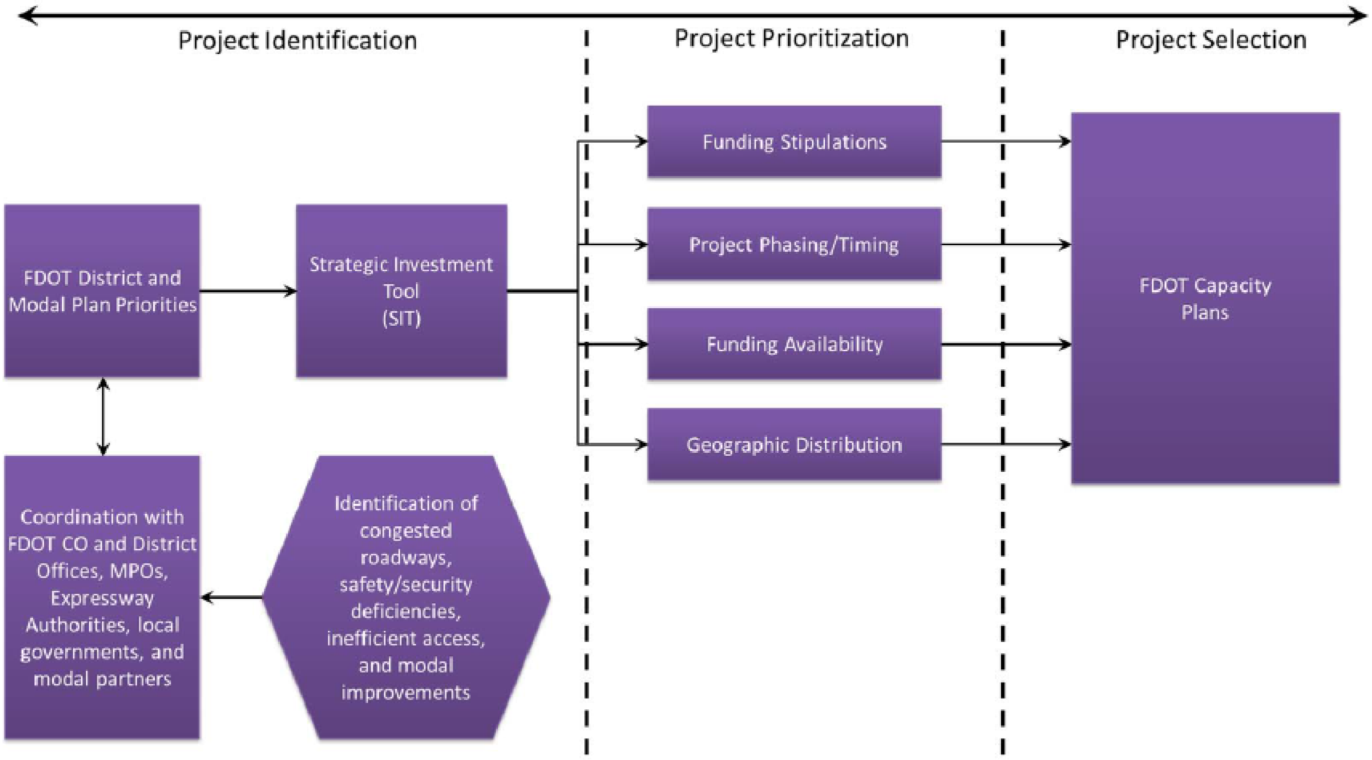
Additionally, there are methods for funding both capital and operations/maintenance of ITS, TSM&O and other operations projects within the Department. However, these are not applied consistently across the State. These are described in Section 4 of this Guide.

Capacity Improvement Processes

Capacity projects are those where additional, physical capacity is added. While they do significantly improve reliability, they tend to be considerably more expensive than operational projects. Roadway capacity projects generally fall into two categories – SIS and non-SIS. SIS highway facilities include interstates such as I-95, as well as controlled access highways such as SR-80. Figure 1 depicts the project identification, prioritization, and selection process for SIS capacity improvements. The left side of the figure depicts the annual project identification phase, during which needed improvements and system deficiencies are identified by Districts together with local government and modal partners, communicated and coordinated through District SIS Coordinators to Central Office staff, prioritized statewide using the Strategic

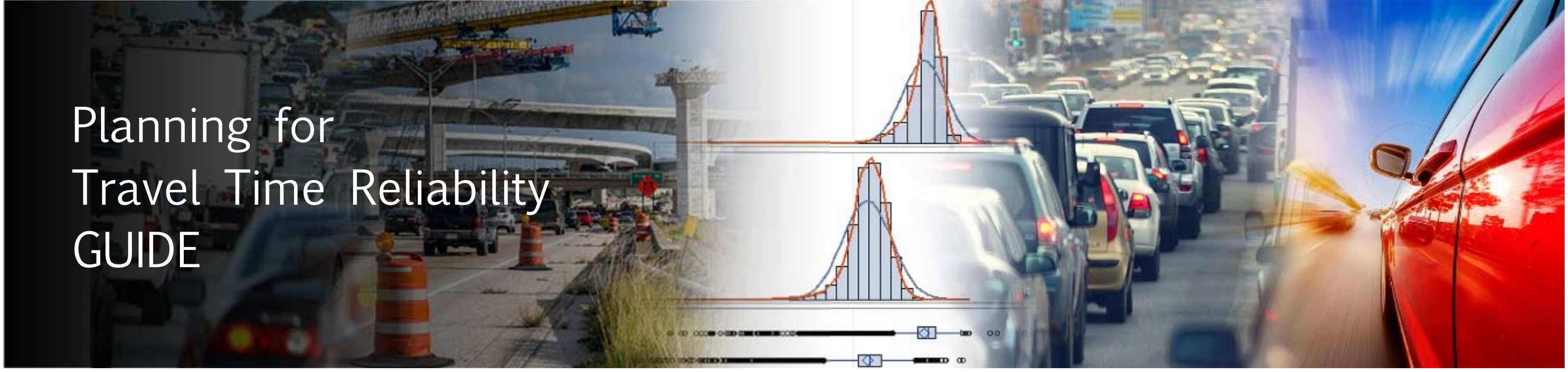
Investment Tool (SIT) funding granted by Central Office to the Districts, and Districts program the funds. This provides the basis for the project prioritization phase, depicted in the middle of the figure. During the project prioritization phase, funding stipulations and projected availability, project timing and phasing, and the geographic distribution of projects are all considered. Finally, because of this prioritization, selected projects are incorporated into capacity improvement plans such as the SIS and MPO/TPO Unfunded Needs Plans, Cost Feasible Plans, and Work Program plans. This is depicted on the right side of the figure. Travel time reliability is already considered in the SIT tool for freeway projects and there are ongoing efforts to incorporate travel time reliability criteria for non-freeways.

Figure 1 SIS Capacity Improvement Program



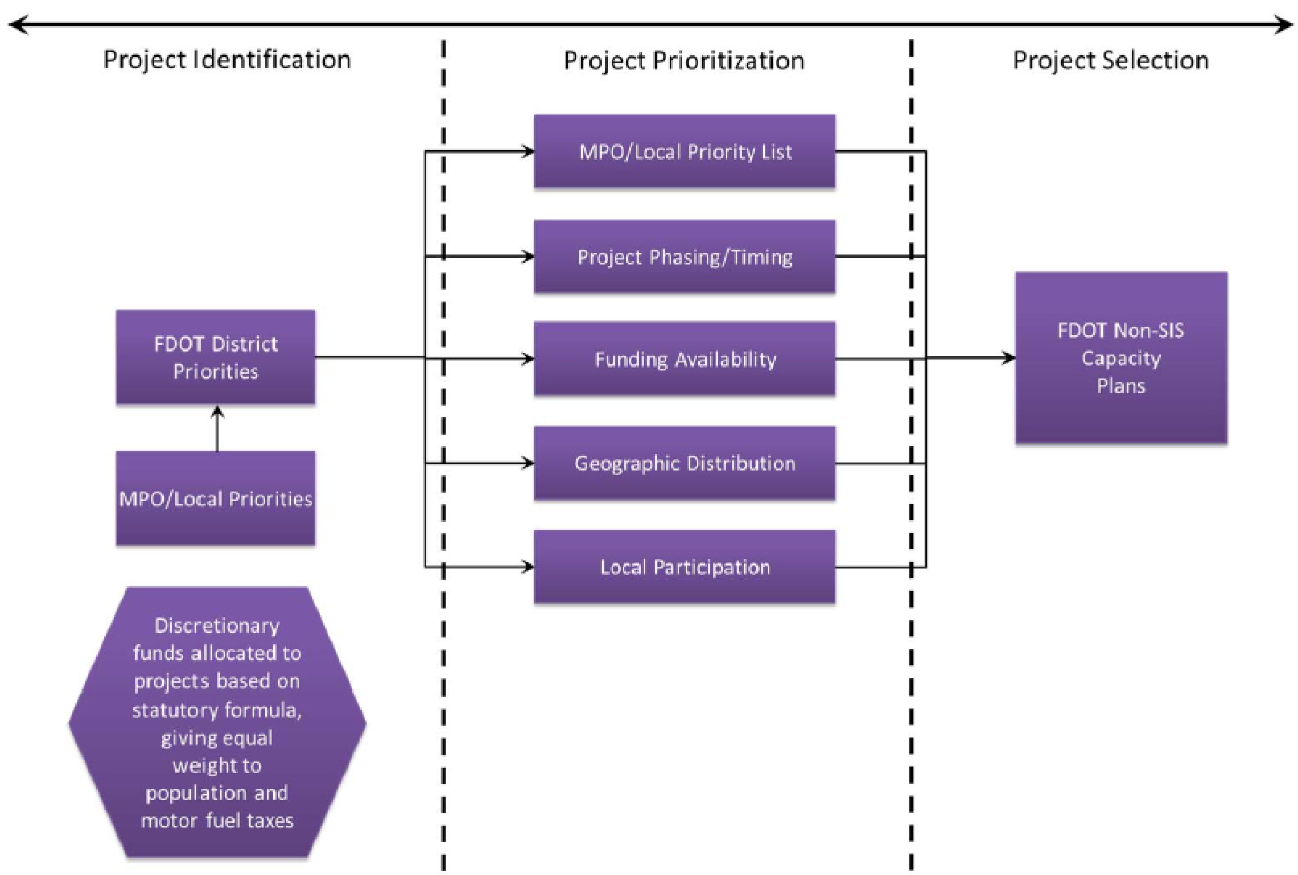
Source: http://www.dot.state.fl.us/planning/systems/programs/mspi/pdf/Prioritizing%20Florida’s%20Highway%20Investments%202013.pdf

The identification and selection process for non-SIS capacity improvement projects is illustrated in Figure 2. In this process, MPOs and local governments in a region are provided discretionary funding based upon a statutory formula giving equal weight to the population and motor fuel taxes collected in the area. During the project identification phase, MPOs provide a prioritized list of projects to the FDOT Districts, who use it to program the state and



federal funds for projects. Districts consider the priorities of local partners and MPOs, funding availability, the timing and phasing of projects, and whether a requested project supports or is part of a larger transportation project being developed by the local partner or MPO. All of these factors, in addition to a wide geographic distribution of projects within the District, are used to prioritize projects at the District level. As depicted on the right hand side of this diagram, non-SIS capacity plans typically are identified by the MPO/TPOs and the Districts, and these projects are then represented in the District work programs. Broadly speaking, the process for non-SIS capacity improvement projects provides an opportunity to incorporate non-SIS highway or arterial capacity improvements that can increase reliability, including new roadways, roadway widening, street connectivity, grade separations, HOV/managed lanes, and multimodal corridors. It should be noted that there is no real difference in the process of identifying SIS versus non-SIS projects – the difference lies in the funding sources.

Figure 2   Non-SIS Capacity Improvement Program



Source: http://www.dot.state.fl.us/planning/systems/programs/mspi/pdf/Prioritizing%20Florida's%20Highway%20Investments%202013.pdf

Operational Improvement Processes

The types of highway operational improvements that improve reliability are the same as those defined by Florida in the Transportation Systems Management and Operations (TSM&O) Strategic Plan. The vision of the TSM&O program is “to operate our transportation system at the highest level of cost effective performance, resulting in reduced excess delay on arterials and freeways, real-time management and traveler information for all modes, and seamless coordination with all operating agencies.”

TSM&O strategies fall into several categories as follows.

Arterial management, including:

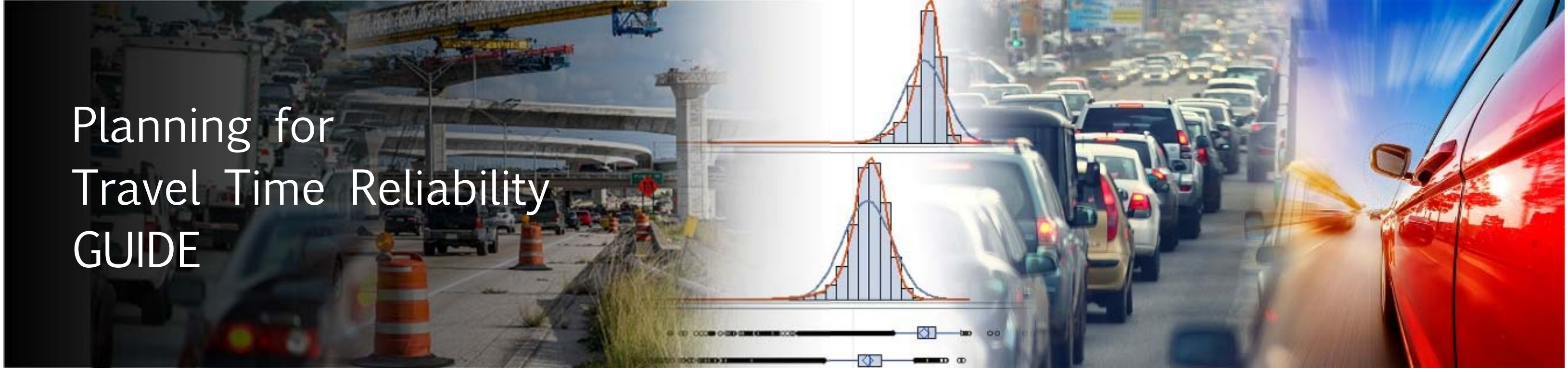
- Advanced Traffic Management Systems (ATMS) consisting of Intelligent Transportation System (ITS) and software investments
- Active arterial management, such as adaptive traffic control and dynamic signal retiming for special events
- Multimodal projects such as transit signal priority and queue jump projects.

Freeway oriented improvements, such as:

- Variable speed limits
- Hard shoulder running
- Ramp signals
- Managed lanes

In addition, others that apply to both freeways and arterials such as:

- Incident management, including incident response vehicle, and rapid incident scene clearance
- Work zone traffic management
- Provision of weather and traveler information



Many of these strategies are deployed as Intelligent Transportation System (ITS) projects on both freeways and arterials. The process for planning and funding ITS projects on freeway systems is fairly well defined in the Florida's ITS Strategic Plan and Ten-Year ITS Cost Feasible Plan.

ITS projects improve capacity through better management of the traffic on the roadway and may include:

- Advanced traffic management systems
- Advanced traveler information systems
- Commercial
- Advanced public transportation systems
- Freeway and incident management systems

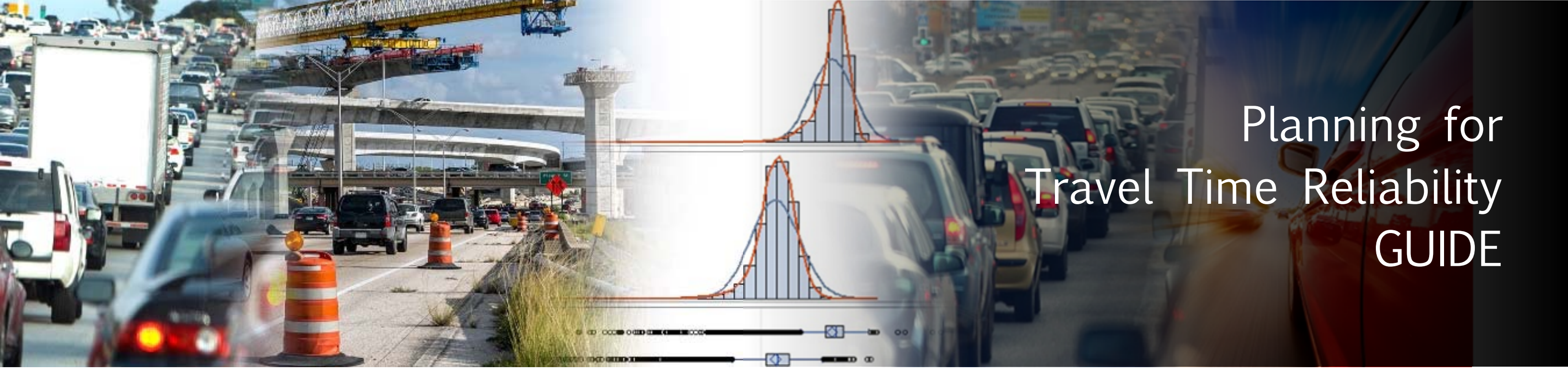
ITS capital and operations contracts are defined as follows:

- ITS capital projects: These projects consist of the initial installation of ITS infrastructure, TMCs, communications systems, ITS field devices, or software acquisitions.
- Operation contracts: These contracts are written to operate TMCs and any contracts for service needed for incident management, providing traveler information services, or general services for ITS program management. Funds have been set aside to provide for operations costs and must be programmed to the levels approved by the executive leadership team. Operations contracts program levels are allocated to Districts through Schedule B of the WPI.

Other TSM&O improvements (freeway or arterial) not included in the ITS Plans can be incorporated into projects in various ways as listed below:

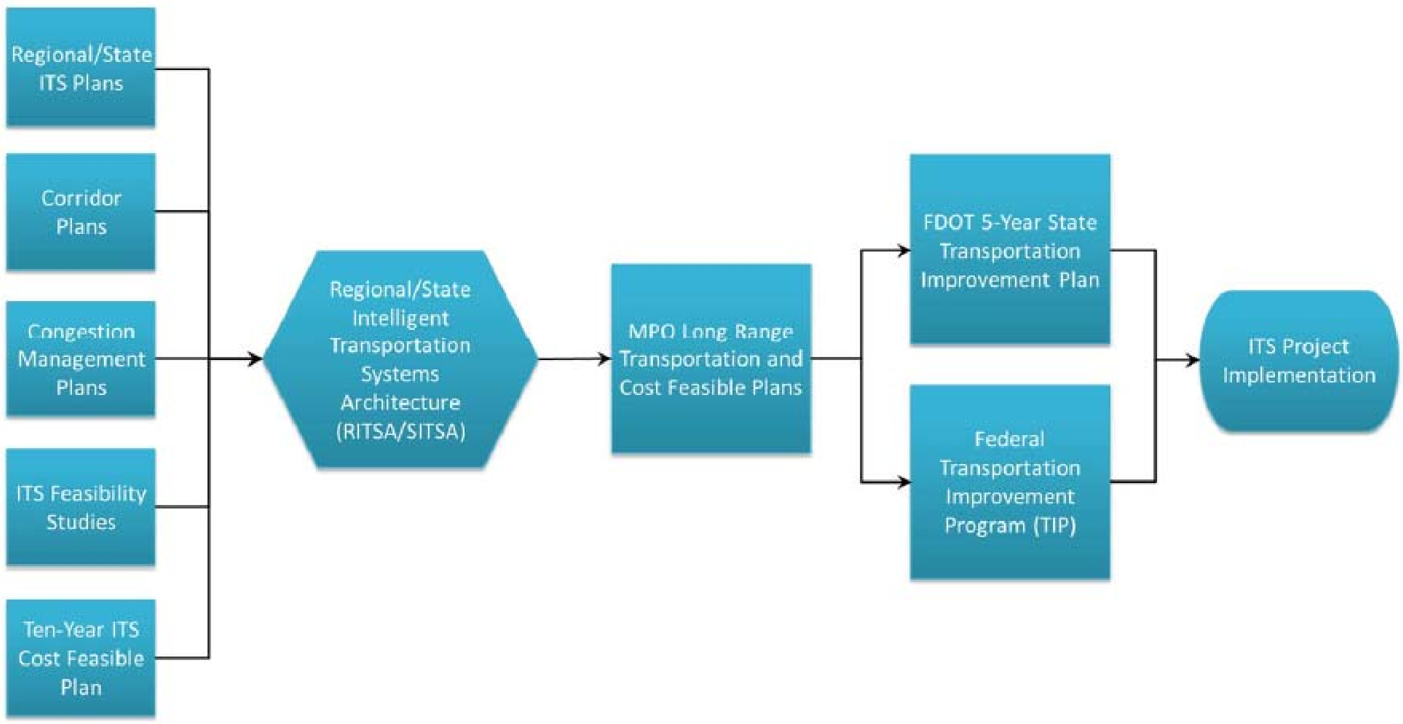
- The improvements can be assessed and modeled as described in Section 5 of this Guide
- The improvements can be planned according to the Blueprint for TSM&O in Corridor studies (See reference in Appendix A)
- The improvements are included in the MPO's planning and prioritization process (See FDOT MPO Manual – referenced in Appendix A)

Two important processes specific to Traffic Operations and Intelligent Transportation Systems are illustrated in Figures 3 and 4, which provide some insight into how this Office



identifies and determines which operational improvements to fund. Figure 3 provides an overview of the process as a whole, illustrating how various plans and studies (e.g., Regional/State ITS Plans, Corridor Plans, Congestion Management Plans, ITS Feasibility Plans) result in arterial and freeway ITS and TSM&O projects, and inform the development of the Regional/State Intelligent Transportation System Architecture (RITSA/SITSA), which identifies short- and long-term ITS project priorities that have been identified to support user needs and selected market packages in the ITS architecture. Projects in the RITSA/SITSA are included in the MPO Long Range Transportation and Cost Feasible Plans, which are programmed at the statewide level through the FDOT Five-Year State Transportation Improvement Plan. Regional/State Intelligent System Architectures are applied in various ways across the state – in some cases projects are identified and then confirmed to be in the Architecture. An opportunity exists to update Architectures frequently to be more inclusive and user friendly for planning staff.

Figure 3 ITS/Operations Project Identification and Funding Process

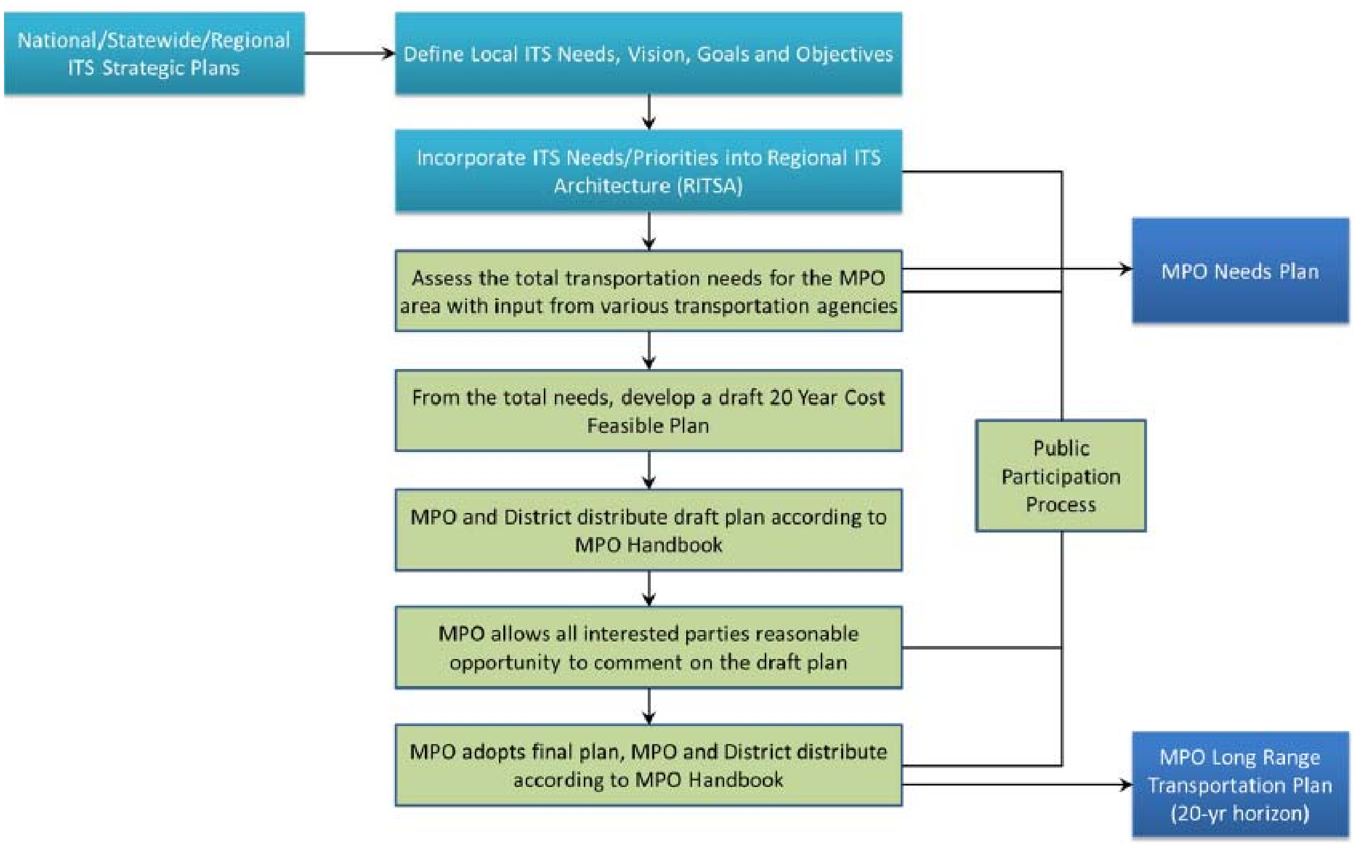


Source: http://www.dot.state.fl.us/trafficoperations/its/projects_deploy/semp/050315_d1-10_v2.pdf

Figure 4 provides further detail on the integration of the ITS plan and regional architecture into the development of the MPO Needs Plan and Long Range Transportation Plan. National, statewide, and regional ITS strategic plans provide guidance that local partners use to define

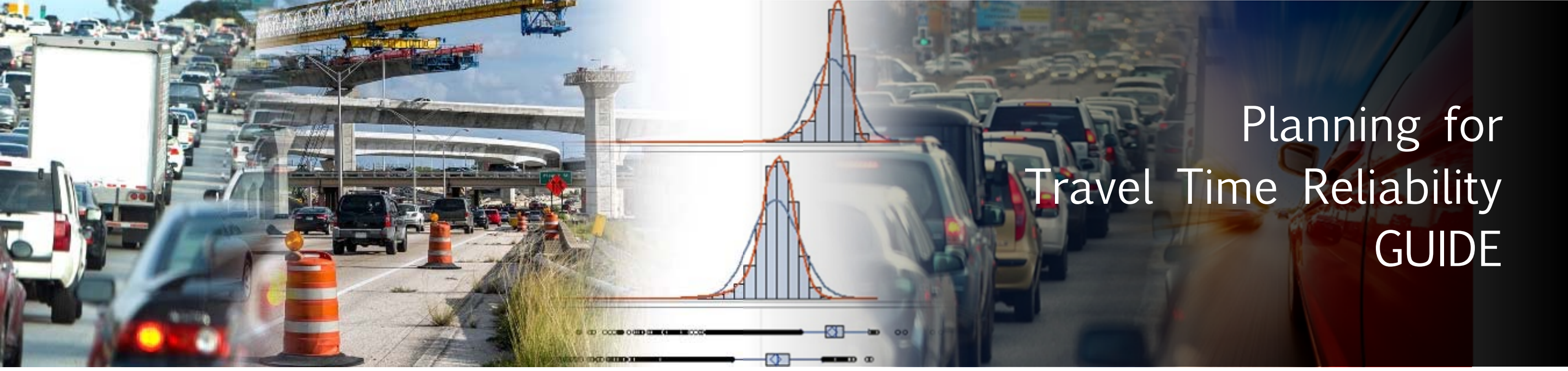
their ITS needs, visions, goals, and objectives. Because of this, each partner agency provides a list of their ITS project priorities, which is next incorporated into the RITSA. The green-colored boxes are used to represent the public participation process, in which the MPO evaluates each of the ITS projects submitted by their local partners and assesses needs for the MPO area as a whole. These projects are ultimately used in the creation of the MPO's Needs and Long Range Transportation plans, during which the MPO and all interested parties are kept up to date on project lists and priorities through drafts of the plans. Note that Figure 4 represents a process that could be followed for identification of ITS types of projects. It is not intended to represent the method used by all MPOs. The optimum way to ensure funding is to include projects in the Transportation Improvement Plans (TIPs).

Figure 4 Integration of ITS Into the MPO Planning Process



Source: http://www.dot.state.fl.us/planning/Policy/metrosupport/mpohandbook/ch4.pdf

The first green-colored box "assess the total transportation needs for the MPO area" represents a process that can be improved. The District Planning Office should initiate this discussion with the MPO to vet the ITS architecture and TSM&O needs.



Incorporation of Travel Time Reliability in the Overall Planning and Programming Process

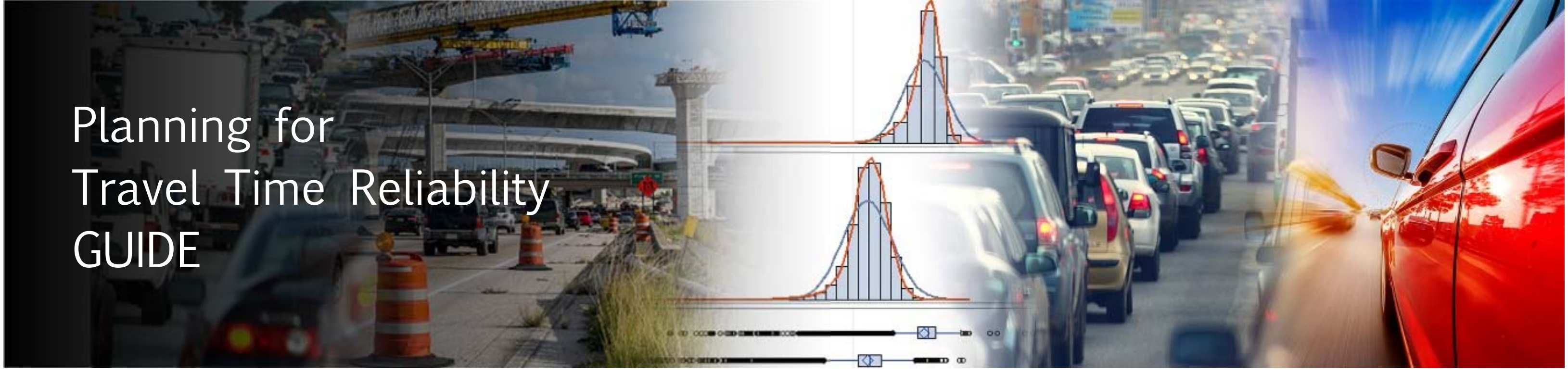
Figure 5 provides a "high-level" depiction of the overall Central Office planning and programming processes/stages from policy, to planning, to program development, and finally to project implementation, and shows how each program area fits into the larger project development and funding process. This allows a "10,000 foot view" of the dynamic and complex relationships between these planning and programming areas, and illuminates 14 areas (as shown with symbols depicting tools or people) with opportunities to better incorporate reliability. **The diagram documents where the Department should be incorporating travel time reliability concepts in the form of collaboration and tools.**

Reading from left to right, the diagram depicts how, on the most broad scale, projects are prioritized through the guiding policies, continuing through both long range and short range planning, and finally how projects are programmed and implemented. The diagram is color-coded by program or process, with purple representing capacity improvement programs; orange modal plans and processes; green preservation programming; red operations and maintenance processes; aqua those plans and processes associated directly with ITS and traffic operations; and blue depicting processes associated with multiple, simultaneous plans or programs. Included are both directional and bi-directional arrows.

The directional arrows depict plans or processes that directly inform or give rise to the construction of additional plans or processes. Bi-directional arrows are used when particular processes inform each other simultaneously, or to show plans that are developed in conjunction.

The left-most side of the diagram represents the policies that serve as a guide to Central Office programs and plans. These policies are more of a general vision that outline key priorities within the Department, and generally do not provide specific recommendations on how these priorities may be implemented. **Opportunities for collaboration at this policy stage (opportunities 1-4) include increased cooperation between offices to develop overarching documents, such as the Florida Transportation Plan as well as more specific ones like the ITS Strategic Plan and the SIS Policy Plan, so that they specifically address planning for improvements that increase reliability of travel. This cooperation between planning and operations at both the District and Central Offices levels is particularly important.**

Continuing to the right, the planning stage includes longer-term project priorities and system needs. Many plans and processes in this stage require close coordination between FDOT offices, and between FDOT and local partners and MPOs. This close coordination is represented by a double-sided arrow, which is meant to express that the plans are developed congruently, and project needs and priorities are negotiated and agreed upon by both parties.



The implementation of the ITS Plan, as well as the development of the Cost Feasible Plan, ITS Cost Feasible Plan, and MPO Long-Range Transportation Plans can benefit from robust tools that incorporate reliability as part of their prioritization or decision-making processes. At the same time, the Multimodal Unfunded Needs Plan and MPO Long-Range Transportation Plans have the potential to better incorporate reliability through internal collaboration and collaboration with state and local operational stakeholders. **To better plan for reliability, it is crucial that operational alternatives (stand-alone as well as in conjunction with capacity expansion) are considered and evaluated during the planning stage. Tools to assist with analyzing and predicting travel time reliability are described in Section 5 of this Guide.**

The program development phase of the overall planning and programming process occurs after the highway and modal plans are completed, and represents the stage in which funding priorities are negotiated and projects are selected. **The potential opportunities here are of a collaborative nature: during the development of the TIPs, MPOs can collaborate internally and with FDOT operations District and Central offices to better plan for reliability improvements. In turn, the District/Turnpike and tentative work programs can make sure to incorporate them. Depending upon the budgetary needs, stakeholders may collaborate in a joint effort to submit a legislative budget request. More details regarding programming operations projects are contained in Section 4 of this Guide.**

Opportunities for collaboration at this policy stage (opportunities 1-4) include increased cooperation between offices to develop overarching documents, such as the Florida Transportation Plan as well as more specific ones like the ITS Strategic Plan and the SIS Policy Plan, so that they specifically address planning for improvements that increase reliability of travel.

Finally, the last stage is implementation, during which work supporting a project and construction begins. This is also the point in which feedback on the overall project identification and selection process is used to evaluate whether the Department is meeting its overall vision and whether it is necessary to adjust any of the policies guiding the process. **A robust performance monitoring process is critical to assess the success of these projects, and feedback the development of key policy documents.**

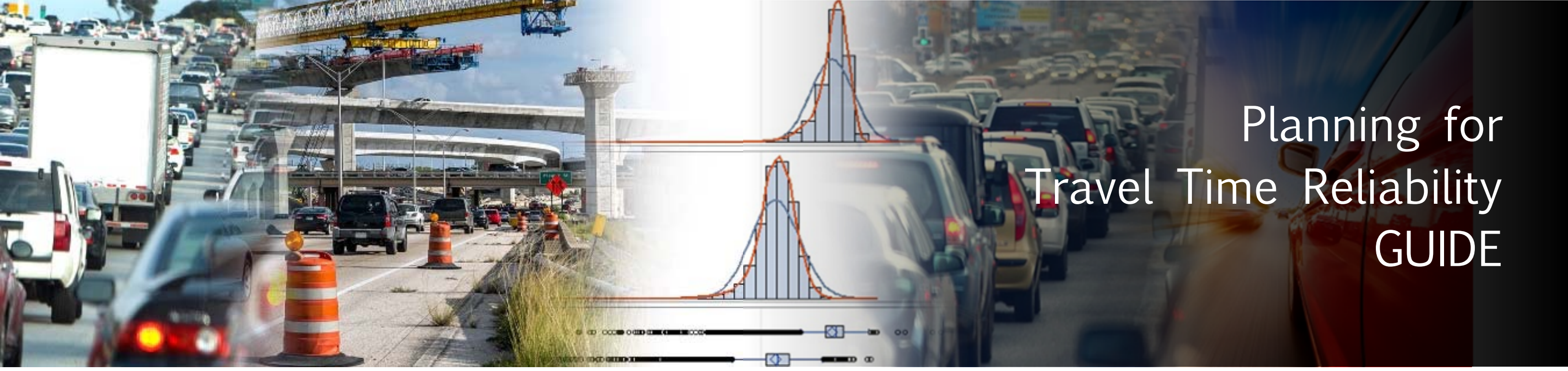
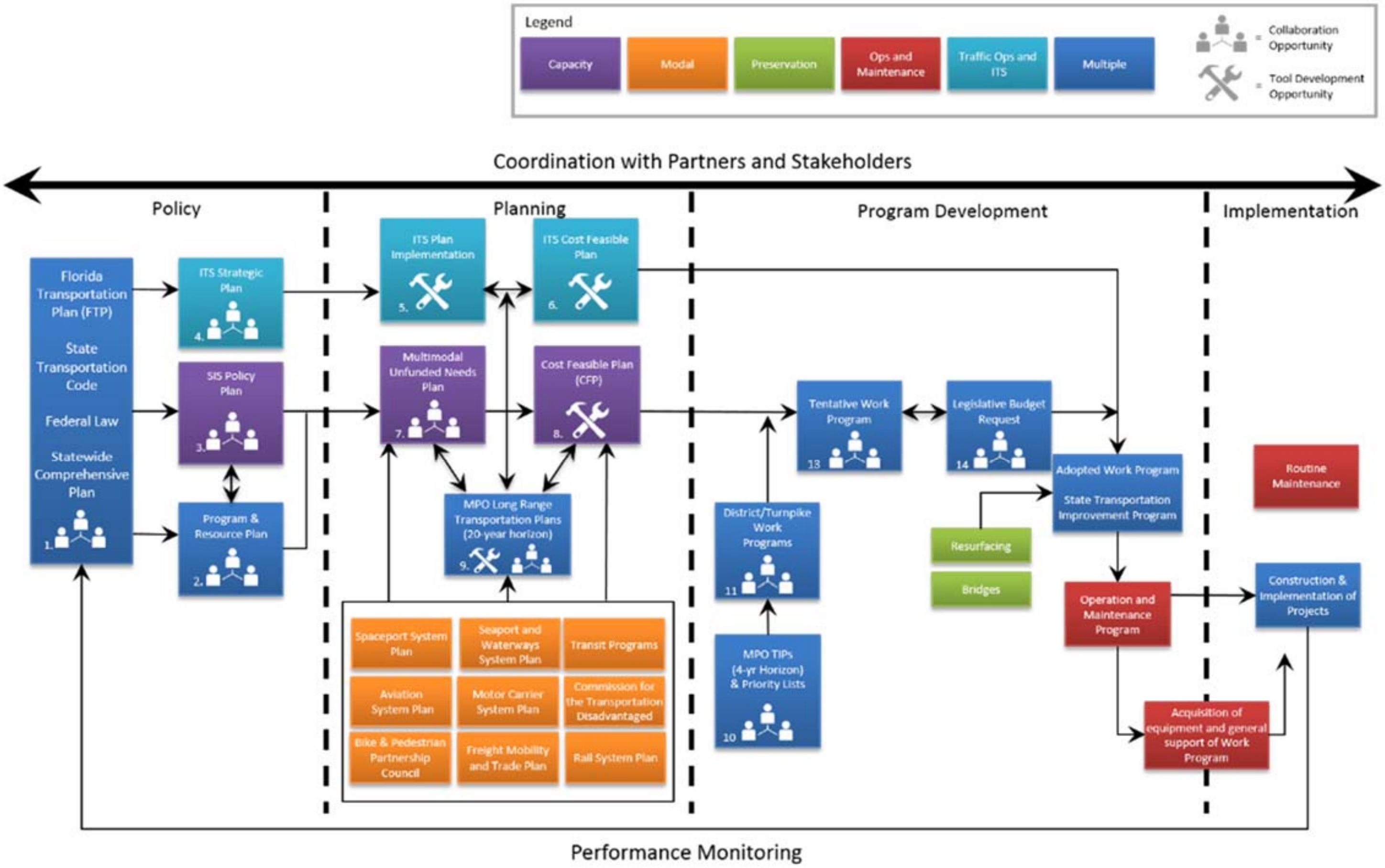
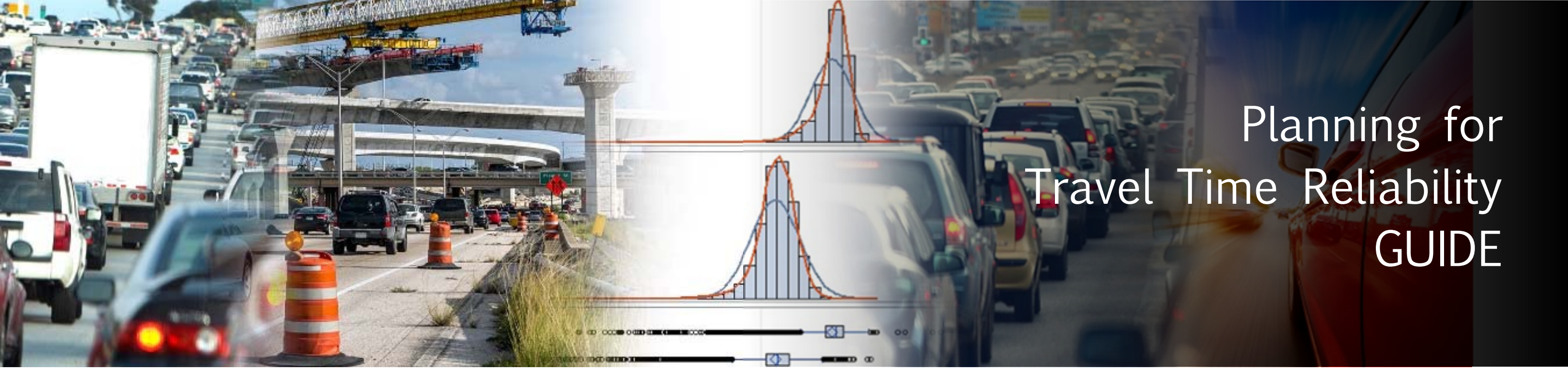


Figure 5 FDOT's Overall Planning and Programming Process Related to Reliability





Funding Sources

4

When it comes to implementing projects that help address travel time reliability (i.e. operations projects), one of the most commonly heard concern is the ability to fund them. This area is complicated and can be interpreted differently across the Department. More specifically, it is not always clear how to code certain projects within existing Department guidelines, such as the Work Program Instructions. While there are plenty of eligible funding sources, there does not appear to be consistent awareness or application of the funds available. A key issues with funding operations projects lies in the difference between capital and Operating and Maintenance costs. Several sources exist for capital funding, however, O&M is often difficult to program and must be programmed as an annual cost. Many districts have been able to secure local funds for arterial O&M and others have not. The Central Office is aware of this issue and is working on securing reliable O&M sources.

The purpose of this section is to describe the funding sources available for operations projects.

This section focuses on funding eligibility and is organized under the following headings:

1. Description of funding sources and eligibility – Describes the eligibility of projects in terms of different types of funding.

2. Funding and programming – Makes the connection between Chapter 3 and 4 – and describes how operations projects can be programmed according to funding type

3. Gaps and recommendations

Description of Funding Sources and Eligibility

The word “operations” is interpreted differently by various offices within Florida DOT. This is one of the main issues with communicating the need and eligible funding sources for operations projects within the Department.

Operations projects are planned and programmed according to eligibility of funding. The Work Program Instructions (WPI) are the source for definitions and instructions regarding how operations projects are funded. Operations projects are funded from different sources depending on whether they are arterial, highway or freeway[1]; if they are in the ITS Ten Year Cost Feasible plan; and if they are on the Strategic Intermodal System (SIS) or not. Another consideration is the eligibility of state and federal funds.

The Work Program Instructions (WPI) define Intelligent Transportation Systems (ITS) as the application of technology and communications to improve the efficiency and safety of transportation systems. They state, *"The District may use District allocated funds to support or deploy any ITS project or program."*

According to the WPI, the two primary categories of projects related to operations are Intelligent Transportation Systems (ITS) and Traffic Engineering and Operations. The three relevant chapters in the WPI are:

- PART III – Chapter 17: Intelligent Transportation Systems (ITS) which is included as Appendix A of this memo;
- PART III – Chapter 26: Project Costing; and
- PART III – Chapter 38: Traffic Engineering and Operations.

The following are categories of projects with different funding sources:

a. Freeway or highway projects on the SIS and in the 10-year Cost Feasible Plan;

b. Freeway, highway or arterial projects (not necessarily "off-system") that are eligible for SIS funding (and not in 10-Year Cost Feasible Plan);

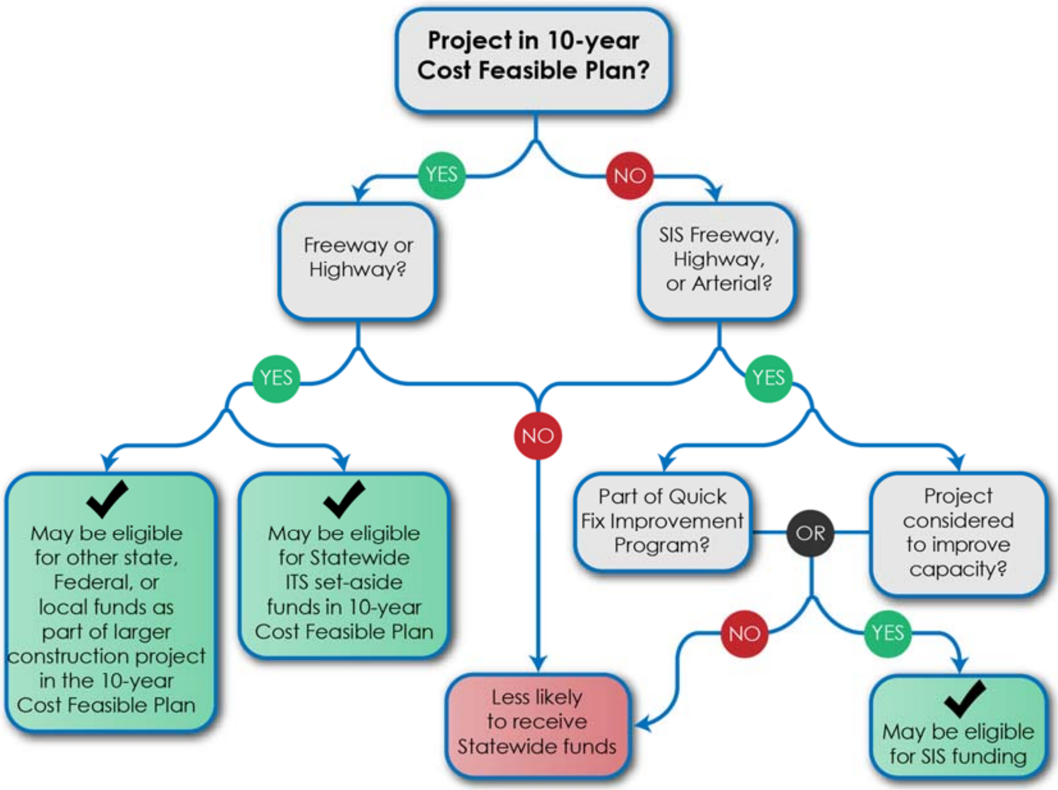
c. Arterial projects that are part of a dedicated funding set aside for signal timing; and

d. All others.

Each of these are described below. Figure 6 depicts the process through a flow chart.

[1] The use of the word "arterial" in this guide refers to the classification of the road (e.g. freeways, highways and arterials). However, note that the Work Program Office equates arterials to being "off system" rather than referring to the classification of the road.

Figure 6 Existing Operational Funding Flow Diagram



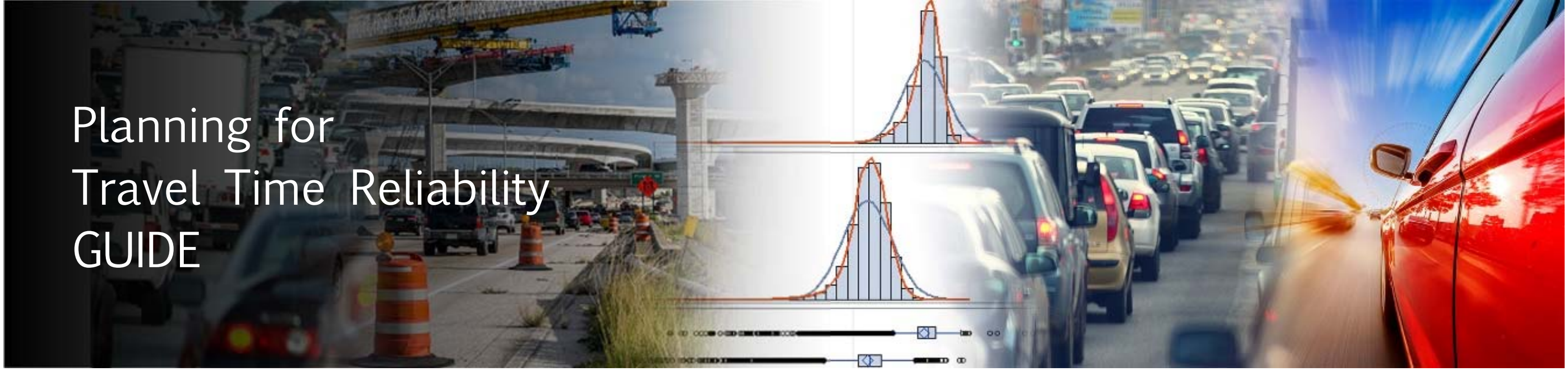
a) Freeway or highway projects on the SIS and in the 10-Year Cost Feasible Plan

There are two types in this category:

- Those funded with statewide ITS set aside funds in the Ten-Year ITS Cost Feasible Plan;
- Those funded with other state, federal or local funds as part of a larger construction project in the Ten Year ITS Cost Feasible Plan.

Per the WPI:

The Ten Year ITS Cost Feasible Plan includes an annual set aside of $25 million of statewide strategic intermodal system (SIS) funds that began in fiscal year 2002, for intelligent transportation system capital projects. These funds are used to fund the highest priority ITS



projects on the five major limited access corridors (I-4, I-10, I-75, I-95, and the Florida Turnpike System). The District allocations for this funding source are established by the Traffic Engineering and Operations Office.

The projects added to the new tenth year of the plan are selected by the Traffic Engineering and Operations Office, ITS section from the corridor implementation plans established for the five major limited-access corridors. The selected projects are reviewed by the Districts and the deputy state traffic engineer – ITS for concurrence prior to the addition of the new tenth year to the Ten Year ITS Cost Feasible Plan. The Ten Year ITS Cost Feasible Plan also is updated to reflect the programming of District allocated funds on the limited-access facilities in the adopted work program, or projects identified by other sources, such as expressway authorities. Following this review, the manager of the Work Program Development and Operations Office finalizes statewide balancing actions to insure funds are balanced and programming is consistent with the WPI.

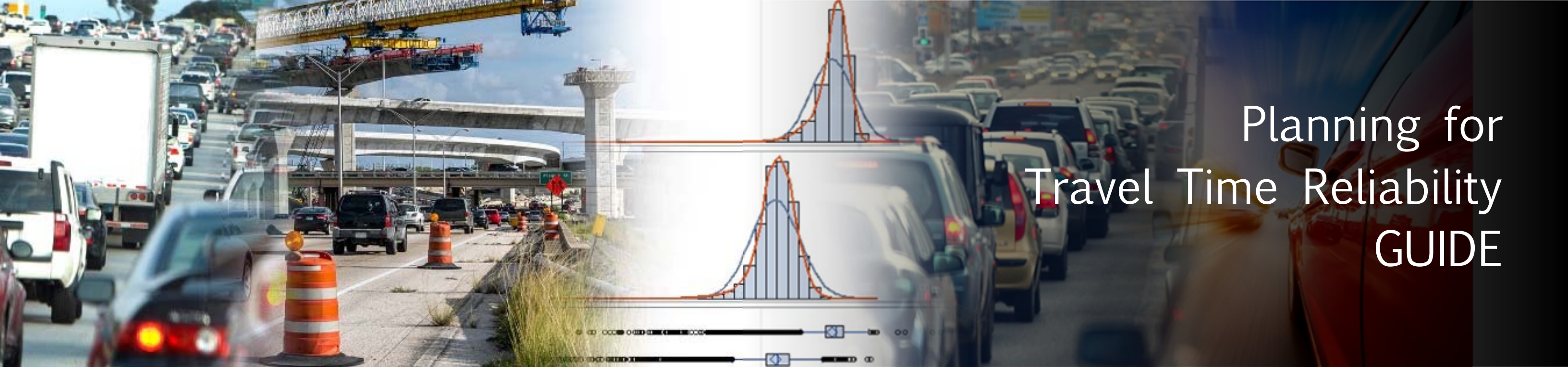
Eligible uses for SIS statewide set-aside ITS funds (fund codes DITS, or ACNP) include:

- constructing ITS infrastructure,
- installing ITS devices,
- acquisition of software,
- construction of traffic management centers (TMCs),
- regional transportation management centers (RTMCs),
- deployment of information systems to support advanced traveler information (ATIS) and commercial vehicle information systems and networks (CVISN),
- construction of communications infrastructure, systems engineering, ITS architecture, construction inspection, testing and acceptance activities, and
- evaluations of ITS deployments.

The ITS operations set-aside is not to be used for District routine maintenance and operations (M&O) contracts.

b) Freeway, highway or arterial projects that are eligible for SIS funding (and not in 10-Year Cost Feasible Plan)

If a project is on the SIS it may be considered for SIS funding if:



1. It was identified by a District as part of the Quick Fix Improvement Program that is a $25 million annual program on the top of SIS funds to address operational capacity issues. (note: this $25 million is different from the $25 million referenced in a) above)

Or

2. The project is considered to improve capacity. For example:

- SIS funds are used for operational improvements that improve capacity when traditional capacity improvements are not feasible or the facility is constrained (such as intersection operational/capacity in lieu of widening a whole section of road). Roadway design determines when a facility is considered constrained. In this case, “constrained” means Right of Way is not available or the local government has designated the facility as constrained.

- Many capacity projects have an operational component to them. However, SIS does not fund “operational only” projects. Examples of projects that might be acceptable and serve both operations and capacity are express lane projects, where we widen AND implement ITS devices and actively manage the traffic, or where we may reconstruct a road and add in queue jump signals for transit. More and more (majority soon) will be these types of integrated projects.

- SIS funds have been used to fund facilities such as Traffic Management Centers. However, SIS funds are not used to operate the facility once it is built.

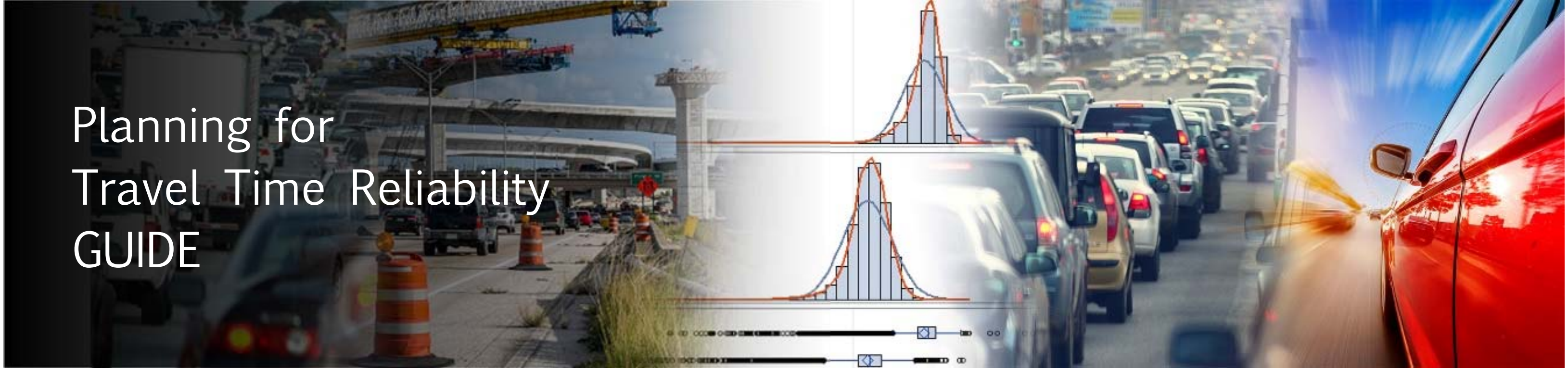
- SIS funds have been used for arterial signal timing projects.

- Auxiliary lanes are considered a capacity improvement and can also be funded with SIS dollars.

The District may use District allocated funds to support or deploy any ITS project or program. These funds are separate from the funds in the Ten Year ITS Plan. From the WPI:

- District work program managers must coordinate with District ITS engineers regarding ITS projects or project modifications proposed for funding with statewide ITS funds. ITS projects submitted to the ITS deployment administrator for statewide ITS funding approval will not be considered without the consent of the District ITS engineer.

- As required for statewide managed programs, the District must notify the ITS deployment administrator in the Traffic Engineering and Operations Office, ITS section, to request additional funding before adjustments can be made to statewide funded ITS projects programmed in their District. Projects will be reviewed in accordance with the funding



eligibility requirements and with respect to available statewide ITS funds. Notification of the approved projects and project funding levels will be sent to the District ITS engineer and District work program manager for programming.

- New ITS projects or project funding modifications submitted directly to the manager of the Work Program Development and Operations Office in the Office of Work Program and Budget will be forwarded to the ITS deployment administrator for funding approval.

- When cost estimates on statewide funded ITS project phases decrease as a result of lower bids, the District will transfer funds and budget made available from the estimate decrease to the statewide reserve to meet statewide ITS program priorities.

- ITS on Turnpike – Funding of ITS projects on the turnpike will be made using turnpike funds or any eligible federal funds. These projects shall be programmed in accordance with the Ten Year ITS Cost Feasible Plan for consistency with Department policy and standards. Turnpike projects will be reported in the Ten Year ITS Cost Feasible Plan for statewide tracking of ITS deployments.

- ITS on expressway authority facilities – Funding of ITS projects on expressway facilities will be made using only expressway funds. These projects will be reported in the Ten Year ITS Cost Feasible Plan for statewide tracking of ITS deployments.

- ITS on other state arterials – ITS projects on other state arterials off the state highway system may be funded with any eligible federal (STP, CMAQ, etc.) or local funds.

Many items in the ITS program are eligible for work program budget; however, many items are also eligible for operating budget. The WPI states that care should be taken to ensure costs are paid from the correct budget category.

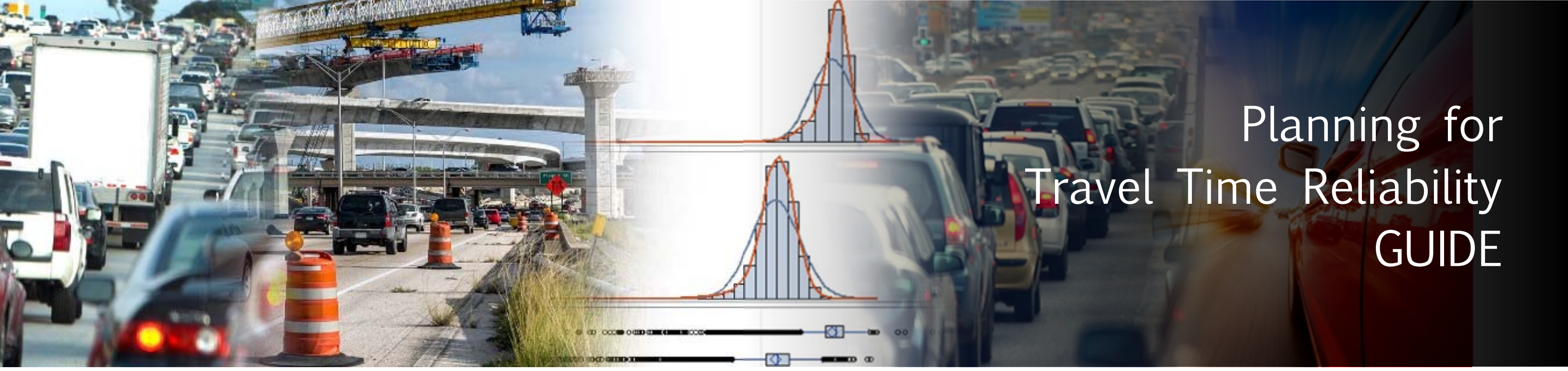
c) Arterial projects part of a set-aside

The TSM&O Office has requested that funding be set aside for arterial operations projects – projects approved as part of this plan could then be funded through this source. However, this is not a consistent or reliable source of funding.

d) All Others

According to the WPI:

The traffic engineering and operations program includes all aspects of planning, design, construction, maintenance and operations that involve traffic operations, engineering, and intelligent transportation systems. This program develops and applies solutions to traffic



operations problems that do not require major structural alterations of existing or planned roadways.

In programming traffic operations improvements, use of the metropolitan planning organization congestion management system plan is encouraged.

Traffic engineering and operations projects may be programmed on or off the intrastate highway system. Priority should be given to strategic intermodal system (SIS) traffic engineering and operations projects needed on the SIS over other traffic engineering and operations projects on the state highway system (SHS). Review action plans on SIS facilities for identification of planned operational improvements.

Action plans are available from the SIS coordinator in each District.

Traffic engineering and operations projects, which include traffic signs, turn lanes, etc., will be identified for at least the first two years of the work program (and preferably three).

Certain traffic engineering and operations projects are eligible for funding with federal “HSP” (safety) funds (see the Safety chapter of these instructions).

State Funds

Per the WPI:

State funds can only be expended on the state highway system (on the SIS), per Florida Statute, (with few exceptions).

There are three methods for allocating State funds as follows:

1. Needs based – Resurfacing, bridge and routine maintenance to achieve specific outcomes.

Examples include preservation, resurfacing, and maintenance. Operations is not included in this category.

2. Statutory requirements - Anything specifically called out in Florida Statute (F.S.). There are too many to list so three examples are shown below.

- Section 206.46(3), F.S., specifies that 15% of certain state revenues deposited into the State Transportation Trust Fund must be committed for Public Transportation projects (fund type DPTO, DDR, PORT);

- Section 339.0801, F.S., specifies how the Department must allocate $200 million of revenue from motor vehicle tag and title fees it began receiving in FY 2013-14;

- Section 201.15(3)(c), F.S., specifies how the documentary stamp tax revenues received by the Department are to be allocated: 10% New Starts Transit (fund type NSTP), 10% Small County Outreach Program (fund type GRSC) and the amount remaining is to be allocated 75% SIS (fund type GMR) and 25% Transportation Regional Incentive Program (fund type TRIP), with the first $60 million of TRIP allocated to the Florida Rail Enterprise.

3. The remainder – 75% to the SIS and 25% to District Statutory formula

Federal Funds

Federal funds are allocated in accordance with Federal law and FDOT use any flexibility the Federal law provides to achieve state priorities. Table 3 summarizes the eligibility of Federal-aid funds for the capital and on-going operating costs of Intelligent Transportation Systems (ITS) and Advanced Traffic Managements System (ATMS) projects. See Table 3 below for description of funding types.

State Transportation Block Grant Program (STBG)

Provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects on any Federal-aid Highway, including intercity bus terminals.

National Highway Performance Program (NHPP)

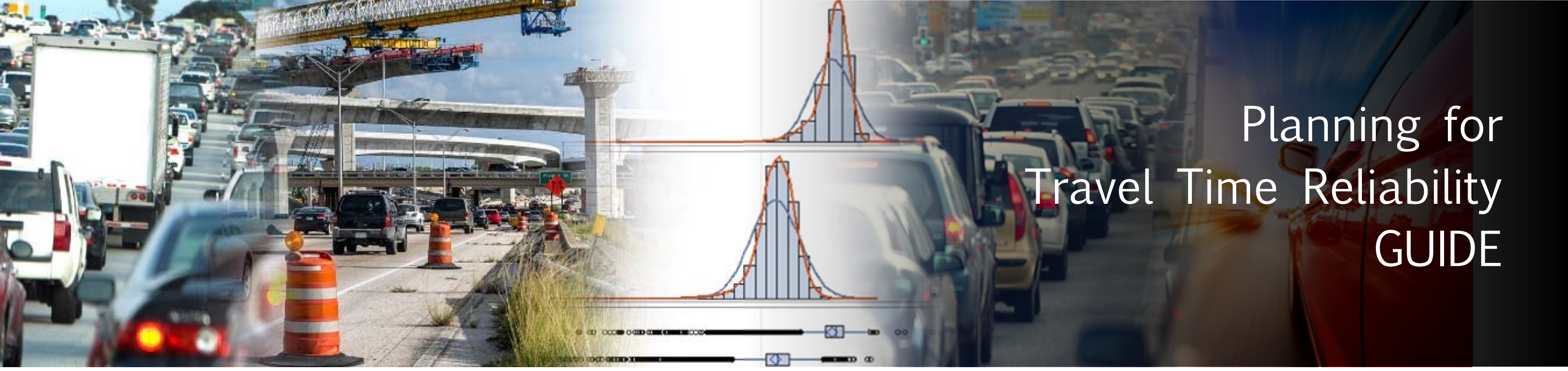
For the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

To provide a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).

Highway Safely Improvement Program (HSIP)

To achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal lands. The HSIP requires a data-



driven, strategic approach to improving highway safety on all public roads that focuses on performance.

Table 3 ITS & ATMS (TSM&O) Eligibility

Federal-Aid Program Funding Types				
	STBG	NHPP	CMAQ	HSIP
Capital Costs	Yes	Yes	Yes	Yes
Operating & Maintenance Costs	Yes	Yes	Yes	No

Source: FHWA

Refer to Appendix C for more information regarding the Ten-Year Cost Feasible Plan, Statewide SIS ITS Funds, Budget Eligibilities (work program versus operating), and programming guidelines with detailed descriptions of work mixes.

Funding and Programming

As described in the section above, funding categories are a key consideration in programming operations project. They are also planned according to timeframe for implementation. Some FDOT staff regard operations projects as “quick fixes” intended to hold a facility over until a larger capacity project can be built. Others view operations projects as an integral part of a traditional capacity project. Each of the District planning, PD&E and traffic operations/TSM&O offices program operations projects in different ways. Ideally, operations projects should be considered as short, medium and long-term solutions to improve mobility and they should be evaluated in every step of planning and programming consistently.

In general, operations projects evolve in many ways. These are listed below along with a reference to guidance for programming (fund codes and eligibility):

1. Freeway in 10-Year Cost Feasible Plan - Follow Chapter 17 WPI

2. Freeway not in 10-Year Cost Feasible Plan

- If on SIS, check if SIS eligible

- Follow Chapter 38 of WPI

3. Arterial or Highway

- Follow Chapter 4 in Guidance for Funding Arterial TSM&O Projects within FDOT
- If on SIS, check if SIS eligible

According to the Work Program Office, Arterial TSM&O projects must be identified through the traditional planning process – they must be vetted with MPOs and identified as priorities in the Transportation Improvement Program (TIP) at the local level. All projects in the TIP are required to come from a MPO Long Range Transportation Plan (LRTP). TSM&O projects may be grouped in the LRTP or identified as a Cost Feasible Project. Guidance is provided in the Federal Strategies for Implementing Requirements for LRTP Update for the Florida MPOs (refer to Appendix A for more information).

Key Issues

The intent of Sections 3 and 4 of this Guide are to provide an overview of the current process and opportunities for planning, programming and funding operations projects. Section 3.5 includes opportunities for more tools and coordination mechanisms to ensure operations projects are considered. There are several issues that are not fully resolved at the time of writing this Guide, described below.

1. Awareness of funding sources – There is still a gap within the Department with respect to knowledge and understanding of eligible codes and processes. This Guide provides a good overview but the reader is encouraged to review Work Program Instructions and other guidance listed in Appendix A to gain a full understanding of the process.

2. SIS Funding Codes – There may still be a gap with respect to consistent application of funding codes for operations projects on the SIS. The Systems Planning Office is responsible for programming SIS projects and close coordination between the Systems Planning and Work Program offices at both the District and Central Office levels should continue to ensure understanding of Work Program codes.

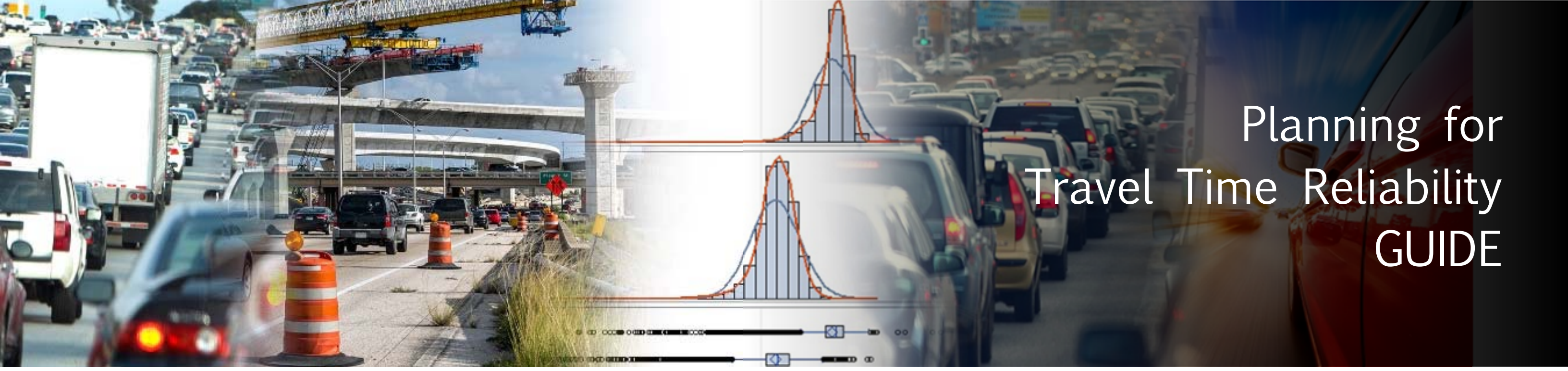
3. Definition of “Operations” - The word “operations” is interpreted differently by various offices within FDOT. This is one of the main issues with communicating the need and eligible funding sources for operations types of projects within the Department. It is the intent of this Guide to clarify the use of the terms operations projects versus operating budget (as defined by work program.)

4. Operating Budget versus Work Program Budget - The eligibility of operating budget versus work program funds is not always clear. Chapter 26 of the WPI is the reference for what is eligible for operations versus work program funds.

5. Eligibility of funds for “capital” projects versus “maintenance and operations” – The Districts often have difficulty securing funds for maintenance and operations of TSM&O projects. The intent of Sections 3 and 4 are to clarify the process that can be followed. Regardless of process, funding must be secured – often through agreement with local operating agencies. The methods referred to in this Guide and more fully described in the WPI should be followed by Districts and MPOs to program operations projects.

6. PD&E Process – There is an opportunity to apply more rigorous tools in the PD&E process to assess the benefits of projects in terms of TTR. A separate effort is underway by the PD&E and Planning offices to address this in the future.

These issues bring to light the inconsistencies regarding the awareness and application of planning, programming, and funding of operations projects. While this guide seeks to document methods and processes, there are opportunities to formally develop more consistent procedures or policies related to this topic within the Department.



5

Adapting FDOT's Traffic Analysis Tools for Reliability

Introduction

This section presents methods for adapting FDOT's current traffic analysis tool set to produce reliability estimates and to account for the effect of operations projects. Reliability is affected not only by the disruptions caused by events like incidents, inclement weather, and work zones but also by demand and its interaction with physical capacity. In fact, reliability is a function of the interaction of all these factors. The implication of this is that any strategy that affects disruptions, demand, or capacity will have an effect on reliability, albeit to different degrees. By NOT including reliability in assessments of projects, an important benefit to travelers is missed.

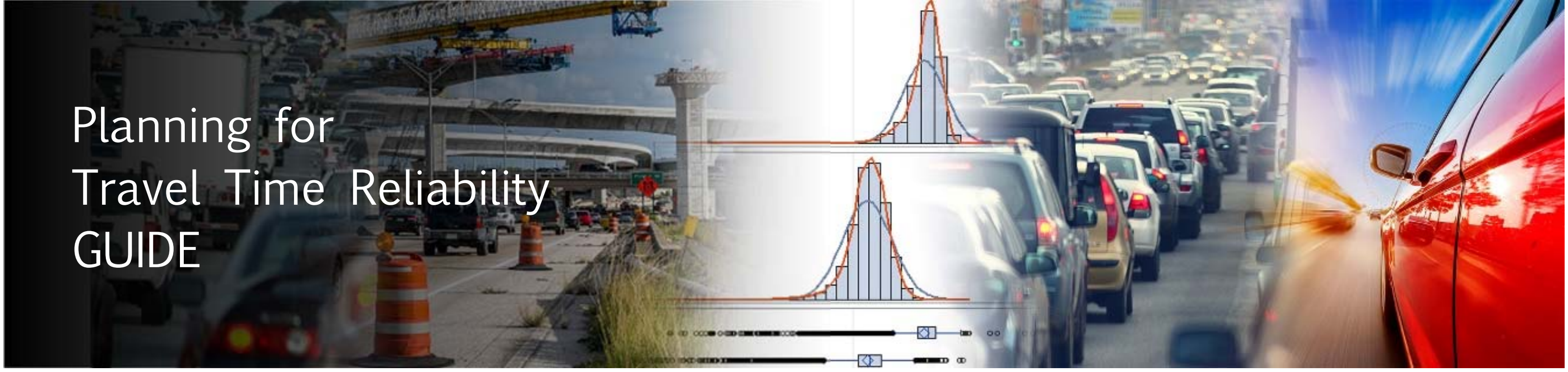
> Any strategy that affects disruptions, demand, or capacity will have an effect on reliability, albeit to different degrees. By NOT including reliability in assessments of projects, an important benefit to travelers is missed.

Categories of Technical Analyses Conducted by FDOT

District and the Central Office Systems Planning Office conduct studies that fall within the following categories. Table 4 provides additional detail.

Corridor: A corridor study is the first step in planning for the future of a transportation facility. By defining the corridor's needs, the corridor plan will help focus planning efforts on the most significant problems and act as catalyst for discussion about how best to invest in the corridor.

Alternatives: An alternatives study involves studying specific corridors and special study areas and developing recommended strategies or alternatives to implement improvement projects and programs. An alternate route analysis studies are conducted when an existing route may



need realignment due to capacity or other constraints where further improvements of the route may be prohibitively expensive or impossible to construct. These studies generally explore the development of new state routes that would bypass urban congested areas.

Feasibility: A feasibility study represents a definition of a problem or opportunity to be studied, an analysis of the current mode of operation, a definition of requirements, an evaluation of alternatives, and an agreed upon course of action. As such, the activities for preparing a feasibility study are generic in nature and can be applied to any type of project.

In addition to these project level studies, system level analyses specifically targeted to reliability are also conducted. These are:

- Reliability estimation for the SIT using a model developed by the University of Florida; and
- A procedure to estimate reliability at the regional level using a post-processor to MPOs' travel demand forecasting models.

Table 4 Steps in Planning Studies

Study	Corridor	Alternative	Feasibility
Problems and Needs: Defining the key issues and opportunities			
Existing Conditions and Needs (Conduct technical analysis & data collection of existing conditions, including gathering relevant work performed in previous studies.)	X	X	X
Future Conditions and Needs (Develop future conditions based on various forecasted traffic and land use projections.)	X	X	X
Alternative Options: Understanding and defining a range of options - including land use solutions			
Identify range of alternative options	X	X	
Develop alternative options with concepts, planning level cost analysis and associated impacts.		X	
Evaluation: Comparing and initial screening of the proposed alternative options			
Identify criteria to evaluate and compare alternative options on a system level and alternative options performance			X
Narrowing alternative options down to which alternatives should be considered/compared in Project Development & Environment (PD&E)			X
Cost-Benefit Analysis			X
Implementation: Identify and itemize an implementation action plan including defining the appropriate phasing		X	
Documentation			
Findings	X	X	X
Recommendations (Short-term, mid-term and long-term)	X	X	
Coordination and Outreach	X	X	X
Green shading depicts identified step where operational improvements and tools can be included to better incorporate improvements that address TTR			

Source: http://www.fdot.gov/Planning/systems/programs/sm/corridor/default.shtm

Traffic analysis tools can be used for corridor and alternatives analyses to help frame options, but feasibility studies make heavy use of them as formal evaluations and technical comparisons are made.

Consideration of operations strategies at each of the study levels in Table 5 is required to move operations projects forward in the existing FDOT project development process. For example, under “Existing Conditions and Needs”, an assessment of the causes of congestion in a corridor or on a facility will help to identify needed operational improvements. Data on travel times (from either detectors or probes) plus incident data will indicate the relative importance of physical bottlenecks, incidents, work zones, and special events.

For example, on Broward County arterials, FDOT personnel find that a larger portion of the events that occur are construction related. Operations personnel monitor work zones and the areas around them via CCTV, alert users of any lane closures using DMS, and verify the lane closures are handled as planned. Signals may be retimed to accommodate work zones. It is therefore important to consider what is currently being done from an operations perspective AND to include the effect of additional operations strategies on future performance, as specified in this chapter.

Planners must also consider the degree of sophistication or intensity in operations strategies. For example, incident management effectiveness will be determined by the service patrols available per mile of roadway covered. In turn, this affects the incident duration modeled by many of the procedures identified below, so a mechanism exists for studying the effectiveness of alternate levels of incident management intensity.

FDOT Traffic Analysis Tools

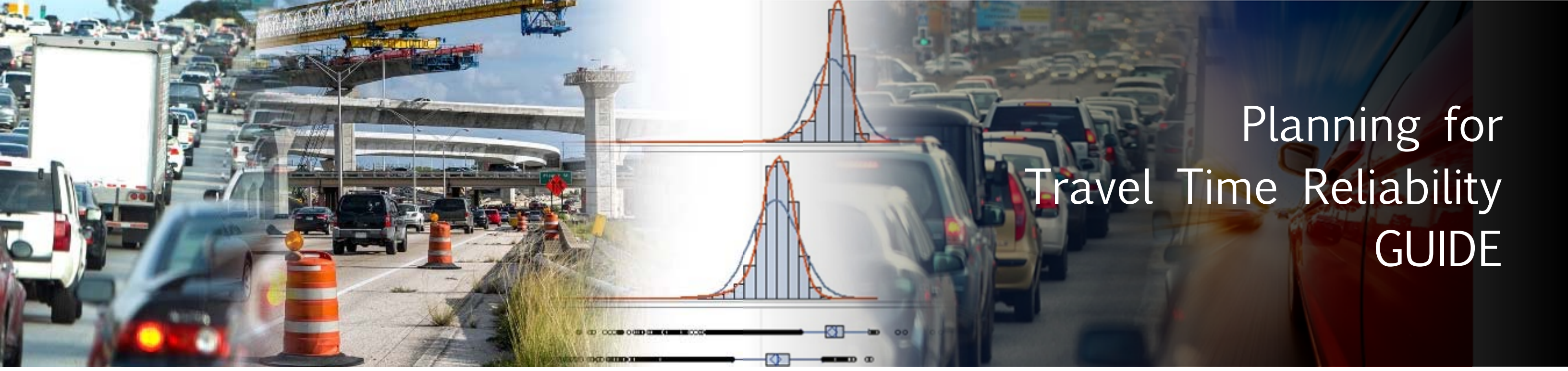
A range of planning scales and associated tools are used by FDOT to conduct analyses during different stages of project development Table 5.[2]

Table 5 FDOT Traffic Analysis Tools Used For Project Development

Project Development Stage	Level of Analysis	Analysis Tool
Sketch Planning	Generalized Planning	Generalized Service Volume Tables LOSPLAN Highway Capacity Manual
Travel demand modeling	Conceptual Planning	Cube Voyager
Deterministic Operations Analysis	Conceptual Planning Preliminary Engineering Design Operations Planning	LOSPLAN Highway Capacity Manual Synchro, Sidra
Stochastic Operations Analysis	Preliminary Engineering Design	CORSIM VISSIM SimTraffic

For each of the analysis tools in Table 5, guidance is presented on how to develop reliability measures in the following sections.

[2] FDOT System Planning Office, *Traffic Analysis Handbook 2014: A Reference for Planning and Operations*, March 2014, http://www.dot.state.fl.us/planning/systems/programs/SM/intjus/pdfs/Traffic%20Analysis%20Handbook_March%202014.pdf



Reliability Estimation

Generalized Service Volume (GSV) Tables

GSV tables are based on developing the maximum annual average daily traffic (AADT) values for Levels of Service (LOS) B through E by applying Highway Capacity Manual (HCM) procedures with default values.

Predicting Reliability with Data Available for GSV Analysis

AADT and number of lanes are the two key input data items for GSV analysis. Relationships between AADT per lane (APL) and the Planning Time Index (PTI; the 95th percentile travel time index) were developed by applying the SHRP 2 C11 reliability methodology using the same default values as used to develop the GSV tables.[3] Figures 7 through 10 show the generated data and final fitted equations for different conditions. The equations are as follows.

Freeways

APL >= 20,000 $$PTI = 11.4391/(1+(\frac{APL}{23248.1})^{-4.8498})$$

(12,000 <= APL < 20,000): $$PTI = \frac{156101+3.9462 \times APL}{1+(36.6387 \times APL)-(0.0016 \times APL^2)}$$

APL < 12,000: $$PTI = 1.05$$

Signalized Arterials

APL >= 18,000 $$PTI = \frac{0.637 + 16.3688 \times APL^{3.4307}}{24648^{3.4307} + APL^{3.4307}}$$

APL < 18,000 $$PTI = \frac{1.1893 + 15.0862 \times APL^{13.5102}}{18836^{13.5102} + APL^{13.5102}}$$

Where: PTI = Planning Time Index (95th percentile travel time index)

APL = AADT per lane.

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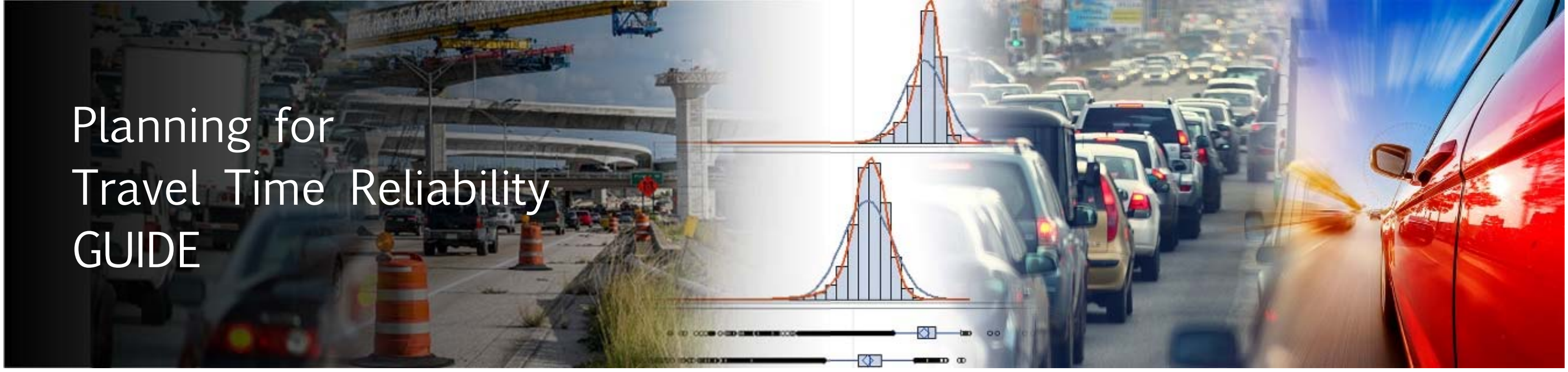
[3] http://www.trb.org/Main/Blurbs/169524.aspx ; the reliability module of this research developed a sketch planning method for predicting reliability from planning level data.



Adjusting Generalized Annual Average Daily Volumes to Account for Operations Strategies

Sketch planning methods assess the effect of transportation improvements through changes in capacity or volume. For capital expansion projects (e.g., more through lanes, interchange reconstruction) capacity is directly affected. A large number of past studies have documented the decrease in travel times and delay due to implementing operations strategies. A few studies also have shown that operations strategies also improve reliability, in addition to reducing overall delay. Therefore, to model the effects of operations strategies, it was decided to translate their effects through capacity increases.

In some cases, operations strategies directly affect capacity (e.g., ramp metering, junction control, hard shoulder running). Incident management and work zone management also affect capacity directly, although the effect is in terms of reduction of the time that capacity was lost. Studies of active signal control systems most often define the effect in terms of increased speeds or reduced delay, although the mechanism by which this achieved is more efficiently signal timing, which has the practical effect of increasing throughput (capacity) at signals. In other words, the effect of operations can be translated into “capacity equivalents” for including them in sketch planning models. A previous study by FHWA took this approach (Table 6)[4].

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[4] Margiotta, Richard, Waddell, Paul, Foti, Fletcher, Dowling, Rick, and Liao, Lawrence, *Travel and Emissions Impacts of Highway Operations Strategies*, FHWA Report FHWA-HOP-14-013, March 2014.

Figure 7 AADT Per Lane And Planning Time Index For Freeways And AADT At Or Above 20,000

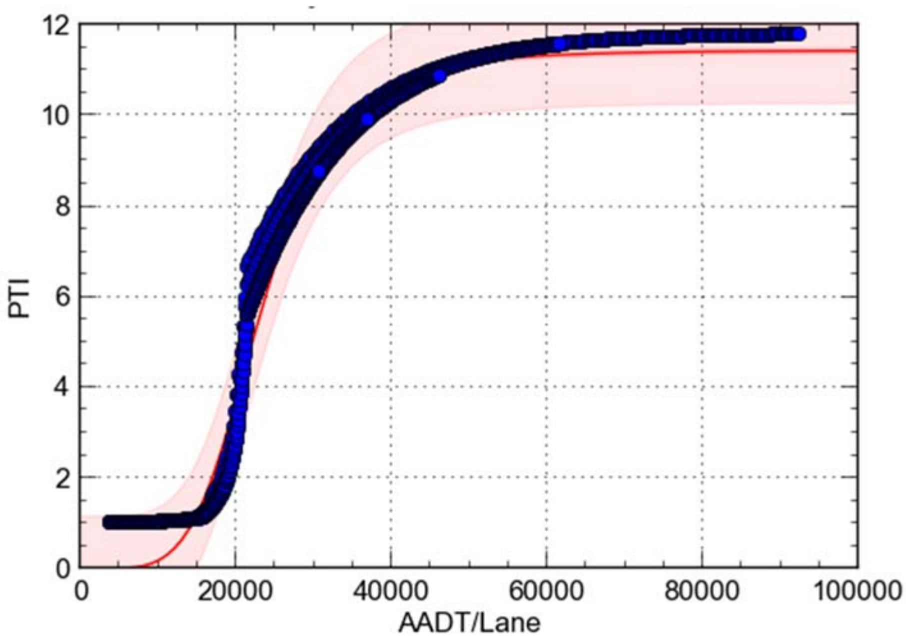
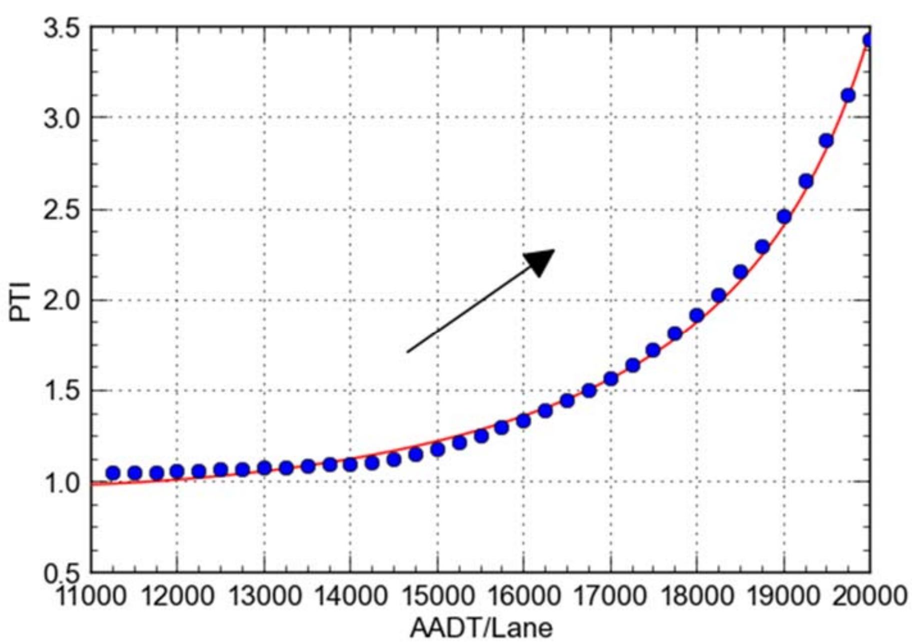


Figure 8 AADT Per Lane and Planning Time Index for Freeways with AADT Between 12,000 and 20,000



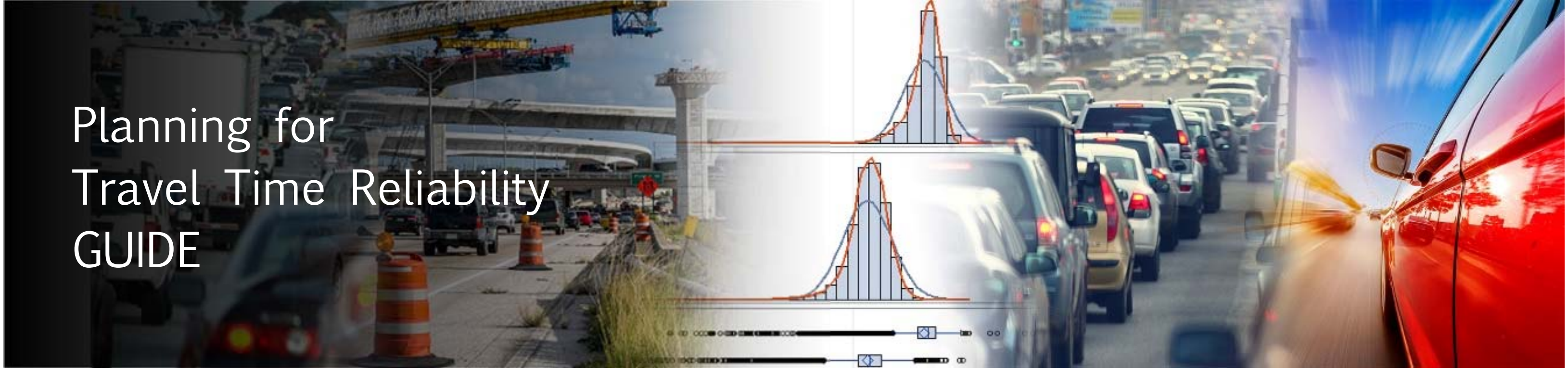


Figure 9 AADT Per Lane and Planning Time Index for Signalized Roads with AADT At or Above 18,000

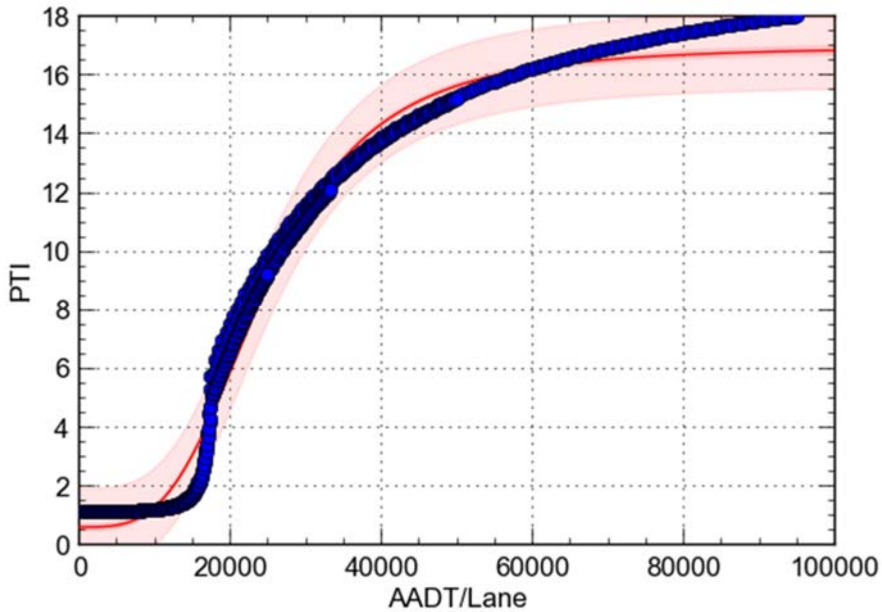
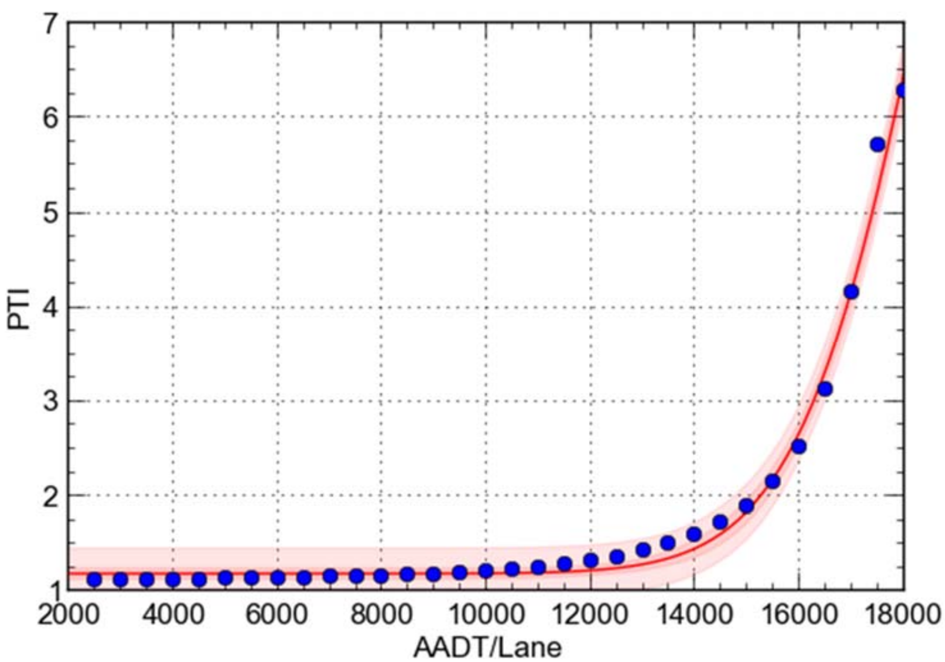


Figure 10 AADT Per Lane and Planning Time Index for Signalized Roads with AADT under 18,000



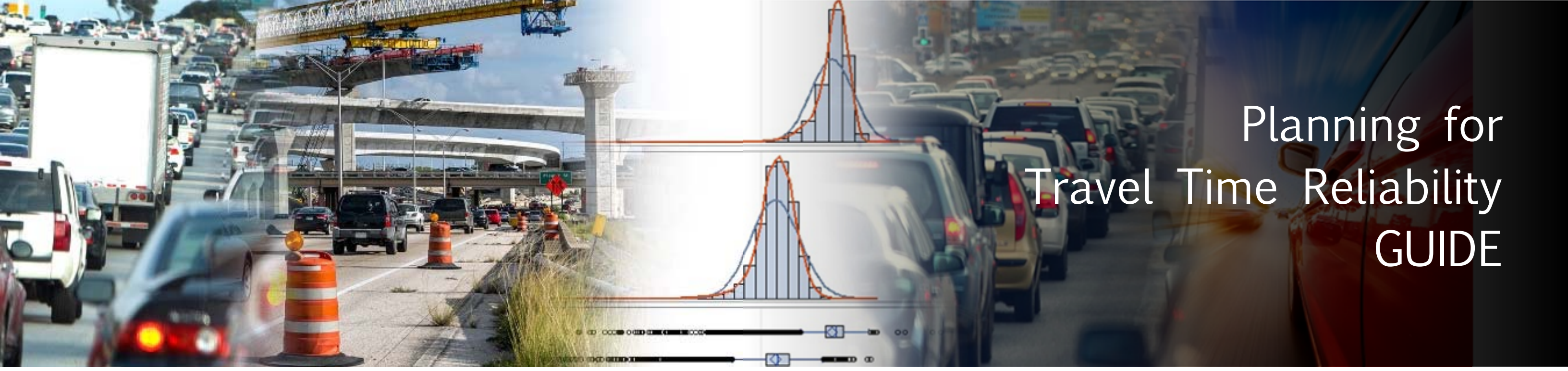


Table 6 Capacity Equivalents For Operations Strategies

Operations Strategy	Capacity Equivalent and Justification
Ramp metering	**Three percent**; Zhang, L. and D. Levinson. Ramp Metering and Freeway Bottleneck Capacity. *Transportation Research: A Policy and Practice* 44(4), May 2010, pp. 218-235. However, research by FDOT suggests that **five percent** should be used.
Incident Management	Two unidirectional lanes: **7 percent** Three plus unidirectional lanes: 6 percent; based on empirical delay analysis and 25 percent reduction in incident duration
Active signal control	**Seven percent**; based on empirical delay analysis assuming that active signal control reduced delay by 25 percent (MTC value is 5 percent capacity increase)
Active Traffic Management	**Twenty percent**; meant cover multiple improvement types, including ramp metering, lane control, queue warning, junction control, and traveler information
Hard Shoulder Running	Increase capacity by 1,700 pcphpl

Source: Adapted from: Margiotta, Richard, Waddell, Paul, Foti, Fletcher, Dowling, Rick, and Liao, Lawrence, *Travel and Emissions Impacts of Highway Operations Strategies*, FHWA Report FHWA-HOP-14-013, March 2014.

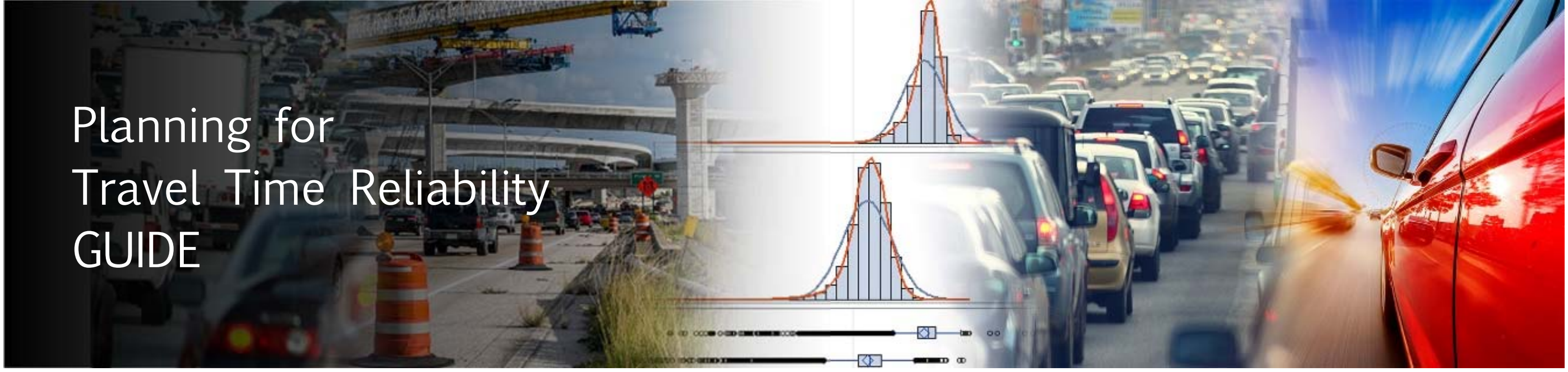
LOSPLAN

LOSPLAN is a tool developed by FDOT to conduct conceptual planning.

Conceptual planning is a type of application detailed enough to reach a decision on design concept and scope (e.g., four through lanes with a raised median), conducting alternatives analyses (e.g., four through lanes undivided versus two through lanes with a two-way left turn lane), and performing other technical analyses. Conceptual planning is applicable when there is a desire for a good determination of the LOS of a facility without doing detailed, comprehensive operational analyses, and for determining needs when a generalized planning evaluation is simply not accurate enough. Florida's LOSPLAN software, which includes ARTPLAN, FREEPLAN, and HIGHPLAN, is the major tool in conducting this type of analysis. Although considered good generalized and conceptual planning tools, the software programs are not detailed enough for PD&E traffic analysis, final design, or operational analysis work, and should not be used for those purposes.5

LOSPLAN modules for freeways (FREEPLAN) and signalized highways (ARTPLAN) are based on simplified methods from the Highway Capacity Manual. Their outputs can be easily processed to produce reliability estimates, using the following steps.

[5] Florida DOT, *2013 Quality/Level of Service Handbook*, http://www.fdot.gov/planning/systems/programs/SM/los/pdfs/2013%20QLOS%20Handbook.pdf



<u>Step 1: Obtain Speed Estimates.</u> ARTPLAN provides average travel speed as an output. FREEPLAN provides density, but speed can be estimated using:

$$Speed = \frac{Volume}{Density}$$

<u>Step 2: Obtain Capacity.</u> LOSPLAN provides capacity values.

<u>Step 3: Calculate Incident Delay Rate (hours per mile).</u> LOSPLAN only considers recurring congestion. To estimate reliability, incident-related delay is the most important additional factor. The following equation, based on relationships in the Intelligent Transportation System Deployment Analysis System (IDAS)[6], is used:

$$D_i = \frac{-0.0031}{1 - 115.44 \times e^{-4.576 \times VC}}$$

Where: D_i = incident delay rate (hours per mile)

VC = volume-to-capacity ratio (max = 1.0)

Step 4: Calculate Recurring Delay Rate.

$$D_r = \frac{1}{Speed} - \frac{1}{FFS}$$

Where: D_r = recurring delay rate (hours per mile)

FFS = free flow speed (from LOSPLAN inputs)

Speed is from Step 1

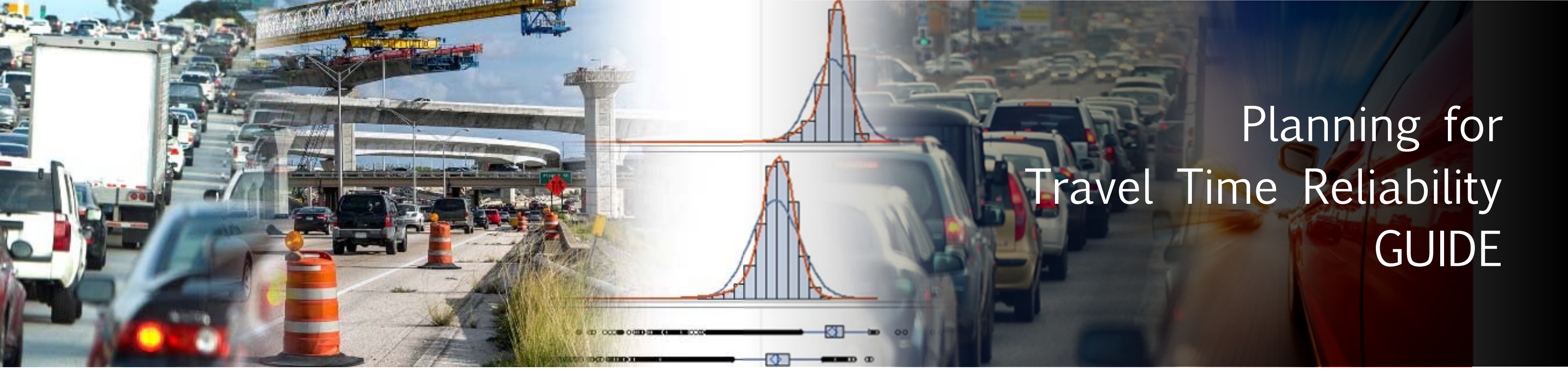
Step 5: Calculate Mean Travel Time Index.

$$MTTI = 1 + \{FFS \times (D_r + D_i)\}$$

Where: MTTI = mean travel time index

<u>Step 6: Calculate Planning Time Index.</u> Florida-specific relationships between the MTTI and PTI were previously developed under the SHRP 2 Implementation Assistance, as follows.

[6] http://ops.fhwa.dot.gov/trafficanalysistools/idas.htm



Freeways:

$$PTI = 11.7933 - 16.2178 \times e^{(-0.3855 \times MTTI^{1.0336})} \; for \; MTTI > 1.08$$

$$= 1.3737X - 0.3737 \; otherwise$$

Signalized Arterials:

$$PTI = 21.1669 \times e^{-\frac{2.9506}{MTTI}}$$

Highway Capacity Manual Related Software

Traditional (non-reliability) procedures from the Highway Capacity Manual (HCM) can be used to produce similar (but more extensive) outputs as LOSPLAN. Therefore, the procedure outlined above can be used to process HCM outputs to produce PTI.

The sixth Edition of the Highway Capacity Manual, published in 2016) includes procedures for estimating reliability directly for freeways and signalized roadways. The concept is to develop scenarios that represent varying conditions due to variability in volume, incidents, and weather. Each scenario is analyzed using the core highway capacity methodology, which results in a distribution of travel times rather than a single value. Reliability measures are then derived from the distribution. In this way, the method replicates how facilities operate over the course of an entire year (or longer) and not just on a disruption-free “typical” day.

Software has been developed to implement the new HCM reliability procedures. If a highway capacity analysis is to be used for an FDOT application, software that implements the new HCM reliability methods should be used.

Synchro and Other Macroscopic Models

Until macroscopic software other than HCM-related software incorporates a direct method of estimating reliability, the procedures specified for LOSPLAN above should be applied.

VISSIM and Other Microscopic Models

As with macroscopic models, until macroscopic software other than HCM-related software incorporates a direct method of estimating reliability, the procedures specified for LOS above should be applied. A separate FHWA grant to implement the methodology developed by SHRP2 Project L04 is also relevant, although the success of the study will determine its long-term viability for FDOT. The concept behind SHRP 2 L04 is to implement a reliability estimation procedure with mesoscopic and microscopic models. It is comprised of two main components: (1) a scenario generator, which operates in a similar fashion to the new HCM method, and (2) a trajectory processor, which generates travel times from vehicle trajectories, thus allowing trip-based performance measures to be developed. This latter feature is a departure from all other methods discussed herein and provides measurements closer to the traveler experience.

An alternative to SHRP 2 L04 is to use an HCM-based procedure to produce reliability measures by pivoting off a typical microsimulation run. This approach is being taken under a different work order using the FREEVAL-RL software in conjunction with the VISSIM microscopic simulation model. This approach is being implemented for the Maryland State Highway Administration using the TTR/ATDM software in conjunction with VISSIM.

Finally, it is possible to process microscopic model outputs with the same procedures specified for LOSPLAN above, but should be seen as the last choice for reliability modeling.

Reliability and Benefit-Cost Analysis

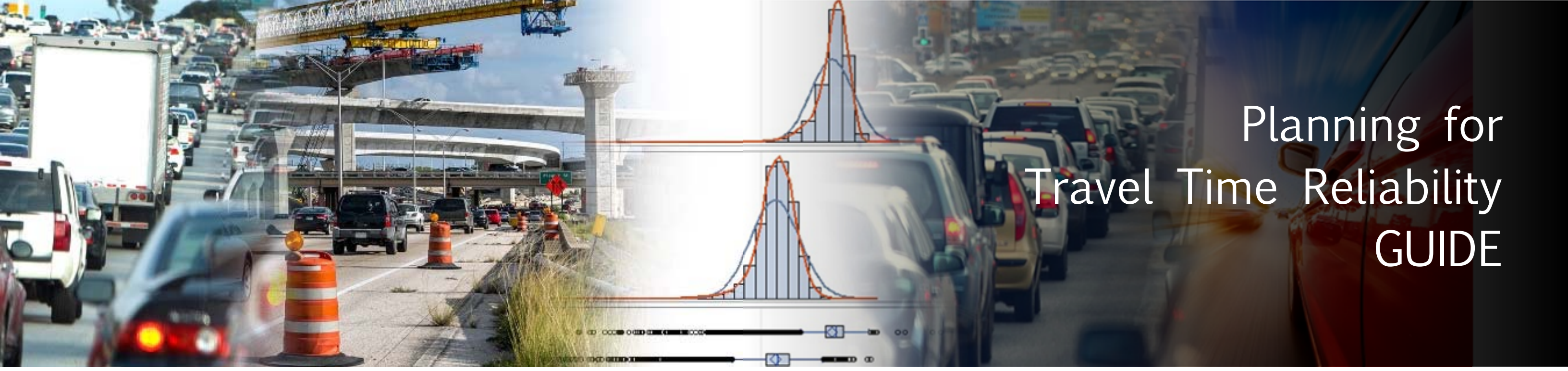
The Value of Travel Time Reliability

Valuing travel time has a long history in transportation modeling and analysis. The value of travel time (VOT) refers to the monetary values travelers place on reducing their travel time. VOT has been long established from a basis in consumer theory where value is related to a wage rate or some portion of it. It is considered one of the largest cost components in benefit-cost analysis of transportation projects because one of the benefits for travelers in a transportation improvement is the reduction of travel time.[7]

In contrast, the value of travel time reliability (VOR) is a relatively new concept. VOR connects the monetary values travelers place on reducing the variability of their travel time. Reliability has most often been considered qualitatively and is associated with the statistical concept of variability.[8] However, it is clearly recognized by travelers of all types. Travelers account for the variability in their trips by building in “buffers” as insurance against late arrival.

[7] Vovsha, P., M. Bradley, and H. Mahmassani. 2011. *Value of Travel Time Reliability: Synthesis of Estimation Approaches & Incorporation in Transportation Models*. Presentation for the Transportation Research Board Annual Meeting.

[8] Carrion, C. and D. Levinson. 2010. *Value of reliability: High occupancy toll lanes, general purpose lanes, and arterials*, in ‘Conference Proceedings of 4th International Symposium on Transportation Network Reliability in Minneapolis, MN (USA)’.



This action implies that the consequence of arriving late is “costly” and should be avoided.[9] Efficiency and productivity lost in these buffers or safety margins represent an additional cost that travelers absorb.

Reliability is of sufficient value to transportation system users that empirical studies have demonstrated a willingness to pay for reduced travel time. Variability in the costs that are acceptable to different travelers for different trips suggests that this value is not a “one-size-fits-all” association. The difference in value between users or for the type of use must be quantified to be understood and applied appropriately.

For the business traveler and freight shippers, time is money. The just-in-time delivery aspect of the present economy implies a high cost associated with an unreliable transportation system and a corresponding value for travel time reliability. Freight providers are a unique category of transportation users in many aspects; however, the value placed on reliability is consistent with or greater than other travelers.

The concept of “extra impedance due to unreliable travel” is probably the best way to incorporate reliability into the modeling structure as an input. SHRP 2 Project C04, *Improving Our Understanding of How Highway Congestion and Pricing Affect Travel Demand*, used this approach where the impedance on a link can be captured as a generalized cost function that includes both the average travel time and its standard deviation (which is used as the indictor of reliability; Figure 11).[10]

Figure 11 SHRP 2 Project C04’s Generalized Highway Utility Function

$$U = a + b \times MedianTime + c \times \frac{Cost}{Inc_e \times Occ_f} + d \times \frac{SDevTime}{Dist} + \cdots$$

Where:

a is an alternative-specific “bias” constant for tolled facilities.

b is the travel time coefficient, ideally estimated as a random coefficient to capture residual heterogeneity.

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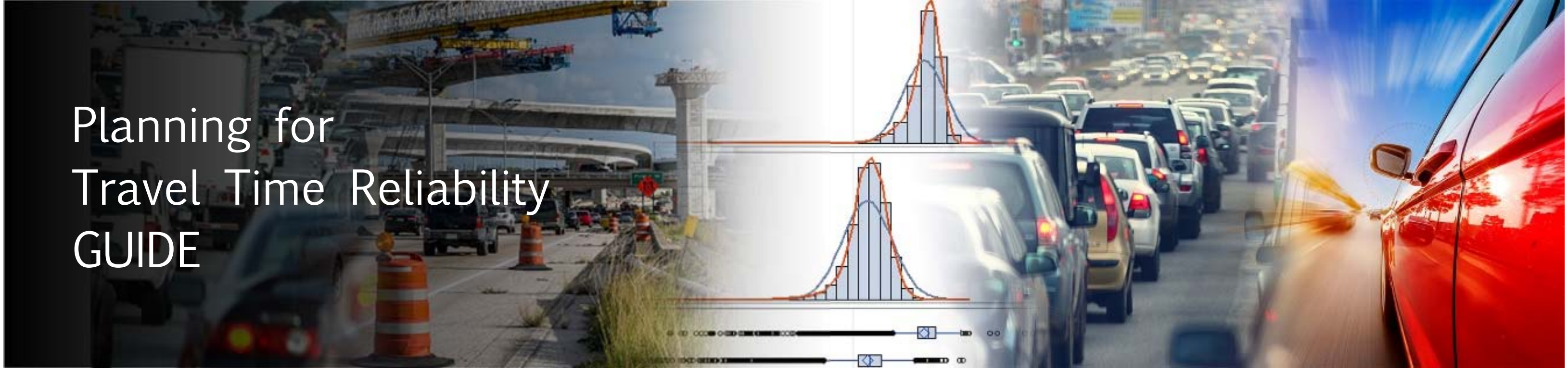
[9] Organisation for Economic Co-operation and Development (OECD). 2010. *Improving Reliability on Surface Transportation Networks.*

[10] PB Americas et al., Improving Our Understanding of How Highway Congestion and Pricing Affect Travel Demand, SHRP 2 Project C04, Transportation research Board, 2013, http://www.trb.org/Main/Blurbs/168141.aspx.)



MedianTime is the median, typical expected, travel time by auto.

c is the monetary cost coefficient.

Cost/(Ince ×Occf) is the monetary cost, scaled by power functions of both income and vehicle occupancy.

d is the reliability coefficient.

SDevTime/Dist is a measure of travel-time reliability, specified as the day-to-day standard deviation of the travel time by auto, divided by distance.

And:

Value of Time, VOT = b/c.

Value of Reliability, VOR = d/c.

Reliability Ratio, VOR/VOT = d/b, ranges from 0.5 to 1.5.

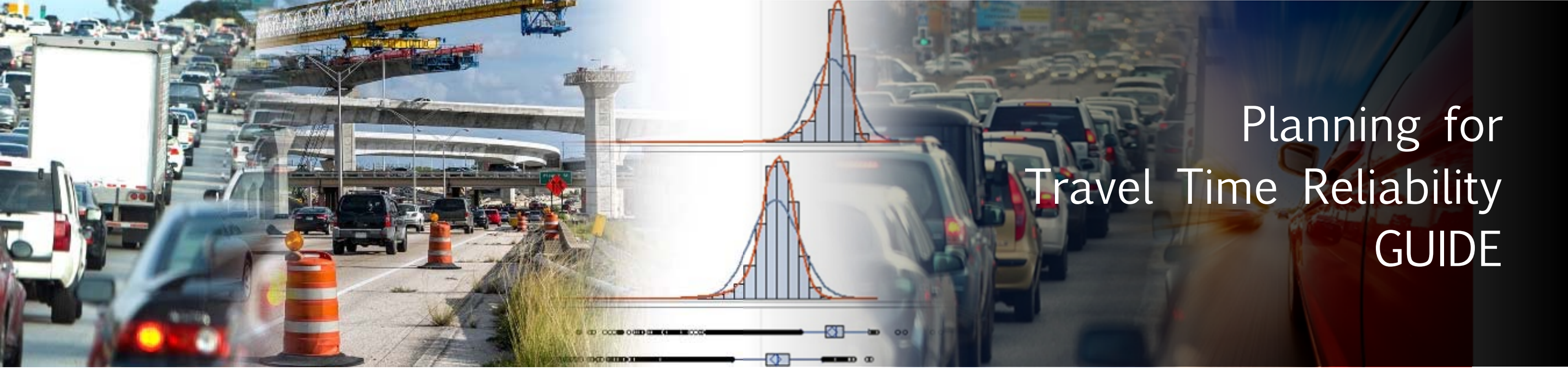
VOR range:

Trip purpose	Distance	VOR
Work	5 miles	$54.9/hour
	10 miles	$27.5/hour
	20 miles	$13.8/hour
Non-work	5 miles	$40.8/hour
	10 miles	$20.4/hour
	20 miles	$10.2/hour

$$Delay_e = \left(\frac{TTI_e}{FFS} - \frac{1}{FFS}\right) \times VMT$$

Where: $Delay_e$ is the equivalent delay value in vehicle-hours

The unit cost of delay used by FDOT in standard benefit-costs analyses is then multiplied by $Delay_e$ to obtain the total delay costs which include reliability.



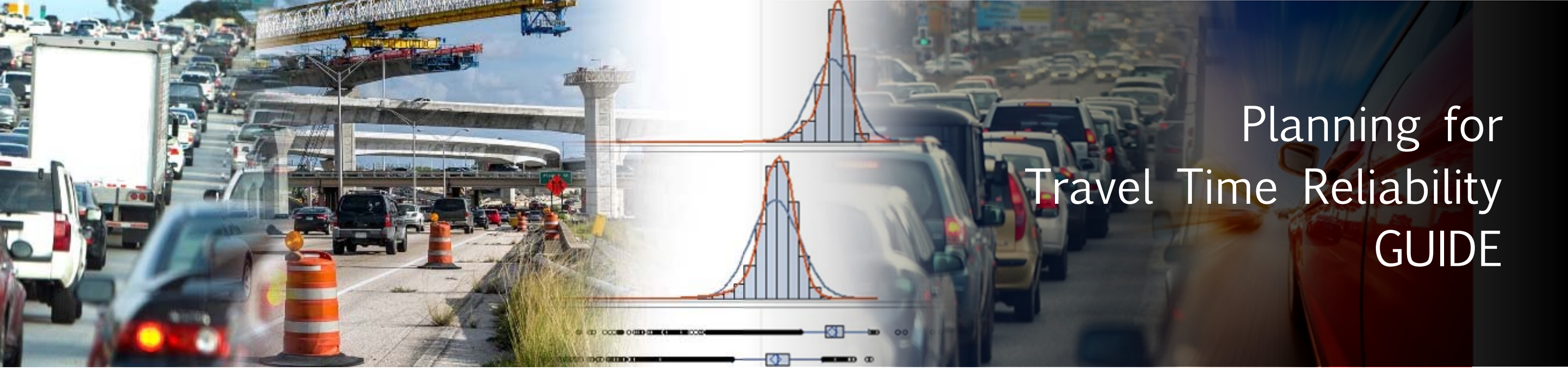
A

Appendix A

This appendix provides a list and web link to various resources that address planning for travel time reliability. It contains three important documents from FDOT, several guides from FHWA, and documents from other organizations.

Title	Year	Web Link
FDOT – TSM&O Strategic Plan	2013	http://www.fdot.gov/traffic/TSMO/documents/TSMO-Strategic-Plan-2013.pdf
FDOT – Blueprint to Incorporate TSM&O in Corridor Planning	2016	-
FDOT – Multimodal Mobility Performance Measures Source Book	2016	http://floridampms.com/Final%20Reports/2016%20General%20Interest%20Source%20Book%20Final%20082416.pdf
FDOT – A synthesis of the "State-of-the-Practice for Advancing Planning and Operations Integration Opportunities within Transportation Agencies" Final Report	2014	http://www.fdot.gov/research/Completed_Proj/Summary_PL/FDOT-BDV29-977-16-rpt.pdf
2040 Southeast Florida Regional Transportation Plan – Planning for Operations in Our Region	2015	http://seftc.org/system/js/back/ckfinder/userfiles/files/12303%202040%20RTP_Final%20Planning%20for%20Operations_Oct2015.pdf
FHWA – Federal Strategies for Implementing Requirements for LRTP Update for the Florida MPOs	2012	http://www.fdot.gov/planning/revenueforecast/usdot.pdf
FHWA – Advancing Metropolitan Planning for Operations, An Objectives-Driven, Performance-Based Approach	2010	http://ops.fhwa.dot.gov/publications/fhwahop10026/fhwa_hop_10_026.pdf
FHWA – Statewide Opportunities for Linking Planning and Operations A Primer	2008	http://ops.fhwa.dot.gov/publications/fhwahop08028/state_plnops.pdf
FHWA – Advancing Metropolitan Planning for Operations, The Building Blocks of a Model Transportation Plan Incorporating Operations	2010	http://www.ops.fhwa.dot.gov/publications/fhwahop10027/fhwahop10027.pdf

Title	Year	Web Link
FHWA – Applying a Regional ITS Architecture to Support Planning for Operations	2012	http://ops.fhwa.dot.gov/publications/fhwahop12001/fhwahop12001.pdf
FHWA – Creating an Effective Program to Advance Transportation System Management and Operations Primer	2012	http://ops.fhwa.dot.gov/publications/fhwahop12003/fhwahop12003.pdf
FHWA – Integrating Demand Management into the Transportation Planning Process: A Desk Reference	2012	http://ops.fhwa.dot.gov/publications/fhwahop12035/fhwahop12035.pdf
FHWA – Incorporating Travel-Time Reliability into the Congestion Management Process: A Primer	2015	http://ops.fhwa.dot.gov/publications/fhwahop14034/fhwahop14034.pdf
FHWA – Advancing Transportation Systems Management and Operations Through Scenario Planning	2015	http://ops.fhwa.dot.gov/publications/fhwahop16016/fhwahop16016.pdf
FHWA – Getting More by Working Together, Opportunities for Linking Planning and Operations – A Reference Manual	2004	http://www.ops.fhwa.dot.gov/publications/lpo_ref_guide/hop05016.pdf
FHWA – Transportation Planning for Operations: Quick Guide to Practitioner Resources	2013	http://www.ops.fhwa.dot.gov/publications/fhwahop13049/fhwahop13049.pdf
FHWA – Statewide Opportunities for Integrating Operations, Safety and Multimodal Planning	2010	http://www.fhwa.dot.gov/planning/processes/statewide/practices/manual/manual.pdf
FHWA – Transportation Planning Capacity Building Program Performance-based Planning and Programming in the Context of MAP-21	2014	http://ntl.bts.gov/lib/54000/54500/54585/NYMTC_Planning_MAP21_3-6-14.pdf
FHWA – Performance-Based Planning and Programming Guidebook	2013	http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/pbppguidebook.pdf
TRB – Incorporating Reliability Performance Measures into Operations and Planning Modeling Tools	2014	http://nap.edu/22388
TRB – Guide to Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes	2014	http://nap.edu/22595



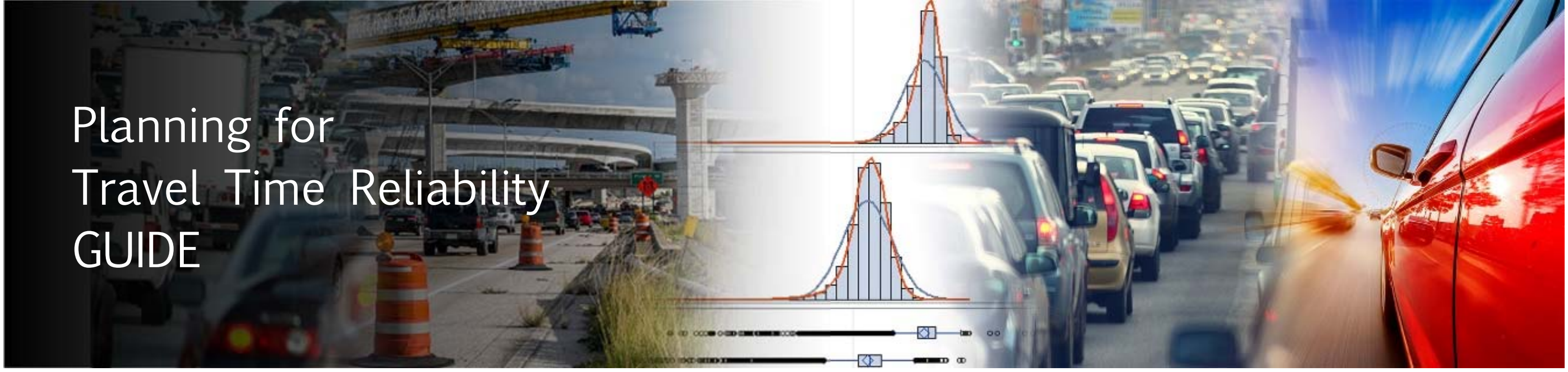
B

Appendix B

There are seven critical processes and documents generated to provide overall financial guidance for the Department. The Florida Transportation Plan (1) provides long-term vision for the State. This Plan sets the broad policy guidance for all future Department initiatives. The Program and Resource Plan (PRP) (2) is a 10-year projected annual budget for all Departmental programs, including the new capital and maintenance programs. The PRP provides program funding levels that form the basis for the Department's Finance Plan, Five-Year Work Program, and Legislative Budget Request. The most important document for project development is the Work Program (3), which is a five-year outlook that identifies which projects and services will be provided, when and where such projects and services will be provided, and how these projects and services will be funded using available revenue. The Five-year Finance Plan (4) provides the Legislature and Department managers with expected revenue forecasts and assurance that the Department's planned program is financed (balanced with anticipated revenues). A separate 36-month Cash Forecast (5) provides a model for ensuring that acceptable cash flow is available for project activity and operations over the time period.

A separate Florida Long-Range Program Plan (6), which is developed on an annual basis as required by section 216.013, F.S., provides the framework and context for preparing the annual legislative budget request and includes performance indicators for evaluating the impact of programs and agency performance.

The Systems Planning Office produces an additional document set known as the SIS Funding Strategy (7), which includes three inter-related sequential documents that identify potential Strategic Intermodal System (SIS) capacity improvement projects in various stages of development. The combined document set illustrates projects that are funded (Year 1), programmed for proposed funding (Years 2 through 5), planned to be funded (Years 6 through 10), and considered financially feasible based on projected State revenues (Years 11 through 25).



Developing the Work Program: Process

The process of developing the Tentative Work Program begins with the Summer Executive Program Planning Workshops, during which policy and preliminary funding decisions are made.

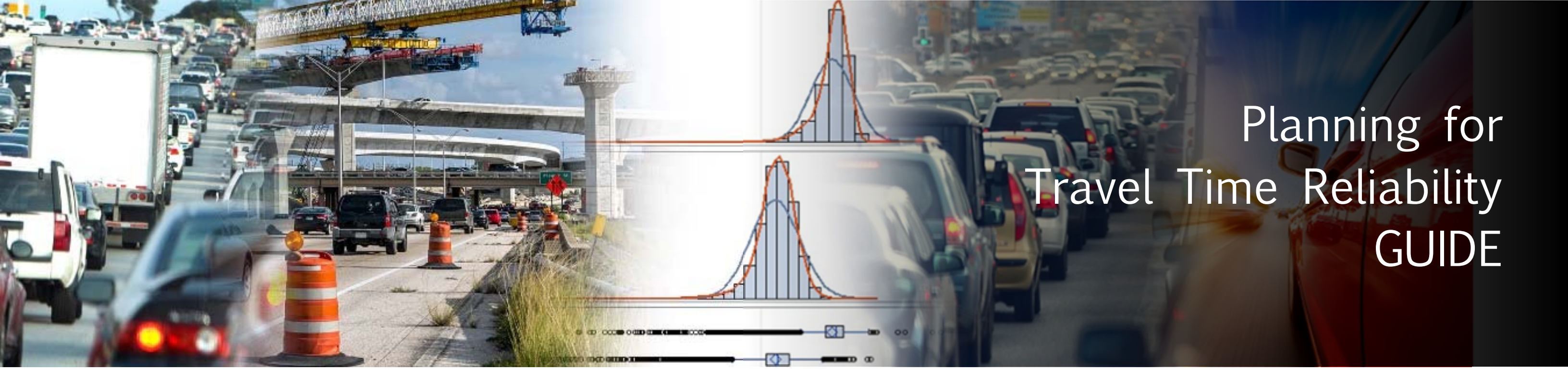
The Office of Work Program and Budget updates the Work Program Instructions annually. The Work Program Instructions reflect any policy changes approved by the Executive Team and reflect changes in technical guidelines arising from system modifications and/or revisions to applicable Federal and state laws, regulations and administrative rules. Changes to the Work Program Instructions are reviewed at workshops held in late August or early September, after which the instructions are finalized.

A gaming period is opened from July to January for Districts/Turnpike and Rail Enterprises and Central Office to update or add to the projects currently programmed in the Work Program Administration System within the Tentative Work Program years. The gaming cycle allows Districts to make modifications that reflect the most up-to-date information. This could include emergency responses, changes to legislation, or project scheduling. District level reviews by District Secretaries, followed by District-wide public hearings, are conducted prior to final closing of the gaming period.

After the closing of the gaming period, the Central Office Work Program staff reviews the District and Statewide Work Programs for compliance with the Work Program Instructions, Federal and state laws and regulations, administrative rules, and any other applicable guidelines. Other offices such as Intermodal Systems Development, Engineering and Operations, and Production Management also participate in the Central Office review. Review results are discussed with the Districts and statewide program managers, and the Work Program Administration system is opened to allow Central Office staff to make necessary changes. Conferences or teleconferences are then scheduled for District Secretaries to review the District work programs with the Secretary. Additional modifications may take place because of these reviews.

The Tentative Work Program is developed by the Central Office based on the submissions of the seven Districts and the Turnpike and Rail Enterprises. A preliminary version of the Tentative Work Program is submitted to the Executive Office of the Governor and the Legislature at least 14 days prior to the start of the legislative session (as required by section 339.135(4)(f), F.S.). This typically takes place in February.

Fourteen days after the start of the session (typically in March), the Department must submit the Tentative Work Program for legislative consideration based on comments and review. The Legislature ultimately approves or modifies the Work Program through the General Appropriations Act. Prior to the start of the new Fiscal Year on July 1, the Department will adopt a Final Work Program. The adopted Final Work Program may include only those



projects submitted as part of the Tentative Work Program plus any projects that are separately identified by specific appropriation in the General Appropriations Act and any roll forwards.

Source: Florida Transportation Asset Management Plan