PlanWorks Case Study

Transportation Systems Management & Operations (TSM&O) PlanFlorida Department of Transportation

This case study is an excellent example of coordination between internal partners in developing a Transportation Systems Management and Operations, or TSMO, plan. Although the Florida Department of Transportation did not use PlanWorks, the PlanWorks Linking Planning and Operations Application will be very useful in helping other agencies collaborating for a similar purpose.

Executive Summary

In 2017, the Florida Department of Transportation (FDOT) released the final version of its new Transportation Systems Management and Operations (TSM&O) Strategic Plan, with a key focus on integrating TSM&O into the transportation planning and project development process. This plan outlines a comprehensive approach for making TSM&O a stronger component of FDOT's plans and projects. The TSM&O 2017 Strategic Plan (Strategic Plan) has a strong performance-based focus and identifies a TSM&O vision; program goals related to mobility, safety, and reliability; and performance measures. The plan makes the connection between the 2060 Florida Transportation Plan Goals and the TSM&O Strategic Plan Goals, as well as connections to various FDOT strategic plans, such as the Florida Strategic Highway Safety Plan. Implementation will include: working with each FDOT District Office to develop unique performance measures, baselines, and targets; identifying supporting data; and tabulating measures to determine whether targets are being met. The intent is to incorporate TSM&O into FDOT's procedures and processes, including the systematic consideration and incorporation of relevant strategies throughout project development, and to reframe TSM&O to be part of every alternative rather than a separate alternative. This case study highlights the development of the TSM&O Strategic Plan with a focus on integration of TSM&O within project development.

Overview

The TSM&O 2017 Strategic Plan provides a performance-based approach to linking planning and operations across Florida. Key features include:

- Close coordination across FDOT functional areas ensured alignment with the agency's high-level goals and helped institutionalize TSM&O in the project development process.
- The Strategic Plan defines a process for the Central Office TSM&O Division to collaborate with each of the State's seven District Offices to establish safety, mobility, and ITS system up-time goals within a two-year timespan.
- The creation of TSM&O leadership and task teams provided an effective means to disseminate TSM&O program objectives to District Offices.
- Collaborations between District Office liaisons and local and regional stakeholders promotes local adoption of TSM&O strategies, and inclusion of TSM&O steps in regional transportation plans.
- SMART Action Plans provide TSM&O leadership a blueprint for monitoring implementation of Strategic Plan objectives.

Agency's Challenge

Florida is home to over 20 million residents and an economy that includes robust trade and tourism sectors. Between 2015 and 2040, the State has been projected to add approximately 6 million more residents. Over the same horizon, freight tonnage is expected to nearly double.[1] FDOT is comprised of seven regional District Offices that serve Florida's diverse and growing needs. Jurisdictions of these seven districts range from the densely populated South Florida region to the largely rural Florida Panhandle in the State's northwest. Structurally, FDOT is organized into functional areas across the transportation spectrum, with offices that include Planning, Maintenance and Traffic Engineering and Operations among many others. FDOT also works closely with the State's 27 metropolitan plannng organizations (MPOs) and Federal transportation agency partners including the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and the National Highway Traffic Safety Administration (NHTSA). This assortment of planning environments, functional areas, and agency partners make the State's transportation system among the largest and most complex in the Nation.

Florida's growing population and economy have magnified the State's highway safety and congestion concerns. Following a few years of reductions, serious injury and fatality crashes have been trending upwards. Similar increases have been documented for congested travel time on the State's highways.[2] Fiscal and environmental constraints present a further challenge for the agency, demanding that existing infrastructure accommodate Florida's growing travel needs to the greatest extent possible. The emergence of connected and automated transportation technologies, shared mobility models, and ubiquitous high-speed cellular service and real-time performance data present additional challenges and opportunities.

The Florida Transportation Plan (FTP), the State's long-range transportation plan, and the Florida Strategic Highway Safety Plan (FSHSP) prioritize eliminating these safety and mobility issues. FDOT's adoption of the "Towards Zero Deaths" national traffic safety vision in 2012 has made the agency's safety focus all the more imperative.[3] TSM&O strategies bring proven safety and mobility benefits and have the potential to positively influence these trends. TSM&O measures that have been widely used in Florida with positive results include practices like Traffic Incident Management to clear roadway lane blockages and the use of dynamic message signs in conjunction with traffic management systems to warn drivers of roadway obstructions and delays. Emerging TSM&O initiatives that promise to further improve safety and mobility include applications like dynamic ramp metering and

Decision Guide Connections

TSM&O Strategic Plan activities support the following Decision Guide connections:

- **LRP-1.** Establishment of TSM&O leadership and task teams comprised of FDOT functional program area management provide an effective means to link planning and operations across the project development spectrum.
- **LRP-2.** Cross-functional collaboration within FDOT's Central Office and close working relationships with district-level leadership ensure the Strategic Plan vision, mission and goals dovetail with the high-level goals of the Florida Transportation Plan and other strategic plans and guidance documents; District Office outreach to local and regional stakeholders promotes inclusion of TSM&O strategies in regional transportation plans.
- **LRP-3.** Three types of goals and performance areas provide a basis for developing TSM&O baselines, measures and targets for each of FDOT's seven districts.
- **LRP-4.** Statewide safety, mobility and ITS system-up time deficiencies inform the development of TSM&O Strategic Plan strategies.
- **LRP-6.** SMART Action Plans provide a blueprint for statewide implementation of TSM&O Strategic Plan objectives and outcomes-driven performance monitoring.

1 2015 Florida Transportation Plan: Vision Element

2 http://www.floridampms.com/

3 http://www.fdot.gov/safety/safety%20coalitions/coalitonsresources.shtm

connected vehicle infrastructure.

In 2017, FDOT published an update to its TSM&O Strategic Plan. While the previous version of the plan focused primarily on operational strategies, the update focused on collaboration with various FDOT functional areas, District Offices, and local and regional stakeholders in order to bridge project development siloes and begin to mainstream TSM&O. This mainstreaming strategy implies systematic consideration of TSM&O applications across the project development process and incorporation of TSM&O as a part of each alternative rather than as a separate alternative.

Development of the TSM&O Strategic Plan

The Strategic Plan builds on a history of FDOT intelligent transportation systems (ITS) strategic planning dating back to the late-1990s, as well as more recent TSM&O strategic planning efforts. Many of the themes developed in earlier ITS and TSM&O strategic plans are carried forward in the 2017 update. These earlier plans laid out a framework for the development of a TSM&O Leadership Team and approaches to TSM&O mainstreaming. Earlier plans also included capacity building resources, focus areas and measures to gauge success.

While the Strategic Plan builds upon these earlier initiatives, it represents a significant overhaul of FDOT's TSM&O approach, with new emphasis on:

- an outcomes-based, performance-driven process developed in collaboration with each District Office;
- cross-functional coordination with Central Office leadership to promote strategic alignment of the TSM&O program with the FTP, the statewide Project Development and Environment (PD&E) Manual and other policy frameworks and guidance documents;
- systematic consideration of TSM&O in functional areas spanning the project development spectrum; and
- the creation of an action plan to foster district by district implementation of the Strategic Plan goals.

FDOT's emphasis on this collaborative, performance-based approach to linking planning and operations is further reflected in the recent rebranding of the agency's ITS Division, which is now called the Transportation Systems Management & Operations Division (TSM&O Division).

TSM&O Vision, Mission and Program Goals

The Strategic Plan includes a focus on improving safety and mobility outcomes through active management of freeways and arterials, and the application of various operations strategies and technologies. The Plan's vision and mission statements[4] support these outcomes:

- Vision: TSM&O will increase the delivery rate of fatality-free and congestion-free transportation systems supporting the FDOT vision and Florida Transportation Plan goals.
- Mission: Identify, prioritize, develop, implement, operate, maintain, and update TSM&O strategies and measure their effectiveness for improved safety and mobility .

Table 1: P-PEG Performance Metrics and Goals

System or Strategy	Performance Metric(s)	Application	P-PEG (1)
Any TSM&O strategies where mobility is a need addressed by the strategy	Throughput, PTI, Speeds	Routes, corridors, and/or modes for which TSM&O strategies are applied	Greater than 5% improvement resulting from the TSM&O application(s)
Any TSM&O strategy where safety is a need addressed by the strategy	Crash rates, Crash Severity	Routes, corridors, and/or modes for which TSM&O strategies are applied	Minimum P-PEG thresholds will be sent in future Strategic Plan updates
Any project intended to improve performance of ITS infrastructure or communication networks supporting TSM&O strategies	Uptime availability	ITS infrastructure and communication networks supporting TSM&O strategies	Minimum P-PEG thresholds will be set in future Strategic Plan updates

Table Note (1): Districts are encouraged to set higher and/or additional P-PEG to support district and regional TSM&O strategic planning.

Figure 1: P-PEG performance metrics and goals.

The Strategic Plan's vision and mission are closely tied to its program goals. The Strategic Plan defines three types of program goals:

- Performance Goals (Goals) – applies to the ongoing operations and maintenance of existing TSM&O systems and strategies.
- Performance Enhancement Goals (PEG) – applies to the operations and maintenance of existing systems where performance goals have not been attained or where a district wishes to go beyond established performance goals.
- Project-Performance Enhancement Goals (P-PEG) – applies to TSM&O strategies and projects funded for implementation.

The Strategic Plan's program goals are linked to

4 TSM&O 2017 Strategic Plan, p. 1

three performance areas: mobility, safety and ITS/communications network system up-time. The Strategic Plan defines a process for the Central Office TSM&O Division to collaborate with each of FDOT's seven District Offices to establish goals within a two-year timespan for routes, route segments and ITS/communications networks for the following outcome-based performance measures:

- Mobility: Improve travel time reliability (applies to all modes)
- Mobility: Reduce all lanes cleared time (applies to all modes)
- Mobility: Throughput increase (applies to all modes)
- Safety: Secondary crash rates
- ITS/communications networks: Statewide and district uptime availability

For each of the above measures, the Strategic Plan includes a district by district implementation plan with corresponding applications, performance metrics, path to goal setting, and data sources (where applicable). To further the goal setting process, the Central Office TSM&O Division provide districts with suggested targets and aims.

TSM&O Division staff report that the initial draft of the P-PEG was more proscriptive in setting project parameters and desired outcomes. However, recognizing that every project is unique and different and that circumstances vary widely between districts, the draft P-PEG language was later revised to be less tactical and more strategic in tone. Figure 1 illustrates this strategic approach to P-PEG performance metrics and goals and demonstrates the breadth of potential applications.

Alignment with Other Plans

The Strategic Plan was developed to include high-level alignment with other FDOT strategic plans and policy plans. Because the FTP focuses significantly on safety, management and operations strategies, TSM&O themes naturally flow into these other plans. Eleven of FDOT's strategic plans and policy documents reference safety, management and/or operations in functional areas that span the transportation spectrum. These include documents like the Freight Mobility and Trade Plan, the Transportation Asset Management Plan and the Information Technology Strategic Plan. Importantly, the Strategic Plan is also closely aligned with the FTP goals, which set an overarching vision for the State's transportation system. Figure 2 demonstrates relationships between the FTP goals and the TSM&O Strategic Plan goals.

To enable this shared goal setting, TSM&O Division staff spent considerable time coordinating with other functional area offices beginning with the Systems Implementation Office and the Policy Planning Office. TMS&O Division leadership report these discussions were consistently met with a positive response and a recognition that TSM&O goals broadly supported strategic plan goals in other functional areas. TSM&O

Florida Transportation Plan Goals	TSM&O Strategic Plan Goals
Transportation Solutions that Support Florida's Global Economic Competitiveness.	Achieve mobility Goals, PEG, and P-PEG.
Transportation Solutions that Support Quality Places to Live, Learn, Work, and Play.	Achieve mobility Goals, PEG, and P-PEG. Continue support for SunGuide® and FL511.
Transportation Solutions that Support Florida's Environment and Conserve Energy.	Achieve mobility Goals, PEG, and P-PEG.
Safety and Security for Residents, Visitors, and Businesses.	Begin to assess the impacts of TSM&O on frequency of secondary crashes.
Agile, Resilient, and Quality Infrastructure.	Achieve mobility Goals, PEG, and P-PEG. Achieve system availability (up-time) Goals and PEG.
Efficient and Reliable Mobility for People and Freight.	Achieve mobility Goals, PEG, and P-PEG.
More Transportation Choices for People and Freight.	Achieve mobility Goals, PEG, and P-PEG.

Figure 2: FTP and TSM&O Strategic Plan goals alignment.

Division staff worked especially closely with FDOT's Safety Office to ensure the Strategic Plan was consistent with their expectations and the goals of the FSHSP. From this discussion, a focus on secondary crash prevention emerged as a primary goal of the Strategic Plan. TSM&O staff also worked closely with FDOT's Office of Environmental Management to ensure the agency's PD&E Manual reflected the priorities of the Strategic Plan. Consequently, the PD&E Manual includes a requirement that TSM&O strategies are included in each step. The Strategic Plan also identifies steps for including TSM&O input in the PD&E Manual's Statewide Acceleration Transformation (SWAT) process. Further, coordination with the Roadway Design Office was crucial to ensuring the FDOT Design Manual was revised to include systematic integration of TSM&O steps.

Mainstreaming TSM&O: Linking Planning and Operations

FHWA encourages integration of operations within transportation planning and programming and an outcomes-based, performance-driven approach to TSM&O project development and delivery.[5] TSM&O strategies provide an opportunity to improve highway safety, operations and maintenance outcomes across each phase of the project development process (these phases include planning, project, PD&E, design, construction and maintenance). Historically, many TSM&O projects in Florida were developed after the completion of a roadway capacity or reconstruction project. For projects that featured a PD&E component, TSM&O steps were often included as an alternative, but later eliminated because of their failure to address the project's purpose and need. Consequently, TSM&O strategies were often excluded as an integral project component despite their ability to positively impact safety and mobility outcomes or substitute for more costly infrastructure improvements.

Florida was the first State in the Nation to implement TSM&O mainstreaming.[6] These efforts began prior to the TSM&O 2017 Strategic Plan update; however, the 2017 Strategic Plan update process became the focal point for realizing this vision. Cross-functional collaboration has been key to achieving FDOT's mainstreaming success, resulting in improved horizontal and vertical communications within the agency and greater participation from various functional areas on both the TSM&O Task and Leadership Teams. Figure 3 provides an illustration of how the typical project development process has been synchronized with an independent development process (in this case, the typical ITS systems engineering process). FDOT is building upon the communications successes developed during the TSM&O strategic planning process by

Figure 5: FDOT Project Development Process and Systems Engineering "Vee" Diagram Process

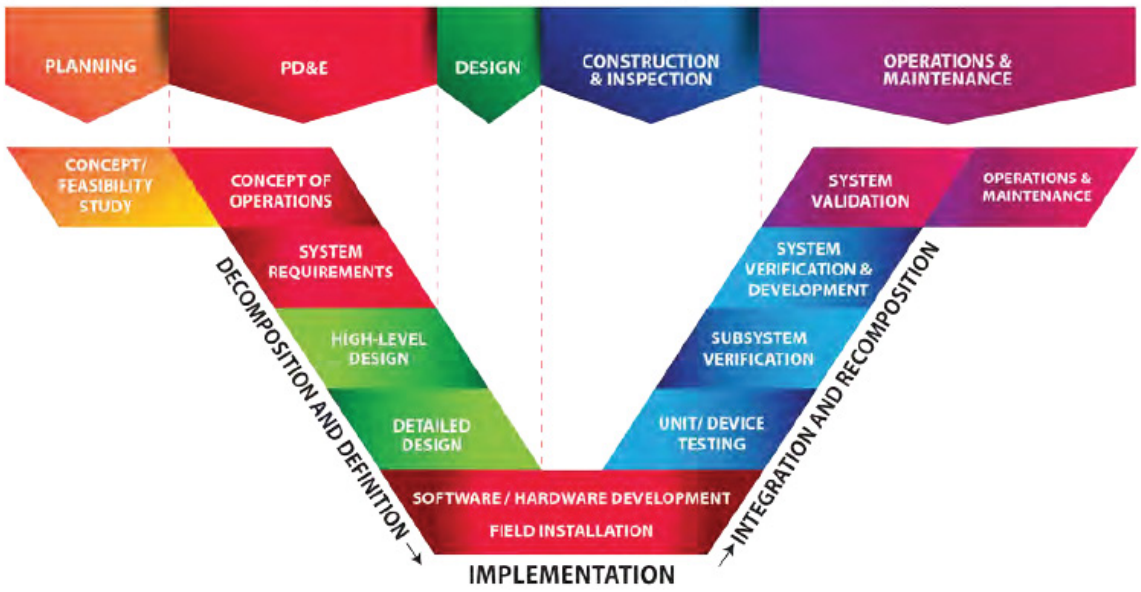

Figure 3: FDOT project development process and systems engineering "Vee" diagram process.

5 TSM&O 2017 Strategic Plan, p. 12.

6 Interview with FDOT State Arterial Management Systems Engineer, December 18, 2017.

broadening TSM&O Task Team membership to include representatives from systems planning, PD&E, Design, construction, maintenance, work programming, and other central offices.[7]

Program Outreach

The TSM&O Leadership Team includes half of the FDOT District Office secretaries and four directors of operations. Collectively, the Leadership Team represents the highest leadership from each of the seven District Offices. This makeup helps to ensure the TSM&O Leadership Team functions as a strong active decision-making body, with the ability to effectively disseminate the TSM&O agenda to district-level staff. In addition to quarterly meetings with the Leadership Team, the TSM&O Division hosts TSM&O Task Team meetings, which bring together many other individuals across FDOT's functional areas. Assignments are given to the Task Team by the TSM&O Division to help further TSM&O program goals. Monthly meetings of the District traffic operations engineers also include a TSM&O program item that allows the TSM&O Division an opportunity to further strengthen buy-in at the District level. TSM&O is also given the necessary technical response at working group meetings for ITS, the Statewide Arterial Management Program (STAMP) group, and SunGuide® – FDOT's advanced traffic systems management software, which is deployed at regional traffic management centers across the State. Internally, the TSM&O Division also works with the Planning Office to incorporate TSM&O in capacity project planning and with the Environmental Office to incorporate TSM&O in capacity projects development. Further, the recent rebranding of the TSM&O Division's bi-monthly SunGuide® Disseminator newsletter to become the TSM&O Disseminator will provide an additional opportunity to share content within the agency that promotes the TSM&O program's mission.

Outside FDOT, TSM&O program outreach was initiated with strategic planning and feasibility studies that involved both FDOT Districts and external stakeholders. The Strategic Plan identifies districts as liaisons to work with external stakeholders that include MPOs, local agencies and transit organizations. This outreach has often included FDOT District traffic operations attendance at MPO meetings, where district representatives advocate for the benefits of TSM&O with the goal of establishing productive local and regional TSM&O partnerships. Understanding MPOs' concerns with respect to operations and maintenance have been key to developing these partnerships and supported inclusion of TSM&O strategies in various regional transportation plans (RTP).

Implementation

Implementation of TSM&O strategies occurs through a planning and project development process involving cross-functional collaboration at FDOT that frequently includes local and regional stakeholders. The projects and initiatives selected for implementation are intended to support Goals, PEG, and P-PEG. The Strategic Plan includes a three-pronged strategy to monitor performance of TSM&O initiatives. First, TSM&O Division staff work with each of the seven districts to develop performance measures, baselines and targets that are uniquely tailored to local context. Second, Central Office staff work with each Division Office to identify supporting data. Finally, performance metrics for TSM&O Goals, PEG and P-PEG are tabulated for each district using inputs from the first and second steps to determine whether targets have been achieved. The aim of these activities is for Goals and PEG associated with operations and maintenance to be continually monitored and reported to the TSM&O Division on a quarterly and annual basis. In addition to the safety, mobility and system up-time goals that all districts are required to monitor, District Offices are encouraged to monitor other performance metrics and Goals using this framework. Figure 4 demonstrates typical TSM&O performance metrics selected by districts along with associated outcomes and applications.

Strategic Plan implementation is further supported by specific, measurable, achievable/accountable, measurable and time-bound (SMART) Action Plans. These plans provide the TSM&O Division, TSM&O Task Team and TSM&O Leadership Team with a roadmap to achieving Strategic Plan implementation. These SMART Action Plans include sequential implementation steps for categories including funding, performance assessment, outreach, mainstreaming, statewide TSM&O capacity building, TSM&O staffing and future Strategic Plan updates.

7 TSM&O 2017 Strategic Plan, p. 22.

Table 6: TSM&O Performance Metrics, Benefits and Applications

Typical TSM&O Performance Metrics	Anticipated Outcomes/Benefits	Application
Crash rates and severity (1)	Reduce rates and severity.	Crashes characterized as initial and secondary incidents
Travel delay (congestion) (1)	Reduce delay, improve travel time reliability.	All modes
Efficiency (throughput) (1)	Increase or optimize throughput.	All modes
Modal access (2)	Improve access to and/or reduce delays/impacts of barriers between modes.	All modes
Traveler information (2)	Improve access to, accuracy of, and/or timeliness of information and travel choice options.	All modes
Environmental impacts (2)	Reduce social, economic and environmental impacts of transportation systems.	All modes

Figure 4: Typical TSM&O performance metrics, outcomes/benefits and applications.

Stakeholder Collaboration

Cross-functional and statewide collaboration has been key to achieving the Strategic Plan's mainstreaming goal. Collaboration with local and regional stakeholders has also furthered the TSM&O program's objectives. For example, FHWA's National Performance Management Research Data Set (NPMRDS), a real-time system management information program, requires State DOTs to work with MPOs to identify routes of local significance. FDOT District 5 worked closely with MetroPlan Orlando (MPO for the Orlando region) to understand the MPO's issues and needs. This collaboration resulted in the development of a decision support system that incorporated traffic data, SunGuide® data and other TSM&O inputs. Ultimately, this decision support system helped FDOT and MetroPlan Orlando secure a $12 million grant from FHWA that will be used to advance ITS technologies in the region.

The Florida Connected Vehicle Initiative has spurred further coordination between FDOT Districts and local agencies. Outcomes of these efforts include planning for the Central Florida Automated Vehicle Proving Ground and design/implementation activities for I-75 Florida's Regional Advanced Mobility Elements (FRAME) in the city of Ocala; the Gainesville Autonomous Transit Shuttle (GATORS); and the SR 434 Connected Vehicle Deployment in Seminole County. Close coordination between local agencies and district-level staff was crucial to the development of these projects and initiatives. TSM&O Division leadership anticipate the deployment of emerging technologies like connected and automated vehicles will help catalyze widespread adoption of TSM&O. Ongoing collaboration with local and regional stakeholders will help pave the way for future TSM&O innovations like these that may bring transformative safety and mobility benefits.

Key Outcomes

FDOT's TSM&O mainstreaming efforts began prior to the 2017 Strategic Plan update. However, the update process became a focal point for making TSM&O mainstreaming a reality. Through cross-cutting dialogue with FDOT functional area management, the TSM&O Strategic Plan process also enabled effective alignment with high-level goals put forth in the FTP, FSHSP and the PD&E manual, which requires TSM&O strategies be considered as a part of each alternative. Alignment with other FDOT functional area strategic plans was also key to fully mainstreaming TSM&O. FDOT's TSM&O Leadership Team and TSM&O Task Team enabled senior management from District Offices and functional areas spanning the project development spectrum to disseminate this TSM&O strategic vision to district-level staff. With guidance from the TSM&O Division, District Offices then operationalized Strategic Plan goals through the development of baselines, measures and targets. In turn, district-level staff work with local and regional stakeholders to develop TSM&O projects and initiatives like those advanced by District 5 and MetroPlan Orlando. The Strategic Plan also includes SMART Action Plans that further advance FDOT towards a fully mainstreamed performance-driven, outcomes-based implementation of TSM&O;

these Action Plans provide a roadmap to achieve the plan's objectives over a 3-5-year window.

This collaborative and systematic approach to TSM&O mainstreaming and implementation has positioned FDOT as a national leader among State DOTs in the effort to link planning and operations. The development of a consistent TSM&O mainstreaming and implementation strategy across jurisdictions has been key to this success. Further, by applying a problem-solving approach and demonstrating the cost-benefit of specific TSM&O strategies to stakeholders, FDOT's TSM&O champions have begun to successfully frame TSM&O as an alternative or precursor to costly infrastructure improvements like capacity expansion, and as a key element to achieving the safety and mobility goals put forth in the FTP. Because staff turnover presents an ongoing challenge, the TSM&O Division's efforts to institutionalize TSM&O best practices statewide helps ensure a transfer of efforts and results and furthers Strategic Plan objectives even where individual TSM&O champions are absent.

For more information

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Resources

- **Transportation Systems Management and Operations: 2017 Strategic Plan** http://www.fdot.gov/traffic/Doc_Library/PDF/2017%20TSM&O%20Strat%20Plan%20Aug%2024%202017%20FINAL.pdf
- **Florida Transportation Plan: Policy Element (2015)** http://floridatransportationplan.com/pdf/FDOT_FTP-SIS_PolicyElement.pdf
- **Florida Strategic Highway Safety Plan (2016)** http://www.fdot.gov/safety/SHSP2012/FDOT_2016SHSP_Final.pdf