

# AASHTO Innovation Initiative

[Proposed] Nomination of Innovation Ready for Implementation

## Sponsor

Nominations must be submitted by an AASHTO member DOT willing to help promote the innovation. If selected, the sponsoring DOT will be asked to promote the innovation to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative.

1. Sponsoring DOT (State): Florida
2. Name and Title: Marie Tucker, Commercial Vehicle Operations Manager

Organization: Florida Department of Transportation

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State: Florida

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## Innovation Description (10 points)

The term “innovation” may include processes, products, techniques, procedures, and practices.

3. Name of the innovation:

FDOT's Freight Operations eXchange (FOX) leverages technology solutions to enhance freight mobility and safety

#### 4. Please describe the innovation.

A centralized, secure Freight Operations eXchange (FOX) platform was developed to organize and analyze data to produce knowledge and insights. FOX is a centrally located repository and exchange platform for information related to the roles and responsibilities of the Commercial Vehicle Operations (CVO) and Motor Carrier Size and Weight (MCSAW) divisions of the Florida Department of Transportation. The centralized FOX houses records from the individual weigh station facilities and roadside devices and serves as the interface for external data sharing. The FOX system also provides an interface for use in performance monitoring, reporting, planning, and other freight management activities. FOX provides the connection between the various facilities and field devices as well as partner agencies, including the Florida Intelligent Transportation Systems (ITS) Operations Network (FION), as well as state and federal databases. FOX also interfaces with remote systems of partner agencies and is used to retrieve and disseminate information such as the Federal Motor Carrier Safety Administration (FMCSA) Performance and Registration Information Systems Management (PRISM) program and the Florida Highway Safety and Motor Vehicle (FLHSMV) overdue compliance citations.

Taking this one step further, FOX interconnects the facilities with freight operations data needed for intra-facility operations. One example application of this allows for advanced subsequent bypass of other weigh stations for CMVs which were previously screened and found compliant, increasing safety and mobility by reducing exit and entrance movements to the facility.

FOX can incorporate additional data sets, including the Truck Parking Availability System (TPAS). This will allow for the use of public truck parking spaces for more than Hours of Service, which generally occurs overnight. During the day, the public parking can be used as staging areas for just-in-time pick-up and delivery to ports, intermodal logistic centers (ILC), etc. This will be accomplished through coordination with the ITS FION and arterial signal network and facilitate the installation of a Freight Advanced Traveler Information System (FRATIS) as well as Freight Signal Priority. Overall, FOX serves as the platform for advanced freight mobility and safety solutions.

#### 5. What is the existing baseline practice that the innovation intends to replace/improve?

In response to forecast growth in truck cargo movements and to maintain the high level of performance and associated infrastructure preservation, MCSAW developed the 2019 Business Plan. The Business Plan focuses on strategies to more efficiently advance activities that increase the safety and mobility of CMVs through technology solutions.

Prior to the plan, MCSAW used a system of permanent installations at its weigh stations, which included internal ramp Weigh in Motion (WIM) bypass lanes (**As seen in the 1st photo attached below**). They also included mainline electronic bypass based only on safety scores. In 2018 the average statewide commercial motor vehicle (CMV) had an electronic bypass (based only on safety scores) of 31% or 7.6 million vehicles, a 44% or 11.1 million ramp WIM bypass rate with a constant operating speed of 45 MPH, and 25% or 6.5 million static weights, requiring a complete stop. While evaluating size and weight criteria, the need to further bypass CMV at mainline speeds was identified as necessary to improve safety by

reducing the exit and entrance movements to the facility and enhancing mobility by keeping trucks moving **(As seen in the 2<sup>nd</sup> attached photo below)**.

CMVs who were participating in an electronic bypass program were bypassing weigh stations based solely on safety scores and not being screened for oversize or overweight compliance. The need to further bypass CMVs at mainline speeds, while evaluating size and weight criteria, was identified as necessary to improve safety by reducing the exit and entrance movements to the facility and enhance mobility by keeping trucks moving.

#### 6. What problems associated with the baseline practice does the innovation propose to solve?

The United States Department of Transportation (USDOT) Bureau of Transportation Statistics (BTS) data shows that 65% of the nation's total tonnage in 2019 is moved by truck. FDOT's 2019 Freight Plan states from 2017 to 2045 truck tonnage is expected to increase 80%. Florida currently operates twenty (20) interstate weigh stations responsible for verifying that commercial motor vehicles (CMVs) operate within a safe, congestion free, reliable, efficient, and informative transportation system which supports both international and domestic trade and passenger movements. The need to further bypass CMV at mainline speeds, while evaluating size and weight criteria, was identified as necessary to improve safety by reducing the exit and entrance movements to the facility and enhance mobility by keeping trucks moving.

#### 7. Briefly describe the history of its development.

In response to forecasted growth in truck cargo movements and to maintain the high level of performance and associated infrastructure preservation, MCSAW developed the 2019 Business Plan along with the 2021 Commercial Vehicle Operation (CVO) Business Plan. The Business Plans focused on strategies to more efficiently advance activities that increase safety and mobility of CMVs through technology solutions.

MCSAW held a "Vision Session" workshop that brought together stakeholders from FDOT, partnering agencies, and the trucking industry to develop Specific Measurable Actionable Relevant and Timebound (SMART) goals to address the forecasted growth in truck movements. Through the implementation of clearly defined tactics and activities, these SMART goals would be achieved. CVO has a formalized partnership group that provides a collaborative venue for external partner coordination and communication. This partnership group is focused on enhancing the safe and efficient operations of commercial vehicles in Florida while supporting the Florida Department of Transportations (FDOT) mission to **provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.**

Standardized plans were developed for the installation of mainline WIM, allowing for the processing of CMVs at interstate travel speeds **(as seen in the 1<sup>st</sup> photo attached below)**. Currently, mainline WIM is installed at the I-75 weigh stations located in White Springs. Construction of mainline WIM is in progress at the other locations throughout the state **(as seen in the 3<sup>rd</sup> photo attached below)**.

Through close coordination with each of the FDOT geographic districts, MCSAW was able to obtain dedicated fiber optic communication cables to implement the closed wide area network which facilitates

secure, reliable, high speed data transmission, processing and decision making (**as seen in the 4<sup>th</sup> photo attached below**).

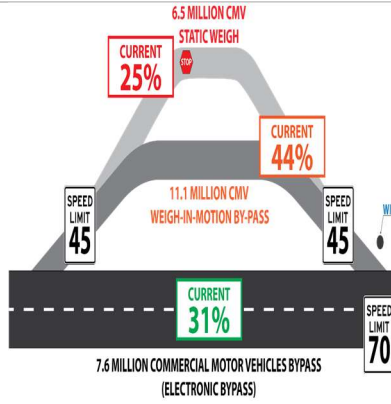
Collaboration was key throughout the planning and deployment process including input from various FDOT Offices, FDOT District Offices, partner agencies including Florida Highway Safety and Motor Vehicles, Florida Department of Revenue, Florida Department of Agriculture and Consumer Services, Florida Trucking Association, Federal Highway Administration, Federal Motor Carrier Safety Administration (FMCSA) and the trucking industry. The communications process leveraged formalized meetings through the FMCSA Innovative Technology Deployment working group as well as follow up Visioning Sessions. FDOT staff and partner agencies were collaboratively engaged throughout the deployment process. Follow-up working groups as well as individual meetings were leveraged. Execution occurred at all levels of FDOT, including both Central Office and the Districts. Building and maintaining lasting relationships through developed partnerships groups internally and externally were valuable in the beginning of this process and currently today (**as seen in the 5<sup>th</sup> photo attached below**).

In addition to aggregating data from weigh stations, FOX is actively incorporating CMV data from other systems, including the traffic monitoring weigh in motion installations, as well as other traffic monitoring systems.

8. What resources—such as technical specifications, training materials, and user guides—have you developed to assist with the deployment effort? If appropriate, please attach or provide weblinks to reports, videos, photographs, diagrams, or other images illustrating the appearance or functionality of the innovation (if electronic, please provide a separate file). Please list your attachments or weblinks here.

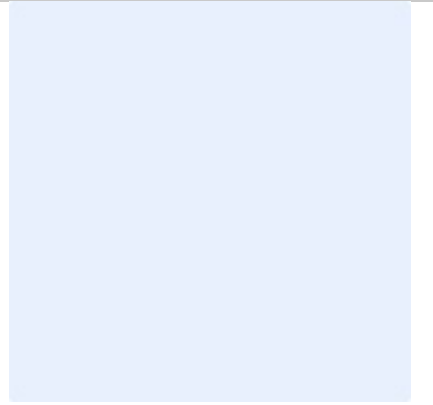
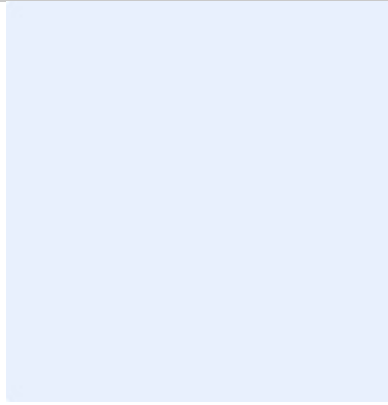
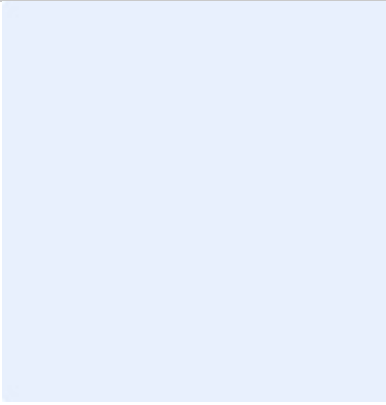
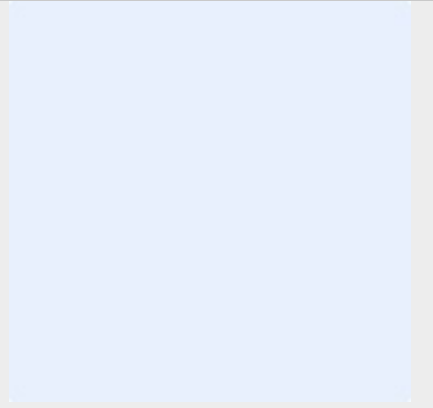
1. FOX One page Overview
2. MCSAW Business Plan
3. CVO Business Plan
4. FOX Informational PPT
5. Memorandum of Understanding between State of Florida and State of Georgia

Attach photographs, diagrams, or other images here. If images are of larger resolution size, please provide as separate files.



MCSAW Intelligent Weigh Station  
PRODUCTION TIMELINE

2020	2021	2022	2023	2024
(1)15 WHITE SPRINGS	(1)10 SNEADS	(1)15 WILLOWOOD	(1)15 YULIEE	(1)15 PENNSACOLA
	(1)10 MADISON	(1)14 KIFFNER	(1)15 FLEASLER	(1)15 PUNTA GORDA
			(1)15 MARTIN	



## State of Development (40 points)

Innovations must be successfully deployed in at least one State DOT. The All selection process will favor innovations that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.

9. How ready is this innovation for implementation in an operational environment? Please select from the following options. Please describe.

- Prototype is fully functional and yet to be piloted
- Prototype has been piloted successfully in an operational environment
- Technology has been deployed multiple times in an operational environment
- Technology is ready for full-scale implementation

Mainline screening for CMV's has been deployed successfully at several MCSAW weigh stations throughout the state. The long-term goal is to have all twenty (20) weigh in motion facilities connected in the near future.

The resulting plan included the following strategies:

- *Increased technology deployment* for site efficiency of freight movement through mainline interstate device deployment – leverage technology advancements to increase safety and mobility
- *Inter-connection of the weigh station* facilities through a statewide fiber optic communication network – enable real-time data exchange for future process enhancement
- *Expansion of the existing database* to process freight flow based on enhanced data processing and analytics – with centralized data management and decision support

10. What additional development is necessary to enable implementation of the innovation for routine use?

Inter-connection of all weigh stations into the FOX system will allow trucks who were previously screened and found in compliance to be able to bypass at subsequent weigh stations. This will allow for good and commodities to flow more efficiently throughout the State of Florida.

11. Are other organizations using, currently developing, or have they shown interest in this innovation or of similar technology??  Yes  No

If so, please list organization names and contacts. Please identify the source of this information.

Organization	Name	Phone	Email
Florida Department of Transportation	Jefferey Frost	850-410-5607	Jeff.frost@dot.state.fl.us
Florida Highway Patrol	Chief Jeff Dixon	850.617.2377	Jefferydixon@flhsmv.gov
Georgia Department of Public Safety	Major Wayne Mobley	Click or tap here to enter text.	wmobley@gsp.net

## Potential Payoff (30 points)

Payoff is defined as the combination of broad applicability and significant benefit or advantage over baseline practice.

12. How does the innovation meet customer or stakeholder needs in your State DOT or other organizations that have used it?

This innovation directly meets stakeholder needs by aligning with the MCSAW Business Plan of 2019 and the CVO Business Plan of 2021 and increasing efficiency within the CVO and Freight Operations system. It is providing immediate, measurable improvements to increase safety, enhance mobility and drive economic resiliency through leveraging technology for digital infrastructure advancements. FOX data is also currently being used by the FDOT Design and Maintenance Offices in the evaluation of pavement design and performance, the Forecasting and Trends Office for transportation system performance evaluation, the Permits Office for systemwide performance evaluation, and seaports are considering uses for terminal applications through outreach and partnerships development. By leveraging data for multiple uses both internally to FDOT as well as with partner agencies, FOX is maximizing the return on investment.

13. Identify the top three benefit types your DOT has realized from using this innovation. Describe the type and scale of benefits of using this innovation over baseline practice. Provide additional information, if available, using quantitative metrics, to describe the benefits.

Benefit Types	Please describe:
Improved Operation Performance	Historically, the MCSAW facilities wrote one citation for every 116 commercial vehicles static weighed. By installing the mainline WIM and leveraging the subsequent ramp WIM, the citation rate increased to one citation for every 86 commercial vehicles static weighed. With the same number of citations being written, this clearly illustrates that fewer commercial vehicles are being stopped for weighing, directly achieving the safety and mobility

	benefits desired through innovation. It also supports the 20-year Benefit Cost Analysis (BCA) of \$565 million accounting for safety, travel time savings, and environmental impacts upon full deployment.
Improved Safety	The ability to expand is an additional benefit of this comprehensive system, allowing for the incorporation of new technology and data from other system deployments as well as other freight modes. Currently, tire pressure and brake monitoring systems are being deployed to identify faulty equipment and address prior to crashes on the roadway— increasing safety and mobility through innovation.
Other (please describe)	An additional benefit that was realized through communications with the Commercial Vehicle Safety Alliance (CVSA) was the desire for enhanced multi-state data exchange. Collaboration between Florida and Georgia resulted in the execution of a Memorandum of Understanding, facilitating data exchange to enhance interstate freight mobility and safety. This expands FOX to regional applications, driving supply chain resiliency.

Provide any additional description, if necessary:

Florida currently operates twenty (20) interstate weigh stations, ten (10) arterial weigh stations and 10 virtual weigh in motion installations, responsible for verifying that commercial motor vehicles (CMVs) operate within a safe, congestion free, reliable, efficient, and informative transportation system which supports both international and domestic trade and passenger movements. High quality infrastructure supports reliable cargo movement and is attractive to manufacturers, distribution centers, and logistics providers, providing jobs, resources, and tax revenues. The Freight Operations Exchange (FOX) is a system for organizing freight data, analyzing the data to produce knowledge and insights, and applying that knowledge to help facilitate the safe and efficient movement of freight on roadways through the innovative application of technology. Data security is a key feature of the system and how it interacts with the storage and communication of data. It serves as a centralized hub for the user to view dashboards, sightings, overdue citation hits, and process active alerts assigned to the user. FOX data is categorized into various types, such as Facilities, Sightings, and Citations. Data types are further categorized with a sensitivity level, such as Restricted, Private, and Public. Incorporation of other modes, such as air, sea, rail and spaceports, will further deliver technology-based solutions to achieve stated goals, including resiliency of the supply chain.



14 How broadly might this innovation be deployed for other applications. in the transportation industry (including other disciplines of a DOT, other transportation modes, and private industry)?

FOX will continue to serve as the future for intelligent active freight management and decision making, leveraging the millions of records of individual vehicle movements captured every year. With the focus on increasing safety and improving mobility, FOX will provide enhanced decision support through machine learning and artificial intelligence. As previously mentioned, FOX data is also currently being used by the law enforcement and compliance agencies, FDOT Design and Maintenance Offices in the evaluation of pavement design and performance, the Forecasting and Trends Office for transportation system performance evaluation, the Permits Office for systemwide performance evaluation, and seaports are considering uses for terminal applications through outreach and partnerships development. By exchanging data in real time with the carriers through onboard units (OBUs) or through electronic logging devices (ELDs), FOX will enable decision support systems which will improve travel time reliability. By incorporating information from ports, enhanced developments of automated systems and intermodal connectivity can be achieved. These advancements can include gate reservation systems which are interconnected with truck parking availability system that sync with freight signal priority. In this case, a commercial vehicle can stage in a truck parking facility until notified of the travel time to arrive at a predesignated time. This incorporation of multiple investment strategies into an overarching management system crosses multiple disciplines as well as the public and private sector. In addition, FOX also addresses the evolving landscape of goods movements, including automated trucks, by providing enhanced data exchange and virtual screening without the need to exit the roadways. By aggregating commercial vehicle data, FOX also supports numerous state and national goals, including reporting of highway performance measures, effective generation of commodity flow data and enhanced safety and operational analysis of goods movements.

## Market Readiness (20 points)

The All selection process will favor innovations that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.

15. What specific actions would another organization need to take along each of the following dimensions to adopt this innovation?

Check boxes that apply	Dimensions	Please describe:
<input checked="" type="checkbox"/>	Gaining executive leadership support	FOX requires coordination and collaboration across functional areas as well as other agencies, which can be driven by leadership support.
<input checked="" type="checkbox"/>	Communicating benefits	Partnerships between agencies and between the public and private sectors is critical to the adoption and implementation. Communication of benefits and generation of unified goals accelerates adoption.
<input checked="" type="checkbox"/>	Overcoming funding constraints	FOX is a low-cost, high return investment that leverages existing installations to drive achievement of safety, mobility and economic prosperity goals. However, the application crosses multiple responsibility areas and requires funding beyond core organizational functions for successful implementation.
<input type="checkbox"/>	Acquiring in-house capabilities	Click or tap here to enter text.
<input checked="" type="checkbox"/>	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	Agencies must address security issues, including the personal and company information (PI and CI). Additionally, policy issues on the storage and usage of data should be addressed.

<input type="checkbox"/>	Resolving conflicts with existing national/state regulations and standards	Click or tap here to enter text.
<input type="checkbox"/>	Other challenges	Click or tap here to enter text.

16. Please provide details of cost, effort, and length of time expended to deploy the innovation in your organization.

**Cost:** \$1,250,000

**Level of Effort:** Medium, focused on data management, systems engineering and cybersecurity.

**Time:** 4 years

17. To what extent might implementation of this innovation require the involvement of third parties, including vendors, contractors, and consultants? If so, please describe. List the type of expertise required for implementation.

The implementation was a collaborative effort of state, consultant and vendors. The state provided expertise and assistance with physical infrastructure as well as oversight for information technology policy and security. The state also provided support with coordination with Federal Motor Carrier Safety Administration and Federal Highway Administration as well as partner state agencies. Consultants supported the systems engineering and development of the system as well as quality control and assurance. Consultants also supported the development of standards and specifications which were used by contractors for field installation of devices and communication infrastructure. Vendors provided interface applications between the facility operating systems and the data exchange platform. Vendors also provided sub-system integration and operations at individual facilities.