

# 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 Department of Transportation
2. **Name and Title:** Connected Vehicle Pilot Application and Deployment

**Organization:** Florida's Turnpike Enterprise (FTE)

**Street Address:** Milepost 263, Florida's Turnpike

**City:** Ocoee

**State:** Florida

**Zip Code:** 34761

**Email:** john.easterling@dot.state.fl.us

**Phone:** 954-934-1620

**Fax:** N/A

## Innovation Description (10 points)

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

3. **Name of the innovation:**

Connected Vehicle Pilot Application and Deployment

4. **Please describe the innovation.**

FTE is in the process of deploying over 50 Roadside Units along Central Florida roadways (Turnpike Mainline-SR 91 & SR 528) to be used as part of its connected vehicle roadmap. This deployment was

preceded by a significant proof of concept effort, whereby three safety applications were tested, demonstrated and delivered using only Cellular-V2X (CV2X) RSU's and cloud-hosted infrastructure to generate safety alerts for connected vehicles. These applications include wrong way driver warnings (for both the wrong way driver and nearby right-direction drivers), stopped vehicle alerting, and speed warning alerts which also apply to curve warnings. These safety-based applications are transferable, customizable, and expandable, as will be done through the 50 RSU deployment in the Central Florida (Orlando) area in the coming year. Further, this innovation includes a smartphone application which can interpret, display and provide audible alert functionality to the driver, allowing continued focus on the roadway conditions, while providing real-time alerts that can facilitate safer actions by the driver.

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

The existing practice this will eventually replace includes significant roadside infrastructure for vehicle detection, speed alerting, stopped vehicle alerting, and the infrequent feedback provided via Dynamic Message Signs, which typical spacing can vary from 10-20 miles.

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

The current problem with the baseline practice is the spacing of Dynamic Message Signs, which despite efforts to strategically locate, cannot feasibly cover the entire freeway segment to provide real-time and near instantaneous alerting capability.

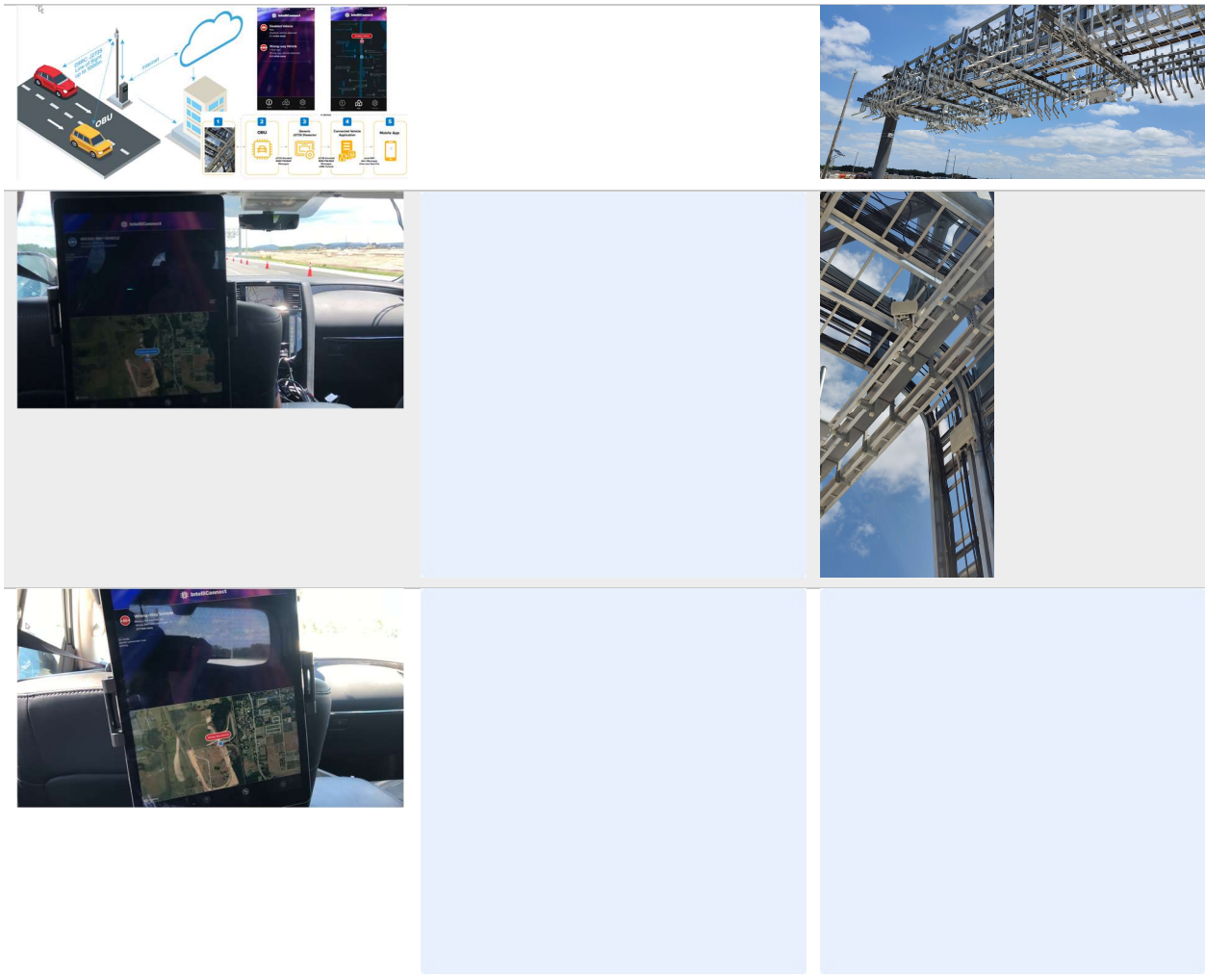
**7. Briefly describe the history of its development.**

This effort began as a proof of concept, evaluating the SAE 2735 message set, identifying applications that are safety based and meet the need of traffic practitioners as well as the customers of the Florida's Turnpike, and simulating vehicle data to capture, filter and alert through the cloud-based platform. This development was then expanded to utilize DSRC as the message transmission media, and ultimately converted to CV2X radio transmission from RSU to OBU.

**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.**

Technical Specifications were developed to assist in the formal pilot program expansion along Central Florida highways, including those for the Data Information management System (specs attached). The remainder of the pilot work was performed in a multi-disciplinary collaboration through working group meetings, and under the leadership of the FTE team to provide the complete vision for each application and how it can benefit each user/stakeholder in greatest detail. Refer to example pictures below and attached graphic file.

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



## State of Development (40 points)

Innovations must be successfully deployed in at least one State DOT. The AI 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

This pilot program has been successfully demonstrated in an operational environment, and is ready and pending construction, will be deployed at the full-scale implementation across 20-miles of limited access freeways to provide these safety enhancements for all connected vehicles.

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

No additional development is required for routine use; however, additional development is planned to incorporate additional safety and mobility applications and expand on the footprint of CV technology to provide greater safety benefits to the customers of Florida’s Turnpike.

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
FDOT (other districts)	Varies	Varies	Varies
Multiple other State Agencies	Varies	Varies	Varies
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

## 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 meets multiple stakeholder needs for better real-time decision making data, increase safety awareness, enhanced mobility, and can be measured in reduction in crashes and lives saved. The application of the Connected Vehicle as the sensor to provide traffic practitioners with actionable data

along the roadside is a true innovation, that can reduce the need to provide roadside sensory and feedback infrastructure, and allow a greater reach to motorists and customers in real-time.

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 Safety	Wrong Way driving is a critical issue for many state agencies. This application notifies both right direction and wrong way drivers, describing the lane of the wrong way driver, and continuously alerting the wrong way driver until corrective action is taken. This can be measured in crashes reduced and lives saved once deployment is completed.
Improved Operation Performance	Stopped vehicles may be due to multiple causes and represent a safety issue both in the travelled lane and along the shoulder. This application functionality provides increased operational performance by notifying the TMC staff when vehicles are stopped allowing for quick response and dispatch of safety service patrol or MOT resources to quickly clear the travelled lanes providing not only a safer travelling environment, but increased freeway operation and mobility.
Improved Customer Service	Timely alerts for safety-based issues that these applications can and will provide, improves overall customer experience using the freeway. Improved safety equals improved customer service along a toll or any freeway facility.

Provide any additional description, if necessary:

[Click or tap here to enter text.](#)

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)?

This application can be deployed along any roadway, parking lot, freeway or interstate, is highly configurable and scalable to provide benefits for connected vehicles and expansion of alerting capability for years to come.

## 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 type="checkbox"/>	Gaining executive leadership support	<a href="#">Click or tap here to enter text.</a>
<input checked="" type="checkbox"/>	Communicating benefits	Communicating the benefits of the CV applications will assist in garnering support of leadership as well as fiscal support.
<input checked="" type="checkbox"/>	Overcoming funding constraints	Funding constraints may be present for the needed roadside infrastructure, communication media or cloud-based infrastructure.
<input type="checkbox"/>	Acquiring in-house capabilities	<a href="#">Click or tap here to enter text.</a>
<input type="checkbox"/>	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	<a href="#">Click or tap here to enter text.</a>
<input type="checkbox"/>	Resolving conflicts with existing national/state regulations and standards	<a href="#">Click or tap here to enter text.</a>
<input type="checkbox"/>	Other challenges	<a href="#">Click or tap here to enter text.</a>

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

**Cost:** \$300,000 for initial development and POC testing.

**Level of Effort:** Modest Level of effort, given clear vision, direction and performance metrics.

**Time:** Due to restraints presented during the pandemic, this effort took approximately 2 years from authorization to concept demonstration, however adaptability and expandability can be done a much more aggressive schedule without the pandemic and post-proof of concept. Expansion of functionality is expected to be completed in less than 6-9 months.

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.

Third parties are likely to be required from any agency. Contractor should be utilized to provide the Roadside Unit deployments. A vendor is required to provide the cloud-hosted alerting solution. Consultants can be utilized to plan, program, and analyze the benefits of the application implementation as well as to manage the overall schedule and direct additional enhancements by identifying key performance indicators for new capabilities.