

June 19 - 20, 2025  
Hollywood, FL



**TRANSPORTATION  
SYMPOSIUM**

## Connected and Automated Vehicles

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Transportation Symposium  
Website



SCAN ME

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## Why CAV?

- CAV Program Supports Target Zero



Target Zero focuses on influencing change in specific behaviors ***before a crash occurs.***

CAV Program is a tool in FDOT's toolbox to prevent crashes.

Influence driver awareness with situational alerts to avoid crashes.



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# How Many CAV Projects in Florida?

## Projects/Initiatives

Statewide Project/Initiative  
FDOT Led Projects  
Partner Agency Led Projects

### Legacy/Retired

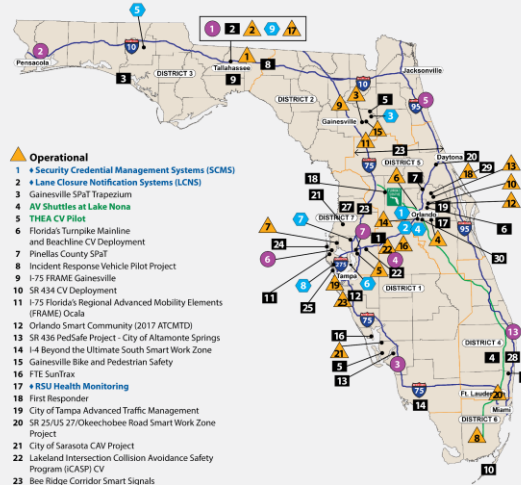
- 1 Near Miss Identification Safety System (NMIS)
- 2 I-4 Active Work Zone
- 3 Gainesville AV Shuttle
- 4 Osceola County CV Signals
- 5 CAV Projects (ATMA)
- 6 Downtown Tampa Autonomous Transit
- 7 HART AV
- 8 AV Shuttle at PSTA
- 9 Smart Signals Dashboard

### Planning

- 1 CV Bike Safety Pilot Deployments
- 2 Escambia and Santa Rosa County CAV
- 3 SW I-75 FRAME
- 4 District 1 CV Master Plan
- 5 Smart St. Augustine
- 6 Pinellas SR 60 West Coast Smart Signal Corridor Project
- 7 Connected Vehicle Priority and Preemption System (CVPP)

### Design/Implementation

- 1 I-4 FRAME (2019 ATCMTD)
- 2 US 90 SPaT Tallahassee
- 3 US 98 Smart Bay
- 4 SR-710/Beeline Hwy-CAV Freight
- 5 US 41 FRAME
- 6 State Road 423 Freight Signal Priority
- 7 Lake Mary Boulevard CV Project
- 8 I-10 Smart Road Ranger
- 9 V2X Data Platform
- 10 Florida Keys Connecting Overseas to Advance Safe Travel (Florida Keys COAST) Pilot Project
- 11 Pinellas County Smart Community (2020 ATCMTD)
- 12 Sarasota County - SR 780 Fruitville Rd and US-41 Tamiami Trail
- 13 LeeTran US 41 Transit Signal Priority
- 14 Collier Countywide Connected Traveler Information System (ICTS)
- 15 Train Vehicle Crash Avoidance Pilot Project
- 16 SR 29 Wildlife Detection
- 17 Bluetooth to RSU Conversion in Orange and Osceola Counties
- 18 CV Smart Signal - Lake County
- 19 "Just on the Phone" Reference Application
- 20 SR-40 ITS Safety Deployment
- 21 Pasco County SMART US-19
- 22 Hillsborough County Connected Vehicle Priority and Preemption System
- 23 I-75 and I-95 Queue Warning System
- 24 City of Clearwater Pedestrian Warning System
- 25 City of St. Petersburg Smart Signal Corridor Project
- 26 South I-75 FRAME
- 27 District 7 Integrated Corridor Management
- 28 SR-869/SW 10th Street Connector TSMO SWZ
- 29 U.S. 17-92 Connected Vehicle Deployment
- 30 Ped/Safe II U.S. 441/State Road 50



As of 10/25/2024

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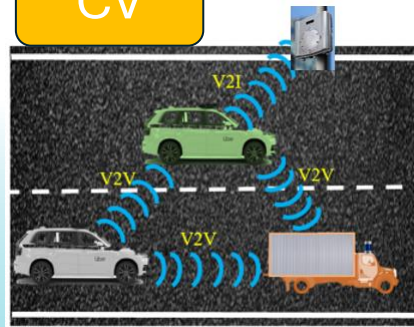
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# What is Connected and Automated Vehicles (CAV)?

## AV



## CV



V2V - Vehicle to Vehicle  
V2I - Vehicle to Infrastructure

### MESSAGE SET

Basic Safety Message	BSM
Signal Phase and Timing Message	SPaT
Map Data	MAP
Traveler Information Message	TIM
Signal Request Message	SRM
Signal Status Message	SSM

### Applications

EVP	TSP	TIM
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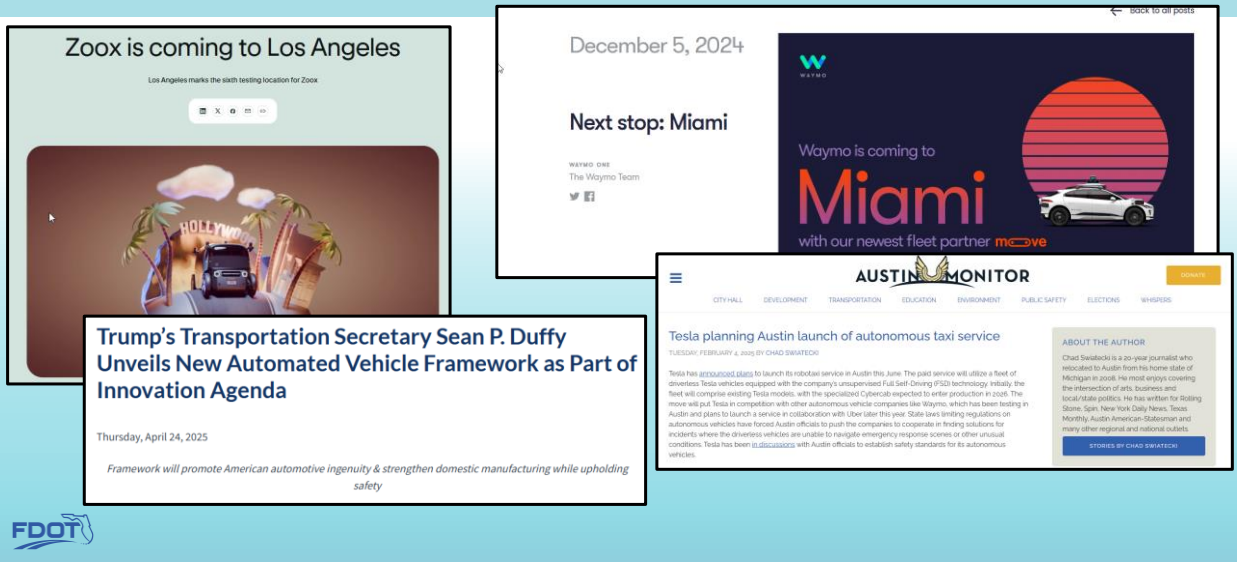
# Autonomous Vehicles

- All about being self sufficient
- Trying to not need infrastructure/information
- Could benefit from infrastructure
- Driven by private sector
- Supported by the Department

# Autonomous Vehicles and Florida

- Florida has been proactive in creating policies and regulations to support the operations of Autonomous Vehicles (AV) in the state. Examples of Florida Statutes for AV:
  - 316.003 – Definitions – defines automated driving systems and AVs.
  - 316.85 – AV Operations: Allows full AV to operate regardless of whether a human operator is physically in the vehicle, deems the automated driving system to be the operator of an autonomous vehicle while engaged, and addresses operations of on-demand autonomous vehicle networks.
  - 316.86 – Manufacturer Liability Exemption – addresses liabilities of a vehicle converted by a third party into AVs.
  - 316.303 (Television Receivers), 316.305 (Wireless Communication), 316.306 (School and Work Zone Wireless Communication) – exempts human operators from distracted driving laws (i.e., handheld phone usage) while the automated driving system is engaged.
  - 319.145 (Autonomous Vehicle Registration) – defines registration requirements for AVs.
  - 322.015 (Exemption from Driver License) – fully AVs are exempt from driver licenses.
  - 338.2216 (Florida's Turnpike Enterprise) – gives Florida's Turnpike Enterprise authority to advance autonomous and connected innovative transportation technologies for improving safety and mobility.
  - 339.64 (Strategic Intermodal System Plan) – mandates the consideration of infrastructure and technological improvements necessary to accommodate automated driving systems in the Strategy Intermodal System Plan.
  - 627.749 (Motor Vehicle Insurance) – outlines AVs insurance requirements.

## Autonomous Vehicle News



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## Autonomous Vehicle




- Policy and Private sector driven
  - Florida managed risk via legislation
- Some design standards have been updated to reflect
  - Striping standards
- Conversation on data exchange
  - Construction locations
  - Lane closures
  - Signal Phasing and Timing
  - Building Information Model (BIM)
- Approved Products List is a boon
- SunTrax provides testing facility





## Connected Vehicles

- All about the communication – CONNECTING VEHICLES
- Driven by USDOT
- Reducing crashes
- Looking for a viable business model

## What are the data elements

- TIM – Warning Message 
  - Road Closed Ahead
  - Apply I-95 NB 177 10pm-6am
- Map 
  - EB 3 lanes, with one Left Turn
  - WB 2 lanes, dual Left Turn
- SPaT – Signal Phasing 
  - Signal is red EBT
  - Signal is green WBL

## Continued Data

- BSM – movement data 
  - Current GPS location
  - Heading, speed
- SRM – Signal Request Message 
  - I am a Fire Truck, give me the green



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## Applications

- Leverage messages together to create a function
  - Emergency Vehicle Preemption
    - Know the position of a fire truck
    - Use Map to know what direction to place call to controller to activate green
    - Display the current signal status to the driver
- USDOT has a list
  - Many are undefined or have yet to actually be implemented
  - Use with care



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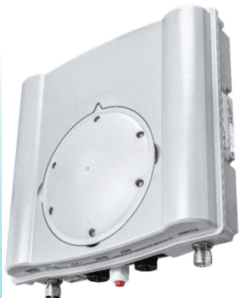
## Applications example issues

- Pedestrian in crosswalk
  - Observe pedestrian in dangerous location
    - HOW IS THIS DEFINED
  - Generate a TIM
    - WHO GENERATES THE TIM (INFRASTRUCTURE OR VEHICLE)
  - What is the risk
    - TOO MANY ALERTS
    - TOO FEW ALERTS

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## What is an RSU and OBU?

**Roadside Units (RSU)**



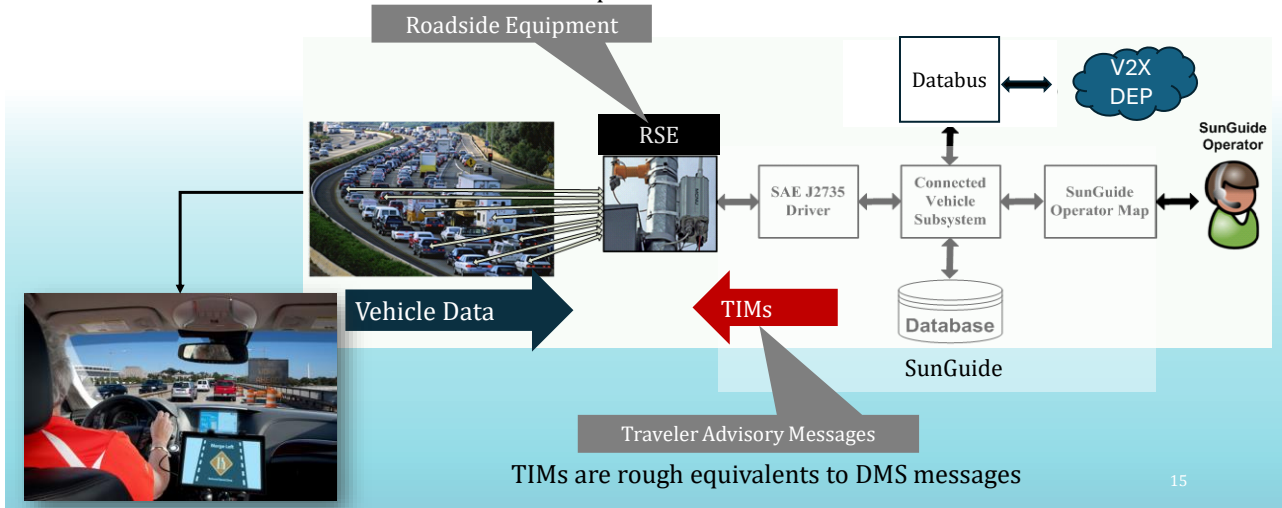
**Onboard Units (OBU)**



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# Connected Vehicle Systems in Traffic Operations

RSEs are the collection points for connected vehicle data



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## Network versus Direct/U-U/PC-5/C-V2X

- Need BSM (position, heading, speed)
- Need way to share message (sound and image)

What other equipment can do this (Known as Network CV)

- Cell Phone
- Your car's infotainment system
- Emergency Vehicle Light Bars



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## Florida's Approach

- Both Network Based and Florida is approaching with dedicated equipment and network
- Dedicated Equipment
  - High Cost of Ownership
  - Low Latency
  - Safety Critical Applications
- Network Based
  - Software Development
  - Leverages Infrastructure Data
  - High Latency
  - Latency Tolerant Applications



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## Florida's Approach

- FDOT Using FL511 Application and V2V work from FTE
  - Sending Messages
    - Approaching Work Zone
    - Curve Speed Warning
    - Lane Blocking
  - Working to gather information
    - Negotiation with App Stores
- Working with Car Manufacturers to provide alerts directly into cars



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# Florida's Approach

- Building out additional use cases

- Wrong Way Driver
- Using New signal controllers
  - Emergency Vehicle Preemption
  - Transit Signal Priority
- Sharing information
  - Emergency Vehicle Ahead

# Florida's Approach

- Mature System

- Security – Security Credential Management System
- Network – Functioning Multiagency Approach, looking to be more standard
- Enterprise Software
- APL listed equipment
- Enterprise Data Management – Data Exchange Platform
- Best Practices for design to maintenance

# Your Role

- Network - Concepts or ideas
  - Share opportunities – Concept of Operations
  - Execution via software contracts
- Direct
  - Plan, Design, Build, Operate and Maintain
  - This is where most of the work will be

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## Lessons Learned and Best Practices Document

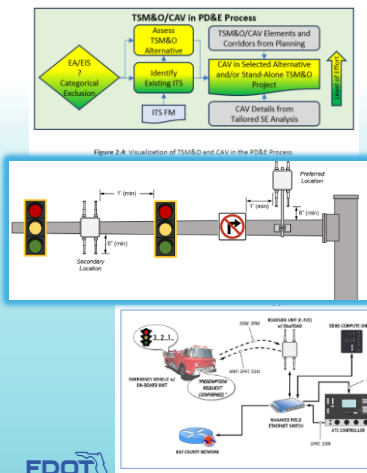
### Section 3: Design, Section 2: Planning and Section 1: Intro

1. Intro: Background, History, Purpose, Assumptions and lots of acronyms
2. Planning

1. Statewide Planning Process
2. District Planning Process
3. LRTPs and MPOs/TPOs
4. Alignment to TSM&O and ITS

3. Design

1. Preliminary Engineering
2. PSEMP
3. Risk Assessment and Compliance
4. ConOps, Validation Plan, Traceability Matrix
5. Infrastructure (Use of existing structure, Cabinets, Power, Comms)
6. Coordination (Stakeholder, Local Agency, Network Admins, Security and Connectivity)
7. Other Equipment (Edge Computing, Ancillary, Mounting, Conduit and pathways)
8. Creating a Design Plan (Plan Sheet, Installation Details, Device Summaries , DevSpecs + TSPs & MSPs )

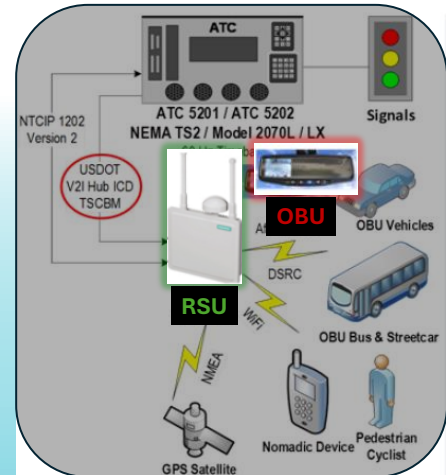


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# Lessons Learned and Best Practices Document

## Section 4: Procurement

1. Road Side Units and Equipment
  - i. Purpose, Location, Communication, Data Use and Transmission
  - ii. Consideration for Materials Procurement
  - iii. RSU Dev Spec 681
2. On Board Units
  - i. Purpose, Location, Communication, Data Use and Transmission
  - ii. Consideration for Materials Procurement
    - i. Example Contracts from D7 and D5
  - iii. Form Factor and Application Considerations
3. Other Devices to Consider
  - i. Controller related considerations
  - ii. Specialized Communication considerations for CV use
  - iii. Specialized Edge Devices
  - iv. Specialized Detection System



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# Lessons Learned and Best Practices Document

## Section 5: Construction

1. Contract Types Pros and Cons
  - i. Design-Bid-Build 🤝
  - ii. Design-Build 🤝
  - iii. Systems-Manager
  - iv. RFP
2. Other Project Coordination Considerations
3. Configuration, Installation and Integration
  - i. Network Access and Security
  - ii. FCC Data Collection and Site Registration
  - iii. MAP Development Guidance
  - iv. Requirement and Processes (SCMS, RSU-HMS)
  - v. Field Testing and Systems Testing
4. Documentation
  - i. As-Built Information and Documentation
  - ii. ITSFM Asset Form documentation



Site Data		Imperial Elevation Reference Information	
A	B	C	D
Proposed Site Name:	013513201a-Mettl	Elevation of Site AMSL:	78.00 Feet
Antenna Latitude (D° XX' XX" N):	28° 37' 19" N	Point Height w/out App:	27.00 Feet
Antenna Longitude (D° XX' XX" W):	81° 21' 50" W	Point Height with App:	27.00 Feet
City:	Maitland	Elevation of Device AGL:	25.00 Feet
County:	Orange	Center Line of Antenna AGL:	26.00 Feet
State:	Florida		
Major Street or Corridor:	US 17/92 (Orlando Ave.)		
Minor Street or Milepost:	McIntosh Ave./Mentor Rd.		
Height of Support Structure (feet) (Antenna to top of tower) (calculated):	23.8		
Overall Height Above Ground Level (AGL) without appurtenances of the support structure in meters (calculated values):	8.2		
Overall Height Above Ground Level (AGL) with appurtenances on the support structure in meters (calculated values):	8.2		
Support Structure Type:	Mast Arm (UPOLE)		

Transmitter Antenna Data	
A	B
Manufacturer of the Antenna:	L-com
Model Number of the Antenna:	HCY-4958-08U
Antenna Gain in dB:	6.5
Beamwidth in degrees:	60°
Operating Frequency in MHz:	5.875
Operating Frequency in GHz:	5.875
Operating Frequency in THz:	5.875
Operating Frequency in PHz:	5.875
Operating Frequency in EHz:	5.875
Operating Frequency in ZHz:	5.875
Operating Frequency in YHz:	5.875
Operating Frequency in XHz:	5.875
Operating Frequency in WHz:	5.875
Operating Frequency in VHz:	5.875
Operating Frequency in UHz:	5.875
Operating Frequency in THz:	5.875
Operating Frequency in GHz:	5.875
Operating Frequency in MHz:	5.875
Operating Frequency in kHz:	5.875
Operating Frequency in Hz:	5.875

Tool Library Using SAE J2735 3/2016

Reach out for support by clicking "Support" on the top right. This will allow submitting support and demonstration requests, reporting and tracking bugs, requesting new features, and providing feedback.

**ISD Message Creator**  
Intersection MAP and SPAT  
This tool allows a user to define the lanes and approaches of an intersection using a graphical interface. Once designed, the user can encode an ISD, SPAT, or SPAT message as an ASN.1 UPER hex string.  
[View Tool](#)

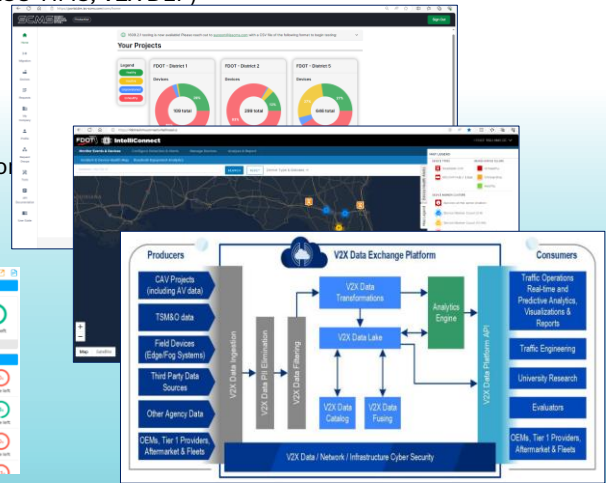
**TIM Message Creator**  
Traveler Information  
This tool allows users to build traveler information messages regarding sign and work zone details using a graphical interface. Once designed, the user can encode a TIM message as an ASN.1 UPER hex string and deposit it to the SDV warehouse.  
[View Tool](#)

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# Lessons Learned and Best Practices Document

## Section 6: Operation and Maintenance Considerations

1. Overview of Operational Software
  - i. FDOT Statewide Software (SunGuide, SCMS, RSU-HMS, V2X DEP)
  - ii. Vendor-specific Software Systems
2. Preventative Maintenance and Troubleshooting
  - i. Operational Monitoring and Check
    - a. Local and Remote Spot Checks
    - b. Onsite Drive Tests
  - ii. Useful tools for remote access and configuration
    - a. Webmin and Browser tools
    - b. Terminal Program Application (PuTTY)
    - c. File Transfer Applications



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**SAFE SUMMER TRAVEL MONTH**



#LetsGetEveryoneHome **ZERO** FDOT



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## Questions

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## Thank you!



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