Connected and Automated Vehicles (CAV) Program

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Agenda

- CAV Vision
- CAV Business Plan
- CAV Deployments: Lessons Learned and Benefits
- Questions
CAV Vision

Drive towards Vision Zero with a fatality-free roadway network and a congestion-free transportation system in Florida using CAV technologies.
FDOT’s Focus on Safety and Mobility

VISION ZERO
DRIVING DOWN FATALITIES

TRAFFIC FATALITIES (FLORIDA 2007 – 2017)

PEDESTRIAN FATALITIES (FLORIDA 2007– 2017)

BICYCLE FATALITIES (FLORIDA 2007 – 2017)
Creation of the CAV Business Plan
CAV Business Plan Focus Areas

1. Policies and Governance
2. Program Funding
3. Education and Outreach
4. Industry Outreach and Partnerships
5. Technical Standards and Specifications Development
6. Implementation Readiness
7. Deployment and Implementation
The Importance of Partnerships

AGENCY PARTNERS

INDUSTRY

UNIVERSITIES

STAKEHOLDERS

CAV PROGRAM
CAV Projects

Projects/initiatives

Planning (7)

Design Implementation (12)

Operational (3)

PROJECTS/INITIATIVES

PLANNING

US 41 Florida's Regional Advanced Mobility Elements (FRAME) 1
Central Florida Autonomous Vehicle (AV) Proving Ground 2
Driver Assistive Trucking Platoonning (DATP) Pilot 3
Pinellas County Signal Phase and Timing (S) 4
Managing the Unexpected Every Day Broward County 5
US 1 Keys COAST 6
I-4 Florida's Regional Advanced Mobility Elements (FRAME) 7

DESIGN/IMPLEMENTATION

I-75 Florida's Regional Advanced Mobility Elements (FRAME) Gainesville 1
I-75 Florida's Regional Advanced Mobility Elements (FRAME) Ocala 2
Florida's Turnpike Enterprise (FTE) SunTrax 3
Gainesville Autobus 4
Gainesville Bike and Pedestrian Safety 5
City of Orlando Greenway/Pedestrian Safety 6
SR 434 Connected Vehicle Deployment 7
Downtown Tampa Autonomous Transit 8
Orlando Smart Community 2017 ATCMTD 9
Voyage at The Villages 10
Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies (I-STREET) 11
Gainesville Signal Phase and Timing (S) Trapezium 12

OPERATIONAL

US 90 Signal Phase and Timing (S) Tallahassee 1
Osceola County Connected Vehicle Signals 2
Tampa Hillsborough Expressway Authority (THEA) Connected Vehicle Pilot 3
ROADMAP to FLORIDA CAV

2017-2018
Initialization

2019-2020
Early Implementation

2020+
Full Scale Implementation
and Operations
- US 90 Signal Phase and Timing (SPaT) (Arterial)
- Driver-Assisted Truck Platooning Demonstration (Automated)
- I-75 Florida’s Regional Advanced Mobility Elements (FRAME) – Ocala/Marion (Multi-Modal Integrated Corridor Management (MMICM))
- I-75 FRAME – Gainesville (MMICM)
- Gainesville SPaT Trapezium (Arterial)
- SR 434 Connected Vehicle Deployment (Arterial)
- PedSafe Greenways Deployment (Arterial)
- On-Board Unit (OBU) Emulator (MMICM)
- I-4 FRAME (MMICM)
- Pinellas County SPaT (Arterial)
- Gainesville Bike/Ped Safety (Arterial)
- US 41 FRAME (MMICM)
- Broward County (MMICM)
- US 1 Monroe County (Arterial)
STATUS: Operational; Florida A&M University-Florida State University research/evaluation

MAJOR FEATURES:

• 1st American Association of State Highway and Transportation Officials (AASHTO) SPaT Challenge Corridor in Florida
• Partnership with City of Tallahassee
• Intelight controllers; Wavemobile roadside units (RSUs) and on-board units (OBUs)
• Dedicated short range communication (DSRC) 5.9 GHz
• Installation by the City of Tallahassee
• Suburban corridor; 7 miles, 21 intersections, Duval St. to I-10

LESSONS LEARNED:

• Procurement of emerging technologies needs value-add component
• Equipment testing should be part of the procurement process
• USDOT MAP required field adjustments by the Vendor
• Line of sight considerations
• Extensive field integration including fine-tuning
• Traffic Engineer/Local Agency support is critical
• Add-on features should be considered in advance
Driver-Assisted Truck Platooning Demonstration

MAJOR FEATURES:

• Mandated by Florida Legislature (House Bill 7027)
• Two-truck platoons at 66 foot spacing
• Short and long haul trips; total of 1,100 miles
• FDOT, Florida Highway Patrol (FHP), and Florida Department of Highway Safety and Motor Vehicles oversight

LESSONS LEARNED:

• FHP noted decals may be needed to reduce potential for traffic stops for trucks spaced closer than the 300 feet (F.S 316.0985)
• Florida bridges – 80,000 pound trucks at 60 foot spacing
• Actual safe spacing is dependent on capabilities of braking and sensor technologies
• Two-truck platoons did not create any problems for merging traffic

STATUS: Complete
MAJOR FEATURES:

- Roadside units (RSU) at 43 locations along 44 miles of I-75 and at 59 signalized locations on US 441, SR 40, and SR 200
- Automated Traffic Signal Performance Measures (ATSPM)
- Connected vehicle applications → signal phase and timing (SPaT), emergency vehicle preemption (EVP); and freight signal priority (FSP) ready
- Bluetooth & Power Distribution Unit
- Regional Integrated Corridor Management
- Real-time information dissemination
- Cyber locks at cabinets

LESSONS LEARNED:

- Evaluation of products and interoperability with RSU, on-board units (OBU), and signal controllers.
- Developed Specifications for:
  - RSU, industrialized central processing unit
  - RSU testing and integration
  - Signal inventory
  - Technical special provision controller software key
  - Data collection for MAP generation

STATUS: Estimated Letting in Late 2019/Early 2020
I-75 Florida’s Regional Advanced Mobility Elements (FRAME) – Gainesville

MAJOR FEATURES:

• RSUs at 35 locations along 26 miles of I-75 and at 93 signalized intersections on US 441, SR 24, SR 26, and SR 222
• Automated traffic signal performance measures (ATSPM), transit signal priority (TSP), and integrated corridor management (ICM)
• Signal phase and timing (SPaT)/MAP broadcast capabilities
• Traveler information message/roadside alert
• Basic safety message receipt/forwarding
• Vendor demonstrations at Traffic Engineering Research Laboratory (TERL)

LESSONS LEARNED:

• Information displayed through OBU varies by vendor
• Installation/configuration complexity varies by vendor
• City of Gainesville utilizes special controller operations.
  • Pay item notes addressing controller database conversion from legacy controllers to advanced traffic controllers (ATC) included in plans.

### MAJOR FEATURES:
- 27 intersections on SR 26, SR 121, SR 24, and US 441 in Gainesville
- Value addition beyond SPaT
- Quick migration to safety and mobility applications
- Trafficware controllers; Siemens RSU, Sirius XM OBUs
- Urban Corridor
- Possibility of DSRC and cellular communication
- Vendor to perform FIITT* services

### LESSONS LEARNED:
- Revised the procurement approach to include addition of value-added services
- Vendor-developed MAP proved to be useful during testing at the Traffic Engineering Research Laboratory (TERL)
- Industry is advancing safety and mobility applications
- Vendor presentations helped understand the potential to deploy safety and mobility applications

### STATUS:
Procurement completed; operational in 2020

*Furnish, install, integrate, test and train (FIITT)*
SR 434 Connected Vehicle Deployment

MAJOR FEATURES:
- Connected Vehicle apps → Signal Phase and Timing (SPaT), Transit Signal Priority (TSP), and Emergency Vehicle Preemption (EVP)
- Roadside Unit (RSU) deployment at six intersections on SR 434 from McCulloch Rd. to E Mitchell Hammock Rd.
- SR 434 Overlay CV on corridor with existing adaptive signal control technologies (ASCT)
- MAP messaging

LESSONS LEARNED:
- Integration of ASCT (Insync) with Connected Vehicle
- Schedule - Procurement of Devices and Integration time with minimal construction
- Range Testing Results
- MAP data collection

STATUS: Estimated Letting in Late 2019
PedSafe Greenways Deployment

MAJOR FEATURES:

- Pedestrian Safety building off of Tampa Hillsborough Expressway Authority (THEA) work
- Approximately 250 roadside units on SR 434, SR 50, and other routes in the City of Orlando
- LiDAR & Wi-Fi on SR 434
- Connected vehicle apps → signal phase and timing (SPaT), transit signal priority (TSP), emergency vehicle preemption (EVP), Pedestrian in Crosswalk
- Parking availability
- Transit Kiosk with closed circuit television camera verification
- Thermal passive pedestrian detection on SR 50
- 247 signals upgraded to Intersection Movement Counts

LESSONS LEARNED:

- Set table for research for Transportation in Smart City
  - Data fusion for PSM, Transportation Management Center
  - Route and Mode Choice
  - Parking lot instrumentation evaluation
- Evaluation of Pedestrian Safety integrated with connected vehicles
- New System Specifications
  - Intersection Movement Counts
  - Transit Kiosk
  - LiDAR

STATUS: Estimated Letting in Late 2019
MAJOR FEATURES:

- Advanced Transportation Congestion Management and Technology Deployment (ATCMTD) Grant Application
- 75 miles of I-4 from Tampa to just west of Orlando and parallel arterials such as SR 60, Polk Parkway, and US 17
- Partnership: Districts 1, 5, 7, FTE, Universities, Local Agencies
- Applications: Automated traffic signal performance measures (ATSPM), transit signal priority (TSP), freight signal priority (FSP), integrated corridor management (ICM), emergency vehicle preemption (EVP), Pedestrian/Bicyclist Safety
- Real-time information dissemination

ANTICIPATED BENEFITS

- Reduce crashes
- Improve travel-time reliability
- Improve throughput
- Reduce delay
- Reduce open-lane clearance times

STATUS: System Manager Request for Proposal under Development
Pinellas County Signal Phase and Timing (SPaT)

MAJOR FEATURES:
• Partnership with Pinellas County
• Urban and suburban corridor (US 19) from SR 688 north to Becket Way (22 miles, 23 intersections)
• Parts of corridor are grade separated
• SPaT project; includes frontage road signals at interchanges; Econolite controllers
• Overlays CV on corridor with existing adaptive signal control technologies (ASCT)

ANTICIPATED BENEFITS:
• Understanding of how SPaT works at interchanges
• Understanding of how SPaT works with adaptive control technologies

STATUS: Procurement in progress
Gainesville Bike/Ped Safety

MAJOR FEATURES:
- FHWA Accelerated Innovation Deployment award of $1 Million; State and Off-system roads
- Partnership with City of Gainesville and University of Florida
- Passive ped detection, advance vehicle detection, transit on-board units, ped info device
- 21 crossings, 13 signalized intersection, 8 mid-block crossings
- Dedicated short range communication and cellular
- Concept of Operations, Project Systems Engineering Management Plan, Request for Information, and National Environmental Policy Act

ANTICIPATED BENEFITS:
- Improved pedestrian safety at signalized intersections and mid-block crossings
- Verification if personal information devices (smart phones) can be used to warn pedestrians and to request pedestrian phases
- Demonstration of the viability of on-board units for communicating with transit operators about pedestrians ahead

STATUS: Systems engineering and procurement documents under review.
US 41 (SR 45, Tamiami Trail) FRAME

MAJOR FEATURES:
- 34 miles in Lee County, from Woods Edge Parkway (Naples) to Lake Fairway Boulevard (North Ft. Myers)
- 62 signals: 60 interconnected; 2 new signals
- Detour route to I-75
- Cellular and dedicated short range communication
- Utilizes road weather information systems and dissemination
- Automated traffic signals performance measures (ATSPM) and connected vehicle solutions

STATUS: Planned

ANTICIPATED BENEFITS:
- Improve safety
- Improve mobility
- Increase throughput
MAJOR FEATURES:

- US 1, SR 84 (SW 24th St.), SR 736 (Davie Blvd), SR 842 (W Broward Blvd), and SR 845 (W Sunrise Blvd)
- Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD) Grant Application
- Partnership: District Four, Broward MPO, and Broward County
- Multi-modal Integrated Corridor Management Platform, Movable Bridge and Pedestrian/Bicycle safety applications, Operation Protocols

ANTICIPATED BENEFITS:

- Integrated Traffic Management
- Enhanced Multimodal Reliability of Network Performance
- Traffic Management Responsive to Mobility Demand/Supply
- Progression towards Vision Zero

STATUS: Planned
**US 1 Keys COAST**

**MAJOR FEATURES:**
- 112.5 miles; Key West to Key Largo; sole access and evacuation route for the Florida Keys
- 50 signals/devices, several transit routes, freight corridor
- Pedestrian and cyclist safety, V2V, drawbridge management, emergency vehicle preemption (EVP), freight signal priority (FSP), transit signal priority (TSP), weigh-in-motion (WIM)
- Real-time data exchange
- Dedicated short range communication and cellular
- Signals are operated and maintained by District 6; Monroe County and Key West have opted out of the Traffic Signal Maintenance and Compensation Agreement (TSMCA)

**ANTICIPATED BENEFITS:**
- Improve mobility
  - Reduce travel time
  - Reduce number of stops
- Improve safety
  - Improve pedestrian/bicyclist safety
  - Reduce red light violations
- Build connected vehicle and automated traffic signal performance measures (ATSPM) Capability
  - Workforce readiness
  - TMC infrastructure readiness

**STATUS: Planned**
Thank You!