CENTRAL FLORIDA TSM&O CONSORTIUM MEETING SUMMARY

Meeting Date: April 25, 2024 (Thursday) **Time**: 10:00 AM – 12:00 PM

Subject: TSM&O Consortium Meeting

Meeting Location: Teleconference

I. OVERVIEW

The purpose of this recurring meeting is to provide an opportunity for District Five FDOT staff and local/regional agency partners to collaborate on the state of the TSM&O Program and ongoing efforts in Central Florida. Jeremy Dilmore gave a short introduction and outlined the meeting agenda.

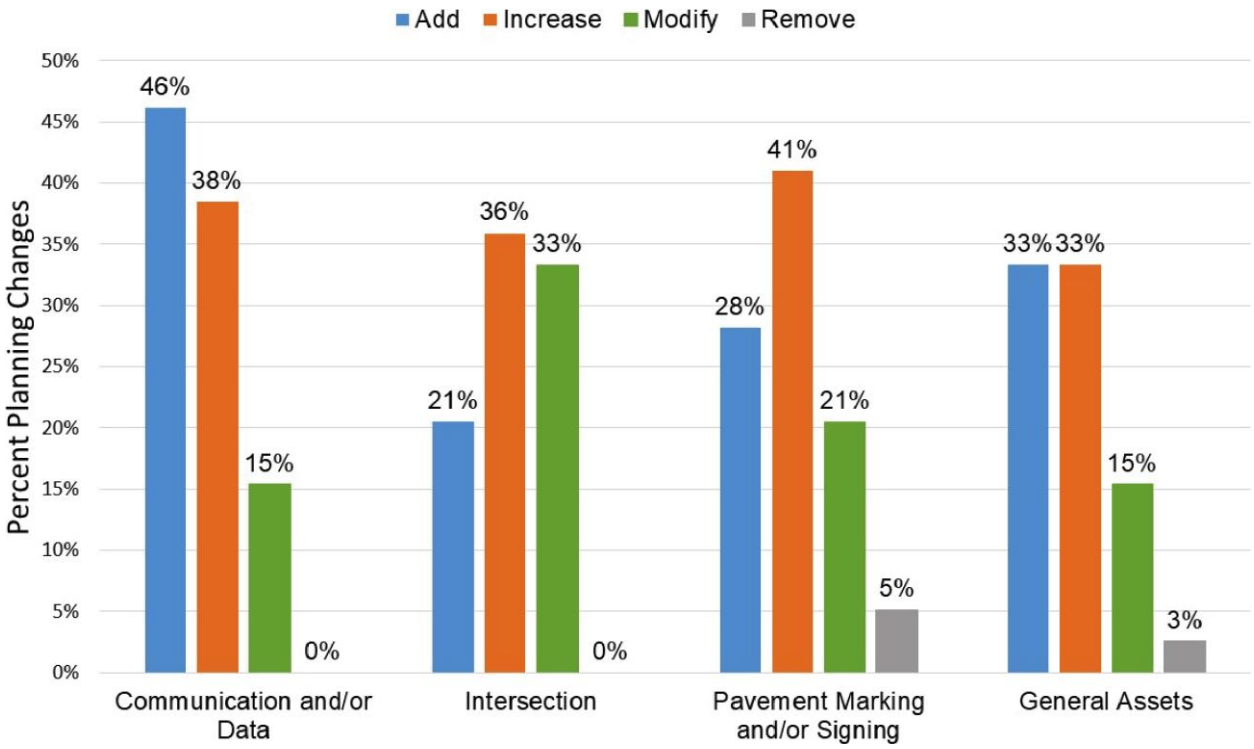
II. CAV TECHNOLOGY: DETERMINING THE IMPACTS ON STATE MAINTENANCE PROGRAMS

David Williams (VHB) presented a summary of the National Cooperative Highway Research Program (NCHRP) Research Report 1084, *CAV Technology – Determining the Impact on State DOT Maintenance Programs*.

- Research led by Iowa State University's *Institute for Transportation*
- Objectives
    - Identify likely maintenance needs due to CAV technology
    - Develop guidance on measurable standards and resource implications
    - Assess workforce implications
- Phase 1 – Literature review; survey of agencies; stakeholder interviews
- Phase 2 – Develop performance measures for CAV and maintenance
    - Performance measure component was dropped from the project because the implementation of CAV was not as mature as anticipated, partly due to Covid-19
- Phase 2 Revised – additional interviews with agencies; interviews with asset vendors; summarize available information about asset maintenance
- Interviews with agencies and vendors occurred from Summer 2020 through January 2022
- General Insights
    - Enabling TSM&O investments (ATC, fiber, etc.) builds agency capacity for active monitoring and operations upon which CV relies
    - Additional guidance is needed on pavement markings and signing standards to support CAV operations
    - Funds are generally available for RSU purchases, but not to install and maintain them
    - Obsolescence concerns given evolving CAV environment
    - Different set of skills may be needed to address maintenance issues from CAV assets
    - Interoperability and interchangeability is important

- Maintenance contractors requested being engaged as new components are developed to facilitate easier maintenance

- Agency Intent
  - 30 out of 39 agencies indicated they would be changing their physical assets to support CAVs in the next 3 years



  - Nontraditional staff may be needed to handle tasks like sensor replacement
  - Concerns about costs, uncertainty about maintenance needs, maintenance frequency, and how CAV assets could take away from other activities
  - Other concerns?
    - Additional staff needed; additional maintenance time needed; additional training needed; maintaining proper retroreflectivity and contrast of pavement markings; impacts to maintenance priorities; CAV recognition of Work Zones

- RSU Considerations
  - In Requests for Proposal, state that RSUs are safety devices
  - Lightning strikes cause issues to functionality of communications
  - Implementing MAP message changes can be specialized and time-consuming
  - RSU/OBU repairs typically handled by vendor instead of infrastructure owner/operator (IOO)
  - Reasonable lifecycle is 5 to 7 years
  - Common failure problems include weather, knockdowns, installation on ungrounded mast arms, security credentialing, improper installation of antenna

- RSU Best Practices
  - Establish expected troubleshooting resolution time tiers (based on existing maintenance standards)

        - Minor problems → diagnosed/resolved by agency staff within 4 hours
        - Intermediate problems requiring virtual troubleshooting by vendor and field agency staff → resolved within 24 hours
        - Serious problems requiring vendor to go into the field → 72 hours
    - Roles and responsibilities
        - Require vendor to help transition expertise to agency staff when demonstration/pilot returns to normal operation
- OBU Best Practices
    - Software update was most common maintenance activity
    - Lifecycle undetermined, but generally 5 years expected
        - Replacement is more likely the result of technology change than issues with existing deployment
    - Minimal best practices given lack of implementation
- Pavement Marking Considerations
    - Pavement markings more relevant to automated vehicles (AV) than CVs
        - Passive camera sends digital images to image signal processor; image decoded using pixel detection
        - Computer vision and machine learning used to determine pavement markings from pavement
    - High contrast is key
    - Wider markings are helpful to AV sensors
    - Discontinuities in pavement markings and remnants of old pavement markings are problematic for AV sensors

    - Daytime conditions can be more challenging than nighttime conditions for AVs
- Resource Gaps
    - (Resource = any dollar, staff time, agency knowledge, or equipment that may be leveraged by the operating agency)
    - Additional field devices needed
        - DOT fleet may be a useful early pilot opportunity
    - Expanded communications network and back-office systems
    - Staff knowledge, skills, and abilities

  - Agency knowledge
- Procuring with maintenance in mind
  - CAV technology (and ITS more generally) have short cycles of operation
  - Prioritize limiting field downtime
    - Recommended "Swap-first" approach, replacing failing field equipment and taking it back to shop for repairs, improving uptime at that location
      - This would require fields technicians with moderate electric and programming skills
- CAV deployment
  - ITS Joint Program Office (JPO) is working on their ITS deployment survey for 2023

III. UPCOMING TRAINING AND WORKFORCE DEVELOPMENT

Manny Rodriguez gave a brief presentation on upcoming training and workforce development training hosted by District Five for transportation professionals in the region.

- District Five is conducting its annual Spring workforce development training across a variety of work activities, concepts, etc.

Course Topic	Duration	Venue	Intended Audience	Class Date
Traffic Signal Timing using Synchro and Tru-Traffic	3 days	Classroom	Engineers	4/8/2024
Traffic Signal Railroad Training	1 Day	Classroom	Engineers & Signal Technicians	4/15/2024
Basic Traffic Signal Cabinet and Field Equipment Orientation	1 day	Lab	Signal Technicians	4/22/2024
Traffic Signal Timing Basics	1 day	Classroom	Signal Technicians	4/29/2024
Traffic Signal Controller Programming	1 day	Lab	Signal Technicians	5/6/2024
CMS and TSP Orientation	1 day	Classroom	Signal Technicians	5/13/2024
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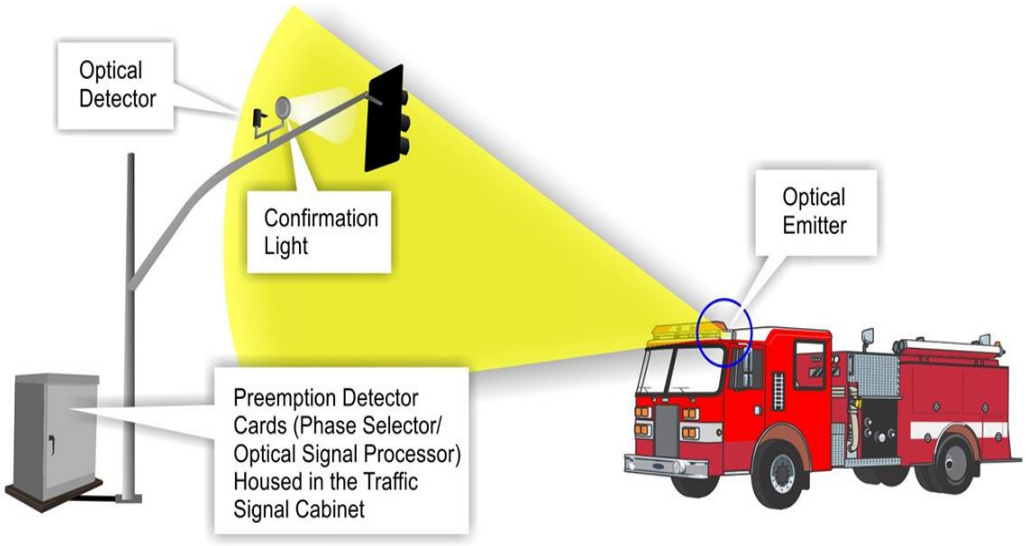
Iteris Video Detection	1 day	Classroom	Signal Technicians	6/10/2024
Gridsmart Video Detection	1 day	Classroom	Signal Technicians	6/24/2024

- IMSA Traffic Signal Level 1 Training
  - May 9/10
  - $265 per person (to cover IMSA fees)
  - Exam on 2nd day
  - Prequisite → complete FDOT TTC Course, Intermediate or Advanced (motadmin.com)
- IMSA Traffic Signal Level 2 Training
  - May 14/15
  - $265 per person (to cover IMSA fees)
  - Exam on 2nd day
  - Prequisite → Level 1, two years of experience

IV. FIRST RESPONDERS AND CONNECTED VEHICLES

Garrett Popovich (AECOM) gave a brief presentation on a potential emergency vehicle preemption (EVP) opportunity in the region that District Five is exploring.

- EVP assists in getting first responders to the scene more quickly and safely
- EVP currently
    - OBU to RSU – V2X preempting the traffic signal timing plan for first responders to move through intersection



    - Extra equipment housed within the emergency vehicle; limited space already exists inside emergency vehicles
- What if we could provide EVP to emergency vehicles AND provide alerts or warnings back to the emergency vehicle…. and do it all with no additional equipment installed inside the vehicle?
    - How?
        - Emergency Vehicle lights control system
            - Working with leading emergency vehicle lighting manufacturers and incorporating the latest technology within emergency vehicles
            - Integrating with systems already installed in use
        - Benefits of this approach?
            - No additional hardware install
            - Cost reduction/savings
            - Agency trust
            - Future enhanced EVP
    - To enable the signal to function on the system, it must be connected to the network

- Timeline
  - Development of proof of concept
  - Support from first responder agencies
  - Real world testing and evaluation

- Several agencies have indicated interest
- Emergency vehicles won't receive the same safety applications with this approach
- This approach is also a higher latency

Discussion

- Q: How do you protect against general public getting a lightbar?
  - Whelen has a special license that each unit is equipped with that will protect against that
- Q: What do you need roadside?
  - Still determining this. We are still a long way off from widespread implementation.

V. FLORIDA 511 – CV SMARTPHONE

Katie King provided a status update on the FL 511 CV SmartPhone application.

- Goals
  - Fill the gap as OEMs work to increase penetration rate so we can leverage CV technology benefits now
  - Provide safety-related TIM messages to the public now using the FL511 Mobile application
  - Statewide software working together to leverage each others' efforts into a singular solution for FDOT.
    - FL511, DIVAS, SunGuide, and Vehicle-to-Everything Data Exchange Platform (V2X DEP)
- Status of FL511 Project
  - In beta testing in iOS and Android for feedback and notification refinement before final acceptance testing
  - Phase 1 Testing held last Friday
  - Phase 2 Demo set for next week
- Key features
  - Safety-related traveler information applications
  - CV notifications for existing AI hardware deployments around Florida
  - Creation of generic third-party interface to combine data from other applications

  - Provide data back to the V2X DEP for future planning and safety insights
  - Route and Mode Choice Trip Planning (D5 region only)
  - Safety related TIM
    - Curve speed warning
    - Congestion ahead
    - Road ranger/emergency vehicle
    - Work zone
    - Weather/Visibility
  - Audible drive mode alerts
  - AI Travel Safely – Glance System Integration
    - All alerts, such as School Zone Alert, will automatically play when the user enters designated alert zone
    - The SDK triggers these alerts, and users have the option to filter them by accessing Menu→Settings, as illustrated in the provided filter alerts demonstration

- FL511 Lessons Learned so far
  - Curve speed warning – We can, but should we?
    - Data set size is overwhelming on driver notifications
    - Might make more sense to hand pick known potential severe locations with District's RTMC Operations staff
  - Connecting TIMs across different software is difficult
    - Need deduplicate/filter with business rules between systems
    - Set basic thresholds for valid notification alerts

VI. TRAFFIC CONTROLLER TESTING AND NETWORK SETTINGS

Aurelio Giovinazzo discussed the District's efforts to resolve issues with network settings in traffic controllers.

- Context
  - Network traffic impact on signal controllers is acknowledged industry-wide
  - Instances of lockups, especially in Port 1 failures during TCP packet broadcast observed
- Testing
  - Extensive testing conduct on signal controllers on models from Econolite, Siemens, Cubic, and Intelight
  - Assessment across various firmware versions
- Objective of Testing
  - Assess controllers' response to requests for the .dat file, typical in ATSPM platforms
  - Requests initiated at a rate of once per minute
- Findings
  - Firmware versions tested: Econolite 3.2.28, Trafficware Scout 85.5, Intelight 2.7.0, Siemens 4.58 and above
  - Controllers demonstrated capability to handle requests at specified frequency
- Vulnerability Discovered
  - Controllers with SFTP capabilities susceptible to TCP floods

  - Testing revealed susceptibility to Econolite, Siemens, and Cubic controllers to TCP floods
  - Intelight controllers, utilizing a web API for file transfers, remained unaffected
- Proposed Resultion
  - Mitigation Strategy
    - Implement storm control and port policing mechanisms on Layer 2 switch connected to controllers
      - (Storm Control – drop or discard broadcast or multicast packets exceeding threshold
      - Port policing – ensure switch port does not exceed set bits per second limit
  - Traffic Analysis
    - Normal traffic: 3-7 kbps ingress and egress
    - Traffic exceeding 40-50 kbps negatively impacts controllers
  - Implementation Measure
    - Storm control policy set at 10 kbps
    - Port policing set at 10 kbps

VII. FLASH AWARD

Kevin Marquez (FDOT) gave a brief presentation of FDOT's FLASH Award to Melbourne Traffic Operations team members.

- This is District Five TSM&O's new recognition program for outstanding maintaining agency response to traffic signal emergencies
- Focuses on showcasing specific efforts throughout the District
- Discuss processes, best practices, lessons learned, etc.
- SR 507 at Florida Avenue
  - Crash occurred on Friday June 2, 2023 at 11:35pm
  - Failure to keep in proper lane crash: vehicle crashed into signal pole while attempting WB left turn movement
  - Concrete pole broke from impact and signal span came down
  - Crash resulted in one incapacitating injury (no fatalities)
  - Traffic Operations/Maintenance response
    - Marion County was informed of damage by County's 911 communications center
    - The on-call signal technician was informed immediately over the phone of the condition of the traffic signal. On-call technician immediately alerted additional team members given the breadth of the damage.
  - The initial response team was onsite within an hour of the first call after collecting material and equipment
  - Plan for repairs was developed immediately
    - Rebuild intersection to a triangular span
    - MOT was deployed to convert intersection to side street stop controlled while signalization was down

  - Triangle span was up and signal in flash mode within 20 hours of crash
  - Full signalization was achieved less than 36 hours after crash
- Key successes
  - Marion County 911 center easily contacted on-call traffic signal team
  - Marion County provided most of the MOT and temporary traffic control needs
  - Senior staff available 24.7 to guide and assist
  - Marion County had all overhead materials available for this event

VIII. CURRENT INITIATIVES

Jeremy Dilmore briefly provided an update on the current work efforts throughout District Five.

- I-4 Express Lanes – no date for dynamic tolling yet
- Smart Work Zone – deployed for situational awareness and data collation
  - Looking into training LiDAR to detect conditions further down line-of-sight (+1,000ft)
- I-4 FRAME – reach out to Jennifer Sardonini if you have any questions
- OBU – coordinating MOUs with several Fire Departments for EVP
- PedSafe II – was featured in DeLand for *Take Your Child to Work Day*
  - Trying to improve compliance rate through HMI piece;
    - Have right-to-experiment in the approval process
- Ops Academy is accepting nominations
  - 2-week commitment but you do come away with a lot of knowledge

IX. NEXT MEETING

- June 27, 2024

X. ATTACHMENTS

- A – Presentation Slides
- B – Meeting agenda

END OF SUMMARY

This summary was prepared by David Williams and is provided as a summary (not verbatim) for use by the Consortium Members. The comments do not reflect FDOT's concurrence. Please review and send comments via e-mail to dwilliams@vhb.com *so the meeting summary can be finalized.*

Welcome to the TSM&O Consortium Meeting

April 25, 2024

Transportation Systems Management & Operations

Meeting Agenda

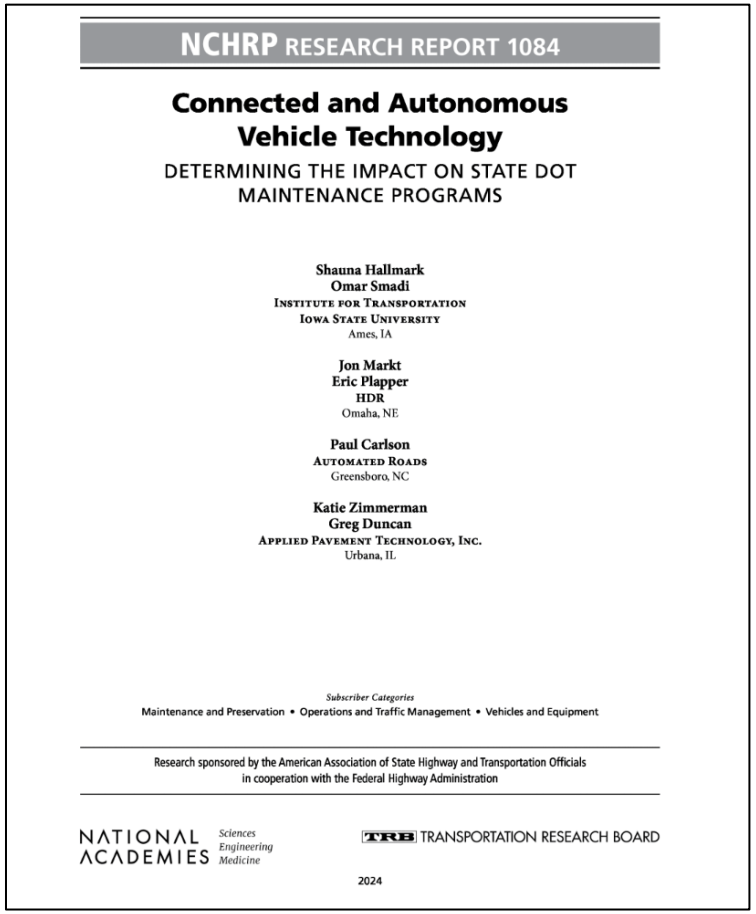
1. CAV Technology: Impact on Maintenance (NCHRP)
2. Upcoming Trainings and Workforce Development
3. Emergency Vehicle Preemption
4. FL511 Updates
5. Traffic Controller Testing and Network Settings
6. FLASH Award for Emergency Repairs – Marion County
7. Current Initiatives

CAV Technology: Determining the Impact on State Maintenance Programs (NCHRP 1084)

David Williams, VHB

NCHRP Research Report 1084

- Sponsored by NCHRP
- Led by Iowa State University's *Institute for Transportation*
- **Objectives**
  - Identify likely maintenance needs due to CAV technology
  - Develop guidance on measurable standards and resource implications
  - Assess workforce implications



NCHRP RESEARCH REPORT 1084

Connected and Autonomous Vehicle Technology

DETERMINING THE IMPACT ON STATE DOT MAINTENANCE PROGRAMS

Shauna Hallmark
Omar Smadi
INSTITUTE FOR TRANSPORTATION
IOWA STATE UNIVERSITY
Ames, IA

Jon Markt
Eric Plapper
HDR
Omaha, NE

Paul Carlson
AUTOMATED ROADS
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Katie Zimmerman
Greg Duncan
APPLIED PAVEMENT TECHNOLOGY, INC.
Urbana, IL

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Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration

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2024

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NCHRP Research Report 1084

- Phase 1
  - Literature Review
  - Survey of agencies to determine state-of-practice for CAV assets
  - Stakeholder interviews with agencies to “fill in the gaps”
- Phase 2
  - Additional interviews with agencies
  - Interviews with maintenance contractors
  - Collect information from asset vendors
  - Summarize available information about maintenance for each asset

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CAV Assets

- Literature review examined 20 CAV-related assets
- Agency interviews emphasized these assets
  - On-board unit (OBU)
  - Roadside unit (RSU)
  - Dedicated Short Range Communication (DSRC); Cellular Vehicle to Everything (C-V2X)
  - Pavement markings
  - Cameras
  - Signal Control
  - Machine-readable signs
  - Road Weather Information Systems (RWIS)
  - Data/digital infrastructure

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Interviews

- Agency interviews conducted in Summer 2020 & Fall 2021
- Vendor interviews held in Fall 2021
- Maintenance Contractor interviews held in January 2022

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Summary of General Insights

- Enabling TSM&O investments (ATC, fiber, etc.) builds agency capacity for active monitoring and operations upon which CV relies
- Agencies need additional guidance on pavement markings and signing standards that support CAV
- Funds are often available to purchase RSUs, but not install and maintain them
- Rapid changes in CAV assets leading to obsolescence concerns
- Concern that a different set of skills may be needed to address maintenance issues from CAV assets

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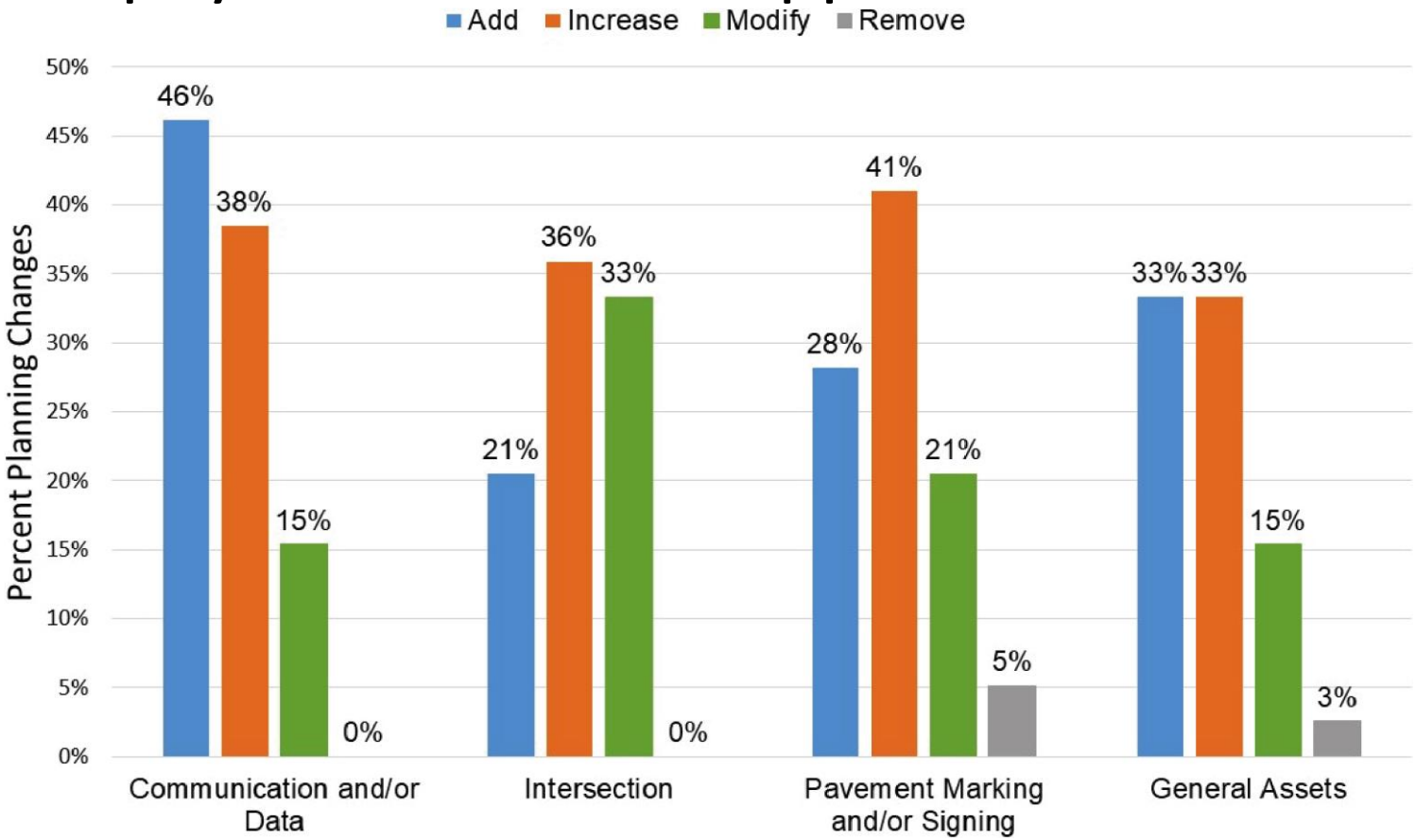
Summary of General Insights

- Interoperability and interchangeability is important
- Maintenance contractors requested being engaged as new components are built to facilitate easier maintenance
- Emphasis on durability of devices
- Ensure one-year warranty, at a minimum
- Operators requested the agency own and store the data (rather than 3rd party)

Agency Intent

- 30 out of 39 (77%) agencies indicated they would be changing their physical assets to support CAVs in the next 3 years



Planned Changes by Category of Assets

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Agency Input

- How has CAV maintenance activities impacted your agency's workforce needs?

Table 3-13. Impacts on agency workforce needs.

Impact	Agencies Responding
Additional maintenance staff needed	6
Additional training needs to deal with new assets	8
Nontraditional maintenance staff needed	7
More staff turnover	None
Software training to use maintenance management system	5
Organizational changes	3
Other	2

Agency Input

- Has the adoption of CAVs impacted other maintenance needs?
  - Concern about
    - Cost
    - Uncertainty about maintenance needs
    - Maintenance frequency
    - Will CAV assets take away from other activities

Agency Input

- Are you concerned about other aspects of CAV maintenance?
  - Additional staff or other resources
  - Additional time to maintain
  - Additional education and training needs
  - Maintaining proper retroreflectivity and contrast of pavement markings
  - Being able to maintain up to the levels needed by CAVs
  - How will CAVs impact maintenance priorities
  - Ability of CAV technology to properly recognize and respond to WZs

RSU Considerations

- When writing RFP, state that RSUs are safety devices
- Loss of communication due to lightning strikes
- Implementing MAP changes can be specialized & time-consuming
- Many agencies used vendor to handle RSU/OBU repairs
- Have a central monitoring system to maintain access to each unit
- Reasonable lifecycle – 5 to 7 years
- Common failure issues

RSU Best Practices

- Set realistic expectations for failure or degraded performance rates
- Establish expected resolution time tiers
  - Use existing maintenance protocols
- Roles & responsibilities
- Require vendor training modules

Table 4-3. Vendor training modules from Smart Columbus Pilot project.

Module	Description	Duration
CV Introduction	The basics on what makes up CV systems and solutions including an overview of the CV products	45 mins
CV Messaging	An overview of the messages used for CVs	30 mins
Connected Mobility Control Center (CMCC) Introduction	An overview on using the CMCC	30 mins
CMCC Locations, Devices, and Messages	Setting up the network using the CMCC	60 mins
CMCC Administration	How to be a CMCC administrator	20 mins
CMCC Operations	Monitoring and troubleshooting the system using the CMCC	30 mins
CV Validator Operations	Setting up and using the CV validator	45 mins
RSU Introduction and Setup	Preparing the RSU for installation	45 mins
RSU Installation	Mounting the RSU at the roadside	30 mins
RSU Verification	How to verify the RSU installation	30 mins

OBU Considerations

- Most common maintenance activity was software updates
- Lifecycle undetermined; expected 5 years
- No best practices had been determined yet

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Pavement Marking Considerations

- Pavement marking more relevant to AVs than CVs
  - Passive camera sends digital images to image signal processor
  - Image decoded using pixel detection
  - Computer vision and machine learning used to determine pavement markings from pavement
  - High contrast is key
  - Wider markings are better
  - Discontinuities in pavement markings create issues for sensors
  - Remnants of old markings also problematic

Pavement Marking Considerations

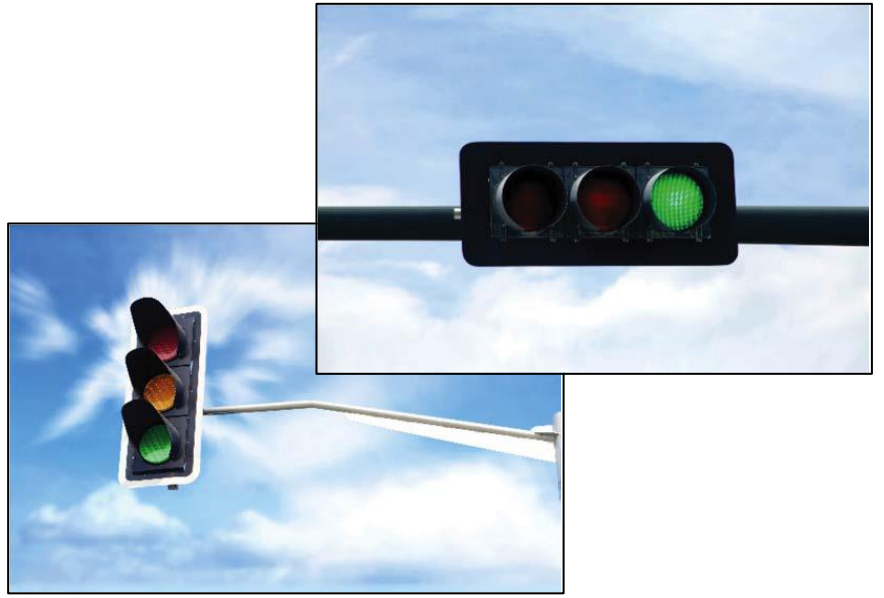
- Research showing that daytime conditions can be more challenging than nighttime conditions
  - Retro-reflectivity needed for nighttime → less than human driving
  - Some research studies recommend a minimum contrast ratio be established to improve daytime performance

Video Detection Camera Considerations

- Research focused on bike/ped detection systems
- Typically warrantied for 3 to 5 years
- Average lifespan ~10 years
- Vendors recommend regular cleaning of camera lenses
- Deterioration of cables due to UV rays (even with UV protection)
- Proper camera positioning is critical

Traffic Signals for CAVs – Recommendations

- Consistency and standardization is critical
- Additional workforce training needed to accommodate advanced systems in cabinet
- Install controllers with SPaT capabilities
- Determine if larger cabinets are needed



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RWIS – Considerations

- No major recommendations, but did have estimates on lifespan

Table 10-1. Estimated lifespan for RWIS components.

Component	Average Life (years)	Standard Deviation (years)
Entire RWIS station	15	3.3
Internet protocol (IP) surveillance system (CCTV) (optional)	7	1.1
Pavement condition sensor	8	2.5
Water-level sensor	4	N/A
Air temperature/relative humidity sensor	9	1.6
Wind direction and speed sensor	9	1.6
Precipitation sensor	10	1.6
Barometric pressure sensor	10	N/A
Visibility sensor	8	2.3
Ultrasonic snow depth sensor	9	1.5
Subsurface sensor	8	3.1
Solar radiation kit	10	N/A
Surface temperature sensor	8	2.9

Source: Lee et al. 2020.

Resource Gaps

- Additional Field devices
- Expanded communication network and back-office technology
- Vehicles and other assets
- Staff knowledge, skills, abilities
- Agency Knowledge

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Procuring with Maintenance in Mind

- CAV (and ITS) technology have short cycles of operation
- Prioritize limiting field downtime

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CAV Workforce Implications

- Difficulty keeping up with workforce skill needs as technology shifts
- Need for professionals other than civil engineers
- Lack of suitable position classifications to hire staff

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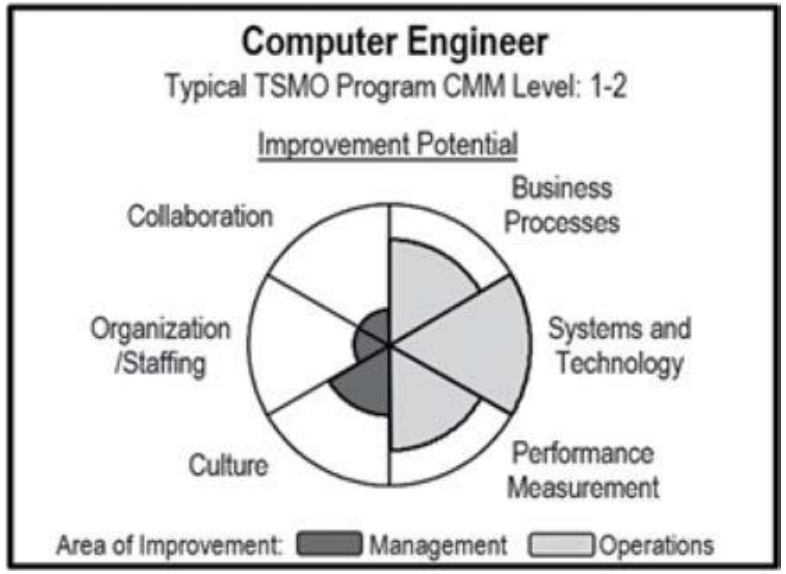
CAV Workforce Recommendations

- Modify and develop new positions oriented around CAV tech
- Assess salary trends
- Partner with educational institutions and develop apprenticeship programs
- Develop nationally consistent CAV credentials and training programs
- Monitor new and emerging standards related to CAV



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CAV Deployment

- ITS JPO is working on their ITS Deployment Survey for 2023

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Upcoming Training and Workforce Development

Manny Rodriguez, Iteris

Upcoming Training and Workforce Development

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Upcoming Training and Workforce Development

- IMSA Traffic Signal Technician Level 1
  - May 9th and May 10th (9am to 4:30pm)
  - $265 per person (covers IMSA fees)
  - Exam on 2nd day; must pass to receive certificate
  - Prereqs → Complete FDOT TTC Course, Intermediate or Advanced (motadmin.com)

- IMSA Traffic Signal Technician Level 2
  - May 14th and May 15th (9am to 4:30pm)
  - $265 per person (covers IMSA fees)
  - Exam on 2nd day; must pass to receive certificate
  - Prereqs → Level 1; Two years of experience

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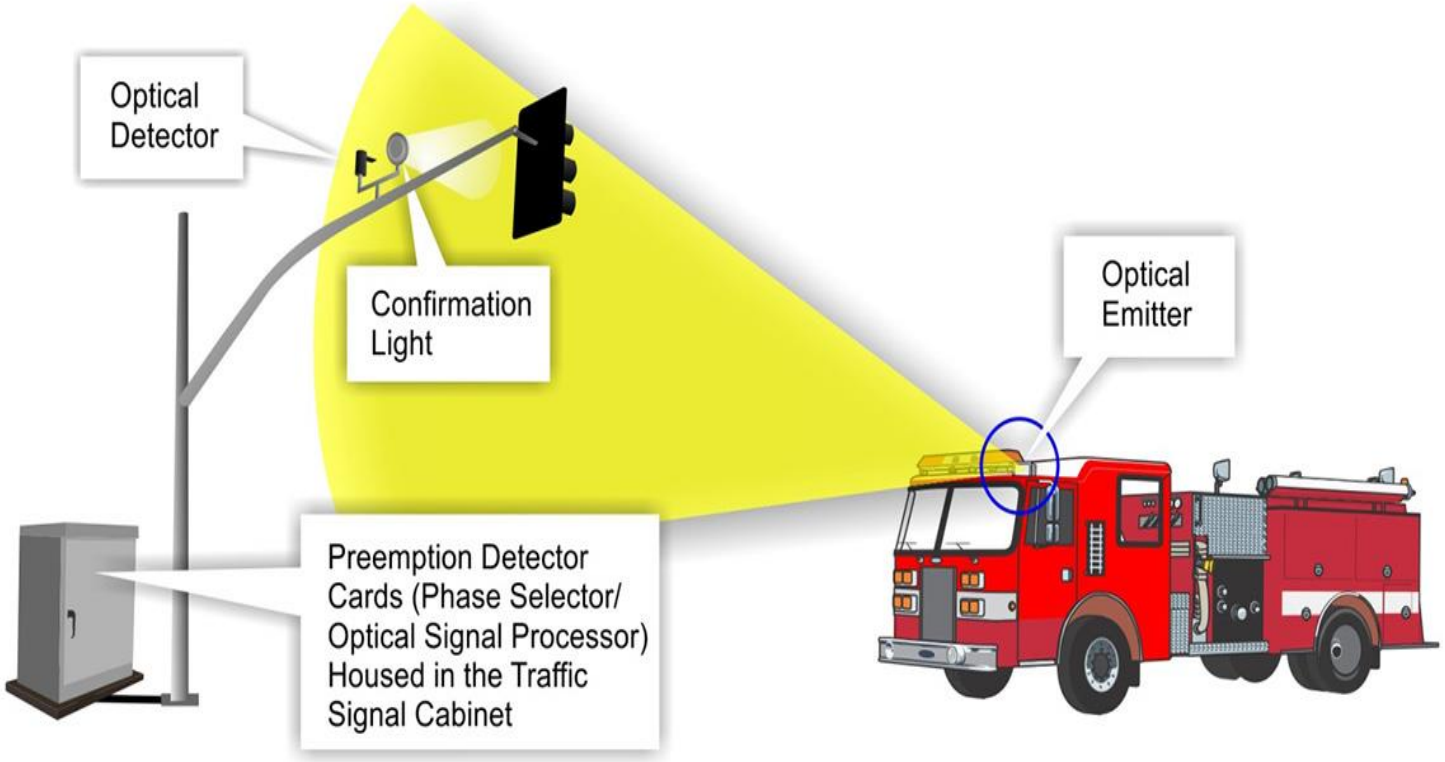
First Responders and
Connected Vehicles
EVP Ingenuity

What is EVP

Emergency Vehicle Preemption (EVP), assists in getting first responders to the scene more quickly and safely.

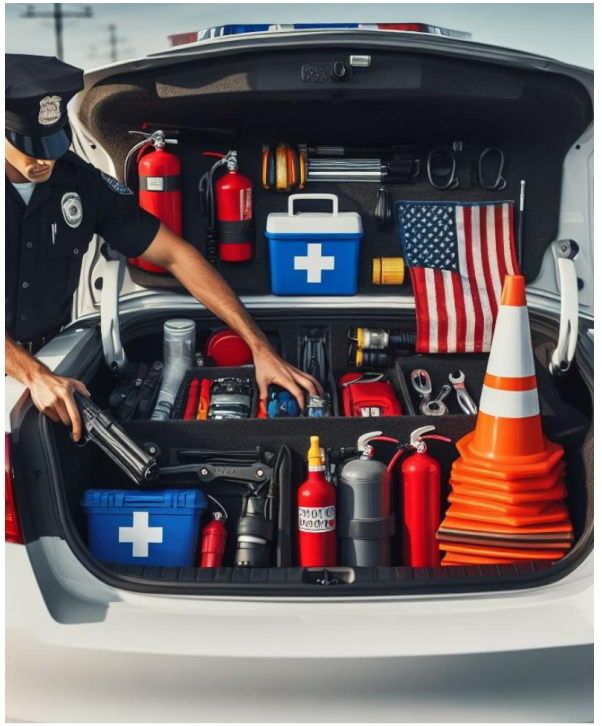
EVP Currently

- OBU to RSU
  - V2X in preempting the traffic-signal timing plan for first responders
- Infrared
- GPS technologies



EVP Equipment

- Extra equipment housed within the emergency vehicle.
- Limited space already exists inside emergency vehicles.

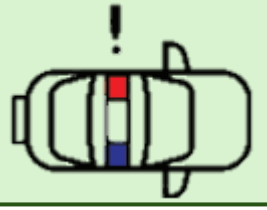


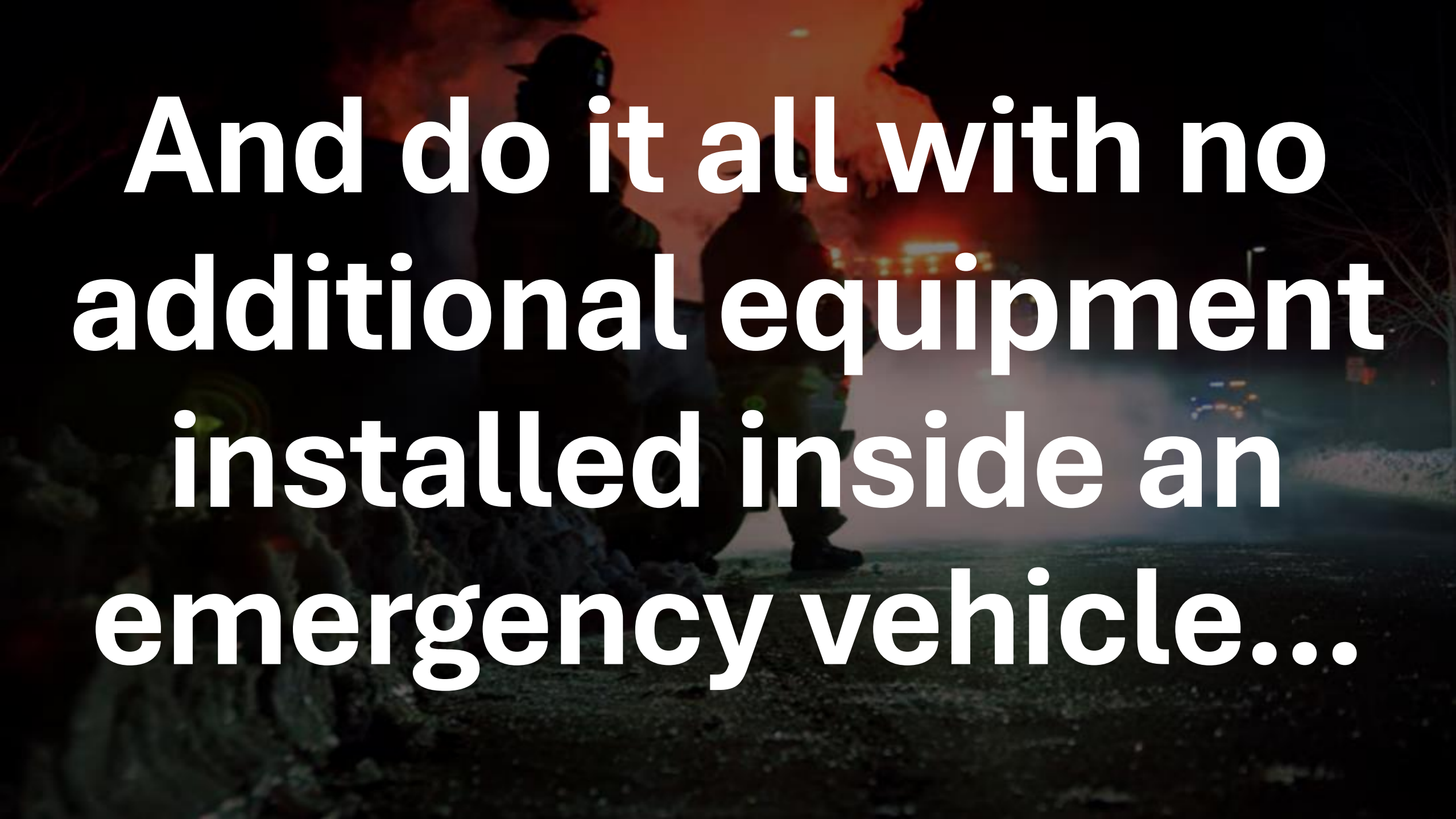
What if…

We could provide EVP to emergency vehicles.

&

Provide alerts or warnings back to the emergency vehicle.




And do it all with no additional equipment installed inside an emergency vehicle...

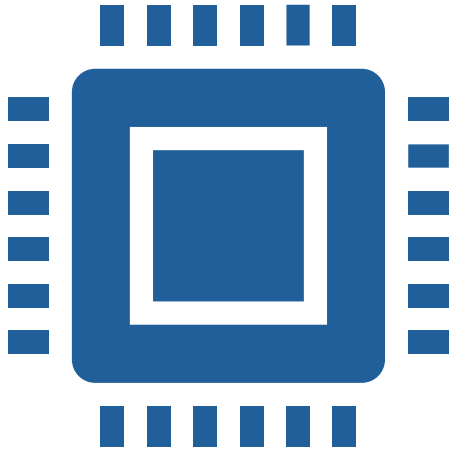
How?

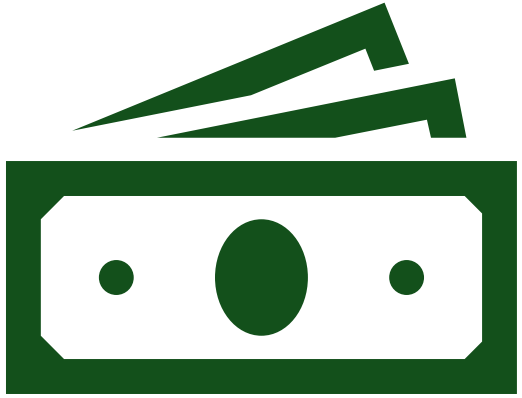
The Vehicle Emergency Lights Control System.

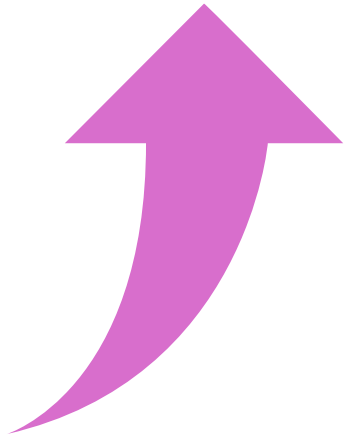
- By working with leading emergency vehicle lighting manufacturers and incorporating the latest technology within emergency vehicles.
- Integrating with systems already installed and in use.

What are the Benefits

- No additional hardware install
- Cost reduction / savings
- Agency Trust
- Future Enhanced EVP

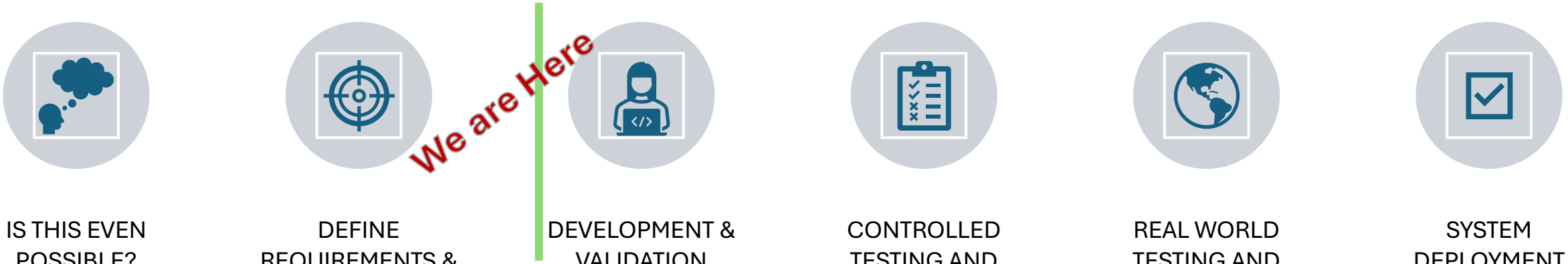






Where we are and where we are going

- Development and Proof of Concept (POC)
- Support from First Responder agencies
- Real world testing and evaluation
- Work with our stakeholders and maintaining agencies
- *To enable the signal to function on the system, it must be connected to the network.*



Questions?

EVP **Ingenuity**

First Responders and Connected Vehicles

Florida 511 – CV Smartphone

Status Update

Katie King

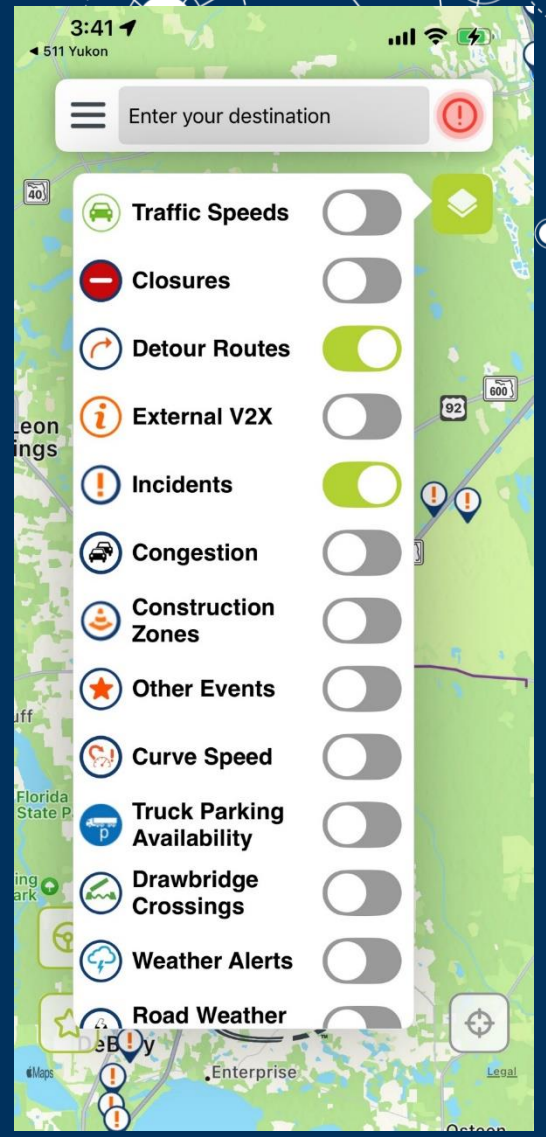
April 25th, 2024

Goals Refresher:

- Fill the gap as OEMs work to increase penetration rate so we can leverage CV technology benefits now.

- Provide safety related TIM messages to the public now using the FL511 Mobile Application.

- Statewide software working together leveraging each others' efforts into a singular solution for FDOT. FL511, DIVAS, SunGuide, and V2X DEP

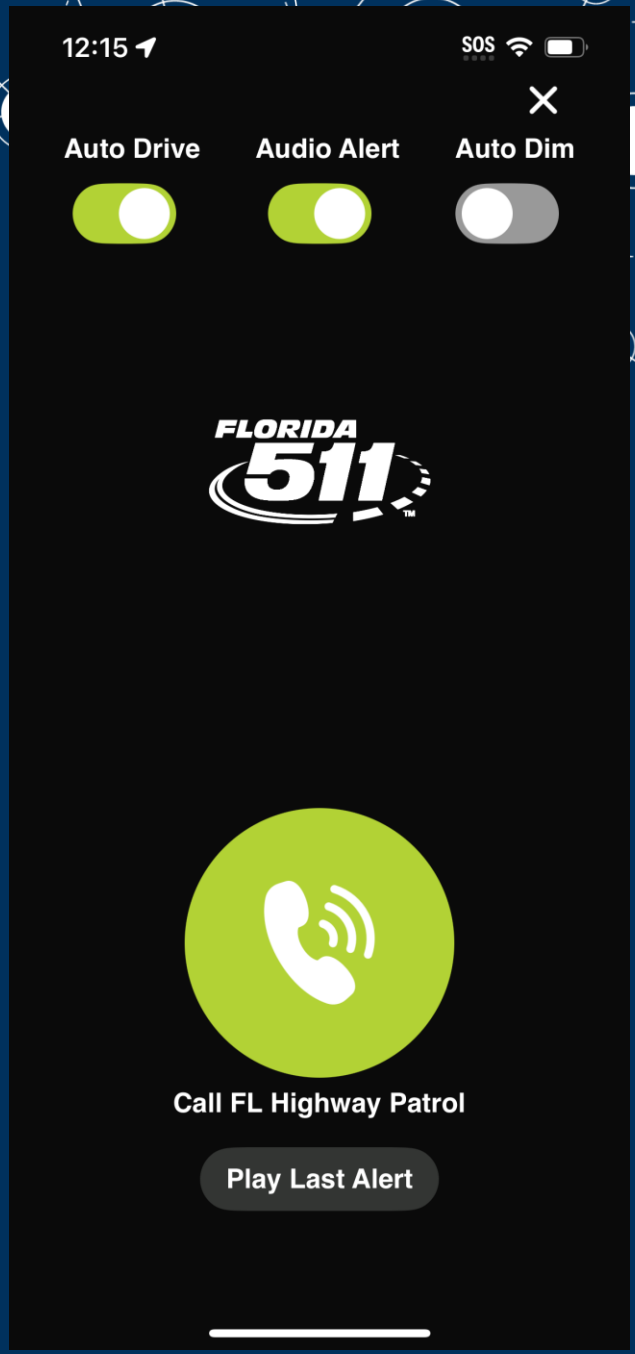


FL511 Project Update

Project Status Update:

- In Beta Testing in iOS and Android for feedback and notification refinement before final acceptance testing.

- Phase 1 Testing Held last Friday.
- Phase 2 Demo set for next week.



FL511 Project Update

What's Integrated so far:

Producer	Data Type
V2X-DEP	Intersection MAP
V2X-DEP	TIM (from SunGuide)
V2X-DEP	TIM (from RSU)
One.Network	TIM (for work zone)
Travel Safely	School Zone
Travel Safely	Emergency Vehicle
Travel Safely	Pedestrian Ahead
Travel Safely	Caution Red Light Ahead
CV SaaS	TIM (through V2X DEP TIM from SunGuide)
FL511	Curve Speed Warning
FL511	Low Visibility
FL511	Truck Parking Locations
FL511	BSM (from smartphone)

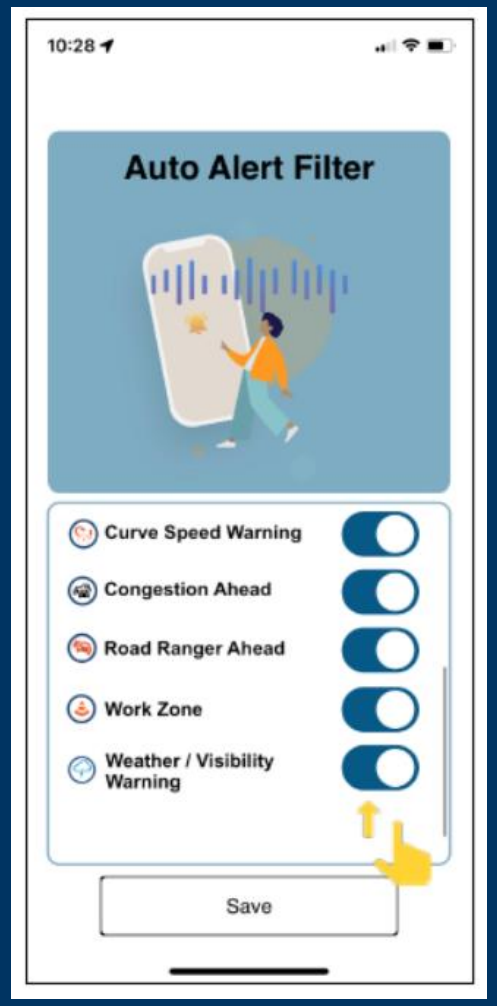
Key Features

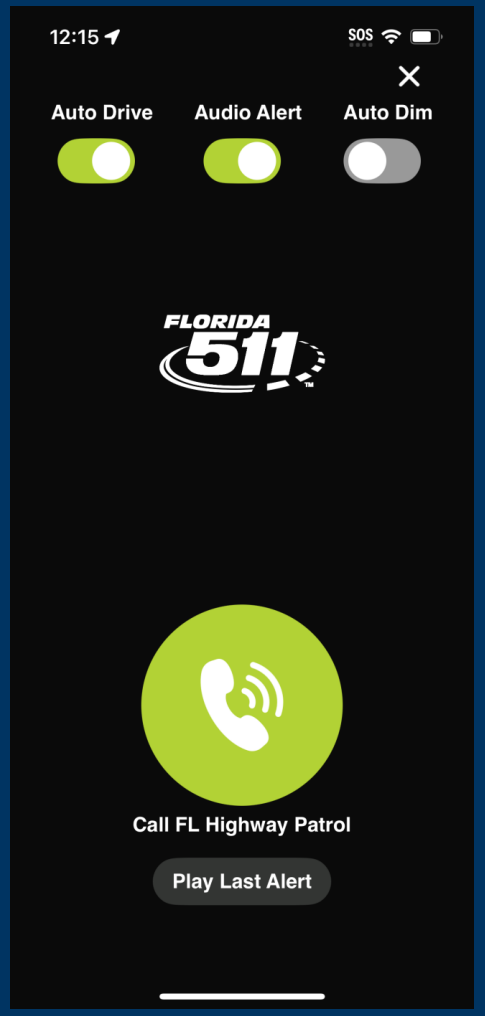
- Safety Related Traveler information applications
- Connected Vehicle Notifications for existing AI hardware deployments around the State
- Creation of a generic third-party interface to combine data from other applications.
- Provide data back to the V2X DEP for future planning and safety insights. (BSM from Mobile)
- Route and Mode Choice Trip Planning (In D5 region only)

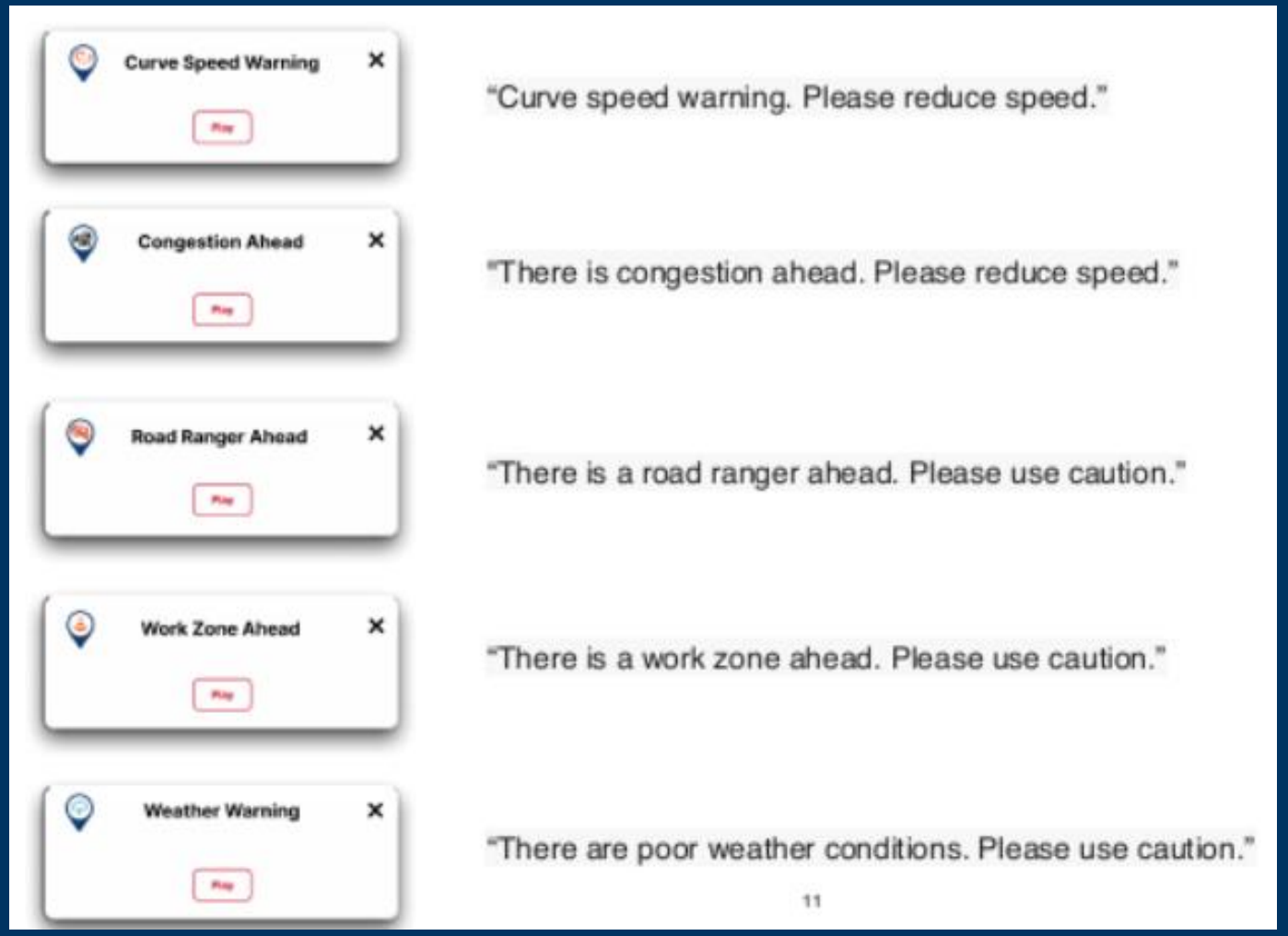
Safety Related TIM

- Curve Speed Warning
- Congestion Ahead
- Road Ranger / Emergency Vehicle
- Work Zone
- Weather / Visibility

Features - Audible Drive Mode Alerts





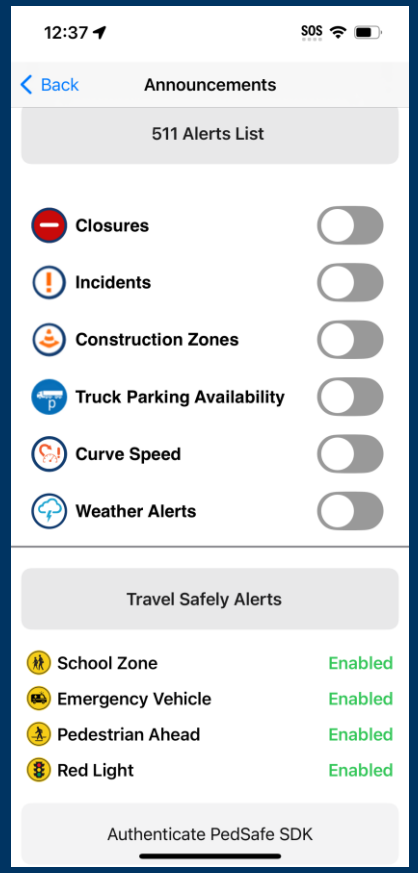


Features

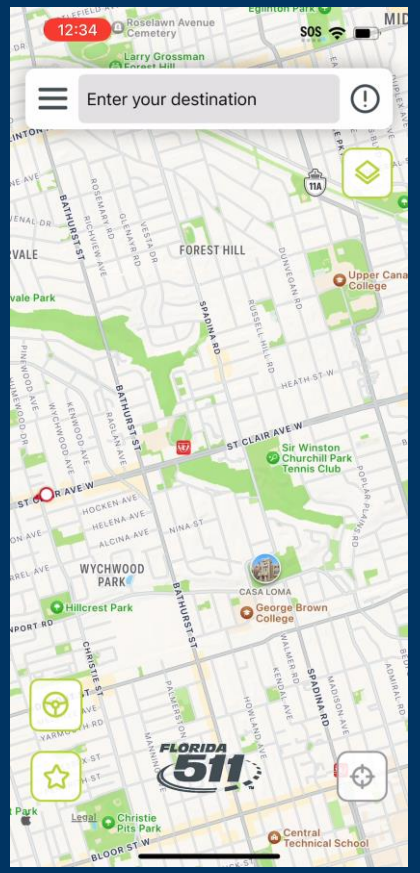
- AI Travel Safely – Glance System Integration

All alerts, such as the School Zone alert, will automatically play when the user enters the designated alert zone. The SDK triggers these alerts, and users have the option to filter them by accessing Menu -> Settings, as illustrated in the provided Filter alerts demonstration.

Settings to filter the alerts



School zone demonstration

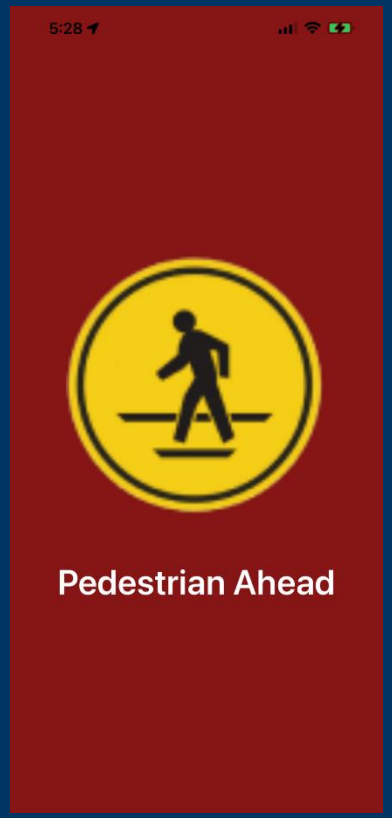


Features

- Travel Safely Applications included in the SDK

Caution, School Zone Ahead

Caution, Emergency Vehicle Ahead



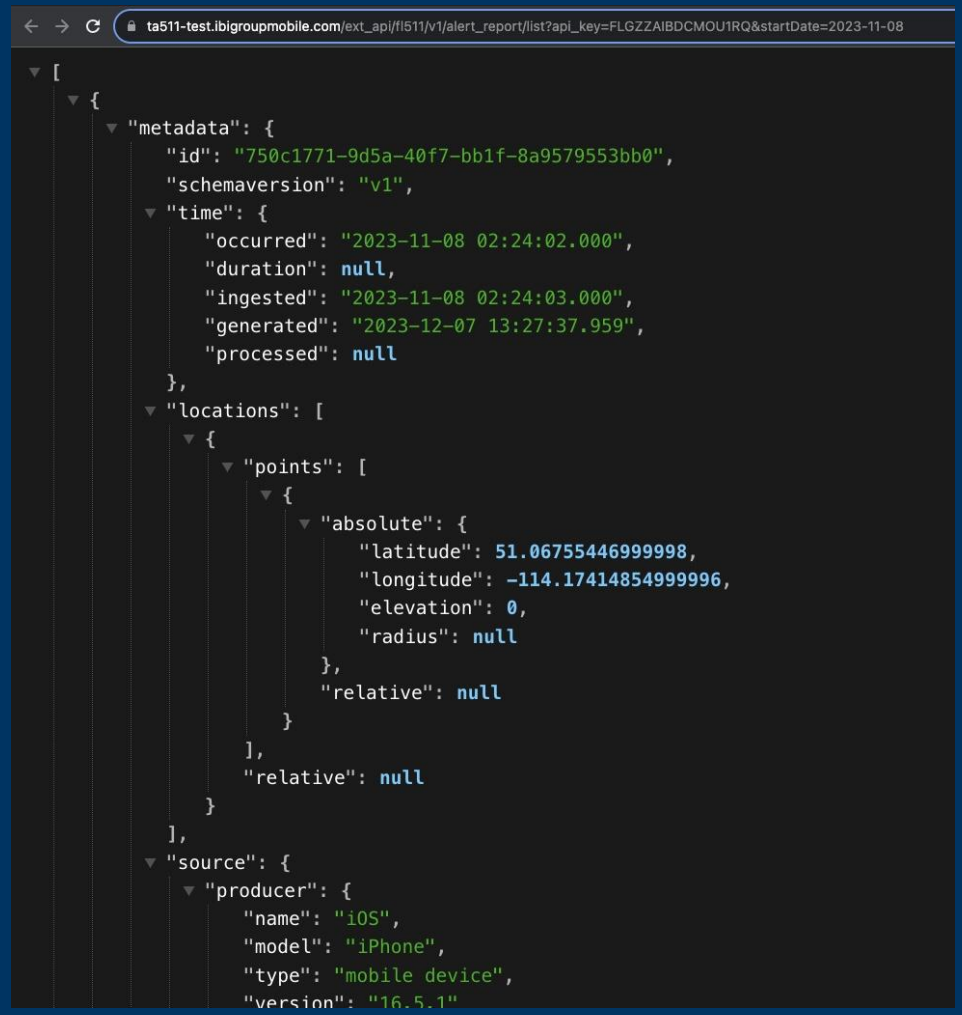
Warning, Pedestrian Ahead

Caution, Red Light ahead

Features - BSM Output/Input

BSM Input data

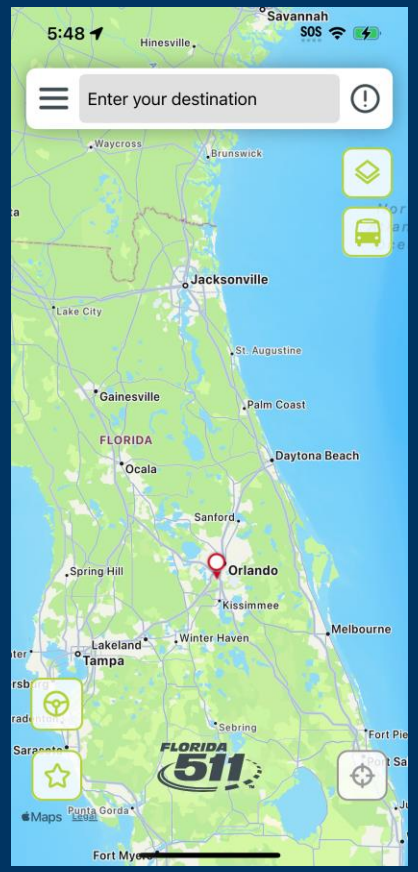
BSM Input data



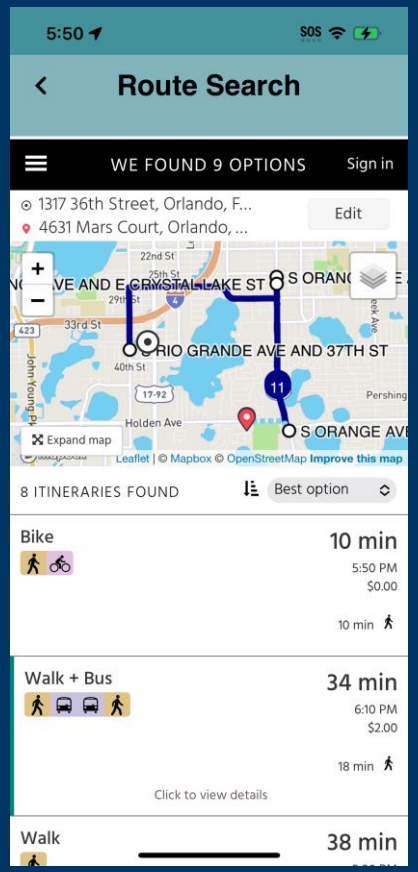
Features - OTP D5 Route Search

Available in the District 5 region only, we have also integrated the Multimodal Trip Planner application from the ATTAIN CFL grant.

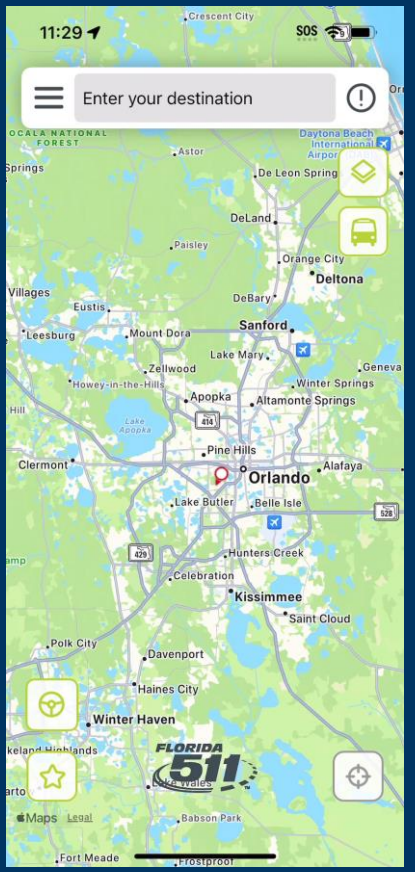
Tap on Bus icon to initiate route search



Search for available transit routes



Video demonstration



FL511 Lessons Learned so far

Curve Speed Warning – We can, but should we?

- Data set size is overwhelming on the driver notifications.
- Might make more sense to hand pick known potential severe locations with Districts RTMC Operations staff.

Connecting TIMs across different software is a pain in the neck

- Need to deduplicate / filter with business rules between systems.
- Set basic thresholds for valid notification alerts (some don’t seem to come in with valid timeframe or area is off)

Thank you
Q&A

Traffic Controller Testing and Network Settings

Aurelio Giovinazzo, TA Labs

Testing Procedure Overview

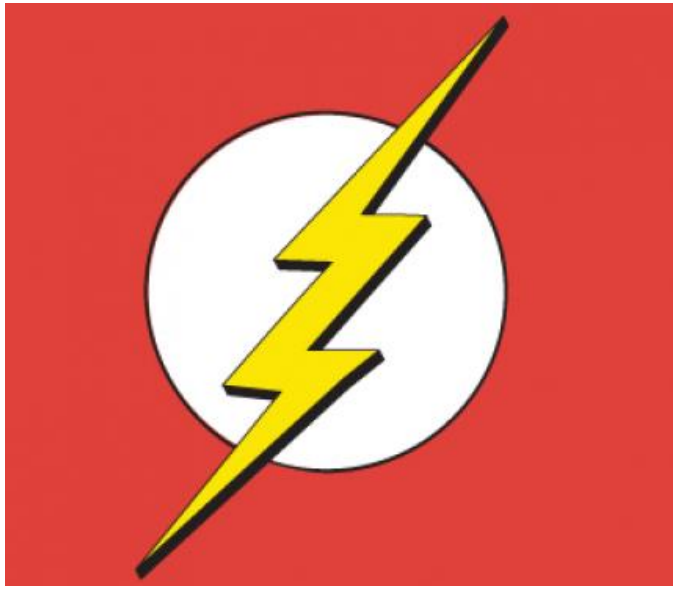
- **Introduction:**
  - Network traffic impact on signal controllers acknowledged industry-wide.
  - Instances of lockups, especially Port 1 failures during TCP packet broadcast, observed.
- **Testing Scope:**
  - Extensive testing conducted on signal controllers.
  - Models from Econolite, Siemens, Cubic, and Intelight evaluated.
  - Assessment across various firmware versions.
- **Objective:**
  - Assess controllers' response to requests for the .dat file, typical in ATSPM platforms.
  - Requests initiated at a rate of once per minute.
- **Findings:**
  - Firmware versions tested: Econolite 3.2.28, Trafficware Scout 85.5, Intelight 2.7.0, Siemens 4.58 and above.
  - Controllers demonstrated capability to handle requests at specified frequency.
- **Vulnerability Discovery:**
  - Controllers with SFTP capabilities susceptible to TCP floods.
  - Testing revealed susceptibility of Econolite, Siemens, and Cubic controllers to TCP floods.
  - Intelight controllers, utilizing a web API for file transfers, remained unaffected.

Proposed Resolution

- **Mitigation Strategy:**
  - Implement storm control and port policing mechanisms on Layer 2 switch connected to controllers.
  - Storm control: Drop or discard broadcast or multicast packets exceeding threshold.
  - Port policing: Ensure switch port does not exceed set bits per second (bps) limit.
- **Traffic Analysis:**
  - Normal traffic: 3-7 Kbps ingress and egress.
  - Traffic exceeding 40-50 Kbps negatively impacts controllers.
- **Implemented Measures:**
  - Storm control policy set at 10 Kbps.
  - Port policing at 10 Kbps.
- **Outcome:**
  - Enhanced stability and security of signal controller infrastructure.
  - Ensured reliability and performance under varying network conditions.

FLASH AWARD

- D5 TSM&O's new recognition program for outstanding maintaining agency response for traffic signal emergencies
- Focuses on showcasing specific efforts throughout D5
- Discuss processes, best practices, lessons learned, etc.



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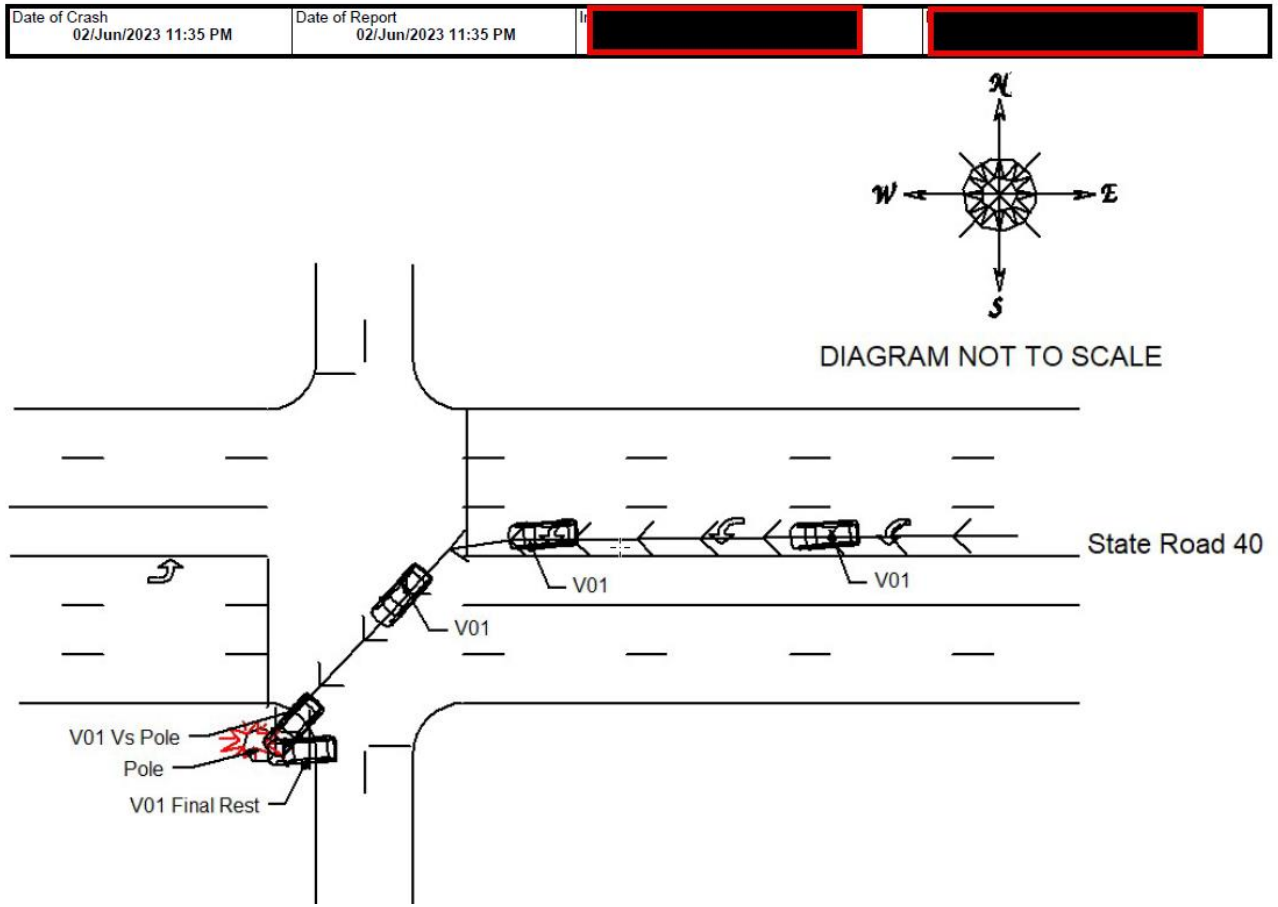
SR 40 at SW 80th Avenue Marion County

- Crash occurred on Friday June 2, 2023, at 11:35pm
  - Failure to keep in proper lane crash: vehicle was attempting a WB left turn and crashed into signal pole
  - Concrete pole broke from impact and signal span came down
  - Crash resulted in one incapacitating injury; driver transported to ORMC



FDOT TSM&O
Transportation Systems Management & Operations

SR 40 at SW 80th Avenue
Marion County

FDOT TSM&O
Transportation Systems Management & Operations

SR 40 at SW 80th Avenue Marion County

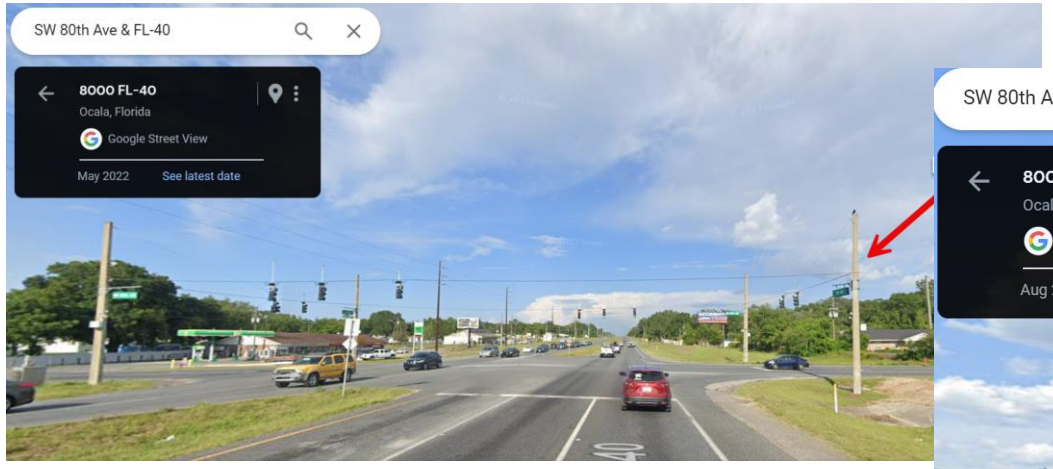
- Emergency Response details
  - Marion County on call staff was informed of the damage by the County's 911 communication center
  - The on-call signal technician was informed immediately over the phone of the condition of the traffic signal. Based on information from dispatcher, the on-call technician immediately began contacting other team members and coordinating with the Roads maintenance staff.
  - The initial response team was able to be onsite within an hour of the first call after collecting material and equipment
  - A plan for repairs was developed immediately after arriving onsite
    - Rebuild intersection to a triangular span using the three remaining concrete poles and replacing all overhead equipment
    - MOT was deployed to convert intersection to side street stop controlled while signalization was down

SR 40 at SW 80th Avenue
Marion County

- Emergency Response details (Continued)
  - Marion County Roads maintenance staff also provided support to clear the damaged pole debris from road.
  - Triangle Span was up and signal in flash mode within 20 hours of the crash
  - Full signalization was achieved by Sunday morning, less than 36 hours after crash

SR 40 at SW 80th Avenue Marion County

- Before and After



Transportation Systems Management & Operations

SR 40 at SW 80th Avenue
Marion County

- Key successes
  - Marion County 911 communication center easily contacted on call traffic signal team
  - On call traffic signal team requested additional assistance from other teams ASAP after learning of damage extent
  - Marion County provided most of the MOT and temporary traffic control needs
  - Senior staff available 24/7 to guide and assist
  - Marion County had all the overhead materials for this event
  - Marion County is working with driver's insurance company for reimbursement

SR 40 at SW 80th Avenue
Marion County

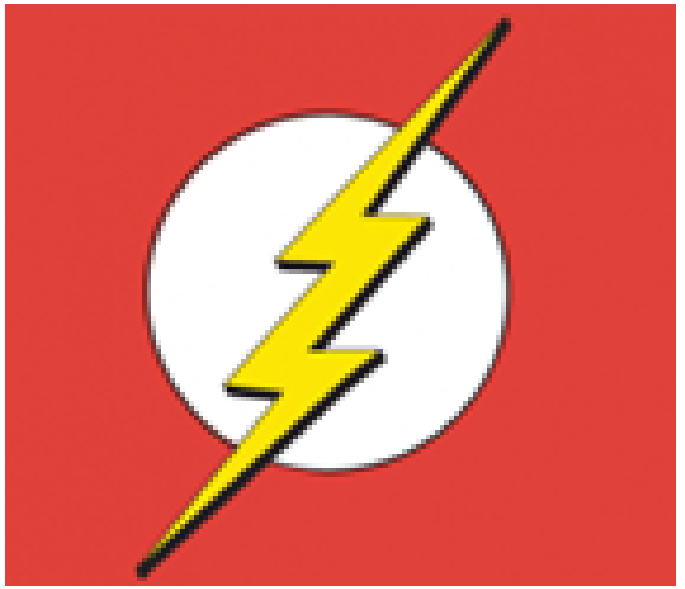
- Next Steps
  - Traffic signal was already planned to be replaced and is funded for construction. Final plans are nearly complete.
  - Marion County and FDOT TSMO CEI team continue monitoring signal spans to ensure new configuration is not lowering below acceptable levels.
- Highlights / Best Practices
  - Importance of training in-house staff and having communication plans in place, specially if event occurs after business hours
  - Importance of having local emergency communications team aware of their on-call traffic ops teams
  - Importance of having materials stocked for emergencies

.

FDOT TSM&O
Transportation Systems Management & Operations

SR 40 at SW 80th Avenue
Marion County

- Key Staff Involved – Marion County
  - Bruce Youman – Signal repair
  - Mike Solimando – signal repair
  - James Farmer – signal repair
  - Alan VanTol – signal repair
  - Tony Pellegrino – traffic control
  - Mike Hileman – traffic control
  - Jay Gool – traffic control
  - Dustin Adams – traffic control
  - Timmy Tieche – traffic control
  - Kevin Kash – traffic control/pole removal
  - Richard Wolowitz - traffic control/pole removal
  - David Holley - traffic control/pole removal
  - Bradley Rutland - traffic control/pole removal
  - Chris Zeigler – coordination/traffic control
  - Jared Peltz - coordination



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FDOT TSM&O

Transportation Systems Management & Operations

Current Initiatives

Jeremy Dilmore, FDOT District Five

FDOT Approved Products List (APL)

- Enables simple purchase of traffic-related equipment and systems
  - Products vetted by Traffic Engineering Research Laboratory (TERL)
- Ensures all listed products comply with Federal/State standards
- Typically renewed on a yearly cycle

Current Initiatives

- I-4 Express Lanes
- I-4 FRAME
  - Coordination with local agencies and device configuration underway
- OBU Deployment

Current Initiatives

- CRISI Grant 2023-2024
  - Just submitted to OPP and Budget Office
    - Due May 28th
  - Pre-signals
  - Queue Cutters
  - Crossing Gate Monitoring System

Current Initiatives

- PedSafe II

Current Initiatives

- AV Shuttle
- Kiosks at UCF
  - Wooden prototype developed for more accessible kiosk

Current Initiatives

- Smart Work Zone
  - Mobilized in late November

FDOT TSM&O

Transportation Systems Management & Operations

THANK YOU!

Next Consortium – June 27, 2024

TSM&O Consortium Meeting

MEETING AGENDA
Teleconference or
FDOT District 5 RTMC (4975 Wilson Rd, Sanford, FL 32771)

April 25, 2024
10:00 AM-12:00 PM

1) CAV TECHNOLOGY: IMPACT ON MAINTENANCE PROGRAMS (NCHRP 1084)
   - David Williams, VHB
2) UPCOMING TRAININGS AND WORKFORCE DEVELOPMENT
   - Manny Rodriguez, Iteris
3) EMERGENCY VEHICLE PREEMPTION
   - Garrett Popovich, AECOM
4) FL511 UPDATES
   - Katie King, Metric Engineering
5) TRAFFIC CONTROLLERS AND NETWORK SETTINGS
   - Aurelio Giovinazzo, Technology Assurance Labs
6) FLASH AWARD FOR EMERGENCY REPAIRS
   - Kevin Marquez, FDOT District Five Traffic Operations Pushbutton Program
7) CURRENT INITIATIVES
   - Jeremy Dilmore, FDOT District Five Traffic Operations