October 28-29, 2025
Orlando, FL

TRANSPORTATION SYMPOSIUM

Smart Work Zones:

Leveraging Technology For Safer and Smarter Roadways

Panelists:

Ryan Buck, FDOT
David Feise, Arrive Alive Traffic Control (ATTC)
Jason Lee, SmartCone
Nagham Matout El-Zine, PE, ATSSA

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Safety Message

- **FDOT Safety Message:**

- October 1st to 31st: NHTSA Pedestrian Safety Month

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Traditional Work Zone Practices

Growing Infrastructure Demands: Increasing number of roadway projects causes traffic congestion and delays.

Higher Risk of Crashes and Injuries: Motorists who are not familiar with the roadway are particularly vulnerable in work zones conditions.

Limited Real-Time Communication: Motorists, workers, and transportation systems often lack coordination.

Safety Concerns: Distraction and speeding continue to be major hazards in work zones across the nation.

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Infrastructure Is Evolving, so are Work Zones

Technology Integration: Use of real-time data, sensors, mapping, and V2X (vehicle-to-everything) communication.

Growing Availability of Real-Time Data: Smart signage, dynamic warnings, and geo-fencing improve work zone visibility.

Enhanced Coordination: Contractors, DOTs, and motorists working more effectively together.

Safer Roads Through Information: Well-informed motorists react better, reducing potential for crashes and non-recurring congestion.

WZ Safety and Mobility (Subpart J) Final Rule: Data-driven assessment of work zone performance.

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Panel Session Objectives

- FDOT Smart Work Zone Design Strategies
- Expectations of Systems and Data Collection
- Implementation Considerations
- Where Are We Now: Update on SWIFTT Challenge-Winning WZ Safety Solution

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FDOT Smart Work Zone Design Strategies

Ryan Buck, P.E.
State Construction Specialty Engineer
Florida Department of Transportation

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FDOT SWZ Strategies

FDOT has developed combinations of SWZ technologies to create ***strategies*** in response to work zone traffic impact scenarios. FDOT SWZ strategies covered in the SWZ Guidebook and Developmental Design Concept (DDC) include:

- Work Zone Data Exchange (WZDx)
- Dynamic End of Queue/Slow Speed Warning (DQW)
- Dynamic Lane Merge (DLM)
- Dynamic Speed Harmonization (DSH)

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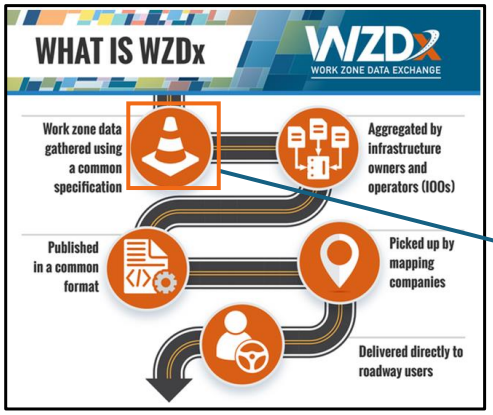

- ***Program Sponsor***: Federal Highway Administration (FHWA)
- ***Goal***: Safe work zone navigation for vehicles equipped with automated driving systems (ADS)
- ***Work Zone Data***: Near real-time work zone data for third party use
- ***Recommended***: Use for projects impacting traffic or when workers are adjacent to open traffic lanes
- ***Long Term***: Eventually use WZDx on all projects that potentially impact traffic

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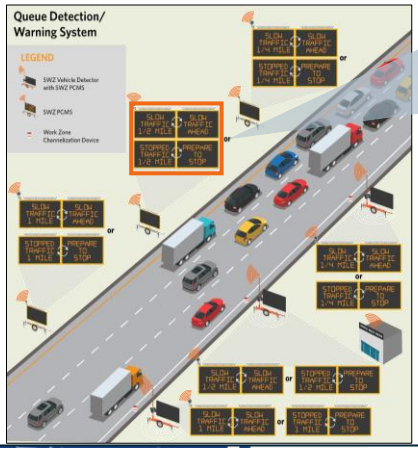
Dynamic Queue Detection / Slow Speed Warning (DQW)



- ***Goals***
  - Fewer work zone crashes
  - Increased throughput
- ***SWZ Vehicle Detectors***
  - Traffic speeds
  - Traffic volumes
- ***SWZ Central Processor***
  - Locate slower traffic
  - Locate stopped traffic
  - Locate end of queue
  - Selects messages from pre-approved library
  - Posts messages to PCMS
- ***Portable Changeable Message Signs (PCMS)***

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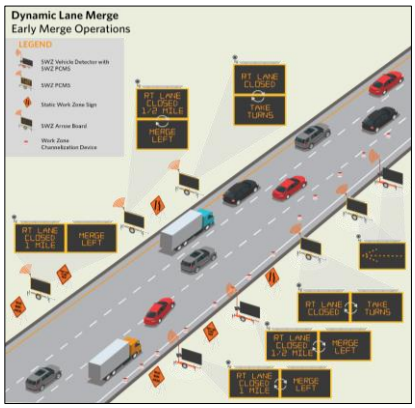
Dynamic Lane Merge (DLM)



- ***DLM Scenarios***
  - **Early Merge**: move traffic (≤1,500 vehicles/lane/hour) to open lanes as early as possible
  - **Late Merge / Zipper Merge**: keep traffic (>1,500 vehicles/lane/hour) in all lanes until the lane closure
- ***Goals***
  - Increase safety (hard braking, road rage)
  - Reduce queue length
  - Increase throughput
- ***SWZ Detectors***
  - Speed and volume approaching merge and through the work area
- ***SWZ Central Processor***
  - Determine applicability of ***early merge*** or ***late merge*** based on pre-determined algorithms
  - Select PCMS messages from pre-approved library
  - Post messages to PCMS
- ***SWZ PCMS***
  - Post early merge or late merge messages from Central Processor

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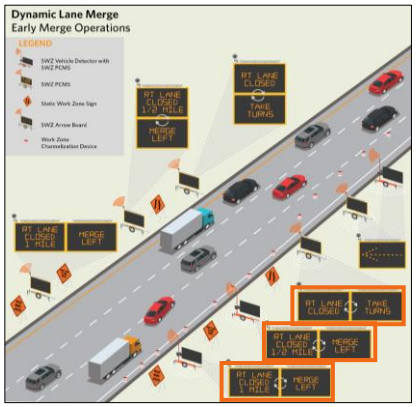
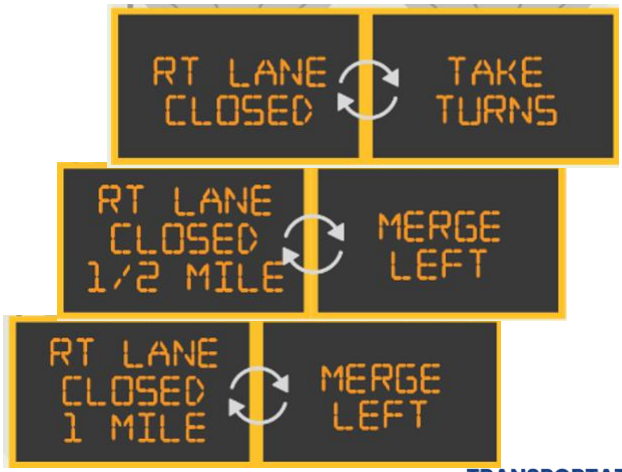
Dynamic Lane Merge (DLM)



PCMS for DLM

Early Merge Scenario



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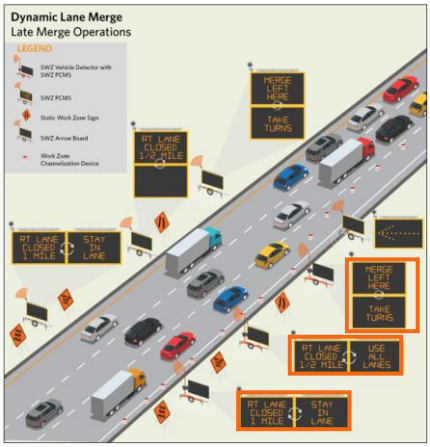
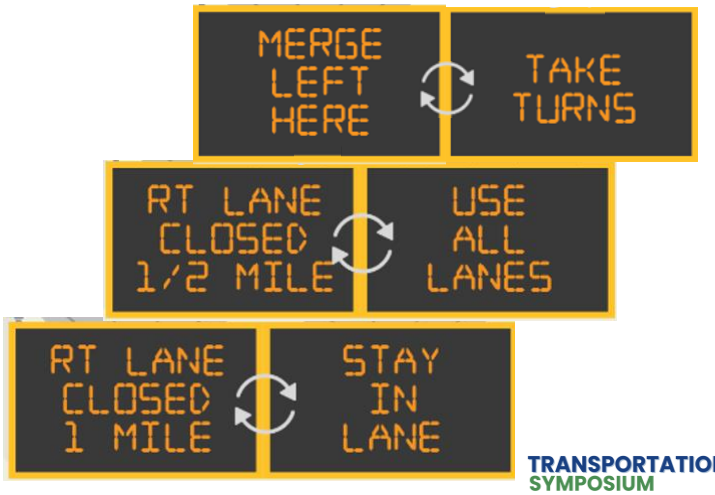
PCMS for DLM

Late Merge Scenario





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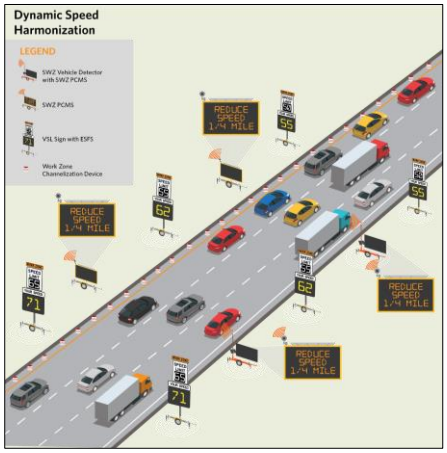

- ***Goals***
  - Uniform speeds approaching and the through work zones
- ***SWZ Vehicle Detectors***
  - Vehicle speeds approaching and through work area
- ***SWZ Central Processor***
  - Locates slow traffic speed areas
  - Determines speed limits for traffic approaching slowed speed areas and posts speeds to SWZ VSL signs
  - Determines PCMS messages from pre-approved library and posts messages to SWZ PCMS
- ***SWZ PCMS***
  - Reduced speed ahead messages
- ***SWZ Variable Speed Limit (VSL) Signs*** with ***Electronic Speed Feedback Signs (ESFS)***
  - VSL: Current speed limit based on downstream traffic
  - ESFS: Displays speed of traffic passing the sign

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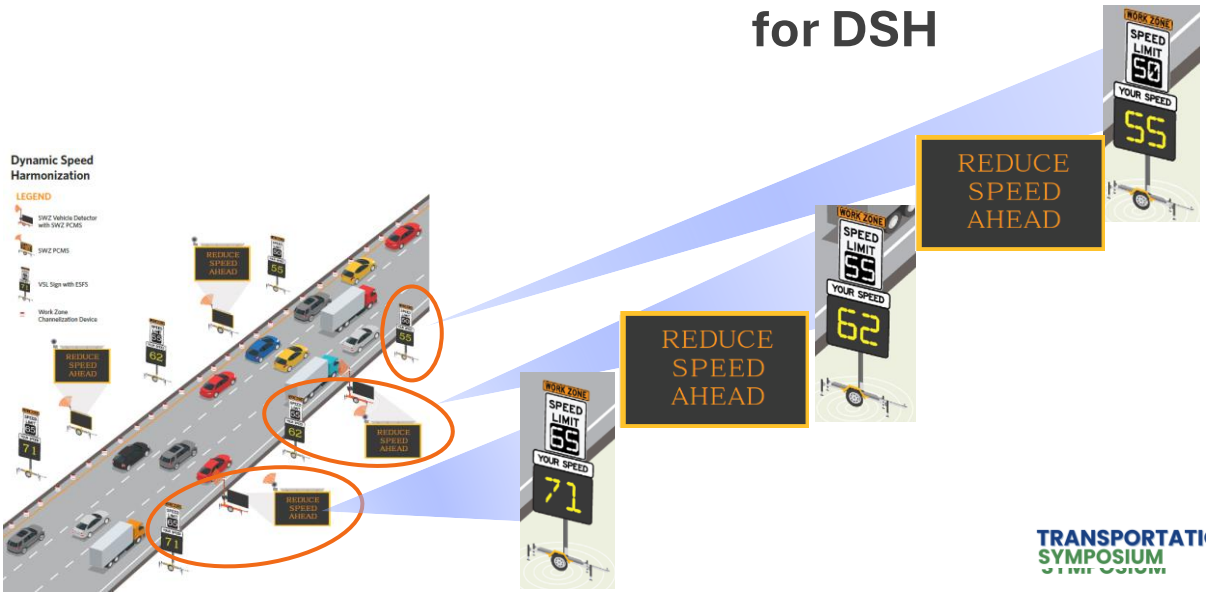
SWZ PCMS and VSL with ESFS for DSH



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Resources to Support Design & Construction

- Smart Work Zone Design and Operations Guidebook
- Developmental Standard Plans for 102-600 series
- Developmental Design Criteria (DDC) for FDOT Design Manual (FDM) Section 240 Transportation Management Plan
- Developmental Specs (DevSpecs) for:
  - Section 102 Maintenance of Traffic
  - Section 990 Temporary Traffic Control Device Materials

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Considerations

- Reach out if you have questions – get answers to your questions and provide feedback to help improve FDOT SWZ Strategies.
- Read through Guidebook – it provides a great overview to anyone involved in FDOT SWZ Strategies and points to other important FDOT resources.
- Look at the other resources, in particular the FDM, to determine when and what SWZ strategies may be applicable to the project.

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Smart Work Zone Implementation Considerations

David Feise
President
Arrive Alive Traffic Control (AATC) LLC

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Implementation Strategies (ground level)

Implementing a Smart Work Zone (SWZ) involves integrating advanced technologies to enhance safety, efficiency, and traffic management in construction zones. Key considerations for successful SWZ implementation:

- Device Location selection
- Training and System Access
- Repair and Maintenance
- Performance Monitoring and Evaluation
- Environmental and Community Impact
- Adaptability to Work Zone Type (Phase changes)

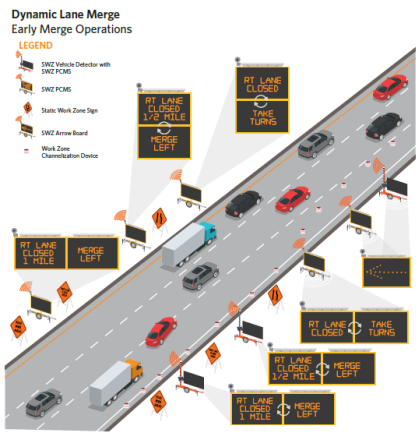
Implementation Strategies (ground level)

Dynamic Lane Merge (DLM)

Use DLM when traffic speeds and volumes typically and predictably change throughout the duration of the lane closure. When a lane closure is present, some drivers tend to move over immediately while others wait until the last possible moment to merge. This driver behavior causes speed differentials, hard braking, road rage, crashes, endangers workers, and reduces throughput in the lanes approaching the lane closure and in the open lanes past the closure.

Designers should consider these systems in long term deployments vs on nightly basis.

FIGURE 3: DYNAMIC LANE MERGE - EARLY MERGE OPERATIONS



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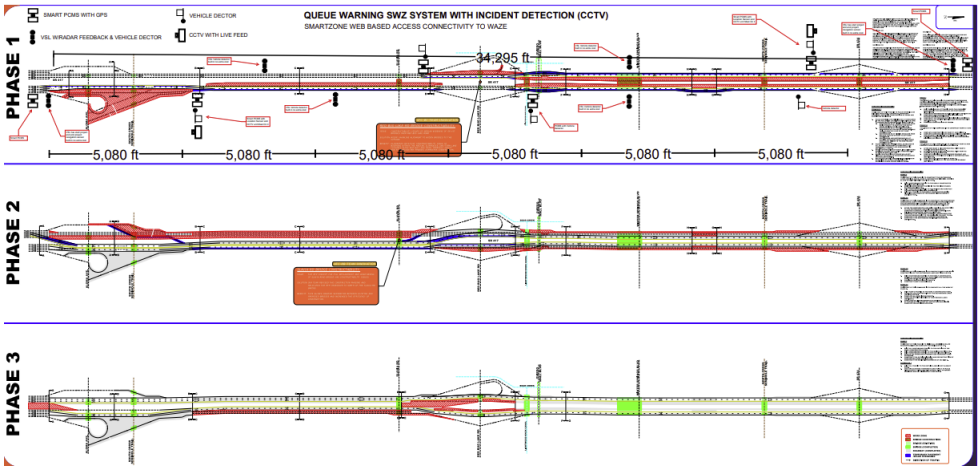
Implementation Strategies (ground level)



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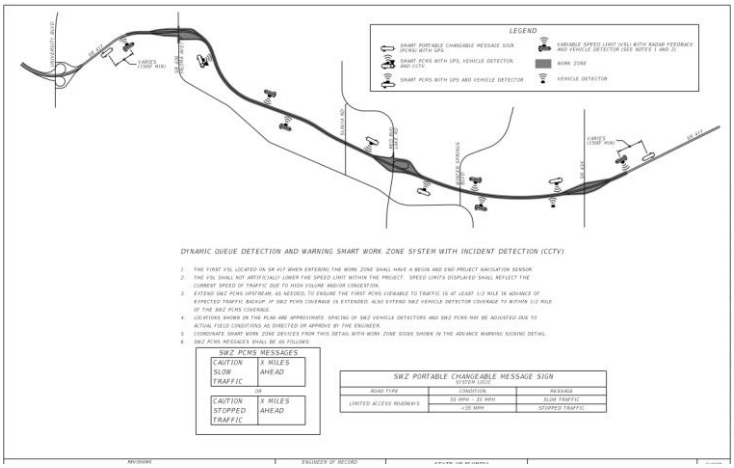
Implementation Strategies (ground level)



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Implementation Strategies (ground level)

- RFP specifies devices and device requirements; it would be helpful to have verbiage on the Engineers intent of data collected and use of the system.
- Allow for modifications to be made through the RFM process and flexibility with contractor and vendor input.
- Number of devices should be considered, harmonize devices to reduce device count.
- Practicality of daily use vs long term deployment.

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Contact Us

David Feise - President
Arrive Alive Traffic Control LLC
507 Marvin C Zanders Ave Apopka FL, 32703
Office 407-578-5431 **Cell** 561-234-7201

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Worker Presence Alert System: Update on SWIFTT Challenge-Winning WZ Safety Solution

Jason Lee
CEO
SmartCone

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2024 SWIFTT Challenge

- 2024 Safety Work Zone innovations for Today and Tomorrow (SWIFTT) Challenge Winner
- Product will be deployed on programmed construction project within the next 24-months.

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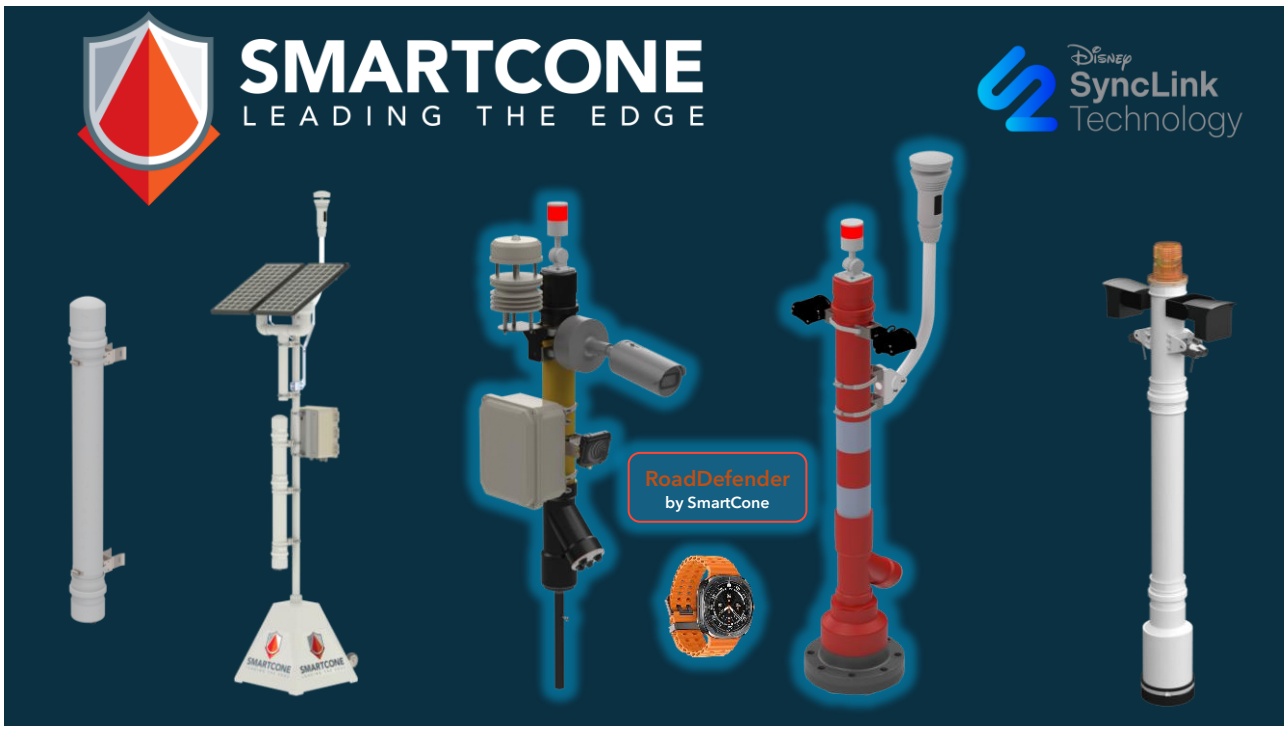

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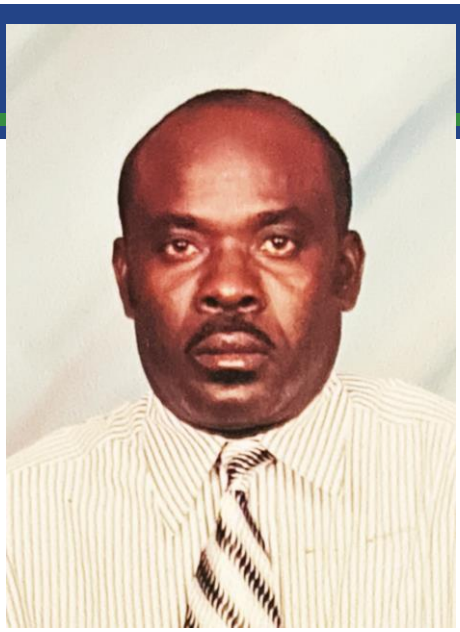

Vixon Louis. MOT Crew Ranger Construction.

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The Problem

According to the National Highway Traffic Safety Administration (NHTSA), 80% of accidents and 60% of highway deaths are the result of distracted drivers.

Vehicle Intrusions are the leading cause of worker fatalities with the road construction industry. In 2013, there were 67,523 crashes in work zones. In 2014, there were 669 fatalities from crashes in work zones.

Why is it so hard to pay attention?

Our Bodies are Designed to Conserve Energy

- Muscle Memory
- Day Dreaming
- Staring off Into Space
- Distracted Driving
- Complacent Workers

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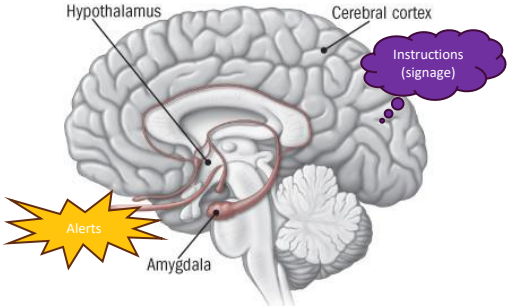
The Problem



HARVARD MEDICAL SCHOOL

When someone experiences a stressful event, the amygdala, an area of the brain that contributes to emotional processing, sends a distress signal to the hypothalamus. This area of the brain functions like a command center, communicating with the rest of the body through the nervous system so that the person has the energy to fight or flee.

Pre-Cue, Cue, Alarm

The stress response begins in the brain (see illustration). When someone confronts an oncoming car or other danger, the eyes or ears (or both) send the information to the amygdala, an area of the brain that contributes to emotional processing. The amygdala interprets the images and sounds. When it perceives danger, it instantly sends a distress signal to the hypothalamus.

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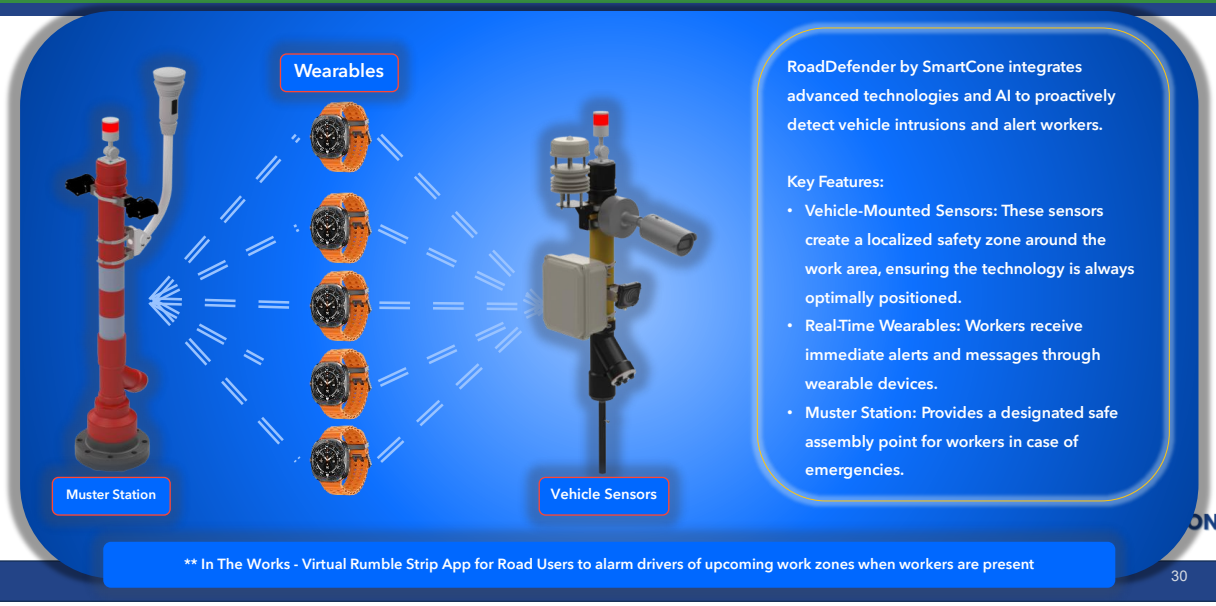
A Solution



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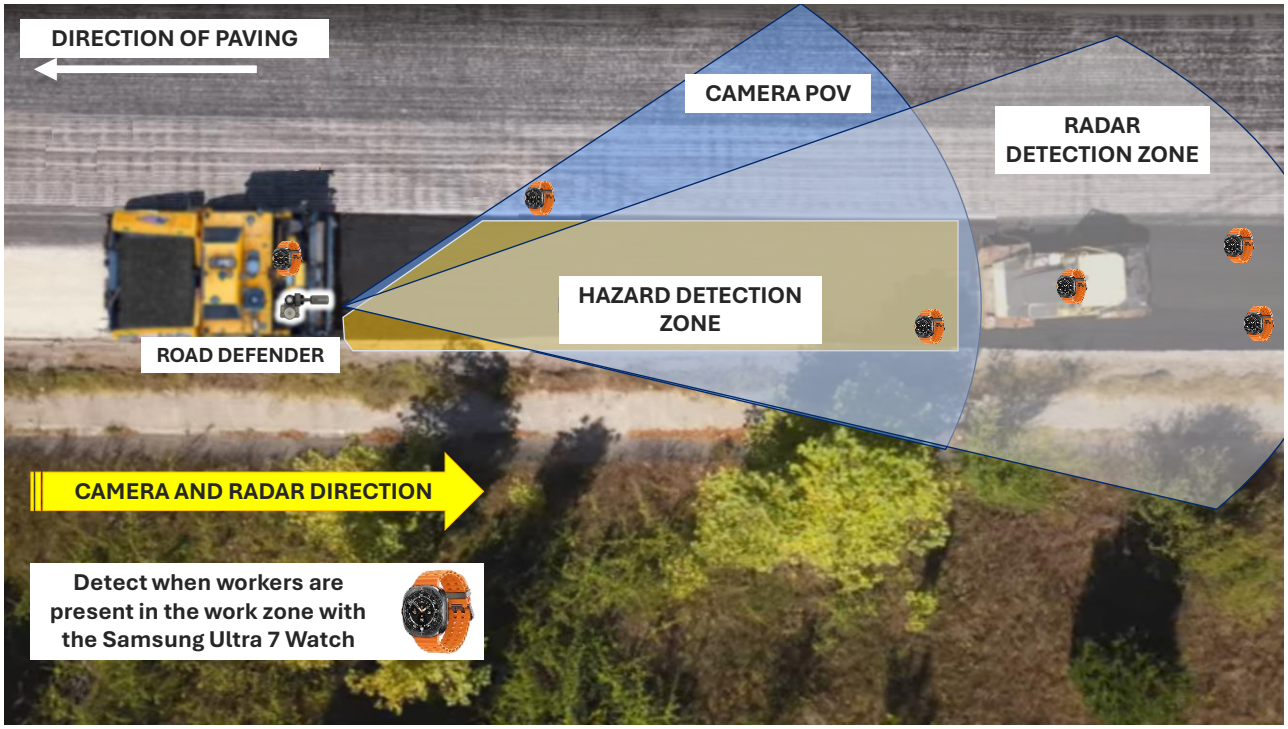
DIRECTION OF PAVING
CAMERA POV
RADAR DETECTION ZONE
HAZARD DETECTION ZONE
ROAD DEFENDER
CAMERA AND RADAR DIRECTION
Detect when workers are present in the work zone with the Samsung Ultra 7 Watch

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SMARTCONE
LEADING THE EDGE

Thank You!

Jason Lee

CEO SmartCone

Email: jason@thesmartcone.com

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Smart Work Zone Solutions

Nagham Matout El-Zine, PE
Innovation and Technical Services Manager
American Traffic Safety Services Association (ATSSA)

Transportation Symposium Website

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Market Ready Innovations

- 20 innovative solutions featured in 2025, including smart work zones solutions
- Many already deployed or piloted by state DOTs
- All are ready for market adoption.
- Designed to improve roadway safety.

ATSSA NEW PRODUCTS ROLLOUT

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Resources

2025 NPRO Summary Report:

NPRO Resources Webpage:

Contact Us

- **Nagham (Melodie) Matout El-Zine, RSP1, P.E.**

Nagham.elzine@atssa.com
innovation@atssa.com

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