

A CULTURE OF INNOVATION

KARLA PETTY, ARIZONA DIVISION

ADOT



OVERVIEW

❖ Brief Arizona Innovation Update

- Arizona Council for Transportation Innovation
- Every Day Counts

❖ Increased Federal Share

❖ Smart Work Zone (Innovation Highlight from ADOT)

❖ Work Zone Data Exchange



Arizona Council for Transportation Innovation

ACTI, Arizona's STIC...



- Engaged in delivering AZ transportation program with representatives from planning, design, construction, education, research, and economic development

ACTI's Objective ~ Strengthen a "Culture of Innovation"

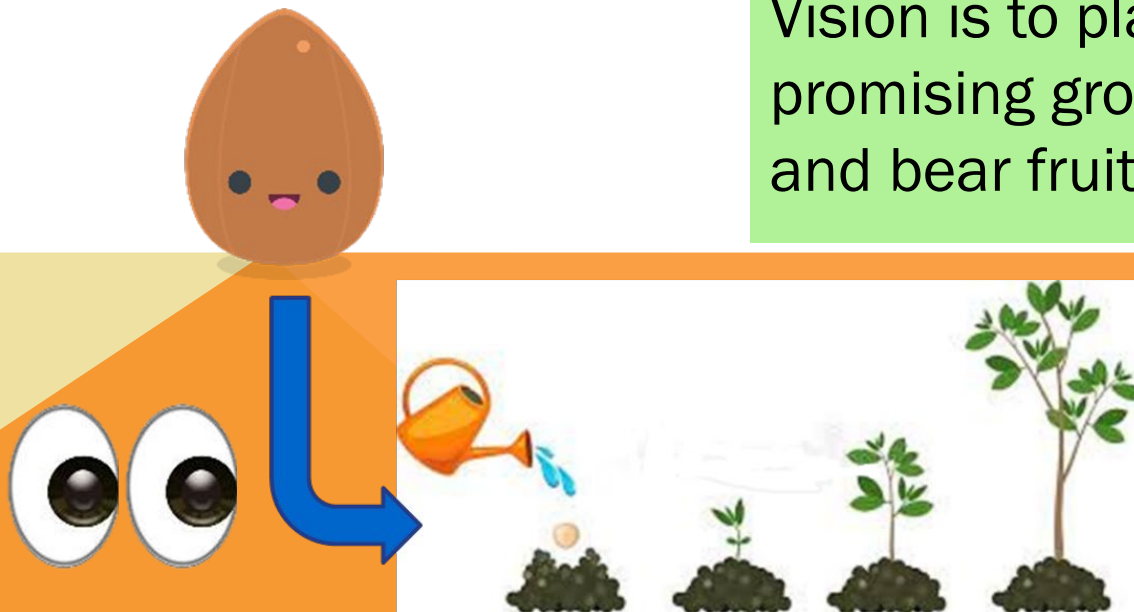
- Inviting agency and industry representatives to participate with the EDC implementation teams
- Support the advancement of implementation team efforts during the EDC rounds.



Every Day Counts

- Past EDC Round 1-4 (2011– 2019)
- Current EDC Round 5 (2019 – 2020)
 - 10 Innovations
- Future EDC Round 6 (2021 – 2022)
- FHWA's Every Day Counts website
<https://www.fhwa.dot.gov/innovation/everydaycounts/>

Vision is to plant the seed, encourage promising growth, fertilize (care and nurture) and bear fruit



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INCREASED FEDERAL SHARE (IFS)

AMMON HEIER, ARIZONA DIVISION

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INCREASED FEDERAL SHARE (IFS) – 23 USC 120(C)(3)

Purpose

Promote innovative technologies and practices

Incentive

Additional 5% Federal-Aid up to 100% share



WHAT QUALIFIES?

Innovative project delivery methods, technologies, engineering or design approaches, financing, or contracting that:

- Improve Work Zone Safety,
- Reduce congestion related to the construction
- Improve quality of highways and bridges
- Extend service life of highways and bridges
- Reduce long-term maintenance costs of highways and bridges

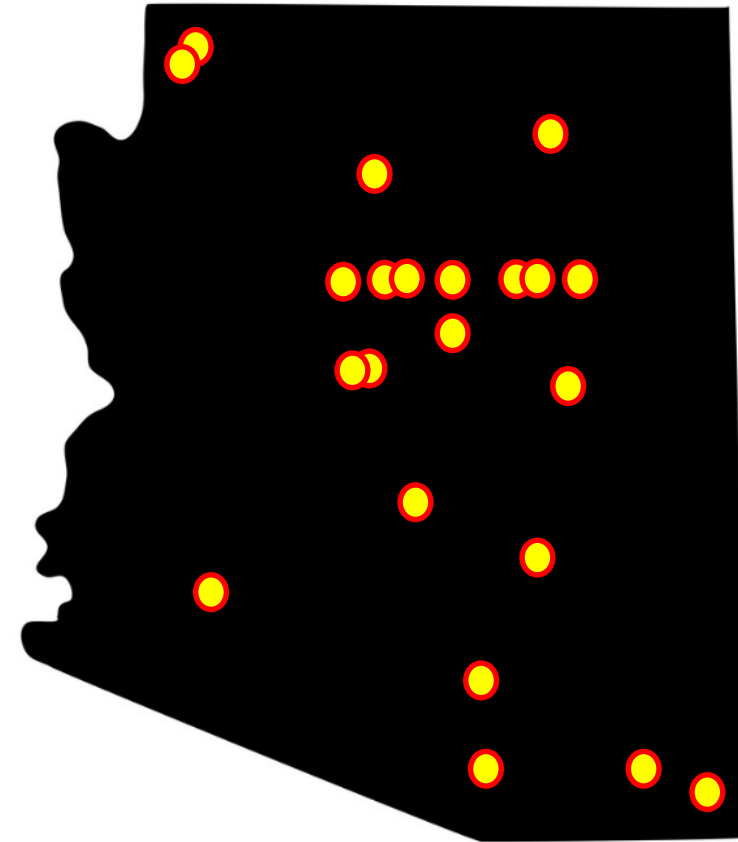
Must be innovative for the applicant



IFS - WIDE USE IN ARIZONA

22 Projects Since 2014

- 6 Smart Work Zone Projects
- 4 Accelerated Bridge Construction
- 3 Intelligent Compaction
- 3 Increased Asphalt Density
- 2 Electronic Plans
- 1 ID/IQ
- 1 EDC Cape Seal
- 1 3D Paving
- 1 2D Hydraulic Modeling & A-GaMe



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Application Form
Technology and Innovation Deployment Program (TIDP)
Increased Federal Share for Project-Level Innovation
23 USC 120(c)(3)

A. Project Information (completed by Applicant)

State	
Project Name	
Location of Project (Include Route Name and general location information)	
Description of Project	
Anticipated Authorization Date	
Approximate Additional Federal Share (\$)	
Increased Federal Share (%)	
Funding Source Used	<input type="checkbox"/> National Highway Performance Program (NHPP) <input type="checkbox"/> Surface Transportation Block Grant (STBG) Program <input type="checkbox"/> National Highway Freight Program (NHFP) <input type="checkbox"/> Metropolitan Planning (PL)
Innovation Being Proposed	
Description of Expected Benefit (include how the innovative technology or practice increases the efficiency of construction, accelerates the construction, improves the safety, improves the quality, reduces congestion from construction, and/or extends the service life of highways and bridges)	
Describe How the Project is Innovative in your State (Include how the technologies or practices proposed are new or have only rarely been used for unique or special applications and represent significant improvement to the state or local agency's conventional practice.)	
Contact Information (Name, Phone, Email)	

B. Eligibility Determination (completed and signed by FHWA Division Office)

- In each fiscal year, a State may apply up to 10 percent of its combined apportionments under the National Highway Performance Program (NHPP), Surface Transportation Block Grant (STBG) Program, National Highway Freight Program (NHFP) or Metropolitan Planning (PL) (funds apportioned under 23 U.S.C. 104(b)(1), (2), (5)(D) and (6)) for this increased federal share provision.

Would approving the increased federal share proposed for this project exceed the limitation of funds available?

☐ Yes ☐ No

- The Federal share payable may be increased by up to 5 percent of the total project cost, not to exceed 100 percent, for projects determined to meet the requirements specified in 23 U.S.C. 120(c)(3).

Would approving the increased federal share proposed exceed the allowable adjustment for the project?

☐ Yes ☐ No

- Provide a short narrative that substantiates how the proposed project meets or does not meet the eligibility requirements for the increased federal share provision.

Comments:

Based on a review of the application submitted by the _____ Department of Transportation,
project _____ is determined to be:

☐ Eligible ☐ Not Eligible

for participation in increased Federal share for project level innovation in accordance with 23 USC 120(c)(3).

SIGNATURE: _____

NAME (PRINTED): _____

FHWA DIVISION OFFICE: _____

DATE: _____

IFS – PROBLEM/SOLUTION

Problem:

- 1) Possibility of innovations being dropped
- 2) No process for capturing lessons learned.

Solution:

Creation of an IFS special provision



NEW SPECIFICATION: 109INFS

Description of IFS component

IFS cannot be removed
without State and FHWA
consent

Lessons Learned Report and
Closeout Meeting is Required

NEW Specification

****USE ON PROJECTS WITH INCREASED FEDERAL SHARE****
****DESCRIBE THE INNOVATIVE TECHNOLOGY IN THE SECOND PARAGRAPH****

(109INFS, XX/XX/XX)

SECTION 109 MEASUREMENT AND PAYMENT: of the Standard Specifications is modified to add:

109.14 Increased Federal Share:

(A) General:

Increased federal share has been approved by FHWA for an innovative technology and practice. The increased federal share on this project is 5 percent.

The innovation includes *(Describe specific innovation – information can be found on the Increased Federal Share Application.)*

Due to the increased federal share, the project components related to the innovation described above must be constructed with the materials, quantities, methods, and innovations as shown on the project plans and specifications. If the contractor requests materials, quantities, methods, or innovations other than those included in the plans and specifications, the request must be reviewed and approved by the Department and FHWA. Approved changes shall be at no additional cost to the Department, and shall not increase contract time.

(B) Post-Activity Report and Meeting:

The contractor shall prepare a report that includes a general summary of the daily operations and discussion of the overall effectiveness of the innovative technology, in a format provided by the Department. A description of additional means of quality control and any benefits realized or detriments suffered relating to implementation and utilization of the innovative technology shall be included. Comments provided by equipment operators, laborers, field personnel, or other personnel who adapted to the use of the technology, positive or negative shall be included.

The contractor shall schedule a closeout meeting with the Engineer within 30 days of the innovative technology completion to review and discuss the findings contained in the report.



INCREASED FEDERAL SHARE – LESSONS LEARNED MEETING

Present at meeting:

Cordell Yazzie, ADOT RE

Norman Bessler, Fisher PM

Brenden Foley, ADOT ADE

Jonathan VanNess, ADOT Inspector

Josh Brooks, ADOT Project Supervisor

Ammon Heier, FHWA Area Engineer

Brad Roberts, Fisher Project Superintendent

Chad Matty, FHWA Bridge Engineer

1. Describe the innovation that led to the increased federal share:

- Accelerated bridge construction
- Original Design/As-bid project: Modular Precast Superstructure Elements – 9 piece modular units for each bridge.
- Ultra-high performance concrete (UHPC) used for longitudinal bridge deck closure pours/transverse modular unit splice closure pours and expansion joint backwall closure pour.

2. How was the innovative construction method implemented?

- Fisher proposed a one piece superstructure construction for each bridge in lieu of the modular construction, with two unit precast approach slabs and deck joints that would utilize the UHPC in the closure pours.
- The proposal included rolling the new bridges into place by rollers, utilizing an in-house engineered falsework system, and engineered uniform jacking system
- An allowable full closure of Transwestern Road over I-40 was reduced from the original nine consecutive calendar days to eight consecutive calendar days.
- Closure of I-40 with traffic detoured to ramps was originally allowed on nights and weekends during the 9 day closure of Transwestern but was reduced to a project maximum of 132 hours total duration, with some closures occurring prior to the full closure of Transwestern Road, and the overall contract time was reduced by 32 calendar days. This resulted in an overall time savings to the project and reduction in delay to the public.
- With the revised proposal (slide in bridge), UHPC was eliminated except at the deck joints. UHPC in the deck joints was a small quantity (~6 CY compared to ~23 CY in the previous design) and was much easier to place and had a much smaller area of imperfection.

3. What were the benefits of or problems encountered with this particular method?

- PROBLEMS w/ Original/as-bid plan:

ADOT Project #	Project Name	Authorization Date	Reason for Increased Federal Share	Additional FA	Application Status	Project Status
F0185	Milton Road		Increased Asphalt Density/ Joint Compaction		Consideration	Development
F0296	SR89A to I40B		Increased Asphalt Density/ Joint Compaction		Consideration	Development
F0201	US60 - Nottingham Lane	Est. Jan 2021	Increased Asphalt Density/ SWZ/Joint Compaction		Pre-Notice	Development
FH300	Apache-Sitgreaves - 40th St	Est. Jan 2021	Increased Asphalt Density/ SWZ/Joint Compaction		Pre-Notice	Development
H8935	I-10: Tubac to Arivaca	6/16/2020	Increased in-place Asphalt density	\$1,500,000	Approved	Construction
F0318	Yuma Region ADA (Base Contract)	est. 6/17/2020	ID/IQ	62,0000, and up to 100,000 per year for up to 5 years	Approved	Development
H8760	I-15: VRV#1 Bridge Replacement and Widening	1/15/2021	Smart Work Zone: Mobile App, Transverse Rumble Strips, Queue Warning System	\$3,000,000	Approved	Development
H8937	SR 80: San Pedro Bridge Replacement		2D Hydraulic Modeling & Cone Penetration Test (CPT)		Pending	Development
F0102	SR79: Bridge Replacement	est Fall 2021	Bridge Slide	\$1,000,000	Approved	Development
F0174	Duval Mine Rd TI - Pima Mine Rd TI	est. 2/7/2020	Smart Work Zone: Queue Warning System and Dynamic Merge Hybrid	\$900,000	Approved	Development
F0089	SR64; Pipline Rd to Air Park	12/16/2019	Smart Work Zone: Real Time Traveler Delay	\$375,000	Approved	Construction
F015201C	I-40; Two Guns TI UP & Meteor Crater TI UP	12/18/2019	Smart Work Zone: Dynamic Merge	\$225,000	Approved	Construction
F011901C	I-10; SR85 to Verrado Way	Est. 6/3/2020	Smart Work Zone: Queue Warning System	\$5,350,000	Approved	Development
H881501C	I-40; 4th St Bridge Replacement and Butler Ave Bridge Rehabilitation	10/31/2019	Bridge Slide	\$335,000	Approved	Construction
F003801C	SR260; Mainline Rd to Overgaard (MP 302.7-MP 210.5)	4/8/2019	EDC4 When & Where, Cape seal	\$954,425	Approved	Complete
F010601C	I-40; Bellemont TI UP	1/16/2019	Roll-in Bridge superstructure and Ultra-High Performance Concrete for deck joints.	\$ 300,000.00	Approved	Complete
H873501C	I-40; Meteor City TI Overpass, EB #1391 & WB #1392	1/16/2019	GRS-IBS with pre-cast girders and pre-cast elements	\$ 253,881.00	Approved	Complete
H881201C	I-15, Virgin River Bridge #2 STR# 1614	10/22/2018	Queue warning system	\$ 400,544.53	Approved	Complete
F0144	US 160 + Long House Valley - Kayenta (MP 372.5-390)	Est. 7/15/2019	High Friction Surface Treatment	\$700,000	Approved	Cancelled
H869401C	I-40; Cataract Lake Rd to Parks TI (MP 162.39 to 179.00) East of Williams	12/13/2017	Increased in-place Asphalt density demo project	\$ 2,441,416.00	Approved	Complete
F013101C	I-40: Devil Dog (MP 156.5) to Williams (MP 161.4), EB/WB	6/2/2017	Use of 3-D Machine Control PCC Paving	\$ 2,010,000.00	Approved	Complete

H893401C	I-17: COCONINO COUNTY LINE (MP 311) TO I-40/1-17 JCT (MP 340), SOUTH OF FLAGSTAFF	12/13/2017	Increased in-place Asphalt density demo project	\$ 1,574,201.00	Approved	Complete
H824601C	SR-264; Burnside-Fish Wash (MP 441.02) to Window Rock (MP 450)	8/10/2017	Use of Electronic Plans	\$ 584,712.00	Approved	Complete
H832301C	SR 92; San Pedro River Bridge #449 (MP 340.560) to MP 341.560) Southeast of Sierra Vista	3/21/2016	Use of Electronic Plans	327,393.00	Approved	Complete
F000301C	SR 260; Thousand Trails to I-17 (MP 214.79 to MP 218.07) South of Cottonwood	6/30/2016	Implementation and Evaluation of intelligent compaction	\$ 1,578,685.00	Approved	Complete
H869901C	SR 260; Thousand Trails to I-17 (MP 214.79 to MP 218.07) South of Cottonwood	6/30/2016	Implementation and Evaluation of intelligent compaction	1,356,715.00	Approved	Complete
H812501C	I-40; Walnut Canyon (MP 205.2) - Twin Arrows (MP 217.85)	5/8/2014	Use of Intelligent Compaction	\$ 651,250.00	Approved	Complete

SMART WORK ZONES (SWZ)

ADAM CARREON, OPERATIONAL TRAFFIC & SAFETY - TSMO -ADOT

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SMART WORK ZONES

Is the application of computers, communications, and sensor technology to freeway transportation and would possess the following general characteristics:

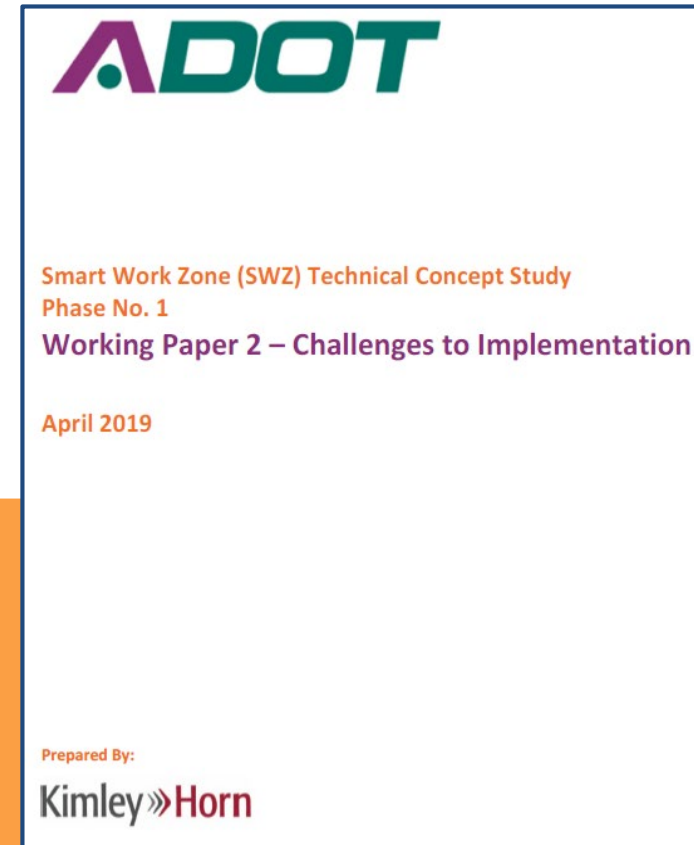
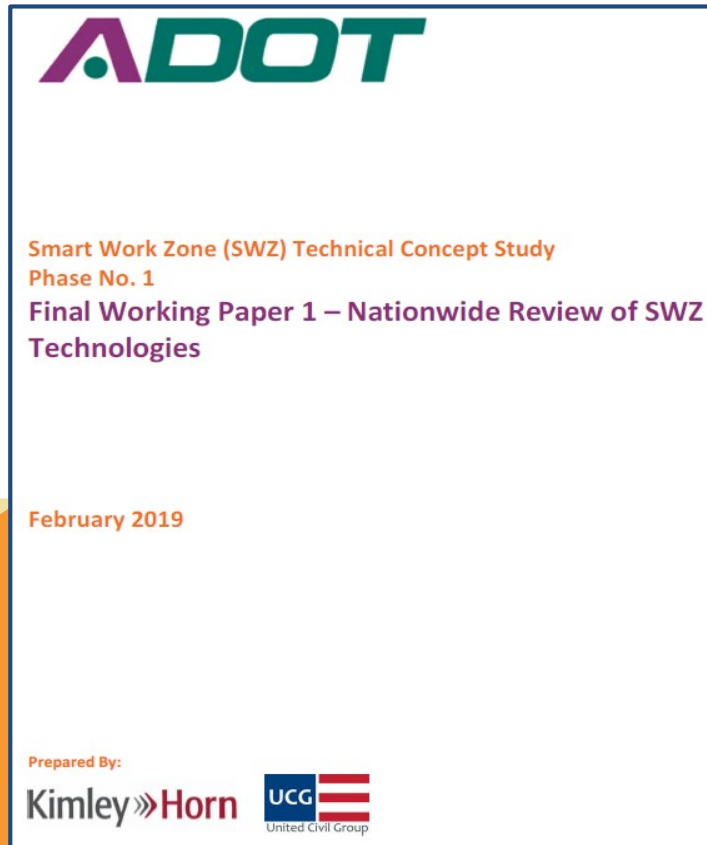
- ***Real-time***
- ***Portable***
- ***Automated***
- ***Reliable***

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KIMLEY HORN & ADOT

- Produce Working Paper 1 & 2
- Develop SWZ Specifications Phase 1 & 2
 - ✦ Currently in between Phase 1 & 2.
 - ✦ Phase 2 will be based on lessons learned from Phase 1 and adding other technologies.



Section 710 Smart Work Zone Systems

1. New Section 710

- ADOT Standard Specifications for Road and Bridge Construction
- Currently Being Applied on Select Projects

SECTION 710 SMART WORK ZONE SYSTEMS

710-1

Description:

The work under this section shall consist of furnishing and installing all components to provide a fully functional, automated, and portable Smart Work Zone (SWZ) system; operating, maintaining, and servicing the portable SWZ System; and relocating or removing various components of the system, as specified herein and in accordance with the project plans.



Section 710 Smart Work Zone Systems

2. Covers the following

- Traffic Data Collection Subsystem (TDCS)
- Queue Warning Subsystem (QWS)
- Dynamic Lane Merge Subsystem (DLMS)
- Travel Time Subsystem (TTS)
- Traffic Monitoring Camera Subsystem (TMCS)
- Variable Speed Limit (VSL) Subsystem



WHAT SMART WORK ZONES LOOK LIKE:

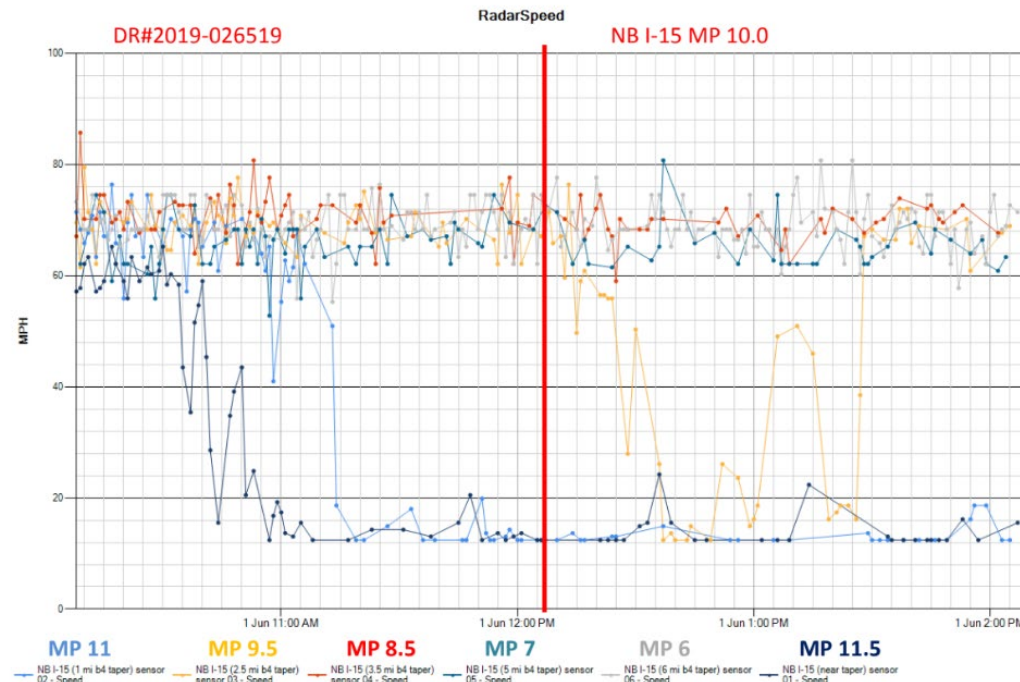


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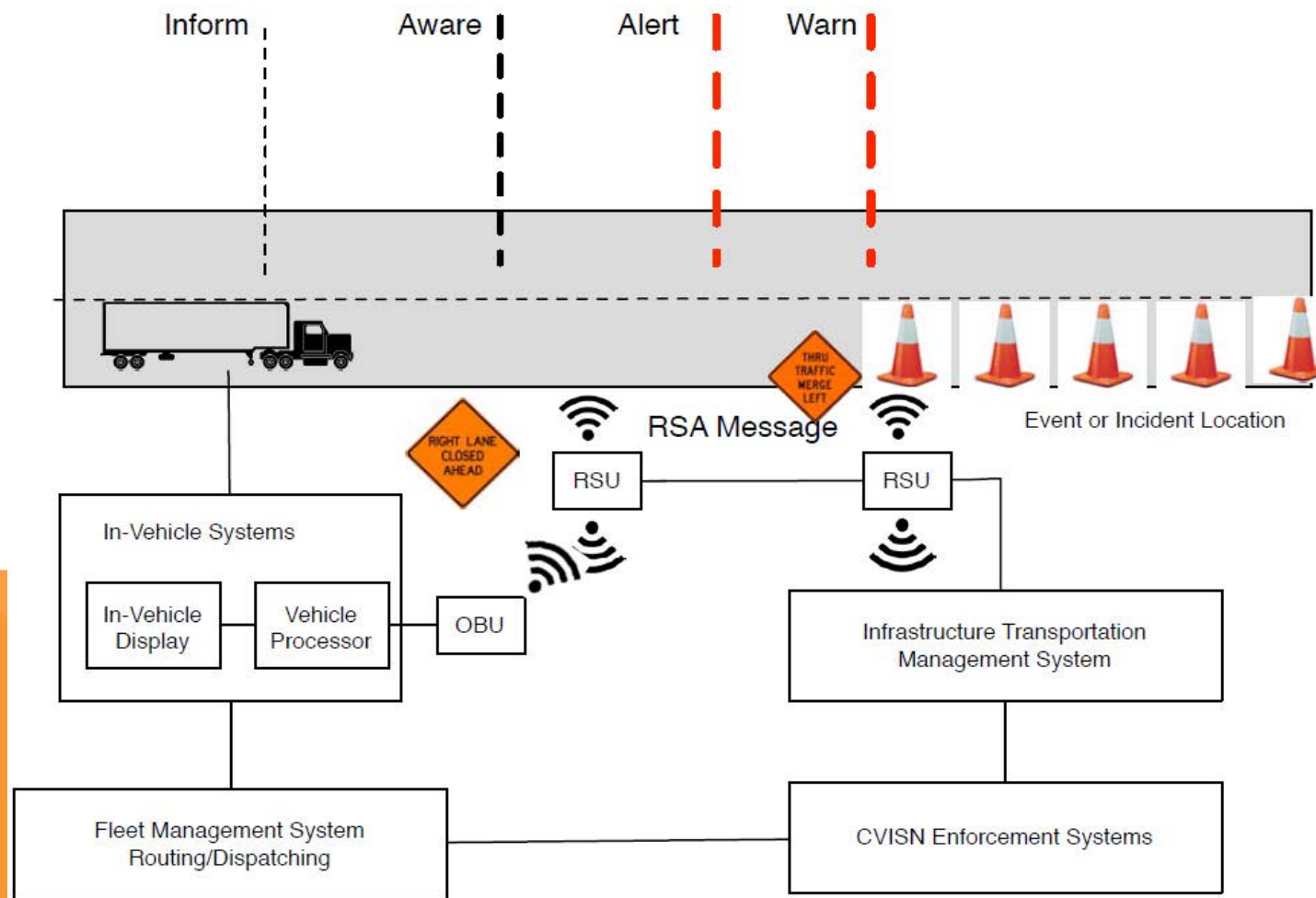
FINDING THE “RIGHT” PROJECTS FOR SWZ

- Although data could/should be collected on all projects, not all projects should have a “typical” smart work “system.”
- Innovation grant helps justify the use, by covering the cost.
 - ✦ Currently estimated at 1% of total construction budget & grant covers an additional 5%
 - I-15 Project **5%= \$318,750**
System Cost = \$22,700
- Look for champions to help
 - ✦ Politically sensitive areas.
 - ✦ Safety concerns.



Smart Work Zones and Connected Vehicles

Connected Vehicle Work Zone Notification ConOps



GETTING THE INFORMATION INTO VEHICLES



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FHWA WORK ZONE DATA INITIATIVE (WZDI)

TONI WHITFIELD, ARIZONA DIVISION

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FHWA WORK ZONE DATA INITIATIVE (WZDI)

Development of a standardized approach for collecting, organizing, and sharing Work Zone Event Data (WZED)

Purpose

Effective coordination of work zone activities
for enhanced mobility and safety



WORK ZONE EVENT DATA (WZED): CURRENT CHALLENGES

- Lack of guidance or standard
- Dynamic work zones
- Multiple stakeholders
- Ad hoc and limited collection
- Difficult to use for other purposes
- Not easily shared



WORK ZONE EVENT DATA (WZED): BENEFITS OF STANDARDIZATION

- Multi-jurisdiction coordination
- Analysis of impacts on safety and mobility
- Monitoring of contractor compliance
- Sharing information with public and stakeholders



WORK ZONE DATA INITIATIVE (WZDI) SERIES OF WORK PROJECTS

- Work Zone Data System (WZDS) Framework
- Work Zone Data Exchange (WZDx) Specification
- Work Zone Event Data (WZED) Dictionary
- Pilot Testing
- Implementation Guidelines – In development



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RESOURCES

<https://collaboration.fhwa.dot.gov/wzmp/wzdi/Forms/AllItems.aspx>



About the WZDI

Find quick background information about the WZDI project.

[Learn More](#)



WZDI Implementation Toolkit

Access resources to help generate buy-in and understand how to identify and implement an appropriate, agency-specific approach for work zone data management.

Coming Soon!



About the WZDx

Find quick background information about the WZDx project.


[Learn More](#)



Case Studies and Factsheets

Learn more about the Work Zone Data Initiative through case studies and factsheets.

[Learn More](#)



Peer Exchanges, Site Visits, and Workshops

Find resources from recent WZDI peer exchanges, demonstration site visits, and workshops.


[Learn More](#)



WZDx Demonstration Grants

Get information on this planned funding opportunity.

[Learn More](#)



Technical Resources

Access a range of draft products that provide direction for effective work zone management in the next generation of transportation operations.

[Learn More](#)



Agency Work Zone Data System(s)

Learn more about the conceptual architecture that supports a wide range of data uses during planning and design, active operations, and post-work zone performance analyses.

[Learn More](#)



Resources from Recurring WZDI Pilot State Meetings

Find notes from our monthly pilot state meetings as well as related resources.

[Learn More](#)



WORK ZONE DATA SURVEY

<https://www.surveymonkey.com/r/TVLT8GK>

Purpose: Better understand methods of collecting and disseminating real-time information about the presence of workers in work zones.

Participants: Infrastructure owners and operators, work zone equipment providers, work zone workers, work zone activity data consumers, and other transportation professionals

Deadline: Open through August 21, 2020



QUESTIONS??

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