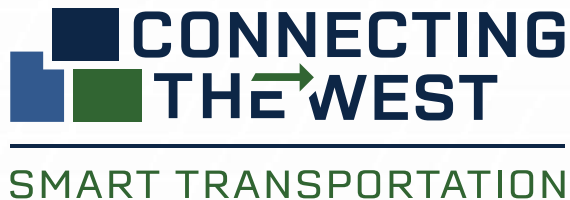**Saving Lives with Connectivity:
Accelerating Vehicle to Everything (V2X) Deployment**

Connecting the West Deployment Concept

October 2, 2025

CONNECTING
THE WEST

SMART TRANSPORTATION

Webinar Protocol

- Please mute your phone during the entire webinar.
- You are welcome to ask questions via chatbox in the Q&A Section.
- The webinar recording and the presentation material will be made available on the ITS America website.

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Agenda

1. Overview of the Saving Lives with Connectivity: Acceleration V2X Deployment Initiative
2. CTW Concept of Operations
3. Stakeholder Q&A
4. Contact Information

Speakers

Blaine Leonard
UDOT

Phillip Castro
UDOT

Heather
Pickering-Hilgers
CDOT

Vince Garcia
WYDOT

Rick Smith
Trihydro

Saving Lives with Connectivity: Accelerating V2X Deployment Initiative

Initiative Goals

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01

Deploy, operate, and showcase integrated, advanced interoperable deployments

02

Inform and educate the ITS community and the general public regarding these impacts

03

Support the development, evaluation, and documentation of a suitable reference implementation
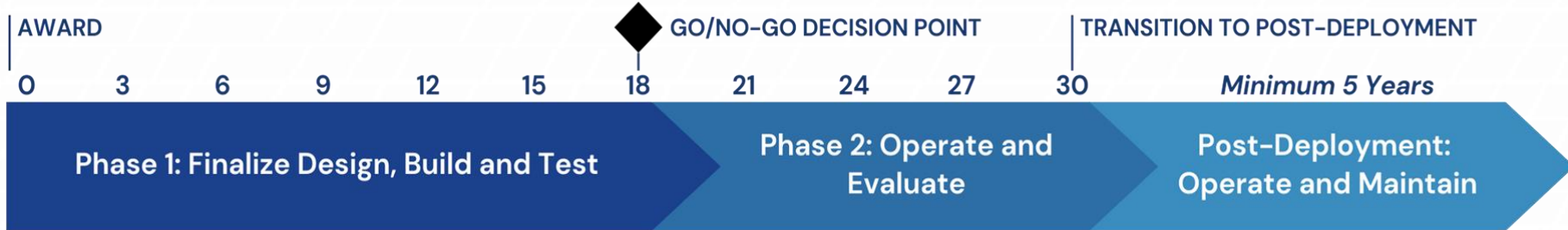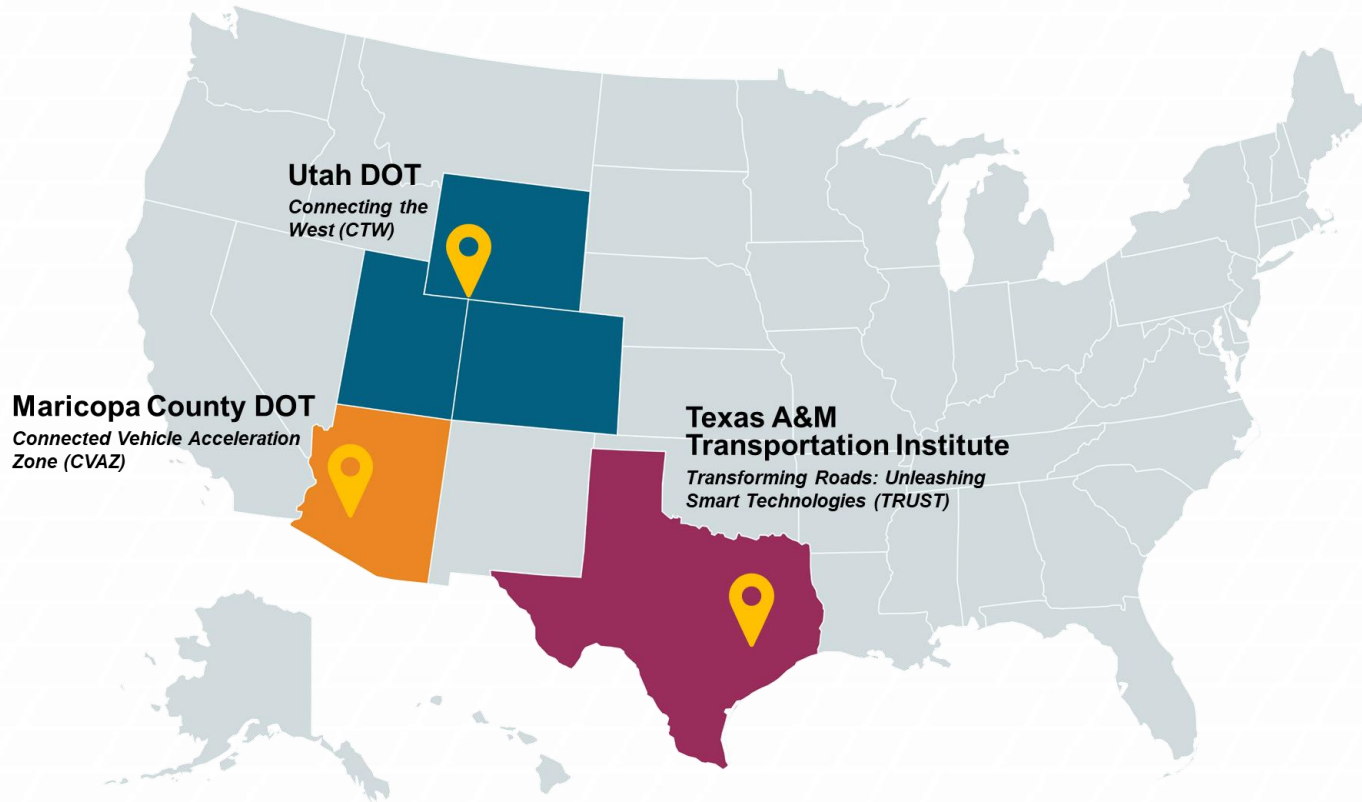
Structure and Phasing

Sep. 2024 **March 2026** **March 2027** **March 2032+**

AWARD GO/NO-GO DECISION POINT TRANSITION TO POST-DEPLOYMENT

| 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | *Minimum 5 Years* |

Phase 1: Finalize Design, Build and Test

Phase 2: Operate and Evaluate

Post-Deployment: Operate and Maintain

V2X Accelerator Sites

Utah DOT
Connecting the West (CTW)

Maricopa County DOT
Connected Vehicle Acceleration Zone (CVAZ)

Texas A&M Transportation Institute
Transforming Roads: Unleashing Smart Technologies (TRUST)

Connecting the West

Concept of Operations

Connecting the West

The Challenge

- Long-term goal is <u>safety</u>
  - Reduced crashes, injuries, fatalities by warning drivers
  - V2X is a "**digital seatbelt**" – and will save lives
  - V2I requires participation of the auto manufacturers
- Secondary goal is <u>mobility</u>
  - Improved transit performance
  - More efficient snowplow and emergency vehicle operations
- Two big <u>systemic challenges</u> to solving this problem:
  - National deployment of interoperable V2X systems
    - This needs to work seamlessly, everywhere
  - Chicken-and-egg problem with the OEMs
    - Who deploys first?

- Interoperable V2X systems:
  - Multi-state / cross-border deployment – Wyoming and Colorado
  - Standardizing the use of "standard" messages
  - Verifying the broadcasts
- Chicken-and-egg problem:
  - We (the IOOs) are the chicken
- Safety:
  - Leverage safety aspects of our applications
  - Deploy broadly to encourage automakers to install V2X applications

Addressing the Challenge

- Very short schedule (18-months to build)
  - Hit the ground running
  - Focus on what we already have
    - Expand existing footprint
    - No new applications

Project Partners

- Utah DOT

- Colorado DOT

- Wyoming DOT

- Utah Transit Authority

- Salt Lake City

- City and County of Denver

- General Motors

The Team

- ## Athey Creek Consultants
  - Project management, systems engineering documents
- ## Crest Solutions
  - Performance management and assessment
- ## Horrocks
  - Document editing and compliance, outreach materials
- ## Narwhal Group
  - System testing, UDOT installation and integration, operations and maintenance
- ## Neaera
 - Systems engineering document support, CDOT and WYDOT central systems

The Team

- ## Panasonic
  - UDOT central system, interface design
- ## Trihydro
  - TIM message harmonization, SDX system, systems engineering document support, CDOT and WYDOT central systems
- ## WSP
  - Data management planning, field testing
- ## X-Factor
  - Outreach planning and execution, stakeholder communication, webinar and conference support

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- **866 RSUs**
  - 752 at signalized intersections
    - 46 non-UDOT (Orem, Logan)
    - 50% of UDOT-owned signals
  - 114 along roadways
- **527 OBUs**
  - Buses (UTA, Cache Valley Transit)
  - Snowplows, Fleet vehicles
    - (UDOT, Orem, Logan)
  - Emergency vehicles (Orem, Logan, WFD)
- **Generating 2.5 billion data points / week**

LEGEND:
2024
2023
2022-2023
2020
2018-2019
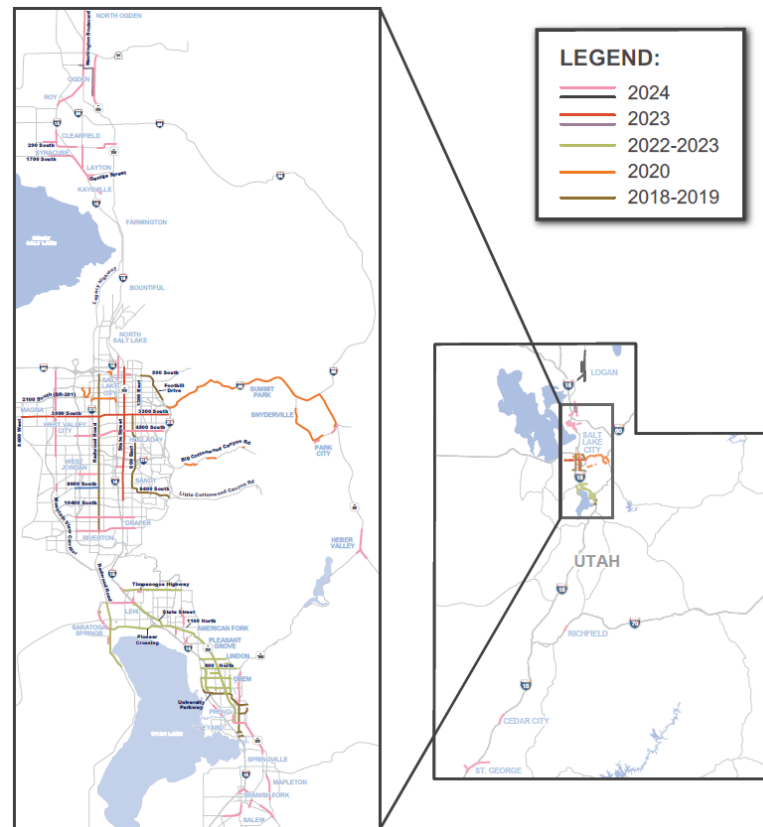
- 503 RSUs
  - 477 along roadways
  - 26 at Signalized Intersections
- 98 OBUs
  - Snowplows
  - Fleet vehicles
- Additional deployments in the City and County of Denver
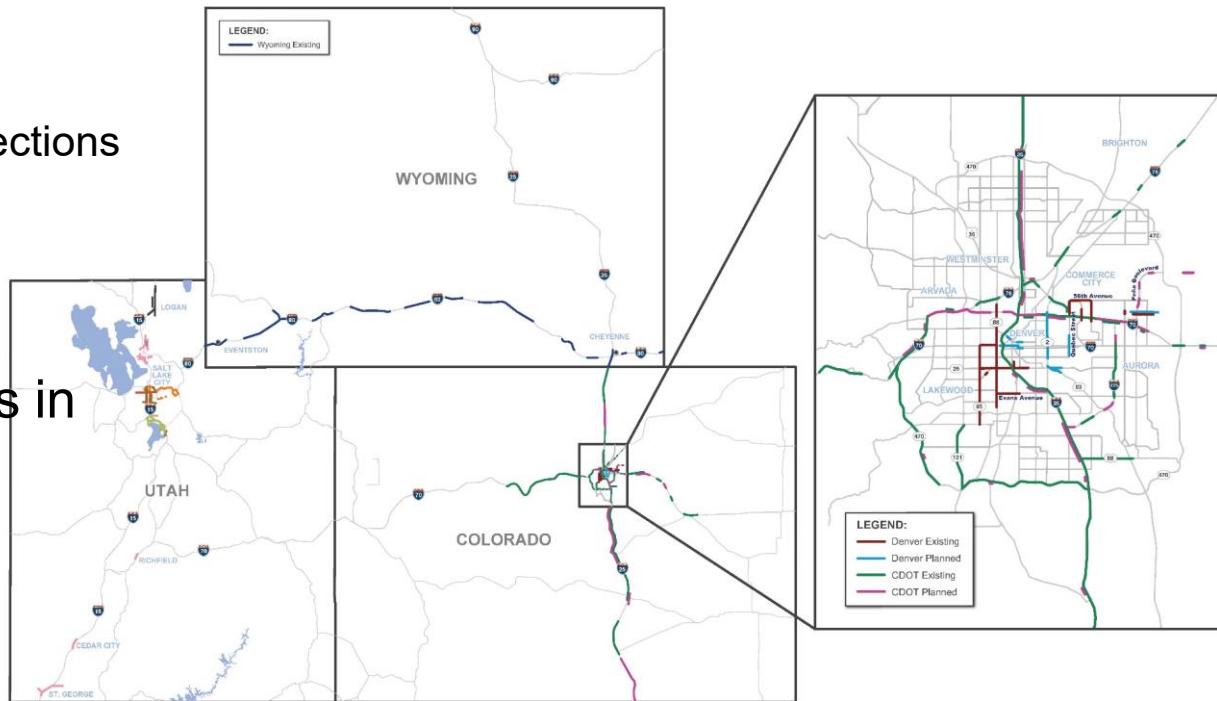
The Current System – WYDOT

- 75 RSUs
  - Along Interstate 80
- 10 OBUs
  - Fleet vehicles
- Installations done as part of CV Pilot Project
- WYDOT provides information to 3rd party providers via SDX

LEGEND:
— CDOT Existing
— CDOT Planned
— WYDOT Existing
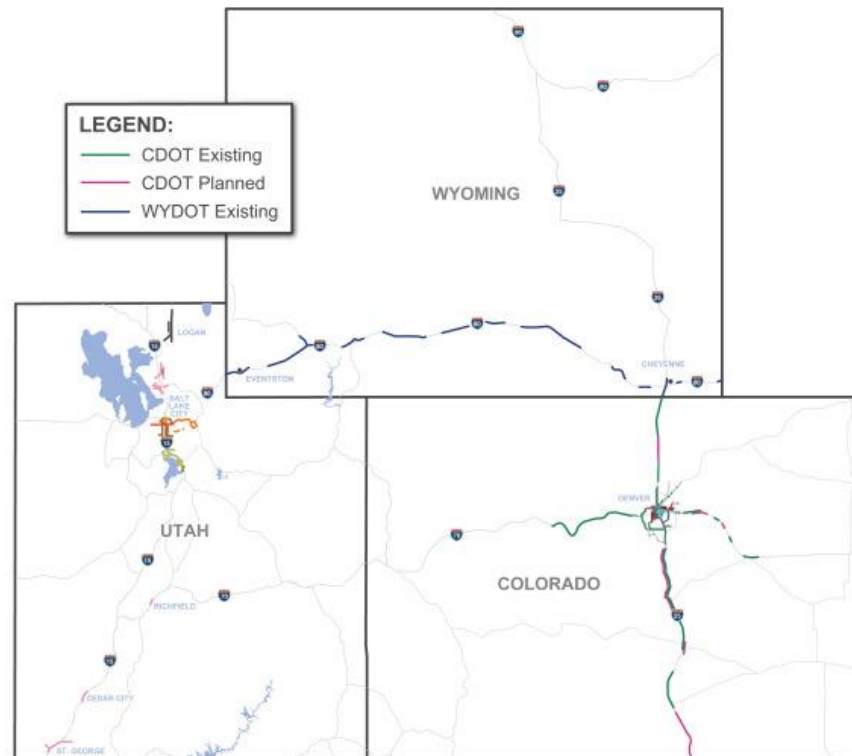
Combined Use Cases

- Transit Signal Priority (TSP) (UDOT)
- Snowplow and emergency vehicle preemption (UDOT / CCD)
- Vehicle insights (weather / hard braking) (UDOT / CDOT)
- Work Zone Alert (WYDOT / CDOT)
- Road Closure / Restrictions Alerts (WYDOT)
- Driver warnings: Curve Speed, Weather Impact (UDOT)
- Vulnerable Road User Warning using LiDAR (UDOT)
- Variable Speed Limits (VSL) (UDOT)
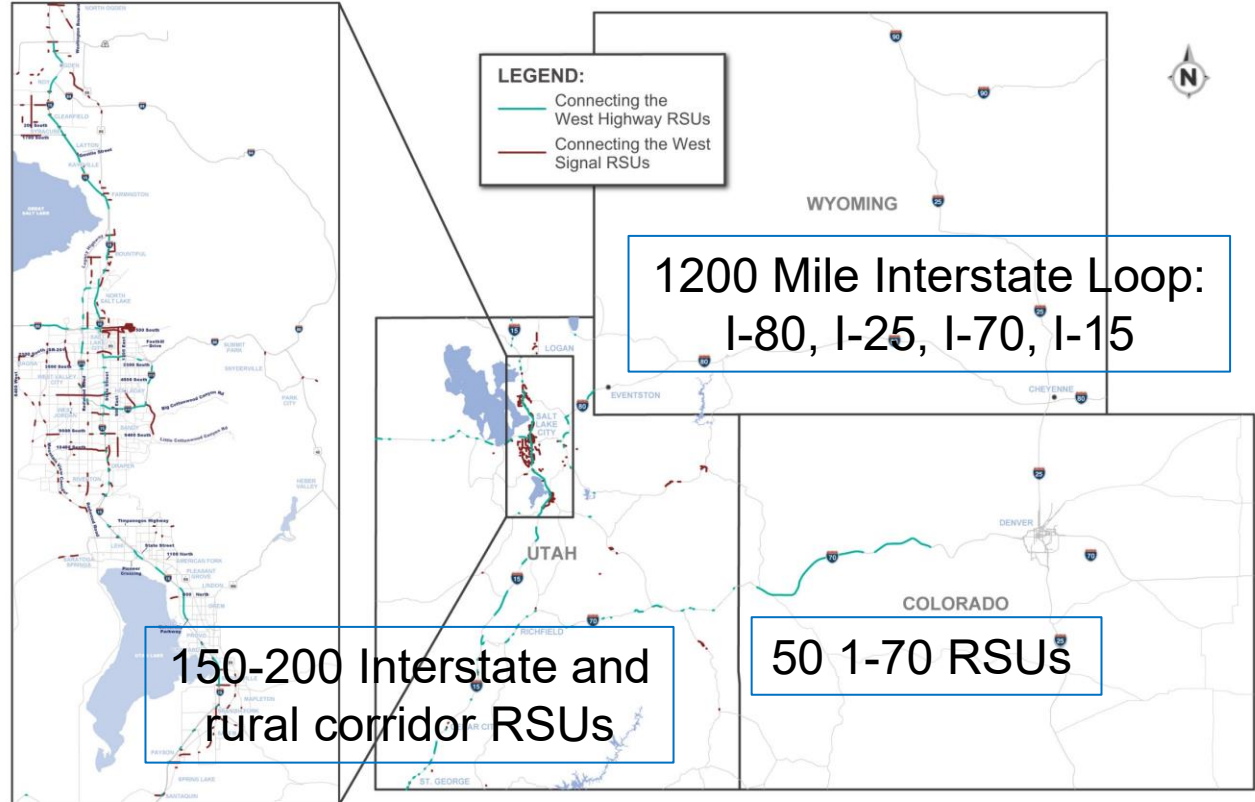- Disabled Vehicle Alert (UDOT)
- RTCM Position Correction (UDOT)

Deployment Plan

450 Intersection RSUs

81% of UDOT-owned signals with an RSU

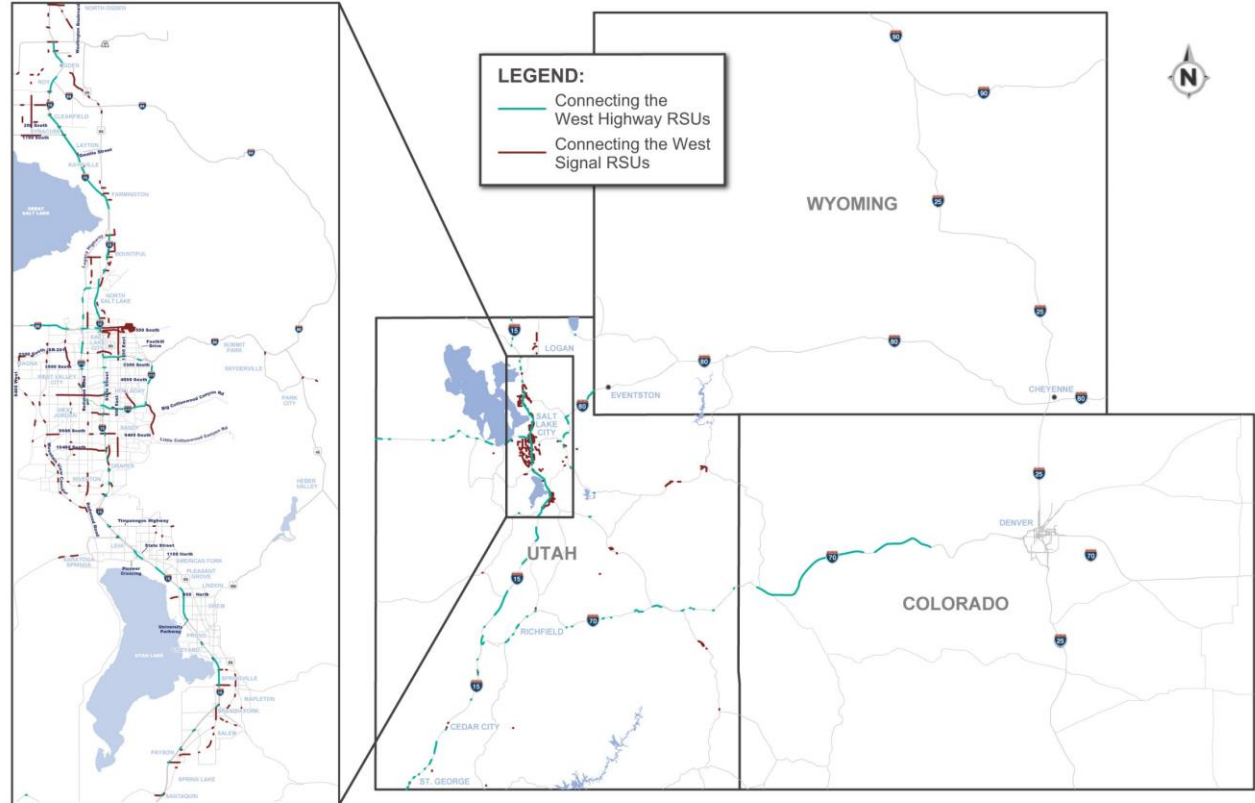215 OBUs (buses, plows)

20 VRU Warning Sites

LEGEND:
Connecting the West Highway RSUs
Connecting the West Signal RSUs

WYOMING

1200 Mile Interstate Loop: I-80, I-25, I-70, I-15

150-200 Interstate and rural corridor RSUs

50 1-70 RSUs

Deployment Plan

Expand Existing
Applications

Interoperable TIM
Messaging
(and Event Data Sharing)

Equipped GM
Vehicle

LEGEND:
— Connecting the West Highway RSUs
— Connecting the West Signal RSUs

- TIM messages used by all three agencies – but implementation is different
- Compiled list of TIMs
  - Each state contributed their desired TIMs
  - About 45 TIM messages
- Team created to evaluate each TIM
  - Developed common approach to message structure and use

Traveler Information Messages

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B.12 Road Construction Ahead

Version	Date	Notes
1.0	2024-11-05	Connecting the West Project - initial version

Conditions

A road construction ahead TIM provides a general warning for a zone and should be attentive for traffic disruptions typically occurring in construction areas. Any road construction activity that impacts or restricts traffic flow may require this warning. Significant traffic disruptions can occur at work zones due to lane closures or lane shifts, reduced speed limits, narrowed lanes, or construction equipment to anticipate these types of hazards.

Standard message phrase and

road-construction, ahead

1025, 13569

ROAD WORK AHEAD

Roadway posted speed limit (mph)	Upstream distance (miles)
<= 35	0.25
35 – 50	0.5
>= 50	1

Key points of the road construction ahead geofence

- **Point A**: beginning of the work zone
- **Point B**: end of the work zone
- **Point C**: start of the road construction ahead TIM geofence
- **Point D**: end of the road construction ahead TIM geofence
- **Width E**: width of the road construction ahead TIM geofence

The geofence start and end locations, width, and the path of the roadway determine the shape, length, and direction of the TIM geofence.
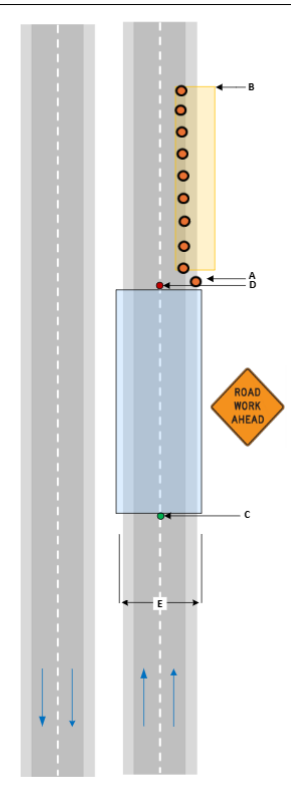
Start to End Extent

should be located within 50 feet along the roadway upstream of the beginning of the work zone location (Point A).

The upstream start point of the geofence (Point C) should be located using defined guidelines. Suggested logic outlined above locates the [geofen]ce start point a specific distance upstream [based] on the posted speed limit of the roadway. [The lo]gic locating the upstream start point should [ac]count for any constraints that may limit the upstream distance. For example, if the route starts at a distance less than the recommended upstream distance, the geofence start point should be placed where the route starts and must not extend into any other upstream route.

Width Extent

The defined width of the geofence should cover the entire roadway in the defined direction. The width should not extend significantly beyond the edge of the roadway, as this may cause vehicles on parallel service roads to consider the TIM as relevant for them. For a bi-directional road, it does not matter if the width extends into the opposite direction lanes as the start and end points of the

Message Title

Conditions of Use

Message Phrase and ITIS Codes

Geofence Details

Display Icon

Geofence Limits

- Roadway 'events' created by each agency
  - Weather event (icy road, high wind)
  - Vehicle event (crash, stalled vehicle)
  - Traffic event (road closed, congestion, debris in the road)
- TIMs created and broadcast by each agency
- TIMs and Events sent to Situational Data Exchange (SDX)
  - Agencies decide how to use SDX data
  - TIMs may be created by other agencies from the event data
  - 3rd parties (Google, Waze, TomTom) use the SDX as a source of roadway information for their subscribers
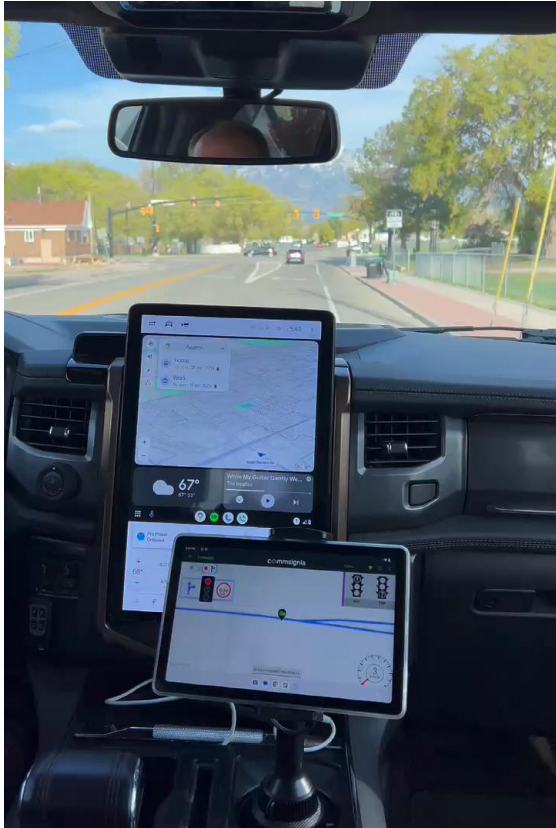
V2X Pedestrian Collision Warning

1. LiDAR detects pedestrian
2. Ped location sent to V2X system
3. V2X broadcasts pedestrian location
4. On-board V2X system assesses potential conflict
5. Driver warned of conflict
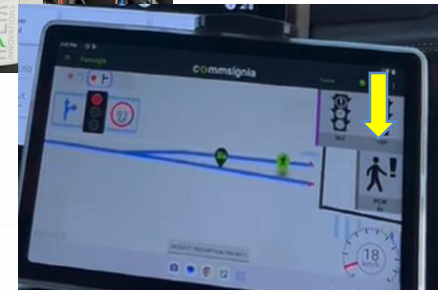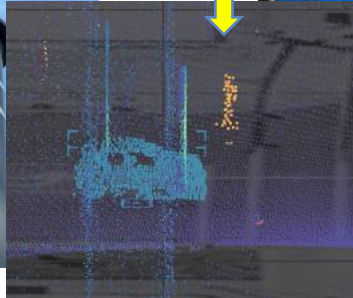
Vulnerable Road Users - LiDAR

Alternate message delivery for unequipped vehicles

Project Status

- Systems engineering documentation nearly complete
  - Documents intended to be useful for other deployers
- Installation has begun
  - Intending to be substantially complete before winter weather
  - Phase 1 ends March 2026
- Planning system tests and operational readiness demonstrations
  - Showcase that everything works as planned
  - Approval for Phase 2 depends on readiness demos

- Agreements and subcontracts sometimes take longer than expected
  - Start early, think ahead about needs
- V2X standards are very mature but still changing. Compliance can be a moving target
  - Engage with these committees, be aware of progress, consider the impacts to procurement and interoperability
- Inconsistency in the use of TIMs can hamper interoperability
  - Look to the new USDOT Guidance (based largely on the CTW work)
- Inadequate internal communication can cause conflict
  - Proactive internal communication with stakeholders will ease concerns

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- After deployment (Phase 2) – measure <u>project impacts:</u>
  - **Outputs**: how well the deployment performs intended functions
    - Message transmission latency
    - Number of capable locations
    - Number of displayed messages
  - **Outcome**: What benefits or changes in behavior result
    - Deceleration rate of vehicle approaching VRU
    - Transit on-time performance
- Safety is hard to measure
  - Not enough vehicles, events, time

Stakeholder Q&A

- Please keep your phone muted.

- Please use chatbox to ask questions.

- Questions will be answered in the order in which they were received.

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