



TEXAS DEPARTMENT OF TRANSPORTATION



TEXAS CONNECTED FREIGHT CORRIDORS

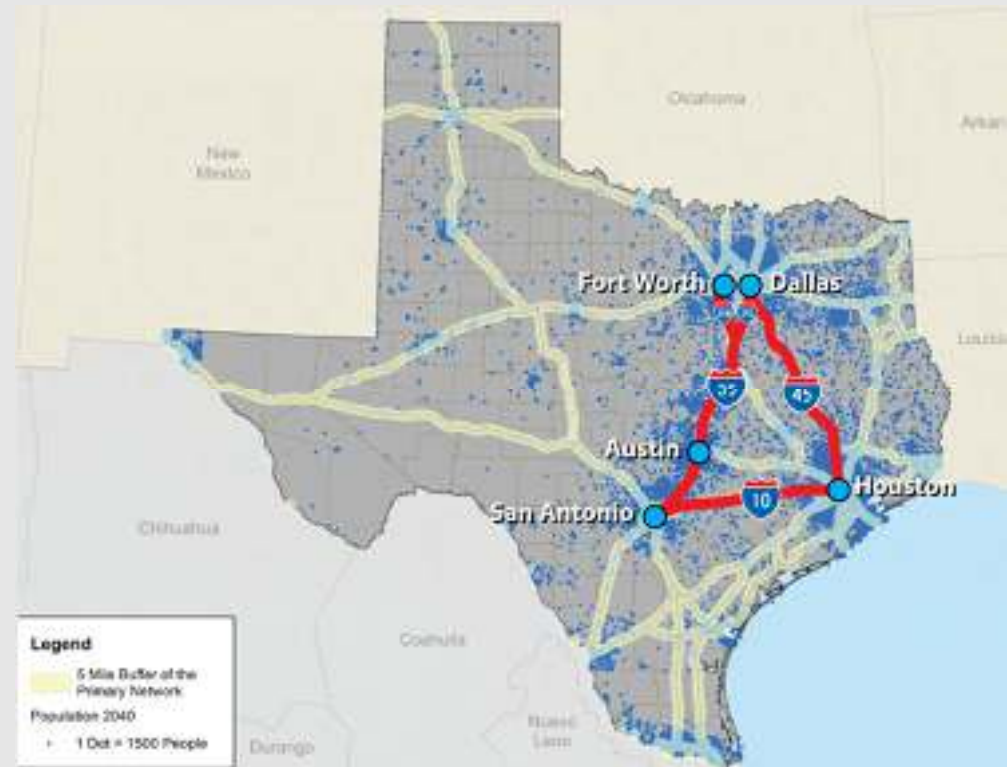
Connected WZ Peer Exchange



30 November 2022

Texas Triangle Challenges

- Texas Triangle contains $\frac{3}{4}$ of Texas' 27 million population – growing to 39 million people in 2040
- Seven of top 25 national freight bottlenecks
- Eleven of top 20 most congested roadway sections in Texas
- Doubling of freight tonnage from 2010 to 2040 (2/3rd by truck)
- More cross border trade value than CA, MI, ND, and AZ combined



Texas Connected Vehicle Vision & Goals

- The Texas vision is to create a sustainable connected vehicle environment covering the 865-mile Texas Triangle (including extension to Laredo) to support V2V and V2I safety and mobility applications
- Goals:
 - Promoting economic efficiency and safety of commercial vehicles and freight first, followed by passenger cars and other users
 - Creating Day One benefits through use of aftermarket devices and integration with existing on-board technologies
 - Minimizing infrastructure costs to state and local agencies



Texas Connected Freight Corridors Project

- Texas Proposal: Equip “Texas Triangle” with connected infrastructure technology (IH10, IH30, IH35 & IH45)
 - Equip 1,000 trucks and TxDOT fleet vehicles with on-board technology
- HEB flagship partner, approaching others for participation
- Provide freight operators and drivers with info and warnings to improve safety and mobility:
 - Warnings for traffic queues, work zones, low bridge heights, weather (heavy rain, ice, fog), wrong-way drivers
 - Equipped truck will get braking warnings from other equipped trucks
 - Info on traffic conditions, route guidance, border wait times



Connected Vehicle Applications – Proposed

USDOT Focus Areas	Proposed Applications		Proposed Locations
Multimodal ICM	Advanced Traveler Information System	Mature	IH35/SL340, Waco IH35/SL363, Temple IH35/SH130, Austin IH30
	Eco-Dynamic Routing	New	
	Work Zone Warnings	Mature	
CV at Pedestrian Crossings	Pedestrian/Animal Warning	New	IH35 in Austin
	SPaT Corridor for Improved Ped/Bicycle Safety	New	Riverside Dr., Austin
Unified Fare Collection/Payment System	Truck Parking Availability/Reservation	New	Rest Areas, IH35
Freight Community System	Border Wait Times	Mature	IH35, Laredo
Connected Communities	Truck Signal Priority	Mature	IH35, San Antonio
Infrastructure Condition Assessment	Low Bridge Height Warnings	New	IH35, IH45
Rural Technologies	Traffic & Road Info for Truck Platooning	New	IH35, IH45
	EEBL Alerts from Trucks Ahead	Mature	Austin/ San Antonio
	Traffic Queue Warnings	Mature	IH35, IH45, IH10, IH30
	Road Weather Warnings	New	IH35
	Wrong Way Driving (WWD) Alerts	Mature	San Antonio

Connected Vehicle Applications – Application Development

Tier 1	 Work Zone Warning	 Queue Warning	 Wrong-Way Drivers	 Advanced Traveler Information System (ATIS)
Tier 2	 Freight Signal Priority	 Road Weather Warning	 Truck Parking Availability	 Bridge Height Warning
Tier 3	 Emergency Electronic Brake Light (EEBL)	 Pedestrian & Animal Warning	 Eco-Dynamic Routing	 Border Wait Times
	Selected for Development		Not Selected for Development	

Project Budget & Schedule

- The USDOT awarded TxDOT \$6.09 million
- The project has a requirement to match with equal state/local contribution
- TxDOT and its partners will match with in-kind contributions making the project over \$12 million

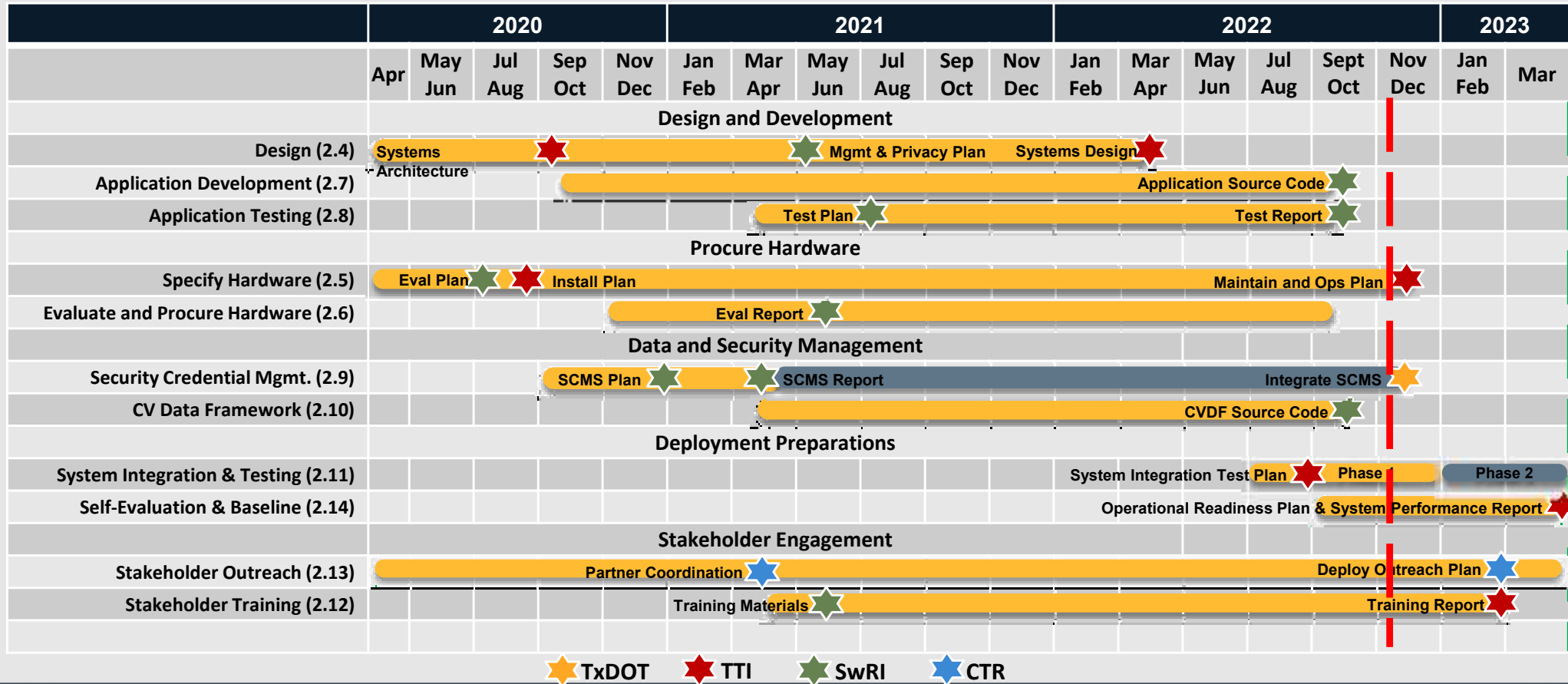
Texas Connected Freight Corridors	Schedule																					
	CY 2019			CY 2020				CY 2021				CY 2022				CY 2023				CY 2024		
Task	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1		
1 - Planning and High Level Design	12 months																					
2 - Detailed Design, Build, and Test					36 months																	
3 - Operate, Maintain, and Evaluate																		12 months				

Project Budget & Schedule – Overall Project Timeline

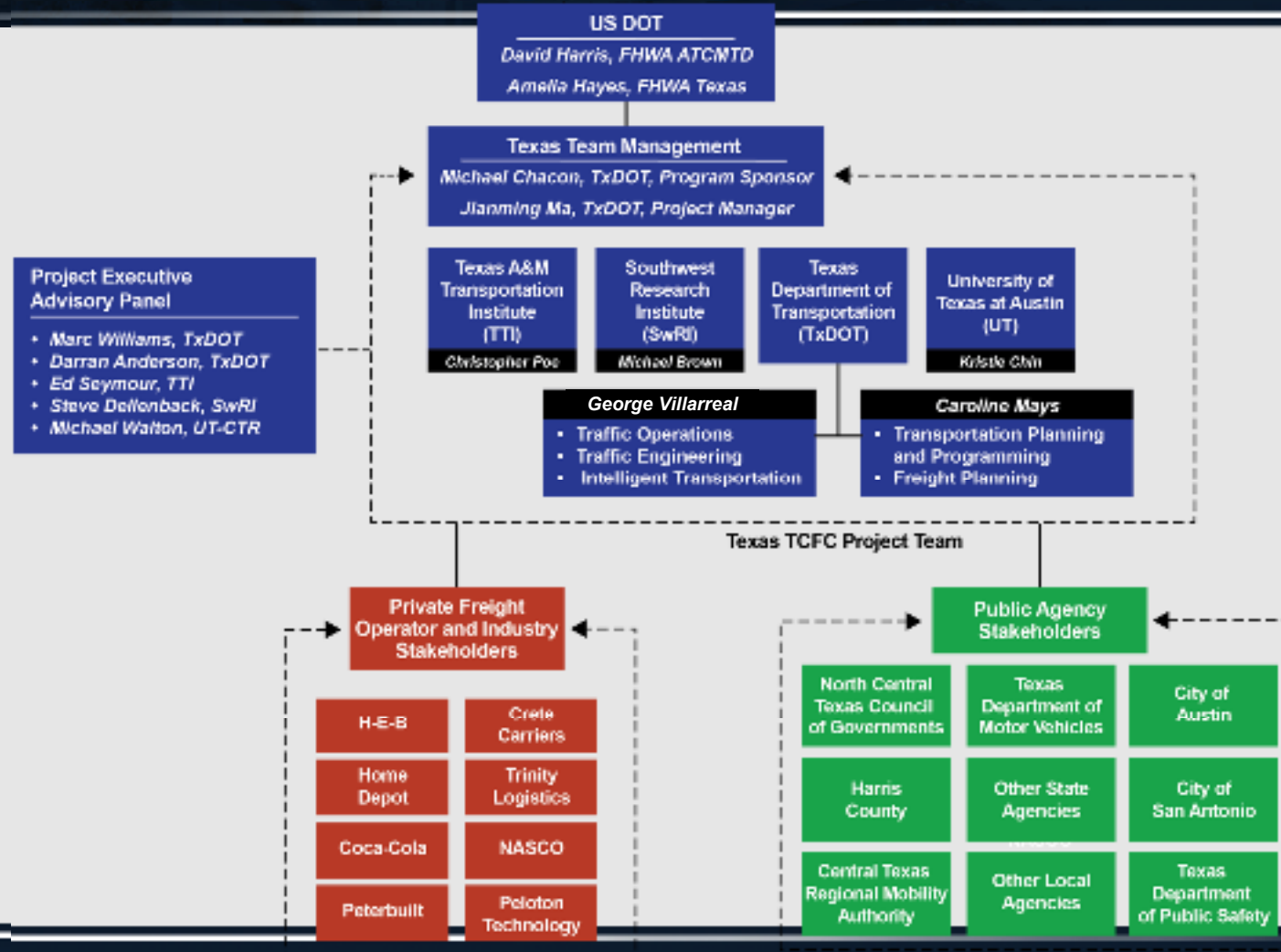


Project Budget & Schedule – Task 2 Timeline and Workflows

All dates listed represent delivery of draft deliverables



Project Organizational Chart



Partnership



THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

Public Sector Stakeholders

- Current



Private Freight Stakeholders

- Stakeholders included in Proposal-



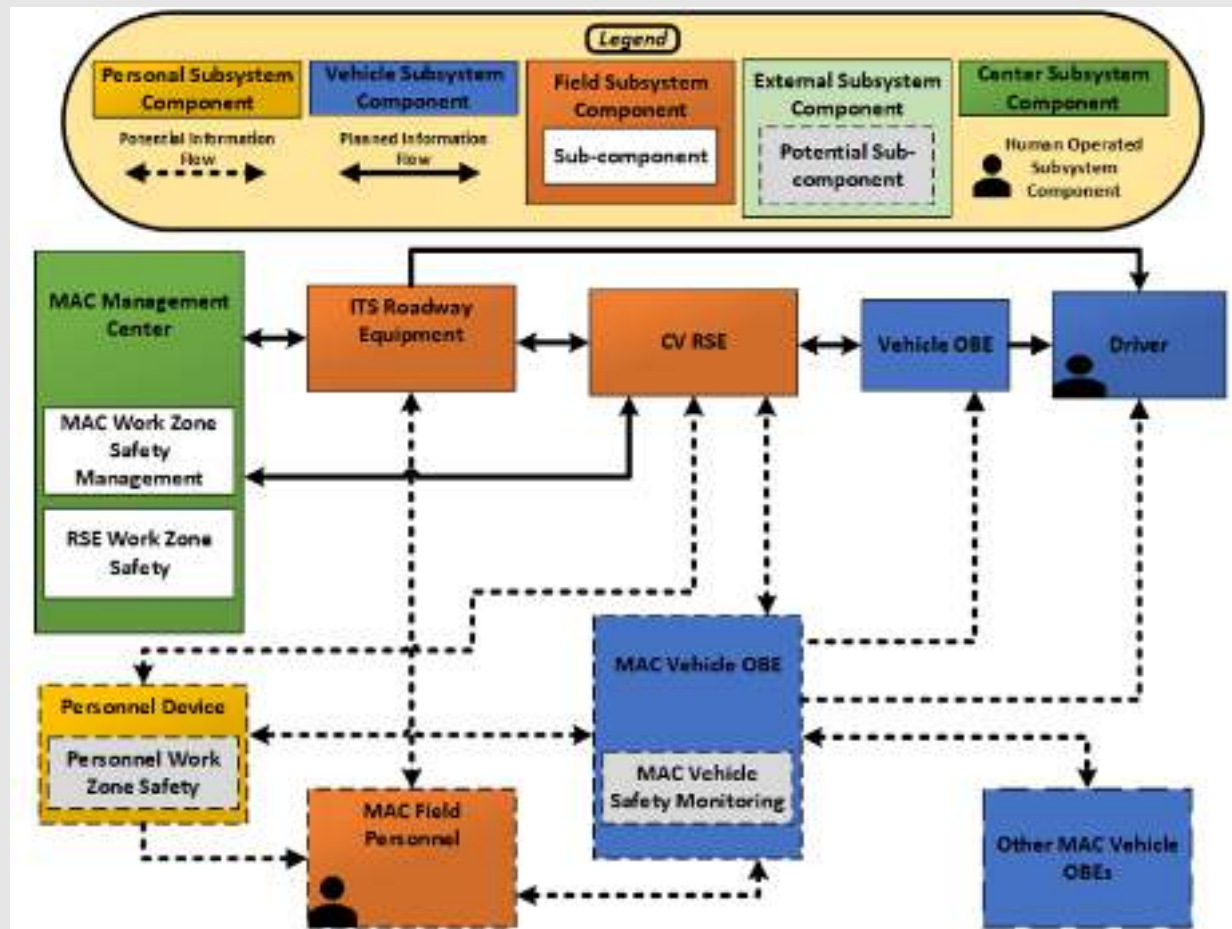
- Project provides opportunities for expansion of private freight stakeholders

Project Information Portal

- Project information page on TxDOT website
 - Goals and Benefits of Project
 - Scope of Project
 - Additional Information
 - Project Proposal
 - Project FAQs
 - <http://www.txdot.gov/inside-txdot/division/traffic/freight-corridors.html>

Work Zone Warnings

Work Zone Warning Overview



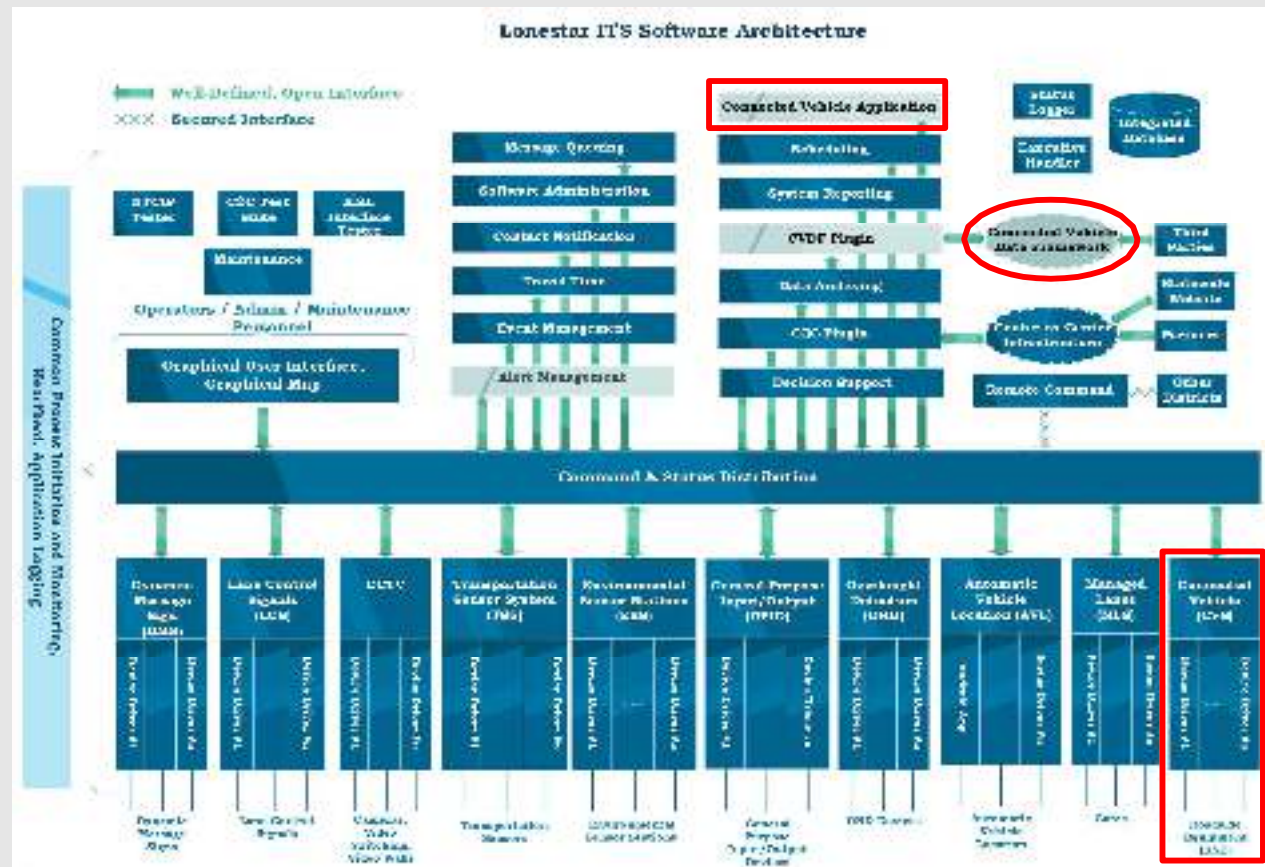
Planned Corridors

District	Segment	Work Zone Warning	Queue Warning	Wrong Way Driving	Freight Signal Priority	Advanced Traveler Info Systems
Austin	I-35 (US-290 to Rundberg Ln)	X	X	X		X
Bryan	I-45 (SH-7 to Freestone County Line)	X	X			
Dallas	1-30 (Big Town Blvd to Rosehill Rd)	X	X	X		
Dallas	Loop 12 (I-30 to 183)	X (Possible)	X		X (Possible)	
Dallas & Fort Worth	I-30 from Dallas to Fort Worth (20 RSUs)	X	X	X		
Fort Worth	I-35 (AllianceTexas Area)	X	X		X	
Houston	I-45 (249 to Conroe)	X	X	X	X (Possible)	
Laredo	I-35 (Calton Rd to Border Patrol Station)	X	X		X	X
San Antonio	I-35 (Y @ I-35 to 281)		X			
San Antonio	Rittiman Rd (5/31 Rittiman Rd to I-35/410)				X	
Waco	I-35 (12th St to Craven Ave near Waco)		X			
Yoakum	I-10 (Wolchik Rd to Brazos River)	X	X			

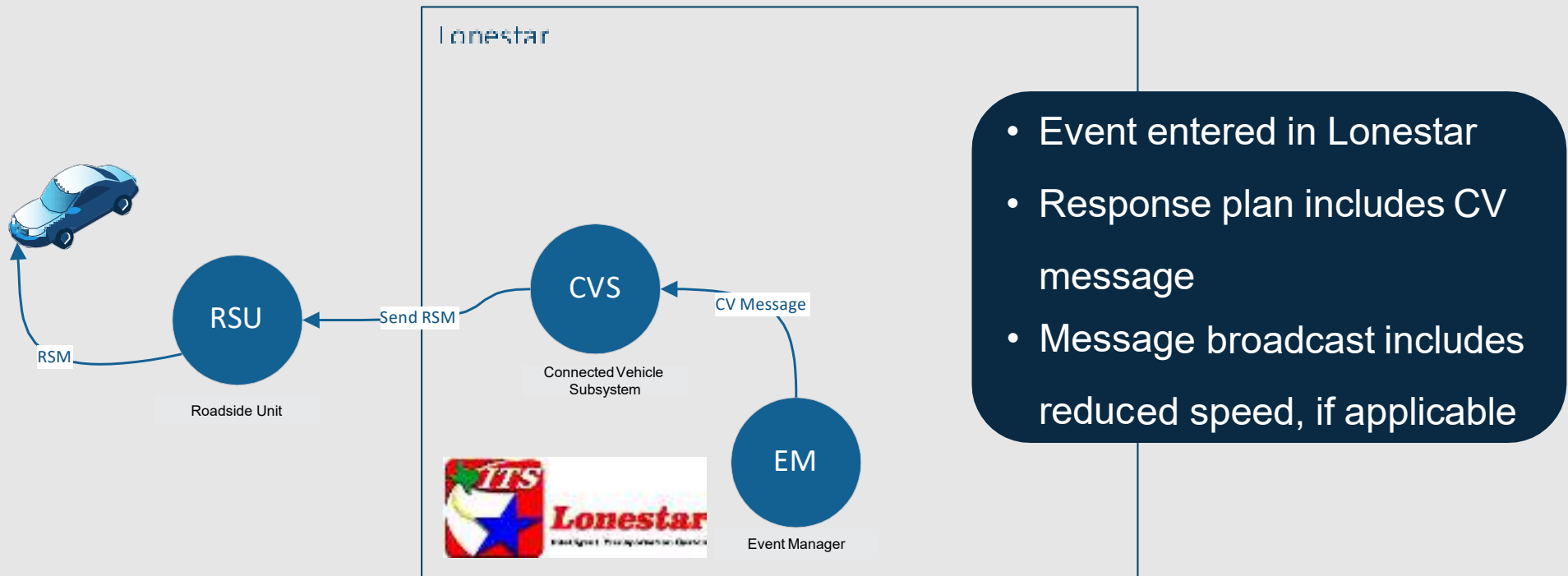
Roughly Roadside Units 3-6 per Corridor Segment

Lonestar Architecture

- Connected Vehicle Subsystem (CVS) expanded
- New Connected Vehicle Application (CVA)
- New Connected Vehicle Data Framework (CVDF)
- Modifications
 - Decision support system
 - Event management
- Other general Lonestar training available



Work Zone Warning



Event Manager (EM) – Connected Vehicle Events



Collision Alert



WorkZone Alert



DSS Alert



Wrong Way Driver



Queue Warning

Group Name: RsmitemGroup1

Group Status: **Succeeded**

Basic Information Message

Cause: Traffic Condition
Location: US 281 at DEE HOWARD WAY
Average Speed:
Speed limit:
Reduced Speed limit:
Lanes closed: Right Main Lane Closed
Start time: 7/29/2022 10:52 AM
Duration: 69928669 hours



Succeeded

☒ Event Info

Event Information

id:

Description:

Type:

Source:

Severity: ☒ Auto

Verified By:

Remainder	Estimated Duration	Priority	Speed Limit	Reduced Speed Limit
10 min	10 min	<input type="checkbox"/>	27 mph	25 mph

Start Date: Friday, July 29, 2022 **Start Time:** 10:46 AM ☒ No End Time (Indefinite)

Recurring: No instances scheduled

State: Pending

7/29/2022 10:46 AM

Affected Lanes:



Associated Events:

Priority Event:

Map Interface - Overview

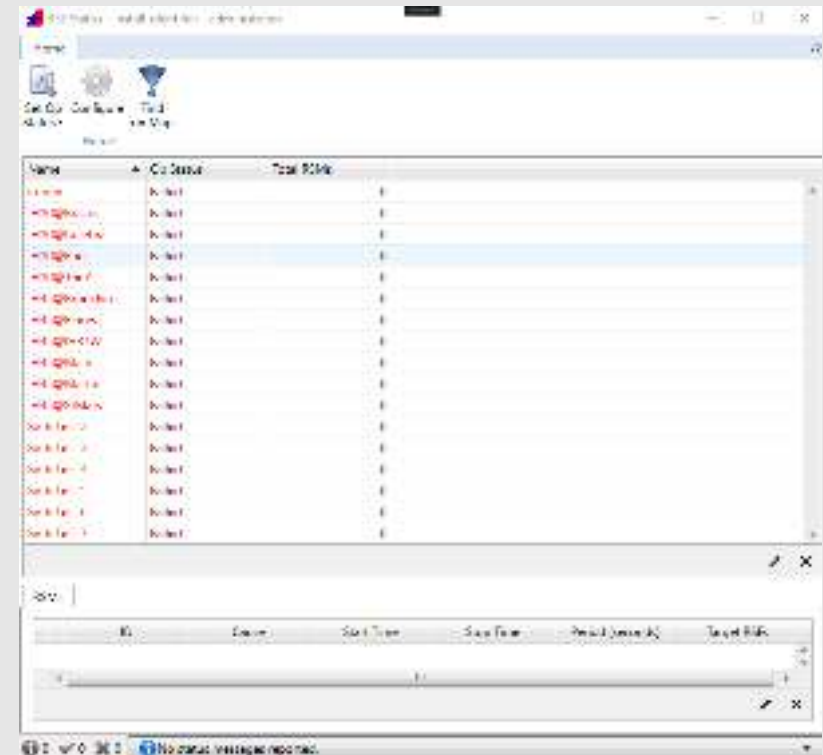


Map Interface - Roadside Equipment Manager & Status



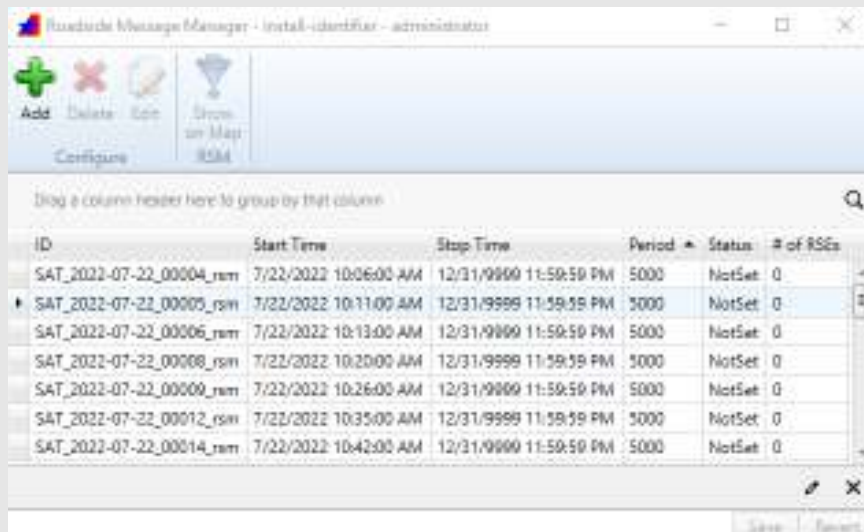
Similar grid view to other Lonestar new equipment windows (ESS, GPIO)

Name	ID	Driver	ET Address	Redebug	Location	LinkAddr	Long Addr	Accessories
Carlin	02190	Jim	182 45.120.10	FROMWAY ST	North	28/4200	+80.51691	Carlin
BHTG1000	02190	Jim	182 45.120.10	From	North	28/4200	+80.51691	BHTG1000
BHTG1000	02190	Jim	182 45.120.10	From	North	28/4200	+80.51691	BHTG1000
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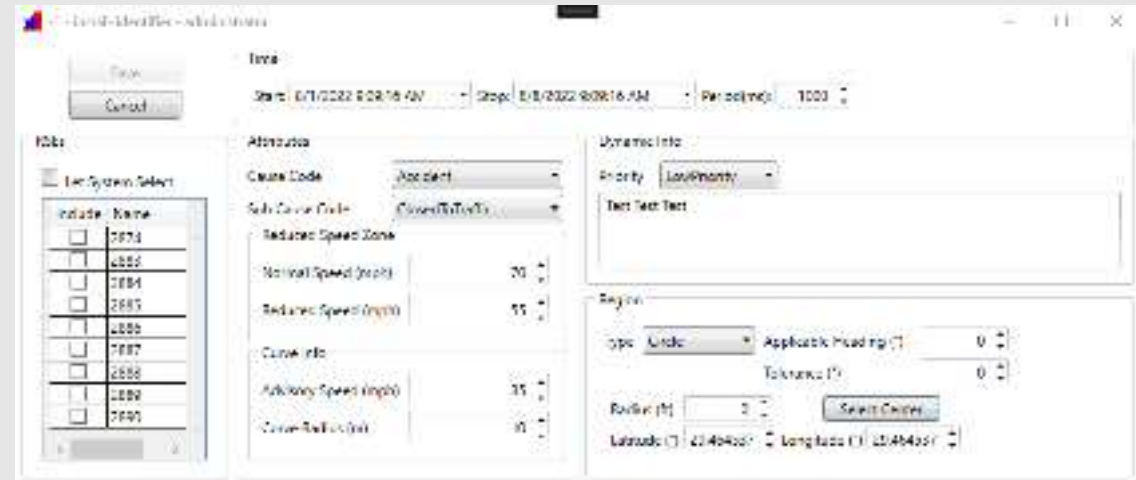


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BHTG1000	02190	Jim	182 45.120.10	From	North	28/4200	+80.51691	BHTG1000
BHTG1000	02190	Jim	182 45.120.10	From	North	28/4200	+80.51691	BHTG1000

Map Interface - Roadside Message Manager & Editor



ID	Start Time	Stop Time	Period	Status	# of RSEs
SAT_2022-07-22_00004_rsm	7/22/2022 10:06:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00005_rsm	7/22/2022 10:11:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00006_rsm	7/22/2022 10:13:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00008_rsm	7/22/2022 10:20:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00009_rsm	7/22/2022 10:26:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00012_rsm	7/22/2022 10:35:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0
SAT_2022-07-22_00014_rsm	7/22/2022 10:42:00 AM	12/31/9999 11:59:59 PM	5000	NotSet	0



Time

Start: 6/7/2022 8:08:16 AM Stop: 6/8/2022 8:08:16 AM Period(mph): 1000

Cause Code: Accident

Sub Cause Code: Closed/Underway

Reduced Speed Zone

Normal Speed (mph): 20

Reduced Speed (mph): 15

Curve Info

Advisory Speed (mph): 35

Curve Radius (ft): 10

Dynamic Info

Priority: Low/Priority

Text: Text Text

Signs

Type: Advance

Advance Heading (ft): 0

Advance (ft): 0

Latitude (N): 40.494000 Longitude (W): 104.940000

- Intended for testing field equipment
- Allows you to alter connected vehicle messages without changing the event

Work Zone Warning Evaluation Plan



Metrics for Improving Safety

Performance Measures	Possible Dataset(s)	Secondary Evaluation Strategy	Data Provider / Stakeholder
Wrong-way driving incidents involving instrumented vehicles	Crash data; 911/law enforcement logs, TMC incident reports	N/A	Fleet Operator, Law Enforcement, Public Agency
Number of messages received in-vehicle: work zone	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: incident ahead	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: queue ahead	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: lane closure	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: wrong-way driving alert	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator

Metrics for Enhancing Mobility

Candidate Performance Measures	Possible Dataset(s)	Secondary Evaluation Strategy	Data Provider / Stakeholder
Average travel time of instrumented vehicles	Travel time data by segment and by vehicle	N/A	Fleet Operator
Travel time reliability - 95th percentile travel time of instrumented vehicles	Travel time data by segment and by vehicle	N/A	Fleet Operator
Average speed of instrumented vehicles	Vehicle log data, roadway speed data by segment	N/A	Fleet Operator
Number of messages received in-vehicle: real-time traffic information	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: work zone	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: incident ahead	Message logs from generating applications, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: queue ahead	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator
Number of messages received in-vehicle: lane closure	Message logs from generating application, OBUs, and RSUs	User Surveys / Interviews	Fleet Operator

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