



Connected and Automated Vehicles Research and Deployment in Texas



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Safety

Mobility

CAV Benefits

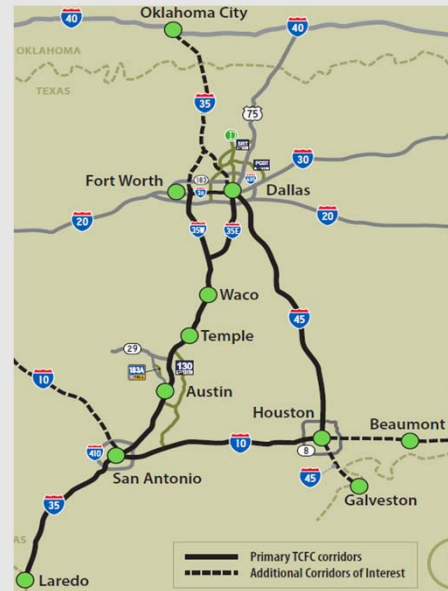
Environment

Technology

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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



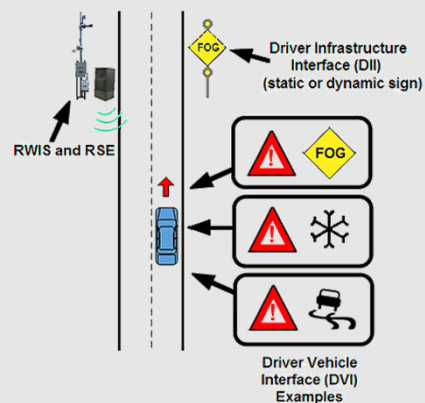
Partnership



Proposed Connected Vehicle Applications

- Vehicle-to-Infrastructure (V2I)
 - Advanced Traveler Information System
 - Eco-Dynamic Routing
 - Work Zone Warnings
 - Ped/Animal Warning
 - Truck Parking Availability/Reservations
 - Border Wait Times
 - Truck Signal Priority on Arterials
 - Low Bridge Height Warning
 - Queue Warnings
 - Road Weather Warnings
 - Wrong-Way Driving (WWD) Alerts

- Vehicle-to-Vehicle (V2V)
 - Emergency Electronic Brake Lights (EEBL)



Private Freight Stakeholders

- Stakeholders included in Proposal-



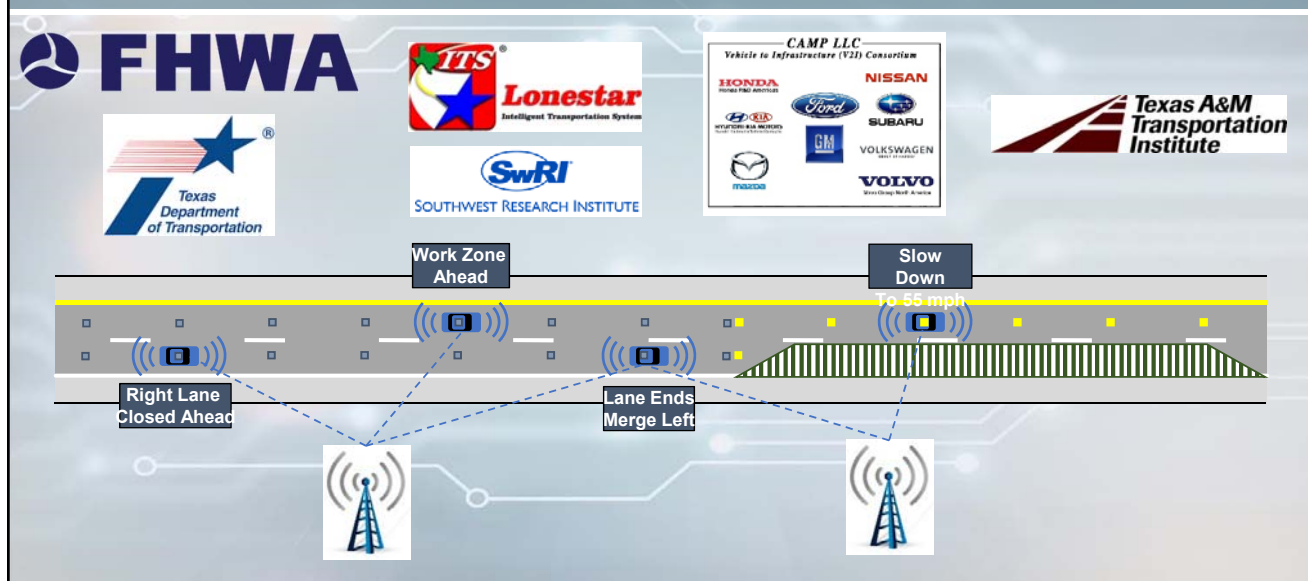
- Project provides opportunities for expansion of private freight stakeholders

Companion Programs and Projects

- I-35 Connected Work Zone
 - Reduced Speed Zone Warning/Lane Closure
 - Lonestar™ CV module
- Western IH 10 Corridor Coalition
 - ConOps study for IH10 western connected freight corridor
- IH10 Corridor Coalition Truck Parking Availability System
 - ATCMTD 2018 Grant
- Small Cell Pilot Projects
 - Houston small cell pilot
- Texas Innovation Alliance
 - Community of practice: freight and logistics
- TxDOT Research
 - Wrong-way Driving Mitigation
- RSU Specifications and Standards
 - Equipment specification for procurement
 - Installation specification and standard detail sheets



I-35 Connected Work Zone



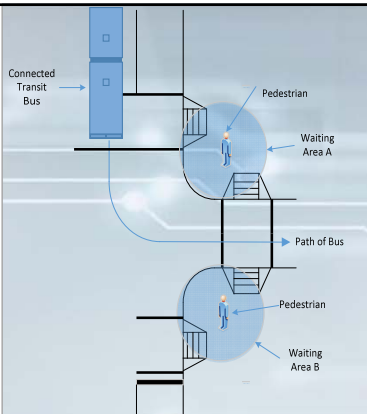
Field Test

RSU Deployment

- 9 RSUs covering about 8 miles of I-35 in Temple
- Average spacing between RSUs is 1 mile

Closure Scenarios

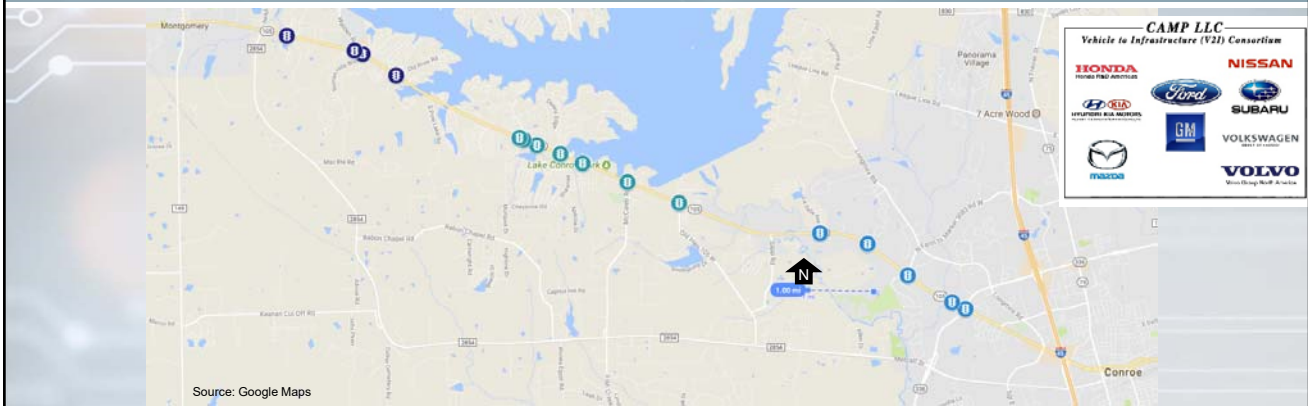
- Single closure
 - Multiple lanes
- Multiple closures
 - Alternate lanes
 - Same lane



Smart Intersection



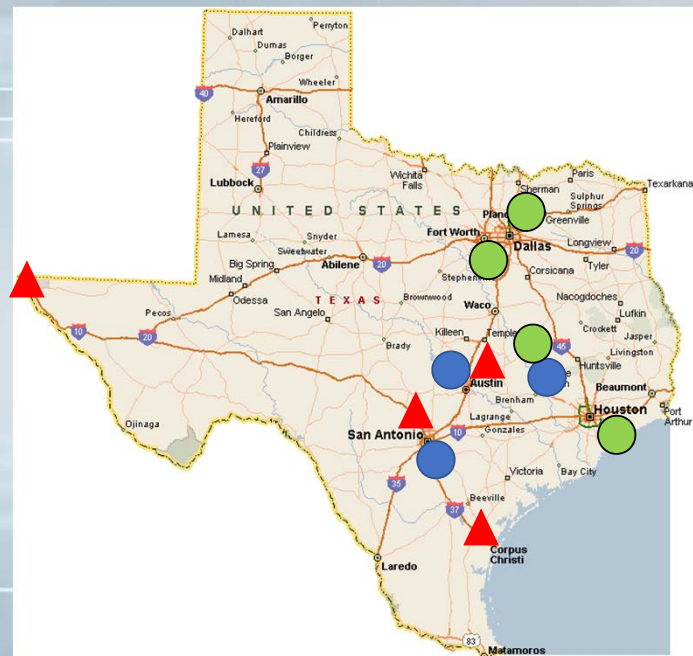
Traffic Optimization for Signalized Corridors



- 15 intersections between Montgomery and Conroe, TX covering about 12 miles
- All the intersections are operated by the City of Conroe
- Posted speed limit: 55 mph for 11 miles (less than 1 mi of east end is 45 mph)

Texas AV Shuttle Deployments

- Research Proving Grounds
- AV Deployment
- ▲ AV Planning



TSU Campus / Houston METRO

University District Project



1 Mile Closed Loop

Closed to Mixed Traffic/ Connect to Light Rail Line

Light Rail Line to Adjoining Campus

Light Rail Line to Transit Center

First Transit

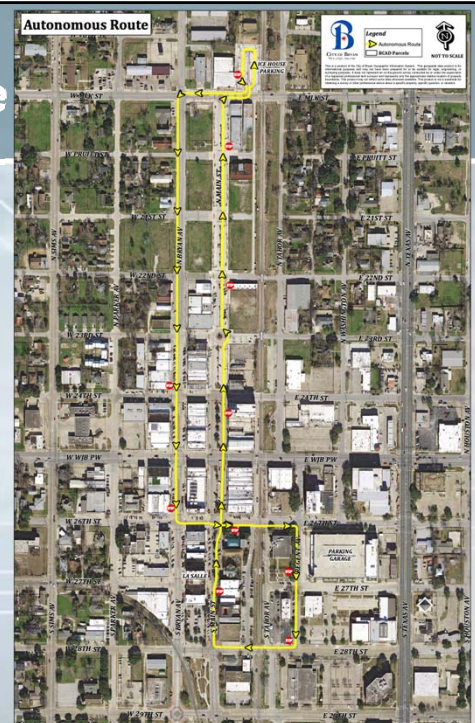
- Phase 1: 2019, campus
- Phase 2: First Neighborhood operation
- First Grade Crossing



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Bryan, Texas Texas A&M Autonomous Shuttle

- LIDAR, Stereo, GPS/INS
- Waypoint following
- Obstacle detection and path planning
- Pedestrian Interaction
 - Directed Speakers and LED
 - Gesture and Intent Recognition



HGACBuy - Statewide

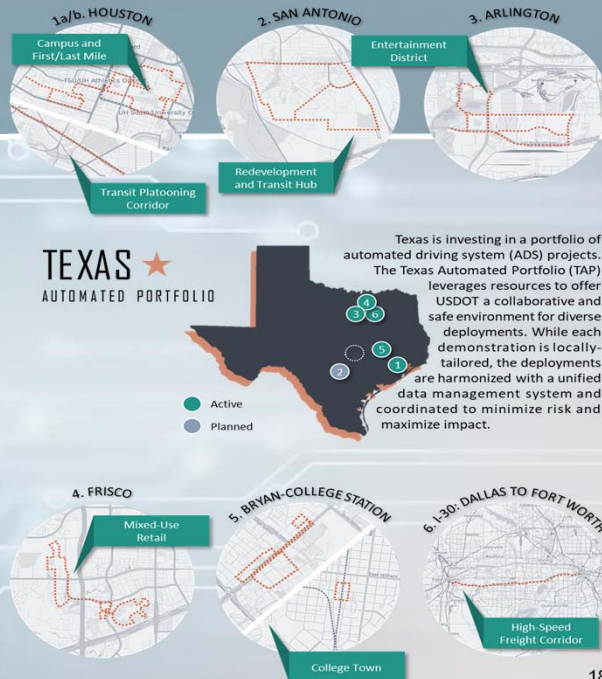
- Innovative procurement
- Statewide qualification for AV shuttle vendors
- Would allow public agencies to use HGACBuy for procuring vehicles / service
- 3 vendors qualified
 - Drive.ai, EasyMile, MayMobility
- New vendors will be allowed to apply



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AV Shuttles in Texas

- USDOT ADS Grant Application
- Leverage existing deployments
- Driving environments
 - Low-speed shuttle
 - On-demand AV Service
 - High-speed truck automation
- Unified data platform
- Safety analysis



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Variety of AV Deployments

	Houston	Arlington	Frisco	Bryan College Station	Texas A&M	VIA	CapMETRO + Houston	Corpus Christi
Vehicle	12 Passenger AV Shuttle	4 passenger van	4 passenger van	4 & 6 passenger electric vehicle	11 passenger AV shuttle	Not Decided - Will conduct an RFP	2-New Flyer Buses 1- Passenger Bus- TBD	15 Passenger AV Vehicle
Make	Easy Mile	Drive.ai	Drive.ai	Polaris	Navya	TBD	New Flyer	Navya
Model	Gen-2	Nissan NV200 Van	Nissan NV200 Van	GEM e4/e6	Autonom Shuttle	TBD	TBD	TBD
On Site Date	April 2019	October 2018	April 2018	Nov 2018	Aug-Nov 2019	TBD	Fall 2020	Fall 2019
Approvals	NHTSA	n/a	n/a	n/a	NHTSA	TBD	n/a	NHTSA
Approvals Status	Waiver Submitted & Pending Response	Meets NHTSA and Texas AV law	Meets NHTSA and Texas AV Law	Low-speed electric vehicle (less than 20 mph)	Waiver Request Submitted & Pending Response	TBD	Meets NHSTA standards	Waiver to be Submitted Following MOU

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Thank you!

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