

# TEXAS FREIGHT NETWORK TECHNOLOGY AND OPERATIONS PLAN



## Strategy

### AV INFRASTRUCTURE, CONNECTED SIGNING, AND DATA

<b>Freight Technology Area</b>	Connected and Automated Freight Vehicles
<b>Owner</b>	TxDOT Divisions
<b>Key Stakeholders</b>	TxDOT Districts, Traffic Management Centers (TMCs), Texas Department of Public Safety (TxDPS), Texas Department of Motor Vehicles (TxDMV), Metropolitan Planning Organizations (MPOs), Original Equipment Manufacturers (OEMs)/Startups, Connected Vehicle Product Vendors
<b>End-Users</b>	TMCs, Truckers

### Motivation

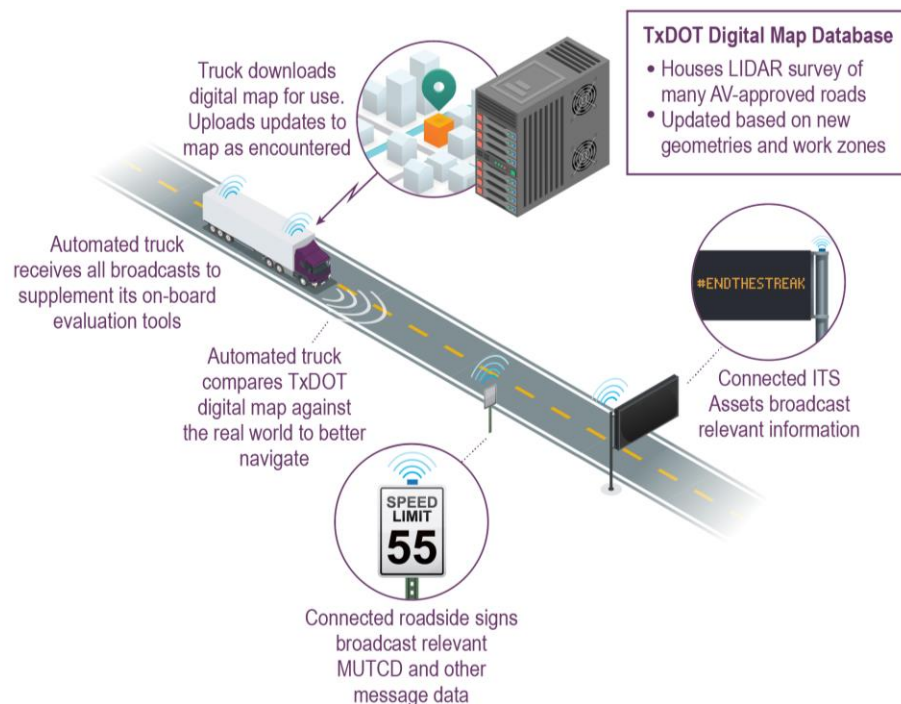
AV truck developers have identified challenges in navigating complicated statewide environments, such as atypical road geometries or construction zones, which are exacerbated by a lack of digital map standards to help provide guidance. Correspondingly, TxDOT is exploring opportunities to leverage cooperation with the AV industry to test and pioneer an electronic signage standard for the freight network.

### Strategy Description

To implement an AV-specific infrastructure program that deploys “Connected Signs” on roadways and a repository of digitized infrastructure data and mapping in coordination with stakeholders in the AV industry.

### Contribution to 2018 Texas Freight Mobility Plan Goals

- ✓ Mobility and Reliability
- ✓ Economic Competitiveness



## Strategy Scope

- Assist with developing an AV mapping standard that provides detailed documentation of core parameters.
- Create a database of the digitized map environment used by AVs that provides a consistent digitized roadway map available at a single source for all users.
- Install equipment on roadside static signs to broadcast location and message information (compliant with the Manual on Uniform Traffic Control Devices, or MUTCD) to help AVs assess roadway conditions (e.g., regulatory, warning, conditions, events).
- Install equipment on Intelligent Transportation System (ITS) assets, such as Dynamic Message Signs (DMSs), to broadcast notifications, advisories, or other messages via vehicle-to-infrastructure communications (V2I) to AVs to help support operational awareness.
- Implement mechanisms for users to contribute mapping updates based on construction projects or general surveys, and to add details on complex environments like road construction zones to help improve navigation.
- Explore opportunities for advanced AV environmental detection systems to contribute observations for crowdsourced data into the digitized map, collect real-time observations of local traffic based on sensor readings, and provide observations to support proper crash reporting when witnessing incidents.

## Examples of User Needs Addressed\*

- Need to develop the Houston-Dallas-San Antonio triangle with new smart technologies to improve operations.
- Need for connected truck infrastructure in Texas to support connected trucks and improve safety.
- Need to support the use of more technology for automating intermodal terminal operations to increase efficiency at these terminals.

## Potential Benefits\*

Safety	Mobility	Emissions
<ul style="list-style-type: none"> <li>• Up to 45% improvement of safety index (probability of incidents)</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 37% reduction in corridor travel times.</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 30% reduction in CO<sub>2</sub> emissions</li> </ul>

## Cost Estimates\*

Sample Capital Cost	Sample Annual Operations and Maintenance Cost
<ul style="list-style-type: none"> <li>• Statewide Database Server: \$998K - \$1.5M</li> <li>• Roadside Infrastructure per site: \$42K - \$73K</li> </ul>	<ul style="list-style-type: none"> <li>• Statewide Database Server: \$445K - \$603K</li> <li>• Roadside Infrastructure per site: \$2K - \$4K</li> </ul>

## Potential Timeline for Implementation

Near-Term (0-2 years)	Medium-Term (2-5 years)	Long-Term (5-7 years)
✓ Plan	✓ Deliver	✓ Deliver, Operate, Maintain

**Freight Modes Covered:** Highways

\* The full list of user needs and supporting sources for benefits and costs can be found in the FNTOP Strategies and Conceptual Framework Report.

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