



The Connected Highway: What It Means for Transportation Estimating

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Strategic Initiatives and Innovation Division

The Strategic Initiatives and Innovation Division (STR) is at the intersection of technology, data, and innovation, exploring transformative projects that **address mobility challenges and put new ideas into motion.**

STR advances TxDOT's enterprise initiatives within the agency's strategic plan and on behalf of executive leadership and works with transportation experts at the department and beyond to make Texas' transportation system future-ready.



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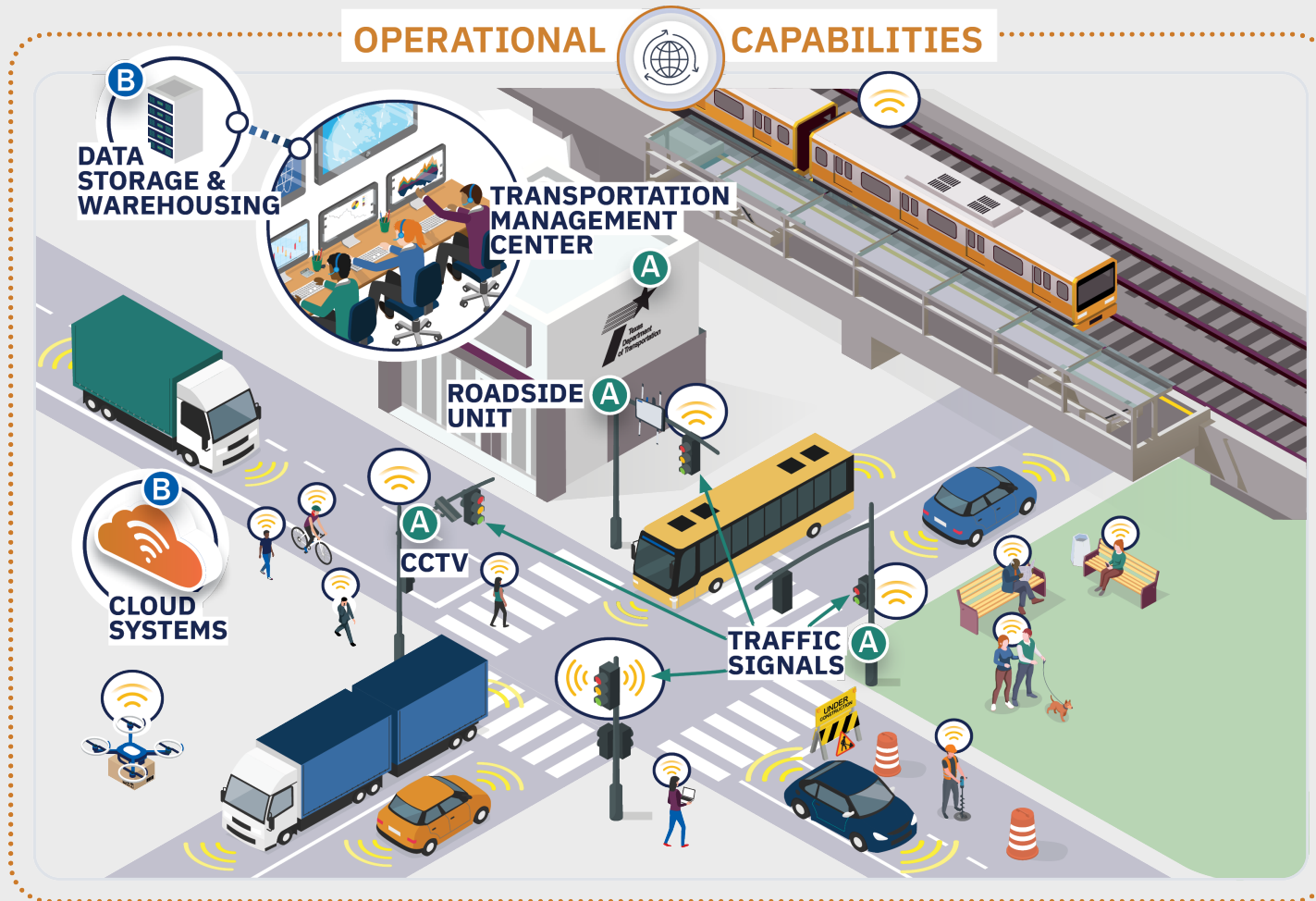
Transportation infrastructure is becoming connected, automated, and data-driven.

These emerging technologies introduce new cost elements, risks, and lifecycle considerations that may not exist in traditional roadway estimates.

Estimators play a critical role in helping agencies prepare for the transportation system of the future.



What is Cooperative and Automated Transportation (CAT) ?



CAT INFRASTRUCTURE EXAMPLES

Physical Infrastructure

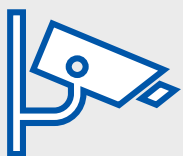
- Multimodal infrastructure
- Traffic control devices
- Intelligent Transportation System (ITS) devices
- Traffic management centers
- Connectivity infrastructure

Digital Infrastructure

- Cybersecurity and data privacy
- Digital communication network
- Advanced sensing technologies
- Data management platform
- Edge computing infrastructure
- High accuracy geographic information systems (GIS)

LEGEND:  Physical Infrastructure  Digital Infrastructure

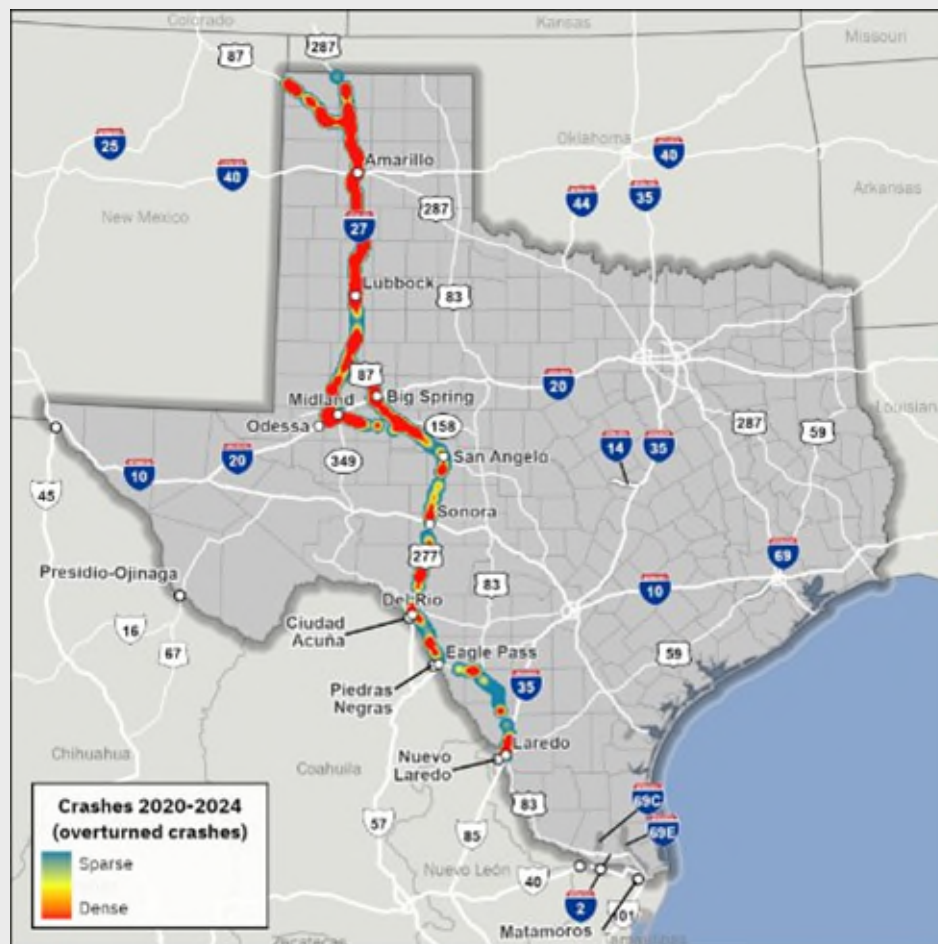
Cooperative and Automated Transportation Devices



Traffic Incident Management

AI Edge Analytic Cameras

- Stalled or stopped vehicles
- Large objects in traveled lane
- Pedestrian crossing and/or walking along freeway
- Sudden speed drop/queuing
- Agency-specified events



Edge Processing Camera

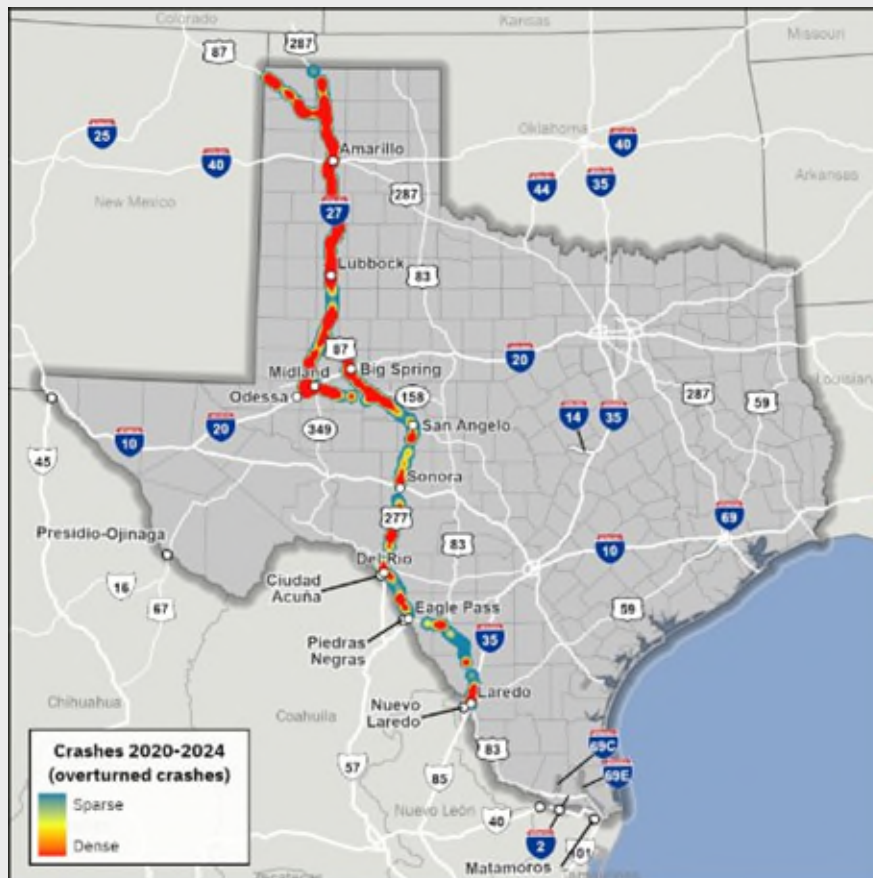
Cooperative and Automated Transportation Devices



Incident Detection and Traffic Management

Wrong-Way Driver Detection System

- Vehicle detection by radar or AI edge analytic camera
- Message sent traffic monitoring center
- Future enhancement to message road users directly



Wrong Way Driving Detection System

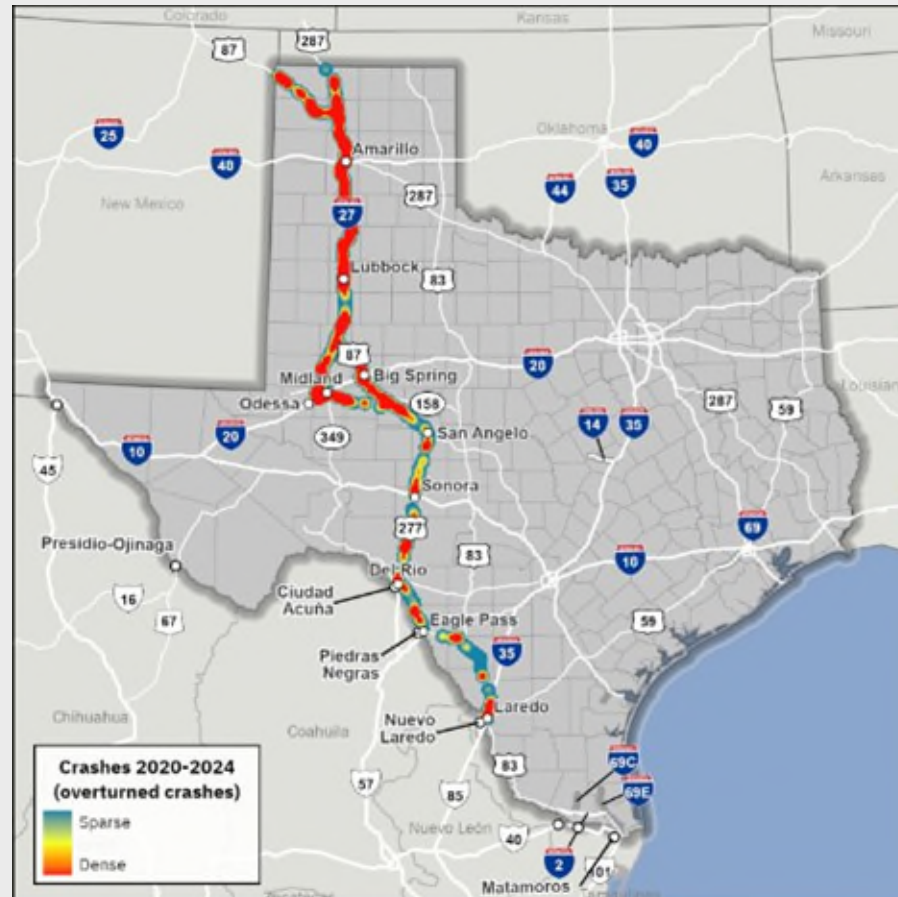
Cooperative and Automated Transportation Devices



**Incident Detection
and Traffic
Management**

Road Weather Information System (RWIS)

- Physical sensor or virtual sensor to provide data
- Message road users of road conditions based on weather detection to alter speed limit base on conditions



**TxDOT Truck
on icy road**

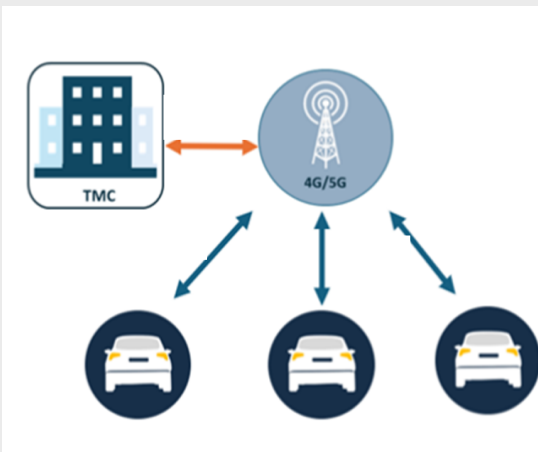
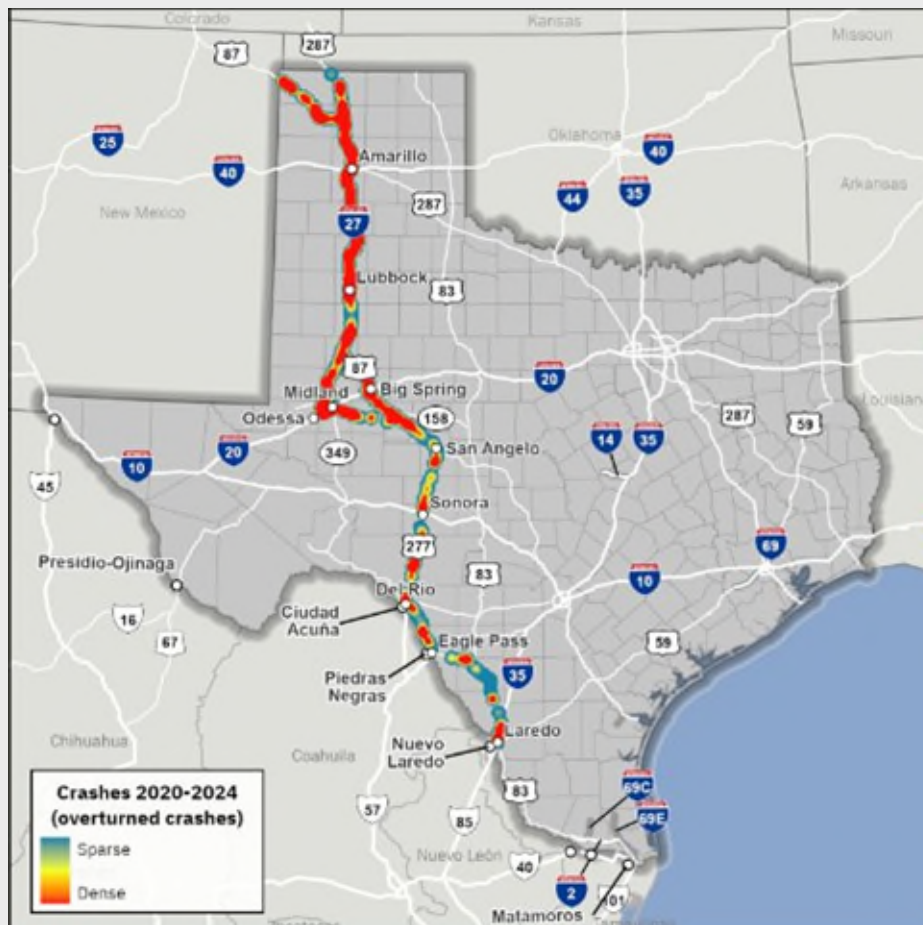
Cooperative and Automated Transportation Devices



Incident Detection and Traffic Management

Vehicle to Everything (V2X)

- Message vehicles directly of incidents and road conditions ahead (bridge clearance, maintenance, crashes, objects)
- Message wait times for congestion



USDOT Vehicle to Everything (V2X) Diagram

Future Cooperative Automated Transportation Applications

Predictive Analytics for Traffic Incident Management

- Analysis of Predictive Analytics Tool

TxDOT Maintenance Vehicle Alert

- Delivery of vehicle location
- Human Factors Consideration

Traveler Information Messages

- Delivery of Traffic Incident Messages
- Human Factors Consideration



Digital Infrastructure: Cost Estimating Challenges and Risk

Federal Domestic Material Program (BABA)

- Final assembly of devices
- Device materials

Construction Price Index

- ITS devices and digital infrastructure are excluded

Product interoperability

- Cost associated with platform integration

Service models

- Software maintenance and updates



Data center

Thank you!



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