What is a Concept of Operations?

It is a document that provides answers to the following questions:

**WHY**—What is the problem or opportunity addressed by the system?

**WHO**—Who are the stakeholders involved with the system?

**WHAT**—What are the elements and the high-level capabilities of the system?

**HOW**—How will the system be developed, operated, and/or maintained?

**WHERE**—What is the geographic and physical extent of the system?

**WHEN**—What is the sequence of activities that will be performed?

Overview

At a high level, the *High-Resolution Freight Traveler Information System* aims to expand the capabilities of TxDOT’s public-facing Advanced Traveler Information System (ATIS) DriveTexas™ to provide a high-quality freight traveler information service, focused on the Texas Highway Freight Network (THFN).
**WHY** What is the problem or opportunity addressed by the system?

- **EXPAND** the capabilities of TxDOT’s public-facing ATIS (DriveTexas™) to provide a high-quality freight traveler information service.
- **ENHANCE** the granularity of traffic information on Texas roads.
- **BUILD** additional elements into the enhanced traveler information service that assist with freight routing decisions, such as freight weight limits for certain roadways or height restrictions.
- **PROVIDE** an Application Programming Interface (API)-based architecture that allows TxDOT to securely collect and distribute data for public use.
- **CREATE** a mobile application (e.g., “DriveTexas™ Mobile for Freight”) that will provide real-time navigation routing tools.

**WHO** Who are the stakeholders involved with the system?

- **Owner**
  - TxDOT Divisions,
  - TxDOT Districts

- **Key Stakeholders**
  - TxDOT Districts,
  - TxDOT Traffic Management Centers (TMCs),
  - Metropolitan Planning Organizations (MPOs),
  - Trucking Industry Groups,
  - Transportation Data Providers

- **End-Users**
  - TxDOT TMCs, MPOs, Truckers,
  - Trucking Companies/Dispatchers, Other Roadway Users

**WHAT** What are the elements and the high-level capabilities of the system?

<table>
<thead>
<tr>
<th><strong>FEATURES</strong></th>
<th><strong>MAIN FUNCTIONS</strong></th>
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<tbody>
<tr>
<td>Expanded Traffic Data Coverage</td>
<td>Increase the geographic coverage and granularity of automated traffic data collection in Texas. Deploy additional state-owned traffic sensors to fill in coverage gaps. Utilize high-resolution private sector traffic data services for the THFN where state-owned sensors are not available.</td>
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<tr>
<td>Data Ingestion, Consolidation, and Aggregation from Multiple Real-Time Data Sources</td>
<td>Consolidate data from state-owned sensors, public agency data feeds, and/or private sector anonymized probe data services into a consistent format for each data type and place all information in a single digital space. Establish a trusted API mechanism to accept freight-related anonymized probe data, with established data use guidelines to encourage the private sector to contribute.</td>
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<tr>
<td>Generate Dynamic Traveler Information</td>
<td>TxDOT sensor data will be fused with other third-party probe-based data services to create a more robust scan of travel conditions along a route. Data services will not be limited to traffic speed data.</td>
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<tr>
<td>Generate Static Traveler Information</td>
<td>Static roadway inventory elements will be built into the enhanced traveler information service and include freight weight limits for certain roadways, height and width restrictions, and other parameters that assist with freight routing decisions.</td>
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<tr>
<td>Travel Condition Forecasting</td>
<td>Utilize AI-enabled forecasting tools to predict future traffic conditions, as well as incident management tools to screen for events. Advanced analytics, such as through artificial intelligence, differentiates this strategy from traditional systems by introducing the ability to process large volumes of traffic data and predict outcomes.</td>
</tr>
<tr>
<td>Information Distribution via Web Platform, Mobile Application, and Trusted API Connection</td>
<td>Enhance the DriveTexas™ platform to provide a mobile application to encourage use among truckers and establish a trusted API to broadcast data to the public and private data users, within parameters established under the data use guidelines.</td>
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<tr>
<td>Location-Specific Alerts</td>
<td>Distribute location-specific alerts to certain geo-fenced areas based on assigned message priorities.</td>
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<tr>
<td>Real-Time Freight-Specific Navigation Routing</td>
<td>Provide truck drivers with an appropriate navigation system that guides them through truck routes, avoiding local roads that are not suited for trucks (e.g., Waze/Google Maps for trucks).</td>
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</tbody>
</table>
The main anticipated benefits of the system include:

- The system would provide improved coverage statewide on route information, which provides truck dispatchers and drivers more opportunities to make pre-trip and en-route decisions to increase mobility.
- As more robust real-time traveler information is available, truckers would see increased overall efficiency based on avoiding congestion, in turn reducing their vehicle operating costs.
- Truckers would have more opportunities to make informed decisions or adjustments ahead of potential hazards, reducing secondary crashes and improving overall safety.
- This strategy would tailor route recommendations for truckers which would prevent routing trucks on unauthorized roadways.
- The improvements under this strategy would help fill in gaps in ITS coverage and increase the availability of freight-specific data.
- The system would help TMC operators better coordinate traffic management and incident response by expanding the number of tools at their disposal.

**HOW How will the system be developed, operated, and/or maintained?**

Advanced processing is a key component of this strategy. The advanced traffic data processing system would receive raw data from DriveTexas™, various standalone systems, other private sector data contributors (e.g., third-party traffic data services or anonymized freight probe data from Electronic Logging Devices or Truck Management Systems), as well as Connected Vehicles. This system would improve traffic and incident management through advanced analytics and early detection of network disruptions. Traffic condition and incident predictions from the advanced traffic data processing system would be communicated back to regional Advanced Traffic Management Systems (ATMSs), DriveTexas™, or via API data feeds for third-party application service developers, resulting in enhanced traveler information for the public and enabling time-dependent route planning for trucking companies.

**WHERE What is the geographic and physical extent of the system?**

While this strategy would focus on maximizing coverage on the THFN, not every section of the THFN would be instrumented with high-resolution traffic data services. Deployments would be done strategically to focus first on critical freight corridors and underserved routes. Truckers may notice differences in the quality of traveler information throughout the State.

**WHEN What is the sequence of activities that will be performed?**

The table below outlines a time-phased series of activities that are needed to accomplish the planning, implementation, and eventual full deployment of the High-Resolution Freight Traveler Information System.

<table>
<thead>
<tr>
<th>Near-Term Actions (0-2 years)</th>
<th>Medium-Term Actions (2-5 years)</th>
<th>Long-Term Actions (5-7 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing TxDOT Program/Initial Next Steps</td>
<td>Concept of Operations</td>
<td>System Requirements</td>
</tr>
<tr>
<td>No; Coordinate internally between TxDOT Divisions and regional partners</td>
<td>✓</td>
<td>□</td>
</tr>
</tbody>
</table>
OPERATIONAL SCENARIO
Incident-Related Traveler Information Using Artificial Intelligence

THE PROBLEM
Leo, an owner-operator new to the Houston area is advised to use the DriveTexas app when making a delivery to the Port of Houston. As he heads down I-10 he gets an audible text alert to “slow down temporary lane closure ahead” on his DriveTexas navigation.

A few minutes later he notices a Dynamic Message Sign (DMS) displaying the same information for those drivers not using the mobile app.

THE APPROACH
Leo is rerouted taking into account truck-permitted routes. He continues down I-610 passing several more DMS signs with the #EndTheStreakTX safety campaign...

...but his smartphone does not notify him of these audibly as information is prioritized to limit the number of in-cabin distractions.

THE SOLUTION
Early incident detection allows TxDOT to promptly respond to and clear incidents, helping reduce the rate of secondary crashes. DriveTexas helps drivers identify unanticipated events in real-time and more intelligently re-route drivers which results in measurable improvements in fuel savings.

Public sector benefits include reductions in emissions, Greenhouse gas (GHG), and contributions to managing congestion on key freight routes throughout the State.

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