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 Smart Freight Connector strategy would implement Intelligent Transportation Systems (ITS) along last-mile corridors leading to intermodal facilities to efficiently manage operations along key freight routes, such as adjusting the existing arterial traffic signal system to better accommodate freight traffic.
WHY  What is the problem or opportunity addressed by the system?

- **HELP** improve mobility, safety, and efficiency for trucks on last-mile connections, especially to intermodal facilities.
- **IMPLEMENT** traffic management technologies on last-mile corridors that will efficiently manage operations along key freight routes that lead to intermodal facilities.
- **COLLECT** comprehensive traffic and freight-related data to help determine the operational performance along a corridor.
- **ADJUST** arterial traffic signal phasing to better accommodate freight traffic.
- **PROVIDE** truckers with real-time parking availability options prior to their arrival.
- **PROVIDE** dedicated truck travel lanes, such as for automated vehicles (AVs) that drive exclusively between intermodal terminals and staging lots.

WHO  Who are the stakeholders involved with the system?

**Owner**
- TxDOT Divisions,
- TxDOT Districts,
- Local Communities

**Key Stakeholders**
- TxDOT Districts, TxDOT Traffic Management Centers (TMCs),
- Local Communities,
- Metropolitan Planning Organizations (MPOs),
- Intermodal Terminal Groups (maritime, railroads, and others)

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

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

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>MAIN FUNCTIONS</th>
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<tbody>
<tr>
<td>Real-Time Freight Traffic Data Collection</td>
<td>Traffic detectors and Weigh-in-Motion (WIM) stations would collect travel and freight data in real-time to determine the performance of operations along Smart Freight Connectors. This information would be used for real-time traffic management strategies, as well as performance measuring.</td>
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<tr>
<td>Real-Time Traffic Signal Phasing and Timing Updates</td>
<td>This feature would allow for traffic signal phasing and timing improvements for freight, prioritizing traffic signal timings in favor of freight movements upon detection of high freight demand. Progressive green lights along a corridor would reduce inefficiencies from stopping or starting. Increased yellow light intervals can increase safety when applicable for freight—such as during high freight demand or inclement meteorological conditions—by improving their chances to clear an intersection prior to the red light.</td>
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<tr>
<td>Real-Time Truck Parking Availability System (TPAS)</td>
<td>Truck staging areas would be instrumented with parking detection sensors to monitor real-time parking usage in the lot. These sensors would broadcast the remaining availability to truckers via highway signs.</td>
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<tr>
<td>Dedicated Truck Priority Lanes</td>
<td>Dedicated truck priority lanes would be a regulated operational improvement to permit certain trucks, such as AVs, to use the lane.</td>
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<td>Facilitation of Future Drayage Optimization Services</td>
<td>Private-sector terminal managers would potentially collaborate with TxDOT to optimize drayage appointments, which could couple with the Smart Freight Connector to align with the U.S. Department of Transportation Freight Advanced Traveler Information System (FRATIS) program.</td>
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The main anticipated benefits of the system include:

- This strategy would **improve freight mobility** for trucking fleets that utilize the corridor.
- This strategy would **improve economic competitiveness of the Texas freight industry** by reducing bottlenecks on intermodal connectors and surrounding freight routes.
- Aligning “green light” progression along a corridor to fit real-time truck movements would **increase corridor throughput through better traffic control**.
- Providing real-time parking availability information at staging lots near intermodal facilities would allow for **better accommodation of early arrivals**.
- By providing traffic control devices that respond in real-time to traffic conditions, opportunities to **improve safety can be realized**.
- By improving freight operations along a corridor, **the host community would experience benefits** as well.

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

New truck parking sensors and signs would utilize the truck parking management system that TxDOT is likely to procure as part of separate efforts (e.g., I-10 Corridor Coalition Truck Parking Availability System). The new processing components will interface with the Advanced Traffic Management System (ATMS) to provide alerts and notifications to TMC operators who might oversee the system. System logs, detector status, and notification events would be archived for reporting purposes, either as part of the ATMS database system or in a separate system. The WIM/permanent count data would be archived in the Traffic Count Database System and accessible through the Statewide Traffic Analysis and Reporting System (STARS II) website. Drayage optimization—if pursued—would be developed through private sector systems and would likely interface separately with users, although the systems would likely work together.

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

Not every intermodal connector or intermodal terminal-serving road would be instrumented with this strategy. Deployments would be done strategically to focus on the most critical corridors.

### 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 **Smart Freight Connector** strategy.

<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 with key local stakeholders</td>
<td></td>
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</tbody>
</table>

Legend:
- ✔ Completed
- ☐ Need to do
OPERATIONAL SCENARIO
“Green Progression” for Freight

THE PROBLEM
Lisa is an operator at the Houston TranStar Traffic Management Center (TMC) with five years of experience.

Lisa notices a notification on her Advanced Traffic Management System (ATMS) console from Galveston on SH 275, a major route that connects I-45 to the Port of Galveston.

Part of TxDOT’s Smart Freight Connector strategy, a Weigh-in-Motion (WIM) device on this route detects a high number of freight vehicles, triggering the notification.

THE APPROACH
Tuesday morning starts off routine as she monitors heavy congestion entering the City of Houston.

Lisa pulls the live video feed from nearby CCTV cameras and confirms that there are a large number of trucks clustered on SH 275.

Following the trucks on nearby CCTV cameras, she sees that the traffic signals are offering extended green time to accommodate for the large truck volume, preventing excessive queueing.

The WIM device evaluates the number of trucks passing and, with the lower volume, instructs the traffic signals to select their traditional time-of-day timing plans.

Routine operations are restored.

As Lisa continues her work day, she keeps a look out for other alerts from Smart Freight Connectors throughout the Houston region.

THE SOLUTION
10 minutes later, the corridor is still operating normally, but the volume of truck traffic is returning to normal.

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