I-10 Western Connected Freight Corridor

PLANNING FRAMEWORK STUDY
I-10 Corridor Coalition

Created among the four state transportation agencies along the western portion of Interstate 10:

- California Department of Transportation (Caltrans)
- Arizona Department of Transportation (ADOT)
- New Mexico Department of Transportation (NMDOT)
- Texas Department of Transportation (TxDOT)
I-10 Western Connected Freight Corridor Pooled Fund Study

Funded through FHWA Transportation Pooled Fund program, combining transportation planning and research funds from all four states.
**GOAL:** produce a Planning Framework for implementing operations and technologies that create a streamlined, connected vehicle experience for safe carriers across the I-10 Corridor, reducing friction for goods movement and expanding economic development in the West.
The Planning Framework Will

- Identify possible operations and technology improvements that could ease goods movement in the I-10 Corridor
- Engage stakeholders in determining corridor improvements that could have the biggest benefits for Corridor users
- Understand the factors that could affect implementation of suggested improvements
- Develop high-level scenarios of improvements, how the scenarios would operate, and why those scenarios would be more beneficial than alternatives
- Allow further detailed plans for implementation of operations and technology improvements to be developed by each state or across the Corridor

Engage stakeholders in determining corridor improvements that could have the biggest benefits for Corridor users
Understand the factors that could affect implementation of suggested improvements
I-10 Western Connected Freight Corridor

Area of Study
WESTERN CONNECTED FREIGHT CORRIDOR

What Has Been Done?

TASK 1
Develop Work Plan, Introductory Chapter

TASK 2
Corridor Inventory, GIS and Stakeholder Data

TASK 3
Information Synthesis, Strategy Identification

TASK 4
Stakeholder Workshops, Interviews
WESTERN CONNECTED FREIGHT CORRIDOR

What Has Been Done?

- TASK 5: Develop Operational Use Case Scenarios
- TASK 6: Implementation Barriers, Opportunities
- TASK 7: Planning Framework Report
- TASK 8: Final Report, Chapter Summaries
What Freight Programs Could Be Possible Along Corridor?

I-10 Coalition states have identified the following freight strategies for the Corridor Planning Framework:

- Interstate credentialing and permitting for regular and oversize/overweight movements.
- Truck parking and reservation systems.
- Transponder and roadside detection technology for safety and weight enforcement.
- Truck platooning and other commercial motor vehicle automation.
- Corridor-wide information on incidents, work zones and weather.
Coalition Implementation Priorities
Considerations in Setting Priorities

◦ Available resources: What public and private resources are available to support implementation of the strategies?

◦ Strategy readiness: How soon could the strategies be deployed?

◦ Public-sector and private-sector roles: How does the relative ownership and responsibility for these strategies fall among the public and private sectors?

◦ Implementation outlook: All things considered, what are the overall prospects for strategy implementation?
# Corridor Strategy Priorities

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<td>Strategy Readiness</td>
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<td>Extensive urban data, rural gaps</td>
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<td>Public/Private-Sector Roles</td>
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<td>70%/30%</td>
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<td>Implementation Outlook</td>
<td>Grant received for public spaces, high priority</td>
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Truck Parking Availability Systems

**WHY?**

- Across the four coalition states, demand for truck parking exceeds the available supply in some locations on the I-10 corridor.
- Drivers often do not know where to find parking spaces (public or private) where they may be available.
- Drivers being unable to find adequate truck parking located in the right locations, when needed can result in them parking in illegal or unsafe locations, such as highway off ramps or breakdown lanes, or to continue driving while fatigued.

Truck Parking on Ramp – Texas Canyon Rest Area, AZ
Truck Parking Availability Systems

WHAT?
- Truck parking availability systems provide timely information about truck parking opportunities.
- To address this, the coalition was awarded grant funding for a truck parking availability system that will deploy technology at the 37 public parking facilities to identify unused spaces and make this information available to drivers through dynamic parking availability signs, mobile smartphone applications, and web applications such as state 511 systems.
Truck Parking Availability Systems

NEXT?

Implementation requires:

- Equipment (field)—DOTs seeking to connect public rest areas to truck parking information systems will want to consider what kinds of devices will measure parking space occupancy and availability.

- Equipment (truck)—Drivers have different kinds of in-cab communications devices that connect to dispatchers, traffic information systems, HOS logging systems, and business and personal smartphones. Truck parking information systems should provide information to drivers and dispatchers already using different kinds of devices.

- Facilities (centers)—Use existing state data processing centers and integrate systems with public and private parking information.
Freight Traveler Information Systems

**WHY?** Stakeholders value having better, more accurate, and more timely information about traffic conditions in the corridor in a single transparent fashion.

Example Freight Traveler Information System Concept
Freight Traveler Information Systems

WHAT?
- The private and public sectors offer various forms of traveler information along most roadways, including I-10.
- The public sector provides the information through web services and applications, such as 511 systems and roadside dynamic message signs (DMSs) that post roadway conditions.
- An I-10 Advanced Freight Traveler Information System would consolidate many inputs and provide travel time, weather, and incident information to regional and long-haul trucking company operations staff, dispatchers, and drivers.
- Information delivery through websites, e-mail alerts, mobile applications, outputs to dynamic messaging signs (DMSs), and outputs to regional traveler information centers/511 centers.
Freight Traveler Information Systems

NEXT?

Implementation requires:

◦ Facilities—State DOTs and MPOs with urban traffic information centers may plan how to enhance data collection and enable communication among statewide traffic centers to cover the hundreds of miles of rural highway mileage and then share that information.

◦ Procedures—DOT traffic information centers may want to consider how to connect with the multiple law enforcement agencies along the corridor to get information on incident severity to communicate relative congestion impacts of incidents.
WHY?

- Advances in connected and autonomous vehicle technologies creates opportunities for enhanced freight movements such as “Truck Platooning.”
- Truck platooning involves a number of trucks equipped with state-of-the-art driving support systems. The vehicles move in a group or platoon with the trucks driven by smart technology and communicating with one another. Truck platooning and connected commercial vehicle offer potential safety and efficiency benefits.
Freight Technology Environment

WHAT?
- National standards and requirements for CAV systems and equipment need to be established since any CAV equipment or application would need to work in every state—not just the four western I-10 states—because tractors and trailers must be able to move freely wherever business takes them.
- I-10 Coalition states could prepare for future developments in automated vehicles (AVs) and connected vehicles (CVs)—and their combination (CAVs by planning for the technologies and beginning to develop infrastructure to enable and support vehicle-to-infrastructure (V2I) communications.
NEXT? Implementation requires:

◦ Equipment (field)—Since drivers obtain roadway information from pavement markings, retroreflective markers, and regulatory/advisory signs, these markers and signs will need to be machine readable for cameras and sensors of autonomous vehicles.

◦ Procedures—National and state regulations may require amendments or adjustments to respond to increasing automated capabilities of new equipment. States may consider pursuing special-purpose legislation that allows or encourages autonomous vehicle operations.
Roadside Safety Communication

**WHY?**
- There is a need for improved roadside safety-related communications to support enforcement, vehicle inspection, and driver safety monitoring for trucks using the I-10 corridor.
- Technologies such as in-vehicle sensors, V2I communications, and interconnected enforcement systems can be used to enable virtual and automated safety inspections.
The I-10 roadside safety communication strategy would develop the truck-road infrastructure necessary to improve the efficiency of state enforcement personnel monitoring and screening of trucks, and to promote a new type of wireless, rapid truck safety inspection that covers truck brake wear, tire pressure, and driver hours of service (HOS).

Technologies and systems could include:

- Electronic screening (e-screening), involving automatic identification and safety assessment of a commercial vehicle in motion.
- Virtual weigh stations/electronic permitting, in which roadside technologies can be used to improve truck size and weight enforcement.
- Wireless Roadside Inspection Program, examining technologies that send safety data (on the driver, vehicle, and carrier) directly from the vehicle.
States may consider pursuing the development of the commercial motor vehicle (CMV) vehicle to infrastructure (V2I) communications infrastructure to enable state enforcement personnel to more efficiently inspect trucks for compliance with safety requirements.

Implementation requires:

- Equipment (field)— As trucks are equipped with more onboard monitoring systems, the public sector will be interested in discovering the right mix of sensors and communications devices to communicate directly with the trucks rather than with a transponder or smartphone.

- Procedures—The public and private sectors will face the challenge of agreeing on how to share private onboard truck data with public law enforcement agencies, both remotely (at driving speeds) and during roadside inspections.
Permitting Standardization

WHY?

◦ When carriers and shippers need to move oversized goods on specialty vehicles through more than one state along the I-10 corridor, they must often duplicate shipment information in multiple permitting systems.

◦ A single OS/OW move can take six to eight weeks to plan, involving coordination across multiple state permitting systems.

◦ A seamless, one stop permitting system could simplify and reduce the time required to obtain permits.
Permitting Standardization

WHAT?

◦ Coalition states could build on an OS/OW standardization initiative begun by the Western Association of State Highway and Transportation Officials to create baseline operational rules (escorts, time-of-day restrictions, and signage) and permit information sharing.

◦ This process could be automated to a new standardized permitting process that covers the four states.
Permitting Standardization

NEXT?

- The standardization of oversize/overweight (OS/OW) truck permitting requirements across multiple states might require states to analyze laws and regulations, clarify permitting processes, and engage in intergovernmental negotiations.

- Implementation requires:
  - Facilities (centers)—Each permitting agency can expect to develop processes to share information on multistate permit moves to all agencies across state lines so that applicants do not duplicate effort and commerce moves freely along the corridor.
  - Procedures—The permitting agencies may need to identify baseline information necessary for coordination, understanding that each state has unique regulations.
How the Strategies Would Work
Scenario 1: Automated truck movement from El Paso, Texas to Riverside, California
Scenario 1: Automated Truck Movement

- The trip begins at a yard in El Paso, Texas, with a driver in a standard tractor picking up a trailer filled with the refrigerators and driving it to a transition point along I-10.
- Once there, the driver unhooks the trailer and it is connected it to the autonomous tractor with driver partial control. That truck carries the load 650 miles along I-10, handing it off to a driver at a transition point somewhere between Indio and Palm Springs, CA, where the trailer was switched to a standard tractor.
- A driver then drives that non-automated tractor and load to a distribution center in Riverside, Calif.
- Corridor Concepts illustrated: Automated/Connected vehicle environment; Automated Freight Traveler Information Systems (AFTIS); Truck Parking Availability Systems; Roadside Safety Communication.
6:00 am Mountain Time, Socorro, Texas warehouse. Trailer of white goods leaves warehouse with conventional tractor, travels to I-10/Horizon Blvd Flying J Truck Stop southeast of El Paso.
6:15 am, Sparks, Texas truck stop. Automated, instrumented Embark tractor and driver exchange Electrolux trailer and the Automated vehicle enter I-10 Westbound.
6:30 am, El Paso, Texas. Driver receives AFTIS information on work zones and congestion in El Paso in advance of early morning rush hour.
7:30 am, Anthony, New Mexico. Driver comes up on Anthony POE (24 hour operations) and CMV safety inspection/weigh station. Vehicle transponder conveys vehicle/driver/carrier information through Pre-Pass/Drivewayze system and truck is cleared to move along without stopping.
9:30 am, Lordsburg, New Mexico. Driver pulls into truck stop for 15 minute bathroom break and snack. Driver checks AFTIS information systems for construction, weather, and congestion information about Tucson and Phoenix.
9:15 am Arizona Time, San Simon, Arizona. Driver comes up on San Simon AZ POE and CMV safety inspection/weigh station. Vehicle transponder conveys vehicle/driver/carrier information through Pre-Pass/Drivewyze system and truck is cleared to move along without stopping. Arizona law enforcement is aware of driver passing NM checkpoint without incident.
10:45 am, Tucson, Arizona. Driver enters urban section of I-10 in Tucson, receives any updated AFTIS information. Arizona DOT crews have maintained the interstate section to remove debris and tire carcasses, and maintained clear pavement markings and reflectivity on all signage so that onboard cameras and sensors can maintain lane integrity in higher traffic area.
12:30 pm, Phoenix, Arizona. Driver pulls off interstate into truck stop for 15 minute break and to access lunch stored in the onboard cooler. (Cumulative driving hours: 6:30). Driver receives any updated AFTIS information on interstate conditions ahead.
12:45 pm, Phoenix, Arizona. Driver pulls back onto I-10 westbound.
2:45 pm, Ehrenberg Arizona. Driver approaches Ehrenberg POE and is waved through pre-clearance lanes. Arizona law enforcement had records of earlier pre-clearance events earlier in the day.
3:15 pm, Blythe, California. Driver approaches WB Blythe CHP weigh station, and is waved through pre-clearance lanes. California law enforcement had records of earlier pre-clearance events earlier in the day in other states.
3:45 pm, Desert Center, California. At this point, without any delays, the Driver is at 9 hours and 30 minutes of cumulative driving time. If the Driver has experienced any delays along the route due to construction, congestion or weather, or stopping at ports of entry, or if WB traffic en route to Riverside is congested, then the Driver and dispatcher will need to identify a place to park in a safe place somewhere between Indio and Palm Springs (suitable for the expensive tractor involved in the automated movement). The Driver and dispatcher would then need to access the I-10 truck parking information system (which would have information on public and private truck parking availability).
5:30 pm, Banning, California. Without any other delays, in part through all other I-10 corridor functions, Driver reaches CHP weigh station and inspection station at Banning and exchanges trailer with conventional tractor. Conventional tractor (and new driver) takes tractor 30 miles into Riverside California warehouse.
Scenario 2: OS/OW movement from Long Beach, California to Fort Stockton, Texas
Scenario 2: OS/OW movement

- This illustration shows a permitted OS/OW load for specialty oil and gas drilling equipment manufactured in Asia, shipped through the Port of Long Beach and destined for wells outside Fort Stockton, Texas.
- Before the move, the carrier uses the coordinated permitting system and by entering shipment information and manifests once into the California permit agency, the baseline permit information for this shipment will be shared among the I-10 corridor states.
- Once the information is processed and the states have returned their OS/OW approvals and fees are electronically paid for, then the multi-state OS/OW permit is issued.
- Delivery of the permit can be via multiple methods such as fax, email or downloadable to a mobile device.
7:00 am, Pacific Time, Port of Long Beach Terminal, California. Carrier arrives at terminal and specialty drilling equipment is loaded and secured on OS/OW tractor trailer. Driver proceeds 90 miles along I-710, I-605, CA-60 to I-10 in Beaumont, California. Driver will make use of AFTIS information on road conditions, congestion and weather.
10:00 am, Beaumont, California. Driver enters I-10 eastbound.
10:15 am, Banning, California. Driver approaches Desert Hills EB weigh station. Even though carrier participates in pre-clearance program, today this OS/OW load is checked to make sure the proper permits are in place and the load is secured properly. This process takes no more than 15 minutes. Driver takes short break during permit check.
12:30 pm, Arizona Time, Ehrenberg, Arizona. Driver approaches EB Ehrenberg POE weigh station, and is waved through pre-clearance lanes. Arizona law enforcement had records of the permit check in Banning.
2:30 pm, Avondale, Arizona. Driver exits I-10 for Pilot Truck Stop. Takes short break, buys lunch for the road. Driver checks AFTIS system for information on congestion and traffic information in Phoenix and Tucson.
4:30 pm, Tucson, Arizona. Without any other delays, Driver is now at 9 hours cumulative driving time and will need to find truck parking in the next two hours. The Driver can communicate with the Dispatcher to check the truck parking information system to locate available parking in the section of rural Arizona ahead. The dispatcher locates parking available at the TA truck stop at Exit 340 in Willcox, Arizona.
5:45 pm, Willcox, Arizona. Driver exits I-10 and enters TA truck stop to park for the night.
6:00 am, Arizona Time, Willcox, Arizona. Driver re-enters EB I-10.
10:00 am, Mountain Time, Anthony, New Mexico. Driver comes up on Anthony POE (24 hour operations) and CMV safety inspection/weigh station. Vehicle transponder conveys vehicle/driver/carrier information through Pre-Pass/Drivewyze system and truck is cleared to move along without stopping. New Mexico law enforcement had information on permit checks in California the previous day.
1:00 pm, Central Time, Van Horn, Texas. Driver comes up on Texas DPS weigh station. Vehicle transponder conveys vehicle/driver/carrier information through Pre-Pass/Drivewyze system and truck is cleared to move along without stopping. Texas law enforcement had information on permit checks in other states on this trip.
1:15 pm, Van Horn, Texas. Driver stops Pilot Truck Stop in Van Horn for short break and to pick up lunch for the road.
1:30 pm, Van Horn, Texas. Driver returns to EB I-10.
3:15 pm, Fort Stockton, Texas. Driver exits I-10 and proceeds north on US 285 to well site 20 miles northwest of Fort Stockton.