ITS in control on the border

State-of-the-art ITS technologies are being deployed for tracking of commercial vehicles at the US-Mexico border in Arizona, reports Pete Goldin

The border between the US and Mexico may be the epitome of America’s wild west, but this remote desert frontier is being tamed by the Arizona Department of Transportation (ADOT) with a state-of-the-art ITS system. A comprehensive port-of-entry (POE) screening system is being deployed at the Mariposa Port of Entry – one of the busiest land ports in the nation – at the border crossing near Nogales, Arizona, to track commercial vehicles.

The Mariposa Port of Entry serves as the main entry point for fresh produce entering the US from Mexico. It is also a key link in the CANAMEX Trade Corridor, a freight transportation route linking Mexico, the US and Canada which is considered a high priority corridor by the US government.

The POE system will pre-screen vehicles that pass over each of the seven lanes at the border crossing. This new cutting-edge solution serves as an excellent example of the essential role ITS can play in transportation management at border crossings.

“When deployed at international border crossings, ITS technologies benefit both the commercial vehicle operators and carriers as well as the enforcement agencies by allowing compliant vehicles to be identified in real time so they can cross the borders with minimal delay,” says Randy Hanson, executive vice president and chief operating officer of International Road Dynamics (IRD), based in Saskatoon, Saskatchewan, Canada.

ADOT awarded IRD the US$1.8M contract as the sole ITS vendor to build the port-of-entry screening system.

“ITS technologies in combination with electronic screening and agency specific business rules enable enforcement agencies to specifically tailor their strategies for non-compliant vehicles, resulting in the most effective use of resources,” Hanson adds.

Epic implementation

The screening system, which is expected to be in place at Mariposa Port of Entry this Spring, includes weigh-in-motion (WIM) scales, license plate readers (LPR), USDOT readers, automatic vehicle identification (AVI), and an upgraded EPIC (Expedited Processing at International Crossings) system.

Its implementation is being funded through the Coordinated Border Infrastructure Programme, a federal grant initiative established as part of SAFETEA-LU, the transportation reauthorization act, to improve the safe movement of motor vehicles at and across US borders with Canada and Mexico. State matching funds are also required. Hensel Phelps is the prime contractor, Mac Electric is the electrical contractor, and IRD provides onsite installation supervision with support from TransCore and Hi-Tech Solutions.

The POE system starts from the ground up, with one scale platform and one DYNAX axle sensor deployed per lane. IRD 4020 SSWIM (slow-speed weigh-in-motion) scales combine in-motion and static scales designed for weighing freight vehicles at low speeds.

Meanwhile, images produced by the LPR system and USDOT Reader – capturing unique USDOT numbers displayed on the sides of vehicles transporting interstate cargo – will be linked to the record of each vehicle. Both systems feature optical character recognition (OCR) to extract the license plate number from the captured image.

“The most significant breakthrough on this project is the advancement of machine vision technology to capture and perform OCR in order to automate data capture from commercial vehicles,” Hanson explains. Machine vision has been used extensively in tolling applications but is now gaining popularity in commercial vehicle tracking and enforcement applications, such as port-of-entry screening.

In addition, unique transponder numbers detected by the AVI system will be linked to the record of each vehicle and the POE system includes high resolution cameras capable of taking...
pictures in all lighting conditions. These cameras will capture an image of each entire commercial vehicle to tag with its record. This provides additional identification of the vehicle to support the LPR and USDOT reader images. With 42 cameras, the Mariposa Port-of-Entry represents the most cameras ever deployed by IRD at any single site.

All of the IRD technologies will be integrated into the EPIC Management System, which has been customised for this project. For example, the EPIC software has been enhanced to allow tracking of vehicle processing times for statistical analysis on an individual vehicle basis.

Screening process
ADOT will use the information presented by the EPIC system as well as the Federal Motor Carrier Safety Administration (FMCSA) SAFER-CVIEW (Safety and Fitness Electronic Record – Commercial Vehicle Information Exchange Window) data to determine if each commercial vehicle has met all the screening criteria. Screening checks are performed in the EPIC system by comparing vehicle and carrier information against predetermined parameters. The system analyses the weight and size of each truck to make sure it is compatible with the vehicle’s official permit. It also automatically checks the truck against safety credentials, HazMat registration, International Fuel Tax Agreement, International Registration Plan, PRISM (Performance and Registration Information Systems Management) and Motor Carrier Safety Improvement Process. ADOT, in cooperation with FMCSA and the Arizona Department of Public Safety, can also conduct manual screenings as well.

The system will identify the vehicle, pull up its previous record and determine if the vehicle requires a safety inspection. Truck drivers interact with ADOT enforcement officers at the end of the screening for a final clearance. If a vehicle meets all screening criteria at the ADOT enforcement lane and no inspections are required, it will be released to exit the facilities.

The US may see an increase in commercial vehicles crossing the border, due to recent US and Mexican policies that streamline border crossings to encourage surface trade. But ADOT says the POE system is being set up to process all such vehicles coming through the port in the same way. All will be checked out and run through the EPIC system to ensure they meet state requirements. There is no special treatment for any vehicles, “The new system automates almost everything that needs to be checked on the commercial vehicles. The new version of EPIC will be able to access a federal database and pull the vehicle’s previous record and credentials. With these new technologies, officers will have the necessary information before the vehicle reaches the booth to interact with the officer.”

The new technologies will help officers at the port to identify the vehicles coming through quicker than before which can help with traffic flow, Harding says.

“We expect to be able to handle more commercial vehicles through the port after the new infrastructure is in place,” Harding continues. “The new system will increase the efficiency of the port and also allow the officers to be more diligent in their screening of commercial vehicles that come across the border to the US.”

“The technologies and automation being provided by the EPIC facility is leading-edge in that the level of automation provides more information to border inspectors in order to better select those vehicles that require additional inspection. Significant increase in traffic flow and reductions in border crossing times will result. Preliminary estimates show that such automation will reduce wait times by more than 50%.”

By integrating the POE screening technology with a border wait time monitoring system at Mariposa Port of Entry, the efficiency of the pre-screening tool can be assessed with visibility of time efficiency for the commercial truck processing at the facilities. Furthermore, advantages of ITS on the border go beyond increased productivity for the State of Arizona and the US government, and reduced wait times for commercial vehicles. The big picture includes safer highways across the US in general, as well as improved hazardous material control.

In addition, a streamlined screening process that focuses inspections on high-risk vehicles benefits legitimate trucking businesses and their customers. Hanson says: “Pre-screening is a tool that can speed up processing of the commercial vehicles and allow for more efficient delivery of goods, saving the trucking industry time and money.”