

Intelligent Transportation Systems at International Borders

A CROSS-CUTTING STUDY



**Facilitating Trade and
Enhancing Transportation Safety**

April 2001

Foreword

Dear Reader,

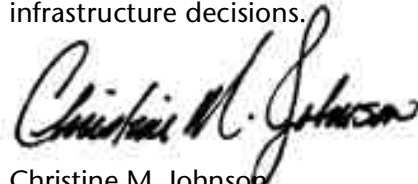
We have scanned the country and brought together the collective wisdom and expertise of transportation professionals implementing Intelligent Transportation Systems (ITS) projects across the United States. This information will prove helpful as you set out to plan, design, and deploy ITS in your communities.

This document is one in a series of products designed to help you provide ITS solutions that meet your local and regional transportation needs. The series contains a variety of formats to communicate with people at various levels within your organization and among your community stakeholders:

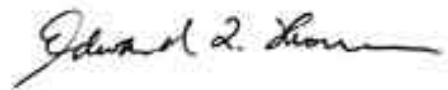
- **Benefits Brochures** let experienced community leaders explain in their own words how specific ITS technologies have benefited their areas;
- **Cross-Cutting Studies** examine various ITS approaches that can be taken to meet your community's goals;
- **Case Studies** provide in-depth coverage of specific approaches taken in real-life communities across the United States; and
- **Implementation Guides** serve as "how to" manuals to assist your project staff in the technical details of implementing ITS.

ITS has matured to the point that you are not alone as you move toward deployment. We have gained experience and are committed to providing our state and local partners with the knowledge they need to lead their communities into the next century.

The inside back cover contains details on the documents in this series, as well as sources to obtain additional information. We hope you find these documents useful tools for making important transportation infrastructure decisions.



Christine M. Johnson
Program Manager, Operations
Director, ITS Joint Program Office
Federal Highway Administration



Edward L. Thomas
Associate Administrator for
Research, Demonstration and
Innovation
Federal Transit Administration

NOTICE

The United States Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear herein only because they are considered essential to the objective of this document.

Contents

<i>International Border Clearance Program Overview</i>	2
<i>IBC Operations Concept</i>	4
<i>Overview of Border Sites</i>	
<i>Northern Border Sites</i>	6
<i>Blaine, WA</i>	8
<i>Buffalo, NY</i>	10
<i>Detroit, MI</i>	12
<i>Southern Border Sites</i>	14
<i>Laredo, TX</i>	16
<i>Nogales, AZ</i>	18
<i>Otay Mesa, CA</i>	20
<i>Significant Findings, Conclusions and Opportunities</i>	22

International Border Clearance Program Overview

What is the IBC Program?

The International Border Clearance (IBC) program was initiated under the provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The program was originally conceived as a means to test the feasibility of utilizing Intelligent Transportation Systems (ITS) technologies at border crossings to facilitate trade and transportation safety, and expedite the processing of commercial vehicles through ports of entry in states along international borders. In support of a Vice Presidential initiative to develop an international trade processing system, the IBC program was expanded to provide a means to help the U.S. Treasury address requirements for improved trade statistics and more effective import/export processing.

The IBC program directs and coordinates the deployment of ITS technologies at international border crossing sites for the facilitation of trade and the enhancement of commercial vehicle safety. The program addresses these goals by leveraging advancements in information technology and vehicle identification to provide federal and state agencies the information necessary to quickly and effectively make informed decisions regarding the cargo, vehicle, and driver crossing the border, and the need to inspect vehicles entering the U.S. The ability to do so will allow vehicles, operators, and shipments to be processed expeditiously, more accurately, and faster than is currently possible, and result in a reduction of congestion and environmental impacts.

What's been Accomplished?

Since ISTEA was enacted, ITS technologies have been deployed and tested at seven border crossing sites—two on the U.S./Canada border, and five on the U.S. border with Mexico. Working closely with representatives from other federal, state, and local agencies, systems developers, and private shippers and motor carriers, the Federal Highway Administration (FHWA) has sponsored and co-funded the installation of dedicated short-range communications (DSRC) systems, local processing systems and networks, and connectivity to other federal and state systems.

Work continues to further expand the utility and value of IBC implementations through the development of interfaces with state commercial vehicle information systems being developed and deployed under the FHWA ITS/Commercial Vehicle Operations (CVO) program.

What Constitutes the IBC Program?

The IBC program is comprised of:

- (1) Technology deployments at select border crossing sites
- (2) Interfaces with existing and planned federal and state safety and trade processing systems
- (3) Partnerships with U.S., Canada, and Mexico transportation, customs and immigration agencies; and
- (4) Liaison with private sector stakeholders involved with international border crossing facilities and activities.

During FY 1997-1998 the field operational testing phase of the IBC program, the following seven sites had ITS technologies deployed:

- Buffalo, NY
- Detroit, MI
- El Paso, TX (limited testing)
- Laredo, TX (2 sites)
- Nogales, AZ
- Otay Mesa, CA

During FY 2000-2001, testing is being conducted at two sites: Laredo and Detroit. This testing was designed to demonstrate technologies that will support using a Freight and Trade Processing System (FTPS), which has a direct interface with the customs system at these sites. The FTPS or its



equivalent, is a system under development which provides data that can be used to facilitate trade and transportation at our Nation's border crossings. The FTPS, or an equivalent system, will allow verification of a commercial motor vehicle's registration and safety status prior to the vehicle crossing the border.

The Purpose of this Study:

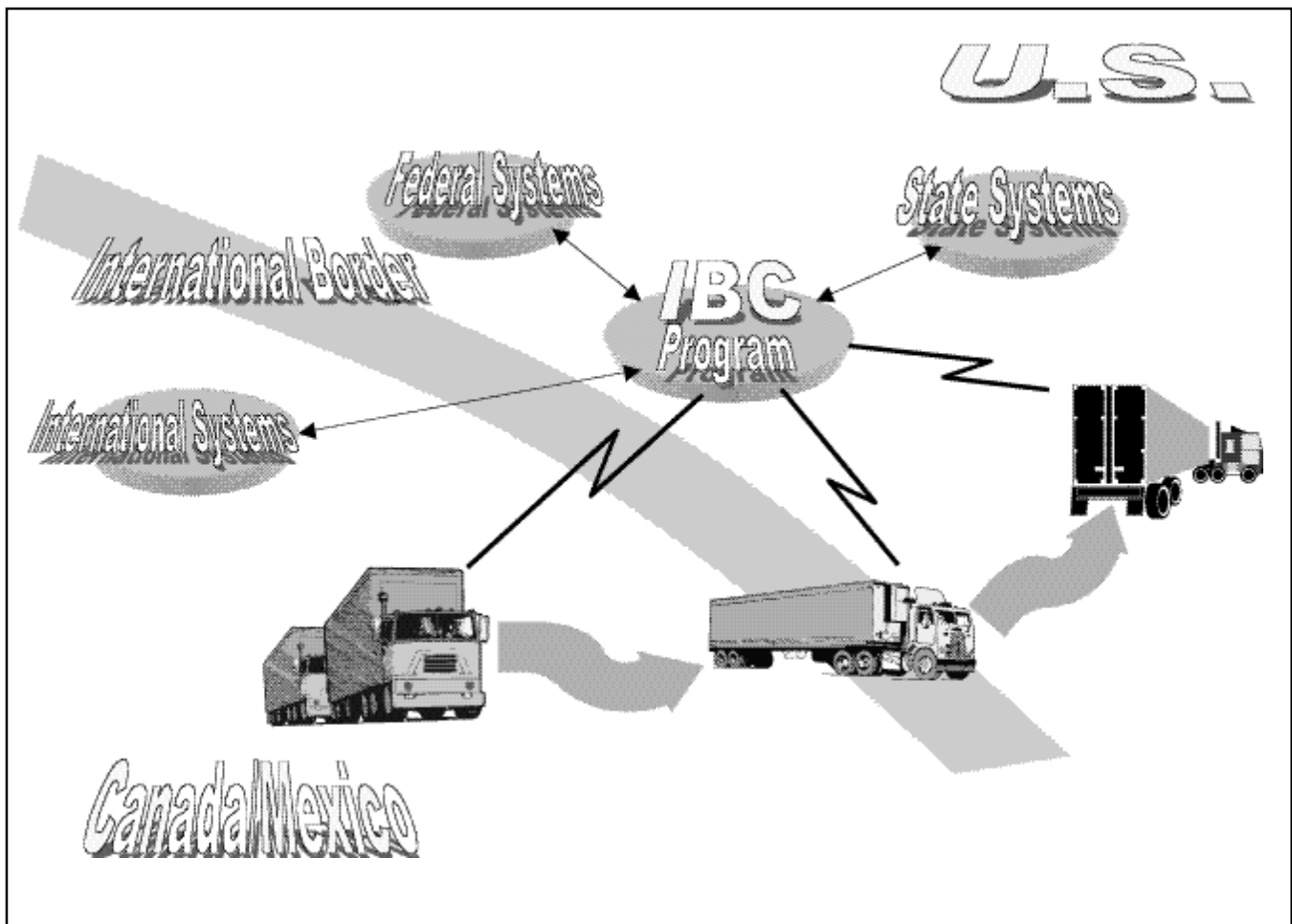
The primary purpose for this study was to identify examples of how IBC has made progress toward its goals of facilitating trade and enhancing safety. The authors compiled information regarding experiences and lessons

learned by the agencies involved in the implementation of IBC technologies, and potentially impacted by their deployment.

This study represents findings gathered from field operational test (FOT) evaluation reports, and during interviews with federal, state, and industry officials at six border crossing sites:

- Blaine, WA
- Buffalo, NY
- Detroit, MI
- Laredo, TX
- Nogales, AZ
- Otay Mesa, CA

IBC Conceptual Overview



IBC Operations Concept

IBC Vision:

The seamless, harmonized, and timely clearance of international commerce between and through trading countries resulting in safe and legal commercial operations. This vision is to be achieved through the harmonization of documentation, the standardization of data elements, and the acceptance of an international data syntax for the exchange of transportation and trade data.

Who is Involved?

- Sixty-five (65) U.S. agencies are involved in international goods movement monitoring, enforcement, and measurement, including:
 - U.S. Department of Transportation (USDOT)
 - U.S. Treasury Department
 - U.S. Customs
 - Immigration and Naturalization Service (INS)
 - U.S. Food and Drug Administration (FDA)
 - U.S. Department of Agriculture (USDA).
- The Office of Freight Management and Operations within the Federal Highway Administration is managing the IBC program.
 - This office manages the installation and upgrade ITS technologies at international border crossings to facilitate the safe flow of commercial trade at several field operational test sites, with local installations supporting multiple federal and state systems.
 - This office also works to facilitate the integration of physical architectures and systems initiatives of federal and state governmental agencies in the U.S., Canada, and Mexico.
- States are responsible for the enforcement of weight and safety laws.
 - Public safety agencies (i.e., law enforcement) weigh and inspect commercial trucks, with the assistance of federal Motor Carrier Safety Assistance Program (MCSAP) inspectors at select ports.

How it Works:

The IBC system architecture was designed to accommodate a wide variety of information management and exchange scenarios among the many public and private organizations involved

with international goods movement.

Prior to the arrival of a given commercial vehicle at the border, trading firms (typically through customs brokers) electronically filed the appropriate declarations to U.S. Customs through the North American Trade Automation Prototype (NATAP). The NATAP was a prototype interface to the International Trade Data System (ITDS) under development by U.S. Treasury. These declarations were in the form of CUSDEC (customs declarations for cargo) and CUSCAR (customs and immigration declarations for the carrier, vehicle and driver) messages. The NATAP evaluated the CUSCAR and CUSDEC data, which allowed processing prior to the arrival of the shipment at the border. In current tests, the FTPS will receive the data and make it available to state motor vehicle enforcement agencies that perform credentials and safety screening of the carrier, vehicle, and driver. Each agency will then return their pre-arrival screening results to the border via the FTPS.

Upon arrival of the shipment at the border crossing site, a unique identifier, stored on a transponder located in the truck cab, was read by DSRC and transmitted to the local trade processing system, which forwarded the unique identifier to the NATAP in Washington D.C. The NATAP used the unique identifier to retrieve the appropriate consolidated pre-arrival screening results. The NATAP then returned the results as a recommendation to the customs inspector, located at the border crossing site. The recommendation authorized release of the cargo and conveyance, or identified the need for further review at the secondary inspection area within the border compound. The IBC system was then used to provide direction to the commercial vehicle operator in the form of a “red” or “green” response – a red indicating the need to proceed to secondary inspection, and a green indicating clearance to proceed to the exit of the compound. In current tests, if the red light is the result of the FTPS screening, the driver will be referred to the nearest state roadside inspection facility for further action.

The IBC system architecture, when completed, will permit connectivity with state and federal commercial vehicle information systems for safety and credentials verification, and access by other organizations or individuals seeking shipment status or traffic information, or collecting tolls. In particular, the FTPS, or equivalent system, will provide connectivity with state roadside inspection facilities to coordinate the application of screening criteria and communicate border crossing information concerning each truck including crossing location, time of crossing, red/green screening results, and recommended actions. The figure below illustrates the projected interconnectivity among federal, state, and other systems.

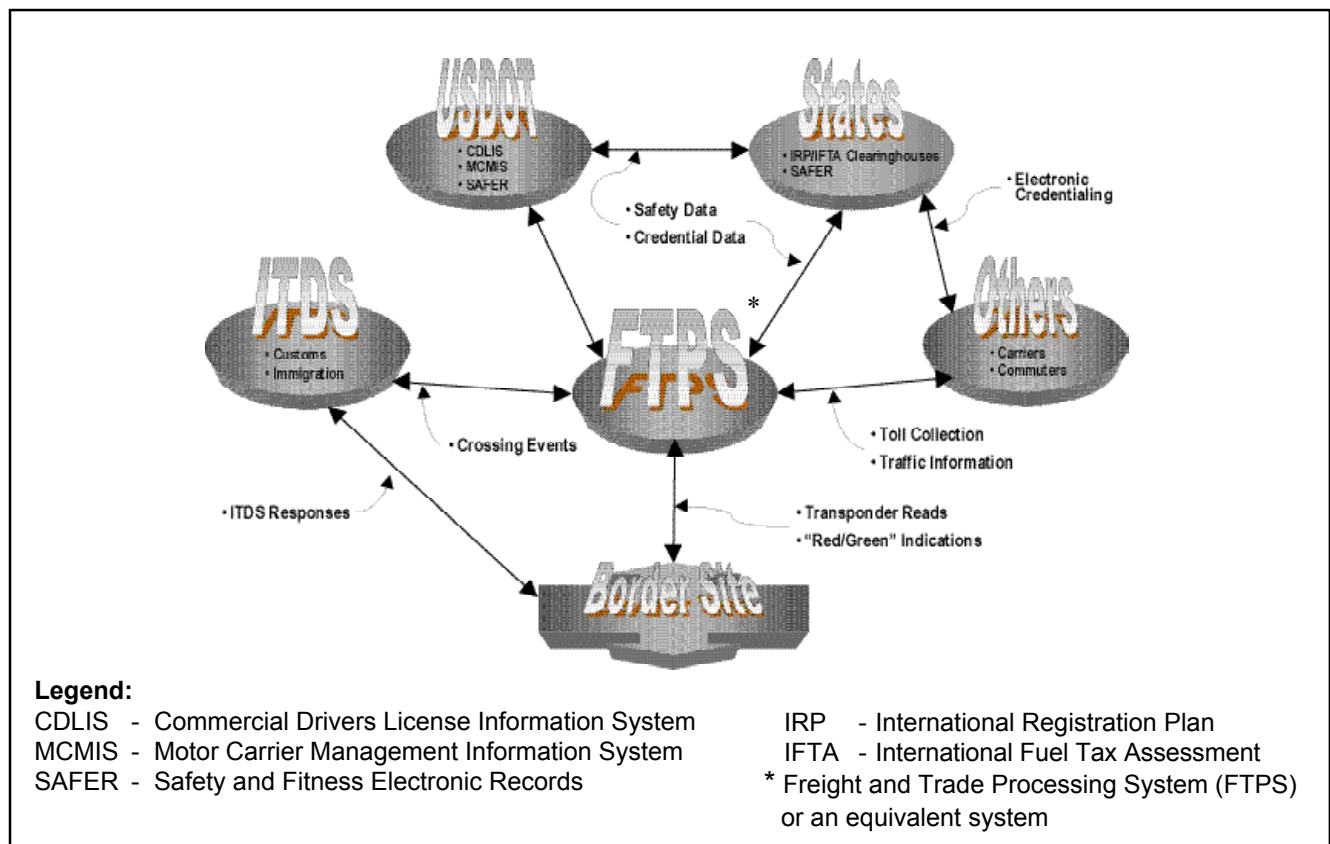
Status:

Vehicle identification and information exchange systems were installed and tested at seven border sites:

- Northern Border:
 - Peace Bridge (Buffalo, NY)
 - Ambassador Bridge (Detroit, MI)
 - Blaine, WA (not part of IBC program)

- Southern Border
 - Otay Mesa, CA
 - Nogales, AZ
 - El Paso, TX (limited testing)
 - Laredo, TX (two locations)
- Technical feasibility of the ITS border crossing systems has been demonstrated.
 - The systems are able to support information management and exchange with U.S. Customs North American Trade Automation Prototype (NATAP).
 - The systems are able to interface with customs processing systems at the border crossing sites.
- Connectivity of FTPS, or its equivalent, to state enforcement systems will be demonstrated in Laredo, TX and Detroit, MI in FY 2000-2001.
- Tri-lateral coordination among U.S., Canadian, and Mexican officials and industry continues through the International Border Clearance Planning and Deployment Committee (IBCPDC), chaired by FHWA.

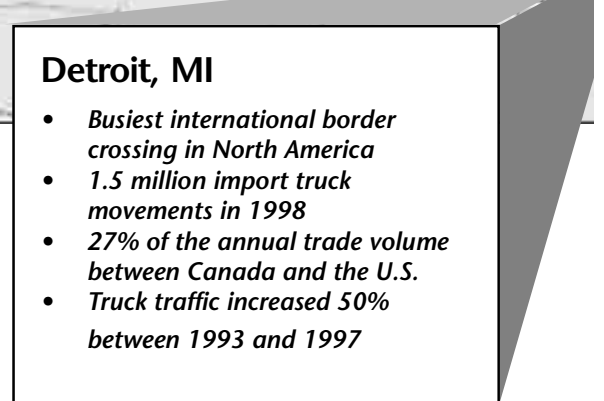
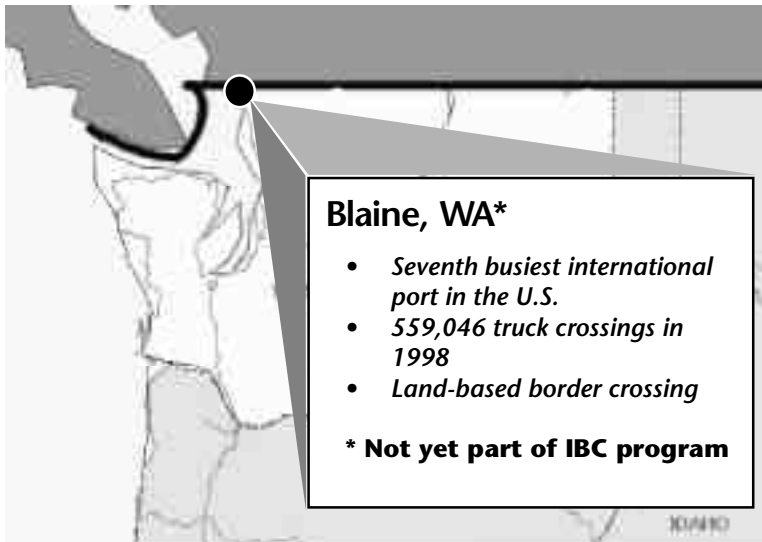
Projected IBC Interconnectivity



Northern Border Sites

Description

Not including the border between Alaska and Canada, the northern U.S. border with Canada extends approximately 3,987 miles, and includes 76 land border crossings that handle commercial vehicle traffic, with the westernmost at Blaine, WA along the Pacific coast, and the easternmost at Calais, ME near the Atlantic coast. The Alaska/Canada land border, which is approximately 800 miles in length, has four commercial vehicle border crossings. Trade with Canada is divided between traditional trade—manufactured goods, raw materials and agriculture products—and the automotive manufacturing trade—products assembled in Canadian factories from parts originating in the US or overseas.



Northern Border Trade Process

Commercial vehicles moving goods into the US across the border with Canada are permitted to operate throughout the U.S. A significant portion of these vehicles support the automotive manufacturing industry, in which auto parts and assembled vehicles are transported short distances between manufacturing facilities on opposite sides of the border. The remaining vehicles transport a wide variety of consumer goods and raw materials between the countries.

Trade volume impacts resulting from full implementation of the North American Free Trade Agreement (NAFTA) provisions are expected to be significant, but relatively small in comparison with those expected along the southern border.



Buffalo, NY

- *Second busiest northern border land port*
- *1.1 million import truck crossings in 1998*
- *Trade volume has increased 15% since 1990*

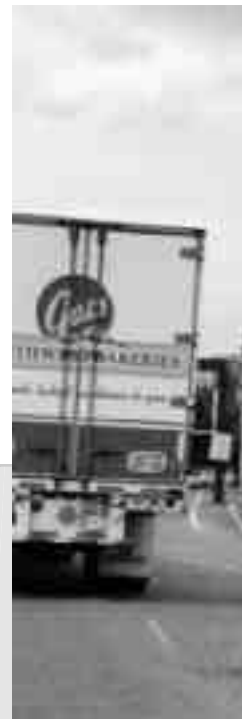
Summary

- **Commercial trucking is the dominant mode of shipment across the U.S./Canada border, accounting for between 62% and nearly 100% of all imports through the 10 busiest ports**
- **Crossings into Michigan and New York account for more than 66% of all import movements from Canada**
- **Detroit is the busiest of all border land ports, with 15% of all import movements into the U.S., and 25% of all imports from Canada**
- **Restrictions regarding differences in size and weight laws aside, Canadian trucks are treated the same as domestic trucks while operating in the US**
- **Canada has consistently been the biggest trading partner of the U.S., and trends indicate continued growth**

Blaine, WA

Located along the US border with Canada between the port cities of Seattle, Washington and Vancouver, British Columbia, the border crossing facility at Blaine is one of 11 ports between the state of Washington and Canada. The majority of the traffic through the crossing consists of commercial trucks, which are precluded from using U.S. Interstate 5, and must exit the interstate and travel a combination of limited-access highway and signalized surface streets to get to and from the facility. Commodities processed through the port consist largely of wood and paper products, and consumer goods—a fair portion of them moving in containers from the Port of Seattle.

Currently, there are no US commercial weigh and inspection facilities at or near the crossing. The nearest Washington State facility is located 40 miles south of the border. The U.S. Customs facility has been undergoing major facility improvement, and will house enhanced and enlarged secondary inspection facilities. The resulting layout of the compound is expected to significantly ease the flow of traffic southbound through the port.



Items of Interest:

- Regional growth is driving an increase in truck traffic.
- Inconsistent size and weight laws between the U.S. and Canada continue to present a significant challenge to carriers.
 - Differences among U.S. states also present challenges.
 - Safety inspectors do not differentiate between U.S. and Canadian trucks.
- It is anticipated that Washington State will employ a third party for commercial vehicle information management and exchange.
 - Similar to British Columbia, where a contractor provides this service
- Stakeholders share a strong sense of institutional unity.
 - Within Washington State, Oregon, and Canada
 - Early and regular coordination has facilitated mutually beneficial informal and formal agreements. (A formal memorandum of understanding between Oregon, Washington, and British Columbia has been authorized.)
- Phased funding makes full implementation of electronic data transfer with Canada difficult.
- There is a lack of understanding state-wide regarding the application of ITS in place of traditional transportation methods.
- Washington State Department of Transportation (WSDOT) officials are concerned about DSRC interoperability, both within the U.S. and across North America.
 - Uncertainty exists regarding the long-term implications associated with deciding which technology to implement (e.g., long-term viability, operations and maintenance investment, technology life-cycle).



Progress:

- WSDOT participates in the Multi-Jurisdictional Automated Pre-clearance and Safety Program (MAPS).
- Washington, in cooperation with Oregon, is a Commercial Vehicle Information Systems and Networks (CVISN) Pilot State.
- Border modernization and infrastructure improvements are underway, with incorporation of the IBC architecture expected in the future.

Plans:

- IBC program DSRC procurement to be initiated soon.
 - Readers, antennae, supporting systems
- New customs compound, roadway, and truck parking lot are being built.
 - New customs compound will have fiber optics as its communication backbone.
- There are plans to institute a program that allows subscribing truckers to pass through a specially designated lane, speeding border processing.
- Statewide ITS/CVO implementation to be installed and operational in FY 2000-2001.

Lessons Learned:

- Competing CVO electronic screening cooperatives are preventing progress toward international interoperability (e.g., PrePass, MAPS, Norpass).
- Planners should develop long-term, sequential deployment schedule that allows for incremental funding and demonstration of capabilities.
- Non-traditional partnerships are not fully accommodated by the state planning process.
 - Bi-national, multi-agency efforts expand the stakeholder body.
 - State and Federal transportation and customs agencies have different roles and different focus areas.
 - Obtaining funding for and conducting coordination of property and infrastructure improvements related to transportation in non-transportation compounds is complex.
 - Limited knowledge regarding life-cycle, operations and maintenance costs of technology implementations makes obtainment of funding commitments difficult.
 - Traditional funding agreements are not universally applicable, requiring creativity and flexibility, particularly with regard to multiple currencies and procurement laws.



Buffalo, NY

Situated at the eastern end of an international trade route that connects the northeast corridor of the U.S. with the industrial northwest through Ontario, Canada, the Peace Bridge spans the Niagra River between Buffalo, New York and Ft. Erie, Ontario. The U.S. side of the bridge property is situated in a densely populated area, bounded closely by a neighborhood on the east side, the Niagra River to the west, and U.S. Interstate 90 and an historical park to the south.



The Peace Bridge is the third busiest crossing in the U.S. with regard to commercial truck traffic, and is second busiest along the border with Canada. Truck traffic has been rapidly increasing over the past 10 years. A 1992 study projected that traffic would double by the year 2020—it is now expected to double by 2010. Revenue for bridge operations and maintenance comes from user tolls, which are assessed to commercial trucks based on weight.

Truck safety inspections are rarely done at the bridge due to congestion and safety concerns. Statewide, 1%-2% of all trucks undergo a safety inspection in a given year. There are no fixed weigh stations in operation in New York State, however, there are a few inspection sites along Interstate 81, located approximately 150 miles from the bridge. The New York State Police set up and operate temporary inspection sites throughout the state to verify vehicle and driver safety and credentials compliance.

Items of Interest:

- Traffic congestion is a chronic problem resulting from restricted space and narrow roadway geometry leading to and from the bridge.
- The weight-based fee calculation process allows for an equitable assessment of bridge tolls.
 - Requires a longer period of time to process individual shipments
- State law prohibits random selection of trucks for inspection.
 - Trucks are inspected in the order they arrive at the mobile site or if a specific safety violation is suspected.
 - If trucks have a valid Commercial Vehicle Safety Alliance (CVSA) sticker, no inspection is performed.
 - The New York State Department of Transportation (NYSDOT) would prefer to target 'at risk' carriers, i.e., those with a record of infractions or pattern of delinquency.
- New crossing facility and adjacent roadway improvements are expected to reduce congestion.
- Bridge operators typically react negatively to commercial vehicle inspections being conducted on or near bridge property.
- Federal, state, and local agencies combined to form the Niagara International Transportation Technology Coalition (NITTEC).
 - Primary objective is to reduce commercial vehicle crashes by increasing awareness of and compliance with vehicle safety laws



Progress:

- Peace Bridge is one of two northern border pilot sites demonstrating the IBC system and the North American Automation Prototype.
- The bridge's electronic toll collection system is interoperable with the IBC system and the New York State Thruway toll system.
- A commercial vehicle processing center (CVPC) aimed at facilitating movement of commercial vehicles has been constructed on the Canadian end of the bridge.
 - Consolidates some commercial vehicle processing functions.

Plans:

- The Peace Bridge Authority plans to invest more than \$200 million over the next 10 years in infrastructure improvements.
 - Addition of a second bridge span
 - Plaza redevelopment
 - CVPC preprocesses manifest and invoice detail and transmits information to U.S. brokers.
- TRANSCOM'S System for Managing Incidents and Traffic (TRANSMIT) will be extended to the Buffalo area.
 - Will allow bridge traffic conditions to be more closely monitored for incidents.
- The high accident corridor program will focus commercial vehicle enforcement resources on high risk corridors.

FOT Lessons Learned

Peace Bridge International Border Crossing System

The evaluation performed for the Peace Bridge FOT revealed a number of significant lessons, including:

- Even if the equipment were to experience relatively high failure rates, the system installed at the bridge has considerable potential to improve the level of service to both freight providers and people crossing the bridge eastbound into the U.S.
 - At a participation rate of 50%, simulation results indicate that freight bridge users could expect to see a 66% decrease in average travel time across the border.
 - Under these participation rates, commuters could expect to spend an average of 35% less time crossing the bridge.
 - Data suggests that equipping additional lanes with ITBCS technologies would further reduce delay.
- Westbound travelers can also expect savings, though on a smaller scale than those traveling east, since Canadian import processing is generally less complex and time consuming.
- Users indicated that the requirement to continue to process through the border with existing processes running in parallel to ITBCS was a likely disincentive to carrier participation in the FOT.
- Because expediting the flow of traffic is a goal not always consistent with the missions of agencies responsible for regulating cross-border movements, seamless cross-border movement is not a universally shared priority.
- Issues:
 - With no U.S. weigh scales on the Canadian side, trucks exceeding the bridge weight limit will cross unimpeded.
 - Increasing trade volumes, road access design issues and limited space combine to create significant congestion at the Peace Bridge site.

Detroit, MI

Spanning the Detroit River between Downtown Detroit and Windsor, Ontario, the privately owned Ambassador Bridge is a single span facility with two travel lanes in each direction, and toll facilities to capture revenue. The bridge is the single busiest international land border crossing in North America, serving as a portal for 27% of the approximately \$400 billion in annual trade between Canada and the U.S.



In 1997, 2.7 million trucks crossed the bridge, a 50% increase since 1993. This volume is expected to double again by the year 2012. A substantial portion of this trade supports the manufacture and distribution of automobiles. The Detroit International Bridge Company, owners of the facility, plan to add an additional six-to-eight lane span, which is projected to be open for use by 2012.

The localized nature of the goods movement across the bridge—transferring parts and completed autos a relatively short distance between the two cities—means that commercial trucks hauling the goods rarely travel far enough into the state of Michigan to encounter fixed weigh and inspection facilities. There are 19 such stations in the state, each supporting all enforcement activities, supplemented by mobile enforcement units in areas exhibiting higher frequencies of safety violations. The inspection team is composed of approximately 120 officers with jurisdiction only over the trucking community. The Michigan State Police Motor Carrier Division conducts approximately 200 compliance reviews each year.

Items of Interest:

- Law enforcement officials do not differentiate between U.S. and Canadian trucks when selecting for inspection.
- Michigan State Police Motor Carrier inspectors must comply with probable cause law when selecting trucks for inspection—there must be visible evidence that suggests a potential violation exists.
- Michigan will soon undergo a \$100 million improvement of freeways connecting to the Ambassador Bridge.
 - Significant commercial vehicle traffic delays are relatively rare and typically the result of limited U.S. Customs staffing at the bridge.
- In preparation for the roadway improvements, Michigan State Police Motor Carrier Division is conducting evaluations of actual and potential transponder market penetration, and the impact of traffic in order to determine how best to address traffic volume.
- The successful deployment of federal systems on a privately owned bridge crossing was the result of an effective public/private partnership that relied on extensive coordination of 11 stakeholder groups.



Progress:

- One of two northern border test sites that demonstrated the IBC system and the North American Trade Automation Prototype, and are now demonstrating FTFS.
- Technical feasibility of the IBC system was demonstrated during a field operational test.
 - Actual usage was limited due to limited trade participation in NATAP.
 - A Dedicated Commuter Lane was activated in 2000; more than 200 commuters signed up for the program during its initial period of operation.
 - Field operational test evaluation results were published in Spring 2000.

Plans:

- Planned second bridge span and highway improvements to facilitate travel to and from the bridge are likely to have a significant impact on traffic flow.
- The Michigan State Police and the Michigan Department of Transportation will demonstrate the FTFS at the Ambassador Bridge in FY 2000-2001 and are actively involved in the CVISN Pilot State project.

FOT Lessons Learned

Ambassador Bridge International Border Crossing System (ABBCS)

The evaluation performed for the ABBCS FOT revealed a number of significant lessons, including:

- Systems installed as part of the operational test proved the technical feasibility of expedited border crossings. Specifically:
 - DSRC is capable of supporting trade processing decision support systems such as NATAP.
 - Provided that performance in adverse environmental conditions is improved, electronic card readers are capable of performing basic commuter identification tasks.
- Implementation of a system such as ABBCS, in conjunction with a carefully selected lane assignment scheme, has the potential to significantly reduce the length of vehicle queues on the bridge during peak traffic periods, reducing the time necessary to transverse the compound by as much as 50%. Reconfiguration of the entry roadway into the Customs compound from one lane to two would have an even more pronounced effect, allowing participating vehicles unhindered access to equipped lanes.
- Simulation results indicate that the Dedicated Commuter Lane concept has the potential to positively impact traffic on the bridge, provided all equipped lanes are open to all vehicles.
- Test events indicated that prolonged exposure to the vehicle identification readers resulted in dramatically reduced transponder battery life, necessitating the replacement of current batteries with extended life units.
- Despite the limited scope of the test, and the small number of participants, user acceptance was relatively positive regarding the ABBCS. Nonetheless, most users indicated that more tangible benefits would be required before significant bridge user enrollment in such programs could be expected.
- Issues:
 - Multiple agency points of contact for statewide CVO make it difficult to obtain uniform guidance from agencies responsible for administration and enforcement.
 - Legal requirements in Michigan do not yet allow the selection of high risk vehicles and drivers for inspection using electronic records, which is counter to the ITS/CVO objective to target high-risk carriers.
 - Space constraints prevent vehicle safety and compliance inspections from being conducted on the bridge facility and support development and use of FTFS and CVISN.

Southern Border Sites

Description

The southern U.S. border with Mexico extends 1,945 miles, and includes 22 commercial vehicle land border crossings, with the westernmost at Otay Mesa, CA along the Pacific coast, and the easternmost at Brownsville, TX along the gulf coast. Trade with Mexico is divided between traditional trade, which is dominated by manufactured goods and agriculture products, and maquiladora trade—products assembled in Mexican factories from parts originating in the U.S. or overseas.



Summary

- Commercial trucking is the dominant mode of shipment across the U.S./Mexico border, accounting for roughly 65% and 75% of the dollar value of all imports and exports, respectively.
- Crossings into Texas through its 10 ports account for more than 68% of all import movements from Mexico.
- Laredo is, by far, the busiest of the southern border land ports, with 34% of all import movements.
- Maquiladora trade constitutes approximately 50% of import trade in Arizona and East Texas, and more than 80% in California and West Texas.
- Trade with Mexico has increased dramatically since 1981, and trends indicate continued significant annual growth.

Otay Mesa, CA

- 599,000 import crossings in 1998
- Second busiest southern border port
 - 22% of all southern border import shipments
- Commercial traffic consists mainly of drayage and private fleets servicing maquiladoras located just south of the border

Nogales, AZ

- 256,494 truck crossings in 1998
- Truck traffic increases at the rate of 10% per annum
- 11th busiest international port in the US
- Largest of six international border crossings in Arizona
- More than 50% of all produce consumed in the US and Canada during the winter months (valued at \$1.4 billion) is imported through the Nogales port-of-entry



Southern Border Trade Process

Most commercial vehicles moving goods across the border with Mexico are of Mexican origin. A significant portion of these vehicles perform a drayage function, in which loaded trailers are transferred from one side of the border to the other, over short distances. This method, which is used extensively at crossings into Texas, makes substantial use of older, cab-over tractors to pull long-haul trailers. Much of the remainder of commercial vehicles are Mexican-owned straight trucks hauling produce.

Current laws prevent U.S.-owned fleets from operating in Mexico, and Mexican-owned fleets from operating outside what have been designated as "commercial zones" in the U.S., which extend from five to 25 miles from the point of crossing.

In contrast, maquiladora plants often rely upon private fleets to carry parts and finished assemblies across the border. These fleets typically carry dual registry (full operating authority in the U.S. and Mexico), and as a result, can operate well into either country. A number of changes are expected to eventually occur as NAFTA provisions are implemented. Discussions are currently ongoing between U.S. and Mexico on the implementation of NAFTA provisions, but no specific agreements have been made.

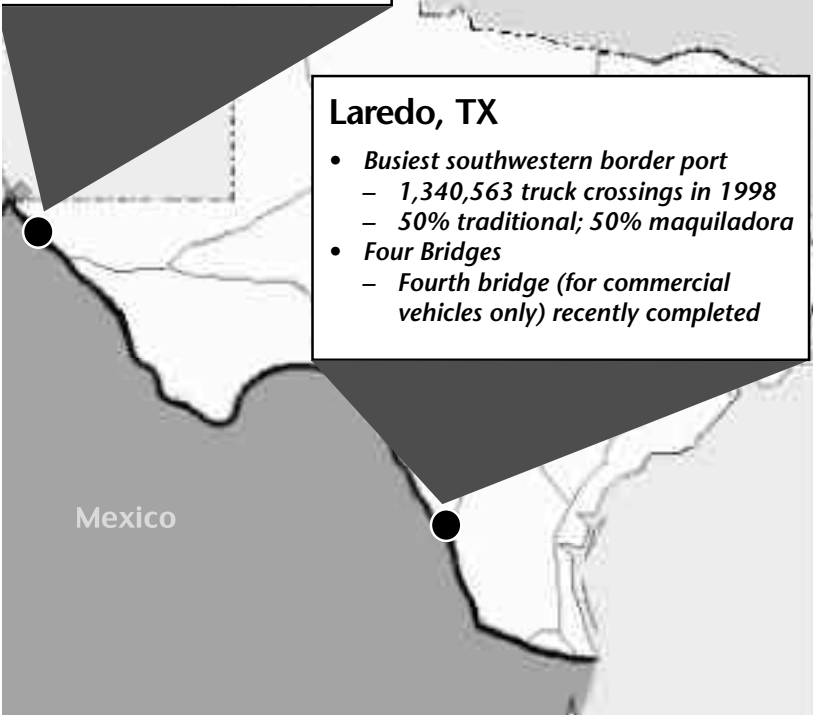
El Paso, TX*

- 591,258 import crossings in 1998
- Third busiest southern port – Second largest in Texas
- Gateway port for West Texas and New Mexico
- Two commercial vehicle import bridges

* Not part of the U.S. DOT-funded field operation test program

Laredo, TX

- Busiest southwestern border port
 - 1,340,563 truck crossings in 1998
 - 50% traditional; 50% maquiladora
- Four Bridges
 - Fourth bridge (for commercial vehicles only) recently completed



Laredo, TX

The busiest port along the southern U.S. border with Mexico, Laredo, TX is home to four bridges, each spanning the Rio Grande River between Laredo and two Mexican states—Nuevo Leon and Tamaulipas. Two bridges are located less than a mile apart in a very busy downtown location. The Columbia-Solidarity Bridge, a modern facility, is located north of the city. The fourth, and newest bridge connects the port directly to U.S. Interstate 35 via an equally new four-lane divided concrete surface roadway and is designated exclusively for commercial truck traffic.



More than 68% of all import truck movements from Mexico pass through Laredo. Of the more than 1.3 million crossings completed annually, approximately half support maquiladora manufacturing, while the other half supports traditional trade. Manufactured goods constitute approximately 50% of imports, and 75% of exports. Traffic across the busiest of the Laredo bridges—Bridge 2—routinely backs up as much as five miles during morning and evening rush.

The state of Texas has no fixed weigh and inspection stations in or near Laredo, and very few throughout the state. The overwhelming majority of vehicle checks are performed at temporary roadside sites set up by the Texas Department of Public Safety (TxDPS). Plans to include a fixed facility at the new bridge remain uncertain.

Items of Interest:

- Multiple crossings and complex road network around laredo make fixed weigh and inspection stations easy to avoid.
 - TxDPS considers mobile enforcement (i.e., portable scales at impromptu roadside locations) more effective.
 - Mobile enforcement offers an excellent opportunity to employ ITS to leverage enforcement resources.
- New crossing facility and adjacent roadway improvements are expected to speed traffic flow and reduce congestion.
 - Current traffic backups extend up to five miles during peak traffic periods (morning and evening rush).
 - Delay could also be reduced with implementation of DSRC technology to trigger Customs, Immigration and Transportation Safety information to the Customs Inspector.
- TxDPS relies upon the experience and discretion of its officers to select vehicles for inspection and weight checks.
 - The CVISN/Safer system containing Mexican driver and vehicle history could help identify high-risk carriers.



Progress:

- IBC equipment installed and operational:
 - Bridge 2—southbound
 - Columbia-Solidarity Bridge—northbound and southbound
- The Texas Department of Transportation (TxDOT) and TxDPS have agreed to support system testing and evaluation.
- TxDOT has assisted TxDPS in the installation of a roadside inspection site that will use information transmitted from the FTPS for vehicle screening.

Plans:

- Plans to install fixed weigh and inspection facilities at Bridge 4 are uncertain due to limited resources.
- The IBC program demonstrating FTPS links to the Safety and Fitness Electronic Record (SAFER) data mailbox and state roadside facilities is scheduled to begin in FY 2000-2001.
- TxDOT recently began development of an ITS/CVO Business Plan, signaling an interest in using ITS technology.
- TxDOT has appointed an official responsible for international trade facilitation.

Lessons Learned:

- Limited resources are available to TxDPS for facilities, technology implementation, and staffing.
 - Traditional approach likely to result in continued travel delays
- Laredo has multiple high-volume crossings, which demand innovative technological solutions.
- Space constraints and traffic volume severely restrict ability to perform safety inspections within the U.S. Customs compound.
- Complexity of road network outside the immediate vicinity of crossings not conducive to use of fixed weigh and inspection facilities.
- Laws permit the application of discretion in selecting vehicles for inspection.
- Large trade volumes and limited enforcement resources make Laredo well-suited for FTPS and ITS/CVO technology implementations.
- Technology can help improve border operations at Laredo crossings, but the largest improvements will come with replacing the drayage system that has been institutionalized between the U.S. and Mexico distribution centers.
 - Carriers drop off containers and trailers at distribution centers, and they are drayed across the border, adding three to five days to the move.



Nogales, AZ

Arizona's main commercial truck crossing, which processes all international commercial traffic entering the state, is located approximately three miles west of central Nogales, at Mariposa. The Nogales port, which connects the U.S. with the Mexican state of Sonora, is the largest inland port for fruits and vegetables in the U.S.—more than 50% of all produce consumed by the U.S. and Canada during the winter months is imported here. Due to the nature of the trade traffic, most of the commercial truck volume across the border is concentrated during the winter months.

There is one fixed weigh and inspection station located in Nogales, which is supplemented by inspectors equipped with mobile inspection devices. This equipment includes wheel weighers, roll-up mat scales, and a Special Response Interactive (SPRINT) port used at six Mexican border ports. In addition, 10 sets of portable scales are carried in the trunks of patrol vehicles, three sets of platform scales are used on details, and three sets of slow speed, weigh-in-motion screening devices are used by detail strike forces to screen for weight at observation points.



Items of Interest:

- U.S. and Mexican agencies are working together at the Nogales crossing to improve relationships and forward a common agenda of enhancing safety and facilitating trade.
 - U.S. Customs and the Arizona Department of Transportation's (ADOT) Motor Vehicle Division (MVD) have been working together toward the goal of having 60% of trucks processed in queue at the Superbooth.
 - The Superbooth is staffed by both Customs and ADOT, and it is intended to expedite truck movement of line release participants into the U.S.
 - The ADOT MVD has been invited by Mexico to set up a satellite office to pre-process Mexican trucks before they reach the U.S. border.
 - The Arizona Department of Public Safety (ADPS) has trained representatives from other agencies to conduct truck inspections.
 - In 1998, 45,000 commercial vehicle inspections were conducted in Arizona:
 - ADPS conducted 67%
 - 70 other agencies conducted remaining 33%
 - ADPS has trained Mexican motor carrier inspectors since 1995; however Mexico has not passed the necessary laws to support enforcement.
 - ADPS taught Commercial Vehicle Safety Alliance standards and Out Of Service (OOS) standards to 80 inspectors at over 10 different Mexican sites.
 - Delays in the full implementation of NAFTA have caused interest in cross border training to wane.
- A combination of random and discretionary selection practices are employed to select vehicles for inspection.
 - Inspection Selection System (ISS) is used for identifying what type of inspection is to be done once the vehicle has already been selected.
- The enforcement of federal commercial zone restrictions is not a priority for Arizona officials.
 - The extent to which restrictions are violated is not well understood.



Progress:

- Nogales used IBC system and Management Information System for Transportation (MIST™), along with variable message signs (VMS), closed-circuit television (CCTV) cameras, and weigh-in-motion (WIM) scales to facilitate commercial vehicle movement through the port.
- Two slow-speed WIM (SWIM) scales are installed on the approach to the U.S. Customs primary inspection site.

Plans:

- A port efficiency study is being conducted at the Douglas Port to determine if there is a need for any infrastructure improvements.
- Arizona has undertaken preliminary planning to deploy ITS/CVO throughout the state.
- Arizona and U.S. Customs are developing a joint state-Federal port to better coordinate border operations.
- Coordination between state and Federal authorities through shared facilities continues. Both are involved in planning the reconfiguration of the Douglas Port.

FOT Lessons Learned

Expedited Processing at International Crossings (EPIC)

The evaluation performed for the EPIC FOT revealed a number of significant lessons, including:

- By eliminating the need for commercial vehicle operators to stop at the Arizona DOT office within the compound to verify trip permits, the EPIC system has the potential to significantly reduce the amount of time spent in the border compound.
 - The EPIC system allowed for electronic verification of trip permits.
 - Average time saved could be expected to be between 8.8 and 12.9 minutes.
- The pre-clearance of vehicles to use the Superbooth, and avoid entering the compound altogether, reduced the average approximate travel time through the compound by over 80% (25 minutes).
- The participating carriers registered in Arizona expected limited benefits to accrue from the use of the EPIC technologies, since they had no need to stop in the ADOT office to verify trip permits. They did, however, expect to benefit from the availability of traffic congestion information.
- ADOT representatives estimated that, due to the pre-processing functions within the EPIC system, they would save approximately two minutes for every trip permit from which they did not have to perform data entry.
- Issues:
 - There is no hazardous materials containment area (safe haven area) at any of the existing Arizona ports.
 - One site planned
 - Insufficient financial resources preclude the operation of fixed weigh stations at all ports.
 - Non-interstate ports are often used to by-pass weigh and inspection facilities—weight violations cannot be detected before a vehicle enters the U.S.
 - Will utilize SPRINT ports at more remote sites to verify weight and safety compliance
 - State representatives support technological innovation to facilitate faster processing and enhance safety. Some areas for focused attention include:
 - Vehicle identification
 - Vehicle status
 - Systems
 - Credentials
 - Operating condition

Otay Mesa, CA

The westernmost border crossing between the U.S. and Mexico, Otay Mesa connects California to the Mexican town of Tijuana, in the state of Baja California. Otay Mesa is the fifth busiest port in the country, and the second busiest on the southern border. The majority of truck traffic through the port, situated on the southern end of the U.S. Interstate 5 corridor, consists of private fleets and dray operations supporting the maquiladora manufacturing complexes in Tijuana.



The state of California has full service weigh and inspection facilities at each of its two commercial vehicle border crossings with Mexico. At Otay Mesa, the California Highway Patrol (CHP) has recently completed construction of a new safety inspection facility located just north of the U.S. Customs facility exit into California. All trucks entering the U.S. at the port must pass through the facility before entering the U.S. The facility is equipped with WIM scales, inspection bays, and a high capacity vehicle inspection area.

Twenty-nine (29) CHP inspectors are assigned to Otay Mesa, the most of any southern port. These inspectors are tasked with inspecting every truck that passes through the facility once every 90 days.

Items of Interest:

- California Highway Patrol's operations are becoming more responsive to commercial vehicle safety issues.
 - California Highway Patrol personnel outside of the border division are now being trained in commercial vehicle inspection.
- Caltrans' capital improvements to the roadways around Otay Mesa are expected to ease traffic flow and reduce congestion for both commercial and non-commercial traffic.
 - Widening roads to and from Otay Mesa from four lanes to six
 - Converting Route 905 from Otay Mesa to a route with reversible lanes
 - Enclosing roadway leading from the Customs facility to the inspection facility with fencing
- California Highway Patrol has continuously upgraded its inspection efforts at the border.
 - Checking driver hours of service more regularly
 - Conducting more level three inspections (driver and vehicle registration)
 - Established a goal of inspecting every truck crossing the border a minimum of every 90 days
- Trucks are selected for inspection based on notable violations, expired CVSA stickers, and random selection.
 - Inspectors do not differentiate between U.S. trucks and Mexican trucks in determining which trucks to inspect.
 - Inspectors utilize the Federal Motor Carrier Safety Administration (FMCSA) SAFER system to identify out-of-service violations.



Progress:

- Technical feasibility of the IBC system was demonstrated, including the North American Automation Prototype.
- The field operational test evaluation final report was published July 1998.
- Since the completion of NATAP, Automated Customs Systems (ACS) have been re-employed until production processing system is completed.

Plans:

- The roadway geometry will be reconfigured so that trucks will pass through both a CHP weigh station and inspection facilities before entering the U.S.
- CHP will be installing the Heavy Vehicle Electronic License Plate (HELP) Pre-Pass system at the inspection facility for passing safe and legal carriers electronically.
- Testing of the FTSP in conjunction with CHP is scheduled to begin in FY 2000-2001.

FOT Lessons Learned

International Border Electronic Crossing (IBEX)

The evaluation performed for the IBEX FOT revealed a number of significant lessons, including:

- The layout of an international border compound, and the operations within it, present a challenge in implementing current DSRC systems in a border environment.
 - The large number of trucks operating in close proximity, in a compound configured such that looping sometimes becomes necessary, place a premium on antennae and reader placement. Antennae footprints must be carefully tuned to avoid extraneous and missed reads.
- Test results indicate that an RF (radio frequency) network is capable of supporting basic information exchange requirements, although it is unclear whether higher transaction volumes could be sustained.
- Participating carriers indicated they saw potential for IBEX technologies to enhance operations, but that improvements to surrounding processes would be necessary.
 - The initial investment associated with equipping vehicles with transponders was considered acceptable, provided that processing paper-based transactions in parallel was eliminated.
 - Participants believed that as congestion at the border increases, participation in automated pre-clearance programs will make the difference in the efficiency and competitiveness of their operations.

Lessons Learned and Opportunities

Lessons Learned		
Institutional	Non-traditional relationships among border stakeholders has resulted in some uncertainty regarding effective methods for cofunding bi-national technology initiatives. For example, no method is in place for maintaining sensor systems like DSRC in a uniform manner in both nations.	As with many domestic ITS/CVO initiatives, institutional issues represent the most significant hurdle in deploying and using technology as a tool for improving processes at international borders.
Infrastructure	At each of the border crossings investigated, planned and actual capital improvements of U.S. Custom compounds involved expansion of inspection areas, redesign of roadways to and from the border, and implementation of new technologies, yet plans for weigh and inspection facilities remain conspicuously absent in most locations.	Customs compound facility improvements play a major role in addressing the concern of excessive delay in processing through the border, but a combination of resource constraints and space limitations in many cases precludes the construction of fixed safety inspection facilities.
Operations	Representatives at each site indicated expectations that the North American Free Trade Agreement (NAFTA) would result in significant increases in traffic at international border crossings.	Little is known or understood regarding how cross-border goods movement business models will evolve once the full provisions of NAFTA go into effect, but the combination of increasing volume and diminishing levels of enforcement personnel is likely to result in continued delays.
Technology	At those ports where IBC systems have been installed and tested, evaluation results have validated the technical feasibility of ITS to support federal, state and local trade and transportation processes.	Significant progress has been made in applying ITS international borders, but existing facility configurations limit the applicability of a uniform border system design/architecture.
Safety Assurance	Departments of public safety responsible for many of the six sites have made significant strides to increase their enforcement presence and apply ITS technology to aid inspection selection processes, but targeted inspections are illegal in some states.	The combination of more, better-trained inspectors and a strong focus on the development and employment of more efficient, effective inspection selection practices offers significant promise for ensuring the safety of non-U.S. trucks.
North vs. South	State officials along the Canadian border indicated their primary concerns regarding commercial vehicle safety were weight and driver hours of service, while officials from states along the border with Mexico were most often concerned with vehicle equipment.	Differences between northern and southern border operations business models—primarily the result of drayage practices and vehicle inspection practices in Mexico and Canada—drive enforcement priorities and practices in the U.S. border states.
South vs. South	Differences in geography, topography, and road networks, combined with differences in cross-border goods movement business models and crossing volumes at ports along the southern border, significantly influence the safety enforcement methods employed by state officials.	The application of a single solution for trade facilitation and safety assurance, in the form of fixed weigh and inspection facilities, along the southern border may be impractical.

Opportunities

The local and international alliances formed in order to improve commercial vehicle movement at the border will continue to drive the level of success of IBC initiatives.

Alternatives to fixed safety inspection facilities, including the application of ITS technologies, and the development of joint compounds in one of the countries, must continue to be explored to ensure that safe trucks entering the U.S. are not delayed.

Further understanding regarding the future of such localized business phenomena as drayage and storage yards on the southern border must be developed if states are to effectively allocate resources along trade corridors.

A continued focus on the refinement of technology, and the opportunities to demonstrate connectivity and interoperability with other federal and state systems will allow agencies to more effectively leverage IBC systems, and facilitate success at our international borders.

Since one of the primary benefits of ITS is its usefulness in leveraging technology to focus enforcement, realizing its full value may require laws precluding selective inspections be amended or changed.

The deployment of IBC systems and technologies offers state officials along each border the ability to utilize available information to increase productivity and better manage their resources, and pre-clearance allows time to correct deficiencies before the truck actually arrives at the crossing.

ITS technologies have the potential to significantly improve operations in states where the construction of fixed weigh and inspection sites at each international border crossing is prohibitively expensive by allowing clearance of carriers that have a proven track record of safety and compliance.



For further information, contact:

Federal Highway Administration (FHWA) Resource Centers

Eastern Resource Center
10 S. Howard Street
Suite 4000 – HRC-EA
Baltimore, MD 21201
Telephone 410-962-0093

Midwestern Resource Center
19900 Governors Highway
Suite 301 – HRC-MW
Olympia Fields, IL 60461-1021
Telephone 708-283-3510

Southern Resource Center
61 Forsyth Street, SW
Suite 17T26 – HRC-SO
Atlanta, GA 30303-3104
Telephone 404-562-3570

Western Resource Center
201 Mission Street
Suite 2100 – HRC-WE
San Francisco, CA 94105
Telephone 415-744-3102

Federal Transit Administration (FTA) Regional Offices

Region 1
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093
Telephone 617-494-2055

Region 6
819 Taylor Street
Room 8A36
Fort Worth, TX 76102
Telephone 817-978-0550

Region 2
Alexander Hamilton Federal Building
1 Bowling Green, Room 429
New York, NY 10004
Telephone 212-668-2170

Region 7
901 Locust Street, Suite 40
Kansas City, MO 64106
Telephone 816-329-3920

Region 3
1760 Market Street, Suite 500
Philadelphia, PA 19103-4124
Telephone 215-656-7100

Region 8
Columbine Place
216 16th Street, Suite 650
Denver, CO 80202-5120
Telephone 303-844-3242

Region 4
Atlanta Federal Center
61 Forsyth Street, SW, Suite 17T50
Atlanta, GA 30303-3104
Telephone 404-562-3500

Region 9
201 Mission Street, Suite 2210
San Francisco, CA 94105-1831
Telephone 415-744-3133

Region 5
200 West Adams Street, Suite 2410
Chicago, IL 60606-5232
Telephone 312-353-2789

Region 10
Jackson Federal Building
915 Second Avenue, Suite 3142
Seattle, WA 98174-1002
Telephone 206-220-7954

FHWA/FTA Metropolitan Offices

New York Metropolitan Office
1 Bowling Green, Room 429
New York, NY 10004-1415
Telephone 212-668-2201

Chicago Metropolitan Office
200 West Adams Street, Suite 2410
Chicago, IL 60606-5232
Telephone 312-886-1616

Philadelphia Metropolitan Office
1760 Market Street, Suite 510
Philadelphia, PA 19103-4124
Telephone 215-656-7070

Los Angeles Metropolitan Office
201 North Figueroa, Suite 1460
Los Angeles, CA 90012
Telephone 213-202-3950

THIS DOCUMENT IS ONE IN A SERIES OF PRODUCTS THAT ADDRESS ITS ISSUES PERTINENT TO A VARIETY OF AUDIENCES

ELECTED AND APPOINTED OFFICIALS • SENIOR DECISION MAKERS
TRANSPORTATION MANAGERS • TECHNICAL EXPERTS

Representing:

STATES • CITIES • COUNTIES • TRANSIT PROPERTIES • TOLL AUTHORITIES
EMERGENCY SERVICE PROVIDERS • METROPOLITAN PLANNING ORGANIZATIONS
ADDITIONAL TRANSPORTATION STAKEHOLDERS

Products Available in This Series:



- **Benefits Brochures** quote how ITS technologies have benefited specific areas.



- **Technical Reports** include results from various Field Operation Tests.



- **Cross Cutting Studies** present current data from related ITS applications.



- **Implementation Guides** assist project staff in the technical details of implementing ITS.



- **Case Studies** provide in-depth coverage of ITS applications in specific projects.

ITS Topics Addressed in This Series:

- COMMERCIAL VEHICLE OPERATIONS
- EMERGENCY SERVICES
- ENABLING TECHNOLOGIES
- EMISSIONS MANAGEMENT
- FREEWAY AND ARTERIAL MANAGEMENT
- PLANNING AND INTEGRATION
- REAL-TIME TRAVELER INFORMATION
- TRANSIT, TOLL, AND RAIL MANAGEMENT
- WEATHER INFORMATION FOR TRAVELERS AND MAINTENANCE

FOR A CURRENT LISTING OF AVAILABLE DOCUMENTS, PLEASE VISIT OUR WEB SITE AT:
www.its.dot.gov

“The bypass system ushers in a new transportation era by streamlining the movement of commercial vehicles without compromising public safety. In addition, the bypass program yields compelling environmental benefits.”

— Chief Lee Denno, California
Highway Patrol

INTELLIGENT TRANSPORTATION SYSTEMS



U.S. Department of Transportation
400 7th Street, SW
Washington, DC 20590

Federal Highway Administration
Room 3416, HOIT-1
Phone: (202) 366-0722
Facsimile: (202) 493-2027

Federal Transit Administration
Room 9402, TRI-10
Phone: (202) 366-4991
Facsimile: (202) 366-3765