2.11. ELECTRONIC SEAL SCREENING AND TRACKING

2.11.1. INTRODUCTION

The concept discussed in this section – Electronic Seal Screening and Tracking – is focused on the Goods Movement market and the safety and security of international cargo traveling through the US. Through the use of fixed, mobile, and virtual electronic screening stations, this system will monitor and track the activity of all agricultural in-bond shipments crossing the state. Testing of this type of freight tracking system is consistent with the Smart Freight goals of the corridor’s overall Strategic Plan, as well as the State and Federal goals of improving the efficiency of the nation’s handling of agricultural goods and other imports requiring tracking.

2.11.2. PROJECT DESCRIPTION

The electronic cargo seal screening and tracking system is an electronic screening network to track agricultural in-bond shipments along pre-designated trade corridor routes. In-bond containerized shipments are sealed cargo containers which cannot legally be opened in the US. The proposed system would provide carrier identity, as well as vehicle, driver, container, and manifest information for in-bond agricultural shipments imported through the US, traveling through New York and destined for Canada. A real-time update about the status and progress of the electronic seals affixed to in-bond agricultural cargo containers can be verified at key locations along designated trade routes and at Commercial Vehicle Information Systems and Networks (CVISN) inspection stations. This proposal adds two new components – the application of electronic seals and the ability to monitor and extract information from the electronic seals – to the existing NYSDOT commercial vehicle electronic screening system.

2.11.2.1. Existing Conditions and Deficiencies

Prior to the events of September 11, 2001, there was not a significant emphasis on sealing and tracking cargo shipments across the country. But with increased commercial vehicle security and safety as a national priority there has been a focus placed on the importance of identifying and monitoring agricultural goods as they move from one country to another through the US. Agricultural products have become an area of concern because of the potential for accidental or intended release or dispersement of agricultural pests or contaminants, and because many products that pass through the US are not legally saleable in the US due to FDA regulations.

2.11.2.2. Existing Actions and Programs

The Federal Highway Administration’s Intermodal Freight Technology Working Group (IFTWG) has embarked on a three-phased initiative for the deployment and development of a comprehensive containerized cargo electronic seal system. The IFTWG has moved forward with the first phase of an electronic seal program that will utilize CVISN technologies to provide cargo tracking of in-bond agricultural shipments along I-87 and I-90 in New York.

The primary goal of the IFTWG program is to demonstrate the electronic screening and security capabilities associated with cost-effective reusable electronic door seals mounted on cargo containers.

The first phase of the proposed system is the installation of the electronic seal tracking equipment in New York along the I-87 and I-90 corridors between the Port of NY/NJ and the US/Canada border crossings at Champlain (I-87) and Buffalo (I-90) as shown in Figure 2.11-1. As an initial component of this phase, an E-Seal checkpoint has been

![E-Seal on Cargo Door](image)
Figure 2.11-1
Approximate Location of E-Seal Demonstration Facilities
identified at Coxsackie along the Thruway. This initial phase roll out will integrate CVISN with the Fast and Secure Trade (FAST) system as part of the US/Canada Port of Excellence border crossing and the Freight Information Real-Time System for Transport (FIRST) system at the Port of Newark. For shipping companies that guarantee security compliance for their cargo, the FAST system allows those compliant commercial carriers faster lane access at border crossings to expedite their border processing and clearing. The FIRST system is an appointment program for pre-scheduling and arrangement of incoming commercial vehicles to the Port for load pick up. The FIRST system is designed to increase security and efficiency of container shipping at terminal port locations.

The roll out of the second phase by IFTWG involves the movement of primarily agricultural goods from Mexico to Canada via Laredo, TX at the southern border and the Ambassador Bridge (connecting Michigan to Ontario) at the northern border. The roll out of the third phase uses the same border crossing location in the south at Laredo, but follows the trade route to the US/Canada border crossing at Blaine, WA.

The basic operation of the system starts at the port of entry (or possibly at the shipper's terminal location) for the agricultural product where a Customs and Border Protection (CBP) agricultural inspector secures the container with the electronic seal. At that time the electronic seal is activated using a hand held device. The container is then tracked and recorded en route using CVISN electronic screening systems deployed at pre-determined locations along the trade corridor route. Under the initial IFTWG rollout alternatives, designated checkpoints have been identified at intermediate locations along the designated route whereby the electronic seals are read as the vehicle travels along the route. At that point the cargo shipment is identified and queried against a database for consistency or deviation from a pre-determined schedule and records. The event information that is read along the route is transmitted through the central server to the border crossing location. Just prior to the designated border crossing location, the seal is again detected and checked by inspectors. This additional checkpoint validates the truck driver's progress, and allows for reduced or no delay when the shipment reaches the border. The central server finally reviews the information, and flags the shipment if any inconsistencies or events (i.e. container doors opened, deviation from the designated route or schedule, etc.) have occurred along the way. The decision to stop and detain the driver will be based on these results.

In 2003 NYSDOT developed a mobile CVISN electronic screening system. The system uses solar powered transponder readers and antennas mounted on transportable trailers. The current CVISN electronic screening system is limited in its application to only the recognition of North American Pre-clearance and Safety System (NORPASS) enrolled operators with functional NORPASS enabled transponders. Because of its portability the system can be easily deployed at strategic locations along designated trade routes. However, the existing system is limited in its deployment and specifically targeted to the electronic credentialing of the specific commercial vehicle. New York's current system cannot detect when specific cargo shipments are within New York State, nor tell if they have been opened.
2.11.3. PROPOSED SOLUTION

The proposed solution involves modifying NYSDOT's existing mobile screening system to support the container-tracking component of the proposed IFTWG system. Since the intent of this system is to utilize existing CVISN technology, the primary modification to the mobile screening system is the addition of more comprehensive and longer-range communications capabilities. The current communications equipment is designed for relatively short ranges and is self-contained within the screening system. To support the expansion of the existing equipment to also function as an electronic cargo seal reader, this initiative requires developing compatible communications between the screening reader and a central server.

The proposed freight tracking system would require the integration of the first two of the following four components, already in use, with the latter two components:

1. **Telematics Wireless E-Seal**, a reusable door seal that can be cost-effectively mounted on the container or trailer to detect discontinuity in contact when the container doors are open; the device is interoperable with CVISN weigh/inspection stations.

2. **Handheld Reader**, used by inspector to activate or check seal, program seal memory, and properly close the container.

3. **Fixed (Roadside or “En route”) Reader**, using modifications to existing CVISN inspection stations, would provide accurate data from seals on containers traveling along those roadways.

4. **Central Server**, the main station to which all information is sent for validation by inspectors. Receives activation data, as well as seal event data, and verifies route, elapsed time, and tamper status.

The functionality of the system would require that overseas in-bond containers arriving in the Port NY/NJ destined for Canada be required to follow one of two pre-determined travel routes between the Port and the NY/Canada border. The first leg of the trip would be exclusively limited to the I-87 corridor from the port of entry to Albany. At Albany, the commercial vehicle would then either continue on I-87 to the border crossing in Champlain for points in Quebec, or follow the I-90 corridor to the border crossing in Buffalo for points in Ontario.

The first element of the system would begin as a truck destined for the Port to pick up a cargo container would make an arrival appointment through the FIRST system. The system would detect the truck as it is approaching and entering the Port of NY/NJ. Based upon the recognition and scheduling of the designated truck arriving at the Port, an electronic cargo seal would be installed on the container, activated and sealed by the same process. The container would then be monitored as it exits the Port. From that point on, the electronic seal would be identified and read at designated points along the route. An initial reader location has been selected at Coxsackie on the Thruway to monitor the progress of the shipment to that point. Two additional screening readers and communication links would be necessary – one between Albany and Buffalo on I-90, and one on I-87 between Albany and Champlain. The final link in the system would be at the US/Canada border crossings. All of the information about the shipment's travel times and security compliance gathered by the en route readers and compiled in the central server would be used at the border crossings to expedite the cargo processing.
An extension of this phase involves the expansion to other shipment types in addition to agricultural. Other inspection sites or virtual sites may possibly be added for an even higher rate of efficiency.

2.11.4. PROJECT IMPLEMENTATION

The project can be implemented in phases. The first phase is a stand alone roll-out of a modest system of en route readers and the integration of the necessary communications network and central server system to support the initiative. Under this initial phase of the initiative is the deployment of an en route reader system at selected locations along I-87 and I-90 between Coxsackie and the US/Canada border. The system's infrastructure would allow for the future expansion of the electronic screening and tracking network through the deployment of additional sites and communication links. In addition to more en route reader locations, the phased approach also allows for the expansion of the communications network and server systems, or expanded diversity of cargo shipment sealing and tracking beyond agricultural products, all of which ultimately provide a more comprehensive screening and security system.

2.11.4.1. Regulatory, Environmental, and Agency Coordination Issues

Because this project would be constructed entirely within the I-87 and I-90 ROW and result in minimal environmental disturbance or consequence, regulatory requirements and environmental processing would be minimal. Electronic screening utilizes Dedicated Short Range Communications (DSRC) technology, which currently shares its frequency with other devices such as wireless telephones, electronic toll payment systems, and military radio-location systems. Federal law requires that DSRC applications do not interfere with military uses, and DSRC systems require a Federal Communications Commission (FCC) license to operate. These issues must be considered as part of site selection for placement of the electronic screening equipment. Inter-agency coordination between the stakeholders (i.e. NYSDOT, NYS State Police, NYS Thruway Authority, USFDA, US Customs and Border Protection, Canadian Food Inspection Agency, Canadian Border Services Agency, the Canadian Customs and Revenue Agency and MTQ) would be necessary to ensure the consistency and functionality of the system and to establish bi-national and inter-agency information sharing and partnering. Coordination between the US and Canada specific to radio frequency (RF) transmissions may require resolution if wireless communications are to be used for international information distribution.

2.11.4.2. Project Costs

The total cost of the demonstration project is $225,000 of which $100,000 has been secured by the Department of Transportation's Passenger and Freight Safety Division. The total cost of $225,000 includes the central database server and associated software development as part of the initial alternative rollout. Annual operating costs for the project are estimated at $50,000 per year.

The following are the projected costs for the proposed system:
Electronic Seal Screening and Tracking: Project Implementation Cost

<table>
<thead>
<tr>
<th>Element</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Engineering/Design</td>
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<tr>
<td>Equipment/Materials</td>
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</tr>
<tr>
<td>Construction/Installation</td>
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<tr>
<td><strong>TOTAL</strong></td>
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