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16. Abstract This report identifies shortcomings in coordination at U.S. – Mexico border ports-of-entry and recommends alternatives that would improve operations and reduce congestion and delay. Based on the review of numerous previous reports and more than 100 on-site interviews from Texas to California, the authors analyze existing shortcomings and their causes. They conclude that the underlying problem is the absence of an overarching forum for coordinated planning and operations. As a result of this fundamental limitation, each of the public and private stakeholders plans and operates in ways that optimize their individual missions rather than the system as a whole. Issues that surfaced a decade ago still plague border operations because the forum to resolve those issues has not been established. Further compounding the challenges are the findings that neither physical infrastructure nor human resources have kept pace with growth. A dearth of basic data and benchmarks prevents all stakeholders from objectively attacking the problems. This reports lists specific actions to address existing problem areas and create an ongoing forum structure.

The authors recommend a pilot project to incorporate the alternatives devised in this study. The pilot would test the specific recommendations, as well as develop a process whereby all ports-of-entry can tackle planning and operations coordination effectively.

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TRUCK TRANSPORTATION THROUGH BORDER PORTS OF ENTRY: ANALYSIS OF COORDINATION SYSTEMS

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TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

EXECUTIVE SUMMARY

The following report contains considerable detail about the findings, conclusions, and recommendations of this project. During the course of the field investigations and analyses required to develop improvements in coordination, a handful of salient issues have emerged. For those readers who have only a few minutes to devote to this report, these "findings in brief" will provide a useful overview.

This report summarizes findings of a binational study examining stakeholder coordination problems that compromise the efficiency and integrity of the U.S. – Mexico border-crossing process for truck trade. Findings cover:

- Analysis of the roles of public and private-sector stakeholders in the border-crossing process;
- Assessment of prevailing coordination systems in place at the border though stakeholder interviews and port-of-entry site visits;
- Identification of the cause and effect of problems resulting from a lack of stakeholder coordination;
- Alternative stakeholder coordination systems; and
- Estimates of the economic impact of coordination alternatives where possible.

OLD ISSUES WON'T GO AWAY

Many issues identified independently in this project are not new and, in fact, have been on the issues list for a decade or more. They are still around because the multi-stakeholder coordination needed to effectively and permanently resolve them does not exist, mostly because there is no mechanism to foster coordination. Because there is no forum or umbrella structure within which planning and operational decisions are made, individual stakeholders or subgroups of stakeholders make changes that address their needs without the ability to understand how those changes may affect the overall process. The United States Customs Service (Customs) has been very dutiful in its ongoing attempts to include stakeholder groups in the planning and deployment of Customs initiatives, but the needs for coordination extend beyond the purview of Customs. The relatively new Border Station Partnership Council may offer the first opportunity to achieve truly broad stakeholder involvement, but considerable effort will be required to assure that all stakeholders participate fully. A pilot project to demonstrate the process and potential results of an umbrella planning and operations endeavor is proposed for the ports-of-entry in the El Paso-Juárez area.

LITTLE DATA, FEW BENCHMARKS

The absence of consistent, reliable data and meaningful benchmarks makes effective planning difficult, if not impossible. Some agencies collect and retain data that are meaningful to their individual missions and some private entities maintain cross-border trade databases, but comprehensive data that will support operational and planning decisions are either non-existent or protected for security or trade reasons. The long-anticipated rollout of Customs' Automated Commercial Environment (ACE) represents an opportunity to cure this chronic lack of crossing data. Between the non-sensitive data available from ACE and supplemental data that would need to be added to ACE data, the data shortages could be largely eliminated. What is needed at this point is a review of data required to effectively plan and operate crossing process, and the development of a plan to collect and fuse those data into useful information.

Another notable absence is meaningful benchmarks. Though individual agency mission objectives may be benchmarked, the complexity of the border-crossing process cannot be adequately measured by simply assembling the available measures. Unlike more traditional transportation processes, "throughput" is not a meaningful measure by itself, as throughput must be balanced against other critical measures of effectiveness, such as compliance with trade laws and interdiction of contraband. In spite of these seemingly diametrically opposed objectives, decision makers must have logical benchmarks to allow them to set priorities, both among functions within a port of entry (POE) and between POEs. Otherwise, it will be impossible to set overall goals for the process, to set priorities for spending, and to monitor progress. A comprehensive, multi-stakeholder analysis to incorporate all relevant benchmarks is needed.

INFRASTRUCTURE HAS NOT KEPT PACE

Internal and external access and circulation at most POEs have not kept pace with the growth in truck volume and changes in inspection requirements and techniques. Increases in truck volume over the last decade have exposed significant capacity limitations, not only within the POEs themselves, but also on the public roadways and bridges that provide access and egress to the ports.

Similarly, changes in inspection technologies and practices over the last decade, such as the introduction of non-intrusive inspection (NII) equipment, are not compatible with the original design of most POEs. At present, many POEs have dock space that is commensurate with the labor-intensive nature of inspections that predates current technology. Many of those same ports have severe space constraints that limit their ability to deploy the needed levels of NII equipment, in some cases because unused dock space takes up a significant portion of the port.

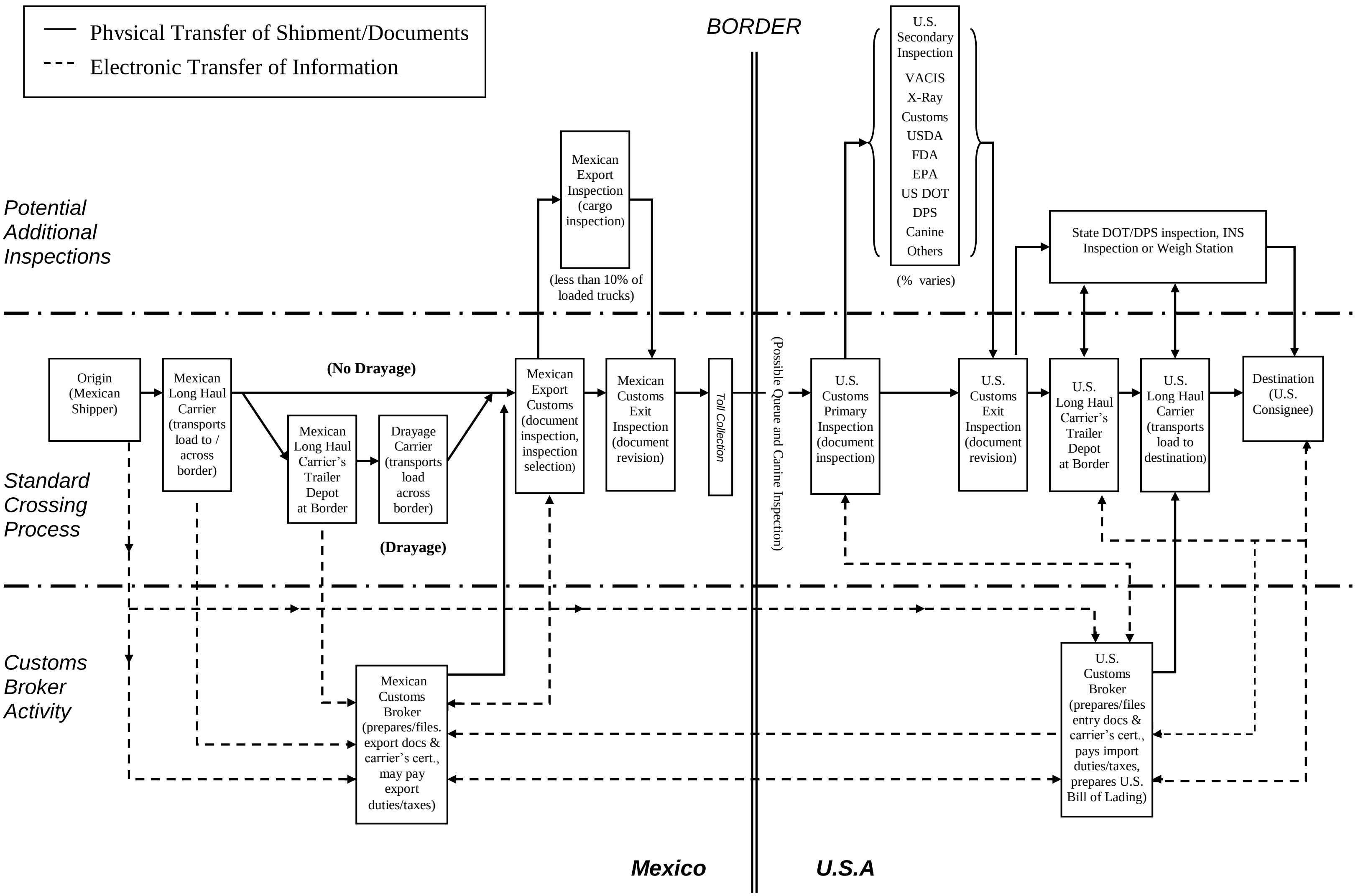
Poor circulation causes two different problems. One problem is a common traffic problem associated with streams of traffic crossing each other, creating congestion for both. The second problem is that the configuration of many ports does not provide for positive separation of cleared and uncleared vehicles, but relies instead on manual tracking, driver compliance, and inspector verification to assure that all required clearances have been received.

A binational port planning effort should be coordinated with local planning functions, such as metropolitan planning organizations (MPOs), to improve the coordination and reduce adverse impacts on both the POEs and the surrounding communities.

BOTTOM LINE: BORDER CROSSING IS NOT TREATED AS A SYSTEM

Figure 3 in the body of the report illustrates the complex relationship among multiple layers of government agencies and numerous private stakeholders. Because there are so many participants acting independently, there is no single entity or coalition that has oversight and responsibility for the successful functioning of the entire system. As a result, initiatives, improvements, and changes are, at best, piecemeal. Programs to promote compliance may not meet their potential because incentives are limited to the purview of the agency involved. Schedules of public and private stakeholders do not match well because there is no forum and few incentives to make them match. Finally, initiatives tend to be focused on a single objective, rather than representing the broad range of objectives of a border-crossing "system."

To achieve the level of coordination necessary to assure the highest level of effectiveness and efficiency, the process must take on system characteristics, including: an oversight or umbrella planning structure, effective benchmarking and monitoring to chart progress, and matching infrastructure and operating systems to achieve the operational objectives of the border-crossing system, and not just those of individual stakeholders. Coordination initiatives designed to incorporate all of the multi-faceted nature of trade across the southern border will ultimately achieve the greatest overall improvement in the Mexico-U.S commercial border-crossing system.



S-1. Schematic Flowchart of Northbound Border-crossing Process for Trucks

CHAPTER 1: INTRODUCTION

INTRODUCTION

In 2001, the Joint Working Committee (JWC) sponsored the first of two phases of a binational study examining stakeholder coordination problems that compromise the efficiency and integrity of the U.S – Mexico border-crossing process for truck trade. Through the Texas Department of Transportation (TxDOT) and the Secretaría de Comunicaciones y Transporte (SCT), U.S. and Mexico project teams were contracted to undertake examinations of coordination issues affecting the movement of truck-borne trade into their respective countries. In accordance with the scope of work established among the project sponsors and consultants, the U.S. team was charged with:

- conducting a literature review and establishing a web-based library containing a summary of findings from previous studies;
- analyzing the roles of public- and private-sector stakeholders in the border-crossing process;
- assessing the prevailing coordination systems in place at the border through stakeholder interviews and port-of-entry site visits;
- identifying the cause and effect of problems resulting from a lack of stakeholder coordination;
- developing alternative stakeholder coordination systems; and
- quantifying the economic impact of coordination alternatives where possible.

Each of these points is succinctly addressed in the present report and elaborated in further detail in the attached appendices.

BACKGROUND

The explosion of U.S. – Mexico trade during the past two decades has had a significant impact on the volume of trucks crossing the border. Since the mid-1980s, northbound truck traffic from Mexico to the United States has experienced growth in excess of 400 percent (Figure 1). Despite an economic downturn in 2001 that resulted in the first decline in U.S. – Mexico commercial traffic in more than a decade, continued expansion of cross-border trucking is forecast for the foreseeable future.

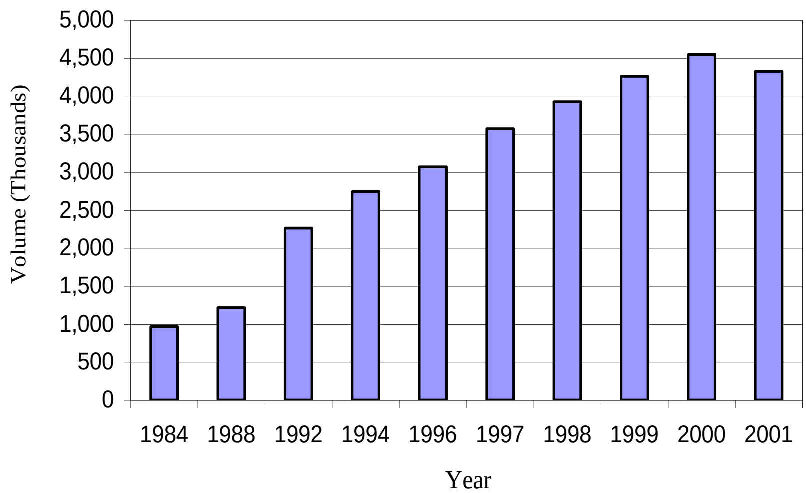


Figure 1. Northbound Truck Crossings from Mexico

Source: U.S. Customs

Although 25 commercial border crossings dot the 2,066-mile U.S. – Mexico border, the majority of truck movements are concentrated at a handful of gateways. Capacity at these locations has been overwhelmed by daily peak truck flows, particularly during the busiest shipping seasons.

Rapid growth, coupled with the large number of stakeholders – federal agencies, shippers, carriers, brokers, etc. – has made effective coordination so difficult that it often does not happen. The adverse effects of uncoordinated border activities and systems include increased levels of congestion, delay and pollution, higher border-crossing costs, and unnecessary wear on local infrastructure. Efforts to mitigate these effects have enjoyed varying degrees of success, but the inefficient, multi-step border-crossing process remains largely intact. Enhancing coordination among the stakeholders involved in the crossing process provides an opportunity to achieve lower and more consistent truck transit times between Mexico and the United States, greater border security, and reduced system costs.

PROJECT OBJECTIVES AND REPORT ORGANIZATION

Project Objectives

This project was undertaken to

- identify, quantify, and raise awareness of coordination problems in the Mexico and U.S. commercial border-crossing process, and
- develop alternative coordination systems that could enhance border operations.

Coordination problems lending themselves to mathematical analysis were quantified to estimate the economic cost of not pursuing alternatives. This report summarizes impediments to border efficiency and alternatives for improving the crossing process that this project identified. The appendices contain detailed explanations.

The range of problems and issues analyzed by the project team were governed by a relatively broad definition of coordination. This approach was necessary in order to capture the full impact of stakeholder interactions that affect overall border efficiency. Coordination was thus interpreted as*: the actions of participants in the border-crossing process that are harmoniously related to produce a desired result*. Four fundamental questions arise from this definition:

- Who are the participants?
- What are the actions?
- How are participants and actions related?
- What are the desired results?

This report addresses each of these questions, with particular emphasis on the relationship among stakeholder activities, the objectives that are sought, and the impact these and alternative strategies have on border efficiency.

Report Organization

The report begins in Chapter 2 with an overview of the information collection phase of the project, which entailed a comprehensive literature review, identification and mapping of stakeholder activities and interactions, extensive private- and public-sector interviews, and site visits to selected ports of entry. In accordance with the project work plan defined with the JWC and the Mexican team, the U.S. project team's analysis of border operations focused on northbound truck movements through the eight border gateways listed below and shown in Figure 2.

1. Otay Mesa, California – Tijuana, Baja California;
2. Nogales, Arizona – Nogales, Sonora;
3. Santa Teresa, New Mexico – San Jerónimo, Chihuahua;
4. El Paso, Texas (Bridge of the Americas) – Ciudad Juárez, Chihuahua;
5. El Paso, Texas (Ysleta-Zaragoza Bridge) – Ciudad Juárez, Chihuahua;
6. Laredo, Texas (Colombia Solidarity Bridge) – Colombia, Nuevo León;
7. Laredo, Texas (World Trade Bridge) – Nuevo Laredo, Tamaulipas; and
8. Pharr, Texas – Reynosa, Tamaulipas.

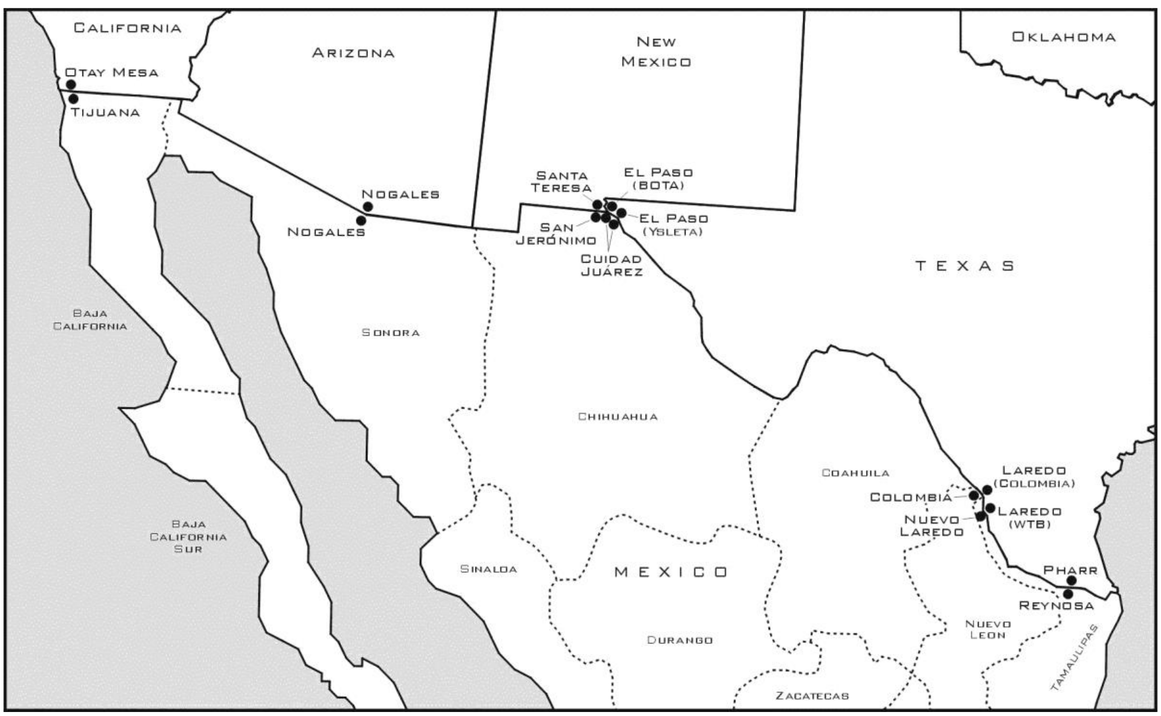


Figure 2. U.S. and Mexico Commercial Gateways Examined in Case Studies

Source: Texas Transportation Institute

Chapter 3 explains how the research team classified and analyzed the border problems and opportunities identified in the information collection phase of the project to determine whether quantification of the proposed alternatives was possible. Chapter 4 qualitatively describes alternative coordination systems for which no quantifiable impact estimations could be made. Where quantification was possible, detailed descriptions of methodology and application were documented, and have been included in the appendices. Also in Chapter 4, alternative coordination systems for enhancing operations at U.S. and Mexican border ports are proposed for consideration by the JWC and border stakeholders for implementation in a pilot project. In Chapter 5 the team provides recommendations for a pilot project.

CHAPTER 2: LITERATURE REVIEW AND INFORMATION COLLECTION

OVERVIEW OF INFORMATION COLLECTION

The coordination problems addressed in this study were identified from three sources:

a) a comprehensive review of literature,
b) private- and public-sector stakeholder interviews, and
c) site visits to eight commercial border crossings between the U.S. and Mexico.

Although the events of September 11, 2001, precluded a thorough first-hand review of port operations during site visits, the researchers gathered sufficient information in the other phases of the project to undertake an analysis of border coordination systems.

LITERATURE REVIEW

The departure point for this project was an extensive search for port-of-entry studies and related literature produced within the last five years. Over 40 reports and dozens of articles and presentations were drawn from a wide range of sources including web-based archives, the Transportation Research Information Service, bibliographies from recent border studies, and a variety of other government, private-sector, and academic sources.

The objective of the literature review was twofold. First, the study team inventoried existing conditions and identified potential impediments to efficient border-crossing systems. Documents collected enabled researchers to gain insight into the activities and interactions of key stakeholders influencing the movement of freight from its origin in Mexico to its destination in the United States. Background information was also obtained on the prevailing operational conditions at the eight commercial crossings analyzed in the study. This groundwork was vital in providing a context for stakeholder coordination issues analyzed in subsequent phases of the study.

Several recurring themes emerged through the review of previous border work.

- Poor stakeholder communication, cooperation, and activity scheduling and execution were identified as primary causes of border congestion and delay for Mexico – U.S. commercial traffic.
- Some antiquated and labor-intensive processes and systems persist, despite the availability of more streamlined systems and technology solutions.
- Infrastructure and space constraints contributed substantially to the narrowing of bottlenecks at some border crossings, especially at older gateways confined by urban development.
- The lack of customer service training and culture among border agencies hindered public- and private-sector interaction and cooperation.
- The mingling of diverse commercial traffic types at the border produced traffic conflicts and congestion that impede efficient crossings for pre-cleared and other low-risk shipments. This problem is exacerbated by extremely high levels of empty and bobtail movements and the development of fragmented crossing programs that offer inadequate incentives to encourage large-scale private-sector participation across the southern border.

A list of the principal findings and recommendations identified in the most relevant reports reviewed by the project team is provided in Appendix A.

The second objective of the literature review was to create a web-based library that would act as a clearinghouse for border literature and project information. Summaries of approximately 40 documents were written or compiled for this purpose and posted to the project website (http://bordercross.tamu.edu/cpoe/). Additional features of the website include full text reports, English and Spanish versions of presentations prepared for the Joint Working Committee, and a selection of links to border-related web pages.

THE BORDER-CROSSING PROCESS

Although the port of entry is the physical symbol of the border crossing, the process itself extends well into Mexico and the United States. To facilitate an understanding of trans-border freight movements, the study team development documents explaining the roles and responsibilities of the various stakeholders in the crossing process. There are literally dozens of parties involved in the preparation, transportation, logistics, documentation, monitoring, enforcement, and measurement of U.S. – Mexico truck-borne trade. However, most of these parties influence a relatively small portion of shipments or do not engage in activities that disrupt the physical movement of freight from origin to destination.

Stakeholders whose activities and level of coordination have the potential to substantially impact the speed and efficiency of the U.S. – Mexico border-crossing process include U.S. public agencies, Mexican public agencies, and private firms. The primary functions of these stakeholders are described in Table 1. Although the influence of Mexican agencies is more pronounced in the southbound direction, they have been included below to familiarize the reader with the agency responsibilities as they relate to binational planning and coordination.

Table 1. Principal Stakeholders in the Mexico-U.S. Border Crossing Process

Stakeholder	Function
U.S. Public Agencies	
U.S. Customs Service (USCS)	Ensures goods and services entering / exiting the U.S. abide by laws and pay applicable duties and taxes
Immigration and Naturalization Service (INS)	Regulates entry of visitors and immigrants into the U.S. and prevents unlawful employment
U.S. Department of Agriculture (USDA)	Inspects animals, plants, related products entering the U.S.
Food and Drug Administration (FDA)	Regulates entry of food, drugs, bio products into the U.S.
Environmental Protection Agency (EPA)	Regulates transportation of hazardous materials in the U.S.
General Services Administration (GSA)	Designs, owns, and operates U.S. ports of entry
Department of Transportation (DOT), Department of Public Safety (DPS)	Enforce U.S. motor carrier, driver, and vehicle safety regulations
Mexican Public Agencies	
Secretaría de Haciendo y Crédito Público (SHCP)	Ensures goods and services entering / exiting Mexico abide by laws and pay taxes - Mexican counterpart of U.S. Customs
Secretaría de Agricultura, Ganadería, Desarrollo Rural (SAGAR)	Conducts phytosanitary inspections of plant and meat products – Mexican counterpart of USDA
Caminos y Puentes Federales de Ingresos y Servicios Conexos (CAPUFE)	Administration, operation, and maintenance of roads and international bridges
Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT)	Regulation of hazardous materials and fumigation of forest products – Mexican counterpart of EPA
Comisión Nacional de Avalúos de Bienes Nacionales (CABIN)	Manages and operates Mexican port of entry facilities – Mexican counterpart of GSA
Instituto Nacional de Migración (INM)	Mexican immigration authority inspects documentation 20 miles south from the border – Mexican counterpart of INS
Secretaría de Comunicaciones y Transportes (SCT)	SCT enforces motor carrier, driver, and safety regulations – Mexican counterpart of DOT
Private Firms	
Mexican Shipper	Loads trailer at origin and provides sales documentation
Mexican Long-Haul Carrier	Transports trailer from origin to the border
Mexican or U.S. Drayage Carrier	Shuttles trailer across border
Mexican Customs Broker	Prepares, files export documentation with Mexican Customs
U.S. Customs Broker	Prepares and files import documentation with U.S. Customs
U.S. Importer (final consignee)	May provide shipment information to customs brokers

The project prepared a detailed flowchart of the northbound border-crossing process and an accompanying text narrative to provide a context for discussion of the stakeholder activities summarized in Table 1. These documents are based on information that the team collected during the literature review and subsequently revised and supplemented throughout the project. Condensed versions of the flowchart (Figure 3) and text narrative (Figure 4) are presented in this report for reference purposes and to sensitize the reader to the complexity of the border-crossing process. Full versions of these documents are provided in Appendix B.

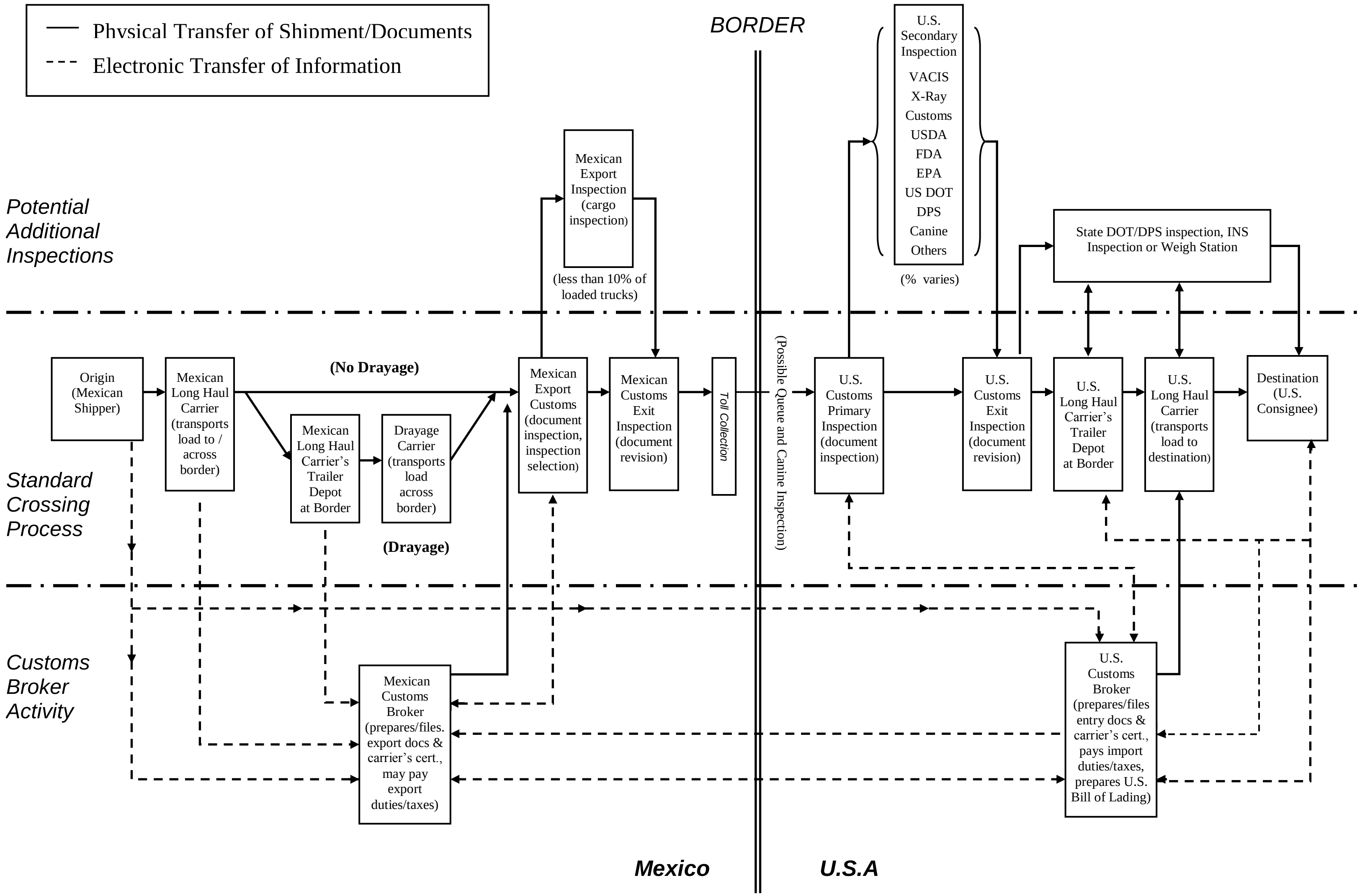


Figure 3. Schematic Flowchart of Northbound Border-crossing Process for Trucks

The shipper is the party that initiates the export movement at the origin in Mexico. If the origin is located in the interior of the country, a Mexican long-haul trucking firm is contracted to transport the freight to a trailer depot situated near the border.

When the shipment arrives at a pre-designated trailer depot at the border, Mexican and U.S. customs brokers prepare and file the export and import documentation. Typically, upon completion of broker activities, a drayage carrier is dispatched to pick up the trailer and haul it across the border. Hard copy documentation is collected by the drayage driver en route to the Mexican Customs Export Compound.

Unlike U.S. Customs, Mexican Customs has the authority to inspect outbound freight prior to export. When a shipment arrives at the Mexican Export Compound, it is subject to a random selection mechanism (red light/green light system) that determines whether it must undergo an inspection; less than 10 percent of shipments are selected for export inspections. After exiting the Mexican Export Compound, the shipment is transported across the border roadway or bridge, to the U.S. port of entry.

The U.S. commercial inspection process is comprised of two main categories of inspection: primary and secondary. The primary inspection entails a review of documentation, a short driver interview, and possibly a brief vehicle inspection for mechanical defects or drugs. Secondary inspections are conducted by a wide range of agencies, including Customs, the Department of Agriculture (USDA), the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and others. These inspections are carried out within the port of entry at non-intrusive inspection stations (such as X-Ray and VACIS gamma ray scanning devices), loading docks, or isolated areas of the compound. At ports of entry handling lower traffic volumes, detailed vehicle safety inspections are commonly conducted within the port of entry compound by state Department of Public Safety (DPS) and federal Department of Transportation (DOT) agents. Dedicated U.S. truck safety inspection facilities have recently been constructed adjacent to or immediately beyond many of the busiest ports of entry along the Mexican border. These facilities will be staffed primarily by state DOT employees charged with ensuring that all northbound trucks comply with U.S. commercial vehicle safety regulations.

Once released from the U.S. port of entry and vehicle inspection facilities, shipments destined for plants, warehouses or distribution centers in the U.S. commercial zone are delivered. Trailers with final destinations in the interior of the country (beyond the 12 to 26 mile commercial zone skirting the border) are transferred to a U.S. long-haul carrier's border depot. Delivery is scheduled and the U.S. carrier transports the shipment to its final destination.

Figure 4. Simplified Description of the Northbound Border-Crossing Process

STAKEHOLDER INTERVIEWS

More than 100 public- and private-sector stakeholders intimately involved in the border-crossing process were interviewed by U.S. and Mexican project team members. Interviewees included shippers, consignees, long-haul and drayage carriers, customs brokers, third-party logistics providers, and officials from various public-sector border agencies among others.

Private-sector interviews were typically held at the interviewee's place of business in the towns and cities surrounding the eight border crossings examined in the study. Public agency interviews with high-level Customs and USDA officials were also arranged at the case-study gateways. Additional informal interviews with public-sector officials were conducted by team members at border conferences and meetings in Mexico City, San Diego, San Antonio, Washington D.C., Tucson, and elsewhere. Issues explored during public-sector interviews and consultations included infrastructure, staffing, scheduling, technology, processes, planning, programs, binational initiatives, data collection, security, and border-agency organization. The variety of port-specific and border-wide coordination issues and problems raised by stakeholders during consultations with the project team are highlighted in a summary table provided in Appendix C.

PORT-OF-ENTRY SITE VISITS

Directors of the Otay Mesa, El Paso-Ysleta, and Nogales ports of entry granted project team members tours of their respective commercial compounds following public-agency interviews at those facilities. Anecdotal information gathered during local stakeholder interviews and findings identified in recent border studies expand the descriptions of observations. This information was compiled to develop border system profiles that account for unique conditions encountered at specific ports of entry, such as the prevalence of pre-cleared, maquiladora, agricultural, traditional, or empty/bobtail movements.

CHAPTER 3: CLASSIFICATION OF ISSUES AND IDENTIFICATION OF ALTERNATIVES

CLASSIFICATION OF ISSUES

A total quality management tool known as a "cause and effect" (or fishbone) diagram was utilized to identify cause and effect relationships within the border coordination systems analyzed. The diagram organizes impediments to efficient truck freight transportation from Mexico to the United States into seven broad categories, which are based on the primary nature of the problem. Issues are then further refined until an action-level of detail is determined.

The fishbone diagram underscores the interconnections of various coordination elements contributing to congestion and delay at the border. Problems that are classified under one heading often comprise components closely related to issues addressed elsewhere in the diagram. The proposed alternatives to these problems aim to eliminate stakeholder disconnects and bridge coordination gaps that currently inhibit more comprehensive goal setting among system participants and prevent coordinated execution of stakeholder activities.

This study appears to be the first time that impediments to border coordination have been defined in a structured manner that facilitates the development of remedies and alternatives. Using the fishbone approach, the project team identified the following categories of problems:

- *Physical Layout and Truck Movement*: infrastructure issues that constrain the movement of trucks across the border, and traffic flow concerns related to the efficiency and organization of inspections;
- *Demand Management:* problems associated with the formation of congestion at the border and the absence of effective instruments to manage it;
- *Standards:* the lack of harmonized processes and regulations to improve security and reduce delays for international truck movements;
- *Information Management:* weaknesses in information collection and sharing mechanisms that represent significant impediments to efficient border coordination;
- *Stakeholder Coordination:* stakeholder schedules, practices, and coordination structures that are suitable to individual stakeholders but have unintended negative consequences in the system as a whole;

- *Planning:* short, medium, and long-term border planning processes that frequently do not include the full range of affected stakeholders; and
- *Staff Management:* personnel availability and assignment practices among public agencies that restrict the capacity of border ports and reduce the efficiency of crossing systems.

These groupings and their respective components are graphically represented in the fishbone diagram shown in Figure 5.

PROBLEM/ALTERNATIVE IDENTIFICATION

Table 2 provides a one-page overview of the issues elaborated in Table 3. In both tables the issues are segregated according to the degree to which changes in coordination are likely to produce a significant benefit. On the left side of both tables are those issues identified by the team as primarily coordination. On the right side are related issues that will affect border crossing congestion and delay, but which are beyond the scope of coordination solutions. They are included because improvements undertaken without considering these issues would likely be less successful.

Table 3 provides a more detailed description of the problems and issues identified by the project team as impediments to improved border coordination and efficiency. The proposed alternative actions would address these problems, and the adjacent columns summarized subsequent benefits of such actions. There is no particular significance to the order of presentation or the numbers assigned to the individual issues. In order to facilitate problem analysis, the table has been arranged according to the groupings presented in the fishbone diagram, rather than by alternative priority, feasibility, or other criteria. For readers interested in learning more about a specific problem or alternative, further detail and background information are offered in Appendix D. The numbering and sequencing of issues in Appendix D are consistent with that of Tables 2 and 3.

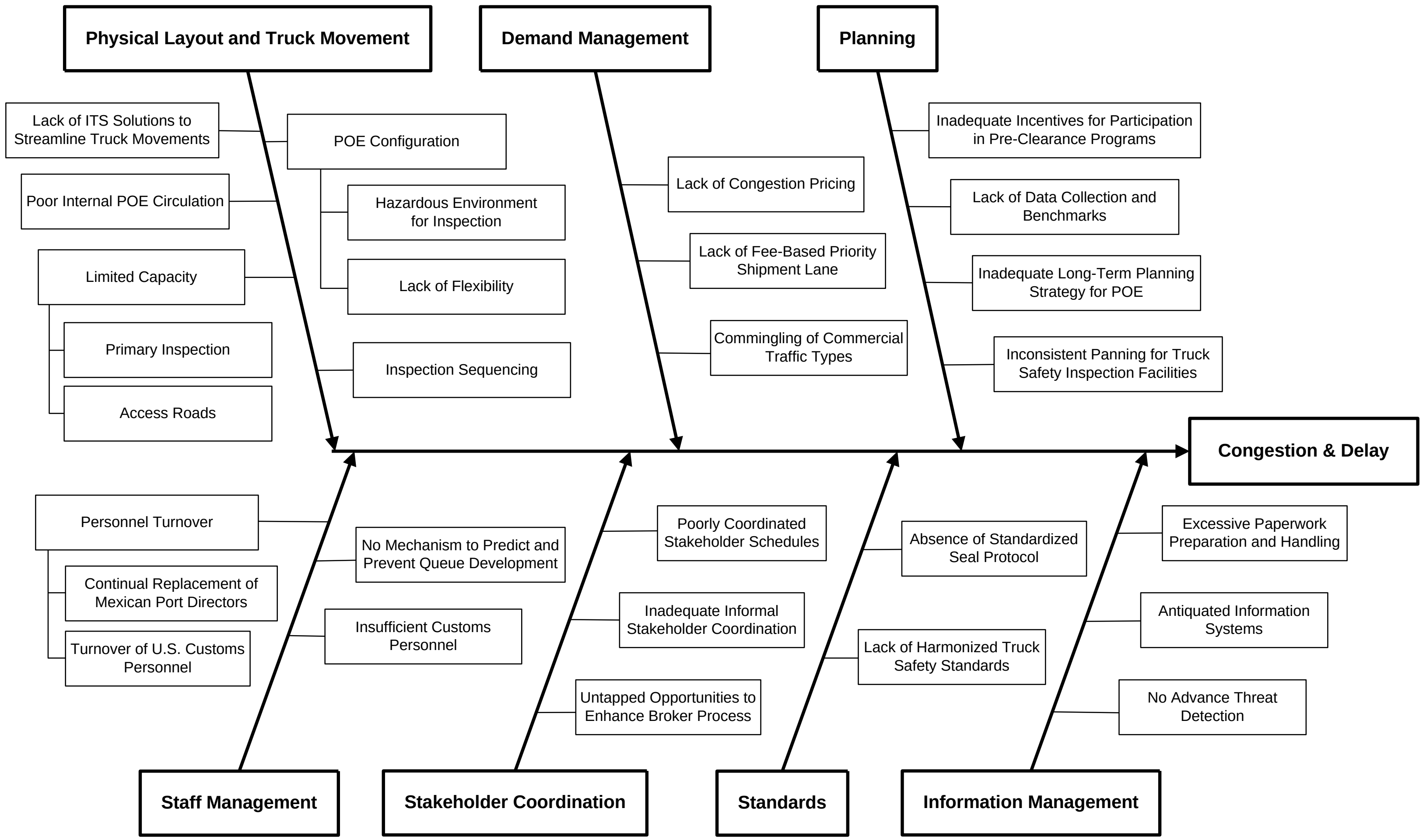


Figure 5. Fishbone Classification of Border Coordination Problems and Issues

Table 2. Summary Key to Coordination and Related Issues

Coordination Issues	Coordination-Related Issues
Planning	
C-1. Inadequate Long-Term Planning Strategy for Border Crossings C-2. Lack of Data Collection and Benchmarks C-3. Inconsistent Planning for Truck Safety Inspection Facilities	R-1. Inadequate Incentives for Participation in Pre-Clearance Programs
Demand Management	
C-4. Lack of Fee-Based Priority Shipment Lane C-5. Commingling of Commercial Traffic Types	R-2. Lack of Congestion Pricing
Physical Layout and Truck Movement	
C-6. POE Configuration – New inspection technologies cannot be accommodated C-7. POE Configuration - Poor Internal POE Circulation C-8. Capacity - Inspection Sequencing C-9. Capacity - Uncoordinated access road design and a limited number of lanes C-10. Lack of ITS Solutions to Streamline Truck Movements	R-3. POE Configuration –Outdated facility layouts R-4. Capacity –Some POEs lack a sufficient number of primary inspection booths
Staff Management	
C-11. Personnel Turnover - USCS inspector attrition rates are high C-12. No Mechanism to Predict and Prevent Queue Development	R-5. Insufficient Customs Personnel R-6. Personnel Turnover - Mexican Customs' rotation of port directors
Stakeholder Coordination	
C-13. Poorly Coordinated Stakeholder Schedules C-14. Inadequate Informal Stakeholder Coordination C-15. Untapped Opportunities to Enhance Broker Process	No Identified Stakeholder Issues
Standards	
C-16. Absence of Standardized Seal Notation Protocol C-17. Lack of Harmonized Truck Safety Standards	No Identified Standards Issues
Information Management	
C-18. Information Systems –Excessive Paperwork Preparation and Handling C-19. Information Systems –Antiquated Technology C-20. No Advanced Threat Detection	No Identified Information Management Issues

Table 3. Description of Issues, Alternatives, and Benefits

Coordination Issues	Related Issues
Planning	
C-1. Inadequate Long-Term Planning Strategy for Border Crossings **Problem / Issue:** Binational port planning is not coordinated to include all U.S. and Mexican agency and private-sector requirements. **Alternative:** Develop medium and long-range plans for port-of-entry and binational planning that involve all U.S. and Mexican public agencies and private-sector stakeholders. To the extent possible and where applicable, incorporate planning into the local MPO process. **Benefits:** *All Stakeholders*: More comprehensive border plans that consolidate and integrate stakeholder requirements and missions to reduce future problems and the need for corrective actions. **C-2. Lack of Data Collection and Benchmarks** **Problem / Issue:** Data deficiencies inhibit problem identification and preclude benchmarking to understand the relative magnitude of needs within and among POEs. **Alternative:** Coordinate public agency technology and resources in Mexico and the United States to gather, compile and disseminate data on traffic characteristics and delay times. Develop a single source for binational border planning data that can be utilized to establish where and why border-crossing needs exist, what their relative magnitudes are, and what remedial policies can be introduced to mitigate them. **Benefits:** *USCS, GSA*: Strengthens the basis for planning and operations decisions. Provides for objective comparisons of POE needs, facilitating allocation of funds. Allows targeting of deficiencies within and between POEs. *Private Sector*: Allows improved logistics planning. Facilitates advocating for improvements and fund allocations.	**R-1. Inadequate Incentives for Participation in Pre-Clearance Programs** **Problem / Issue:** Inconvenient enrollment structures and lengthy U.S. pre-primary wait times for pre-approved traffic have diminished private-sector participation in pre-clearance programs and reduced program effectiveness. **Alternative:** Organize comprehensive incentive programs that provide tangible benefits to participants, such as queue by-pass or expedited processing, thus increasing the efficiency and security of the border-crossing process. **Benefits:** *Shippers, Carriers*: Time waiting in queues reduced or eliminated. Predictable crossing times allow for better scheduling. *USCS*: Better able to classify traffic. Provide only essential checks for pre-approved traffic, focus resources on uncleared or unknown traffic.

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Planning (Cont.)	
C-3. Inconsistent. Planning for Truck Safety Inspection Facilities **Problem / Issue:** Planning and construction of U.S.. state vehicle inspection facilities at the border is being undertaken on a state-by-state basis with little integration with transportation corridors. **Alternative:** A standardized facility planning process would determine the location and operations of safety inspection sites and opportunities for credentialing trucks for their entire trip. This has clear links to Commercial Vehicle Operations and ITS initiatives and required coordination with the stakeholders (GSA, USCS, DPS, DOTs, and FWHA) to allow implementation. **Benefits:** *Shippers, Carriers*: Provides predictability in inspection process. Allows carriers to make prudent investments in CVO technology. *Federal and State DOTs*: Establishment of consistent technology planning facilitates development of credential and inspection tracking, reducing staffing, and increasing safety verification.	

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Demand Management	
C-4. Lack of Fee-Based Priority Shipment Lane **Problem / Issue:** Time-sensitive shipments are mingled with other traffic types. Shippers are faced with a "one-size-fits-all" primary inspection structure. **Alternative:** Implement value-priced express lanes for commercial traffic willing to pay for shorter U.S. pre-primary waits. Represents alternative to congestion pricing, focus on added value of express service for additional fee. **Benefits:** *Shippers, Carriers*: Allows option of expediting crossing operations; significantly reduces transit times during peak periods; increased predictability, thereby enhancing interlining schedules or intermodal movements. *Public Agencies*: Increases funding to provide additional inspection resources and facilities (Eligible for pilot project funding through the Federal Highway Administration (FHWA) Value Pricing Pilot Program). **C-5. Commingling of Commercial Traffic Types** **Problem / Issue:** Lack of commercial vehicle segregation by risk level, type, or time sensitivity exacerbates traffic conflicts prior to the U.S. primary inspection station. **Alternative:** Segregate pre-cleared vehicles from traditional trade and empties/bobtails. Monitor and enforce traffic-type segregation. Implement latest pre-primary ITS technologies in combination with driver, vehicle, shipper databases to aid identification of high-risk movements and expedite processing of low-risk movements. Where practicable, provide bypass lanes for vehicles not requiring detailed inspections. **Benefits:** *Certified Shippers and Carriers*: Reduces wait times. Prevents certified shipments from having to queue behind non-certified or non-time-sensitive shipments at the border. *USCS*: Provides incentives for compliance with certification (see Issue #R-1), allowing for better focus of staffing and resources.	**R-2. Lack of Congestion Pricing** **Problem / Issue:** Lack of congestion pricing may cause excessive congestion and delays during peak border-crossing periods. **Alternative:** Collect additional data on traffic and delays to identify when and how predictably peaks occur. Authorize increase in fees during peak period to mitigate demand; fee increase justified on the basis of additional resources necessary to accommodate peak demand. Investigate likely demand responses to peak-period tolls and, where warranted, perform cost-benefit analysis of congestion pricing scenarios. **Benefits:** *Public Agencies*: Allows some leveling of peak demand, reducing acute conditions. Provides funds for additional inspections and facilities. *Private Sector*: Reduces extensive waiting periods, providing for more predictable transit time. Provides lower-cost alternative for off-peak shippers.

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Physical Layout and Truck Movement	
C-6. POE Configuration – New inspection technologies cannot be accommodated **Problem / Issue:** New inspection technologies and requirements cannot be efficiently accommodated within many POE layouts. **Alternative:** Evaluate options for retrofitting/reconfiguring port facilities to accommodate Non Intrusive Inspection technologies, POE demand, and updated processing techniques. **Benefits:** *Inspection Agencies*: Significant increases in the number and effectiveness of vehicles screened; improved likelihood of identifying smuggling or terrorist activity.	**R-3. POE Configuration** **Problem / Issue:** Outdated facility layouts contribute to delays and safety hazards at some ports of entry. **Alternative:** Widen POE access lanes and provide adequate and isolated hazardous materials inspection sites at designated ports of entry. **Benefits:** *Inspection Personnel:* Safer working environment.
C-7. POE Configuration – Poor Internal POE Circulation **Problem / Issue:** The combination of current processes and layouts produce internal circulation problems that include the commingling of cleared and uncleared trucks. **Alternative:** Redesign POE circulation to prevent uncleared trucks from exiting POEs unlawfully and reduce traffic conflicts between cleared vehicles and those awaiting inspection. **Benefits:** *Inspection Agencies*: Reduces opportunity for uncleared vehicles to evade detection and inspection. **C-8. Capacity – Inspection Sequencing** **Problem / Issue:** There are untapped opportunities for border agencies to inspect vehicles while they are in the queue for U.S. primary inspection. **Alternative:** Identify methods for extending sequential screening/inspection activities to take advantage of idle time in queues (e.g. Nogales "drug barn"). Collapse activities when volumes do not justify additional booths or pre-primary screening. **Benefits:** *Inspection Agencies*: Allows the expansion of inspections longitudinally where lateral space is limited. Increases effectiveness of inspections in the absence of space for additional primary booths.	**R-4. Capacity – Number of Primary Inspection Booths** **Problem / Issue:** Some POEs lack a sufficient number of primary inspection booths due to severe space constraints. **Alternative:** Explore opportunities to expand the number or primary inspection booths where required/feasible. Improvements to port layouts, operations and vehicle tracking, and changes in peak arrival characteristics through improved incentive planning may provide some relief to capacity constraints. In some cases, acquiring land to expand the number of primary booths may be the only option. **Benefits:** *All Stakeholders*: Improved traffic flow and process efficiency. Expedited processing of vehicles through U.S. primary (main bottleneck in the border-crossing process) during peak periods.

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Physical Layout and Truck Movement (Cont.)	
C-9. Capacity – Uncoordinated access road design and a limited number of lanes **Problem / Issue:** Uncoordinated access road design and a limited number of lanes cause cross-border traffic to interfere with local vehicular movement on roads near border crossings. **Alternative:** Coordinate access road and port designs binationally and within each nation. Use MPO planning processes to incorporate border station and city planning needs. **Benefits:** *Public Sector, Shippers, Carriers, Local Community*: Significant improvements in traffic flow will reduce transit time for border crossing and reduce traffic on local streets. **C-10. Lack of ITS Solutions to Streamline Truck Movements** **Problem / Issue:** Existing processes in the crossing system are time consuming, resource intensive, and contribute to redundant information verification. **Alternative:** Develop ITS capabilities at the border that are interconnected with CVO improvements and technology initiatives along transportation corridors. Deploy Dedicated Short Range Communication (DSRC) transponder systems and ITS technologies such as automated toll collection, variable message signs, weigh-in motion scales, and smart cards to streamline and expedite the border-crossing process for legitimate trade. Work to incorporate vehicle/trade links in ACE so that DPS data at vehicle safety inspection stations can be developed as part of the POE system. Coordinate with the FHWA and U.S. State DOTs along NAFTA corridors to develop a credentialing system that spans the entire supply chain. **Benefits:** *Shippers, Carriers*: Reduced stops, shorter transit time. *Inspection Agencies*: Reduced data entry, less duplication of effort, fewer errors.	

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Staff Management	
C-11. Personnel Turnover – USCS inspector attrition rates are high **Problem / Issue:** USCS inspector attrition rates are high due to positional requirements and lower pay than other agencies. **Alternative:** Establish a long-term plan to equalize agency compensation and reduce USCS inspector attrition rates. **Benefits:** *USCS*: Higher level of experience among Customs inspectors, improved inspector efficiency and productivity, significant savings in agency training expenses.	**R-5. Insufficient Customs Personnel** **Problem / Issue:** U.S. Customs staffing levels at POEs are often too low to take full advantage of available Non-Intrusive Inspection (NII) technology. **Alternative:** Provide specific funding for NII operating personnel in coordinated NII equipment-personnel implementation plans. **Benefits:** *USCS*: Improved utilization of existing inspection technology. Increased interdiction of contraband and security threats. Shippers and Carriers: Shorter delays for vehicles and shipments sent to NII inspection stations.
C-12. No Mechanism to Predict and Prevent Queue Development **Problem / Issue:** Fixed primary inspection staffing schedules prevent the opening of additional primary booths as soon as demand warrants. **Alternative:** Implement an arrival-rate monitoring device upstream of primary to provide port authorities with advanced information on impending queue development. This will allow managers to make informed, real-time decisions on staffing and assignments. **Benefits:** Trade Community: Reduction in queuing time attributable to a shortage of available inspection booths. USCS: More efficient utilization of resources. Ability to rely on automated prediction of queues so that staff assigned to booths only when arrival rates warrant.	**R-6. Personnel Turnover – Mexican Customs' rotation of port directors** **Problem / Issue:** Mexican Customs' rotation/ dismissal of Port Directors results in communication problems and disruption of valuable binational initiatives. **Alternative:** Establish binational public-agency communication plan to reduce conflicts stemming from changes in Mexican or U.S. Customs management. **Benefits:** *Public Agencies*: Improved synchronization of evening and holiday schedules. Binational cooperation that transcends changes in port management. *Private Sector*: More streamlined and integrated Mexico-U.S. border-crossing system.

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Stakeholder Coordination	
C-13. Poorly Coordinated Stakeholder Schedules **Problem / Issue:** Uncoordinated schedules between two or more key stakeholders in the border-crossing process contribute to congestion, and prevent the movement of freight across the border at off-peak periods. **Alternative:** Organize public to private-sector consultation to facilitate identification of scheduling problems and enable adjustments that smooth POE demand and reduce border congestion and delay. **Benefits:** *Inspection Agencies*: Reduction in peak demand patterns. *Shippers, Carriers*: Reduction in idle time waiting for inspections in the border-crossing process.	No Identified Stakeholder Issues
C-14. Inadequate Informal Stakeholder Coordination **Problem / Issue:** Stakeholder practices are typically designed to meet individual stakeholder needs, but may have unintended consequences for the system as a whole. **Alternative:** Establish a forum for identification and resolution of stakeholder coordination problems. For example, provide web broadcasting of monthly Customs-broker community meetings to facilitate dissemination of port operations information among all interest groups. Provide web-casting of truck queue lengths to facilitate off-peak scheduling for discretionary shippers. **Benefits:** *All Stakeholders*: Improved operations, safety and efficiency from enhanced communication and interaction, resulting in minor adjustments and improvements throughout the system.	
C-15. Untapped Opportunities to Enhance Broker Process **Problem / Issue:** Where modern technology and practices have not been leveraged, the provision of broker services such as freight classification, stevedoring, drayage, and warehousing may involve delays and expense that are at cross-purposes with system efficiency. **Alternative:** Automated crossing programs and a shipper/consignee education campaign on efficient crossing procedures would help familiarize supply-chain partners with broker activities and services, and expedite shipments across the border. Web-casting of monthly broker-Port Director meetings could also enhance private-sector understanding of problems contributing to crossing inefficiency. **Benefits:** *Private Sector*: Identification of opportunities to realize border-crossing efficiencies within the private sector.	

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Standards	
C-16. Absence of Standardized Seal Notation Protocol **Problem / Issue:** The lack of a standardized binational procedure for documenting trailer and container seal numbers creates security vulnerabilities, liability concerns, and delays in the border-crossing process. **Alternative:** Develop and implement a binational agreement on the procedure for documenting container and trailer seal numbers for shipments moving between Mexico and the United States. Explore opportunities to incorporate this initiative into the development of new regulations governing the physical properties of trailer and container seals. **Benefits:** *USCS*: Enhances security and frees up resources associated with verification of seal numbers. *Shippers and Carriers*: Minimizes inspection delays caused by inconsistent seal notation protocol. **C-17. Lack of Harmonized Truck Safety Standards** **Problem / Issue:** Different commercial vehicle size, weight, and safety standards in the U.S., Canada, and Mexico complicate inspection and enforcement activities at the border. **Alternative**: An existing NAFTA mechanism – the Land Transportation Standards Subcommittee (LTSS) – is charged with addressing the harmonization of North American trucking standards. With the opening of the border, the LTSS should revitalize its efforts to coordinate with state DOTs, the trucking industry, and related stakeholders to determine a single NAFTA safety protocol. **Benefits:** *State and Federal DOTs*: Facilitation of driver and vehicle safety inspections. *Carriers*: Facilitation of adherence to U.S., Mexican, and Canadian safety regulations.	No Identified Standards Issues

Table 3. Description of Issues, Alternatives, and Benefits (cont.)

Coordination Issues	Related Issues
Information Management	
C-18. Information Systems – Excessive Paperwork Preparation and Handling **Problem / Issue:** Required preparation, transfer, and submission of multiple paper documents slows / complicates the border-crossing process and contributes to congestion and delay. **Alternative**: Introduce an internet-based information system accessible to authorized stakeholders (ACE/ITDS). Implement a paperless Mexican Export process similar to the U.S. Export Declaration system. Complete harmonization of U.S. and Mexican tariff classification systems and develop joint information validation platform. **Benefits**: *Public Agencies*: Single-source access to required information. Faster, more reliable inspections. *Shippers, Brokers, Carriers*: Reduction in paperwork, duplicative data entry, and border-system costs and delays. **C-19. Information Systems –Antiquated Information Systems** **Problem / Issue:** Separate public-agency information systems require multiple filing of documentation. Antiquated technology occasionally malfunctions causing delays and manual processing of documentation. **Alternative:** An integrated information system such as Automated Commercial Environment is required to streamline stakeholder transactions and processes and protect information privacy. Automation of manual toll collection systems will be necessary as the border-crossing process becomes more **streamlined.** **Benefits**: *Public Agencies*: Reduction in backlogs due to manual processes and occasional system failures. *Shippers, Brokers, Carriers*: Reduction in paperwork, duplicative data entry, and border-system costs and delays. **C-20. No Advanced Threat Detection** **Problem / Issue:** Most border stations have limited ability to identify and contain security threats at a safe distance from personnel and facilities. The lack of a binational threat detection / response capability is a border security and coordination weakness. **Alternative:** Explore opportunities to expand intelligence sharing among U.S. and Mexican agencies. Implement detection technology and practices in advance of Mexican and U.S. border compounds to reduce vulnerabilities and speed the crossing process for legitimate trade. **Benefits:** *Public Agencies and Public at large*: More secure border-crossing process.	No Identified Information Management Issues

CHAPTER 4: ESTIMATING IMPACTS OF IMPROVEMENT ALTERNATIVES

Table 3 provides a snapshot of 20 border coordination problems and issues adversely affecting U.S-Mexico transportation and trade. The project team determined that pilot study of the nature and scope defined in the original work plan could effectively address 15 of these issues. Table 4 specifies the border crossings at which each of these problems is most prevalent. Although several problems are virtually ubiquitous along the border, only critical cases deemed appropriate for pilot project study have been indicated.

ESTIMATING IMPACTS OF SELECTED COORDINATION IMPROVEMENTS

Generally speaking, quantifiable benefits of coordination accrue to one or more stakeholders when the mismatch between available capacity and peak period demand can be mitigated. This mismatch can be mitigated either by expanding the capacity of the bottleneck, by changing the demand pattern, or by a combination of both.

Many of the historical approaches to reducing congestion have focused on increasing the capacity of the infrastructure, either bridges or border stations, since one or both may be a physical capacity constraint. Most, but not all, capacity-enhancing alternatives are not coordination-related; thus, they are beyond the scope of this project. However, mitigating peak demand may be possible through low-cost changes in coordination, thus many of the alternatives are focused on demand patterns.

Finally, some variations in demand management include the segregation of trucks according to the level of attention required at the border station. With the exception of random inspection or other for-cause inspections, certain types of trucks, such as empties and bobtails, typically require less inspection than fully loaded trucks. Much as in other service industries that have “express lanes,” segregating these lower-risk vehicles would allow the focusing of scarce resources on other vehicles.

The primary quantifiable benefits the project team identified were:

- reduced wait time upstream of primary inspection (these benefits accrue mainly to the private sector),
- reduced air pollution from reduced idling (local communities benefit), and
- reduced labor associated with inspection of selected trucks (accruing to the inspection agencies, principally Customs).

Other quantifiable benefits accrue from changes in POE configuration and processing: however, those benefits are best estimated using queuing models such as the Border Wizard.

Table 4. Coordination Problem – POE Matrix

Most Prominent Pilot Project Issues at POES	Pharr	Laredo WTB	Laredo Colombia	El Paso Ysleta	El Paso BOTA	Santa Teresa	Nogales	Otay Mesa
C-2. Lack of Data Collection and Benchmarks	*	*	*	*	*	*	*	*
R-2. Lack of Congestion Pricing	*	*		*	*		*	*
C-4. Lack of Fee-Based Priority Shipment Lane	*	*		*	*		*	*
C-5. Commingling of Commercial Traffic Types	*	*		*	*			*
R-3. POE Configuration & Outdated facility layouts			*	*	*			*
C-6. POE Configuration & New inspection technologies cannot be accommodated			*				*	
R-4. Capacity & lack a sufficient number of primary inspection booths		*		*	*		*	*
C-9. Capacity & Uncoordinated access road planning	*			*	*	*	*	*
C-10. Lack of ITS Solutions to Streamline Truck Movements								
C-7. POE Configuration & Poor Internal POE Circulation			*	*	*			*
C-8. Capacity & Inspection Sequencing								
C-12. No Mechanism to Predict and Prevent Queue Development	*	*		*	*			*
C-13. Poorly Coordinated Stakeholder Schedules				*	*		*	*
C-14. Inadequate Informal Stakeholder Coordination	*	*	*	*	*	*	*	*
C-16. Absence of Standardized Seal Notation Protocol								

TOTAL COST OF DELAY

Delay is identified as that added wait time upstream of primary inspection that is a result of the demand for passage at primary booths exceeding either the physical or inspection capacity. The project team estimates that the total cost of this delay is on the order of $60 million annually at the southern border.

IMPACT OF ALTERNATIVES

Alternatives with Quantifiable Benefits

The alternatives presented previously, identified improvements that could provide benefits through various mechanisms. Some of these benefits are quantifiable, particularly those achieved by a reduction in peak period demand. Alternatives intended to reduce peak period demand include congestion pricing, value pricing, and preclearance programs.

Congestion Pricing

Congestion pricing involves placing a surcharge on peak-period crossings. This approach is very similar to load-leveling practices in virtually all capacity-constrained industries – utilities, airlines, movie theaters – all of which charge higher prices to use the facilities during the peaks. The surcharge is not a penalty, rather it is a fee to allow the service provider to augment resource levels to better accommodate the peak demands.

Internal calculations show that there are net savings (which accrue primarily to trucking) of $16.10 for each truck that shifts from the peak period to the off-peak periods. Thus, the cost of improvements that successfully draw trucks from the peak can be weighed against this benefit.

The project team estimated the benefit from reduced congestion and pollution that results from a marginal change in peak-period traffic – that is, from the diversion of a single vehicle from the peak period to an uncongested off-peak period. The main value of this estimate is that it provides a rough indication of the magnitude of the congestion charge that would be appropriate. One could use this rough indication as a starting point for investigation of the likely demand responses to congestion pricing, perhaps within the context of a stated preference analysis.

In addition to reducing the average border crossing time, congestion pricing should reduce the variability of that time. Variability imposes additional costs on the trading community because much of the variation is unpredictable until a vehicle is nearly arrived at the border crossing. Although the impact of congestion pricing on the amount of unpredictable variation could not be estimated, the project team made a preliminary effort toward quantifying the extent of the current problem. For the wait times before U.S. primary inspection, the project team analyzed how much of the variation can be predicted on the basis of recent traffic volumes, day of the week, and the holiday effect, versus how much of the variation cannot be predicted.

At the busier POEs, rescheduling a truck arrival from a peak congestion period to an uncongested off-peak period will produce benefits in reduced waiting time at primary inspection and reduced pollution. On a rough estimate, these benefits would amount to $16.10 per truck; this figure is also a ballpark indication of the congestion charge that would be economically warranted. This figure does not factor in the congestion-induced delays that occur inside the POE, which can include waits for secondary inspection. Factoring in these delays would increase the estimate of benefit/congestion charge.

If 10 percent of the northbound trips are peak hour trips, and if 10 percent of those trips were diverted to the off-peak through congestion pricing, the savings in delay and pollution would be roughly:

2,000,000 trips x 10% x 10% x $16.10 per truck = $322,000 (border-wide)

Value Pricing

While reasonably accurate estimates of total delay are important to estimating the impact of congestion pricing, the analysis of value pricing can proceed without an estimate of total delay. This alternative provides an option for traffic with a high value of time (typically, time-sensitive or high-value cargo). When such cargo is diverted from the congested lanes, all traffic benefits. These savings have been estimated for various illustrative scenarios involving different splits in traffic between a value-priced express lane and the regular lane, and different amounts of time saving from taking the express lane.

In illustrating the benefits of value-priced express lanes, the project team considered a situation where, in the absence of value-pricing, all vehicles would have to wait 60 minutes for primary inspection. In the value-pricing scenarios, the wait remained 60 minutes on average, but it was shorter for vehicles in the express lane and longer for vehicles in the regular, unpriced lanes. The estimated benefits from this more efficient distribution of delay time were appreciable. One of the scenarios assigned one-fourth of the traffic to an express lane with a 15-minute wait and the rest of the traffic to a regular (unpriced) lane with a 75-minute wait. Compared with the base case of no traffic segregation, this division of the traffic would reduce the total cost of the delay time (excluding pollution cost) by an estimated 39 percent.

Appendix E estimates that border-wide wait times likely exceed $60 million annually. Applying the estimated 39 percent delay reduction through value pricing produces a rough estimate of the potential benefits as large as $24 million.

Increased Incentives for Participation in Pre-clearance Programs

The impact estimation for this alternative was similar to the estimation performed for congestion pricing. The project team estimated the reductions in the costs of pollution, congestion, and requirements for U.S. Customs inspection labor. As with congestion pricing, the focus here was on a marginal increase in participation – the effects of a single vehicle being precleared on a single crossing.

Estimation of the benefits from increased participation in preclearance programs focused on one particular program, the Border Release Advanced Selectivity and Screening (BRASS) system. The focus was further narrowed to certain "external" benefits from BRASS participation – benefits that accrue to parties other than the participant. The external benefits considered were the reduction in the time required of Customs inspectors and the reductions in the queuing time for primary inspection. For a single crossing of the border, these benefits amount to an estimated $8.56. An implication is the need for a per-crossing incentive to participate in BRASS that equates to about this amount. The incentive could be access to a fast lane at primary inspection or it could be monetary. In the former case, the time savings from taking the fast lane should be about 17 minutes. External benefits from BRASS participation that could not be estimated are the improvement in national security and the increased compliance with drug laws; if one could quantify these benefits, the estimate of the appropriate incentive for BRASS participation would be higher.

On the crude assumption that one loaded truck equals one entry, using FY2000 data on loaded trucks entering the U.S., a 30 percent increase in BRASS participation rate translates to 696,000 additional BRASS entries per year. As a very rough estimate, that increase in number of BRASS entries would generate external benefits of nearly $6 million per year (=$8.56 multip. X 696,000). These benefits are roughly split between savings in trucking delay and reductions in inspection agency labor costs.

These savings represent productivity benefits to Customs and other inspection agencies. A 10 percent increase in BRASS participation would result in productivity savings of more than $1,600,000.

All of these options require some special actions by both the private sector and the public sector. The public sector must provide incentives and take actions that represent a net benefit to the process, even though some groups might not benefit directly. In all cases, if a private stakeholder is willing to change its operations or pay an extra fee, it can receive improved service. The magnitude of the benefits depends on the level of private- sector participation.

HOW QUANTIFICATION WAS CONDUCTED

For each of the alternatives presented, impact estimation required an assumed cost of time per hour for truck delays at the border. Equivalently, this assumed value represents the benefit from a one vehicle-hour reduction in delay. The components of this benefit are savings in trucking inputs, benefits from time savings for freight delivery, and reductions in pollution.

Savings in Costs of Trucking Inputs

An hour reduction in border delay reduces the amounts of inputs such as fuel and labor that a trip across the border consumes. To estimate the benefit of these savings in inputs, the project team considered evidence from the 1) Mexican consultant's contribution to the present study, 2) the earlier Binational Border Transportation Planning and Programming Study, 3) a recent study of the value of time among California truckers, and 4) a 2001 report to the Mexican SCT.

Benefits from Time Savings for Freight Delivery

Faster delivery of freight allows the trade community to realize various benefits through the reorganization of supply chains, especially with respect to changes in inventory and warehousing arrangements. Although the project team could not make an estimate of this component of benefit, a review of relevant literature has yielded information that assists with the design of pilot studies.

Reduction in Pollution

Evidence from several studies of truck emissions and of the costs of vehicle emissions to society was reviewed. The project team took emission factors from a study from ICF Consulting that estimated factors for cross-border drayage trucks, assumed to be Mexican-domiciled vehicles with four or more axles. For measuring the costs of emissions, the focus of estimation may either be the costs of damage to human health or the "control costs," which are entailed in counter-measures that are undertaken to offset the impact of vehicle emissions ("control costs"). An example of counter-measures in the context of climate change (which we did not consider) would be planting trees to absorb carbon dioxide. The estimates of unit emission costs that are used in this report are taken from a study that focused on control costs.

Other Elements

The impact estimation involved many other data and analytical elements. In brief, these were:

- distribution among truck trips of the cost of time per hour (this element was central to the impact estimation for value pricing, and it was taken from the above-mentioned study of California truckers.);
- data on delay at U.S. primary inspection stations, supplied by U.S. Customs;
- data on border-crossing delays for commercial vehicles, collected by TTI and Battelle;
- estimates of secondary inspection rates, based on a U. S. General Accounting Office (GAO) study and the project team's discussions with U.S. Customs officials at the border;
- estimates of time required for primary and secondary inspections, based on the project team's observations and discussions with U.S. Customs officials at the border;

- the cost of U.S. Customs inspector labor per hour, based on discussions with financial officers at the U.S. Customs national headquarters; and
- econometric modeling with Ordinary Leased Squares (OLS) and logit regressions, to analyze the variation in pre-primary wait times in a way suitable for a limited dependent variable. (The dependent variable is “limited” because wait times cannot be less than zero, and, not infrequently, the recorded wait times are zero.)

CHAPTER 5: PILOT PROJECT RECOMMENDATIONS

PHASES OF PILOT PROJECT

The purpose of the pilot project is to demonstrate and evaluate the effectiveness and impacts of implementing selected alternatives to address coordination shortcomings. Successful alternatives can then be exported to other POEs, while careful analysis of unsuccessful options should aid in understanding what factors may or may not be suitable for further improvement.

The majority of the coordination issues identified in Phases I and II are related to or exacerbated by inadequate interaction among all pertinent stakeholders in either the planning or operations phases. For this reason, the project team recommends that any pilot project include the broad range of stakeholders, rather than focus on improving more narrowly defined specific coordination issues, particularly since priorities among the issues will vary among POEs. Further, as coordination is a function of time and interaction, once proper stakeholders are gathered, a full range of applicable issues can and should be addressed, maximizing the effectiveness of increased coordination. The proposed pilot accomplishes those things via the following two-phased project:

PHASE III-A – DEVELOP CONSENSUS IMPLEMENTATION PLAN

Identify the Relevant Stakeholders

Identify a comprehensive list of all relevant stakeholders from the process chart developed during Phase II. The project team will verify the list will be verified through key stakeholders, such as the port director for the U.S. Customs.

Develop Issue Priorities

Provide an initial workshop (Workshop #1) will involve all relevant stakeholders. At this half-day workshop the project team will present the results of the coordination study and facilitate a discussion among the stakeholders. The purpose of the discussion is to refine the list of issues, improve the accuracy of the team's assessment of the nature and magnitude of the coordination, and gain group consensus on which issues should be pursued for improvement. Table 4 shows the initial list of issues for starting the discussion.

Address Individual Stakeholder Concerns

Following the group meetings, the project team will meet one-on-one with individual stakeholders to assure that all concerns and major objections have been voiced and are receiving attention. This additional meeting will occur two to three weeks after Workshop #1 to allow the stakeholders time to identify concerns that may not arise in the initial group setting. The application of Border Wizard to one or more of the El Paso POEs may be valuable in identifying specific improvements.

Gain Consensus on Improvements

Based on Workshop #1 and the subsequent small-group discussions, the project team will prepare specific improvement alternatives for stakeholder discussion. This half-day Workshop #2 will focus on gaining consensus on improvements to be explored and details to be worked out.

Prepare Detailed Implementation Plan

Using the consensus "implementation plan" drafted by the stakeholders, the project team will perform necessary data collection, analyses, and related work to prepare a specific detailed implementation plan for consideration by the stakeholder group. The plan will address actions required of every stakeholder, and individual stakeholders will be contacted as needed to assure understanding and willingness to pursue implementation. The research team will identify alternatives to any obstacles. Again, the development of the detailed implementation plan will no doubt require the application of Border Wizard to evaluate alternatives that affect layout and operation.

Present and Approve Implementation Plan

At Workshop #3, final implementation details will be presented to the stakeholder group along with action plans and priorities for each stakeholder. Final questions and concerns will be resolved. The evaluation plan will be presented for group review and comment.

PHASE III-B – IMPLEMENT AND EVALUATE CHANGES

Implement Changes

Following priorities identified by the stakeholders, the project team will serve as facilitators to the individual stakeholders to implement the consensus changes. This assistance may involve design, traffic analysis, process planning, group coordination, or other activities. The team's role is to provide those services that stakeholders would normally have their staff do if they had time.

Collect Data and Resolve Problems

Based on the evaluation plan agreed upon by the stakeholders, the project team will collect ongoing or snapshot data, depending on the nature of the evaluation. The team will work continually with affiliated stakeholders to identify and remedy minor problems encountered in operation. Using the data collected, team observations and stakeholder experiences, the project team will prepare an evaluation and a set of recommendations for review by the stakeholders.

Present Evaluation Results and Prepare Consensus Recommendations

At the final half-day Workshop #4, the project team will present results of the evaluation and facilitate discussions of the experiences among the stakeholders. The primary purposes of this workshop will be to identify a) what to keep, what to change, and what to delete, as well as b) what types of improvements to recommend for general application at other POEs.

Prepare Final Report

The project team will prepare a final report documenting the pilot project.

EL PASO-CIUDAD JUÁREZ PILOT PROJECT ILLUSTRATION

Viable pilot projects adhering to the structure outlined above could be implemented at several points along the U.S.-Mexico border. For illustrative purposes, the project team selected El Paso-Ciudad Juárez to demonstrate potential elements to be included in the pilot project undertaken. The El Paso-Ciudad Juárez gateway was chosen for the following:

- the opportunity to address coordination in a complex, high-volume border system in which a variety of factors contribute to congestion and delay;

- the proximity of three commercial gateways within the system (Santa Teresa-San Jerónimo, Bridge of the Americas, and the Ysleta-Zaragoza bridge), which enables designation of initiatives to specific crossings;
- the diverse size, infrastructure characteristics, and technological capabilities of the port facilities, which allow further options for port specialization;
- the imbalance of truck volumes among crossings and the possibility of diverting trucks from congested crossings to crossings with excess capacity;
- the prevalence of localized maquiladora movements that facilitate the organization of comprehensive stakeholder meetings; and
- the expressed interest of port authorities, regional customs management, the trade community, and local elected officials in exploring new opportunities to enhance border operations (*critical* to the success of the proposed coordination effort).

Regardless of where the pilot project is undertaken, various coordination alternatives would be proposed for implementation in conjunction with one another. This strategy reduces competing or contradictory initiatives and enables the development of synergies among proposed solutions. Some examples of alternatives that could be combined or otherwise tailored for implementation in an El Paso-Ciudad Juárez pilot project include:

- data collection and benchmarking (C-2);
- planning for port capacity, retrofitting and traffic circulation (R-4);
- stakeholder schedules (C-13);
- ITS package, information technology and pre-emption of queue development (C-10), (C-12);
- opportunities to improve inspection sequencing (C-8);
- trailer seal notation protocol (C-16); and
- commercial traffic segregation and pricing instruments (C-4).

Data Collection and Benchmarking

A binational data collection initiative must be undertaken in order to conduct a more precise evaluation of impediments to border efficiency, understand their relative magnitude, and formulate effective remedial policies. U.S. and Mexican public agency technology and resources at the three commercial crossings in the El Paso-Ciudad Juárez border system should be coordinated to gather, compile, and disseminate border data more efficiently. These data should, at minimum, include detailed and reliable statistics on disaggregated traffic flows (laden and empty/bobtail), truck arrival rates, and delay times at various points in the border-crossing process. Because Mexican and U.S. Customs already collect much of this information through the scanning of documentation and other means, these stakeholders would be closely involved in the design and implementation of a binational data collection and sharing effort.

Planning for Port of Entry Capacity, Retrofitting, and Improved Traffic Circulation

Layouts of U.S. ports of entry at the Ysleta-Zaragoza and BOTA commercial border crossings were designed to accommodate lower traffic volumes and manual inspection processes. Despite modifications, they are not presently configured for optimum throughput, safety, and security. Current infrastructure and traffic engineering plans at the Ysleta POE call for expansion of the primary inspection module, alternate traffic flows through and around the POE, and adjustments to the exit gate and egress route. Consultations regarding these plans should not be limited to obvious stakeholders such as the USCS and GSA, but they should involve non-traditional POE planning participants such as representatives from the local drayage carrier community. As the direct users of the system, these carriers are in the position to provide valuable feedback on port design and traffic circulation plans for the Ysleta-Zaragoza crossing. This information should be solicited under a focus group structure in the border coordination forum.

Stakeholder Schedules

The schedules of some stakeholders in the El Paso-Ciudad Juárez border-crossing system are established in isolation and contribute to peaked traffic patterns at local commercial gateways. In addition to promoting congestion and delay, the lack of schedule coordination among key stakeholders such as the maquiladora community, U.S. Customs, and the FDA shrinks the daily crossing window available to cross-border movements. A broadly attended public–and private-private sector meeting is required to identify and disseminate information about all scheduling conflicts that contribute to border system inefficiency. This meeting will illuminate the impact of scheduling practices among the various stakeholders and enable the development of a more systemic approach to activity scheduling and coordination.

ITS Package, Information Technology, and Pre-emption of Queue Development

There are opportunities to improve the security and efficiency of the border-crossing process in the El Paso-Ciudad Juárez region through more extensive use of ITS technologies. Stakeholder consultation is a critical component of the ITS implementation process. The Texas Transportation-Center for Transportation Research (TTI-CTR) Model Border Crossing Project could be utilized by stakeholders participating in the border coordination forum to identify ITS technologies suitable for implementation at the three local commercial crossings. ITS options to be considered include transponder systems, automated toll collection, variable message signing, weigh-in-motion scales, and smart cards. A new commercial driver identification card currently in the trial stage at the Ysleta and BOTA crossings may provide an opportunity for piggybacking data collection and shipment tracking initiatives.

The deployment of vehicle arrival monitors would enhance the ability of U.S. Customs to detect the impending formation of queues at primary inspection and take pre-emptive action to adjust primary booth staffing levels to reduce congestion and delay. Manual traffic monitoring duties could be assigned to U.S. Customs personnel working in the vicinity of primary inspection on an interim basis until automated monitoring devices are installed.

Examination of the feasibility of incorporating vehicle and trade links proposed under ACE should also be undertaken by the border coordination forum so that DPS data at vehicle safety inspection stations can be fully integrated into the border-crossing system. Coordination should be initiated with the FHWA, the U.S. State DOTs and participants in other segments of NAFTA transportation corridors to develop a credentialing system that extends beyond the border.

The development of more rapid and seamless means of electronic intelligence sharing among Mexican and U.S. public agencies is another priority topic to be considered at the border coordination forum. A broad-based stakeholder consultation group would assess the potential of implementing these and other state-of-the-art technology, communications and process applications at local truck crossings.

Opportunities to Improve Inspection Sequencing

The U.S. primary inspection typically represents the greatest constraint for northbound truck movements. The idle time trucks spend in queues prior to the U.S. primary inspection module at the BOTA and Ysleta ports of entry makes this one of the least productive segments of the El Paso-Ciudad Juárez border-crossing system. Various inspection activities currently carried out within these POEs could be conducted in advance of the primary booths. Transfer of activities such as canine drug inspections, driver interviews, vehicle safety screening, document reviews, and weigh-in-motion screening could be relatively easy to achieve, involve minimal capital expenditure, and improve the speed and security of the crossing process. Pre-primary inspection activities can be designed to be collapsed when they disrupt the flow of traffic into the primary inspection module. Given the interest of U.S. Customs in incorporating pre-primary inspection activities into redesigned operations at the Ysleta port of entry, this is an opportune moment to assess their feasibility and value in a pilot project.

Trailer Seal Notation Protocol

In order to ensure that cargo is not tampered with, seals are applied to the container or trailer door. Recent focus on international cargo security has prompted the development of standards governing the physical properties of these container and trailer seals, but little has been done to address the inconsistent manner in which seal numbers are noted on shipment documentation. If a seal is broken by Mexican Customs for export inspection purposes, an inspector signature, stamp, or other form of authorization may accompany the new seal number on the documentation. However, in some cases, no notification is made. This binational coordination deficiency creates security vulnerabilities and delays in the border-crossing process. In the absence of an agreement governing the documentation requirements for resealing of trailers and containers, authorities cannot determine whether conveyances have been illegally tampered with or opened for legitimate inspection purposes. As a result, these shipments are often needlessly sent to a U.S. secondary inspection for re-examination. An informal binational seal protocol could be tested in a pilot project at the three El Paso-Ciudad Juárez commercial crossings. Opportunities to incorporate this initiative into the development of new regulations governing the physical properties of trailer and container seals should be considered by the border coordination forum.

Commercial Traffic Segregation and Pricing Instruments

The El Paso-Ciudad Juárez border-crossing system is unique in that it encompasses three commercial gateways within close proximity to one another. This facilitates the implementation of pilot project alternatives that involve the dedication of border capacity to specific initiatives. For example, approximately 45 percent of northbound truck movements through El Paso-Ciudad Juárez area crossings are empties or bobtails. Opportunities to reduce these movements and prevent them from interfering with revenue loads and high-priority shipments are more easily accommodated in this system due to higher levels of access lane and processing capacity. The lack of traffic-type segregation and the subsequent mixing of shipments with different risk characteristics, priority levels, and processing requirements is undesirable because it slows the movement of laden trucks and reduces the benefits of expedited crossing programs for low-risk shippers and carriers.

Alternatives proposed by the project team for consideration and possible implementation at El Paso-Ciudad Juárez crossings include:

- monitored and enforced segregation of empties and bobtails from loaded movements,
- the dedication of access lanes or a specific border crossing to certified/pre-cleared commercial traffic (such as C-TPAT participants),
- the creation of dedicated fee-based border lanes for high-priority traffic, and
- the implementation of congestion pricing at border gateways.

Given the underutilization of the Santa Teresa-San Jerónimo crossing, measures to divert congestion to that gateway may hold promise. The availability of excess capacity at Santa Teresa, and the subsequent higher rates of inspection at that port, have counteracted efforts to increase truck volumes at that port. Conversion of this crossing into a high-speed corridor for certified traffic is a possible solution that could be considered for analysis by participants in the border coordination forum. This option would be evaluated in concert with other initiatives to improve the efficiency of the regional border-crossing system such as paving a northern border access route from Ciudad Juárez to San Jerónimo (the current route south of mountains is circuitous).

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APPENDIX A: SUMMARY OF LITERATURE REVIEW

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Border Crossing Facilities	Congestion and delays through port of entry	Lack of bypass lane: Vehicles not chosen for intensive inspection must pass though compound	Redesign the commercial cargo facility entrance. Build bypass lane for trucks not selected for intensive inspection.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Border Crossing Facilities	Limited queuing area and poor access to X-ray equipment	Insufficient space	Continue land acquisition initiatives. Acquire land adjacent to facility for queuing area, X-ray inspection access, or other initiatives such as bypass lanes or hazardous materials area.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Border Crossing Facilities	Traffic flow inefficiencies	Space constraints	Construct larger staging area between exit gate and ADOT facility. Additional space is needed within compound to accommodate all state and federal agencies.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Border Crossing Facilities	Sub-optimal management and control of truck traffic within commercial compound		Design and deploy a formalized traffic management system at POE. Implement traffic management by type of cargo or entry (example: laden, empty, pre-filed).
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Customer Service	Lack of customer service POE management practices, resulting in communication and coordination problems	Lack of customer service culture, mentality in POE agencies	Integrate customer service focus into POE resource allocation and staffing practices. Make POE operations more responsive to user requirements.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Customer Service	Real time information on POE operations not communicated to drivers		Add bilingual static and variable message signs to redirect traffic as conditions dictate.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Preclearance Programs	Low participation in gate-to-gate preclearance programs (20 percent or less)	Poor promotion	Expand and better promote gate-to-gate preclearance program (for brokers). Provide incentives for prefiling and multi-trip ADOT permitting.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Staffing/ Scheduling	Insufficient primary booths open	Lack of funding; rigid, pre-established staffing schedules	Allow supervisors to open additional primary inspection gates or secondary inspection resources in response to fluctuating traffic demands.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Stakeholder Coordination	Multiple stops	Booths not normally staffed by more than one agency; lack of overlapping agency jurisdiction	Replace current booths with larger, elevated "superbooths" that accommodate more than one inspector and more than one agency function. Cross-train inspectors to perform other border agency requirements.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Stakeholder Coordination	Lack of consensus regarding facility design and operation		Establish formal communication and coordination between U.S. Federal and State agencies working at the border.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Stakeholder Coordination	Lack of objective POE management leadership	No single agency with the responsibility or resources to oversee the efficiency of overall port of entry operations	Establish and fund organization to provide analytic and staff support to enforcement and regulatory port agencies in the flow efficiency aspects of port performance.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Stakeholder Coordination	Lack of consensus regarding facility design and operation		Establish formal communication and coordination between U.S. and Mexican agencies working at the border.
Arizona Port Efficiency Study: Final Report	SAIC, Transcore	1997	Nogales	Technology			Add video cameras and driver signing at critical locations to monitor traffic and improve security for inspectors. Use hand-held, pen-based computers to record inspection results.
Binational Border Transportation Planning and Programming Study – Task 13	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Preclearance Programs	Lack of pre-cleared loads	Unnecessary delays for repetitive, compliant, high-volume shipments at U.S. inspection facilities	Preclear more loads.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Binational Border Transportation Planning and Programming Study – Task 13	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Technology		Delays due to manual paperwork processing	Employ new technology to reduce processing delays.
Binational Border Transportation Planning and Programming Study – Task 3: Trade Flow Process	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Private Sector Practice	Demand peaks	Brokers "rushing" customs (perceived reduction in length or number of inspections)	Create earlier start times for the Mexican brokers or later hours for U.S. Customs. Encourage shippers to move loads at off-peak times.
Binational Border Transportation Planning and Programming Study – Task 3: Trade Flow Process	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Private Sector Practice	Northbound trucks arrive at Mexican border early and must park until the pedimentos arrive in mid afternoon.	Function of current private sector practices and documentation requirements	Offer addistional options for reducing vehicle queing such as greater electronic automation, shorter lunch hours, and or clearing paperwork and receipts in the afternoon instead of morning
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities	POE layout	At some facilities with X-ray machines, the X-ray queue blocked circulation within the compound, primarily due to improper location of the X-ray unit and truck queuing.	Provide additional X-ray equipment and extended hours for tanker trucks.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities		Primary booth entry/exit geometry, turning radius difficult to negotiate.	Study potential for improving road geometry, turning radius.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities	Northbound delays at U.S. POEs	Major system constraint is primary inspection area (not border crossing road or bridge). U.S. POEs are too small to accommodate enough inspection capacity (primary booths, secondary spaces, and other inspection areas) for trucks. Road/truck path geometry is often inadequate.	Sufficient lanes/booths should exist and be staffed to accommodate peak hour traffic levels. Sufficient queue capacity should be provided on site in advance of the initial inspection or toll booth. The queue road should have at least two lanes throughout its entire length, and truck paths throughout compounds should meet minimum standards. Sufficient maneuvering space should be provided in front of all docks.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities	POE infrastructure deficiencies	There were not always enough primary inspection booths at some locations, even if staffing was available.	Explore possibility of adding booths. Encourage use of alternate crossings. Implement differential pricing for certain types/time segments of traffic to reduce unnecessary peak period traffic.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities		Small number of docks are available for agricultural and informal entries at some POEs.	
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Border Crossing Facilities		Truck merging and weaving between primary and exit booths creates traffic conflicts and congestion within compound.	Internal truck circulation should be counter clockwise (inside turns on driver's side - most efficient). All secondary inspections should be off line.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Customer Service	Lack of customer service (avoidable time delays)	Lack of customer service culture in border agencies and service providers. Minimizing travel delays does not appear to be a priority for either U.S. inspection agencies or toll collectors.	Encourage inspection agencies and service providers to reduce avoidable time delays.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	General Planning	Inefficient POE ingress and egress routes	Access roads to Mexican POEs are overloaded or carry truck volumes for which the streets or adjacent development were not intended. Most truck entrances to the crossings are simple driveways without traffic signals (or synchronized signals) or any other provisions for traffic flow facilitation or separation.	Ingress routes should be major streets or highways. Crossings should be considered part of the regional transportation system. Where high volumes of large trucks are expected, dedicated corridors serving separate truck crossings away from incompatible land uses would be beneficial. More exit lanes are required at some Mexican inspection facilities.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	General Planning		POE access routes do not link directly to maquiladora areas.	
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	General Planning		Traffic mixing - passenger traffic and commercial traffic. Pedestrians cross truck lanes at some POEs.	Separate commercial and passenger vehicle flows and vehicle and pedestrian flows.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	NAFTA Trucking		Bobtails consume primary inspection capacity.	
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Private Sector Practice	Dangerous/impeded traffic flow on POE access roads	Document completion / exchange with customs broker on shoulder of access road. Some drivers of empties pull over to close doors.	Provide remote area away from access road for trucks to complete/wait for documentation and make adjustments to truck.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Staffing / Scheduling	POE Demand - Capacity mismatch	Components in POE system with significant capacity constraints limit the effectiveness of the rest of the components that have excess capacity. Booths opened according to pre-defined schedules, not truck arrival rates.	Staff additional booths during peak periods. Install closed-circuit television cameras in advance of U.S. primary inspection to monitor and adjust to queue length.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Stakeholder Coordination	Canine inspection delays	At some POEs, exit inspection queues were created purposely, then used to conduct block canine inspections - closes, blocks, slows traffic.	Relocate or change canine inspections. Use smaller, more frequent off-line canine block inspections within compound.
Binational Border Transportation Planning and Programming Study – Task 9: Port of Entry Case Studies	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Technology	Manual toll both operation	There were no coin baskets or electronic toll collection. Where available, prepayment via corporate accounts took as long or longer than collecting cash toll. Fee collection was slow.	Electronic toll collection and prepaid accounts should be utilized to speed toll collection process.
Binational Border Transportation Planning and Programming Study – Task 14	Barton-Aschman Associates, La Empresa	1998	Southwest Border	Stakeholder Coordination	Delays for northbound truck traffic	Duplication of import authentication, pre-inspections, cargo transfers, and other required processes is inefficient.	
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Customer Service			Provide mandatory customer service training for POE staff.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	General Planning			Build bypasses around cities for truck traffic. Focus freight movement toward specific corridors and POEs.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	General Planning	Duplication of border activities and infrastructure		Prioritize and focus investments. Identify key freight corridors. Channel international freight movements to specific corridors/POEs. Explore concept of unified ports.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	General Planning	Mexican customs broker monopoly and practices contribute to congestion and delays (create demand peaks)		Work with Mexican government and private sector to revise brokerage system and level demand.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	General Planning	Commercial and passenger vehicles utilize same crossing at some POEs. Commuter traffic is not segregated.		Separate commercial and passenger traffic (different POEs).
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	NAFTA Trucking	Non-compliant Mexican vehicles (weights, dimensions, registration)		
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	NAFTA Trucking	Excessive paperwork related to International Fuel Tax Agreement (IFTA)		
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Preclearance Programs			Use expedited processing and dedicated commuter lanes for commuter traffic. Implement transportation demand management on Mexican side.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Preclearance Programs	Preclearance procedures need to be enhanced on both sides of border.		

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Staffing/ Scheduling	Inadequate agency staffing levels		Increase staffing levels at border.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Lack of stakeholder coordination and cooperation that goes beyond the local level	No single lead agency, committee or working group to formally coordinate border efforts on a broad scale	Create a contact agency responsible for taking a leadership role in facilitating coordination and cooperation among agencies operating at the border (including collection and dissemination of performance measures, data, analysis, and information on successful efforts to increase efficiencies, etc).
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Lack of data on cause of delay		Improve ability to assess causation of delay. Identify key freight corridors and focus investment there.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Institutional coordination and cooperation barriers remain		Enhance agency coordination and cooperation through cooperative agreements between agencies, unified operations and management at ports of entry.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Coordination and cooperation among federal and state agencies does not always occur.		"Unify" operations at each POE. Create joint working groups and cooperative agreements among agencies. Require centralized administration or unified port management.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Insufficient data/understanding regarding magnitude of border delays and impacts		Improve and enhance data gathering, understanding of causation of delay, and the economic costs associated with it.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Stakeholder Coordination	Multiple stops	Inefficient and time-consuming stop required for permit purchase or verification at ADOT facility.	EPIC would eliminate the need for commercial vehicle operators to stop at the Arizona DOT office within the compound to verify trip permits by offering service at "superbooths." Average time saved could be expected to be between 8.8 and 12.9 minutes/truck.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Technology	Operational improvements at POEs not fully utilized		Use of broadcast announcements, reader boards, Internet to announce lane closures, waiting times, updates of laws in English/Spanish.
Border Efficiency Initiative Assessment	Dye Management Group	1999	Southwest Border	Technology	New technology has been deployed only at a limited number of POEs		Improved marketing of new technologies. Implement identified and available operational improvements. Improve ITS applications at border.
Expedited Processing at International Crossings (EPIC) Field Operational Test (FOT) – Evaluation Final Report	The Western Highway Institute, SAIC	1998	Nogales	General Planning	There was a lack of hazardous materials containment area at POEs in Arizona		
Expedited Processing at International Crossings (EPIC) Field Operational Test (FOT) – Evaluation Final Report	The Western Highway Institute, SAIC	1998	Nogales	Preclearance Programs	Sub-optimal participation in pre-clearance and "superbooth" program		The preclearance of vehicles to use the superbooth reduced the average approximate travel time through the compound by over 80% (25 minutes).
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Border Crossing Facilities	Unfit/overloaded vehicles creating congestion in customs compound	Vehicle weight and inspection modules are located within or after POE.	Reconfigure roadway geometry so that trucks will pass through both a weigh station and inspection facility before entering the U.S.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Border Crossing Facilities	Inadequate POE facilities	Space constraints (limiting or precluding POE facility improvements and repairs).	Encourage possible development of joint compounds.
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	NAFTA Trucking	Continuation of complex trailer transfer process at southern border		
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	NAFTA Trucking	Safety concerns regarding Mexican trucks	Disparate laws, limits, regulations and enforcement in the Mexican and U.S. trucking industries	Leverage ITS technologies, improve inspector training and a focus on the development and employment of efficient, effective inspection selection practices that ensure that safe, legal trucks entering the U.S. are not delayed.
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Preclearance Programs	Long waiting times for compliant vehicles	Peak-hour congestion	Greater participation in preclearance programs, dedicated lanes for precleared vehicles
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Stakeholder Coordination	Lack of cofunding for binational technology initiatives	Non-traditional relationships among border stakeholders (different roles, agendas, schedules, areas of focus)	
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Stakeholder Coordination	Institutional barriers impeding border efficiency	Inconsistent policies, rules, regulations, funding regimes affecting border efficiency	Strengthen local and international alliances in order to improve commercial vehicle movement at border.
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Technology	Slow progress toward interoperability of technologies	Competing, incompatible border-crossing technologies under development	

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
FHWA ITS - Intelligent Transportation Systems at International Borders: A Cross-cutting Study	FHWA	2001	Southwest Border	Technology	Inadequate technology / equipment	Resource constraints limit or preclude POE facility improvements and repairs.	ITS technologies must continue to be explored to ensure that there is connectivity and interoperability among local, state and federal stakeholders.
Overview of the Texas-Mexico Border: Background	Center for Transportation Research	1994	Texas Border	Border Crossing Facilities	Congestion, traffic crossing at primary inspection booths	Lack of signage, advisories indicating which booths are open.	Use a system of red-green lights on top of the toll and primary inspection booths to indicate to vehicles which both are staffed.
Overview of the Texas-Mexico Border: The Assessment of Traffic Flow Patterns	Center for Transportation Research	1994	Texas Border	General Planning	Border agency resources spread too thinly	Too many crossings for commercial traffic, limited border agency funding.	Concentrate agency services at fewer locations that are equipped with state-of-the-art inspection technology. These "super-crossings" would expedite existing traffic and encourage pre-cleared traffic on dedicated lanes.
Reorganization Proposals for U.S. Border Management Agencies	Congressional Research Service	1999	Southwest Border	Stakeholder Coordination	Duplication of effort; fragmentation of authority and responsibility; rivalries among agencies and inconsistent, conflicting, or overburdening agency missions	A lack of coordination and cooperation among the numerous agencies involved in border management	Reorganize border management structure to better coordinate and carry out objectives (5 possible reorganizations outlined).
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Border Crossing Facilities	Constraints on expanding, reconfiguring, retrofitting of POE facility	Several of the urban international bridges are land-constrained, and expansion of the border station facilities would be difficult.	Identify infrastructure needs of existing border stations.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	NAFTA Trucking	Complex, time-consuming drayage and trailer transfer process	Border crossing process involves changes of equipment; separate freight forwarders and customs brokers, and drayage between separate warehouses and terminals. Significant volume of empties crossing contributes to delays.	Implement NAFTA trucking provisions.
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Private Sector Practice	Mexican Customs Broker practices	Mexican customs brokers contribute to congestion by releasing vehicles in batches rather than as documentation is completed.	
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Private Sector Practice	Documentation deficiencies causing delays	The majority of referrals to the secondary inspection stop are for deficiencies in entry documentation.	
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Staffing/ Scheduling		Personnel shortages at U.S. primary result in an additional delay before reaching the U.S. POE.	
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Staffing/ Scheduling	Insufficient U.S. Customs and INS inspectors	All inspection booths are not staffed - line ups form at peak periods.	Increase staffing levels at border.
State Functions at the Texas-Mexico Border and Cross-Border Transportation	Texas Comptroller of Public Accounts	2001	Texas Border	Technology	Multiple stops	During pre-border crossing activities in Mexico, commercial vehicles stop to prepare entry documentation. All trucks stop to manually pay tolls before they are allowed on the bridge.	Automate information about the cargo, commercial carrier, commercial vehicle, and the driver in the pre-crossing stages, and thus be able to charge and clear the commercial vehicle for release before it arrives at the border. Assess border agency staffing allocation and needs. Automate toll collection.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Traffic Simulation at the International Ports of Entry: El Paso-Mexico Case Study	Center for Highway Materials Research	2000	El Paso	Technology	Congestion and spillback prior to U.S. primary inspection booth	Tollbooth closes for personnel changes.	
Understanding the U.S./Mexico Border Crossing Process	USDA Foreign Agricultural Service	1999	Southwest Border	NAFTA Trucking		There are a number of truck/trailer and bobtail movements associated with each shipment.	
Understanding the U.S./Mexico Border Crossing Process	USDA Foreign Agricultural Service	1999	Southwest Border	Private Sector Practice	Freight not palletized	Stevedoring delays for inspected shipments	Shipper should palletize loads.
Understanding the U.S./Mexico Border Crossing Process	USDA Foreign Agricultural Service	1999	Southwest Border	Private Sector Practice	Lack of communication between shippers and customs brokers	Customs brokers do not always give advance notice of all information required from shipper including when carrier should have shipment at border.	Improve communication between Customs broker and shipper (detail and accuracy of information).
Understanding the U.S./Mexico Border Crossing Process	USDA Foreign Agricultural Service	1999	Southwest Border	Private Sector Practice	Peak demand schedules and inefficient crossing process	Forwarding and banking practices result in peak hours for commercial border crossings.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Border Crossing Facilities	Inadequate POE access	Lack of land to expand port of entry access. Lack of inspection space.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	General Planning	Inefficient distribution of traffic among POEs	Inefficient distribution of traffic among POEs.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	General Planning	Duplication of effort	Differences exist in U.S. and Mexican customs classification	

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	NAFTA Trucking	Large volume of empty trucks crossing the border	Large volume of empty drayage trucks crossing border. Complex and inefficient drayage system utilized to move most freight between the U.S. and Mexico.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Staffing/ Scheduling	Insufficient primary booths open	Inspection agency staffing shortages at some border crossings. Staffing levels often too low to keep all primary inspection lanes open.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Stakeholder Coordination	Documentation deficiencies causing delays	Customs brokers should provide more advance notice/clarification of information required from shipper.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Stakeholder Coordination	Peak demand schedules	Hours of operation at POEs and Mexican banks influence cross-border traffic patterns, congestion levels, and POE asset utilization.	
U.S.- Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Stakeholder Coordination	Congestion created by multiple inspections requires several stops for trucks	Multiple checks exist at the border by various federal and state agencies.	
U.S.-Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Stakeholder Coordination	Lack of binational coordination regarding POE operations and planning		Promote an inter-agency effort to establish facility, resource and equipment requirements, goals for queue waiting times, commercial vehicle processing times, hours of operation, and technology and infrastructure improvements that facilitate commercial crossings.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
US-Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Stakeholder Coordination	POE congestion	"Batch" release customs clearance protocol in Mexico for shipments spread over many trucks	
US-Mexico Border: Better Planning, Coordination Needed to Handle Growing Commercial Traffic	General Accounting Office	2000	Southwest Border	Technology	Inadequate technology / equipment		
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Staffing/ Scheduling	Unnecessary delay approaching border station primary inspection booths	Insufficient staffing to meet demand patterns; insufficient monitoring to establish staffing needs	Monitor and staff inspection lanes to meet demand.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Border Crossing Facilities	Bottleneck at U.S. primary inspection	Too few primary inspection lanes at some POEs	Provide additional commercial vehicle inspection lanes.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Border Crossing Facilities	Pre-cleared vehicles delayed in primary inspection queue	Rapid enforcement lanes (REL) not available for trucks at most POEs	Add at least one Rapid Enforcement Lane (REL - formerly North American Trade Automation Prototype lane) at major commercial crossings and encourage preclearance.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Border Crossing Facilities	Insufficient physical capacity results in excessive congestion and delays.	Insufficient land to accommodate crossing, queuing, and/or border station needs	Provide a new commercial vehicle border crossing.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Customer Service	Lack of customer service objectives exist among agencies at POEs.	No official goal for total time to process vehicles through primary inspection, including wait time.	Establish hourly average maximum time (e.g., 20 minutes) as official goal for commercial vehicle crossings.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Customer Service	Inefficient inspections and processing result in congestion.	Inspection regulations too difficult to understand	Simplify regulations and better disseminate information on requirements and changes.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	General Planning		Some vehicles cross border without having to	Establish international trade centers straddling border; integrate inspection facilities into trade center.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	General Planning	Border crossing demands peak and exceed crossing capacity; results in increased congestion.	Free border crossings near tolled crossings attract traffic and result in congestion	Use similar tolls at nearby adjacent crossings.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	General Planning	Congestion and delays are due to inefficient and/or circuitous access.	All inspections are concentrated at border	Move inspections away from immediate border crossing zone. Complete or improve direct access roads.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	General Planning	Inspection and transportation agencies lack sufficient funding for many of the desired operational and infrastructure improvements.	Federal and state agency headquarters do not fully understand local problems and needs and/or lack sufficient funding.	Develop strategy to implement border operational and infrastructure improvements and increase funding among inspection agencies; federal facilities, agencies, and transportation agencies.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	NAFTA Trucking	Dead heading trucks produce congestion and unnecessary emissions.	NAFTA provision to permit return load from alternate location not yet implemented	Implement NAFTA provision.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Private Sector Practice		Commercial vehicle crossings peak due to dispatch platooning and shipping schedules.	Dispatch more trucks to reach crossings at off-peak times. Vary tolls to encourage crossings during off-peak periods.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Western Governors' Association - Border Congestion Study	Parsons TransportationGroup, Suma Sinergia	1999	Southwest Border	Staffing/ Scheduling	Some commercial border stations operating schedules result in delays.	Operating hours do not fit shipping schedules.	Extend operating schedules by two hours.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Stakeholder Coordination	Inconsistent operating schedules exist among stakeholders.	Bank hours are inconsistent with trade schedules.	Improve inter-stakeholder coordination and cooperation.
Western Governors' Association - Border Congestion Study	Parsons TransportationGroup, Suma Sinergia	1999	Southwest Border	Stakeholder Coordination	No one agency is responsible for coordinating inspection process		
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Stakeholder Coordination	Unnecessary delays occur approaching primary inspection booths.	Some supplemental inspections temporarily block primary inspection lanes.	Conduct all inspections "off-line" in secondary inspection.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Stakeholder Coordination	Some commercial border stations operating schedules result in delays.	Different operating exist hours for adjacent U.S. and Mexican border stations.	Coordinate U.S. and Mexican border station operating hours.
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Stakeholder Coordination	Lack of standardization and consolidation of documents causes excess delay	Significant variation in documents extend preparation, inspection times.	
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Technology	Inadequate technology exists for information dissemination.		Encourage use of underutilized crossings through improved information dissemination (broadcast wait times, queue lengths).
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Technology	Inefficient inspections and processing result in congestion.	Automated Customs Entry system lacks funding.	Actual inspection processes are not included in this study.

Publication	Source	Year	POE	Issue Category	Problem / Issue Description	Problem / Issue Cause	Recommendations / Opportunities
Western Governors' Association - Border Congestion Study	Parsons Transportation Group, Suma Sinergia	1999	Southwest Border	Technology	Antiquated technologies are employed at POEs.	Inspection agencies lack sufficient funds to keep current with technology.	Increase funding to permit installation of current technologies, such as Automated Customs Entry (ACE) implementation X-ray machines, laser visas, palm-print readers, license plate readers, and technology connectivity between agencies, brokers, shippers.

APPENDIX B: DESCRIPTION OF THE NORTHBOUND BORDER-CROSSING PROCESS

TABLE OF CONTENTS

APPENDIX B: DESCRIPTION OF THE NORTHBOUND BORDER-CROSSING PROCESS

INTRODUCTION

The complexity of trans-border truck movements is a function of the stakeholder activities and interactions they entail. A shipment originating in central Mexico may require processing or handling by a dozen or more entities before it reaches its final destination in the United States. Understanding the various roles of key government agencies and private-sector groups in this system enables a more detailed assessment of the underlying issues and problems that contribute to border congestion and delay.

This document provides a step-by-step account of the conventional northbound border-crossing process for truck-borne trade. Descriptions of stakeholder activities, referenced in a schematic diagram, depict the flow of goods and documentation from origin to destination (Figure B-1). There are several potential variations to the process described on the following pages. Problems encountered by any of the stakeholders can result in delays much longer than those cited. The southbound border-crossing process is substantially different from the northbound process and is not addressed in this document.

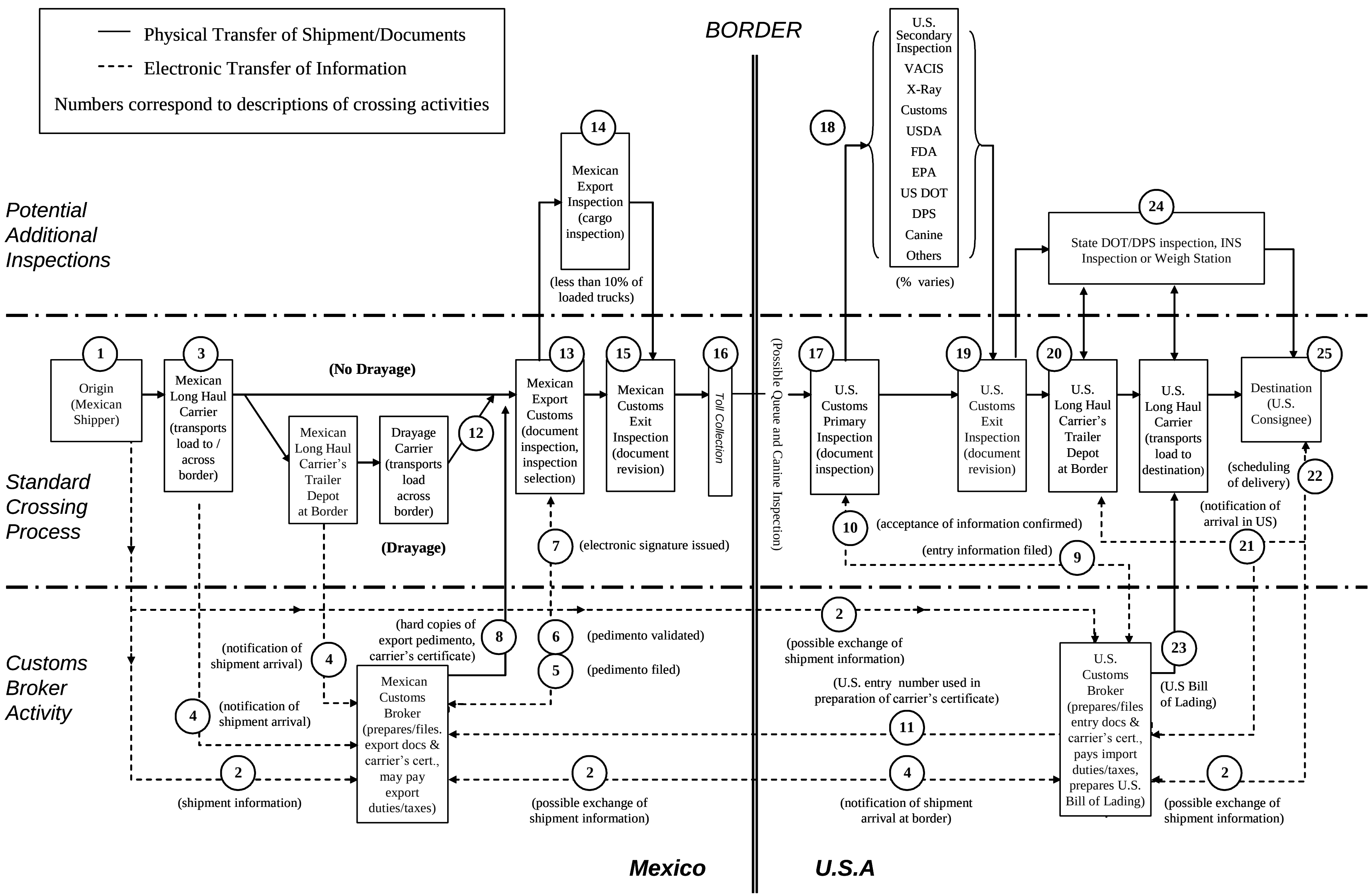

Figure B-1. Flowchart of the Northbound Border-Crossing Process for Truck-Borne Trade.

NORTHBOUND BORDER-CROSSING PROCESS

Mexican Shipper

The Mexican shipper is the exporting firm that initiates the cross-border movement (Figure B-1, Point 1). Its primary partners in the export process are the U.S. consignee, the Mexican and U.S. customs brokers, and the Mexican long-haul trucking firm.

The extent of exporter and importer responsibilities in international commerce is defined by the incoterms in the sales contract. For most truck shipments between the United States and Mexico, these terms specify transfer of liability at the border. Under this scenario, the shipper's main responsibilities are to arrange transportation and brokerage services in Mexico, load the trailer, and provide information about the shipment to the Mexican trucking firm(s) and the customs brokers. In practice, cargo information is often electronically transmitted to only one of the shipper's supply-chain partners (U.S. consignee, Mexican customs broker or U.S. customs broker) and then distributed among the other parties (Figure B-1, Point 2).

Paper documents normally furnished by the shipper include the commercial invoice, cargo manifest, and the NAFTA certificate of origin. A Mexican bill of lading (carta porte) and a packing list may be provided in some cases. Fax and email are the preferred methods of exchanging information among supply-chain partners. If complete, accurate information is not transmitted to the customs brokers in advance of the shipment's arrival at the border, delays may result.

Mexican Long-haul Carrier

The long-haul carrier is a trucking firm that provides freight transportation to companies exporting to the United States from the interior of Mexico. The transportation process begins with the carrier spotting an empty trailer at the shipper's factory or warehouse. When it is loaded, the long-haul tractor returns, hooks up to the trailer, and transports it to a pre-specified commercial crossing along the U.S.-Mexico border (Figure B-1, Point 3). In fiscal year 2001, commercial border crossings in Laredo, El Paso and Otay Mesa processed approximately two thirds of all northbound truck movements between Mexico and the United States (Table B-1).

The Mexican leg of the northbound transportation process takes one to two days for shipments originating in Mexico's industrial heartland (the Monterrey-Mexico City-Guadalajara triangle). Long-haul carriers usually prepare the bill of lading for these movements although the shipper is legally permitted to perform this task. Most long-haul carriers operate trailer depots at the border that serve as pick-up and drop-off points for international movements. When a shipment bound for the United States arrives at the Mexican carrier's border depot, the U.S. customs broker is contacted. This party notifies the Mexican customs broker, and the document preparation and submission process begins (Figure B-1, Point 4). Shipments that reach the border zone in the morning usually cross into the United States the same day. Those arriving in the late afternoon or evening often must wait until the following day to cross the border.

Table B-1. Northbound Truck Crossings through U.S. Port Systems, Fiscal Year 2001.

Port of Entry	Truck Crossings*	Accumulated Percent of Total
Port of Laredo, TX[1]	1,419,165	33%
Port of Otay Mesa, CA	700,453	49%
Port of El Paso, TX[2]	656,257	64%
Port of Hidalgo/Pharr, TX	367,991	73%
Port of Calexico East, CA	259,174	79%
Port of Brownsville, TX[3]	255,231	85%
Port of Nogales, AZ	251,474	90%
Port of Eagle Pass, TX	100,983	93%
Port of Tecate, CA	62,243	94%
Port of Del Rio, TX	59,286	96%
Port of San Luis, AZ	39,908	97%
Port of Douglas, AZ	34,054	97%
Port of Santa Teresa, NM	30,612	98%
Port of Rio Grande City, TX	26,391	99%
Port of Progreso, TX	16,649	99%
Port of Roma, TX	12,141	99%
Port of Naco, AZ	9,976	100%
Port of Presidio, TX	7,562	100%
Port of Lukeville, AZ	4,271	100%
Port of Columbus, NM	4,239	100%
Port of Sasabe, AZ	2,215	100%
Port of Andrade, CA	1,727	100%
Port of Fabens, TX**	147	100%
Total	**4,322,149**	

* Loaded and empty/bobtail trucks
[1] Includes Laredo World Trade Bridge and Colombia Solidarity Bridge
[2] Includes Bridge of the Americas and Ysleta-Zaragoza Bridge
[3] Includes Veterans International Bridge and Los Indios Bridge
** Light trucks only - not a full-service commercial crossing

Source: U.S. Customs Service

Mexican Customs Broker

A licensed Mexican customs broker is the only entity legally permitted to prepare and file export documentation (pedimento de exportación) in Mexico. The first step involved in preparing the pedimento is classification of the cargo according to the Mexican Harmonized Tariff Schedule. For northbound shipments, neither the Mexican nor the U.S. broker documentation process entails a physical review or unloading of the cargo. Pedimento information is subsequently transmitted to Mexican Customs via the Mexican Customs Brokers Association (Asociación de Agentes Aduanales) (Figure B-1, Point 5). Correctly filed pedimentos are validated by a broker representative (Figure B-1, Point 6) and assigned an alpha-numeric barcode (referred to as an electronic signature) by Mexican Customs (Figure B-1, Point 7). The Mexican customs broker affixes this barcode to paper copies of the pedimento so that Mexican Customs can electronically scan the documentation and close out the file when the truck arrives at the border. Use of a bar-coded pedimento also facilitates shipment tracking and the collection of duties, fees, and statistical information by the Mexican government.

Mexican export taxes are payable electronically or in person prior to arrival of the shipment at the export compound. Payment is normally made by the Mexican broker on behalf of the shipper and is secured by a bond. Maquiladora shippers are permitted to use consolidated pedimentos that are filed and paid on a weekly basis.

Before a shipment can proceed across the border, all U.S. and Mexican brokers prepare and file hard copies of the Mexican pedimento and the U.S. Inward Cargo Manifest (also known as the Carrier's Certificate). The Inward Cargo Manifest is the main document used to import merchandise into the United States. It contains vital information about the carrier, exporter, importer, and cargo (including the shipment's U.S. entry number) and may be completed by either the U.S. or Mexican customs broker.

A broker or drayage-firm employee presents the pedimento and Inward Cargo Manifest to the truck driver hauling the shipment across the border. Transfer of these documents usually occurs at a broker office in the immediate vicinity of the crossing, on a roadside prior to the Mexican export compound, or while the truck is waiting in a queue to cross the border (Figure B-1, Point 8). Mexican broker cycle times for preparing and filing documentation can range from a few minutes to several hours depending on the nature of the cargo, the shipper's export experience, and the shipper-broker relationship, the broker's workload, among other factors. Fees for preparing and filing Mexican export documentation range from US$25-$30 for a homogenous maquiladora shipment to US$55-$60 for regular freight (excluding disbursements).

U.S. Customs Broker

Because the activities of Mexican and U.S. customs brokers are overlapping and simultaneous, communication between these stakeholders is an important facet of the crossing process.

Several scenarios exist for the preparation and processing of U.S. entry information. In most cases, cargo is classified according to the U.S. Harmonized Tariff Schedule (two digits longer than the Mexican Harmonized Tariff Schedule), a unique 11-digit entry number is assigned to the shipment, and information is electronically filed with U.S. Customs via the Automated Broker Interface (ABI) system (Figure B-1, Point 9).

Customs brokers were once obliged to file ABI information and submit hard copies of import documentation four hours before a shipment crossed the border. Today, the U.S. Customs Service requires only that import information be electronically transmitted before the shipment arrives at the port of entry. Some port directors request that ABI information precede shipments by at least one hour to ensure sufficient time for data analysis.

Upon receipt of a valid ABI transmission, U.S. Customs confirms acceptance of the information (Figure B-1, Point 10). The U.S. broker notes the entry number on the Inward Cargo Manifest or provides it to the Mexican broker (Figure B-1, Point 11). Marking the Inward Cargo Manifest with the entry number allows officials at the U.S. port of entry to verify that the paperwork submitted by the driver matches what was filed electronically by the U.S. broker. Cycle times for the preparation and submission of U.S. broker documentation are similar to those offered by Mexican brokers (a few minutes to several hours). U.S. broker charges for classification of the shipment and transmission of import information normally range from US$25-$50. Charges for complicated or multiple-classification shipments (such as apparel) often cost US$55-$85 (excluding disbursements).

Approximately 10 percent of truck entries on the southern border are processed under a special U.S. Customs initiative called the Border Release Advanced Screening and Selectivity (BRASS) program.*i* BRASS expedites the border-crossing process for repetitive, low-risk shippers that export a minimum of 50 trailer loads of merchandise to the United States annually. Each BRASS shipper receives an identification barcode that enables its shipments to enter the country without prior transmission of entry information by the U.S. broker. Additional benefits include faster Customs processing and fewer secondary inspections at the U.S. port of entry. In order to participate in BRASS, shippers must have a history of customs compliance and utilize trucking firms that are certified in the U.S. Customs Service's security-based Carrier Initiative Program (CIP).

Although tariffs on North American trade have diminished since the implementation of NAFTA and are now quite rare, they are not scheduled to be completely phased out until 2005. Most U.S. brokers electronically pay import duties on behalf of the U.S. consignee using the Automated Clearinghouse payment method. A compliance bond allows duties for regular shipments to be paid up to 10 working days after they have entered the United States. Legislation enabling monthly duty consolidation and payment for BRASS shipments is expected to be extended to all freight in the near future.

Drayage Carrier

A northbound shipment originating in the interior of Mexico may be transported across the border by a drayage or long-haul trucking firm. Drayage carriers are trucking firms that specialize in shuttling freight over short distances. At the U.S.-Mexican border, binational accord grants trucks from both countries the right to pick up and drop off cross-border movements within commercial zones extending 3-20 miles beyond either side the of the international boundary.

Drayage carriers are responsible for crossing the vast majority of trailers at the two busiest gateways for U.S.-Mexico truck traffic, Laredo-Nuevo Laredo and Otay Mesa-Tijuana. Delays and congestion at these gateways have made trans-border movements uneconomical for most long-haul carriers using modern equipment. Short-haul maquiladora moves between factories, assembly plants, and distribution centers in the twin border cities of El Paso, Texas, and Ciudad Juárez, Coahuila, drive a thriving drayage industry in that region.

Other major gateways, such as Nogales-Nogales and Pharr-Reynosa, are heavily influenced by seasonal exports of Mexican produce. This freight is transferred to the U.S. commercial zone primarily by Mexican long-haul trucks. Instead of contracting traditional drayage services, drivers that do not possess a valid U.S. visa and commercial license hire "contract drivers" to deliver their shipments across the border. Despite the security and insurance risks involved in this method of shipment transfer, the contract driver system is used for a large portion of the northbound crossings at these gateways.

Where drayage carriers are utilized, the trailer-transfer process starts with the dispatch of a drayage tractor to a long-haul carrier's border depot. The driver engages the loaded trailer and hauls it to the border crossing (Figure B-1, Point 12), collecting the export pedimento and Inward Cargo Manifest en route (Figure B-1, Point 8). Once the driver, truck, shipment, and documentation have been assembled, the unit proceeds into the Mexican Export Customs compound. One-way drayage services across the border usually take between one and three hours and cost US$100-$200.

Mexican Export Compound – Mexican Customs

The Secretaría de Hacienda y Crédito Público (Mexican Customs) is the principal Mexican agency involved in the inspection of freight entering and leaving the country. Unlike U.S. Customs, Mexican Customs occasionally inspects outbound freight prior to export. The main purpose of these inspections is to verify that duty-free temporary imports do not remain in Mexico and to ensure that all applicable export duties and taxes are paid.

When a shipment arrives at the Mexican Export Compound, it is subject to a random selection mechanism (red-light/green-light system) that determines whether it must undergo a physical inspection (Figure B-1, Point 13). Between 1 and 10 percent of loaded northbound commercial vehicles are reported to receive a red light at this station..*ii* However, Mexican Customs brokers indicate that export inspections are quite rare and that this figure is exaggerated. In any event, export inspections may involve the partial or complete unloading of a trailer and take anywhere from 30 minutes to several hours (Figure B-1, Point 14). A representative of the Mexican customs broker that prepared the shipment's export documentation must be present during this inspection.

Trucks that receive a green light proceed to the compound's exit gate (Figure B-1, Point 15). Export documentation and clearance authorization are checked here before the shipment is released to cross the border. Shipments that do not undergo export inspections normally take a few minutes to half an hour to clear the Export Compound, depending on traffic.

Border Bridges and Roadways

There are 25 commercial border crossings that connect Mexican and U.S. customs compounds. Many large crossings serve trucks exclusively while others serve segregated flows of commercial and passenger vehicles. Border-crossing infrastructure varies in length from a few hundred yards to several miles and usually requires payment of a toll (Figure B-1, Point 16). Northbound charges range from US$1-$3 per axle (regardless of vehicle weight) and are collected manually or by means of an account-based system.*iii* Transit times between the Mexican Export Compound and the U.S. port of entry are determined by the level of congestion at the U.S. Primary Inspection Module.

U.S. Port of Entry

Sixty-five governmental agencies monitor and regulate U.S. trade.*iv* Only a handful of these, however, significantly impact the border-crossing process. Port of entry inspection activities on the U.S. southern border have traditionally focused on preventing illegal drugs and contraband from entering the country, guarding against illegal immigration and the introduction of agricultural pests, protecting U.S. public safety and commercial interests, and ensuring the collection of duties and taxes. In the wake of September 11, 2001, the prevention of terrorist attacks has become a top priority for U.S. border agencies and has resulted in greater scrutiny of drivers, shipments, and conveyances at U.S. ports of entry. The U.S. commercial inspection process can be broken down into three broad categories: primary, secondary, and exit inspections.

Primary Inspection Module - U.S. Customs

Northbound trucks may be subject to canine (narcotics detection dogs) or other inspections before reaching the port of entry complex, but their first mandatory stop in the United States is usually the Primary Inspection Module (Figure B-1, Point 17). This module normally comprises two to eight processing booths, each staffed by a Customs (or Immigration and Naturalization Service) agent. The peak-period arrival rate of trucks at these booths often exceeds their processing capacity. The congestion that forms backs up onto border roadways and bridges, creating pre-primary delays that range from 30 minutes to more than two hours at major crossings.

Upon arrival at the primary inspection booth, the truck driver presents identification (proof of citizenship or a valid visa or laser card) and a copy of the Inward Cargo Manifest to the agent. After verifying the driver's identification, the agent types the entry number on the Inward Cargo Manifest into an Automated Commercial System (ACS) computer terminal. The ACS matches the entry number to import information that was filed electronically by the U.S. broker and subsequently reviewed by Customs headquarters in Washington, D.C.

If the information on the paper manifest corresponds to that in the electronic file, and a hold (obligatory inspection) has not been placed on the shipment by Customs headquarters, the agent uses his or her discretion to determine whether a secondary inspection is necessary. This decision is typically based on driver responses to questions, a brief review of the outside of the vehicle (possibly including inspection with a density detector or other hand-held inspection instrument), and the reaction of canine units to the truck. In some cases, a driver's license, vehicle registration, insurance, trip permit, or other documentation may be requested. Since September 11, 2001, some ports of entry open trailers at the Primary Inspection Module to conduct a brief visual review of the cargo/inside of the conveyance.

All trucks entering U.S. ports of entry pay a mandatory user's fee for the provision of U.S. Customs and Department of Agriculture services. The per-trip charges for these services are US$5.25 and US$4.50 respectively, payable at the primary inspection booth. Drayage trucks and other commercial vehicles that regularly cross the border can purchase an annual exemption decal for US$185.

Processing times at the Primary Inspection Module average one to two minutes per truck. Commercial vehicles that do not pass over a U.S. weigh-in-motion scale upon crossing the border may be directed to a static scale within the port of entry. Trucks not requiring weight checks, special permits, or further inspections are sent directly to the compound's exit gate. Agents note required secondary inspections on the Inward Cargo Manifest.

Secondary Inspection – Multiple Agencies

There are varying opinions among border-agency officials as to what constitutes a "secondary inspection". For the purposes of this report, a secondary inspection is defined as any inspection that the driver, freight, or conveyance undergoes between the Primary Inspection Module and the exit gate of a U.S. port of entry.

The principal agencies that conduct secondary inspections are the U.S. Customs Service, the U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA) the U.S./State Departments of Transportation (DOT), and State Departments of Public Safety (DPS) (Figure B-1, Point 18).

If the rationale for the secondary inspection is related to drugs or suspicion about the contents of the load, the truck is sent to a Non-Intrusive Inspection (NII) station operated by Customs or the National Guard. NII equipment scans the contents of tractors and trailers/containers, reducing the need for time-consuming and expensive manual inspections. The two most common NII technologies currently employed on the southern border are the gamma ray VACIS (Vehicle and Container Inspection System) and the truck X-ray. Most major U.S. commercial crossings operate between one and three NII machines. Shipments requiring further review after scanning are directed to a loading dock for manual cargo inspection.

The advent of NII equipment renders some of the loading dock capacity at U.S. land ports obsolete. Although Customs still conducts a small number of manual inspections, most dock space is now occupied by the USDA and FDA. Shipments examined by these agencies rarely require complete unloading of the cargo. Instead, the inspector selects a random sample for analysis. This expedites the inspection process and minimizes losses due to spoilage. The stevedoring costs for partially or fully unloading shipments at U.S. and Mexican Customs compounds are paid by the Mexican/U.S. customs broker and charged to the shipper/consignee of the freight.

The EPA is the principal agency regulating the importation of hazardous materials into the United States. The EPA requires 24 hours advanced notice of all hazmat shipments arriving at U.S. ports of entry. In some regions, hazardous materials are restricted to specific routings and crossing schedules. Secondary inspections of hazmat shipments are conducted in isolated areas of the Customs compound.

Regardless of the freight being transported, all trucks and drivers passing through U.S. ports of entry must meet certain safety standards. The California Highway Patrol facilities at Otay Mesa and Calexico, California, are the only permanent U.S. truck safety inspection stations on the U.S. southern border. Other ports of entry rely on U.S. DOT and state DPS personnel to conduct truck safety inspections within the secondary inspection areas of Customs compounds.

The U.S. government's decision to implement the NAFTA trucking provisions between the United States and Mexico during the summer of 2002 is contingent upon satisfaction of new safety criteria. The most salient public-sector requirements of these criteria are the hiring and training of 214 state safety inspectors and the construction or improvement of truck inspection facilities at the U.S.-Mexico border. As of July 2002, nearly all of the new personnel had been appointed, and temporary truck inspection facilities at 23 of the 25 commercial border crossings were ready.*v* Truck inspection activities at smaller crossings are scheduled to continue at expanded sites within Customs compounds. Dedicated facilities adjacent to larger border compounds will eventually inspect 100 percent of the trucks entering the United States from Mexico.

The percentage of shipments sent to the diverse U.S. secondary inspection stations varies from crossing to crossing but is generally consistent with the availability of inspection capacity. Customs strives to ensure that its NII equipment is kept continuously operating. The private-sector reports that, occasionally, port directors impose inspection blitzes where 100 percent of the vehicles entering the port during a given time period are sent to an NII station. Officials at smaller ports of entry that lack NII equipment typically conduct higher rates of canine and manual narcotics inspections (Table B-2). Approximately 10 to15 percent of shipments governed by the USDA are physically examined.*vi*

The length of time commercial vehicles spend waiting for and undergoing secondary inspections is also highly variable. NII inspections take between 2 and 12 minutes to complete but may require queuing times of 30 to 60 minutes. Delays for USDA and FDA inspections usually range from 20 to 45 minutes if an inspector is readily available.

Table B-2. Narcotics Exam Rates at U.S. Commercial Port Systems, Fiscal Year 1998.

Port of Entry	Truck Crossings*	Percent of Trucks Examined
Port of Laredo, TX[1]	1,340,653	28%
Port of Otay Mesa , CA	599,001	23%
Port of El Paso, TX[2]	591,258	35%
Port of Brownsville, TX[3]	273,087	47%
Port of Hidalgo/Pharr, TX	261,322	18%
Port of Nogales, AZ	256,494	14%
Port of Calexico East, CA	222,093	35%
Port of Eagle Pass, TX	85,974	23%
Port of Tecate, CA	53,109	44%
Port of Del Rio, TX	50,949	30%
Port of San Luis, AZ	42,472	25%
Port of Douglas, AZ	35,561	53%
Port of Santa Teresa, NM	28,206	85%
Port of Rio Grande City, TX	18,658	57%
Port of Progreso, TX	17,298	57%
Port of Roma, TX	13,140	83%
Port of Naco, AZ	7,650	85%
Port of Presidio, TX	6,883	38%
Port of Columbus, NM	4,013	85%
Port of Lukeville, AZ	3,723	Not Available
Port of Sasabe, AZ	1,844	100%
Port of Andrade, CA	Not Available	Not Available
Port of Fabens, TX**	Not Available	Not Available
Total	**3,913,388**	

* Loaded and empty/bobtail trucks
[1] Includes Laredo World Trade Bridge and Colombia Solidarity Bridge
[2] Includes Bridge of the Americas and Ysleta-Zaragoza Bridge
[3] Includes Veterans International Bridge and Los Indios Bridge
** Light trucks only - not a full-service commercial crossing

Source: U.S. General Accounting Office

Exit Inspection – U.S. Customs

The final inspection at U.S. ports of entry occurs at the exit gate (Figure B-1, Point 19). Customs agents review documentation to ensure that all required inspections have been performed and that the driver, truck, and cargo have been cleared to enter the United States. Exit inspections are normally completed in a matter of seconds although limited exit booth capacity and poorly designed egress routes result in the formation of exit queues at some crossings.

U.S. Long-haul Carrier

Once released from the U.S. port of entry, shipments destined for plants, warehouses, or distribution centers in the U.S. commercial zone are delivered. Trailers with final destinations beyond the commercial zone are taken to a U.S. long-haul carrier's border depot (Figure B-1, Point 20). The U.S. carrier or customs broker notifies the importer of the shipment's arrival in the United States (Figure B-1, Point 21), and final delivery of the cargo is arranged (Figure B-1, Point 22). Transit times for the U.S. inland portion of the international movement generally range from a few hours to several days, depending on the final destination and the urgency of the shipment. The U.S. customs broker currently prepares the domestic bill of lading for this movement (Figure B-1, Point 23). A NAFTA bill of lading scheduled to be introduced in 2002/2003 proposes to replace multiple domestic bills of lading for North American shipments. Truck traffic circulating in the U.S. may be subject to weigh station exams, Immigration and Naturalization Service checkpoints or State DOT and DPS roadside inspections (Figure B-1, Point 24).

U.S. Consignee

The U.S. consignee's receipt of goods at destination concludes the northbound movement (Figure B-1, Point 25).

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iv Intelligent Transportation Systems Joint Program Office, U.S. Department of Transportation, *Intelligent transportation systems at international borders: a cross-cutting study, facilitating trade and enhancing transportation safety*, Report FHWA-OP-00-003, 2001.

v Mead, K. M. Testimony Before the United States Committee on Appropriations, Subcommittee on Transportation on the Implementation of Commercial Motor Carrier Safety Requirements at the U.S.-Mexico Border. June 27, 2002. http://commerce.senate.gov/hearings/062702mead.pdf. Accessed on July 8, 2002.

vi Conversation with USDA Port Director and Supervisor, Nogales, Arizona, March 20, 2002.

APPENDIX C: SUMMARY OF STAKEHOLDER INTERVIEWS

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Customs Broker (Mexico)	Cd. Juarez, Ch	TX	1-Mar-02	Current U.S. POEs in El Paso have insufficient capacity for peak-hour traffic volumes.	Enable U.S. and Mexican inspections to be conducted in bonded Mexican facilities at border.
Private	Trucking Firm (Mexico)	Cd. Juarez, Ch	TX	1-Mar-02	Insufficient inspectors to operate NII equipment. Traffic conflicts from mingling of empty and loaded trucks.	U.S. and Mexican Customs should alter schedules (morning hours not fully utilized). Increase staffing for NII equipment operators. Separation of empty and loaded trucks necessary to improve flow of commercial traffic.
Private	Trucking Firm (U.S.)	Eagle Pass, TX	TX	30-May-02	Insufficient promotion of CIP program. DOT vehicle inspections are often very slow (45 mins).	Improve program promotion for carriers (CIP). Reduce unnecessary delays for vehicle safety inspections.
Public	Customs (U.S.)	El Paso, TX	TX	28-Feb-02	Low private-sector enrollment in BRASS. Insufficient lanes/booths available at primary inspection and exit inspection. Peaks in traffic volumes at POEs are partially caused by private-sector scheduling. Staffing shortages at POEs also contribute to congestion (USCS and FDA particularly). Poor private-sector communication and coordination results in crossing delays and documentation errors.	Greater private-sector enrollment in BRASS is required (current volumes very low at El Paso). Redesign entrance to Ysleta POE, providing more primary lanes and a pre-primary inspection station. Relocate and widen exit gate. Increase information sharing and automation (implement ACE as soon as possible).
Public	Customs (U.S.)	El Paso, TX	TX	28-Feb-02	Shortage of personnel to operate NII equipment. No segregation of truck traffic. Benefits for BRASS participants are insufficient.	Increase funding for NII operators. Build preprimary inspection station at Ysleta and expand primary lanes to expedite traffic through POE. Consider dedication of Bridge of the Americsas (BOTA) crossing to empties and BRASS traffic. Explore solutions to privacy laws that limit the information available for developing expedited crossing programs. Enhance BRASS benefits for private sector. Explore legal requirements to enable U.S. and Mexican Customs agents to inspect cargo at one another's compounds.
Private	Customs Broker (U.S.)	El Paso, TX	TX	19-Nov-01	Shippers make last-minute changes to manifests that delay crossing process. Customs uses blanket inspection techniques that penalize honest shippers, brokers, and carriers.	Improve private-sector communication and coordination. Target inspections at U.S. Customs instead of using blanket approach. Provide longer hours at U.S. ports of entry.

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Customs Broker (U.S.)	El Paso, TX	TX	28-Feb-02	Significant duplication of processes (public and private sector) in crossing system. There is no binational protocol sealing/resealing trailers. Private-sector schedules and practices contribute to congestion at the border Maquiladoras don't load trailers until mid-morning.	Eliminate double validation of Export Pedimento by Mexican Customs. Reduce repeat truck inspections by federal/state DOT and DPS inspectors.
Private	Logistics Provider (U.S.)	El Paso, TX	TX	19-Nov-01	Lack of lead agency at border.	Create POE management entity, privatize functions where necessary/possible. Develop a long-term development strategy for specific POEs and border. Provide economic incentive to encourage private sector to cross during off-peak periods.
Private	Shipper (Mexico)	El Paso, TX	TX	1-Mar-02	Mexican trade regulations change frequently - U.S. and Mexican vehicle safety authorities do not exchange information on drivers/vehicles. U.S. and Mexican authorities do not exchange intelligence information pertaining to one another. Technology and processes are duplicated on each side of the border.	Enable U.S. inspections to be conducted in Mexico. Improve binational information sharing. Consolidate U.S. border agencies (create lead agency). Pave northern route from Cd. Juarez to Santa Teresa POE to relieve congestion at BOTA and Ysleta.
Private	Shipper (U.S.)	El Paso, TX	TX	19-Nov-01	Lack of leadership among U.S. border agencies. Insufficient incentives for BRASS.	Create dedicated lane for BRASS shipments at a local POE. Improved information sharing among U.S. and Mexican agencies.
Private	Trade Group (U.S.)	El Paso, TX	TX	19-Nov-01	Excess capacity at local border crossing during off-peak periods. POE staffing constraints.	
Private	Trade Group (U.S.)	El Paso, TX	TX	19-Nov-01		Coordinate schedules of local POEs. Improve promotion of BRASS program.
Private	Trucking Firm (Mexico)	El Paso, TX	TX	19-Nov-01	Late broker starting times delay crossing process (may not begin documenting shipments until 9 a.m.) No physical separation of traffic types	Improve private-sector scheduling. Physically separate distinct commercial traffic types.
Private	Warehouse	El Paso, TX	TX	19-Nov-01		Promote utilization of POEs with excess capacity (e.g., Santa Teresa).
Private	Consultant	Friendswood, TX	TX	30-May-02		Enable U.S. Customs inspections to take place in Mexico to improve security and relieve border congestion.
Private	Customs Broker (U.S.)	Hidalgo, Tamps.	TX	31-May-02	FDA does not have sufficient staffing, is not connected to the ABI / ACS system. FDA does not communicate new requirements to trade community.	POEs should open earlier in the morning. Funding for FDA should be increased (more staff, connection to ABI system).

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Public	Customs (U.S.)	Laredo, TX	TX	12-Feb-02	Mexican custom broker activities often delay border-crossing process. Major U.S. agencies (USCS, USDA, FDA) not connected to same computer systems. POEs have an excess of dock capacity and a shortage of queuing areas for X-ray / VACIS.	Involve trucking associations and other trade groups to help define Customs initiatives. More VACIS units are required on southern border. U.S.-Mexico Through Bill of Lading (NAFTA B/L) would help streamline the border crossing process. Encourage greater information sharing between private and public sectors required. Implement ACE as quickly as possible.
Private	Customs Broker (Mexico)	Laredo, TX	TX	31-Jan-02	Delays are largely due to a lack of communication between shippers and customs brokers regarding freight in transit. Brokers have to wait for shipment to arrive before preparing paperwork.	
Private	Customs Broker (U.S.)	Laredo, TX	TX	31-Jan-02	Border crossing coordination problems primarily occur in the private sector.	
Private	Customs Broker (U.S.)	Laredo, TX	TX	29-Jan-02	Failure of the ABI system occurs several times per year.	Create more effective contingency plan for ABI brownouts. Implement ACE as quickly as possible. Improve public agency training to handle Hazardous Materials shipments.
Private	Customs Broker (U.S.)	Laredo, TX	TX	30-Jan-02	Mexican access to Colombia toll route is narrow and hazardous (twinning project near completion). Breakdowns in communication among private sector partners are common causes of delay. Staffing at USCS is insufficient - too few primary gates open during peak periods.	Increase U.S. Customs staffing of primary booths during peak periods.
Public	Municipal Government	Laredo, TX	TX	30-Jan-02		State vehicle inspection facilities should be located away from commercial border crossings.
Private	Shipper (U.S.)	Laredo, TX	TX	30-Jan-02	Lack of private sector coordination is evident in the crossing process. Broker schedules contribute to afternoon traffic peaks at border.	Single entry of information - share a greater degree of information (domestic and binational). Increase staffing at U.S. POEs. Improve border-region road infrastructure in Mexico.
Private	Trade Group (U.S.)	Laredo, TX	TX	19-Jan-02	Delays occur at VACIS and X-Ray units within U.S. POEs	Provide more NII equipment and operators.

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Trucking Firm (U.S.)	Laredo, TX	TX	29-Jan-02	Interest groups and politics prevent efficiency at border (e.g., Municipal opposition to vehicle inspection facilities, USCS labor unions). Retention of CIP certified drivers is difficult.	Install more NII equipment at POEs. Increase funding for paperless crossing system (ACE). Provide longer hours at Laredo World Trade Bridge (WTB) - private sector must be notified in advance of schedule change.
Private	Trucking Firm (U.S.)	Laredo, TX	TX	30-Jan-02	Most coordination problems at border are caused by private sector.	Improve private-sector communication and coordination to prepare and submit broker documentation in a more timely fashion.
Private	Trucking Firm (U.S.)	Laredo, TX	TX	31-Jan-02	Communication problems exist between the shipper and the Mexican broker.	Install more NII equipment at POEs.
Private	Trucking Firm (U.S.)	Laredo, TX	TX	31-Jan-02	Lack of communication and information exchange exists among private sector stakeholders. Staffing shortages occur at U.S. primary during peak periods.	Locate TxDOT commercial vehicle inspection facilities 13- 15 miles north of the border to avoid exacerbating congestion.
Public	Customs (U.S.)	Nogales, AZ	AZ	20-Mar-02	Infrastructure is major constraint at Nogales. There are insufficient border crossing and POE access lanes. Queues routinely form at the X-Ray and VACIS units. There is insufficient room for additional machines. USDA and USCS computers are not linked. Mexican Port Directors are constantly changing – no continuity of relationships or initiatives.	
Private	Customs Broker (U.S.)	Nogales, AZ	AZ	21-Mar-02	USDA’s lack of connectivity to the ABI/ACS system. Shortage of "Cruzadores" (contract drivers) to transfer long-haul tractors and trailers across the border. Physical border crossing infrastructure at Nogales is insufficient for current crossing volumes. Numerous military drug checkpoints on the Mexican highways leading to Nogales cause significant delays for time-sensitive produce. USDA graders begin inspecting shipments in Mexico too late in the morning.	Enable USDA connection to ABI/ACS computer system. Shift passenger vehicles to alternative crossing.

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Customs Broker (U.S.)	Nogales, AZ	AZ	21-Mar-02	Shortage of "Cruzadores" to transfer long-laul tractors and trailers across the border. USDA graders begin inspecting shipments in Mexico too late in the morning. Private sector schedules (Warehouses are not opened in U.S. until 10 a.m. because they stay open until 2 a.m.). Shippers try to avoid excess capacity and higher U.S. secondary inspection rates in morning. USDA's lack of connectivity to the ABI/ACS system. Physical border crossing infrastructure at Nogales is insufficient (POE designed for half of current volume). Private-sector schedules contribute to peak-period congestion and delays.	Enable USDA connection to ABI/ACS computer system. Provide incentive to encourage use of off-peak periods at POE. Provide refrigerated stations for produce inspections at POE.
Private	Trade Group (Mexico)	Nogales, AZ	AZ	22-Mar-02	USDA graders begin inspecting shipments in Mexico too late in the morning. Physical border crossing infrastructure at Nogales is insufficient (POE designed for half of current volume).	Schedule USDA inspectors to begin work earlier in Nogales, Sonora. Open POE earlier on Mondays to accommodate private-sector demand. Improve public-private sector schedule coordination.
Private	Trucking Firm (Mexico)	Nogales, AZ	AZ	22-Mar-02	Physical border crossing infrastructure at Nogales is insufficient (POE designed for half of current volume). Two preprimary inspection lanes are insufficient.	
Public	USDA	Nogales, AZ	AZ	21-Mar-02	USDA is not connected to ABI system (network is antiquated and cannot handle additional users). USDA ands FDA dock spaces at Nogales POE are not deep enough; unloaded cargo occupies several docks.	Enable USDA connection to ABI/ACS computer system. Create an in-bond pest inspection warehouse in Nogales, AZ.
Private	Customs Broker (Mexico)	Nogales, Sonora	AZ	22-Mar-02	Physical border crossing infrastructure at Nogales is insufficient (POE designed for half of current volume). U.S. vehicle safety inspection agencies target Mexican trucks / drivers.	

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Trade Group (U.S.)	Nogales, Sonora	AZ	22-Mar-02	USDA graders begin inspecting shipments in Mexico too late in the morning. USDA's lack of connectivity to the ABI/ACS system. Trucks arriving early at POE have to wait because USDA does not begin inspecting produce until 8 a.m. Numerous military drug checkpoints on the Mexican highways leading to Nogales cause significant delays for time-sensitive produce. Manual paperwork submission and inspections process at USDA is time-consuming and inefficient (for all parties). Mexican port directors constantly change - no continuity of relationships, initiatives.	U.S. Consulate should provide longer work visas for Mexican truckers (they currently must renew every year). Border facilities should be redesigned to accommodate larger traffic volumes.
Private	Shipper (Mexico)	Nuevo Laredo, Tamps.	TX	30-Jan-02		Customs brokers should adjust schedules to improve utilization of off-peak morning hours at POEs. State vehicle inspection facilities should be located away from (as opposed to at) border.
Private	Trucking Firm (Mexico)	Nuevo Laredo, Tamps.	TX	30-May-02	High percentage of shipments is sent to U.S. secondary inspection. Toll collection is not automated. Renewal of driver visas and laser cards is difficult.	Expedite the crossing process for large, reliable shippers and carriers.
Private	Customs Broker (U.S.)	Otay Mesa, CA	CA	5-Nov-01	Lack of clarity regarding requirements for HazMat shipments. Empties significantly exacerbate congestion and delays at Otay Mesa.	Hold public-private sector in meetings on HazMat requirements. Increased staffing required at Otay Mesa POE.
Private	Trucking Firm (Mexico)	Otay Mesa, CA	CA	23-Mar-02	Insufficient POE hours.	Open Otay Mesa-Tijuana commercial crossing for 16 hours/day.
Public	Customs (U.S.)	Otay Mesa, CA	CA	23-Mar-02	Space constraints. Insufficient NII equipment to inspect empties. Mexican port director is frequently changed. Private sector practices create afternoon traffic peaks.	Purchase available land adjacent to POE. Install additional VACIS unit. Build new empties' gate to reduce congestion.
Private	Trucking Firm (Mexico)	Otay Mesa, CA	CA	6-Nov-01	No formal segregation of loaded/empty traffic. POE schedule does not match private-sector schedules. Layout of U.S. and Mexican compounds incongruent.	Provide physically separated lanes for different traffic types in advance of Primary. Otay Mesa entrance for empties should be on west side of compound to reduce congestion. Customs should lengthen schedule and remain open later (two 8-hour shifts). BRASS program requires greater incentives/promotion and faster application processing.

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Customs Broker (U.S.)	Pharr, TX	TX	15-Nov-01	Insufficient access lanes at POE (2 lanes that narrow to 1). U.S. vehicle safety inspection agencies target Mexican trucks/drivers. Long secondary delays occur during U.S. Customs shift changes (2-3 p.m.). FDA is understaffed at the Pharr-Reynosa border crossing.	
Private	Trade Group (U.S.)	Pharr, TX	TX	14-Nov-01	Lack of accurate real-time information on traffic conditions at POEs (to improve private-sector scheduling). Customs sometimes conducts "secondary activities" at primary inspection, slowing down all traffic (has worsened since September 11, 2001).	
Private	Trucking Firm (U.S.)	Pharr, TX	TX	14-Nov-01	U.S. vehicle safety inspection agencies target Mexican trucks/drivers. Delays sometimes result due to incomplete documentation.	Weigh northbound trucks in Mexican export compound. Share information with U.S. agencies to avoid duplication.
Private	Trucking Firm (U.S.)	Pharr, TX	TX	15-Nov-01		Extend POE hours until midnight (from 9 p.m.).
Private	Trucking Firm (U.S.)	Pharr, TX	TX	15-Nov-01	Certification in Line Release/BRASS programs takes too long.	
Public	DPS	Phoenix, AZ	AZ	31-May-02	Trailer/container seal numbers are not noted on cargo manifests. Truck inspection standards vary from POE to POE. Forged vehicle safety decals have been problematic.	Implement standard binational protocol for sealing/resealing trailers and containers. Standardize safety regulations and enforcement among U.S. POEs.
Private	Customs Broker (Mexico)	Piedras Negras, Coah.	Coah.	16-May-02	Excess capacity exists at Eagle Pass-Piedras Negras border crossing.	Increase promotion of gateway is required to relieve congestion at nearby crossings.
Public	Customs (Mexico)	Reynosa, Tamps.	TX	14-Nov-01	Mexican broker must be present when shipment is inspected at Mexican export customs (results in longer delay). Insufficient infrastructure (primary inspection booths) is available at the U.S. POE.	
Private	Customs Broker (Mexico)	Tijuana, BC	CA	23-Mar-02	Validation of Mexican Pedimento is slow. Border-crossing times are excessive.	Improve Mexican pedimento validation process. Better private-sector coordination and improved drayage services are required.
Private	Shipper (Mexico)	Tijuana, BC	CA	23-Mar-02	Business Anti Smuggling Coalition (BASC) certification on hold after September 11, 2001. Lack of communication between U.S. and Mexican authorities hinders crossing process.	Longer POE hours are required by maquiladoras. Documentation and processes at border must be streamlined.

Private / Public	Stakeholder	City	POE State	Date	Main Issues / Problems	Suggestions
Private	Customs Broker (Mexico)	Tijuana, BC	CA	23-Mar-02	Hard copy document transfer process creates congestion near border crossing. Validation of Mexican pedimento is slow. Incomplete information from shipper frequently delays crossing.	Reduce hard copy documentation requirements. Provide faster, more reliable pedimento validation in Mexico. Improve shipper understanding of information requirements for cross-border movements.
Private	Shipper (Mexico)	Tijuana, BC	CA	23-Mar-02	Shipments to U.S. are frequently pilfered.	Greater transparency in border crossing process. Better trailer seals.
Private	Trucking Firm (U.S.)	Tijuana, BC	CA	23-Mar-02	Inefficiency at U.S. primary inspection contributes to delays and congestion at border (e.g., drayage drivers must get out of truck to hand documents to agent).	Streamline U.S. primary inspection process. Increase number of primary inspectors.

APPENDIX D: DESCRIPTION OF COORDINATION PROBLEMS AND ALTERNATIVES

TABLE OF CONTENTS

APPENDIX D: DESCRIPTION OF COORDINATION PROBLEMS AND ALTERNATIVES

PLANNING

C-1. Inadequate Long-Term Planning Strategy for Border Crossings

Description of Issue/Problem

Binational port planning is not coordinated to include all U.S. and Mexican agency and private-sector requirements. There is no long-term strategy for border system planning, or planning is dependent on the inclinations of senior U.S. and Mexican officials. Trade practices and new technologies may not be taken into consideration during the planning process.

Alternative

Develop medium- and long-range plans for port of entry and binational planning that involve all U.S. and Mexican public agency and private-sector stakeholders.

Future Needs

Develop a border-wide planning handbook for use by public agencies in Mexico and the United States. This handbook would provide detailed profiles of all U.S. and Mexican commercial land ports. At minimum, each profile should include U.S. and Mexican port layouts specifying traffic flows, processing points, bottlenecks, and lane designations; detailed data on two-way truck movements (by empty/bobtail and loaded trucks) and average delay times; an inventory of NII equipment, ITS technology, DOT installations, dock capacity (utilized and dormant), and other port facilities; human resource capabilities of the various agencies working at the port; and the operational schedules of those agencies and the border bridge/roadway. This document would constitute a comprehensive, updated compilation of strategic border planning information that is currently fragmented among U.S. and Mexican Customs, the General Services Administration, the Department of Transportation, and a myriad of other public agencies in the United States and Mexico. The report would build off previous efforts of a smaller scale such as the General Service Administration's Summary of Existing and Proposed

Border Stations (1996) and the Texas Department of Transportation's Handbook, International Bridges and Border Crossings Existing and Proposed (2001).

The operation of separate U.S. and Mexican land ports along their shared border results in considerable duplication of systems, activities, and infrastructure. The potential operational, financial, and security benefits of developing joint border facilities is substantial. However, special provisions would be necessary for the construction and operation of binational border ports. Research aimed at defining the political and operational requirements for development of joint border facilities at remote, low-volume crossings between the United States and Mexico is timely in light of current plans to expand the number of border gateways.

R-1. Inadequate Incentives for Participation in Pre-Clearance Programs

Description of Issue/Problem

Inconvenient enrollment structures and lengthy U.S. pre-primary wait times for pre-approved traffic have diminished private-sector participation in pre-clearance programs and reduced program effectiveness. The U.S. Customs Service has taken a leadership role in the development or oversight of many incentive programs, which aim to improve compliance, reduce smuggling and terrorism threats, and enhance the speed and efficiency of the commercial border-crossing process. Success of the Border Release Advanced Screening and Selectivity (BRASS) program, the Carrier Initiative Program (CIP), the privately-run Business Anti-Smuggling Coalition (BASC), and the Customs Trade Partnership Against Terrorism (C-TPAT) is contingent upon their ability to provide tangible benefits to participants.

BRASS is an anti-narcotics smuggling initiative developed to expedite the release of compliant shipments into the United States from Mexico and Canada. Certified shippers are not required to pre-file import documentation or undergo U.S. secondary inspections in most instances. Freed-up inspection resources focus on unknown shipments and those requiring a closer examination. In order to qualify for enrollment in BRASS, Mexican shippers are required to have a 90 percent (or higher) Customs compliance record over the past year, export a minimum of 50 truckloads to the United States annually, and utilize security-certified CIP carriers.

BASC is an industry-led program intended to deter the use of commercial conveyances as a means of narcotics smuggling across international borders. Participants agree to implement various security measures and procedures in exchange for more lenient treatment by Customs in the event that one of their shipment containers or trailers is utilized by drug traffickers to import contraband into the United States.

C-TPAT is also designed to strengthen supply-chain and border security by requiring participants to incorporate infrastructure, personnel, and procedural security elements into their businesses. Like participants in the BRASS and CIP programs, C-TPAT members receive fewer inspections at the port of entry and are eligible for consolidated, account-based processing. Despite an abundance of large shippers and highly repetitive movements through U.S.-Mexico commercial gateways, BRASS enrollment in Mexico is small vis-à-vis Canada.

According to the U.S. Customs Service, less than 10 percent of truck entries on the southern border are BRASS, compared to 60 percent on the northern border.1 Special BRASS lanes have been informally designated upstream of some U.S. ports of entry to expedite these movements, but it is still common for certified shipments to be forced behind non-certified and low-priority traffic on access roads and in border queues. This problem, combined with the lengthy BRASS certification process, outweigh the benefits of participation in pre-clearance initiatives for some firms.

Acknowledging private-sector demands for increased program incentives, the U.S. government recently merged C-TPAT into a new program, FAST (Free and Secure Trade program), at the U.S.-Canada border. This program addresses private-sector demands for increased incentives by incorporating features such as exclusive truck lanes for program participants and barcoded ID cards for use by truck drivers.

Alternative

Organize comprehensive incentive programs that provide tangible benefits to participants, such as queue bypass or expedited processing, thus increasing the efficiency and security of the border-crossing process. The requirements of incentive programs should not be so financially or logistically onerous that they preclude participation by most candidates. Initiatives must be marketed aggressively by public agencies and supported with sufficient resources to ensure that program objectives (including reasonable application processing times) are achievable.

Creation of a lead agency at U.S. ports of entry would facilitate coordination among the various stakeholders involved in the development and launch of improvement initiatives. In the absence of a single lead border agency, a binational, multi-agency planning structure would help. Such a structure would foster the development of comprehensive and worthwhile border initiatives as opposed to many overlapping programs.

Future Needs

First, the potential for reducing traffic congestion at the border through higher private-sector participation in incentive programs is significant. Further research could identify new options for inducing private sector enrollment in these programs and to develop improved strategies and action plans to achieve this goal.

Second, research to determine whether the remote border clearance and “fast-lane” initiatives being tested at the U.S. - Canada border could be implemented between the United States and Mexico and would provide a basis for creating a more efficient and secure incentive program on the southern border. Given the emphasis on drug interdiction and other conditions at the southern border, development of a fast-lane program may incorporate unique features.

C-2. Lack of Data Collection and Benchmarks

Description of Issue/Problem

One of the principal shortcomings of port of entry planning is the absence of comprehensive traffic data and port performance monitoring. Data deficiencies prevent operators, users, and oversight agencies from understanding whether a given port of entry is functioning effectively and efficiently. Likewise, the absence of benchmarks prevents the development of coordinated inter-agency strategies to improve border-crossing systems.

Numerous data collection efforts provide a better understanding of truck-borne trade between the United States and Mexico. These efforts focus on a variety of system characteristics including traffic patterns, arrival rates, truck types (loaded vs. empty/bobtail), processing rates, and delay times.

Manual data collection methods have limited many of these studies to snapshots of select high-volume crossings. Because data collection efforts normally last only a few days, the reliability of data is sometimes questionable. The temporary presence of researchers at border-crossing facilities may encourage border agencies to process traffic more expeditiously than would otherwise be the case.

Some information on binational truck flows is automatically collected by bridge operators, public agencies, and private-sector entities through the scanning of documentation and other means. However, this information is often not compiled, shared, or made available to the public. There is currently no single, comprehensive source of data on trans-border truck movements.

A consequence of the scarce availability of detailed, reliable data is the lack of performance benchmarks. Problem identification in local crossing systems is sometimes based on subjective analysis. U.S. port directors report that the methodology for calculating pre-primary wait times includes conversations with drivers and "eyeballing" the length of the truck queue. Sources in the drayage industry dispute the pre-primary wait times published on the U.S. Customs website, claiming that actual delays are often much longer.

The underlying causes of border problems and their magnitude relative to other problems experienced locally or border-wide may remain undetermined due to data and benchmarking shortfalls.

Alternative

Coordinate public agency technology and resources in Mexico and the United States to gather, compile, and disseminate data on traffic characteristics and delay times. Develop a single source for binational border planning data that can be utilized to establish where and why border crossing problems exist, what their relative magnitudes are, and what remedial policies can be introduced to mitigate them.

C-3. Inconsistent Planning for Truck Safety Inspection Facilities

Description of Issue/Problem

The 1993 North American Free Trade Agreement (NAFTA) required the United States to allow Mexican trucks entry for deliveries and return loads, first in border states by 1995, and then open entry into the United States by January 1, 2000.*2* Former President Clinton, sighting safety concerns, imposed a moratorium on Mexican trucks beginning December 1995. But a NAFTA arbitration panel ruling in 2001 said the U.S. moratorium violated the treaty, and

President Bush said he would open the border. Before Mexican trucks can cross into the U.S., the U.S. Department of Transportation must satisfy that it is now safe for them and that all safety procedures are in place. The Federal Motor Carrier Safety Administration (FMCSA) reported that by June 30, 2002, inspection facilities should meet new federal requirements at 23 of the 25 southern border crossings.*3* In a written comment on a recent Inspector General's report on the safety issue, the Secretary of Transportation, Norman Mineta, said that he fully expected that the U.S. would be in a position to certify opening of the border by the summer of 2002.*4*

Various strategies to maintain truck safety have been proposed at the southern border. The overall commercial vehicle safety improvement initiative at the border entailed the hiring and training of 214 new inspectors and the construction or improvement of physical truck inspection infrastructure. In Texas, eight truck inspection stations have been (or are scheduled to be) constructed as close to the POE facilities as possible. When these are operational, activities within the federal compound by the FMCSA staff will cease. Other border states have developed different systems to raise the level of truck inspections at the border and ensure the safety of Mexican trucks entering the U.S..*5*

TransAnalysis, an engineering and planning company in Texas, has undertaken a simulation of the safety inspection facilities at a number of sites.*6* The output of the simulation model includes system impacts within the locale, the need for new traffic signals, modifying signal coordination, evaluating geometry, and other related highway impacts. However, the model does not address either the costs or benefits of cooperation between those responsible for the safety inspection facilities and related entities such as GSA, USCS, and the local city planning entities. Planning and construction of U.S. state vehicle inspection facilities at the border is being undertaken on a state-by-state basis with little stakeholder coordination or system integration within transportation corridors.

The absence of a consistent and far-reaching inspection facility development and implementation plan has led each state to determine its own direction and stakeholders to plan in isolation.

Alternative

Symmetry among truck safety inspection facilities is necessary to ensure that commercial vehicles entering the United States are treated equally regardless of the gateway through which they pass. A standardized facility planning process would determine the location and operations of permanent safety inspection sites along the border and promote greater coordination with respect to the integration of those facilities into border-crossing and international trade corridor systems.

There are clear benefits from enhanced stakeholder cooperation and coordination in the construction and operation of border safety inspection facilities on the U.S.-Mexico border. First, truck records can be linked to USCS activities so that each may be aware of the other, particularly when trucks first enter the USCS facilities. Developing the records within the safety inspection facilities can lead to the creation of trip records, which can be accessed after the vehicle has left the facilities. This may assist police and safety inspection officers throughout the border state and corridor states through which the truck is traveling. Finally, there is an opportunity for these records to be linked to the commercial vehicle operations (CVO) schemes that are currently being developed by U.S. federal authorities along key trade corridors. By credentialing these vehicles, it will be possible to hold a record for the entire length of the trip and provide benefits for both the users and those enforcing truck safety laws.

DEMAND MANAGEMENT

C-4. Lack of Fee-Based Priority Shipment Lane

Description of Issue/Problem

Time-sensitive shipments are mingled with other traffic types creating a “one-size-fits-all” border-crossing structure. High-priority, low-risk cargo that is handled by certified carriers may be delayed in border queues behind empties and low-priority shipments due to the lack of expedited crossing alternatives. At some gateways, the organization of infrastructure and processing systems tends to spread delay evenly among vehicles regardless of whether they are carrying urgent shipments or low-value, non-time-sensitive freight. The ability of border infrastructure and processes to account for heterogeneous truck flows with varying needs is an important aspect of a coordinated crossing system.

Alternative

Resolution of one-size-fits-all traffic problems through implementation of a fee-based priority shipment lane is referred to as "value pricing." Value pricing differs from congestion pricing in that drivers have the option to choose between regular facilities (lanes or roads) and facilities that provide a premium level of service for an extra payment. Unlike congestion pricing, value pricing does not seek to encourage the off-peak movement; rather, it provides an opportunity for priority shipments to circumvent peak-period congestion prior to inspection for a fee that reflects the value of the premium service.

Although value pricing is usually proposed in connection with the construction of new infrastructure (lanes, etc.), the main economic rationale is its potential to improve the utilization of infrastructure. Value pricing, therefore, takes infrastructure as given so that its adoption entails the tolling of an existing facility that would otherwise be unpriced. From this perspective, dedicating a lane for value pricing means one less lane for regular use. The benefit of value pricing arises not from a reduction in overall delay but from a more efficient distribution of the burden of delay, shifting it from relatively time-sensitive traffic to traffic that can bear delay at lower cost. The more time-sensitive traffic opts for the fast lane and experience shorter delays than it would in the absence of value pricing, while traffic that sticks with the untolled lanes experiences longer delays.

R-2. Lack of Congestion Pricing

Description of Issue/Problem

Lack of congestion pricing may indirectly contribute to congestion and delays during peak border-crossing periods. As discussed in C-13, a significant coordination problem at the border is the lack of complementary stakeholder schedules. For example, schedules in the trading community may not match the schedules and processing capacity of the POE inspection agencies. The typical consequence is a peak in the demand across the day, usually in the afternoons. The processing capacities of the border inspection agencies are relatively stable because of constraints on infrastructure and staffing. As a result, the processing capacity at many POEs is not able to accommodate the daily peaks in demand and queues form.

Alternative

Collect additional data on traffic and delays to identify when and how predictably peaks occur. Authorize an increase in fees during peak periods to mitigate demand with a fee increase justified on the basis of additional resources necessary to accommodate peak demand. Investigate likely demand responses to peak-period tolls and, where warranted, perform cost-benefit analysis of congestion pricing scenarios.

Congestion pricing is a potentially valuable tool to manage demand and improve productivity and efficiency in the commercial border-crossing process. Stakeholders that are currently able to disregard costs they impose on others by crossing during peak periods, such as congestion and subsequently higher levels of environmental pollution, would be forced to internalize these costs. This, in turn, may bring about positive changes in stakeholder procedures and scheduling. Stakeholders that cross during congested afternoon periods may be enticed to reorganize their activities to take advantage of cheaper, off-peak periods during the morning. Drayage firms and independent drivers that frequently cross empty or without a trailer, a common practice in unidirectional, multi-shipment drayage contracts, will be encouraged to expend greater effort in securing backhauls. This will enhance border system productivity and efficiency. At border crossings that exhibit particularly consistent hourly traffic patterns and delay times, charges could be varied according to the level of congestion at a given time of day. Revenue from congestion pricing could be allocated to initiatives aimed at further reducing border congestion and delay.

Future Needs

To devise and evaluate a regime of congestion pricing would call for more data. A clear and complete picture on when delays occur, their length, and additional data on the predictability of peaks would be necessary to undertake a congestion pricing feasibility analysis. Information on the likely demand responses to peak-period tolls would also aid in the development of appropriate congestion pricing alternatives at U.S.-Mexico commercial truck crossings.

C-5. Commingling of Commercial Traffic Types

Description of Issue/Problem

Lack of commercial vehicle segregation by risk level, type, or time sensitivity exacerbates traffic conflicts prior to the U.S. primary inspection station. Trucks carrying time-sensitive BRASS, maquiladora, or perishable freight may be funneled into the same queues as trucks hauling traditional dry freight or empties/bobtails. The mixing of commercial traffic types with different risk characteristics, priority levels, and processing requirements is undesirable because it slows the movement of priority trade and reduces the benefits of expedited crossing programs for certified low-risk shippers and carriers.

At some ports of entry, the movement of laden vehicles is being choked off by non-revenue movements. Nearly half of all northbound trucks crossing the Mexico-U.S. border currently move empty or without a trailer (Table D-1).

At Otay Mesa, the Laredo World Trade Bridge, and other ports of entry that process large volumes of truck traffic, authorities have tried to informally dedicate access lanes to specific truck types such as BRASS, empties, or traditional trade. The segregation of truck traffic into homogeneous groups reduces vehicle conflicts, facilitates Customs processing, and speeds the crossing process for low-risk, priority shipments. However, many of these arrangements have not achieved their full potential on account of insufficient traffic monitoring and enforcement of truck segregation. Drivers seeking the quickest route across the border frequently enter the shortest queue regardless of whether they are entitled to be in that lane or not. Other drivers create traffic jams by using clear lanes to bypass traffic, cutting into the correct lane immediately prior to the Primary Inspection Module. Truck drivers working for the same firm allow this practice to continue.

Alternative

Segregate pre-cleared vehicles from traditional trade and empties/bobtails. Monitor and enforce traffic-type segregation. Implement latest pre-primary ITS technologies in combination with driver, vehicle, and shipper databases to aid identification of high-risk movements and expedite processing of low-risk movements. If space constraints limit the use of physical barriers to segregate traffic, compliance with informal lane designation schemes should be

Table D-1. Percent of Northbound Truck Crossings at U.S.-Mexico Border that Were Loaded, Fiscal Year 2001.

Port of Entry	Loaded Truck Crossings	Total Truck Crossings*	Percent of Crossings Loaded
Port of Laredo, TX[1]	769,237	1,419,165	54%
Port of Otay Mesa , CA	368,428	700,453	53%
Port of El Paso, TX[2]	366,677	656,257	56%
Port of Hidalgo/Pharr, TX[3]	227,749	367,991	62%
Port of Calexico East, CA	113,837	259,174	44%
Port of Brownsville, TX	122,223	255,231	48%
Port of Nogales, AZ	189,438	251,474	75%
Port of Eagle Pass, TX	55,567	100,983	55%
Port of Tecate, CA	31,395	62,243	50%
Port of Del Rio, TX	39,648	59,286	67%
Port of San Luis, AZ	21,503	39,908	54%
Port of Douglas, AZ	17,365	34,054	51%
Port of Santa Teresa, NM	18,310	30,612	60%
Port of Rio Grande City, TX	19,037	26,391	72%
Port of Calexico, CA	4,765	Not Available	Not Available
Port of Progreso, TX	3,644	16,649	22%
Port of Roma, TX	6,718	12,141	55%
Port of Naco, AZ	6,304	9,976	63%
Port of Presidio, TX	4,526	7,562	60%
Port of Lukeville, AZ	Not Available	4,271	Not Available
Port of Columbus, NM	2,995	4,239	71%
Port of Sasabe, AZ	1,110	2,215	50%
Port of Andrade, CA	1,127	1,727	65%
Port of Fabens, TX**	Not Available	147	Not Available
Total	**2,391,603**	**4,322,149**	**55%**

* Loaded and empty/bobtail trucks
[1] Includes Laredo World Trade Bridge and Colombia Solidarity Bridge
[2] Includes Bridge of the Americas and Ysleta-Zaragoza Bridge
[3] Includes Veterans International Bridge and Los Indios Bridge
** Light trucks only - not a full-service commercial crossing

Source: U.S. Customs Service

closely monitored and enforced by authorities. This will prevent inspection delays that apply to certain traffic types from adversely affecting entire commercial flows at the border. Where practicable, bypass lanes through/around ports of entry should be provided for trucks not selected for detailed inspections.

Future Needs

In order to determine the full magnitude of the empty/bobtail problem at the U.S.-Mexico border, detailed data on southbound loaded and empty movements must also be captured. Unfortunately, the Mexican agencies that might collect such data (Customs - SHCP, the Federal Road and Bridge Authority – CAPUFE, and the National Institute of Statistics, Geography and Informatics – INEGI) do not archive this information or are unwilling to share it with the public. An effort to combine data collected by Mexican public agencies and private border bridge and roadway operating authorities should be undertaken. This will enable a much clearer understanding of traffic mixing problems and potential solutions.

PHYSICAL LAYOUT AND TRUCK MOVEMENT

C-6. POE Configuration – New Inspection Technologies Cannot be Accommodated

Description of Problem or Issue

Most border stations were built to accomplish specific missions and lack flexibility and adaptability. New technologies and procedures have changed the way inspections are performed. For instance, the advent NII technology has rendered a significant portion of the loading dock capacity at some U.S. land ports obsolete. Traditional layouts cannot provide the space and symmetry needed for new inspection technologies because there is not enough land to accommodate efficient linear processes.

Alternative

Assess operational value of current POE design and evaluate options for retrofitting and reconfiguring facilities to accommodate changes in technological capabilities, POE demands, and updated processing techniques. Discontinue initiatives, such as the construction of additional secondary dock space, if more efficient non-intrusive inspection options exist. Continue to acquire land adjacent to extra-urban POE facilities to ensure future space availability for port development and expansion.

R-3. POE Configuration – Outdated Facility Layouts

Description of Problem or Issue

The layouts of border stations have evolved over the life of the facility, reflecting changing missions and practices. Most ports of entry are inefficiently configured for optimum throughput, safety, and security. Squeezing more activities into the limited confines of some land ports on the U.S.-Mexico border has resulted in the creation of a hazardous environment for inspection personnel. Tijuana-Otay Mesa is an example of a border-crossing system with lane configurations that do not provide sufficient room for inspectors to move safely around the vehicles to perform pre-primary inspections. Other ports of entry lack isolated and properly equipped areas to conduct hazardous materials inspections.

Alternative

Restructure POE layouts to provide the flexibility necessary to properly accommodate manual inspection activities and Customs processes. Widen POE access lanes and provide adequate, isolated hazardous materials inspection sites at designated ports of entry. Include all U.S. and Mexican public-sector agencies in the planning and design of future border crossings.

C-7. POE Configuration – Poor Internal POE Circulation

Description of Issue/Problem

The combination of current processes and layouts produce internal POE circulation problems that include traffic conflicts between cleared and uncleared trucks. Some of these problems have arisen due to a larger number of vehicles being inspected at secondary stations than was previously possible. High-volume secondary inspection stations situated close together have generated considerable traffic flow problems within ports of entry.

Security concerns have also arisen due to inadequate regulation of cleared and uncleared traffic circulation within U.S. ports of entry. Anecdotal reports of forged inspector signatures and the illegal exchange of documentation between cleared and uncleared vehicles at secondary inspection waiting areas underscores the need for improved, more tightly regulated POE traffic circulation schemes.

Alternative

Redesign POE circulation to prevent uncleared trucks from exiting POEs unlawfully, and reduce traffic conflicts between cleared vehicles and those awaiting inspection.

R-4. Capacity – Number of Primary Inspection Booths

Description of Issue/Problem

Some POEs lack a sufficient number of primary inspection booths due to severe space constraints. The Nogales, Arizona, port of entry is an example of a facility that has insufficient physical capacity to handle daily traffic volumes. Operation of all primary booths cannot efficiently accommodate demand at this port throughout most of the day. Demand for additional primary inspection booths could also increase sharply at El Paso if plans to close the El Paso-BOTA facility to laden truck traffic are implemented.

Alternative

Explore opportunities to expand the number of primary inspection booths where required/feasible. Improvements to port layouts, operations and vehicle tracking, and changes in peak arrival characteristics through improved incentive planning may provide some relief to capacity constraints. In some cases, acquiring land to expand the number of primary booths may be the only option.

C-8. Capacity – Inspection Sequencing

Description of Issue/Problem

There are untapped opportunities for border agencies to inspect vehicles while they are in the queue for U.S. primary inspection. Peak-period truck queues at U.S. Primary Inspection Modules are nearly ubiquitous at major commercial ports of entry along the southern border. Normally, the arrival rate of northbound trucks at the border steadily increases throughout the morning. As vehicles exit the Mexican Export Compound, they proceed onto the border roadway or bridge. The U.S. primary inspection station is typically the greatest constraint in the crossing system. Consequently, this is one of the first areas at which queues and congestion form. Depending on the gateway and the time of crossing, queues may be encountered immediately after the Mexican export facility or as the truck approaches the U.S. primary inspection area. The time spent by vehicles waiting in lines upstream of U.S. primary inspection stations represents one of the largest segments of unproductive "dead time" in the U.S.-Mexico border-crossing system.

Alternative

Various inspection activities typically carried out within the port of entry could be conducted in advance of the Primary Inspection Module where traffic and conditions permit. Assess the potential to reduce idle wait time, alleviate congestion, and improve security in the border crossing process through the transfer of canine drug inspections, driver interviews, vehicle revisions, document reviews, and weigh-in-motion screening activities to pre-primary vehicle queuing areas. Enable these activities to be collapsed when congestion and queue length are insufficient to justify them.

C-9. Capacity – Uncoordinated Access Road Design and Limited Number of Lanes

Description of Problem/Issue

Uncoordinated access road design and a limited number of lanes cause cross-border traffic to interfere with local vehicular movement on roads near border crossings. Urban and geographical features confine the number of access lanes leading to Nogales, El Paso-BOTA, and other U.S. ports of entry. In the border cities of Tijuana, Ciudad Juárez, and Reynosa, access roads to Mexican export facilities have been enveloped by urban sprawl. The length and width of these roadways are insufficient to handle present volumes of peak-period truck traffic. Access bottlenecks in Mexico commonly produce truck queues that back up onto adjacent roadways, disrupting traffic circulation in surrounding communities.

Although a new highway leading to the Colombia-Laredo border crossing is now complete, dangerous road conditions deterred carriers from utilizing that uncongested crossing for years. Similarly, the absence of a northern paved access route along the border from Ciudad Juárez to the San Jerónimo-Santa Teresa border crossing has impeded a redistribution of truck traffic from the congested BOTA and Ysleta facilities to that gateway.

The length and width of the actual crossing infrastructure connecting Mexican and U.S. commercial compounds is another access consideration affecting border capacity. Delays at the

U.S. Primary Inspection Module occasionally produce queues that extend into Mexico. Where insufficient queuing capacity exists, congestion clogs the Mexican export facility. These problems are compounded by incongruent U.S. and Mexican border facility layouts that require large commercial vehicles to negotiate tight turns and steep grades.

Alternative

The extent to which access road design and capacity disrupt cross-border trade flows depends on a combination of factors including the location of the crossing, the volume of truck traffic, and the capacity of other components in the system. Opportunities exist to better coordinate access road and port designs binationally and within each nation. Use the Metropolitan Planning Organization (MPO) planning processes to integrate border station and city planning needs.

C-10. Lack of ITS Solutions to Streamline Truck Movements

Description of Issue/Problem

Existing processes at the border are time consuming, resource intensive, and contribute to redundant information verification. The prevailing crossing process at most commercial gateways between the United States and Mexico requires a truck to stop several times within and around border compounds. Delays are imposed for toll collection, Customs risk assessment, inspections, document verification, vehicle weight checks, and other reasons. The manual processes used to carry out these tasks are time consuming and resource intensive.

Currently, trucks cross the border and normally stop behind other vehicles waiting to be examined at the U.S. Primary Inspection Module. As vehicles are processed at primary inspection (usually a 1-2 minute procedure), the queue slowly advances, creating stop-start engine cycles. If cleared at primary, the truck makes its way through the port of entry, stopping again at the exit booth to ensure that all paperwork has been checked and the vehicle is cleared to proceed into the United States.

If a vehicle is sent to secondary, it may be required to stop a number of times (for canine drug screening, a gamma ray or X-ray scan, vehicle safety inspection, HazMat inspection, or manual cargo or conveyance inspection at a loading dock). These steps are sequential in that a vehicle can be cleared at any time and as it moves through the process. The time taken at each step becomes successively longer, culminating with a dock inspection if necessary. In an extreme case, it may take several hours for a vehicle to be thoroughly checked and processed through the U.S. port of entry.

New U.S. DOT regulations now require that vehicle safety inspections be undertaken near the border. The U.S. congress has passed legislation mandating that all trucks entering the United States meet state and federal laws, and those whose trips are beyond the traditional commercial zone receive even greater scrutiny. However, once familiarization with Mexican companies and vehicles grows, vehicle safety inspections should fall to meet those rates for all state vehicles. Not to do this would be to follow a profiling policy, which is prohibited under NAFTA.

Alternative

Develop ITS capabilities at the border that are interconnected with Commercial Vehicle Operations (CVO) improvements and technology initiatives along transportation corridors. ITS systems that minimize delays for safe, legitimate trade should incorporate the electronic transmission of pre-qualified information on the driver, tractor, trailer, and cargo. Existing Dedicated Short-Range Communication (DSRC) technology can be employed to transmit this information as the vehicle approaches the border crossing, allowing sufficient time for public agencies to determine which, if any, inspections are required. ITS technologies, such as automated toll collection, variable messaging signs, and weigh-in-motion scales, are additional traffic management instruments that can be leveraged to streamline and expedite the border-crossing process for legitimate trade.

The benefits to be gained from reducing multiple stops are three-fold. First, fuel consumption will improve, which will lower vehicle operating costs for truckers. Second, transit times through the facilities would be improved, and this would impact both truck productivity and possibly improve supply chain efficiency at the border. This may have associated benefits in terms of production processes, just in time deliveries, and the necessity to store or hold material in border warehouses. Finally, reducing speed cycle changes at low-level engine revolutions will improve emissions and promote a healthier environment for personnel working in the facilities. As noted, further stops maybe necessary at vehicle inspection stations adjacent to ports of entry.

Work to incorporate vehicle/trade links in ACE so that DPS data at vehicle safety inspection stations can be developed as part of the new POE systems. Coordination with the FHWA and U.S. State DOTs along NAFTA transportation corridors should be undertaken to develop a credentialing system that spans the entire supply chain.

In principle, inspection efficiency should remain the aim of all future border crossings, and coordination should be structured to ensure that all inspection duties can be carried out within expedited crossing systems. In reality, some interim steps will need to be implemented at border ports of entry to move from the current system to a one- or no-stop system.

STAFF MANAGEMENT

C-11. Personnel Turnover – USCS Inspector Attrition Rates Are High

Description of Issue/Problem

In the United States, voluntary attrition among public sector employees has created human resource challenges for agencies such as U.S. Customs. Customs inspectors are reportedly recruited from offices around the country to work at the southern border. Senior officials report that many new inspectors are unprepared to work the long hours and overtime that are, today, common among Customs employees. Inspectors who are trained to work as U.S. Customs agents quickly move on to more lucrative jobs within the agency or elsewhere in government. Openings created as a result of new government initiatives, such as the FAA's "Sky Marshall" program, have drawn recently recruited agents away from the U.S. Customs Service.

The extreme heat, vehicle exhaust, and difficult working conditions prevalent at the U.S-Mexico border are additional factors cited as contributors to inspector burn out. High rates of turnover among agents at the USCS compromise agency resources, staff training levels, and overall border planning and operations.

Alternative

Establish a long-term plan to equalize agency compensation and reduce attrition rates due to unprepared trainees.

R-5. Insufficient Customs Personnel

Description of Issue/Problem

U.S. Customs staffing levels are often too low to take full advantage of available NII technology. The two most common NII technologies currently employed on the southern border are the gamma ray VACIS and the truck X-ray. NII equipment scans the contents of tractors and trailers, reducing the need for time-consuming and expensive manual inspections. In the past, the National Guard has helped eased the staffing burden of operating NII equipment, but this was never envisioned as a permanent solution. Some U.S. port directors have indicated that they occasionally have to shut down NII equipment on account of not having sufficient staff to operate it. In other cases, trucks must wait in long queues at NII stations or undergo alternate inspections that may be more time consuming.

Alternative

NII-related deficiencies should be addressed through the provision of specific funding for NII technology and equipment operators in coordinated equipment/personnel implementation plans. Such plans will require a reassessment of investment strategies and infrastructure designs at U.S. ports of entry to ensure optimization of inspection resources. Greater reliance on NII technologies in concert with the deployment of advanced information systems will result in reduced congestion and delay at U.S. ports of entry, lower levels of contraband smuggling on commercial conveyances, and enhanced inspection efficiency, capacity, and interdiction capability. In cases where physical space limitations constrain the ability to add needed NII equipment, POE retrofitting and reconfiguration should be considered.

C-12. No Mechanism to Predict and Prevent Queue Development

Description of Issue/Problem

Primary inspection capacity is partially determined by the availability of personnel to perform required inspection activities. Fixed primary inspection staffing schedules prevent the opening of additional primary booths as soon as demand warrants. In some cases, a sufficient number of primary inspection booths exist, but staffing is not sufficiently responsive to preclude queue development. At large ports of entry, primary staffing levels are normally tiered according to demand. For example, a third of the available primary gates may be open during the early morning hours, approximately two- thirds of the booths are staffed throughout the mid morning, and all booths are generally operated during the peak period from around noon until the evening hours.

However, regimented staffing schemes are unable to respond promptly to variable traffic demands. Afternoon Customs shift changes are particularly problematic because they can result in vehicles remaining unattended within the port of entry for half an hour or longer. In other instances, pre-primary queues have been observed to build to dozens of vehicles before additional inspectors are assigned to primary inspection. The lack of flexibility and responsiveness on behalf of Customs in opening primary inspection booths and rapidly and seamlessly executing shift changes contributes to delays for northbound commercial vehicles. High truck arrival rates overwhelm constant (or temporarily reduced) port capacity and promote the formation of queues that often take significant periods of time to dissolve after additional personnel have been added.

Alternative

Improving the responsiveness of primary booth staffing schemes and reducing processing times during shift changes are two alternatives for increasing capacity and lessening delays in the border-crossing process. Implement an arrival-rate monitoring device upstream of primary inspection to provide port authorities with advanced information on impending queue development. This technology, coupled with enhanced Customs staffing flexibility and responsiveness, would enable port managers to make informed, real-time personnel decisions to speed the crossing process.

Future Needs

In order to determine the extent of staffing responsiveness problems at U.S. POEs, on-site observation or detailed POE operations records and traffic data are required. Information currently available on primary inspection wait times and staffing schedules is subjective, and comprised of daily AM and PM snapshots of delay times rather than the continuums that are necessary for meaningful analysis. Development of a standardized wait-time monitoring system at southern border crossings would facilitate and improve collection of this data. Maintenance of

U.S. Customs staffing records is also required to determine the level of congestion generated by sub-optimal staffing transitions.

R-6. Personnel Turnover – Mexican Customs' Rotation of Port Directors

Description of Issue/Problem

There are frequent personnel changes within public agencies at the U.S.-Mexico border. This disrupts domestic and binational planning, operations, and coordination initiatives. The continual replacement of Mexican port directors is a major component of this problem. Many port directors have been fired or transferred after less than one year on the job. This practice is likely associated with the Mexican federal government's new anti-corruption initiative championed by President Fox. In 2001, 44 of 47 Mexican Customs directors were dismissed along with 43 mid-level Customs officials and all 50 leaders of the Customs Police Force.*7*

U.S. port directors have indicated that the constant adjustment to new port management in Mexico is complicated by changing rules and regulations. Occasionally, new rules contradict effective agreements and procedures that were developed over long periods and through extensive consultation with previous administrators. Examples of such disruptions include the discontinuation of extended evening hours at Mexican and U.S. ports of entry, coordination problems regarding Mexican and U.S. holiday schedules, and reduced or cancelled binational port initiatives.

Alternative

Establish a binational public-agency communication accord to minimize conflicts caused by changes in Mexican Customs personnel.

STAKEHOLDER COORDINATION

C-13. Poorly Coordinated Stakeholder Schedules

Description of Issue/Problem

The differing schedules of public- and private-sector stakeholders in the border-crossing process partially dictate daily commercial traffic patterns at U.S.-Mexico border crossings. The differing operational schedules of individual stakeholders and the time requirements for completion of their activities result in a crossing window that is substantially narrower than the daily hours of service offered at border facilities. This is especially true at busy commercial crossings where delays due to congestion can be lengthy or difficult to predict. Loaded truck movements from Mexico to the United States are generally concentrated between midday and the late afternoon-early evening hours. Daily traffic peaks frequently result in the complete saturation of border facilities during these periods and the availability of excess capacity at other times. This demand pattern is a major contributor to congestion at many ports of entry along the U.S. southern border.

By virtue of their role as an information conduit between Customs and the privatesector, customs brokers exercise a large degree of control over the timing of trans-border movements. The broker industry has been criticized for contributing to peak-period congestion at the U.S.-Mexico border by not beginning the documentation preparation and transmission process earlier in the morning and, thereby, removing some of the peak-period strain on public resources. The broker community contends that the specific drayage information they require for completion of their responsibilities is not available until the shipment is ready to cross the border and that broker cycle times are generally too short to justify pre-preparation of documentation.

The USDA's schedule for grading northbound produce at the port of Nogales, Arizona, is an example of a public-sector scheduling practice that contributes to a demand-capacity mismatch at the border. Agricultural shipments that require grading to be sold on the U.S. market are sent to special Mexican border facilities where they are assessed and certified by USDA graders prior to importation into the United States. Although the Nogales port of entry opens to commercial traffic at 7 a.m., USDA employees do not typically reach the Mexican grading facilities and begin grading activities until 9 a.m.. As a result, many shipments are prevented from crossing the border during early off-peak hours. By the time agricultural loads have been graded and cleared, delays at the U.S. Primary Inspection Module are often excessive. FDA staffing shortages at ports of entry along the southern border are also reported to significantly constrain crossing windows for shipments governed by that agency.

As the initiators of cross-border movements, shipper schedules play an important role in determining when a load crosses the border. This is especially true in the case of border zone maquiladoras operating just-in-time inventory systems. Maquiladora factories in Ciudad Juárez, Coahuila, and Tijuana, account for a sizeable portion of northbound movements through commercial gateways in these regions. Maquiladora plants normally load directly onto the truck to maintain low, inventory carrying costs. Production runs initiated early in the day may not turn out a finished product until midmorning. Additional delays associated with loading the trailer and documenting the shipment prevent many northbound loads from crossing the border until after 10 a.m. Uncoordinated stakeholder schedules produce a peak demand trend that is clearly visible in a random five-day sampling of laden truck movements through the Otay Mesa port of entry (Figure D-1). By not coordinating their activities, stakeholders in consecutive segments of the system squander excess morning and late evening border capacity and aggravate peak-period congestion.

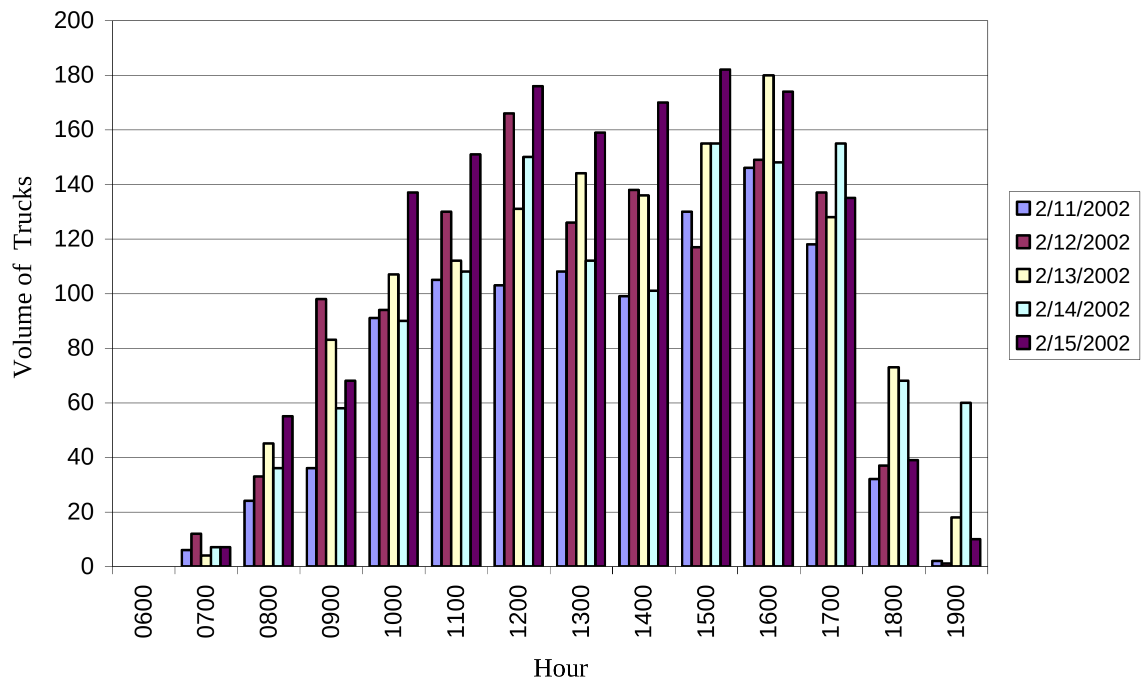

Figure D-1. Hourly Arrival of Laden Trucks at the Otay Mesa POE (02/11/02-02/15/02)

Source: Otay Mesa Port of Entry

Alternative

Organize public- and private-sector consultation to facilitate identification of scheduling problems and enable adjustments that smooth POE demand and reduced border congestion and delay. More broadly distributed demand for port of entry services could be achieved if USDA graders and customs brokers began their work earlier in the day and shippers coordinated their production and shipping schedules to take advantage of off-peak periods. Increased FDA funding would enable that agency to bring its inspection schedules in line with those of other agencies at major ports of entry.

C-14. Inadequate Informal Stakeholder Coordination

Description of Issue/Problem

Stakeholder practices are often carried out in isolation without regard to their impacts on system efficiency. The physical movement of goods across the U.S.-Mexico border is contingent upon the timely and accurate transmission of information. Shipment data is exchanged among private-sector supply chain partners via fax, email, Electronic Data Interchange (EDI), or other means. Typically, the Mexican exporter communicates cargo information to one or two parties (i.e., U.S. consignee, Mexican customs broker, or U.S. customs broker) that subsequently distribute it among other stakeholders on a need-to-know basis. Some shippers rely on a customs broker in one country to arrange broker services in the other. If these arrangements are not made in advance and clearly communicated to the appropriate parties, delays will result. Another common source of disruptions in U.S.-Mexico supply chains is the transmission of incomplete or inaccurate information by the shipper. If the customs broker does not receive the proper information before the shipment arrives at the border, scheduled crossings may have to be pushed back.

Most delays due to poor private-sector coordination occur with infrequent shippers who lack established relationships with their Mexican or U.S. customs brokers. These exporters may be unfamiliar with the crossing process and transmit information that is incomplete, incorrect, or late. In rare cases, documentation errors are not discovered until the shipment reaches the U.S. port of entry, at which time correction can be costly and potentially result in the impoundment or confiscation of the conveyance and merchandise.

Broker delays may be the result of slow cycle times or infrequent document delivery to the border. Two key documents prepared by customs brokers are the Mexican Export Pedimento and U.S. Inward Cargo Manifest. A driver and shipment may be forced to wait at the border if this paperwork is not quickly processed and delivered. Some brokers indirectly contribute to border delays by not providing precise instructions or educating their clients with respect to required documentation.

Poor broker-carrier coordination is another potential impediment to crossing efficiency. Transfer of a trailer from a long-haul trucking firm to a drayage carrier (and vice versa) may entail a short or long delay, depending on the degree of communication and coordination that exists between these stakeholders. If the long-haul carrier does not expeditiously inform the broker of a shipment's arrival at the border, the load may be forced to cross the border during the most congested period. Similarly, the agility of the drayage carrier in responding to service requests by brokers and long-haul firms is an important factor in the timing and speed of the crossing process.

Poor communication between the public- and private-sector stakeholders precludes border efficiency in some instances. Shippers using gateways where traffic volumes vary on a daily basis complain that there is no accurate source of real-time information on the length of truck queues at U.S. primary inspection. Such information could be used by the private sector to better match shipping schedules with available capacity at the port of entry.

Alternative

Establish a forum for definition and resolution of stakeholder coordination problems. Provide Web broadcasting of monthly U.S. customs broker community meetings to facilitate dissemination of port operations information among all interest groups. Provide Web broadcasting of truck queue lengths to facilitate off-peak scheduling for discretionary shippers.

The expansion of port meetings to all stakeholders in the supply chain would increase awareness and accountability in the border-crossing process and facilitate resolution of problems resulting from the lack of informal stakeholder coordination. Port meetings address issues affecting port operations and are held at large U.S. commercial ports of entry on a monthly basis. Currently, these consultations are generally limited to the U.S. Customs port director and the members of the customs broker community. Utilization of Web broadcasting technology or other communication resources could make these meetings available to other key stakeholders such as shippers and carriers. Given that stakeholder awareness and communication are major causes of border congestion and delay, this alternative could potentially have a significant positive impact on border operations. Real-time Web broadcasting of truck queue lengths at ports of entry would also assist the trade community in avoiding peak traffic periods at U.S.-Mexico gateways.

C-15. Untapped Opportunities to Enhance Broker Process

Description of Issue/Problem

Mexican law requires that a licensed Mexican Customs broker prepare and submit all documentation for cargo entering or leaving that country. As a result, Mexican Customs brokers have assumed a significant degree of control over the border-crossing process. Many of these companies also own border drayage firms, U.S. customs brokers, freight forwarding agencies, and warehouses. Where modern technology and practices have not been leveraged, the provision of services, such as freight classification, stevedoring, drayage, and warehousing, may involve delays and expense that are at cross-purposes with system efficiency. A more streamlined crossing process may not be in the financial interest of some brokers, especially for those whose clients are far-removed from the border and do not view the status quo import/export system as particularly problematic.

Alternative

Automated crossing programs and a shipper/consignee education campaign on efficient crossing procedures would help familiarize supply-chain partners with broker activities and services, and expedite shipments across the border. Web broadcasting of monthly broker-port director meetings could also enhance private-sector understanding of problems contributing to crossing inefficiency.

STANDARDS

C-16. Absence of Standardized Seal Notation Protocol

Description of Issue/Problem

The lack of a standardized procedure for documenting trailer and container seal numbers creates security vulnerabilities and delays in the border-crossing process. In order to ensure that cargo is not tampered with between the shipper's premises and the border crossing, special seals are applied to the container or trailer door. Once the seal has been applied, the door cannot be opened without breaking the seal.

For northbound shipments that are subject to inspection by Mexican Customs prior to proceeding to the U.S port of entry (Mexican Export Inspections), original seals are replaced. There is no standardized protocol for documenting the replacement of these seals. Inspector signatures, stamps, or other forms of authorization may accompany the new seal number. This regulatory gap often causes U.S. Customs agents at primary inspection booths to view shipments that have had their seals replaced in Mexico with skepticism. These shipments are frequently directed to U.S. secondary inspections. In the absence of a binational protocol governing the sealing and resealing of trailers and containers, authorities cannot determine whether conveyances have been illegally tampered with or opened for legitimate inspection purposes.

Alternative

Develop and implement a binational agreement on the procedure for documenting container and trailer seal numbers for shipments moving between Mexico and the United States. Such an agreement would enhance border security and minimize delays due to the unnecessary examination of shipments with replaced seals. Explore opportunities to incorporate this initiative into the development of new regulations governing the physical properties of trailer and container seals.

C-17. Lack of Harmonized Truck Safety Standards

Description of Issue/Problem

Different commercial vehicle size, weight, and safety standards in the U.S., Canada, and Mexico complicate inspection and enforcement activities at the border.

Alternative

An existing NAFTA mechanism–the Land Transportation Standards Subcommittee (LTSS)–is charged with addressing the harmonization of North American trucking standards. With the opening of the border, the LTSS should revitalize its efforts to coordinate with transportation authorities in Mexican, U.S., and Canadian jurisdictions to establish a simplified NAFTA safety protocol for commercial vehicles.

INFORMATION MANAGEMENT

C-18. Information Systems – Excessive Paperwork Preparation and Handling

Description of Issue/Problem

Some northbound border-crossing processes still rely on repetitive and manual paperwork preparation and submission. Currently, the Mexican Export Pedimento, U.S. Inward Cargo Manifest, and Mexican and U.S. bills of lading must be produced in hard-copy format. Repetitive document processing increases the potential for data entry errors, and adds cost, time, and additional steps to the border-crossing process.

The pedimento is usually not prepared by the Mexican broker until the shipment arrives at the border. Although shipment classification and documentation preparation tasks are not normally problematic, hard copies must be submitted to the truck that hauls the shipment across the border. Many brokers employ "runners" to deliver documentation to trucks waiting on roadsides at or near the Mexican export compound. Delays attributable to the preparation and delivery of these documents force some trucks to cross the border during peak, rather than off-peak, periods.

Other inefficiencies associated with the continued use of paper documents include the duplication of data entry activities by various stakeholders. For example, preparation and submission of U.S. entry information involves processes similar to what occurs in Mexico for export movements (Harmonized Tariff Code classification numbers in the U.S. are two digits longer). Each time data is re-entered to generate required paperwork, the risk of information corruption increases. Public and private-sector modernization has begun to alleviate this problem in recent years, but port directors report that shipments are still routinely detained at border crossings due to paperwork problems.

The USDA's and FDA's lack of connectivity to the Customs Service's Automated Commercial System at some ports of entry is a critical coordination shortfall that has exacerbated manual processes at these locales. This is a critical problem for the USDA at the Nogales border crossing where brokers must prepare and submit stacks of paper documentation each morning in order to qualify for the expedited Border Cargo Release (BCR) program. USDA agents must then sift through the documentation manually to determine which shipments require inspection. In spite of the increased use of electronic filing of U.S. entry information, paperwork and document handling remains an important part of the border-crossing process and a significant contributor to congestion and delay.

Alternative

The use of a shared, internet-based information system accessible to authorized stakeholders-as envisioned under the Automated Commercial Environment (ACE) and International Trade Data System (ITDS) programs–would reduce the time, cost and coordination requirements of the border-crossing process. Implementation of a paperless Mexican Export system (similar to the U.S. Export Declaration process), harmonization of U.S. and Mexican Tariff Code reporting requirements, and development of a joint documentation validation system would further streamline the movement of international trade.

C-19. Information Systems – Antiquated Technology

Description of Issue/Problem

Information systems utilized by some public-sector agencies are outdated and incompatible with one another and those used by the private sector. This hampers efficient stakeholder communication and information-sharing efforts and prolongs the use of duplicate and manual transaction systems.

The main entry documentation system used by the U.S. Customs Service is the Automated Commercial System (ACS). This system was developed in the 1970s to provide an electronic link between U.S. customs brokers and the U.S. Customs Service via a link called the Automated Broker Interface (ABI). The purpose of the ACS and ABI was to facilitate the transmission of information to Customs so that agents could assess the need to inspect a shipment before it arrived at the border. While originally successful in achieving this goal, the systems have since become outdated and plagued by intermittent failures. Sporadic “brown outs” prevent Customs from electronically confirming receipt-of-entry information which, in turn, disrupts the flow of commercial traffic from Mexico to the United States.

Key U.S. agencies involved in the inspection of inbound freight do not have access to these systems at some ports of entry. For example, the USDA and the FDA still solicit hard-copy documents from the trade community for lack of connectivity to the ABI and ACS. Public-sector sources report that the USCS’ ACS interface, the FDA’s Operational and Administrative

System for Import Support (OASIS), and other public agency information systems are outdated, incompatible, unstable, and are not capable of handling additional user loads.

Mexican Customs has its own computer system, the SAAI (Sistema de Automatización Aduanera Integral) that it uses to communicate with Mexican Customs brokers. While this system is more advanced than those employed by U.S. public agencies, it can only be accessed via the Mexican Customs Broker Association and does not replace the need for paper transactions. Several U.S. ports of entry are currently developing stand-alone systems that provide basic information about the driver and conveyance that is not currently available through other electronic means. While these systems may prove valuable on an interim basis, a more comprehensive, long-term solution to trade information management is needed.

Toll collection is another segment of the border-crossing process requiring modernization. With the exception of some gateways outside of Texas, most major commercial border crossings are tolled. Diverse charging mechanisms have been implemented to collect crossing fees. These range from cash, tokens, and tickets to account payment. While a transponder payment system similar to electronic toll collection on freeways is now offered for commercial vehicles at Laredo and other crossings, most trucks are still required to manually pay tolls before proceeding across the border. Manual driver identification and visa verification processes necessitate additional stops within the commercial compound. While some of these delays do not presently create bottlenecks in the system, removing or diminishing surrounding constraints could result in their becoming points of congestion.

Alternative

A single, fully integrated information system such as that proposed under ACE is needed to modernize and simplify the border-crossing process and improve stakeholder coordination within the United States and binationally. A system that ties together all stakeholders and disseminates information on a need-to-know basis could drastically reduce data input requirements and stakeholder transactions while protecting information privacy and reducing data corruption. Promotion of standardized trade data requirements and the development of universally compatible technologies (i.e., interoperable transponders and compatible processing systems) for use by stakeholders throughout the supply chain will substantially diminish border delays stemming from data preparation, submission, and analysis.

C-20. No Advanced Threat Detection

Description of Issue/Problem

Most border stations have limited ability to identify and contain security threats at a safe distance from inspection personnel and facilities. The lack of a binational threat detection/response capability is a critical border security and coordination weakness.

Alternative

Explore opportunities to expand intelligence sharing among U.S. and Mexican agencies. Deployment of detection equipment along approach roads distant from the inspection facility could significantly reduce the threats to personnel and facilities and speed the crossing process. Develop a binational contingency plan to deal with threats or attacks at U.S.-Mexico land border crossings.

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APPENDIX E: QUANTIFICATION OF IMPACTS OF ALTERNATIVES

TABLE OF CONTENTS

APPENDIX E: QUANTIFICATION OF IMPACTS OF ALTERNATIVES

BENEFIT-COST APPROACH

The alternatives that are considered in this study would have various impacts on U.S. Customs and other government agencies, the trading community, and other segments of society. The impacts may be negative (costs) or positive (benefits), and to evaluate the alternatives it is desirable to sum the costs and benefits, which leads us to the realm of benefit-cost analysis.

In economics, a "benefit-cost analysis" is more or less what the name suggests: an analysis of the benefits or costs to society of some action. (To emphasize the societal perspective, the term "social benefit-cost analysis" is often used.) It is important in such an analysis to be clear on what population forms "society." Some analyses attempt to measure benefits and costs for the population of a particular nation, state/province, or locality. For example, some analyses of international airports or seaports have attempted to exclude the benefits or costs accruing to foreigners. Adopting this particularist perspective can greatly complicate the modeling and data requirements, however, and, if only for this reason, many benefit-cost analyses have taken a universalist perspective.

In this study, the researchers have taken the universalist perspective in estimating benefits from alternatives for improved coordination. To estimate only benefits for the United States would be inconsistent with the binational nature of this study and entail a large amount of speculation. It is one thing to estimate, for example, the savings in transportation costs for cross-border shipments that would result from a given alternative. To estimate how much of the savings would ultimately accrue to residents of different countries is a much taller order. The savings can be passed backward and forward along the supply chain through changes in prices, and these changes depend on market factors such as the price-responsiveness (elasticity) of demand and supply.

Transfer payments are not social benefits or costs

One of the pitfalls in benefit-cost analysis is mistaking transfer payments for social benefits or costs. A transfer payment is a zero-sum exchange between one segment of society and another. Tax payments, for instance, are government-arranged transfers of wealth between a taxpayer and other members of society. Suppose that some initiative were to reduce evasion of the tariff revenues owing to US Customs; the additional revenue collected would represent a cost to those paying it and an equal benefit to those to whom the revenue is distributed. One cannot count the amount of the revenue as a social benefit.

Estimation focus

A border simulation model would quantify many of the alternatives mooted in this report. One such model, the Border Wizard, has been recently developed for the Border Station Partnership Council, a coordinating body of federal inspection services.[1] The General Services Administration has directed that that all ports of entry doing feasibility studies use Border Wizard for project justification and evaluation. Border Wizard is not yet available to the general research community, but we understand it will be made available in the near future to state departments of transportation. Reportedly, the model has been calibrated to information on each major POE, including traffic data that were collected electronically for this purpose. In view of the advanced stage of development of Border Wizard and its apparent sophistication, we decided it would be a poor use of time and resources to attempt to construct our own border simulation model for this study.

Instead, we have concentrated our modeling in directions that complement, rather than duplicate the capabilities of Border Wizard. In particular, while Border Wizard can simulate the effects of changes to border operations on vehicle-delay time, it does not place a cost on vehicle delay time, as we do below.

EXTENT OF CURRENT BORDER DELAYS

Before attaching a money value to border delays, we review the available information on their frequency and duration.

Delays prior to U.S. Customs Primary Inspection

U.S. Customs Estimates of Wait Times

U.S. Customs reports daily estimates of vehicle wait times at primary inspection at land border POEs. Wait times are measured once in the morning, generally between 8 a.m. and 8:30

[1] For a description of the Border Wizard, see http://www.ops.fhwa.dot.gov/freight/Border%20Wizard/Border%20Wizard.htm.

a.m., and once in the afternoon, generally between 4 p.m. and 4:30 p.m. The study team's field observations and public-sector interviews suggest that these collection windows are not strictly adhered to and that actual information collection times may not represent the peak traffic period at the port. The Customs field offices also have latitude in selecting a method of measurement as long as it is non-intrusive. Some offices have opted for camera measurement, but two simpler methods predominant in practice. One of them is to tag the last vehicle in line and to measure how long it takes to reach a primary inspection booth. Another method is for a Customs official to "eyeball" the queue, relating the position of the last vehicle in line to a point of reference, which could be, for example, the midpoint of a bridge. The official then estimates the time it will take for the vehicle to reach primary inspection based on the vehicle's position and past experience. To continue the example, past experience might be that a vehicle takes 20 minutes to progress in the queue from the midpoint of the bridge to primary inspection. U.S. Customs agents also reportedly interview drivers as they are processed through the Primary Inspection Module to determine preprimary wait times. The national office of Customs examines the estimates of wait time, whichever method is used, and may query a field office about the reasons for any unusual delays. The private sector speculates that this promotes underestimation of preprimary wait times at U.S. ports of entry although no independent wait-time data are continuously collected to support or refute this assertion.

Customs reports on its web site only the most recent day's estimates of wait times, but provided the study team with the complete historical series from September 15, 2001, when data collection commenced, through June 12, 2002.[2] Recorded wait times for commercial vehicles were normally longer in the afternoon than in the morning. Among the southern border POEs with the largest volumes of commercial traffic, the average afternoon wait time over the entire sample period reportedly ranged from 6.1 minutes at El Paso-BOTA to 22.7 minutes at Otay Mesa (Table E-1). Excluding the weekends, the average afternoon waiting times become 8.3 minutes to 31.5 minutes, with some ports at these extremes. The average morning wait time excluding weekends was under 7 minutes, except for the 18.1 minute average recorded at Otay Mesa. We were unable to obtain daily data on traffic volumes and, therefore, could not compute traffic-weighted average wait times; these would somewhat exceed the unweighted averages reported here and would better reflect the waits that trucks typically experience.

[2] The address for the web site is http://www.customs.ustreas.gov/news/sept11/sep11infof.htm

Table E-1. Commercial Vehicle Wait Times For U.S. Customs Primary Inspection at Major POEs on Border with Mexico.

Averages, Monday-Friday, Sept. 15, 2001-June 12, 2002

Average Wait Time	**Otay Mesa**		**Calexico East**		**Nogales**		**El Paso-Ysleta**		**El Paso-BOTA**		**Laredo - WTB**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Sunday	0	0.3	0	0.1	0	0	0	2.0	0.4	0.5	0	1.8
Monday	10.4	16.2	3.6	11.3	1.0	36.3	0.4	13.3	5.4	7.3	0.6	19
Tuesday	14.9	35.3	3.6	17.8	4.2	15.4	0	19.2	4.5	10.3	0	37.1
Wednesday	21.9	36.0	3.0	19.5	2.3	15.8	0	25.8	7.1	9.5	0.5	24.2
Thursday	18.4	35.8	4.7	16.0	1.5	17.4	0	17.7	6.8	7.0	0.5	19.9
Friday	25.1	34.3	5.0	14.1	3.0	18.4	1.3	22.8	5.7	7.2	1.2	19.7
Saturday	0.8	0.8	0	0.9	2.2	11.8	0	7.7	0	0.9	0.4	3.3
All days	13.1	22.7	2.8	11.4	2.0	16.4	0.2	15.5	4.3	6.1	0.5	17.9
Weekdays (M-F)	18.1	31.5	4.0	15.7	2.4	20.7	0.3	19.8	5.9	8.3	0.6	24.0

Note:

Morning= 8-8:30 a.m.
Afternoon = 4-4:30 p.m.

Source: U.S. Customs

The lack of traffic weights may partly explain why these averages are substantially lower than the figures supplied to the study team when we asked carriers and others in the trading community to estimate the typical wait times for primary inspection at U.S. Customs. Preprimary wait times cited by the trade community were generally over an hour at the busiest U.S. ports of entry. The U.S. General Accounting Office found similar divergence between the private-sector representatives and U.S. Customs officials in their estimates of border delays. The clearest example cited pertained to the Lincoln-Juarez Bridge in Laredo, prior to the opening of the World Trade Bridge. Trucking representatives said that drivers faced an average wait of 3 hours to enter the United States, whereas the Customs port director at Laredo said that the standard wait time was 2 hours.

In other examples the GAO cited, the private sector and Customs differed in their delay time estimates partly because they were not referring to the same thing. At Otay Mesa, trucking representatives said that delays in crossing the border could run 2 to 3 hours. Customs port officials noted that in an internal study conducted over nine days in 1998, the average wait time to enter the port was 76 minutes between 5 p.m. and 6 p.m. The study did not include, however, the time it took to be processed through the port. Other common crossing delays that are not accounted for in U.S. preprimary wait-time data include drayage carrier staging activities and transit times to and from the border, and line ups and processing at the Mexican Export facility. During peak traffic periods, delays generated by these activities could easily exceed 45 minutes to 1 hour.

In the estimates of wait times that Customs has been collecting since last September, there is substantial day-to-day variation and some extreme outliers (Figures E-1–E-5). At Nogales, where the average weekday afternoon wait was about 21 minutes, there were several days when the wait for primary inspection took 2 hours or more. According to Customs, exceptionally long waits are largely attributable to two categories of events:

- infrastructure problems, such as repairs to tunnels or bridges; and
- hazardous wastes spills or scares or other incidents such as bomb threats.

A threat or scare that disrupts Customs operations for only half an hour can lead to massive backups.

TTI-Battelle Estimates of Border Delays

The Federal Highway Administration FHWA commissioned Battelle and TTI to measure delay times for commercial vehicles at seven POEs. Data were collected for two or three days during 2001 at each of the ports surveyed. On the southern border, data collection occurred in the summer at El Paso-Ysleta and Otay Mesa and in the autumn at the Laredo World Trade Bridge, from port opening time through early evening (Table E-2). Travel time was measured between the point at the border crossing where delay may first occur–generally, a point upstream of the export inspection facility–and a point immediately after the primary inspection booth. Data collectors used handheld computers to record license plate information for all vehicles that passed their location. The computer also stored the time that each license plate was entered. From matching the license plates recorded at the two locations, the researchers could calculate the travel time between those locations.

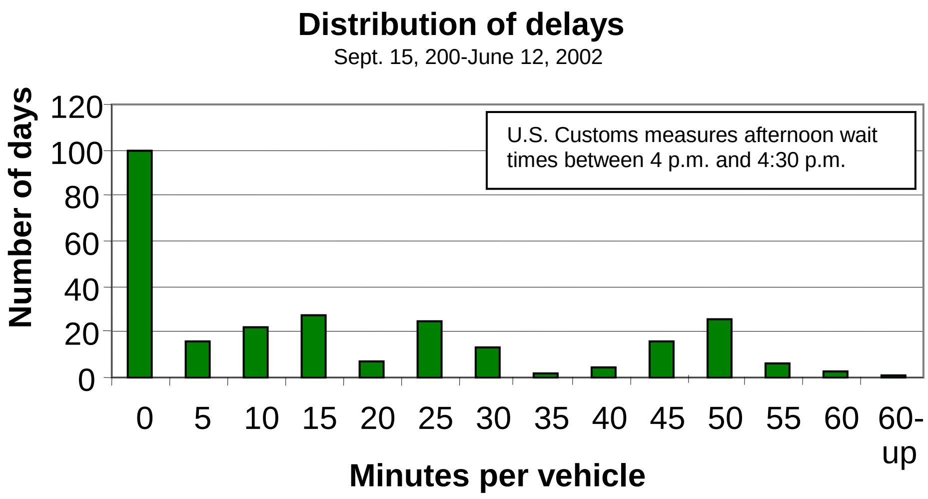

Figure E-1. Commercial Vehicle Wait Time for U.S. Customs Primary Inspection, Afternoons, Laredo World Trade Bridge.

Source: U.S. Customs

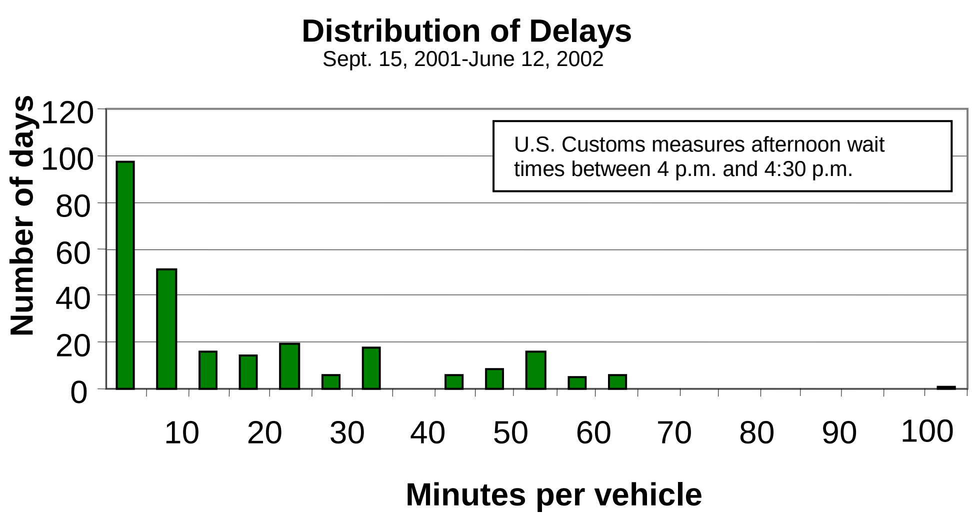

Figure E-2. Commercial Vehicle Wait Time for U.S. Customs Primary Inspection, Afternoons, El Paso – Ysleta Bridge.

Source: U.S. Customs

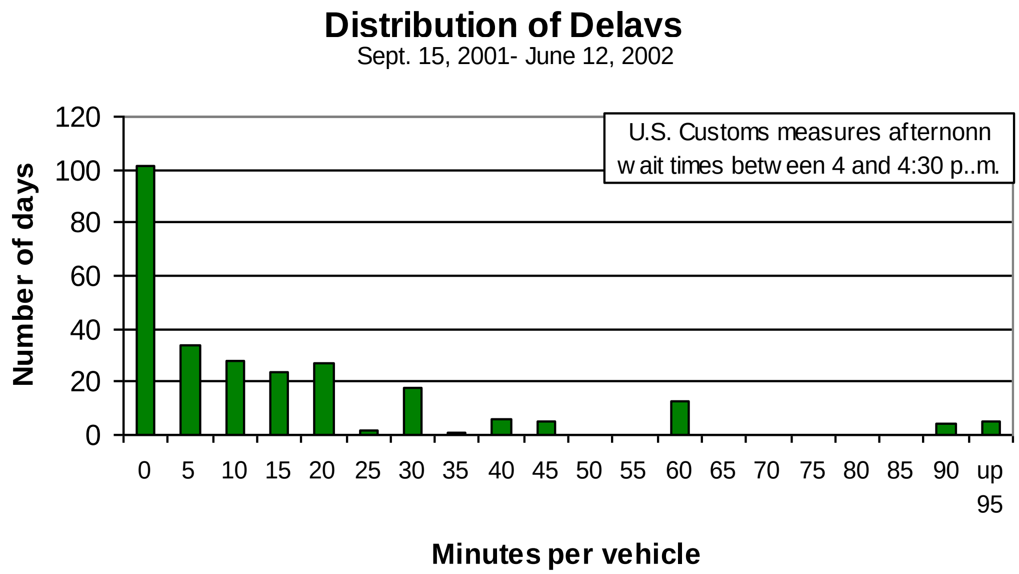

Figure E-3. Commercial Vehicle Wait Time for U.S. Customs Primary Inspection, Afternoons, Nogales.

Source: U.S. Customs

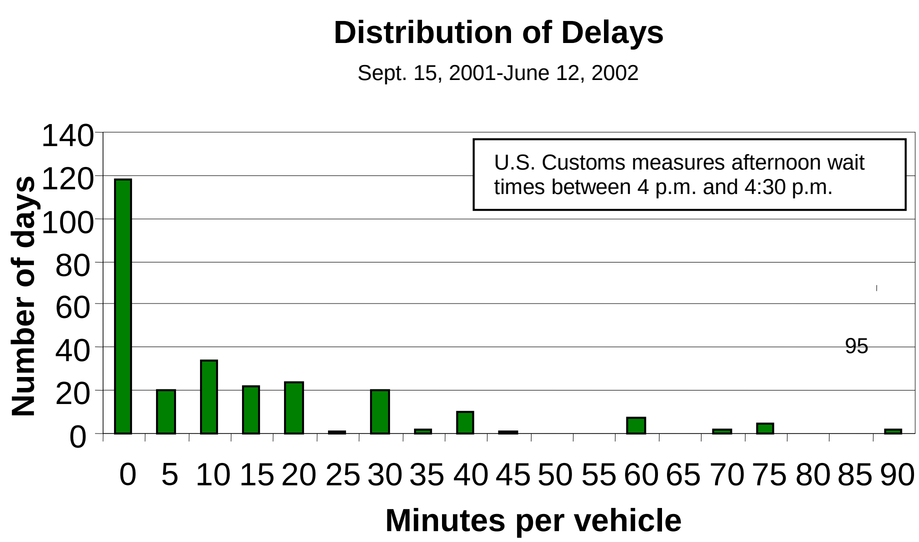

Figure E-4. Commercial Vehicle Wait Time for U.S. Customs Primary Inspection, Mornings, Otay Mesa.

Source: U.S. Custom

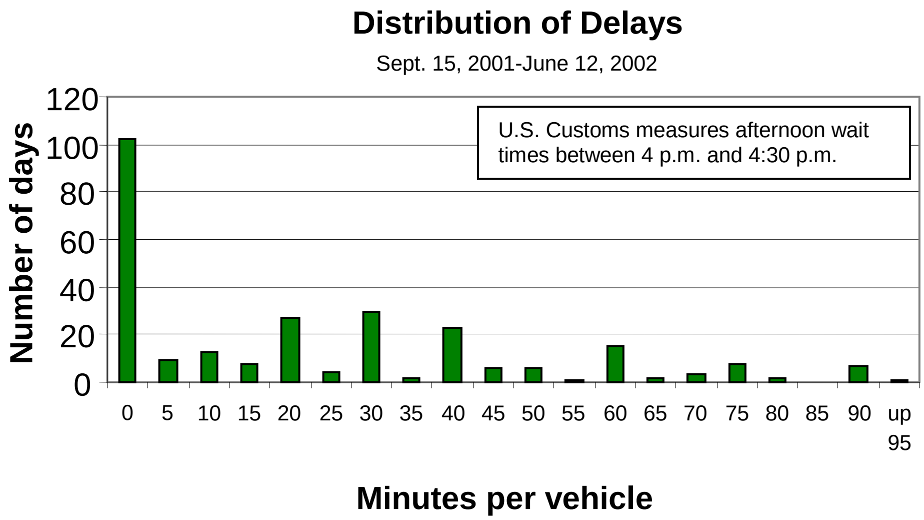

Figure E-5. Commercial Vehicle Wait Time for U.S. Customs Primary Inspection, Afternoons, Otay Mesa.

Source: U.S. Customs

Table E-2. Battelle-TTI Survey of Commercial Vehicle Delay at U.S. Border: Summary Information for Vehicles Entering from Mexico.

Port of Entry	Survey Date(s)	Survey Time(s)	Average daily times for inbound traffic (in minutes)
Otay Mesa, CA	July 17-19, 2001	6:00 a.m. to 8:00p.m.	28.6
El Paso, TX	June 26-28, 2001	8:00 a.m. to 8:40 p.m.	29.6
Laredo, TX	October 30-November 1, 2001	8:30 a.m. to 7:00 p.m.	18.9

Minutes per vehicle

Note: Travel time was measured between the point at the border crossing where delay may first occur–generally, a point upstream of the Mexican export inspection facility–and a point immediately after the US primary inspection booth. Delay time was defined as the difference between actual and free-flow travel time, the latter being the lowest hourly travel time measured over the course of the day.

Source: Texas Transportation Institute (The Texas A&M University) and Battelle Memorial Institute, *Evaluation of Travel Time Methods to Support Mobility Performance Monitoring, FY 2001 Synthesis Report*, final report to Office of Freight Management and Operations, Federal Highway Administration, U.S. Department of Transportation, 2002.

Delay time was defined as the difference between actual and free-flow travel time, the latter being the lowest hourly travel time measured over the course of the day. Border delay time, thus defined, is not quite the same as the wait time in the queue for primary inspection at U.S. Customs. In particular, delays that result from Mexican export inspection will add to the TTI-Battelle measure of northbound delay but not to the U.S. Customs measure of wait time. That said, it is generally primary inspection at U.S. Customs, rather than Mexican export inspection, that is the real bottleneck for traffic flowing between the two data collection locations in the TTI-Battelle study. A previous study put it this way:

A border crossing system can be considered like a pipeline. Each section of the pipeline has a certain diameter and a capacity based on that diameter. The capacity of the entire pipeline is equal to the lowest capacity of any one section–the bottleneck. The same is essentially true for a border crossing system. If we consider all on-line components (those which every vehicle must pass through), the system capacity becomes that of the lowest capacity segment…. The section with the lowest capacity is the U.S. primary inspection booths *(1).*

In view of this, it is not too surprising that despite the differences in what was measured and how, and in when the data were collected, the estimates from TTI-Battelle (Table E-2) and those from U.S. Customs (Table E-1) are of broadly similar magnitude. It should be pointed out, however, that travel time in the TTI-Battelle study decreased dramatically after the first day of data collection in some instances, despite relatively constant traffic volumes per booth. This raises questions as to the reliability of border-crossing data collected over short 2- to 3-day periods.

Another pattern evident in both data sets is the substantial day-to-day variation in the timing of peak delays. The variation in the TTI-Battelle data (Figures E-6 –E-8) is such that the longest delays do not necessarily occur at a particular time of the day. At Otay Mesa, the peak in measured delays on the first day of observation, a Tuesday, was 42 minutes between 5 p.m. and 6 p.m.; the next day, the second of 3 days of data collection, the peak was 64 minutes between 10 a.m. and 11 a.m.

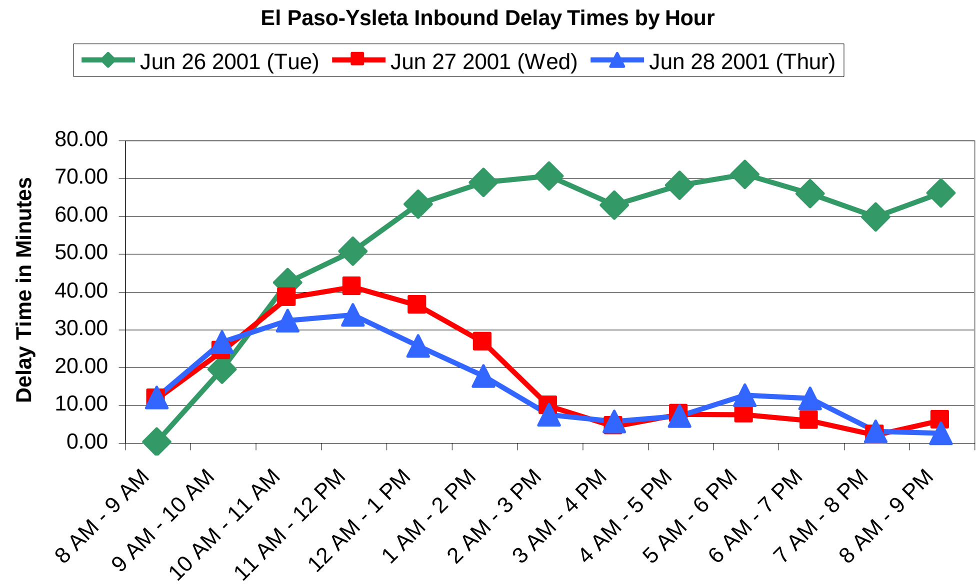

Figure E-6. Estimated Border Delay Time by Hour on Surveyed Days, Commercial Vehicles Entering the U.S. from Mexico, Laredo World Trade Bridge, 2001.

Source: 22

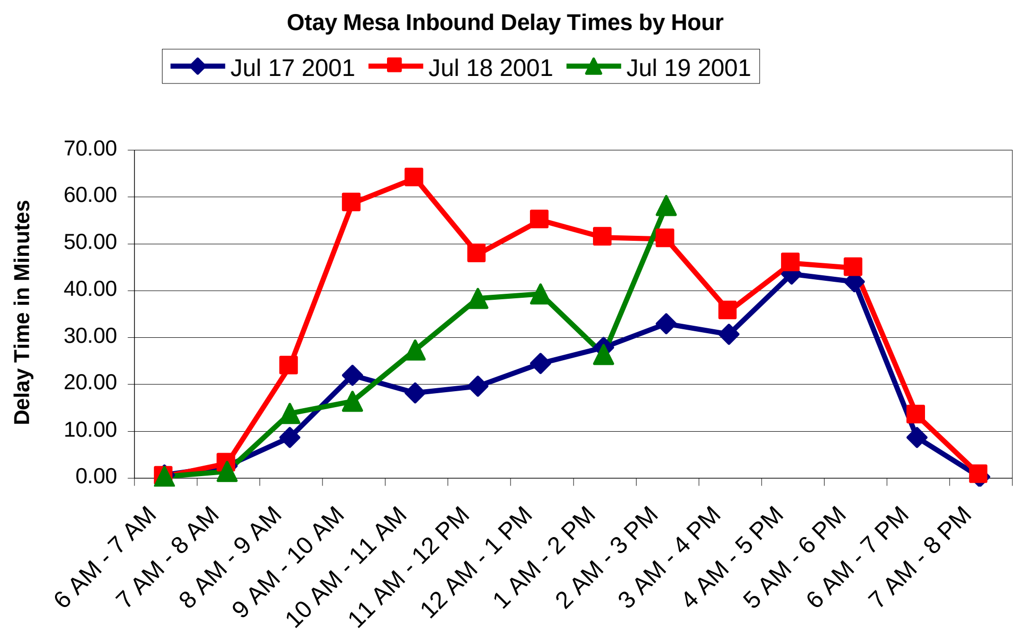

Figure E-7. Estimated Border Delay Time by Hour on Surveyed Days, Commercial Vehicles Entering the U.S. from Mexico, El Paso-Ysleta Bridge, 2001.

Source: See source note to Figure E-6.

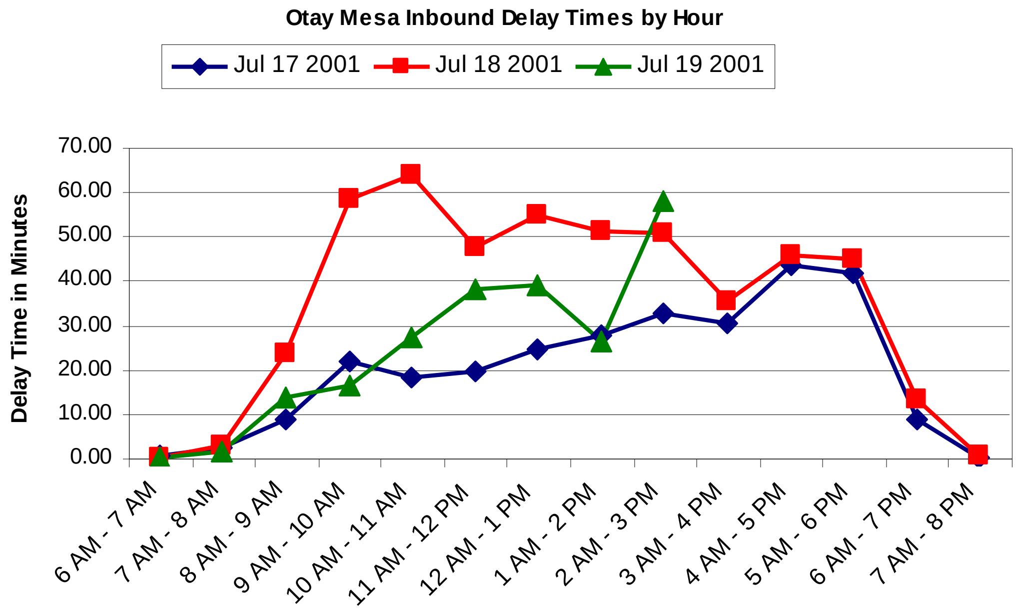

Figure E-8. Estimated Border Delay Time by Hour on Surveyed Days, Commercial Vehicles Entering the U.S. from Mexico, Otay Mesa, 2001.

Source: See source note to Figure E-6.

DELAYS AT U.S. CUSTOMS SECONDARY INSPECTION

Customs data reported by the General Accounting Office indicates that in FY 1998, 29 percent of commercial trucks entering the U.S. from Mexico underwent a secondary inspection. For the present study, we requested an update of these data from U.S. Customs, which informed us that the data are now classified as security-sensitive.

From information obtained during our field visits, our impression is that Customs processing time for secondary inspection is typically about 40 minutes (excluding the intensive manual inspections, which are nowadays infrequent). Total delay time for vehicle is often somewhat longer than Customs processing time, however, since vehicles must sometimes wait their turn for inspection.

THE COSTS OF BORDER DELAY

Border delays for commercial truck movements can impose costs on society in the following ways:

- Requirements for driver labor and other trucking inputs increase, adding to transportation cost.
- Increased time is required for delivery of cargo, interfering with just-in-time production processes and other logistic arrangements.
- Vehicles wait in line with their engines idling, spewing pollutants into the atmosphere.
- Queues of northbound commercial trucks at the U.S. border sometimes extend far enough south that they cause congestion delays for other traffic on the roads of the Mexican border cities.

This list is not exhaustive–for example, the vibrations from heavy vehicles can weaken bridges on which they are often queued at some POEs. The major costs of border delay, however, are those listed above. Of these, we omit from the following discussion the costs from spillover congestion onto the Mexican road network, estimation of which would require a detailed traffic simulation model.

Costs in Trucking Inputs

Delays at the border increase the resources required to accomplish a given cross-border freight task–resources such as driver time, fuel, or truck fleet capital. For their contribution to this binational study, Felipe Ochoa and Associates (FOA) simulated a scenario where an increase in staffing at Mexican primary inspection reduced truck delays *(2)*. To value this benefit, the researchers estimated the operating cost per hour while idling in the inspection queue, for a six-axle combination truck. Estimation was in two stages and relied on the Highway Development and Management (HDM) Model version 3.0, which the World Bank developed and which includes the full range of trucking inputs in calculating operating costs. The first stage consisted of various runs of the model to estimate the operating cost per km at alternative values for road roughness and vehicle speed. The second stage entailed econometric analysis of the first-stage results to estimate the operating cost per hour as vehicle speed approaches zero (idling). The value thus obtained was $111.25 Mx or $11.93 at the average exchange rate during 2001 when FOA conducted its modeling. (We us the same exchange rate for other currency conversions.)

The HDM model's valuation of vehicle operating costs follows the factor-cost approach, which many other highway evaluation models have used as well. A characteristic feature of this approach is the use of an input's average unit cost to value marginal changes in input consumption. To illustrate, consider a drayage truck driver whose wage is $6 per hour and who saves 5 minutes on a particular trip. For this time saving, the HDM model would count a 50 cent saving in labor cost for the trip. A common objection to this practice, especially as applied to small time savings, is that the carrier may not be able to use the time savings productively because of the "lumpiness" of transport tasks. For example, a drayage truck driver may be carrying three shipments across the border each working day, each shipment involving 3 hours round-trip. Even if 5 minutes are trimmed from each of these trips, it may not be possible to squeeze a fourth trip into a day because of various constraints, such as those on the working hours of drivers (legal limits or worker preferences) or on the schedules of border agencies and the members of the trading community (shippers, importers, brokers, etc.). Other potential adjustments to take advantage of the time savings, such as reducing the driver hours on the job, may also run up against these constraints.

Yet it is far from certain that the factor-cost approach overstates the benefit from truck time savings, even as regards small savings. For one thing, even when small time savings may be "unproductive" in some sense, they rarely have no value. Even if they merely allow a driver to spend some time on break rather than behind the wheel, that should count for something – particularly in view of the hazards from driver fatigue. More importantly, the arguments about lumpiness of trips and other constraints can cut both ways. In some cases, a small saving in time may be just enough to overcome these obstacles–for example, just enough to reach Customs before it closes for the day. In such situations, the factor-cost approach may understate the benefit of the time savings. To make essentially the same point another way, it is consistent to claim, for example, that 5 minutes off the border-crossing trip has no value while an hour saved brings a appreciable benefit: logically, the benefit from an hour saved must equal the benefit from 20 increments of 5-minute time savings.

The bottom line is that for large reductions in trip time, the factor-cost approach gives acceptable estimates of the savings in the costs of trucking inputs, whereas for small reductions, it is more problematic though whether it is biased in a particular direction is unclear. The adequacy of the factor cost approach also depends on the specificity of the scenario being analyzed. If the scenario involves time savings across a wide range of trucking operations, the errors entailed in the factor cost approach may tend to cancel out. On the other hand, when the context is rather specific, such as cross-border drayage operations, the canceling out is less likely.

The binational study also estimated the hourly cost of truck delay at the border and although the study report does not document the estimation method, we have learned that it was based on the factor cost approach. The estimates, which pertain to a typical five-axle combination truck undertaking cross-border trips in 1995, exceed those obtained by FOA. The mean cost was established at $17.45 per hour for delays in the Customs complexes and $21.45 per hour for delays in lines to cross the borders. (The difference between these figures reflects that vehicles in line are burning fuel.) One of the consultants from the binational study estimated for the Mexican Ministry of Transport (SCT) that idling operation of a five-axle combination truck costs $28.70 per hour. To round off our discussion of the factor-cost approach, a few other points also deserve mention:

Economic Versus Financial Costs

For various reasons, what a carrier pays for a trucking input may differ from the cost of the usage of that input to society. As the documentation for the HDM model cautions:

Unit costs are applied to the calculated physical and operational quantities to produce the cost estimates used in investment decisions and budget preparation. Unit costs should be expressed in economic terms when economic analysis is being undertaken and in financial terms for financial analysis. Financial unit costs are the market prices of resources. Economic unit costs are the real value or opportunity costs of resources, and they are found by removing distortions such as taxes, subsidies and other miscellaneous costs from the market prices *(3)*.

In the context of cross-border trucking, probably the most important source of divergence between the financial and economic costs is taxes. As explained above, tax payments represent transfers within society rather than net benefits or costs to society. And with motor fuel so highly taxed, economic evaluations of transportation arrangements often measure fuel costs net of taxes. In contrast, the FOA estimate of operating cost per hour was gross of fuel taxes. That said, fuel tax payments are typically a modest component of truck operating cost, so netting them out would probably have had only a small effect on the FOA estimate.

Values for Unit Input Cost

For some trucking inputs, such as fuel, the unit cost is readily measured from prevailing prices and tax rates. Issues, such as depreciation, complicate measurement of costs for capital inputs, and the diversity in pay and earnings complicates measurement for costs of labor inputs. In the case of driver labor, the FOA analysis assumed an hourly labor cost of $15.25 pesos per hour, which equates to about $1.65 (U.S.). Based on the conversations and interviews conducted for the present study, we consider this value to be conservative.

Unanticipated delays

Unanticipated delay is generally more costly than the same amount of anticipated delay. In terms of trucking costs, unanticipated delays can result in cost increases because of missed connections, as when a vehicle arrives too late for a pickup, leaving the vehicle and driver with some dead time. In practice, carriers cope with the risk of unanticipated delays by building buffer time into their schedules. However, while this strategy reduces the risk of lateness, some buffer time may go wasted when delays do not materialize. Whatever the carrier's strategy, difficulty in predicting delays adds to the costs of trucking operations.

These sorts of costs are hard for researchers to measure and are not reflected in the estimated costs of delays from the FOA analysis and the binational study. In this respect, these estimates are conservative.

A first step in measuring the costs of unanticipated delay would first require quantification of the amount of unanticipated delay, which raises the question: anticipated when? As the time of planned arrival at the POE approaches, the amount of delay becomes easier to predict. For a growing number of POEs, a web site provides live views of traffic conditions and, failing access to that, truckers may hear reports over radio or through other means. Companies can sometimes make "last-minute" adjustments in light of such information, changing their schedules or, when more than one POE is nearby, rerouting a vehicle. But the "last minute" is too late for some changes to occur as when a carrier must decide today on whether to accept a particular job for tomorrow.

So a question of interest is how much of the variation in delay time can be predicted a day ahead of the planned arrival at the border? Partly as a rough start toward an answer, but more to stimulate discussion of directions for research and data collection, we conducted an econometric analysis of the U.S. Customs data on commercial vehicle wait times for primary inspection. For each of the four POEs with the longest wait times along the U.S.-Mexico border, our analysis sought to explain the daily variation in wait times over the period for which we have data (September 15, 2001 through June 12, 2002). We analyzed the wait times measured in the afternoon (4-4:30 p.m.) and, at Otay Mesa, in the morning (8-8:30 a.m.; at the other POEs, the waits recorded in the morning were too short and infrequent to warrant analysis.

The explanatory variables in the econometric analysis distinguished the day of the week and the proximity to a national holiday in the U.S. or Mexico. The holiday variables separately identified days that coincided with, immediately preceded, or immediately followed a holiday. Another explanation was the current month volume of truck traffic arriving at the POE from Mexico. We contemplated separate variables for the volumes of empty and loaded trucks, but the split of traffic between categories was fairly stable across months.

Our econometric analysis, detailed in this Appendix, succeeded in explaining only a modest amount of the variation in wait times. As was foreseeable from Table E-1, the variables for day of the week were statistically significant in many cases. So was the variable for monthly traffic volume, which had the expected positive sign. The estimated effects of proximity to holidays were significant in some cases and varied in their signs across POEs. But most of the variation in wait times was left unexplained by our regressions. The econometric analysis depicts the large variation that remains; each shows the probability distribution of wait times assumed for the explanatory variables.

Without a doubt, these distributions somewhat overstate the unpredictable variation in wait times. Predictive power would increase with data on daily traffic volumes, in the absence of which, we had to use monthly figures. Other omissions from our analysis include, for example, information on temporary conditions that affect traffic flows at the POEs, such as repairs to bridges. Equally, however, there is no doubt that delays at the POEs are hard to predict much ahead of time.

Costs in Added Time for Freight Delivery

When border delay time increases, it takes longer for cross-border shipments to get from origin to destination, and this can create various costs aside from the extra costs in trucking inputs discussed above. We term these the "costs in added time for freight delivery."

One source of these costs is the increased risk of spoilage for perishable commodities and of other time-related damage to cargo. Another source is the increased requirement for stocks of precautionary inventories, particularly when the occurrence and amount of delay are hard to predict. An example of this effect can be found in the short-term aftermath of the September 11 terrorist attacks, when tightening of security caused major delays for vehicles entering from Canada. For the U.S. motor vehicle manufacturers in the Detroit region, this seriously interfered with their just-in-time dependence on deliveries of parts and components from plants in Canada. Reportedly, GM™ and Chrysler™ initially adjusted to the delays by adding a day's worth of input requirements to their inventories. But subsequently, as crossing times returned to normal, all three major automakers have returned to the usual two days worth of inputs.

Yet another way in which added time for freight delivery can raise costs is by affecting the number and location of warehouses (depots), decisions that are often made by the areas that can be served within a day's travel from the warehouse. European investigations found the main costs of added time for freight delivery to be related to depot structure and inventory size.

From various carrier providers interviewed for this study, we heard they build sufficient buffer time into their schedules that truck shipments from Mexico seldom arrive so late that downstream logistics are seriously disrupted. When this does occur, contract carriers may be liable for substantial penalties, so they, like private carriers, build sufficient buffer time into their schedules to make this occurrence infrequent.

In addition, while auto components are a significant export from Mexico to the U.S., the sort of logistics that integrate motor vehicle plants in the U.S. and its neighbors–just-in-time production processes with very narrow delivery windows–are quite different from the logistics that characterize many other trade links between the U.S. and Mexico. For example, a shipment of clothing from Mexico may enter a warehouse in one of the U.S. border towns late in the day, where the cargo stays overnight or longer.

For both of these reasons–the buffer time built into carrier schedules and the relative time-insensitivity of some of the cargo–some of the Mexican shippers with whom we spoke were not particularly concerned about their shipments getting delayed at the border for short periods of time. Indeed, when we spoke about our project at a meeting of maquiladora managers in McAllen, Texas, the border delays that most concerned the audience were those on their commutes between homes in the U.S. and their Mexican plants. One of the managers remarked that even a few hours of delay did not matter much, and that while an overnight delay was of great concern, such delays seldom occurred.

Modeling approaches

Economic evaluations of freight-related issues generally have trouble costing the time required for freight delivery. The value of a reduction in delays varies greatly among shipments, and the data from which one could calculate a “hard” estimate are commercially sensitive. Many companies base their logistics on sophisticated optimization models that could simulate the effects of a change in delay time, but economic researchers do not have access to the companies’ models. Occasionally, someone from a company may report the result of some such simulation, which, to maintain commercial privacy, may pertain to some hypothetical “representative” company. But the actual realism and representativeness of the results can be hard to judge from the information provided, and strategic bias may be a problem. (Some industry representatives may be tempted to overstate the benefits from reduced delays in order to influence policy decisions.) An early example of such simulation analysis, though not with a sophisticated model, pertains to the effects of reduced delays on logistic costs for U.K. supermarket chains *(3)*.

In the absence of access to company data, researchers have taken several approaches to valuing the cost of added time for freight delivery. One of them is an extension of the factor-cost approach discussed. Some evaluations take a factor-cost approach to valuing delay-related costs of spoilage and other damage. They may also estimate an opportunity cost of cargo in transit by applying an interest rate to the value of the cargo. But this is a very partial allowance for the costs of added time for freight delivery that omits, as one study noted, “many advantages from … speedier deliveries, such as can be gained from rationalizing deliveries, storage locations, or inventory size” *(3)*. Moreover, the estimated interest cost on in-transit inventory generally turns out negligible relative to the estimated delay-induced costs in trucking resources (such as labor and fuel). If only for this reason, many economic evaluations omit it from the estimated cost of freight delay.

The other approaches to valuing the cost of added time for freight delivery are more modeling-based: revealed preference analysis and stated preference analysis. Actually, one can bring these approaches to bear on the costs of freight delay in general, be they the costs of additional trucking inputs or the costs of added time for delivery. The data and study design determine which elements of time cost are reflected in the findings.

With both these techniques, the modeler infers the value that companies attach to freight time by examining the choices companies make among alternative logistic arrangements. Econometric analysis is usually involved, and the choices analyzed often pertain to mode of transport (e.g., rail versus road) or, more commonly, to choices of route or facility. The difference between these techniques is that revealed preference analysis looks at data on actual choices that companies make, whereas stated preference analysis takes its data from surveys in which respondents are presented with hypothetical choices.

Studies that have used these techniques to value the cost of freight time are not numerous, and they have tended, at least in recent years, to use stated preference more than revealed preference analysis *(4)*. Compared with the latter, stated preference analysis is much less data constrained because the researchers can incorporate into their hypothetical questions variation not observed in the real world. To make the questions as relevant as possible to each individual respondent's circumstances, practically all the stated preference surveys in freight transport have been carried out as computerized interviews. The interviews include questions that are customized to each respondent through a computer program that inputs the responses to the standard questions asked at the start of the interview.

Of the stated preference studies we know of, the most relevant to trucking between the U.S. and Mexico was based on a survey conducted in urbanized areas of California in November 1998 and January 1999 *(5)*. The respondents to the survey were drivers, dispatchers, fleet managers, and supervisors in companies that provided trucking for hire, or that maintained private fleets of at least 10 vehicles. The aim was to interview the decision-maker for fleet management and operations. The interview questions presented respondents with a number of hypothetical scenarios where they had to choose between tolled lanes and free lanes on a congested freeway. The scenarios involved various combinations of tolls and of time savings that would result from using the tolled lane. The choices entailed in these scenarios, although hypothetical, would have been familiar to many of the respondents because of the value-priced toll lanes in operation on SR 91 in Orange County, CA. Because these lanes provide an option to "buy" out of the delays on the regular untolled lanes, they have been highly popular with time-pressed travelers and well received in general *(*6*).* To the extent that truckers in Southern California share this favorable attitude, the existence of the value-pricing scheme on SR 91 would have reduced a potential source of bias in the responses to the trucker survey. There are some indications from a European stated preference study that general resentment against expressway tolls may bias responses to questions involving payment of tolls. The responses to the study's survey indicated that the willingness of truckers to pay for time savings was only half as large when the payment involved a toll rather than an increase in money cost of unspecified form (*7).*

The responses to the California survey yielded an estimate of $23.40 per hour for the average value to companies of savings in truck trip time. The willingness of respondents to pay this amount for time savings undoubtedly stems in large part from the time-related savings in trucking input costs (including the tax component of fuel costs, which is a private, rather than a social, cost.) The willingness of the respondents to pay for time savings may also reflect in some measure the costs of added time for freight delivery discussed above (such as the costs in increased stocks of precautionary inventory). To factor these costs into their responses, however, the interviewees would have needed knowledge of company logistics that may have lied outside their area of expertise. For example, the dispatcher for a for-hire carrier may lack much knowledge of customer needs for precautionary inventory. Even for those respondents familiar with the broader logistics beyond trucking, to factor considerations such as precautionary inventory into their responses would probably require more investigation and reflection than the survey would allow time for.[3]

In many stated preference analyses of travel decisions, the often important distinction between anticipated and unanticipated delay is either absent, as in the California study just discussed, or unclear. A well-designed stated preference survey should convey to the respondents

[3] These doubts about the extent to which respondents factor in the costs of added time for freight delivery have also been expressed elsewhere. De Jong, op. cit. writes: "The indirect reorganization benefits of transport-time savings consist of opportunities to reorganize the distribution and logistic process, opportunities that are lost at present

hypothetical choices that they will understand and be able to meaningfully evaluate without a great deal of reflection. One survey of freight shippers incorporated in the hypothetical choices a specified probability of being late, but to incorporate more detail on the probability distribution of delay might be expecting too much from some respondents *(8)*.

Additional evidence on the value of truck freight time may emerge from the freight benefit-cost analysis study being conducted for the Federal Highway Administration. A report on that study noted the potential for stated preference analysis to assist with the valuation of freight time savings and also noted some analytical improvements, such as increased sample size, that could help realize that potential *(9)*. Sample size can be a problem because of the expense of the stated preference surveys. The aforementioned report cited findings from an NCHRP study that conducted a stated preference survey of motor carriers and came up with quite large estimates for the average value of time–between \$144 and \$192 per hour for savings in transit time and \$371 per hour for savings in unanticipated delay. The report cautions, however, that the results are only indicative "since the sample was restricted to 20 carriers, the characteristics of which were not controllable."

Costs in Air Pollution

As notorious contributors to ambient ozone[4] and fine particulate matter, heavy-duty diesel vehicles are targets for U.S. EPA emission standards that are increasingly stringent and costly. Vehicles of this type entering the U.S. from Mexico are especially bad polluters because they are relatively old and mostly domiciled in Mexico where emission standards are more lax than in the U.S. Further exacerbating the pollution from heavy trucks crossing the border are the queues in which these vehicles sometimes have to wait. While queued, the vehicles generate idling emissions and emissions associated with the short acceleration-deceleration movements (creeping motion) of vehicles as they progress forward. In this section, we restrict our focus to the idling emissions and their cost to society. By estimating the rate of emissions per vehicle-hour and then the cost per unit of emission, we are able to estimate the cost of the emissions per

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because of longer and unreliable transport times. These long-run effects will probably not be included in the trade-offs that respondents make when comparing within- or between-mode alternatives in SP experiments." (p. 562).

[4] The emissions from heavy-duty diesel trucks that are of greatest concern from an air quality perspective are Nitrous Oxide (Nox) and particulates. Ground level ozone is formed by a series of reactions between NOx and VOC (Volatile Organic Compounds) in the presence of sunlight. For heavy-duty diesel vehicles, the VOC emissions are usually much lower than the prescribed standards and, hence, are less of a concern than the NOx emissions.

hour of idling operation. To help prepare these estimates, we reviewed the various studies that are summarized in Table E-3.

Table E-3. Environmental Literature Review.

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
Border Congestion, Air Quality, and Commerce	Richard W. Halvey, Western Governors' Association		The study was designed: • To examine explanations for border congestion, • To understand the relationship between various factors that contribute to border congestion and delays, and • To propose opportunities to alleviate that congestion and the resulting impacts on air quality and commerce. Four POE systems on the U.S.-Mexico border were analyzed: • Laredo, Texas–Nuevo Laredo, Tamaulipas • El Paso, Texas–Ciudad Juárez, Chihuahua • Nogales, Arizona–Nogales, Sonora • San Isidro / Otay Mesa, California–Tijuana, Baja California	Determine existing conditions: • Congestion was quantitatively measured through a study of vehicle arrival and departure rates (North Bound and South Bound). Formed basis for existing delays. Delay were estimated as follows: ➢ The time of arrival of vehicles at the back of the queue was noted. ➢ When the vehicle arrived at the primary inspection booth, the time was checked. ➢ The wait time was the difference between when the vehicle arrived at the queue and when the vehicle reached the inspector. ➢ From that point, the vehicle was monitored to determine the amount of time spent with the primary inspector. ➢ Individual wait times were then added to determine an average wait time for all vehicles. • Benefits of candidate actions and improvements (see Table E-2) aimed at reducing avoidable or correctable delays (potential changes in queues and delays) were analyzed using variations of a model developed as part of the Binational Border Transportation Planning *and Programming Study*.	• Traffic counts of commercial vehicle arrival and processing rates – U.S. Mexico Binational Border Transportation Planning and Programming Study (1998) • Additional traffic counts conducted on Fridays • Surveys of commercial vehicle processing rates • Used vehicle exhaust emission estimation model MOBILE Juarez (2000) to estimate emissions for CO, NOx, VOC associated with avoidable or correctable delay for existing conditions as well as for improved operations • EPA's PART5-TX1 model – used to model particulate matter idling emission rates.

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
				➢ The combined impact of individual delay strategies were calculated by means of an algorithm in the model ➢ Average avoidable delay in minutes/ vehicle was calculated from average wait time for all vehicles and the vehicle counts. ➢ Idling emissions in grams/ vehicle hour (for each vehicle category and a composite factor) from PART5-TX1. ➢ Generate potential emissions savings (in kilograms per day) from total avoidable delay estimate and the composite emissions factor. The combined impact of individual delay strategies were calculated by means of an algorithm in model ➢ Average avoidable delay in minutes/ vehicle was calculated from average wait time for all vehicles and the vehicle counts. ➢ Idling emissions in grams/ vehicle hour (for each vehicle category and a composite factor) from PART5-TX1. ➢ Generate potential emissions savings (in kilograms per day) from total avoidable delay estimate and the composite emissions factor.	

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
Air Polution Overview Along the United States-Mexico Border Region	Dr. Carlos A. Rincón, Environmental Defense	2000	Highlights the concerns relating to increased air pollution along the U.S.-Mexico border attributable to increased population growth and economic expansion (maquiladoras and increased trade). Conditions that affect air quality in the border region: • Climate • Land use characteristics • Percentage of unpaved streets • High concentration of old and badly-maintained vehicles • Inadequate planning and design of roadways to allow free flow and movement of traffic • Long queues at the international bridges • Industrial processes • Power plants • Open air burning (brick kilns, dumps, and home fire places • Paint body shops • Fueling		• Paso del Norte emissions inventory shows information by sources of pollutants e.g., motor vehicles, open air burning of trash, home fuel consumption fuel transport and storage; dust from highway traffic; construction materials and equipment; brick ovens and small scale industrial sources; fugitive solvents from painting, architectural coatings and manufactured processes; and heavy industry.) • La Paz Agreement Annex V seeks a better understanding of the problem through a binational inventory of emissions sources, air quality monitoring, and modeling.

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
			Highlights regulations pertaining to air quality in U.S/Mexico and steps taken to solve transboundary air pollution problems.		
Freight Activity and Air Quality Impacts in Selected NAFTA Trade Corridors	Jeffrey Ang-Olson and Bill Cowart, ICF Consulting	2002	Examines the current and future air quality impacts that occur as a result of the development of NAFTA trade and transportation corridors. The analysis focuses on five specific binational corridor segments: Vancouver-Seattle, Winnipeg-Fargo, Toronto-Detroit, San Antonio-Monterrey, and Tuscon-Hermosillo. For each segment, commodity flows and ground freight traffic volumes (truck and rail) are used to develop an estimate of current air pollution emissions associated with cross-border trade. Trade forecasts to 2020 are used to develop a sketch-level estimate of future trade-related emissions. The paper also discusses the impace of six emission mitigation strategies:	• Procedure followed: • Used commodity flow data to analyze trade and transportation in each corridor segment • Calculated the number of larger trucks (four or more axles) at each crossing to represent the number of trade-related freight trucks • Estimated average border crossing delay for each POE • Used commodity flow data and average payloads to calculate the loaded rail car volumes • Calculated air pollution by applying freight vehicle activity data to emission factors • Two truck emissions factors (1999) were developed: an on-highway emission rate based on 55 mph average speed and an idle emission rate based on certain assumptions about the age distribution of the truck fleet	• U.S. Bureau of Transportation Statistics Transborder Freight Dataset • Information on cross-border movements from U.S. Customs, Canada Customs, and private bridge and tunnel operating authorities • Heavy-duty truck emission factors for NOx, VOC, CO, and PM10 estimated from the EPA's MOBILE5 and PART5 models • Current and future locomotive emissions factors were based on the Class I line-haul emission rates used in the EPA's 1998 Regulatory Support Document.

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
			alternative fuels for heavy trucks, reducing border delay, low sulfur diesel and use of advanced emission controls for truckis in Mexico, reducing empty freight mileage, expanded use of longer combination vehicles, and use of advanced emission controls for locomotives	• Two truck emissions factors (2020) were developed based on the adoption of the stringent EPA 2007 standards by the U.S. and Canada standards by Mexico • Calculated railroad emissions based on freight tonnage and fuel consumption • Calculated rail fuel consumed (1999) by estimating an average fuel consumption rate pre revenue ton-mile. A curve was fit to historic data and projected to 2020 to estimate the future fuel consumption rate per revenue ton-mile • Calculated rail locomotive emissions by multiplying fuel consumption by relevant emissions factors	
Workzone mobile source emission prediction	Pattabiraman Seshadri, Southwest Region University Transportation Center Rob Harrison, Center for Transportation Research	1993	Developed a methodology for calculating excess emissions resulting from traffic congestion associated with freeway reconstruction and rehabilitation work within construction workzones. The methodology, presented in the form of a computer model, takes into account workzone configuration and traffic characteristics.	Case III: Vehicle stoppage near the workzone caused by queues: • Vehicles decelerate from the approach speed until they are idling at the end of the queue. • Vehicles make short acceleration-deceleration movements (creeping motion) as they progress through the queue. • Vehicles accelerate to workzone speed at beginning of workzone. • Vehicles pass through workzone at the average workzone speed	Data required: • Approach speed • Length of deceleration zone • Length of queue • Average queue speed • Length of first acceleration zone • Workzone average speed • Length of second acceleration zone • Vehicle mix

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
			Using the model, planners can compare different workzone strategies to identify the one that most effectively reduces vehicle emissions.	• Vehicles accelerate to pre-workzone speeds at the end of the workzone. Calculations performed include: • Average emissions associated with deceleration • Average emissions associated with creeping • Average emissions associated with lower-speed travel • Average emissions associated with acceleration Excess emissions were defined as the difference between the total emissions produced at and near the workzone minus those that would have been produced had the same number of vehicles cruised unhindered through the workzone. The approach was to determine the time spent by each vehicle in each mode of operation (accel, decel, cruise, and queue) so that the average emission rates for each mode can be multiplied with the time spent in that mode to obtain the emission values. These emission values, when multiplied by the total number of vehicles in the analysis period, will give the total mass of pollutants.	• Vehicle acceleration-deceleration characteristics • Traffic data • Workzone parameters • Average vehicle emission rates

Table E-3. Environmental Literature Review. (Continued)

Publication Title	Author	Year	Study Purpose	Quantification Approach	Data Sources
U.S. Mexico Border: Despite Some Progress, Environmental Infrastructure Challenges Remain	United States General Accounting Office: Report to Congressional Requesters	2000	This report analyzes: • The nature and extent of environmental infrastructure problems along border • The programs/funding levels in place to address problems, and • The impediments to improving environmental infrastructure. The report focused on three areas: water, wastewater, and solid waste. Detailed analysis was conducted at five cities: San Diego-Tijuana, El Paso-Ciudad Juarez, Brownsville-Matamoros, Calexico-Mexicali and Douglas-Agua Prieta.		

Idling Emissions Factors

For a given pollutant, the amount of emissions per hour ("emissions factor") from an idling truck depends partly on ambient temperature. Other influences are vehicle characteristics including:

- type of fuel consumed,
- age and condition,
- truck model year,
- weight (heavy-versus light-duty),
- whether trailer or container is refrigerated ,
- technologies, and
- any tampering with emissions technologies.

For the present analysis, we have taken idling emissions factors from a study undertaken by ICF Consulting for the North American Commission for Environmental Cooperation (*10*). The study found that:

- NAFTA trade contributes significantly to air pollution on the San Antonio to Monterrey corridor, particularly the emissions of NoX and PM-10, that is, nitrogen oxides and fine particulate matter (less than 10 microns in diameter);
- Most of the NoX and PM-10 emissions stems from trucks since they transport most of the freight in the corridor; and
- Truck idling due to border crossing delays contributes significantly to carbon monoxide (CO) emissions.

ICF estimated emission factors for cross-border drayage trucks assumed to be Mexican-domiciled vehicles with four or more axles (Table E-4, first row). Diesel fuels in Mexico were assumed to be the same as the U.S., with 500 parts per million (PPM) sulfur. Compared with U.S. line haul fleets, the ICF assumptions for vehicle age were that the Mexican trucks average 5 years older but have the same dispersion around the average. The estimation of emission factors took account of vehicle age and of the Mexican emission standards for the model year. Based on the assumptions about age, ICF estimated that 90 percent of the Mexican drayage fleet was manufactured before 1993 when Mexico first introduced emission standards. The emissions factors for VOC, CO, and NOx were estimated using the U.S. EPA's MOBILE 5 model. PM-10 emissions factors were estimated using EPA's PART 5 model.

Table E-4. Estimation of Cost of Emissions per Hour of Idling Operation, Drayage Trucks Entering the U.S. from Mexico.

Estimates of	Units	VOC	CO	NoX	PM-10
Emission factors	grams/hour	23.4	146.4	103.2	4.92
Cost per unit emission:					
Damage cost	1989 $/ton	2,420	N/A	4,820	6,507
Control Cost	1989 $/ton	9,944	2,714	10,634	3,687
Emission cost per vehicle-hour:					
Damage cost	1989 $/hour	0.06	N/A	0.50	0.03
Control cost	1989 $/hour	0.23	0.40	1.10	0.02
Emission cost per vehicle-hour:					
Damage cost	2001 $/hour[a]	0.10	N/A	0.91	0.06
Control cost	2001 $/hour[b]	0.33	0.57	1.57	0.03

a The estimates of damage cost were updated from 1989 to 2001 using the medical care component of the BLS consumer price index. This component covers medical care commodities, professional medical services, and hospital and related services. Medical care commodities comprise of prescription drugs and nonprescription medical equipment and supplies.
b The estimates of control costs were updated from 1989 to 2001 using the consumer price index for all items.

Sources: 12, 13, 19, 20

Costs Per Unit of Emissions

Estimation of the cost per unit of emissions has generally taken either of two methods, the difference being in the measure of cost. The damage cost method measures the cost in damage to human health and, theoretically but rarely in practice, to property, animal welfare, visual amenity, etc. Costs of damage to human health can relate to medical expenses, loss of work, shortened lifetimes, and reduced quality of life. The method normally involves seven steps:

1. Identify the emission sources.
2. Estimate the quantities of emissions.
3. Simulate air pollutant concentrations in the atmosphere.
4. Estimate exposure of humans and other objects to air pollutant concentrations.
5. Identify and estimate physical effects of air pollutant concentrations on humans, using dose-response relationships from epidemiological studies.
6. Value the physical effects on humans.
7. Calculate emission values in dollars per ton.

Most of these steps are fraught with uncertainties, making the results rather speculative. Researchers differ in the assumptions and simplifications they adopt to deal with the uncertainty, which often leads to a wide range of estimates. Using the damage cost approach, one study estimated that the health costs of anthropogenic air pollution ranged from a low $55 to a high $670 billion (1991 dollars) in the U.S. in 1990 (McCubbin, Murphy, and McCubbin; 2001).

An alternative to the damage cost method is to measure the costs of emissions as the costs of actions to curb them. Examples of such actions are planting trees, improving the catalytic converters on vehicles, raising fuel taxes, and installing scrubbers in coal-powered plants. The idea behind the control cost method is to estimate the cost of the most economical means of controlling a pollutant. Calculating control costs require information on costs and emission reductions associated with the control measure over its entire life, including initial capital cost, operation cost, maintenance cost, and the emission control deterioration rate over the lifetime of the equipment. In addition, if the control measure reduces emissions for a number of pollutants, the cost of the measure needs to be allocated among the pollutants reduced. The control cost method requires fewer steps than the damage cost method and is, thus, generally regarded easier to undertake. That said, estimating emission values by using either method remains time-consuming and resource-intensive.

The values we use in this report are drawn from a summary by Litman, who, in turn, extracted them from the econometric analysis of Wang and Santini *(11).* The econometric analysis used as data inputs previous studies' estimates of the cost to society per unit of emission. The variation in these estimates across U.S. urban areas was modeled as a function of air pollutant concentrations and population exposed. Wang and Santini modeled this variation separately by type of emission and by method of estimation–damage versus control–used in the source studies. They then extrapolated the results of the modeling to nine major urban areas in the U.S. that were not represented among the source studies. Table E-3 gives the average values of the extrapolated costs per unit of emission both at the 1989 prices used in the study and at 2001 prices. A damage cost value for CO was not available, which is why we have chosen to use the control cost values in this report's analysis. The control cost values indicate that for each hour a commercial truck waits in the primary inspection queue, it generates emissions that impose a cost on society of $2.50.

Total Cost per Hour of Border Delay

For a commercial truck in the primary inspection queue at U.S. Customs, we assume for our calculations a total cost to society of $31.20 per hour of delay. Of this assumed amount, $28.70 per hour consists of trucking costs–the estimate prepared last year for the Mexican SCT–and the reminder consists of costs from air pollution (the $2.50 estimate derived above). That the trucking cost component far exceeds the allowance for pollution agrees not only with the evidence we have reviewed but also with what we know of benefit-cost analyses of highway-related projects. Typically, when such analyses have attempted to measure pollution costs, the benefits from reduced congestion still consist overwhelmingly of the more traditionally- measured logistic benefits.

With more complete data on the occurrence of delays at the border, we could combine those data with our assumed cost per hour to get a rough estimate of the total annual cost of current delays. Even with the data available, however, we can get a crude order of magnitude for delays at U.S. primary inspection. From Tables E-1 and E-2, we infer that among commercial vehicle entries from Mexico, the average wait time at U.S. primary inspection does not exceed 30 minutes. Given that some 4.3 million commercial trucks entered from Mexico in FY 2001, the total cost of delays at U.S. primary inspection in that year was probably not more than about $60 million – provided that our assumed cost of delay per hour does not underestimate by much.

VALUE PRICING

To begin with, what is "value pricing"? A recent exchange in a transportation journal offered two competing definitions. The broader definition comes from the manager of the FHWA Value Pricing Pilot Program:

> The term was proposed by the U.S. DOT to Congress during the development of the Transportation Equity Act for the 21st Century (TEA-21) legislation in response to calls from state and local pricing project partners (under the predecessor Intermodal Surface Transportation Efficiency Act program) to come up with a new name for the Congestion Pricing Pilot Program. The desire was to have a name that would convey the position benefits (value) of using pricing to reduce congestion *(12)*.

Although "value pricing" may thus have emerged as a euphemism for "congestion pricing", a more specific meaning has attached to the term. As often used nowadays, "value pricing" refers to an arrangement in which motorists have the option to choose between regular facilities (lanes or roads) and facilities that provide a premium level of service for an extra payment:

> Known as value pricing, the concept was first introduced by the operators of a privately funded toll facility, the SR 91 Express Lanes, built in the median of an existing freeway in Orange County, CA. The facility was marketed to the public as offering extra value in the form of providing a faster, safer, and more reliable trip in return for a fee (hence, "value pricing") *(15)*.

In this report, we use "value pricing" in the sense of payment for premium service. Although value pricing is usually proposed in connection with the construction of new infrastructure (lanes, etc), the main economic rationale is its potential to improve the utilization of infrastructure. Our discussion of value pricing, therefore, takes infrastructure as given so that its adoption entails the tolling of an existing facility that would otherwise be unpriced. From this perspective, dedicating an expressway lane for value pricing means one less lane for regular use.

Value pricing is sometimes viewed as a special case of congestion pricing, one that is politically more acceptable. Several analyses show that peak-period congestion fees on all lanes of an expressway to be economically more efficient than imposing them only on special value-priced lanes. It may well be, however, that leaving some lanes free of the congestion fee will be more acceptable to the public.

The functional similarity between value pricing and congestion pricing is emphasized in much of the research literature. Indeed some benefit-cost analyses of value pricing limit their modeling of benefits to a reduction in the overall level of congestion (Box 1).[5] The other benefit from value pricing – more efficient management of delay – is absent from these analyses because they ignore the variation among vehicles in the per hour cost of delay. Precisely because of this variation, value pricing yields benefits even in the hypothetical event of no impact on the overall amount of congestion. These benefits arise from a more efficient distribution of the burden of delay, shifting it from relatively time-sensitive traffic to traffic that can bear delays at lower cost. The more time-sensitive traffic opts for the fast lane and experience shorter delays than it would in the absence of value pricing, while traffic that sticks with the untolled lanes experiences longer delays. In what follows, we consider only the benefit from this redistribution of delay since the pricing policies to reduce POE congestion are considered elsewhere in this report.

Value Pricing at the Border Crossings

Many of the recent plans and proposals to deal with compliance issues at our land border POEs - especially the threat to national security – feature fast lanes for traffic precertified as low risk. Already, fast lanes for low-risk passengers exist under the SENTRI program at crossings in San Diego and El Paso and under the NEXUS program at some

[5] One of these analyses is by the aforementioned FHWA manager: DeCorla-Souza, P. “The Long-Term Value of Value-Pricing in Metropolitan Areas”, *Transportation Quarterly*, vol. 56, no. 3 (summer), 2002, pp. 19-31.

Another analysis that abstracted from heterogeneity among vehicles is Liu, L. N. and McDonald, J.F., “Efficient congestion tolls in the presence of unpriced congestion: a peak and off-peak simulation model”, *Journal of Urban Economics*, vol. 44, no. 3 (November), 1998, pp. 352-366.

BOX 1: BENEFIT-COST ANALYSES OF HIGHWAY VALUE PRICING

A recent analysis by De Corla-Souza evaluated various tolling options to accompany the addition of two lanes to a prototypical six-lane urban expressway segment. The value pricing options involved peak-period tolls on dedicated fast lanes consisting of the new lanes, and in one scenario, two existing lanes as well. An important simplification of the analysis was the assumed homogeneity among vehicles on the prototypical expressway: traffic consisted of identical passenger vehicles for which the cost of time was $12 per vehicle-hour. The tolls were set high enough to ensure that the satisfaction of two equilibrium conditions:

(1) Traffic flows freely on the fast lanes (no congestion delays)
(2) The total private cost of a trip in time and money (including tolls) - is the same on the fast lanes as on the untolled lanes.

Condition 2 means that in equilibrium, travelers are indifferent between going on the regular lane or going on the fast lane (and paying the toll). The division of traffic between these lanes emerges from Condition 1, which sets the traffic volume at the maximum possible without congestion.

Compared with the base case equilibrium where all eight lanes are free of tolls, the value-pricing equilibrium features less congestion on the tolled lanes. But it also features additional congestion on the remaining untolled lanes, so that the total cost of a trip during the peak period increases on these lanes and, by Condition 2, on the tolled lanes as well. Because of this cost increase, value pricing reduces demand for peak-period travel from a level that would otherwise produce excessive congestion.

For the prototypical expressway segment, DeCorla-Souza measured the net benefit from value pricing as the net benefit from the reduction in peak-period demand, minus the capital and operating costs for toll operation. The estimate of net benefit was then annualized and extrapolated to all 2,780 miles of severely congested urban freeways nationwide. The final estimates indicated annual net benefits of between $3 billion and $5.3 billion, depending on the value-pricing strategy. The magnitudes of these estimates are dependent on the responsiveness of peak-period travel demand to changes in travel cost. De Corla-Souza assumed an elasticity of unity (-1.0); other analyses that (like De Corla-Souza) treated vehicles as homogenous, but which assumed demand to be less responsive, obtained results less supportive of value pricing.

Small and Yan reworked the analysis Liu and McDonald and extended it to account for heterogeneity: Small, K. and Yan, J., “The Value of ‘Value Pricing’ of Roads: Second-Best Pricing and Product Differentiation”, Department of Economics, University of California-Irvine, Irvine Economic Papers, November 1999.

crossings along the Canadian border. Current plans are being developed to expand such precertification programs, for commercial as well as passenger traffic, and to provide fast lanes for vehicles thus identified as low-risk. As we discuss in a following section with respect to commercial vehicles, the provision of these fast lanes would have as one of their likely benefits the an efficient redistribution of wait time at primary inspection. As long as participation in the precertification programs remains voluntary, companies will not participate unless the costs they incur in the certification process and in other ways (e.g., the implementation of transponder technology, security equipment and infrastructure, and more tightly controlled operations and procedures) are less than the benefits they accrue. Since the primary benefit to the participants is the saving in border-crossing time, companies that decide to participate will naturally tend to have more time-sensitive shipments than have the non-participants. So the dedication of fast lanes for commercial traffic precertified as low risk should partly fulfill one of the objectives of value pricing.

Even so, the introduction of value pricing arrangements at the border could further improve the allocation of delay time among commercial vehicles. Inevitably, the eligibility criteria for the precertification programs will exclude some legitimate traffic that is at least sometimes hard pressed for time. For example, a carrier may be ineligible to participate because it lacks a sufficient history of border crossings for its risk of noncompliance to be assessed. In other cases, the shipper may not export the required volume of merchandise to qualify for existing U.S. pre-clearance programs (e.g., a minimum of 50 trailer loads per year are necessary to enroll in the Border Release and Advanced Screening and Selectivity Program.) Among eligible companies too, participation will be less than universal because of the costs involved, which may include costs for inspections, record-keeping and other administrative tasks, special equipment or infrastructure, and other expenses. For some companies that cannot participate in the precertification programs or do not receive significant time savings through participation, having an option to pay for fast-lane access would be beneficial.

One possibility is fast-lane access that is free to traffic precertified as low risk and tolled for other traffic, analogous to high occupancy toll (HOT) lanes on expressways, where high occupancy vehicles (HOVs) travel for free and other vehicles have to pay. In this scenario, traffic that pays for access to the fast lane will, unlike the traffic precertified as low risk, be subject to the normal inspection requirements; by paying, these vehicles simply get inspected sooner. Given that the wait times for primary inspection are hard to predict, the toll for using the express lane would have to vary as a function of real-time traffic information.

Benefits from More Efficient Allocation of Wait Time: Evidence

However it comes about–whether through value pricing or through dedicated lanes for precertified traffic or some other means–a reallocation of border wait time from time-sensitive traffic to other traffic will reduce the cost to society of a given amount of border delay. In this section, we present some evidence on the size of this cost saving under alternative scenarios for reallocation of wait time, and focusing on commercial traffic.

As discussed previously, estimates of the hourly value of commercial truck time are usually based on either the stated preference approach or the factor-cost approach. Both approaches permit the estimation of a distribution of time values among trips rather than merely an average or typical value. With the factor-cost approach, one could, for example, attach higher time values to more expensive trucks or perhaps to trucks operated by better-than-average paid drivers. We do not know, however, of any such application of the factor-cost approach that would shed light on the distribution of the value of time among commercial trucks crossing the border.

The only evidence we have encountered that would serve our purpose is from stated preference studies, of which the most relevant is Kawamura's study of California truckers *(13)*. The distributions of truck time values estimated in that study show the variation among companies. They do not capture, however, any of the intra-company variation. The study's survey asked truckers to focus on their situation at 10 a.m. on a typical weekday, when stating the choices they would make among the hypothetical alternatives presented. Thus, the study did not capture the variation across alternative situations within a company in the value attached to truck time. In this respect, the time value distributions estimated in the study understate the true variation. It should also be noted that these distributions are among companies, without any weighting for the size of a company's fleet. Weighted distributions would be more informative, but it is unclear what difference weighting would make.

For all truckers within the survey universe, the estimated distribution of per hour values of time had a mean value of $23.40, a median of $13.90, and a standard deviation of $32.

Figure E-9 graphs this distribution for all truckers combined as well as separately for private fleets versus for-hire carriers. The distributions are lognormal. So in contrast with the normal distribution, which is symmetric around the median/mean, the distribution has a long tail to the right, and the mean exceeds the median. For private carriers, the mean value of an hour ($17.60) was substantially lower than for carriers for-hire ($28.80).

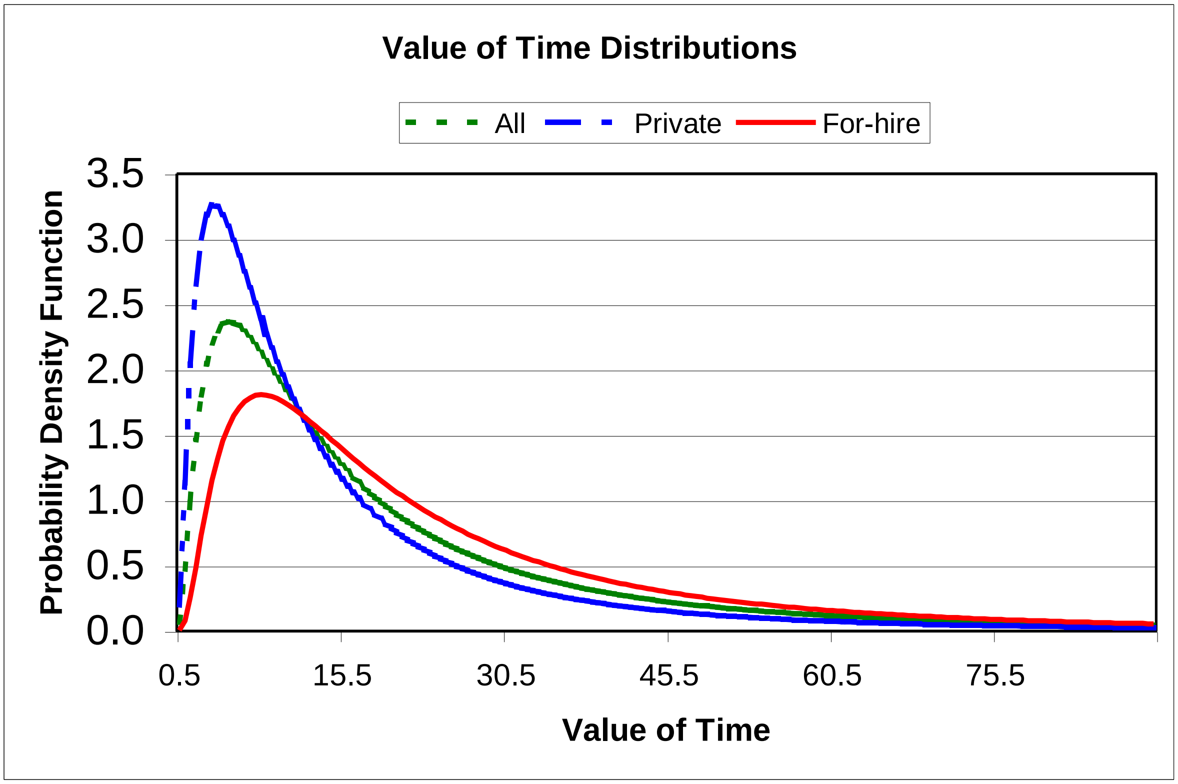

Figure E-9. Estimated Distribution of Values of Time for Commercial Trucks Operated by California-Based Motor Carriers, 1998.

Sources: 7, 21

Table E-5 provides another view of the study's estimated distribution of time values among California truckers (private and for-hire combined). To interpret the numbers, consider the entries in the row that has the value 25 in the first column (heading, "Lowest X Percent"). The numbers in this row indicate that the average value of time is $4.12 (second column) among truckers whose value of time is in the lowest quartile (25 percent), and $28.36 among truckers whose average value of time is in the highest quartile (last column).

Table E-5. Average Value of Time by Percentile Group in the Distribution of Value of Time among Commercial Trucks Operated by California-Based Motor Carriers, 1998.

Lowest X percent	Average Value	Highest Y Percent	Average Value
X=		Y= 100-X =	
10	$2.43	90	$24.54
15	$3.02	85	$25.73
20	$3.57	80	$27.00
25	$4.12	75	$28.36
30	$4.67	70	$29.83
35	$5.24	65	$31.43
40	$5.82	60	$33.18
45	$6.43	55	$35.12
50	$7.08	50	$37.28
55	$7.77	45	$39.72
60	$8.52	40	$42.50
65	$9.33	35	$45.73
(2/3)*100 ≈66.7	$9.62	(1/3)*100 ≈33.3	$50.96
70	$10.23	30	$54.12
75	$11.25	25	$59.84
80	$12.43	20	$67.29
85	$13.82	15	$77.67
90	$15.57	10	$93.87
100	$23.40	—	—

Sources: 7, 21

Table E-6 contains a worked example of the benefits of reallocating border wait time from time-sensitive traffic to traffic with a lower value of time. For simplicity, the table heading attributes these benefits to value pricing although other measures, such as dedicated fast lanes for traffic precertified as low risk, could achieve at least a portion of these same benefits. The estimated values of time in this table are taken from Table E-5. The assumed peak-hour wait time for primary inspection, 60 minutes, is worse than the late afternoon average at the busier POEs but not extraordinary. The number of lanes leading to primary inspection is set at two–as at Nogales–one of which forms the express lane under the value pricing scenarios, though what matters for our calculations is simply that half the lanes, however many, become express lanes. Likewise, based loosely on data for Nogales on a day when the afternoon wait time was 60 minutes, the number of commercial trucks waiting during the peak hour is set at 120. The choices of traffic volume and the base case wait time (60 minutes) affect our estimates of the benefits of value pricing as measured by the dollar savings in delay costs. They do not, however, affect the estimated benefits as measured by percent savings in delay costs, and these are the bottom-line numbers in Table E-6 that warrant the most attention (bottom right).

Table E-6. The Value of Value-Pricing for Entry to U.S. Customs, Worked Example for Peak Hour

Assumptions

# lanes	**2**
Traffic volume (# commercial trucks)	**120**
Average wait per vehicle (minutes)	**60**
Average cost of delay per vehicle-hour	**$23.40**

Base Case: No Value-Pricing

Total daily cost of peak hour wait time	**$2,808**

Value Pricing Scenarios:

(one fast lane, one slow lane)

	Traffic Spilt		Wait / Vehicle		Average Cost of Delay/ Veh.-Hr.		Daily Cost of Delay Peak Hour		
Scenario	Fast lane	Slow lane	Fast Lane	Slow Lane	Fast Lane	Slow Lane	Total	Savings from Base Case	
								$	***%***
A	**1/3**	**2/3**	**40**	**70**	**$50.96**	**$9.62**	**$2,257**	**$ 551**	**19.6**
B	**1/3**	**2/3**	**20**	**80**	**$50.96**	**$9.62**	**$1,706**	**$1,102**	**39.3**
C	**1/3**	**2/3**	**10**	**85**	**$50.96**	**$9.62**	**$1,430**	**$1,378**	**49.1**
D	**1/4**	**¾**	**30**	**70**	**$59.84**	**$11.25**	$ 2,079	**$ 729**	**26.0**
E	**1/4**	**¾**	**15**	**75**	**$59.84**	**$11.25**	$1,715	**$1,093**	**38.9**
F	**1/4**	**¾**	**12**	**76**	**$59.84**	**$11.25**	$ 1,642	**$1,166**	**41.5**

The six value pricing scenarios in Table E-6 differ in the traffic split between the express lane and the untolled ("slow") lane and in the time savings that truckers gain from choosing the express lane, which ranges from 30 minutes in Scenario A to 75 minutes in Scenario C. Value pricing is estimated to reduce the total cost of the wait at primary inspection by between 19 percent and 50 percent, depending on the specific scenario. Not represented in the table are scenarios that might be possible at large POEs, in which lanes are "express" to varying degrees, much like parcel delivery services offer a menu of fast-delivery services, in which the price increases with speed. Offering such a menu would permit a still more efficient allocation of wait time than the simple fast-slow choice considered here.

The estimates in Table E-6 are largely illustrative, if only because they are based on evidence from a stated preference study of California truckers, rather than of truckers carrying shipments from Mexico into the U.S. It should be borne in mind that the values of time estimated in that study were invariant with respect to the amount of time savings, so that 40 minutes have a value 10 times greater than four minutes. Further research would be needed to more precisely estimate the benefits from value pricing at the entry lanes to U.S Customs. In addition to the valuation of time savings, an important task in such research would be the costing of systems for toll collection.

LEVELING THE FLOW OF TRAFFIC

One of the coordination problems identified in this report is the mismatch between the schedules of trading community and the schedules and processing capacity of the POE inspection agencies. The schedules of the trading community create peaks in the demand across the day, usually in the afternoons. The processing capacities of the inspection agencies are more stable because of constraints on infrastructure and staffing. As a result, the processing capacity at many POEs is not able to accommodate the daily peaks in demand and queues form.

In this section, we estimate the benefit to society from a marginal reduction in peak-period congestion. More precisely, we estimate the benefit that would result from one vehicle shifting from the peak to an uncongested off-peak hour. We then extend the discussion to consider non-marginal reductions in congestion, which reduce both the mean and variability of border-crossing time.

Benefit from Marginal Reduction in Peak-period Congestion

Rescheduling a truck's arrival at a POE from the peak to the off-peak has several benefits for society:

Reduction in primary inspection wait

For illustration, we assume a current 30-minute wait at a primary inspection during peak, similar to recent late afternoon wait times at Otay Mesa from Monday through Friday. In this case, removal of a single vehicle from a queue during the peak period would reduce the combined wait time for vehicles behind it by 30 minutes. Recalling our estimate that each hour of truck wait time in the primary inspection queue has a cost to society of $32.20, the removal of a single vehicle from the peak-period queue would yield a benefit to society of $16.10. The main component of this benefit estimate is the saving in freight costs; reduction in noxious vehicle emissions is credited with only $1.25.

Reduction in congestion within Customs' compound

When traffic peaks, the areas inside the POEs can become congested, with increased delays due to traffic conflicts and to waits for secondary inspections. We lack the data to estimate the reduction in these delays that results from one less vehicle in the congested peak.

Given such an estimate, one could value the benefit of time saved inside the POE, though presumably at a lower rate than for time saved in the primary inspection queue. Vehicles awaiting secondary inspection do not necessarily have their engines running, unlike the vehicles awaiting primary inspection, which burn fuel in idling operation.

Reduction in congestion on roads leading to the border

More speculatively, a shift in POE arrivals away from the peak periods might reduce congestion on roads leading to and from the border. At some POEs, the congestion peak overlaps to a large extent with the afternoon rush hour on local roads.

At Otay-Mesa, for example, a significant amount of the northbound traffic travels on congested Southern California freeways, heading toward the port of Long Beach, rail terminals, or other destinations in the Greater Los Angeles region, such as produce markets. The additional congestion resulting from this traffic has significant costs. Although we could not find estimates specific to Southern California, an FHWA study at the national level estimated for various types of vehicles the marginal congestion cost per mile traveled on urban interstate highways. For five-axle combination trucks, the estimate was 20.6 cents at a weight of 80,000 lb. For a truck that travels the approximately 270 round-trip miles from Otay Mesa to Los Angeles, that would equate to a total congestion cost of $55.60.

To properly analyze how a shift in POE arrival times would affect congestion on roads leading to the border would require an investigation beyond this study's scope. We suspect, however, that at many POEs, a shift away from the afternoon peak at the POE would reduce congestion.

Benefits and Costs of Non-Marginal Reductions in Peak-period Congestion

When we turn to a non-marginal reduction in peak-period traffic, estimation of the benefits becomes harder and costs also enter the picture.

On the benefit side, there is, so to speak, a law of diminishing returns. The benefit from, for example, 10 vehicles transferred from the peak to the off-peak will be less than 10 times the benefit from one vehicle transferred. As additional vehicles are removed from the peak-period queue, the size of the queue shrinks and, hence, so does the reduction in waiting time from the removal of yet another vehicle. To estimate the reduction in congestion from such changes, we would want a full-fledged simulation model of traffic patterns, including queues, at the POEs.

As well, to induce a non-marginal shift in traffic away from the peak will entail costs in inconvenience. The schedules on which the maquiladora factories operate, for example, do not dovetail with off-peak deliveries to the U.S.. To avoid the afternoon peak at the border would require adjustments to these schedules, and these adjustments have costs, such as the premium pay that might be needed to operate a night shift.

Returning to the benefit side of the equation, recall that congestion at the POE makes the border crossing time not only longer on average but also unpredictable. A switch in traffic arrivals toward the off-peak would improve the border crossing process both by reducing the variability in crossing time and also the average.

Congestion Pricing

Congestion pricing is among the potential strategies for reducing congestion of commercial vehicle traffic at the border POEs. In its basic form, congestion pricing would involve the collection of a toll from vehicles entering the POE during periods of peak delay. Although currently there is a charge of $9.75 for commercial vehicles to enter a POE, the charge does not vary between peaks and off-peaks, and vehicle owners have the alternative of buying an annual decal for $190. Since the large majority of commercial vehicles entering the U.S. have the decal, few pay a charge per entry into the POE compound, much less a charge that varies with the time of entry.

To devise and evaluate a regime of congestion pricing would call for more data than were obtainable for this study. To make a start, one would want a clear and complete picture on when delays occur and on their length. Available data, however, are basically limited to the delays through primary inspection. In addition, the data on wait times collected by Customs pertain to only two times of the day, 8-8:30 a.m. and 4-4:30 p.m., while the data collected by TTI-Battelle indicate delay times over the course of only two or three particular days in 2001. Underscoring the need for additional data is the pattern in the TTI-Batttelle data, where the delays can peak at quite different times on successive days.

Although congestion pricing at the POEs is an option that deserves further consideration, it must be recognized that the irregular occurrence of delays could limit both its effectiveness and political palatability. For illustration, consider the Customs observations on wait times at the Laredo World Trade Bridge POE, taken at some point between 4 and 4:30 in the afternoon. From Monday to Friday, the recorded wait time averaged 24 minutes (Table E-1), but on about 20 percent of the days, no wait was observed. Now suppose that a congestion charge has been introduced for late afternoon arrivals, and a vehicle arrives at the POE, pays the charge, and observes no congestion. One can imagine that the drivers and others involved with the shipment feeling more than the usual annoyance about having to pay a toll. Likewise, parties that inconvenienced themselves by going earlier in the day to avoid the late afternoon toll may feel annoyed when they find out that the congestion in the late afternoon did not materialize. This would not be a mere nuisance; altering the schedule of shipments to avoid the expected peak does entail costs.

Basing congestion charges on near real-time traffic information could eliminate some of these counter-productive shifts in arrival time, but only to a limited extent. The technical feasibility of such an approach is demonstrated by the value-pricing regime for California's SR 91. As of November 2001, the tolls on the express lanes varied between $1 and $4.75 according to the level of congestion delay avoided in the adjacent non-tolled freeway lanes. *14* But such variation in an express lane toll is much more likely to influence decisions than similar variation in a congestion charge. The choice between a tolled express lane and an untolled regular lane can be deferred until entering the expressway and can be influenced by a sudden change in the toll. The scheduling of shipments, in contrast, is much less flexible; as was observed above, the "last minute" is too late for many changes to occur.

In passing, we note the availability of modeling frameworks for estimating the net benefits of traffic congestion pricing. The simplest, and perhaps most often applied, distinguish only between a peak period with a fully predictable level of congestion and an uncongested off-peak period. These frameworks feature marginal and average cost curves, which reflect the relationship between congestion delay and the volume of peak-period traffic. Another element is a demand curve that reflects the degree of sensitivity of demand for peak-period trips to changes in their cost. With these elements, the modeler can estimate through subtle economic inference the net benefits of congestion pricing, apart from the costs of toll collection and administration, which can be estimated independently. In the border POE context, implementing this sort of framework would require a POE traffic simulation model and knowledge of the demand curve for peak-period crossings. Unfortunately, neither of these elements was obtainable within the time frame and resources for the present study.[6]

Leaving aside what we cannot quantify and ignoring the day-to-day variation in congestion, the quantification performed above provides a rough indication of the magnitude of the charge that would be appropriate were congestion pricing introduced at the busier POEs. If the congestion-induced delay at primary inspection is 30 minutes at peak, a vehicle entering the POE at peak should pay about $16.10 more than a vehicle entering at a totally uncongested time. Congestion delays at secondary inspection and elsewhere inside the POE compound could justify a higher differential. All this assumes that the currently observed congestion at the POEs is "natural," rather than a consequence of poor staffing or investment decisions by Customs or other inspection agencies. Any congestion that results from understaffing at peak periods or underinvestment would need to be considered in conjunction with pricing solutions.

INCREASED INCENTIVES FOR PARTICIPATION IN PRECLEARNCE PROGRAMS

U.S. Customs has programs that expedite border processing for shipments precertified as low-risk for noncompliance. These programs are rapidly evolving with an increased focus on national security. The U.S. and Canada are close to launching the Free and Secure Trade (FAST) program, a public-private partnership to improve security measures throughout the supply chain. In return for adopting the tighter measures, participating companies will see their trucks cross the border with less delay.

The following analysis pertains to a particular preclearance program, the Border Release Advanced Selectivity and Screening system, which was previously known as Line Release. However, the points that are made are applicable to other preclearance programs as well.

The BRASS Program – Basic Features

The BRASS system allows Customs to expedite the release of high-volume and highly compliant cargo shipments. Certain categories of cargo are ineligible: absolute quota

[6] Lack of information about the sensitivity of peak-period demand to changes in cost is a general problem in studies of congestion pricing. Fairly often, studies simply assume a certain degree of sensitivity, as expressed by an elasticity. We had considered doing likewise in the present study, when congestion pricing was being mooted as an alternative. But given our lack of access to a POE traffic simulation model, we would also have had to contrive the marginal and average cost curves, making the whole modeling exercise too speculative for our comfort.

merchandise, merchandise deemed "trade sensitive," and merchandise requiring inspection by other government agencies.

Approval to participate is granted to a combination of product and of parties involved in moving that product across the border: the shipper/manufacturer, carrier, importer, and entry filer/broker. For approval, Customs must have sufficient experience in dealing with these elements in combination to assess the level of compliance. On the southern border, this requires that the ACS cargo selectivity system has processed the combination at least 50 times in the past year. Applicants must satisfy the compliance assessment standards and show proof of an active business relationship. No application fee is required.

When a BRASS shipment arrives at Customs, the truck driver presents an invoice with a barcode label that identifies the shipper, importer, filer, and product. An inspector scans the barcode and the relevant BRASS information appears on the inspector's computer screen. Customs normally approves and releases the truck and its cargo within minutes but may order additional checks and inspections either for cause or on a random basis.

The participation rate is lower on the southern border (9 percent of entries) than on northern border partly because of the additional requirement that carriers participate in Land Border Carrier Initiative Program (LBCIP). Carriers participating in the program must be prescreened by Customs through background checks and site visits and approved as low-risk for drug smuggling. When the program went into effect in FY 1997, participation in Line Release on the southern border dropped significantly. Officials at Nogales and Laredo told the General Accounting Office that:

"companies did not want to participate in the program either because they already had contracts with non-program carriers or because they did not want to tie themselves to carrier initiative- approved carriers, many of whom were located near the border and not the Mexican interior, where many of the commodities were produced" *(17).*

Benefits for BRASS Participants

By participating in BRASS, companies reap several benefits for themselves, or "internal" benefits, for which estimates are presented below.

Reduction in delays at the border

Primary Inspection

At primary inspection, entry of information using the barcode labels saves a small amount of time relative to normal procedure. We lack current data on the time required for primary inspection, but from our discussions with Customs staff on the border, we believe that 60 seconds for BRASS traffic and 90 seconds for other trucks would be fairly realistic averages. Our assumption, then, is that BRASS participation reduces delay at primary inspection by 30 seconds per loaded truck crossing.

Secondary Inspection

More importantly, participation in BRASS reduces the probability of secondary inspection. In the absence of current data, we have assumed for our calculations that 35 percent of loaded trucks undergo secondary inspections. We have chosen a value higher than the 29 percent reported for all trucks in FY 1998 because the secondary inspection rate is higher for loaded trucks than for empties. Consistent with information we obtained from Customs, we assume that a secondary inspection rate of only 5 percent of the trucks with BRASS shipments.

Another assumption adopted here is that on average, a secondary inspection requires 2.25 inspectors to each devote 12 minutes of their time.

Reductions in paperwork

Participation in BRASS reduces the paperwork required of companies for clearing their shipments through Customs. U.S. Customs estimates that brokers save 5-15 minutes processing time per transaction, which reduces paperwork by 25 to 50 percent. For shippers, estimated reduction in paperwork is 50 to 80 percent; for importers, 25 to 50 percent.

External benefits from BRASS participation

By participating in BRASS, companies not only derive benefits for themselves but also generate benefits for the rest of society.

Reductions in time spent in inspection queues

If being in the BRASS program reduces the time required for a truck's primary inspection, that means that each vehicle behind the truck in the queue also saves half a minute.

For illustration, let us assume a 30-minute per vehicle wait for primary inspection, as in the above calculation for peak/off-peak diversion. In that case, a truck that carries a BRASS shipment will delay vehicles queued behind it by about 8.5 fewer minutes than a truck that does not carry a BRASS shipment. Using the above estimate of $32.10 for the hourly cost of delay, that amounts to a savings of $4.07. Included in this estimate is the benefit from reduced emissions when trucks spend less time queued. The estimate does not reflect, however, the benefits from possible reductions in time that vehicles spend waiting for secondary inspection. Because participation in BRASS reduces the rate of secondary inspections, it may shorten the time that vehicles have to wait for these inspections.

Savings in costs of Customs' Operations

Based on conversations with Customs, a reasonable value for the cost of inspector labor is about $31 per hour. This can be combined with the above assumptions about the inspector labor input per primary inspection and about the differences between BRASS and non-BRASS trucks in the processing time for primary inspection and in the rates of secondary inspection. In combination, these elements imply the following savings in inspector labor when a truck enters the POE under the BRASS program: 23 cents at primary inspection and $4.26 at secondary inspection, for a total of $4.49.

Total estimated external benefits per vehicle

Comparing vehicles that enter the POE, one under the BRASS program and the other outside it, the total estimated external benefit from BRASS participation is $8.56, the sum of the $4.07 saving in vehicle delay costs at primary inspection, and the $4.49 saving in inspector labor cost.

Increased Levels of Compliance

Increased participation in the BRASS program may enable inspection agencies to free resources to concentrate on the relatively high-risk shipments that are not in the program. This would reduce the flow of contraband and improve national security, but it is not possible to quantify these potentially important benefits.

Need for Additional Incentives to Participate in BRASS

In deciding whether to participate, companies will normally consider only their self-interest, so they will ignore the external benefits that their participation would produce for the rest of society. So without the provision of special incentives to participate, the rate of participation will be suboptimal.

What form should the incentive take?

Dedicated fast lanes

One form of incentive that has been advocated is the provision of fast lanes for BRASS traffic. U.S. Customs does not currently dedicate any of the lanes at POEs exclusively to BRASS traffic, which mingles with other traffic in sometimes-congested lanes. In a recent report on the border, Senator Shapleigh of Texas called for dedicated fast lanes for vehicles participating in BRASS, BASC, and LBCIP as an incentive to participate. Dedicated lanes to provide participation incentive will also be part of the FAST program on the U.S.-Canada border.

Dedicated fast lanes could have another rationale apart from inducing participation in BRASS since they can also reduce traffic conflicts.

Money incentives

Money incentives would have some advantages over the fast-lane incentive since they allow that the amount of incentives can be fine-tuned. Money incentives, unlike fast lane, would have incentive value for vehicles crossing at off-peak when there are no queues at primary inspection. The possibility of money incentives could be examined along with the reconsideration of Customs' user fees when COBRA expires at end of FY 2003.

How large should the incentive be?

The incentive should equal the amount of external benefit per shipment, which we estimated at $8.56 excluding the benefits in increased compliance. If the incentive takes the form of a fast lane, it is possible to translate the time saving offered by access to the fast lane into money equivalent, and conversely. Previously, the assumed cost to truckers of delay in the inspection queue was $28.70 per hour. So an incentive of $8.56 to participate in BRASS would be equivalent to an incentive of about 17 minutes in time savings. In other words, one could economically justify a fast lane that saves BRASS traffic at least 17 minutes wait at primary inspection.

What would be the effect of an incentive on BRASS participation?

In the absence of evidence on the effectiveness of additional incentives to participate in BRASS, one can assume, for illustration, a 30-percent increase in the BRASS participation rate on the southern border, from the current 9 percent of entries to 39 percent. An entry refers here to the entry of a shipment into the Customs database. On the crude assumption that one loaded truck equals one entry, and using FY 2000 data on loaded trucks entering the U.S., a 30-percent increase in the BRASS participation rate translates to 696,000 additional BRASS entries per year. As a very rough estimate, that increase in number of BRASS entries would generate external benefits of nearly $6 million per year (= $8.56*696,000). Several caveats attach to this calculation:

- It omits the potential benefits from increased compliance with drug laws and improved national security. In this respect, the above calculation is too low.
- It omits the internal benefits that would result from the increase in BRASS participation. The reason is that the internal benefits are presumably more than offset by internal costs of BRASS participation such as the costs of applying and the loss of flexibility from having to rely on LBCIP carriers. In this respect, the above calculation of benefit may be too high.
- It does not recognize the "law of diminishing returns" in queuing: As additional vehicles are removed from the queue, the size of the queue shrinks and, hence, so does the reduction in waiting time from the removal of yet another vehicle. In this respect, the above calculation of benefit may be too high.

TECHNICAL ANNEX: ECONOMETRIC ANALYSIS OF US CUSTOMS DATA ON COMMERCIAL VEHICLE WAIT TIMES

Appendix E ("Quantification of Impacts of Alternatives") described the data that U.S. Customs collects on wait times for inbound commercial vehicles. The appendix also briefly described the study team's econometric analysis of a subset of these data. Details of this analysis are provided below.

DATA ON WAIT TIMES

The study team obtained an archive of the daily data on wait times from September 15, 2001 (when data collection began) through June 12, 2002. The data are estimates of wait times at two times of day: morning (generally between 8 and 8:30 am) and afternoon (generally between 4 and 4:40 pm).

The subset used for the econometric analysis was limited to the data for the four largest POEs on the southern border: the Laredo World Trade Bridge, the El Paso Ysleta Bridge, Nogales, and Otay Mesa. The subset included data for all weekday afternoons. For weekends and mornings, the subset included data only for Saturday afternoons at Nogales and for weekday mornings at Otay Mesa; with these exceptions, the Customs data indicated virtually no delays at the times on weekends or in the morning.

MODEL SPECIFICATION

Even after the omission of weekend or morning observations, the data for each POE include many observations with "no delay" recorded. The dependent variable in the team's econometric model – the wait time in minutes – was therefore a limited dependent variable, bounded below by zero.

Since the modeling of limited dependent variables is a complex and evolving area of econometrics, the study team sought advice from a colleague with expertise in this area, Professor Chandra Bhat of Civil Engineering Department at the University of Texas-Austin.

The team had originally contemplated using a single-equation Tobit specification, but Professor Bhat recommended a specification with two equations. One of these equations is a Logit model of the probability that a delay will occur on a given day; the other equation is a model of the duration of delay on days when delays occur. This two-equation model is theoretically less restrictive than the Tobit model.

The study team accepted Professor Bhat's recommendations, which led to the specification of equations (A1) and ((A2). The log-linear specification of equation (A2) was adopted to preclude negative predicted values of wait times.

$$\text{(A1)}\ \ln\left(\frac{P_i}{(1-P_i)}\right) = \alpha \ + \sum_{j=1}^{k} \beta_j X_{ij}$$

$$\text{(A2)}\ \ln Y_i = \gamma + \sum_{m=1}^{n} \delta_j X_{im} + v_i$$

where:

k is the number of explanatory variables, and j and m index these variables
i indexes the observation period (date, morning or afternoon)

P_i is the probability that a delay will be recorded for observation period i

Y_i is the duration of the wait (in minutes) for observation period m for which a non-zero wait is recorded

X_{ij}, X_{im} are the values of the explanatory variables

v_i is a stochastic disturbance term that is normally distributed with mean zero.

Stochastic Restrictions

The Logit model, of which equation (A1) is an example, rests on the assumption of independently and identically Gumbel-distributed disturbance terms. The independence means that serial correlation is absent, an assumption also adopted here for the disturbance term v_i in equation (A2). Although the assumption of no serial correlation is clearly restrictive, it avoids the need for estimation procedures that would be unduly complicated for the illustrative analysis being undertaken.[7] Certainly, the treatment of serial correlation should be a priority for any future research that builds on the present analysis.

Based on Professor Bhat's advice, another assumption adopted was that of independence between the disturbance terms underlying Equation (A1) and the disturbance term in equation (A2). Professor Bhat considered that for a preliminary, largely illustrative, analysis of the type the study team was planning, the specification error from imposing this restriction would be small relative to the saving in modeling effort.

Explanatory Variables

The explanatory variables, defined in Table E-7, include variables for day-of-the-week effects. For other explanatory variables, the rationales for their inclusion or exclusion were the following:

Monthly traffic volume was hypothesized to have positive effects on both probability and duration of delay. The data on traffic volume distinguish empty from loaded trucks, and since empties take less time to process, an increase in their share of the total truck traffic could be expected to reduce delays. Since this share was fairly stable over the sample period, however, it was not included as an explanatory variable. The researchers could not obtain from U.S. Customs data on each day's traffic volume, and these would have enhanced the analysis considerably.

Figures E 10-14 show the total truck traffic volumes by month; the figures for the last two months are extrapolated from past trends because the actual figures were unavailable at the time the analysis was performed.

A variable for linear *trend was included* to allow for influences that that were not otherwise modeled and that follow a long-term trend. An example could be a secular trend toward increased productivity of U.S. Customs.

[7] Adjustments for serial correlation would be complicated because of the exclusion of one or more weekend days from the sample, and because of the two-equation framework for dealing with the limited dependent variable.

The inclusion of variables for *Mexican and U.S. holidays*, and for the days immediately before and after, was based on statements from carriers. One informant said that at Laredo World Trade Bridge, the day before a Mexican holiday tends to be relatively busy, with carriers trying to beat the holiday stoppage of production in Mexico.

ESTIMATION RESULTS

Tables E-8 – E-11 and E-12 – E-16 present, respectively, estimates of equations (A1) and (A2); the estimation methods were maximum likelihood Logit regression for equation (A1) and OLS regression for equation (A2).

As hypothesized, the estimated coefficients on "traffic volume" are positive – i.e., more traffic produces more delay – and most are statistically significant.
The estimated coefficients of linear trend varied in sign and significance. The trends were toward less delay at Otay Mesa and Nogales, and more delay at El Paso-Ysleta. The estimates of day-of-the-week effects were consistent with what the raw data showed, sometimes statistically significant, and varied by POE. The regression results also indicate that delays are generally shorter on U.S. holidays, and at Nogales, on the day after as well.

Although the regressions explain some of the variation in wait times, they leave a great deal of the variation unexplained. This is illustrated in Figures E-14 – E-18, which show two distributions of minutes of delay. One distribution shows the variation among days in the delays recorded by U.S. Customs over the analysis period (September 15, 2001 through June 12, 2003). The other distribution is a conditional probability distribution that was derived from the regression results for our two-equation model. Since it is conditional on specified values for the explanatory variables, it does not include the variation in delay that results from the real-world variation in these variables. But even with this variation in delay statistically removed, the dispersion in the probability distribution is considerable. For example, according to the model for Laredo, the median delay is about 15 minutes, but there is a 14.5 percent probability of no delay, and about a 12 percent probability of a delay of at least 30 minutes.

Table E-7. Explanatory Variables in Econometric Analysis of Per Vehicle Wait Times for U.S. Customs Primary Inspection: Commercial Vehicles Entering from Mexico

Variable Name	Definition	Data source	Remarks
Monday	Dummy variable* for Mondays		Included only in the equation for Nogales
Tuesday	Dummy variable* for Tuesdays		
Wednesday	Dummy variable* for Wednesdays		
Thursday	Dummy variable* for Thursdays		
Friday	Dummy variable* for Fridays		
Traffic Volume	Current month's volume of truck traffic (000's) entering U.S. through the POE	U.S. Customs	Extrapolated for May and June.
Trend	Number of "months" since the start of the sample period (Sept. 15, 2001)		"Month"=30 day period. Variable has fractional values, e.g. 1.5 months.
U.S. Holiday (-1)	Dummy variable*for day before a U.S. national holiday		
U.S. Holiday	Dummy variable* for U.S. national holiday		
U.S. Holiday (+1)	Dummy variable* for day after a U.S. national holiday		
Mexican Holiday(-1)	Dummy variable* for day before a Mexican national holiday		
Mexican Holiday	Dummy variable* for Mexican national holiday		
Mexican Holiday (+1)	Dummy variable* for day after a Mexican national holiday		

- **Note -** A dummy variable is dichotomous. It distinguishes whether or not an observation has a particular characteristic. The variable equals 1 for observations with the characteristic and 0 for all other observations. For example, the variable "Tuesday" equals 1 for all observations that are Tuesdays and 0 for all other observations.

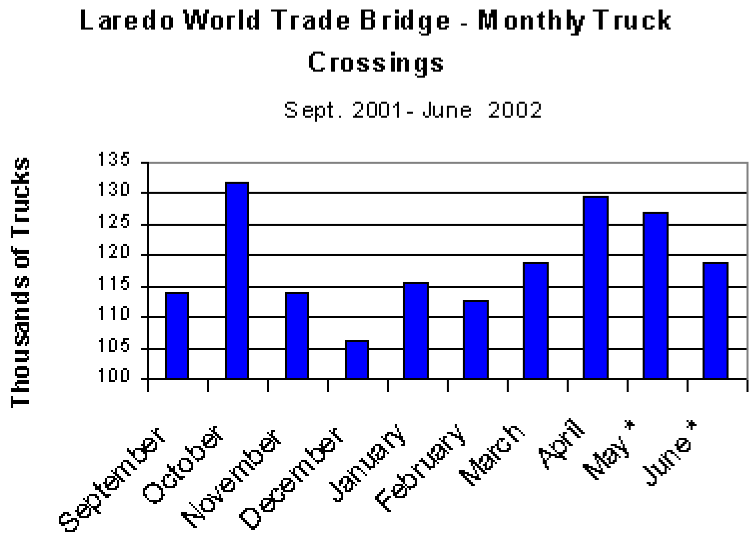

Figure E-10. Monthly Truck Crossings, Laredo World Trade Bridge

Note: May and June 2002 were calculated with the average change rate between 2001 and 2002 monthly crossings

Source: U.S. DOT, BTS based on data from US Customs Service, Mission Support Services, Office of Field Operations, Operations Management Database.

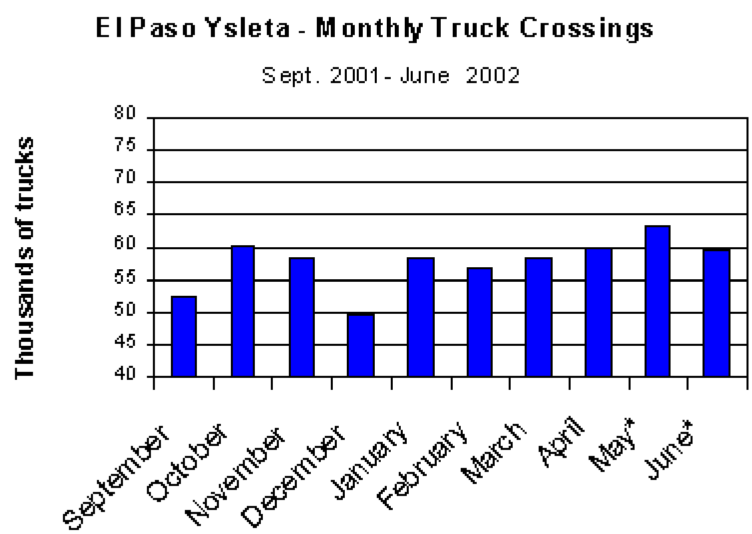

Figure E-11. Monthly Truck Crossings, El Paso Ysleta

Note: May and June 2002 were calculated with the average change rate between 2001 and 2002 monthly crossings

Source: U.S. DOT, BTS based on data from US Customs Service, Mission Support Services, Office of Field Operations, Operations Management Database.

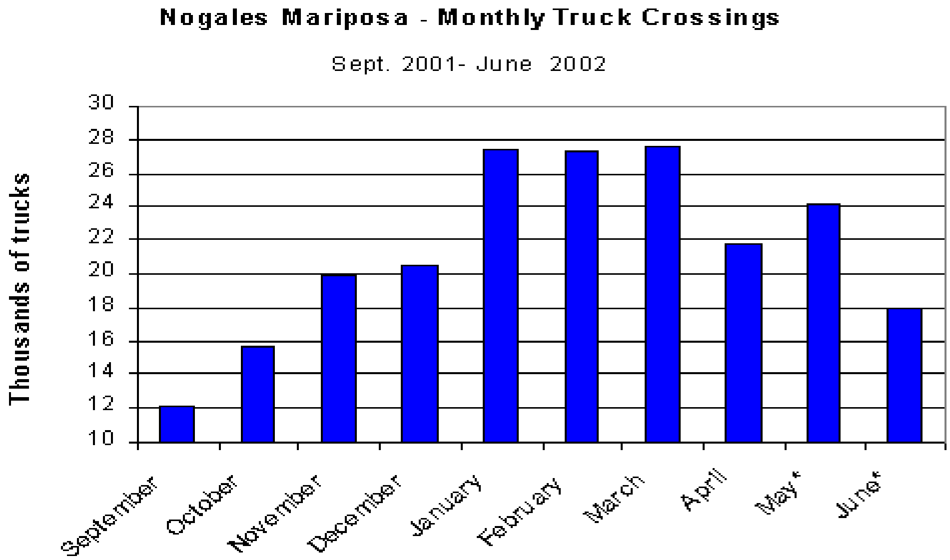

Figure E-12. Monthly Truck Crossings, Nogales Mariposa

Note: May and June 2002 were calculated with the average change rate between 2001 and 2002 monthly crossings

Source: U.S. DOT, BTS based on data from US Customs Service, Mission Support Services, Office of Field Operations, Operations Management Database.

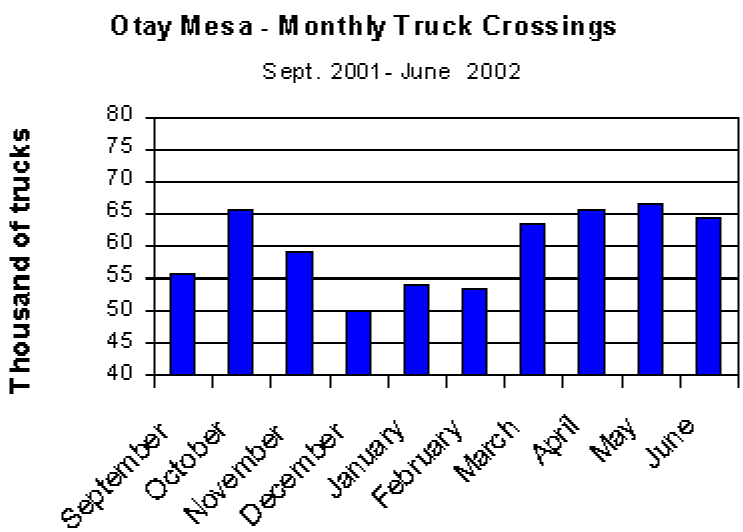

Figure E-13. Monthly Truck Crossings, Otay Mesa

Note: May and June 2002 were calculated with the average change rate between 2001 and 2002 monthly crossings

Source: U.S. DOT, BTS based on data from US Customs Service, Mission Support Services, Office of Field Operations, Operations Management Database.

Table E-8. Results from the Logit model regression: Laredo World Trade Bridge, Afternoons

GENERAL STATISTICS FOR THE MODEL				
Number of Observations				192
Number of Observations with Wait Time for Inspection				153
Number of Observations with no Wait Time				39
-2 log likelihood ratio for the model Intercept only				193.81
-2 log likelihood ratio for the model Intercept and Variables				131.46
Likelihood Ratio				62.35
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept *	-15.152	4.488	11.398	0.001
Tuesday	1.198	0.858	1.953	0.162
Wednesday	-0.097	0.675	0.021	0.885
Thursday	0.334	0.695	0.231	0.631
Friday	0.437	0.714	0.375	0.540
Traffic Volume *	0.142	0.040	12.491	0.000
Trend	0.001	0.004	0.126	0.722
U.S. Holiday (-1)	-2.449	1.769	1.916	0.166
U.S. Holiday	-2.823	1.383	4.163	0.059
U.S. Holiday (+1)	-1.173	1.229	0.912	0.309
Mexican Holiday(-1)	1.921	1.591	1.457	0.227
Mexican Holiday *	-4.087	1.002	16.638	0.000
Mexican Holiday (+1)	-0.240	1.059	0.051	0.821

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-9. Results from the Logit model regression: El Paso Ysleta, Afternoons

GENERAL STATISTICS FOR THE MODEL	
Number of Observations	193
Number of Observations with Wait Time for Inspection	151
Number of Observations with no Wait Time	42
-2 log likelihood ratio for the model Intercept only	202.22
-2 log likelihood ratio for the model Intercept and Variables	189.77
Likelihood Ratio	12.45

ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept	-0.280	3.039	0.009	0.926
Tuesday	0.427	0.574	0.553	0.457
Wednesday	0.969	0.618	2.460	0.117
Thursday	0.206	0.543	0.144	0.704
Friday	0.332	0.564	0.346	0.556
Traffic Volume	.018	.055	0.103	0.748
Trend	0.002	0.003	0.706	0.401
U.S. Holiday (-1)	-1.458	1.268	1.322	0.250
U.S. Holiday*	-2.291	1.038	4.870	0.027
U.S. Holiday (+1)	-0.179	1.184	0.023	0.880
Mexican Holiday(-1)	0.165	0.905	0.033	0.855
Mexican Holiday	0.636	0.930	0.468	0.494
Mexican Holiday (+1)	-0.171	0.799	0.046	0.831

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-10. Results from the Logit model regression: Nogales Mariposa, Afternoons

GENERAL STATISTICS FOR THE MODEL				
Number of Observations				230
Number of Observations with Wait Time for Inspection				167
Number of Observations with no Wait Time				63
-2 log likelihood ratio for the model Intercept only				270.07
-2 log likelihood ratio for the model Intercept and Variables				235.36
Likelihood Ratio				34.71
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept *	-2.153	0.874	6.063	0.014
Monday **	1.043	0.583	3.196	0.074
Tuesday	0.714	0.560	1.625	0.202
Wednesday	-0.011	0.508	0.001	0.982
Thursday	0.665	0.567	1.375	0.241
Friday	0.456	0.546	0.696	0.404
Traffic Volume *	0.167	0.046	13.408	<0.001
Trend *	-0.005	0.002	4.542	0.033
U.S. Holiday (-1)	-1.371	1.159	1.398	0.237
U.S. Holiday *	-3.568	1.219	8.563	0.003
U.S. Holiday (+1) *	-2.216	0.989	5.018	0.025
Mexican Holiday(-1)	-0.246	0.675	0.133	0.715
Mexican Holiday	-0.201	0.819	0.060	0.806
Mexican Holiday (+1)	-0.041	0.702	0.003	0.954

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-11. Results from the Logit model regression: Otay Mesa, Mornings

GENERAL STATISTICS FOR THE MODEL				
Number of Observations				192
Number of Observations with Wait Time for Inspection				149
Number of Observations with no Wait Time				43
-2 log likelihood ratio for the model Intercept only				204.24
-2 log likelihood ratio for the model Intercept and Variables				176.18
Likelihood Ratio				28.06
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept *	-6.511	2.164	9.052	0.003
Tuesday **	1.055	0.608	3.008	0.083
Wednesday **	0.990	0.575	2.961	0.085
Thursday	0.944	0.579	2.661	0.103
Friday **	1.026	0.586	3.066	0.080
Traffic Volume *	0.151	0.043	12.607	<0.001
Trend *	-0.012	0.004	9.719	0.002
U.S. Holiday (-1)	-0.714	1.331	0.288	0.592
U.S. Holiday	-0.565	1.089	0.269	0.604
U.S. Holiday (+1)	0.198	0.993	0.040	0.842
Mexican Holiday(-1)	-0.488	0.772	0.400	0.527
Mexican Holiday	-0.954	0.747	1.632	0.201
Mexican Holiday (+1)	- 0.350	0.608	3.008	0.083

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-12. Results from the Logit model regression: Otay Mesa, Afternoons

GENERAL STATISTICS FOR THE MODEL				
Number of Observations				267
Number of Observations with Wait Time for Inspection				163
Number of Observations with no Wait Time				29
-2 log likelihood ratio for the model Intercept only				163.01
-2 log likelihood ratio for the model Intercept and Variables				133.61
Likelihood Ratio				29.40
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept	-3.277	2.397	1.869	0.172
Tuesday *	2.241	0.840	7.121	0.008
Wednesday *	1.490	0.681	4.792	0.029
Thursday *	1.310	0.654	4.012	0.045
Friday *	1.991	0.752	7.011	0.008
Traffic Volume **	0.073	0.043	2.938	0.087
Trend	-0.001	0.003	0.116	0.734
U.S. Holiday (-1)	-1.961	1.501	1.707	0.191
U.S. Holiday (+1) **	-2.062	1.110	3.450	0.063
Mexican Holiday(-1)	1.867	1.473	1.607	0.205
Mexican Holiday *	-2.933	0.769	14.547	<0.001
Mexican Holiday (+1)	-0.199	0.821	0.059	0.809

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-13. Results from the Log-linear model regression: Laredo World Trade Bridge, Afternoons

GENERAL STATISTICS FOR THE MODEL				
F Value				7.79
R square				34.3%
Adjusted R square				29.9%
Residual Mean Square				1.487
Regression Mean Square				11.591
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**T-stat**	**Pr > t-stat**
Intercept *	-4.422	1.336	-3.309	0.001
Tuesday *	0.821	0.286	2.868	0.005
Wednesday	0.187	0.281	0.667	0.505
Thursday	0.113	0.284	0.397	0.691
Friday	0.206	0.287	0.718	0.474
Traffic Volume *	0.054	0.011	4.785	0.000
Trend *	0.003	0.001	2.438	0.016
U.S. Holiday (-1)	-0.624	0.700	-0.891	0.374
U.S. Holiday *	-1.091	0.545	-2.001	0.047
U.S. Holiday (+1)	-0.595	0.583	-1.021	0.309
Mexican Holiday(-1)	-0.204	0.411	0.496	0.620
Mexican Holiday *	-1.776	0.402	-4.414	0.000
Mexican Holiday (+1)	-0.419	0.430	-0.976	0.331

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-14. Results from the Log-linear model regression: El Paso Ysleta, Afternoons

GENERAL STATISTICS FOR THE MODEL				
F Value				2.697
R square				15.2%
Adjusted R square				9.6%
Residual Mean Square				1.901
Regression Mean Square				5.129
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**t-stat**	**Pr > t stat**
Intercept	-0.779	1.756	-0.443	0.658
Tuesday	0.335	0.325	1.031	0.304
Wednesday *	0.771	0.317	2.432	0.016
Thursday	0.151	0.319	0.472	0.637
Friday **	0.555	0.325	1.709	0.089
Traffic Volume	0.039	0.032	1.247	0.214
Trend *	0.003	0.001	1.985	0.049
U.S. Holiday (-1)	-0.641	0.793	-0.808	0.420
U.S. Holiday	-1.865	0.615	-3.032	0.003
U.S. Holiday (+1)	0.098	0.655	-0.150	0.881
Mexican Holiday(-1)	0.063	0.464	-0.135	0.893
**Mexican Holiday ** **	0.864	0.456	1.895	0.060
Mexican Holiday (+1)	-0.234	0.461	-0.507	0.612

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-15. Results from the Log-linear model regression: Nogales Mariposa, Afternoons

GENERAL STATISTICS FOR THE MODEL				
F Value				6.04
R square				25.9%
Adjusted R square				21.5%
Residual Mean Square				0.811
Regression Mean Square				2.806
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**t-stat**	**Pr > t-stat**
Intercept *	-1.397	0.479	-2.919	0.004
Monday *	0.895	0.306	2.922	0.004
Tuesday	0.338	0.310	1.090	0.277
Wednesday	0.057	0.303	0.187	0.852
Thursday	0.360	0.310	1.162	0.247
Friday	0.385	0.308	1.249	0.213
Traffic Volume *	0.168	0.023	7.247	<0.001
Trend *	-0.0038	0.001	-2.725	0.007
U.S. Holiday (-1)	-0.600	0.731	-0.820	0.413
U.S. Holiday *	-1.658	0.592	-2.800	0.006
U.S. Holiday (+1) **	-1.038	0.585	-1.775	0.077
Mexican Holiday(-1)	-0.115	0.390	-0.296	0.768
Mexican Holiday	-0.297	0.448	-0.663	0.508
Mexican Holiday (+1)	-0.267	0.387	-0.690	0.491

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-16. Results for the Log-linear model regression results – Otay Mesa Morning Times

GENERAL STATISTICS FOR THE MODEL				
F Value				4.783
R square				22.6%
Adjusted R square				17.9%
Residual Mean Square				1.546
Regression Mean Square				7.393
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**t-stat**	**Pr > t-stat**
Intercept	-0.849	0.963	-0.882	0.379
Tuesday **	0.549	0.293	1.875	0.062
Wednesday *	0.732	0.284	2.578	0.011
Thursday *	0.669	0.289	2.317	0.022
Friday *	0.973	0.291	3.343	0.001
Traffic Volume *	0.059	0.017	3.539	0.001
Trend *	-0.0073	0.001	-5.837	<0.001
U.S. Holiday (-1)	-0.507	0.709	-0.715	0.475
U.S. Holiday (+1)	-0.041	0.592	-0.070	0.944
Mexican Holiday(-1)	0.400	0.419	0.956	0.340
Mexican Holiday	-0.404	0.387	-1.043	0.298
Mexican Holiday (+1)	-0.382	0.415	-0.918	0.360

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

Table E-17. Results for the Log- linear model regression results – Otay Mesa Afternoon Times

GENERAL STATISTICS FOR THE MODEL				
F Value				4.35
R square				21.0%
Adjusted R square				16.2%
Residual Mean Square				1.599
Regression Mean Square				6.957
ANALYSIS OF THE PARAMETERS				
Variable Name	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > Chi Sqr**
Intercept	0.801	0.980	0.817	0.415
Tuesday *	1.181	0.298	3.969	<0.001
Wednesday *	1.070	0.289	3.704	<0.001
Thursday *	1.035	0.294	3.524	0.001
Friday *	1.232	0.296	4.160	<0.001
Traffic Volume	0.027	0.017	1.605	0.110
**Trend ** **	-0.0023	0.001	-1.774	0.078
U.S. Holiday (-1)	-0.973	0.721	-1.349	0.179
U.S. Holiday (+1)	-0.602	0.602	-0.999	0.319
Mexican Holiday(-1)	0.540	0.426	1.269	0.206
Mexican Holiday *	-1.456	0.394	-3.695	<0.001
Mexican Holiday (+1)	-0.547	0.423	-1.294	0.197

Note * denotes statistically significant at the 95 percent level.
** denotes statistically significant at the 90 percent level.

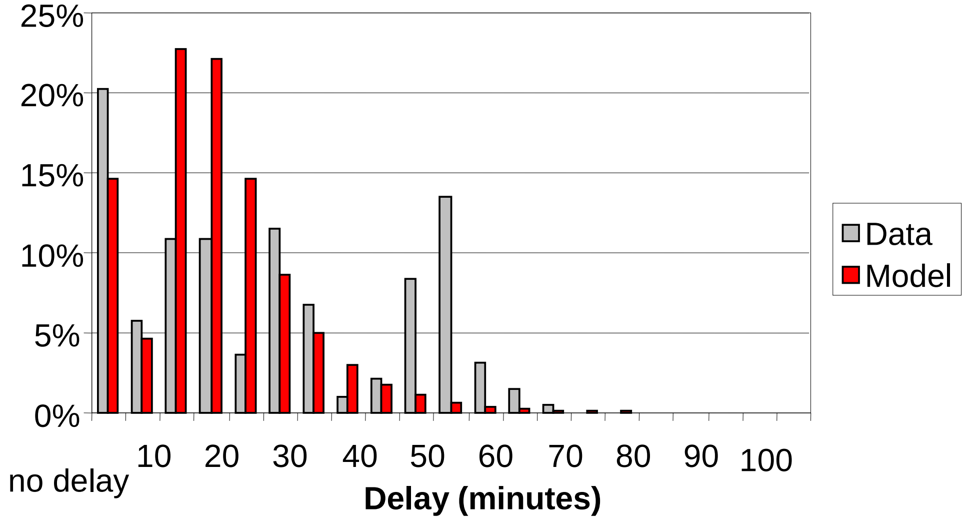

Figure E-14. Commercial Vehicle Wait Times for U.S. Customs Primary Inspection at Laredo World Trade Bridge, Afternoons: Model-Based Conditional Probability Distribution compared to Distribution of Data.

Notes:

Distribution of the data shows the distribution across days from September 15, 2001 through June 12, 2003, excluding weekend days.

The model-based probability distribution is conditional on values of the explanatory variables that describe a hypothetical Wednesday that occurs in month with an average traffic volume, that neither coincides with or comes immediately before or after a holiday.

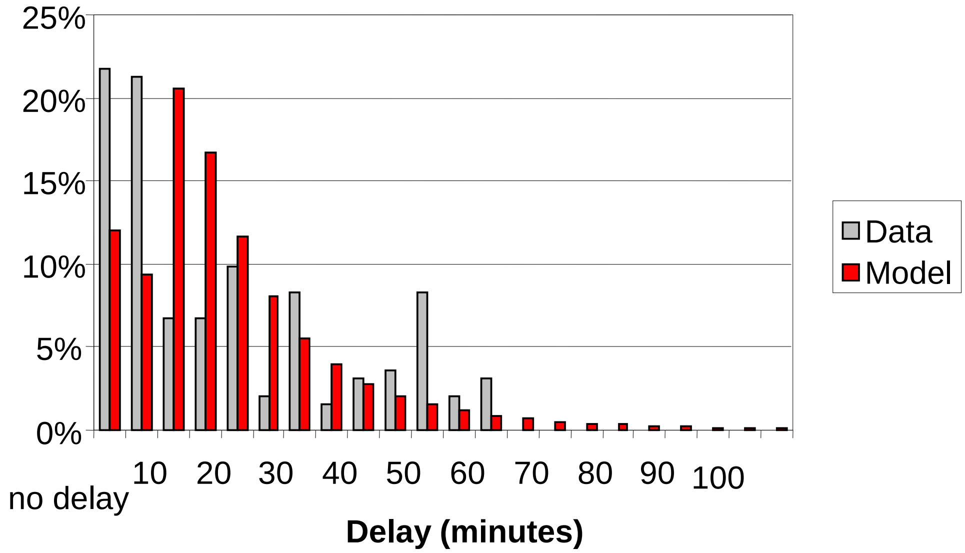

Figure E-15. Commercial Vehicle Wait Times for U.S. Customs Primary Inspection at El Paso-Ysleta POE, Afternoons: Model-Based Conditional Probability Distribution compared to Distribution of Data.

Notes: See notes to Figure E-14.

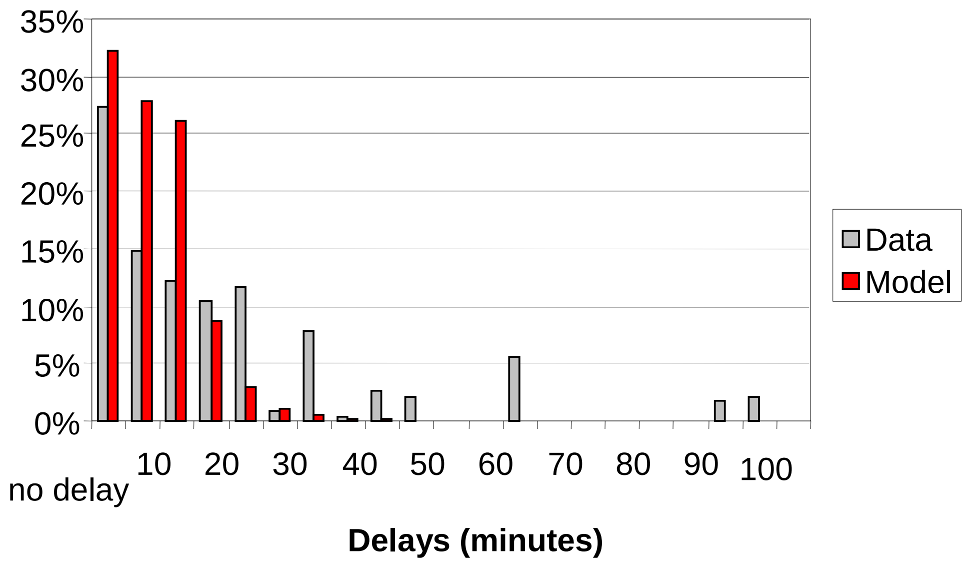

Figure E-16. Commercial Vehicle Wait Times for U.S. Customs Primary Inspection at Nogales-Mariposa POE, Afternoons: Model-Based Conditional Probability Distribution compared to Distribution of Data.

Notes: See notes to Figure E-14.

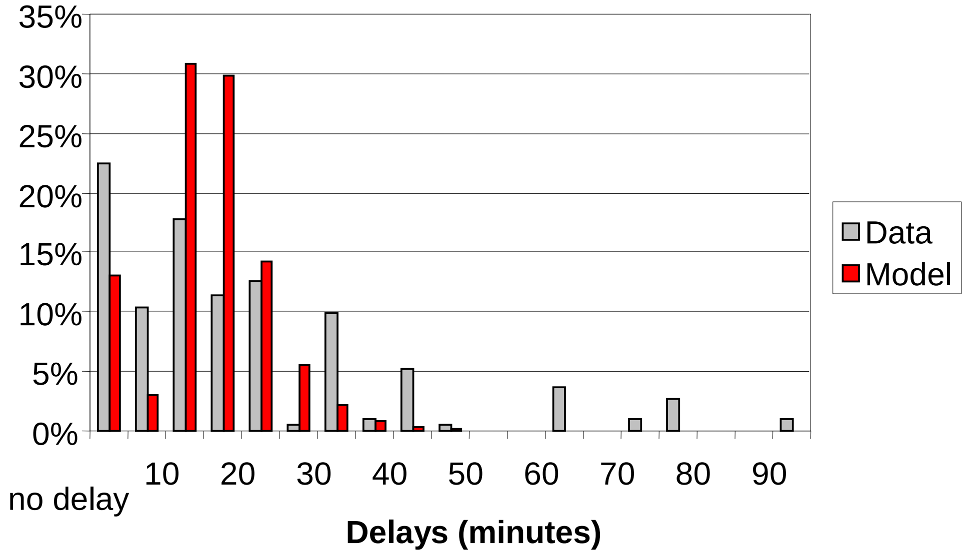

Figure E-17. Commercial Vehicle Wait Times for U.S. Customs Primary Inspection at Otay Mesa, Mornings: Model-Based Conditional Probability Distribution compared to Distribution of Data.

Notes: See notes to Figure E-14.

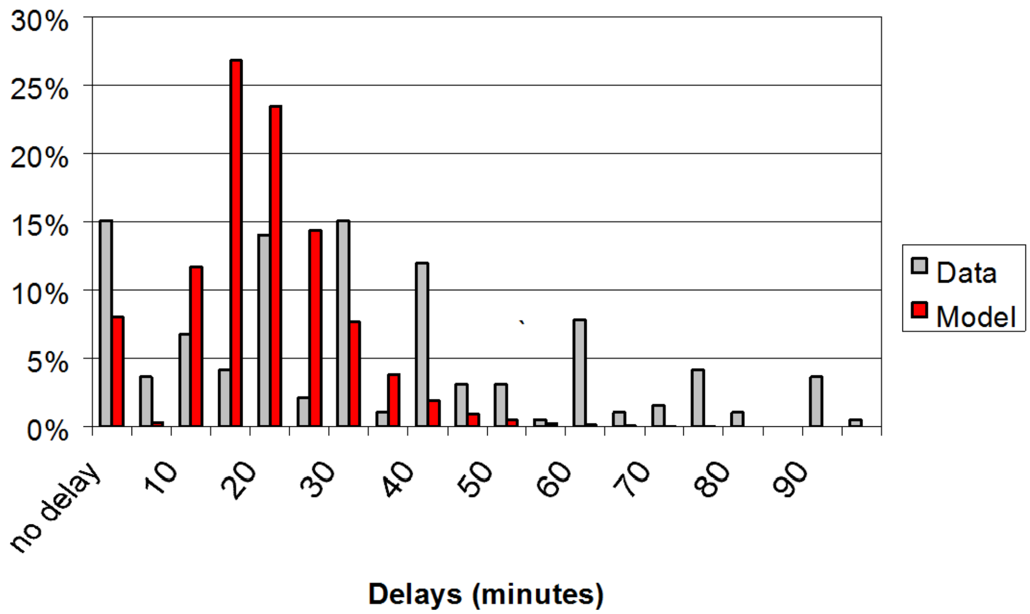

Figure E-18. Commercial Vehicle Wait Times for U.S. Customs Primary Inspection at Otay Mesa, Afternoons: Model-Based Conditional Probability Distribution compared to Distribution of Data.

Notes: See notes to Figure E-14.

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