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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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The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the Federal Highway Administration (FHWA) or the Texas Department of Transportation (TxDOT). This report does not constitute a standard, specification, or regulation. The engineer in charge was William R. Stockton, P.E., (Texas, # 41188).

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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.

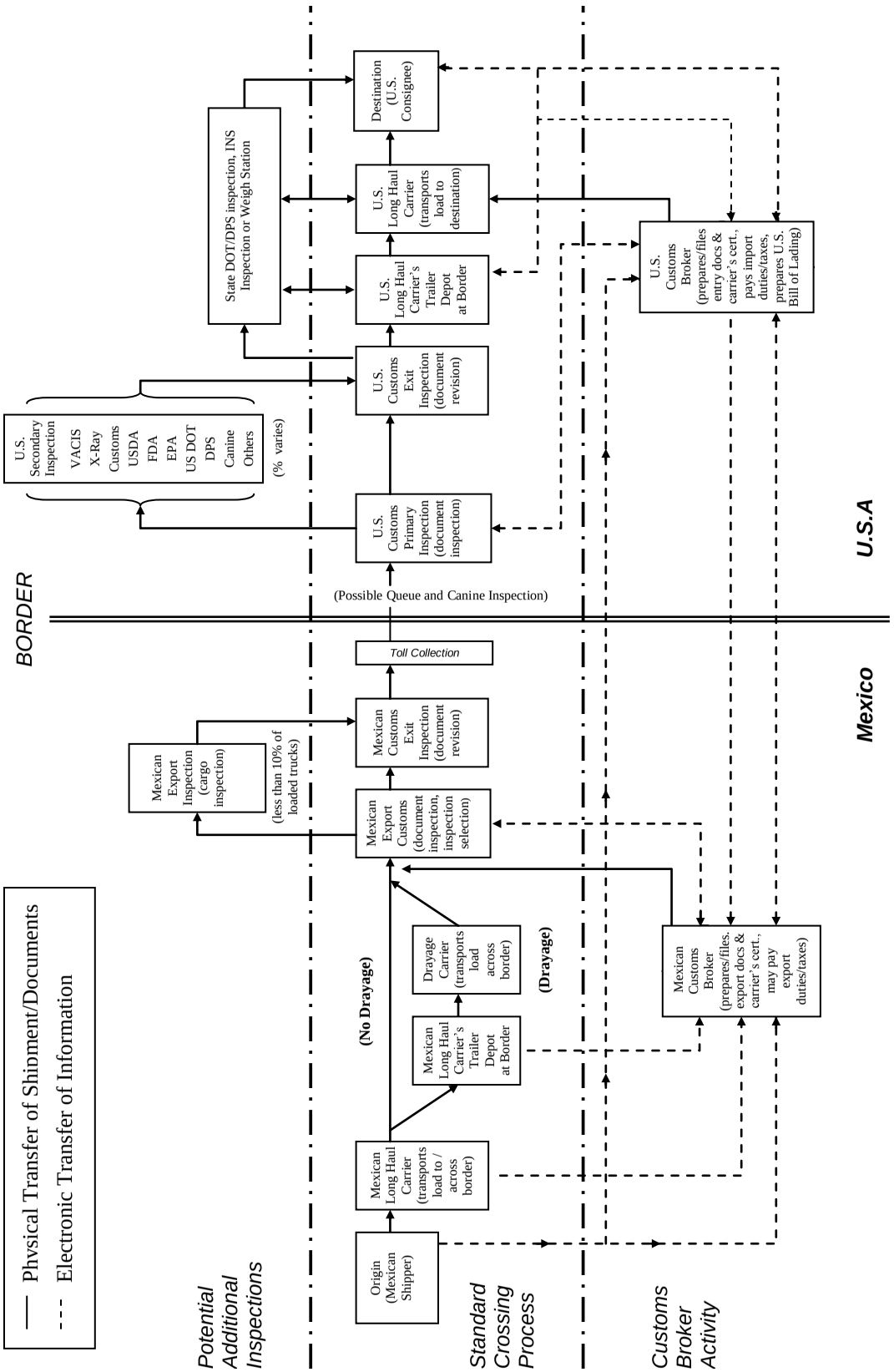
Poor circulation causes two different problems. One problem is a common traffic problem associated with streams of traffic crossing each other, creating congestion for both. The second problem is that the configuration of many ports does not provide for positive separation of cleared and uncleared vehicles, 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.

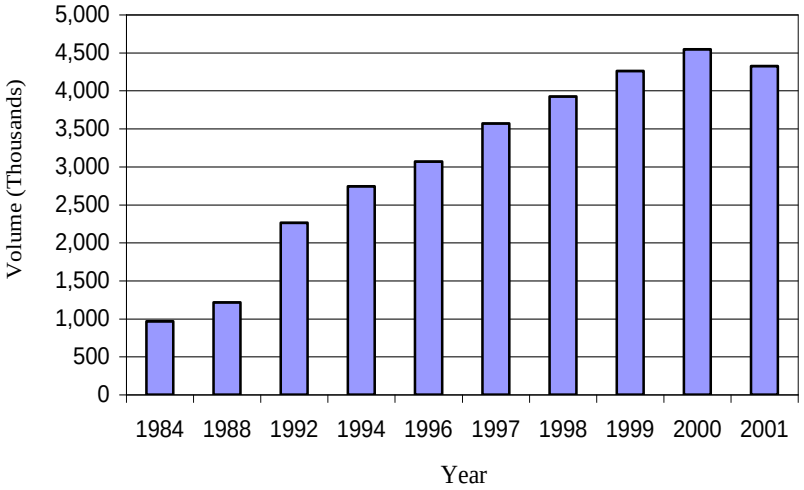


Figure 1. Northbound Truck Crossings from Mexico

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.

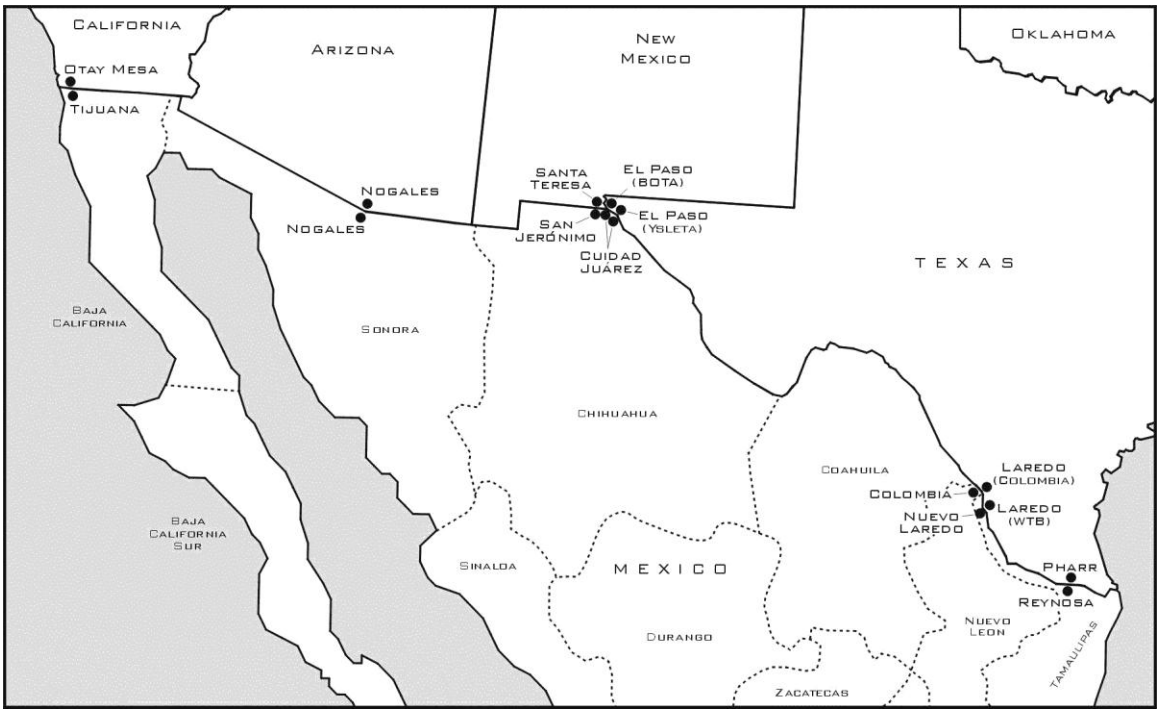


Figure 2. U.S. and Mexico Commercial Gateways Examined in Case Studies

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.

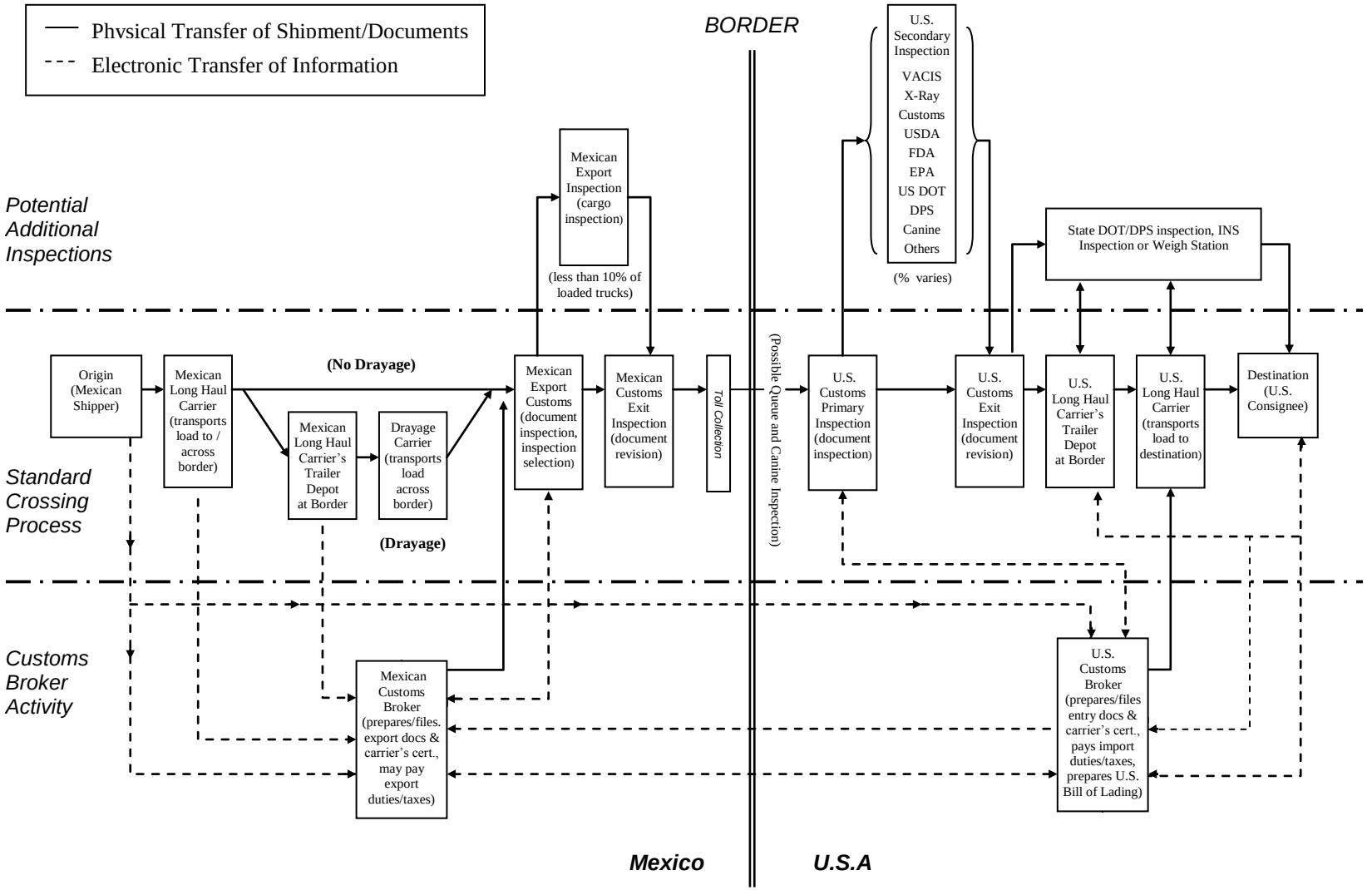


Figure 3. Schematic Flowchart of Northbound Border-crossing Process for Trucks

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.

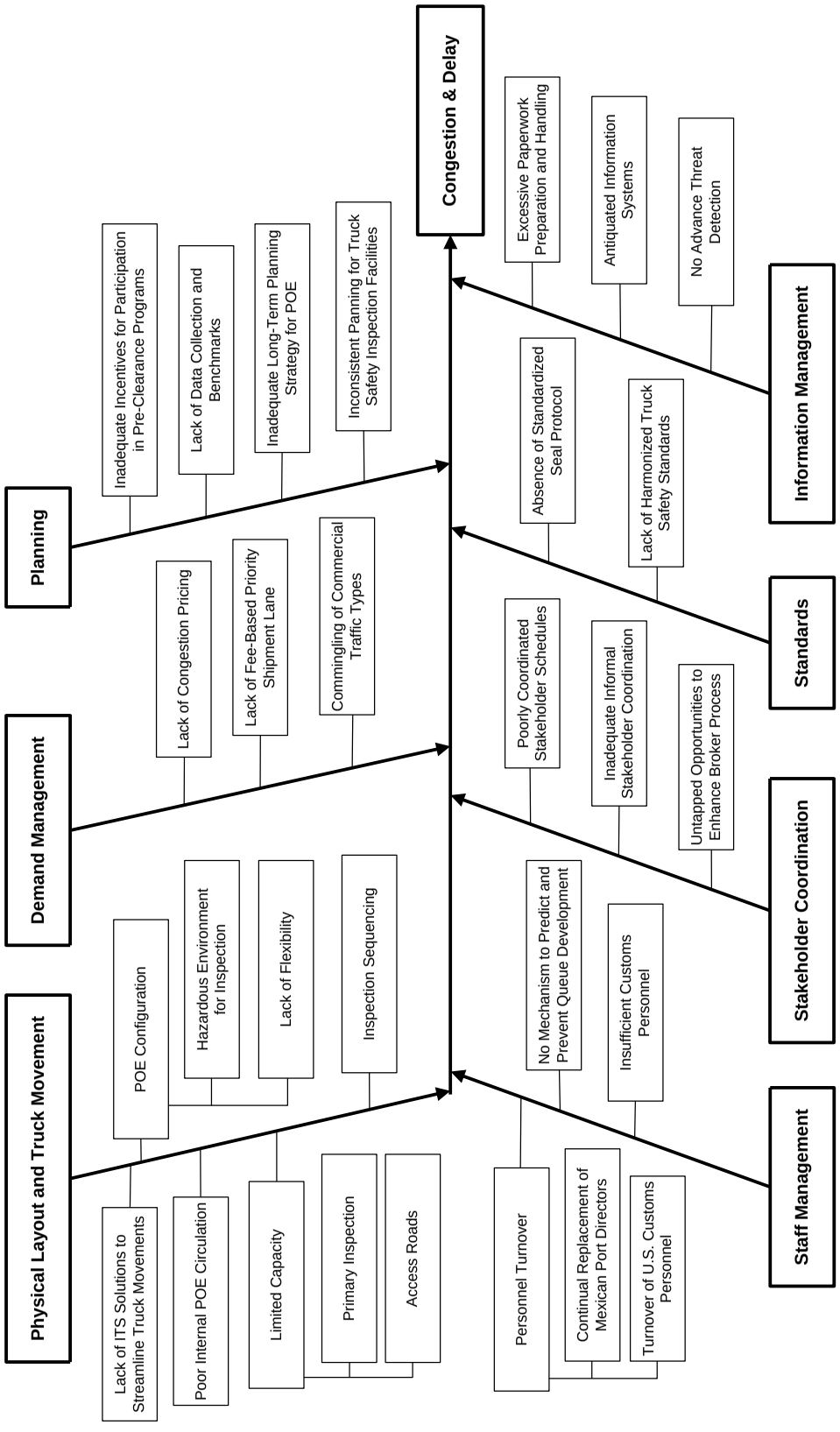


Figure 5. Fishbone Classification of Border Coordination Problems and Issues

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.	**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.
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.	

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.	**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.
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.	

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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