BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING STUDY

Task 9:
Port of Entry Case Studies

Barton-Aschman
La Empresa

March 20, 1998

FINAL REPORT

Preface

U.S./Mexico Binational Border Transportation Planning and Programming Study implements a significant binational policy making document entitled "Memorandum of Understanding on the Planning Process for Land Transport on Each Side of the Border" signed by the federal governments of Mexico and the United States at the first "NAFTA Transportation Summit" held in Washington, D.C., April 29, 1994.

The purpose of this study is to provide policymakers with information needed to establish a continuous, joint, binational, transportation planning and programming process. A goal of this study is to improve the efficiency of the existing binational policy making planning procedures and funding criteria affecting our Border Land Transportation Systems (BLTS). The BLTS should be seen as a binational transportation system made of international bridges and border crossings and land connections to major urban and/or economic centers, principal seaports, airports and multimodal/transfer stations, and, ultimately, to national transportation facilities.

Disclaimer

The purposes of the Binational Planning and Programming Study and all of its reports were: to investigate current state and national transportation planning processes in both the United States and Mexico, to review available data on border transportation infrastructure and goods movement, and to recommend an ongoing, binational planning and programming process. The information contained in these reports was not developed to serve as the basis for making funding allocation or distribution decisions at either the federal or state level in the United States.

BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING
TASK 9 REPORT: PORT OF ENTRY CASE STUDIES

This report presents the findings and conclusions of the operational analyes performed at the Ports of Entry (POE) at the six case study locations along the United States-Mexico border: Nogales-Nogales, Eagle Pass-Peidras Negras, Otay Mesa-Mesa de Otay, Laredo-Nuevo Laredo, El Paso-Ciudad Juarez, and Brownsville-Matamoros. Each case study presents a description of the port of entry facilities and operations including the type and volume of trade flow. There is a description of the individual elements present at each POE as well as data collected as a part of the study. The analysis identifies the existing inefficiencies at each POE and opportunities to correct these inefficiencies. These studies did not consider changes to the existing inspection practices at the POE. The final chapter of the report summarizes the procedures used and general conclusions gleaned from the six studies. The results of these case studies were used to develop a standard methodology which is documented in the Task 13 report.

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TABLE 9.OF CONTENTS

9.1 Introduction 1

9.1.1 Purpose 1

9.1.2 POE Systems Studied 2

9.1.3 Procedures 2

9.1.4 This Report 5

9.2 Nogales-Nogales POE System 6

9.2.1 Introduction 6

9.2.2 Physical Description of the Border Crossing Area 7

Northbound 7

Southbound 9

9.2.3 General Observations and Conclusions 9

Northbound 10

Southbound 14

9.3 Eagle Pass-Piedras Negras POE System 20

9.3.1 Introduction 20

9.3.2 Analysis of Flow 21

Cargo Volumes 21

Vehicle Flows 21

Northbound Observations - Mexican Side 21

Northbound Observations - U.S. Side 24

Northbound Opportunities 24

Southbound Observations 25

Southbound Opportunities 25

9.3.3 Bridge Proposal 26

9.4 Otay Mesa-Mesa de Otay POE System 28

9.4.1 Introduction 28

9.4.2 Physical Description of the Border Crossing Area 29

Northbound 29

Southbound 31

9.4.3 General Observations and Conclusions 32
Northbound 33
Southbound 38
9.5 Laredo-Nuevo Laredo POE System 42
9.5.1 Introduction 42
9.5.2 Physical Description of the Border Crossing Area 43
Northbound 43
Southbound 45
9.5.3 General Observations and Conclusions 46
Northbound 47
Southbound 51
9.6 El Paso-Ciudad Juarez POE System 57
9.6.1 Introduction 57
9.6.2 Physical Description of the Border Crossing Area 58
Northbound 58
Southbound 61
9.6.3 General Observations and Conclusions 61
Northbound 62
Southbound 67
9.6.4 Santa Teresa-San Jeronimo and Bridge of the Americas POEs 70
Santa Teresa-San Jeronimo 70
Bridge of the Americas (BOTA) 70
9.7 Brownsville-Matamoros POE System 72
9.7.1 Introduction 72
9.7.2 Physical Description of the Border Crossing Area 73
Northbound Gateway Crossing 73
Northbound B&M Crossing 75
Southbound Gateway Crossing 75
Southbound B&M Crossing 76
9.7.3 General Observations and Conclusions 76
Gateway Bridge Northbound 78
B&M Bridge Northbound 78
Gateway Bridge Southbound 83
B&M Bridge Southbound 83

9.7.4 Conclusions 89

9.8 Conclusions 91

9.8.1 Border Crossing Systems 91

9.8.2 Efficiency Studies 92

9.8.3 Key Findings 92

9.8.4 General Characteristics of Border Crossing Systems 93

Northbound 93

Southbound 98

9.8.5 Opportunities for Improvement 99

General Planning Considerations 99

Crossing Configurations 100

Toll Collection 101

Inspection Facilities 101

Institutional Changes 106

9.8.6 Additional Research 107

LIST OF TABLES

Table 9.1	Northbound Commercial Vehicle (Truck) Volumes By Gateway	2
Table 9.2	Nogales-Nogales Survey Results	11
Table 9.3	Nogales-Nogales Northbound Survey Results	11
Table 9.4	Northbound Nogales Crossing Inefficiencies and Opportunities	12
Table 9.5	Southbound Nogales Crossing Inefficiencies and Opportunities	13
Table 9.6	Northbound Cargo Movement (1995)	22
Table 9.7	Southbound Cargo Movement (1995)	22
Table 9.8	Otay Mesa-Mesa de Otay Survey Results	33
Table 9.9	Northbound Otay Mesa Crossing Inefficiencies and Opportunities	35
Table 9.10	Southbound Otay Mesa Crossing Inefficiencies and Opportunities	40
Table 9.11	Laredo-Nuevo Laredo Survey Results	47
Table 9.12	Northbound Juarez-Lincoln Bridge Inefficiencies and Opportunities	48
Table 9.13	Southbound Juarez-Lincoln Bridge Inefficiencies and Opportunities	52
Table 9.14	El Paso-Ciudad Juarez Survey Results	63
Table 9.15	Northbound Ysleta-Zaragoza Bridge Inefficiencies and Opportunities	65
Table 9.16	Southbound Juarez-Lincoln Bridge Inefficiencies and Opportunities	68
Table 9.17	Brownsville-Matamoros Survey Results	77
Table 9.18	Northbound Gateway Bridge Inefficiencies and Opportunities	79
Table 9.19	Northbound B&M Bridge Inefficiencies and Opportunities	81
Table 9.20	Southbound Gateway Bridge Inefficiencies and Opportunities	84
Table 9.21	Southbound B&M Bridge Inefficiencies and Opportunities	87
Table 9.22	Characteristics of Border Crossing Systems	94

LIST OF FIGURES

Figure 9.1	Crossings in the Nogales-Nogales POE System	6
Figure 9.2	Schematic of Nogales-Nogales Crossing	8
Figure 9.3	15-Minute Arrivals in Nogales, Mexico - January 16, 1997	15
Figure 9.4	15-Minute Arrivals in Nogales, Mexico - January 17, 1997	15
Figure 9.5	Total Vehicle Crossing Times by Time of Day - January 16, 1997	16
Figure 9.6	Total Vehicle Crossing Times by Time of Day - January 17, 1997	16
Figure 9.7	Cumulative Frequency of Crossing Times - January 16, 1997	17
Figure 9.8	Cumulative Frequency of Crossing Times - January 17, 1997	17
Figure 9.9	Nogales Primary Inspection Area Capacity	19
Figure 9.10	Nogales Southbound Hourly Arrivals	19
Figure 9.11	Crossings in the Eagle Pass-Piedras Negras POE	20
Figure 9.12	Schematic of Eagle Pass - Piedras Negras Crossings	22
Figure 9.13	Crossings in the San Diego-Tijuana POE System	28
Figure 9.14	Schematic of Otay Mesa-Mesa de Otay Crossing	30
Figure 9.15	Arrivals in Mexico, U.S. Primary Processing Rate and Queued Vehicles	37
Figure 9.16	U.S. Primary Processing Rates Otay Mesa	37
Figure 9.17	Otay Mesa Southbound Arrivals, Document Processing and Queue	39
Figure 9.18	Crossings in the Laredo-Nuevo Laredo POE System	42
Figure 9.19	Schematic of Downtown Crossings in Laredo-Nuevo Laredo	44
Figure 9.20	Arrivals, U.S. Primary Processing & Queuing of 4/5 Axle Trucks	50
Figure 9.21	U.S. Primary Processing Rate - Mixed Flow - All Trucks	50
Figure 9.22	Southbound Bridge Approach	53
Figure 9.23	Laredo Bridge II Southbound Arrivals, Document Processing and Queue-January 1997	56
Figure 9.24	Laredo Bridge II Southbound Arrivals, Document Processing and Queue-April 1997	56
Figure 9.25	Crossings in the El Paso-Ciudad Juarez POE System	57
Figure 9.26	Schematic of Ysleta-Zaragoza Crossing	59
Figure 9.27	Arrivals in Mexico, U.S. Primary Processing & Queuing of Vehicles	64
Figure 9.28	U.S. Primary Processing Rates	64
Figure 9.29	Crossings in the Brownsville-Matamoros POE System	72
Figure 9.30	Schematic of Downtown Crossings in Brownsville-Matamoros	74

Figure 9.31	U.S. and Mexican Facilities at Gateway Bridge	80
Figure 9.32	U.S. and Mexican Facilities at B&M Bridge	82
Figure 9.33	Alternative Concepts for the Southbound Gateway Bridge Approach	85
Figure 9.34	Mexican Customs Compound	88
Figure 9.35	Brownsville-Matamoros Arrivals, Document Processing and Queue at Mexican Compound	89
Figure 9.36	Prototypical U.S. Port of Entry Layout	103
Figure 9.37	Prototypical Mexican POE Layout	104

9.1 Introduction

This report documents the procedures and findings of transportation operations studies of six selected port of entry systems along the U.S.-Mexican border. The six locations were selected as part of Task 3 of this study. The selection is documented separately as part of the Task 3 report.

It should be emphasized here that this study was limited to transportation movement efficiency and was specifically not to include any aspects of the actual inspections. Hence, although inspections may themselves absorb more time than the travel time and delay outside an inspection facility, it was not the purpose of this study to examine how the inspection processes themselves were conducted.

9.1.1 Purpose

The six case studies were to provide more than the operational assessments which are described in this report. In total, the case studies were to:

- Provide an analytical foundation for analyzing port of entry (POE) border crossing facilities along the U.S.-Mexican border
- Inventory existing transportation network characteristics (see Task 2)
- Inventory background and trade conditions for the POEs (see Task 3)
- Inventory the types and quantities of trade flowing through the POEs (see Task 8 and appendix 9.1)
- Establish what might be considered, from the transportation sense, typical operations of a border crossing *system;* with a system including the following components (all not present at all crossings):
  - approach routes
  - export inspection
  - toll booths
  - actual crossing facility (e.g., bridge)
  - access to import inspection
  - document inspections
  - primary inspection
  - secondary inspection (all components)
  - safety, weight, or other supplemental inspections
  - exit document inspection
  - egress routes
- Identify any apparent existing transportation inefficiencies in the six systems selected for study (this excludes any consideration of actual inspection practices or procedures)
- Provide a basis for estimating the economic costs associated with the operation of the POEs studied
- Identify opportunities or improving planning and design for existing and future POEs, developing planning criteria where possible

- Establish procedures for subsequent POE studies which the Joint Working Committee (JWC) or others may wish to perform.

9.1.2 POE~~s~~ Systems Studied

The six POE~~s~~ Systems selected in Task 3 were:

- San Diego - Tijuana
- Nogales - Nogales
- El Paso/Santa Teresa - Ciudad Juarez
- Eagle Pass - Piedras Negras
- Laredo - Nuevo Laredo
- Brownsville - Matamoros

Table 9.1 shows the total northbound commercial vehicle counts for the major port of entry systems for the period from 1991 to 1995. The highlighted rows are the crossings that are included in the six case studies listed above. Some of these POEs have multiple crossings which may or may not serve commercial vehicle traffic. Since the emphasis in the Binational Study is on trade, crossings that do not permit trucks were not included in this task.

The case studies were originally to include one or more rail crossings. However, during the time when the case studies were performed the Mexican national railroad went into privatization. It was expected that the changes in ownership, unification of U.S. and Mexican operations, private sector profit motivation, and other factors would result in major short-term operational changes. This would invalidate any conclusions derived from observations of operations under government operation. Hence, no rail crossings were subjected to extensive operational data collection. Observations were made to identify rail operational characteristics at ~~three~~ four ~~–~~locations: Nogales-Nogales, Brownsville-Matamoros, Eagle Pass-Piedras Negras, and El Paso-Ciudad Juarez and findings are included herein.

9.1.3 Procedures

Background information was available from work completed in other tasks (2, 3, 8). In this task the emphasis on data collection was placed on processes and physical and operating data.

Each POE study began with meetings and interviews with representatives of U.S. and Mexican inspection agencies, departments of transportation (DOTs), state, county, and/or local transportation providers, private sector interests, and others specific to the individual POEs in both countries. These discussions were held to become familiar with local aspects of the POE operation, identify local issues, problems, improvements ideas or proposals, and to obtain any other information or suggestions which might relate to the POE or its impacts. On the Mexican side, the Ministry of Finance & Public Credit (SHCP) allowed the consultants to familiarize themselves with the general operation criteria and make in-depth visits to each POE in order to appreciate the difficulties in each location. On the U.S. side, the inspection agencies provided tours and access to the inspection facilities. They also provided information and data related to their activities.

Table 9.1
Northbound Commercial Vehicle (Truck) Volumes By Gateway

Port	1991	1992	1993	1994	1995	Total	%
□ El Paso-Ciudad Juarez	455,121	552,171	563,413	580,200	610,177	2,761,082	22.5%
□ Laredo-Nuevo Laredo	337,866	432,061	473,480	659,924	733,783	2,637,114	21.5

□ Otay Mesa-Mesa de Otay	312,752	374,141	384,615	428,086	477,390	1,976,984	16.1
□ Brownsville-Matamoros	182,715	203,116	224,147	264,345	233,615	1,107,938	9.0
□ Nogales–Nogales	167,388	154,845	185,107	187,423	203,298	898,061	7.3
Calexico-Mexicali	122,174	152,317	156,381	176,825	176,420	784,117	6.4
Hidalgo-Reynosa	115,576	129,354	147,492	158,405	174,049	724,876	5.9
□ Eagle Pass-Piedras Negras	36,060	41,868	45,318	55,046	54,779	233,071	1.9
Tecate–Tecate	49,625	41,833	36,710	34,674	41,064	203,906	1.7
San Luis-San Luis Rio Colorado	32,456	34,847	36,620	43,356	44,214	191,493	1.6
Del Rio-Ciudad Acuña	27,943	30,448	32,672	32,719	36,601	160,383	1.3
Douglas-Agua Prieta	18,744	26,113	18,300	47,522	38,242	148,921	1.2
Progreso-Nuevo Progreso	30,320	35,179	23,760	22,711	22,962	134,932	1.1
Rio Grande-Ciudad Camargo	9,009	11,639	15,649	15,665	14,936	66,898	0.5
Roma-Miguel Aleman	13,825	14,881	14,110	12,273	11,426	66,515	0.5
Naco–Naco	7,683	7,082	4,521	5,043	5,789	30,118	0.2
Presidio-Ojinaga	6,215	5,712	5,606	4,764	5,291	27,588	0.2
San Ysidro-Tijuana[1]	24,138	88	0	0	0	24,226	0.2
Fabens-Guadalupe Bravo	7,208	8,587	3,199	700	269	19,963	0.2
Andrade-Los Algodones	2,042	1,577	1,420	3,114	3,818	11,971	0.1
Lukeville-Sonoyta	1,501	1,765	2,278	2,419	2,665	10,628	0.1
□ Santa Teresa-San Jeronimo	0	0	0	4,554	5,360	9,914	0.1
Columbus-Palomas	1,353	1,311	1,345	1,351	2,087	7,447	0.1
Sasabe–Sasabe	1,376	1,333	1,691	1,308	1,180	6,888	0.1
Total	1,965,081	2,264,260	2,379,827	2,744,421	2,901,410	12,245,034	100.0%

□ - Crossings included in the six case study locations.
[1] San Ysidro was closed to commercial traffic in 1992.
Source: U.S. Customs Service

In most cases the chief inspectors confirmed when operating data should be collected to obtain peak volume conditions (month of the year, day of the week). Seasonal variations were discussed. For Nogales, a POE heavily oriented to binational agricultural trade, it was suggested that the operational studies be conducted during the tomato shipping peak (November through February). The inspection agencies stated that there were not substantial seasonal peaks at the other POEs (except during the month of December for maquiladoras when production is minimal).

Where there were multiple commercial crossings, the chief inspectors also confirmed which crossing or crossings were the busiest In some cases one crossing handled much more traffic than others. In other cases one crossing would primarily handle empty trucks while another crossing handled loaded trucks. Since one of the purposes of the case studies was to establish transportation operating statistics, data needed to be collected at busy facilities which handled loaded trucks. Specific study sites were selected by the consultants using input from those interviewed and data collected in earlier tasks.

The meetings and interviews also produced additional background information which had not been assembled during other task activities or which was more current.

Before any data was collected, a reconnaissance was made of the border crossing systems to be studied. This included access routes, inspection facilities, and toll collection systems for both truck and auto crossings. Observations were made of the operations so the consultants could determine where data should be collected in order to meet the dual objectives of establishing a quantitative transportation data base of operational characteristics and identify inefficiencies quantitatively. Data collection points and procedures were then established.

Two data collection approaches were tested in the first two case studies. One was to tag each truck so it could be identified as it passed through each point in the crossing process. This could enable determination of the time consumed by each truck in each monitored part of the process. It would also permit building a truck crossing time profile.

The second approach involved making controlled counts which would enable computations of processing times through the critical steps in the crossing process as well as total delay. Rather than using a tagging process, this approach involved counting trucks as they entered or left critical points. This permitted computation of more “movement” operating characteristics, although it did not permit isolating trucks individually.

Both approaches involved observations of operations and assessments of causes of actual problems or inefficiencies. Together with the data collected, this enabled the consultants to separate perceptions from reality, very important in developing effective measures to reduce avoidable delays through increased efficiency.

The first approach was used in Nogales where truck volumes were moderate (1,000 northbound vehicles) and the survey logistics were relatively simple. The second approach was tried at Laredo where truck volumes were high (over 2,500 northbound vehicles) and the survey logistics were more complex.

It was concluded that the second approach would provide more usable data for operational studies, although it would not enable analysts to evaluate individual truck processing times. This method allowed better estimation of the time invested at critical points in the process. In addition, the second methodology was less intrusive to truck operations and the ports of entry. Finally, since the case studies were not to interfere or become involved with the actual inspection processes, the second data collection method was selected for the remaining surveys.

Operating data collection typically included the following; variations were necessary because the crossing and inspection facility components varied:

- Arrivals entering the crossing system (usually the end of the queue of vehicles arriving at the export compound)
- Entry queue length
- Departure from the primary inspection booth (U.S.) or document inspection/primary inspection selection booth (MX)
- Percentage of trucks selected for primary inspection (MX)
- Primary inspection processing rate
- Percentage of trucks selected for secondary inspection
- Secondary inspection processing rate
- Percentage of trucks sent to other inspections (x-ray, hazardous materials - hazmat - inspections)
- Time leaving the exit gate
- Exit gate queues (if persistent)
- Other data at points observed to be capacity constraints

Field observations were made throughout the survey period on both sides of the border to determine where and when problems seemed to be occurring and the apparent causes. This included both ingress and egress routes going both northbound and southbound across the border.

Analyses consisted of determining:

- Arrival patterns
- Queue lengths
- Processing times
- Transportation inefficiency identification
- Opportunities for improvements in facilities or operations which could significantly and cost-effectively reduce overall travel time
- System considerations affecting the operation or opportunities such as other border crossings in the vicinity, the street system, urban development policy, etc.
- Comparison of results with other POEs studied
- Estimate of cost of transportation delays
- Conclusions about individual sites
- Determination of typical transportation operating statistics for POEs
- Development of a standard approach for conducting POE case studies

In some of the POE studies it was also requested that a briefing be given to interested local agencies to discuss tentative findings and to give them a chance to critique or add to the consultant output.

9.1.4 This Report

The next six chapters summarize the findings and opportunities for improvement resulting from each of the six case studies. The studies are presented in chronological order based on the date of the survey. This order was selected to demonstrate how the process evolved and the methodology was refined. Each chapter presents a set of logistic considerations that affects the operation of the POE, with specific observations for each of the crossings evaluated. Chapter 8 provides the typical transportation operating characteristics of a border crossing system and also suggests some planning, design, and operating principles to minimize unnecessary lost time for trucks.

The suggested approach for future studies is presented in a future Phase III report. It describes where they would be most beneficial, when they should be conducted, the suggested procedures, and what entities should be involved at a minimum.

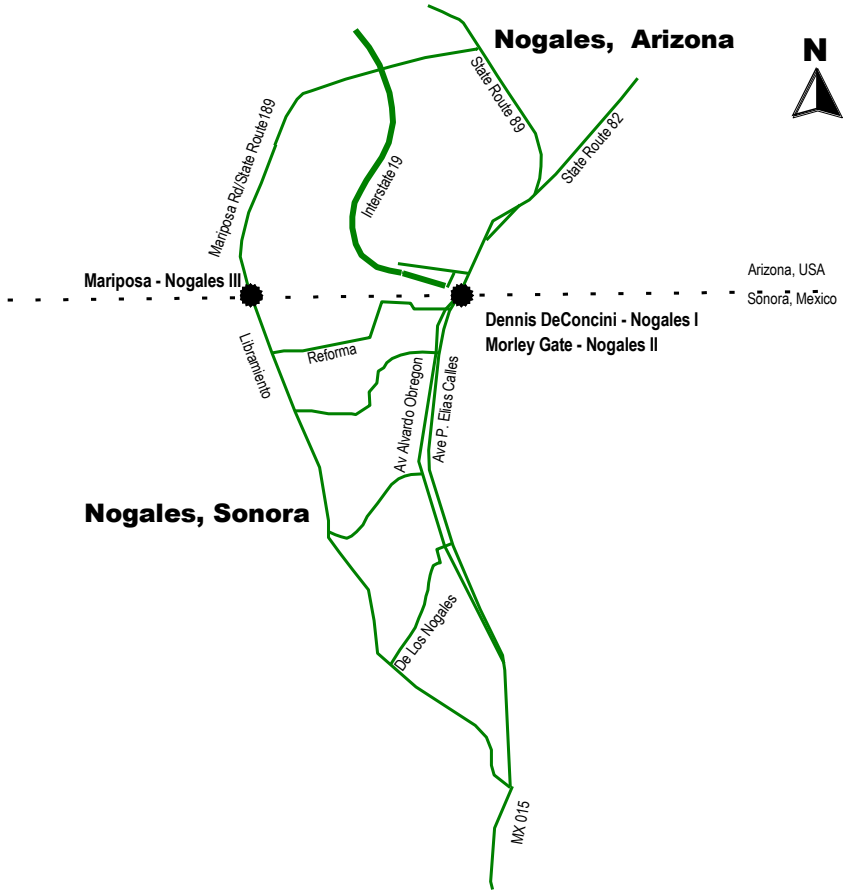
9.2 Nogales-Nogales POE System

9.2.1 Introduction

The commercial crossing located within the Nogales port of entry (POE) system, is the major crossing point for commercial trade between the states of Arizona and Sonora. The Nogales case study surveyed only the commercial crossing at Nogales (Mariposa)-Nogales III. The passenger vehicle and rail crossings located in the center of the urban area were not surveyed. Figure 9.1 shows the location of and primary access routes to the Nogales POE crossings.

Due to the close proximity of the Nogales-Nogales POE to the agricultural production areas in Sonora and Sinaloa, a significant portion of northbound commercial trade at this POE consists of produce and other agricultural/food products. Secretariat of Commerce and Industrial Development (*Secretaría de Comercio y Fomento Industrial* - SECOFI) data indicates that agricultural products represent between 25 to 30 percent of the northbound trade. Very little agricultural trade goes southbound at this crossing.

Figure 9.1 - Crossings in the Nogales-Nogales POE System



Source: Barton-Aschman-La Empresa, 1997

Southbound trade is dominated by the maquiladora industry as the Nogales commercial crossing serves a large number of maquiladora plants located along the border and interior cities as far south as Hermosillo. Traditional trade represents less than ten percent of the trade in Nogales. Traditional trade as defined as trade having an origin in one country and a destination in the other (non-maquiladora).

Due to the high volume of agricultural trade, Nogales experiences seasonable variability in trade flow. The peak volume times occur in the late fall and early winter months. In order to capture the peak trade activity, the consulting team conducted surveys at the Mariposa commercial facility on Thursday January 16 and Friday January 17, 1997. Both the northbound and southbound surveys were conducted between the hours of 8:00 a.m. and 8:00 p.m.

These survey hours reflected the operating hours of the U.S. and Mexican Customs operations, respectively. It should be noted that the U.S. compound remained open until 10:00 p.m. Between 8:00 p.m. and 10:00 p.m. empties and bobtails (tractors without trailers) were allowed to pass. However, the volume was so small it did not warrant the continuation of the survey.

9.2.2 Physical Description of the Border Crossing Area

The Mariposa Commercial Compound was originally constructed in 1976. In 1991, renovations were made to the U.S. secondary inspection facilities. Figure 9.2 shows a schematic layout of the U.S. and Mexican port of entry facilities. The following sections briefly describe the major components of the northbound and southbound border crossing areas:

Northbound

1. **Confederation of Agricultural Associations of Sinaloa (Confederacion de Asociaciones Agriculturales del Estado de Sinaloa - CAADES) Inspection Yard.** This inspection yard for agricultural products is located approximately four miles south of the border at the intersection of the Libramiento and Mexican Federal Highway 15 (MX 015).
2. **Libramiento.** The Libramiento is a four-lane arterial roadway that extends from MX 015 to the border. Both passenger and commercial vehicles access the Mariposa border crossing from this roadway. Trucks queue on the shoulder and in the right lane while passenger vehicles use the left lane.
3. **Mexican Export Area.** The Libramiento extends into the Mexican Export Area which houses the export inspection booths under a canopy. At the time of the survey, no inspections were being conducted in this area, however, trucks were required to stop to make their bank payments.
4. **Border Crossing Roadway.** This is a six-lane roadway between the Mexican export booths and the U.S. Primary processing booths. Three lanes are exclusively for trucks and three for passenger vehicles.
5. **U.S. Primary Inspection Booths.** Import papers are collected and need for additional inspection is determined. Monday through Friday these booths are open from 8:00 a.m. to 7:15 p.m.
6. **Secondary Inspection Area.** Trucks are directed to this area for secondary inspection or park here temporarily completing documentation. There are 92 secondary inspection docks at this facility.

Figure 9.2 - Schematic of Nogales-Nogales Crossing

7. **Arizona Department of Transportation (ADOT) Permit Booth.** At the time of the survey the ADOT permit booth was located inside the U.S. Customs compound. Since the survey was completed the ADOT booth has been moved outside the compound.
8. **Exit Booths.** There are two exit booths, although both are not continually open. All vehicles entering the commercial facility exit at these booths. The exit booths remain open until approximately 8:00 p.m. to allow for all vehicles to exit the compound before the close of the business day.
9. **Mariposa Road (State Highway 189).** Trucks exiting the commercial facility must use Mariposa Road. This facility is a four-lane divided highway that connects with I-19 approximately five kilometers to the northeast.

Southbound

A. **Mariposa Road (State Highway 189).** See Item 9 above.
B. **U.S. Export Booth.** Southbound in-bond shipments must enter the U.S. Customs import compound prior to enter Mexico. If southbound trucks have export declarations to file, they must stop at the export booth and drop the export declaration in a drop box. All other southbound trucks are free to cross into Mexico without stopping on the United States side of the border.
C. **Mexican Document Inspection Booths (Random Selection System).** After traversing the zone between the ports of entry trucks come to the document inspection booths where trucks are subjected to the random selection system. There are two document inspection booths; however, only one is operated in the morning, and the second is opened later in the afternoon.
D. **Primary Inspection Area.** If a truck is selected for a primary inspection it enters the primary inspection area located west of the document inspection booths. Ten percent of all commercial vehicles are subjected to a primary inspection. There are seven inspection spaces.
E. **Secondary Inspection Booth.** As vehicles exit the primary inspection area, they are passed through the random selection system for a second time. Ten percent of these vehicles are chosen for a secondary inspection. The secondary inspection is a reinspection of the cargo performed by a separate organization. There are two spaces for secondary inspections.
F. **Exit Booth.** All vehicles exit the import compound through the exit booth.
G. **Libramiento.** See Item 2 above.

9.2.3 General Observations and Conclusions

The Nogales-Nogales commercial crossing was the one of the lower volume crossings surveyed as a part of the case studies. (Overall, Nogales-Nogales is the fourth busiest port of entry of all the crossing systems along the border in terms of truck volumes.) This was the first location surveyed and the methodology used to collect the northbound data was different than the methodology used at the subsequent locations. At this port of entry every northbound truck was "tagged" with a label indicating the time it arrived in the queue in Mexico. The label was removed at the exit gate of the U.S. import compound and the time of exit was recorded.

While, this methodology provided very accurate arrival times and total processing time per vehicle across the border, it did not, however provide sufficient data on the various processing rates throughout the border crossing event. Therefore, in subsequent locations a controlled counting methodology was used to determine arrival rates and processing times at various points in the border crossing event.

In the southbound direction, counts were made at the following locations within the Mexican compound: the document inspection booths, primary inspection area and secondary inspection area. These counts were recorded on ten minute intervals. In addition, the duration of each inspection was recorded. This methodology proved effective and was utilized for the remaining locations.

Table 9.2 summarizes the results of the surveys conducted at the POE on January 16 and 17, 1997. This Table 9.format was developed to present the data from the surveys conducted using the second methodology, therefore, some information was not available for this location. In the northbound direction, a total of 940 and 975 vehicles were counted on January 16th and 17th, respectively. It should be noted that in the southbound direction bobtails and empties do not pass through the Mexican Customs compound and were therefore not counted. The following sections describe the findings of the northbound and southbound movements respectively.

Northbound

Table 9.3 provides additional detail on the information collected by the northbound surveys for each survey day. Tables 9.4 and 9.5 summaries the inefficiencies and opportunities identified based on the surveys and field observations. Figures 9.3 and 9.4 show the 15-minute arrival patterns (trucks entering the queue in Mexico) for the two survey days. Note the variability in the arrivals through out the day. On average the arrival rate fluctuated around 20 trucks per 15-minute interval or 80 trucks per hour.

Based on counts conducted at four of the other case study locations, U.S. primary booth processing rates can vary between 20 to 60 vehicles per hour. In Nogales, with three primary booths open, the facility was operating at or above capacity during much of the day. This was evidenced by the queues which formed and dissipated through out the day. At times, the queue extended along the Libramiento for more than six kilometers.

The queue formed in the right hand lane of the Libramiento. Other trucks waiting for their pedimentos parked on the right hand shoulder and along the side streets. These trucks would merge back into the queue once their pedimentos were delivered by the brokers. Brokers used passenger vehicles or had the transitos (police) deliver the documents to the drivers. The circulation of these vehicles added to the congestion on Libramiento.

Additional congestion (confusion) occurred at the three-way T-intersection of Reforma and the Libramiento just south of the Mexican Customs compound. This stop sign controlled intersection is used heavily by both passenger vehicles and trucks. At times trucks completely block the intersection and at other times passenger vehicles block the trucks. In the afternoon the intersection is controlled by a traffic control officer.

On the survey days, no delay was observed due to the operations of the Mexican export facility. There were three export booths where drivers stopped and presented their export documents for inspection and made any necessary bank payments. From this point, they proceeded north to the U.S. primary inspection booths.

Table 9.2
Nogales-Nogales Survey Results

Vehicle Classification	Northbound Nogales-Nogales	Southbound Nogales-Nogales
Total Vehicles (Average 2 days)	1030	400
Bobtails (Tractors Only)	60 / 6%	Not Counted
Single Units & Tractor-Trailers	970 / 94%	Loaded Vehicles Only
Truck Inspections		
Primary Inspections		
Percent Inspected	100%	10%
Average Time (min)	na	180
Secondary Inspections		
Percent Inspected	na	1%
Average Time (min)	na	180
Average Processing Time (min)	na	20
Average Waiting Time	na	0
Outside Compound (min)		
Total Average Time (min)	50	20
Minimum Processing Time (min)	3	1.5
Maximum Processing Time (min)	365	na

Source: Barton-Aschman & La Empresa, January 16-17, 1997

Table 9.3
Nogales-Nogales Northbound Survey Results

Vehicle Classification	January 16, 1997	January 17, 1997
Total Vehicles (U.S. Customs)	1038	1025
Total Vehicles Surveyed	909	935
Bobtail (Trucks w/o trailers)	6%	6%
Empties	16%	17%
Loaded Trucks	78%	77%
Processing Times Mexico to United States		
Primary Inspections		
Percent Inspected	100%	100%
Average Time (min)	na	na
Total Average Time (min)		
Empties/Bobtails	26	21
Loaded Trucks	60	55
Minimum (min)		
Empties/Bobtails	3	3
Loaded Trucks	6	6
Maximum (min)		
Empties/Bobtails	365	190
Loaded Trucks	335	285

Source: Barton-Aschman and La Empresa, January 16-17, 1997

Table 9.4
Northbound Nogales Crossing Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route (MX) - Libramiento • Trucks park on shoulder of roadway and along side streets creating congestion • 3-way intersection at Reforma and Libramiento breaks down due to truck and passenger vehicle conflicts/congestion, requires traffic control officer in afternoon peak • broker vehicles add to the congestion on Libramiento with delivery of export documents	• Encourage increased use of CAADES yard for pre-inspection and pre-clearance • Provide remote area away from roadway for trucks to wait for documents • Consider a dedicated fiscal route project • Consider installation of signal at intersection of Reforma and Libramiento	Mexico	Secretariat of Communication and Transportation (SCT), Municipio of Nogales
Mexican Export Compound • Approximately 50 percent of the trucks are pre-inspected and pre-paid • No congestion observed	• No opportunities required.	Mexico	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP)
U.S. Primary Inspection • Only 2 of 3 booths operated • Canine inspection conducted in front of primary booths.	• Staff third booth during peak periods	United States	U.S. Customs
Secondary Inspection Areas • Drivers accessing ADOT permit booth located on the Secondary Inspection docks, at times blocked primary inspection • Canine inspections conducted near exit were performed “off-line” out of the flow of traffic	• Relocate ADOT permit booth (this has already occurred) • Continue to perform canine inspection “off-line”	United States	Arizona Department of Transportation (ADOT), U.S. Customs
U.S. Exit Booth • Used both available lanes during peak periods	• One of two facilities studied that used two exit lanes	United States	U.S. Customs
Egress Route - Mariposa Road • Trucks turn from compound exit directly onto Mariposa Road • Intersection of Mariposa Rd. and I-19 congested during peak periods.	• Monitor intersection for needed improvements	United States	ADOT

Source: Barton-Aschman & La Empresa, January 16-17, 1997

Table 9.5
Southbound Nogales Crossing Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route (US) - Mariposa Rd. • Intersection of Mariposa and I-19 is congested during peak periods • Trucks park on shoulder while waiting for documentation (pedimentos)	• Monitor intersection for needed improvements • Encourage the brokers to establish better coordination between dispatchers and drivers • Provide an area for trucks to wait	United States	ADOT, U.S. Customs, Mexican Brokers
U.S. Export Inspection Area/Document Collection • Drop box system	• No opportunities required	United States	U.S. Customs
Mexican Document Inspection Booth • 2 of 3 booths open for random selection system • Third booth was opened during peak periods	• Additional document inspection lanes may be needed if truck volumes increase	Mexico	SHCP
Mexican Primary Inspection • Area currently working near capacity.	• Additional spaces may be needed if truck volume increases	Mexico	SHCP
Mexican Secondary Inspection • 2 spaces are operating near capacity • Additional spaces would be required if truck traffic increases	• Add new secondary inspection if truck volumes increase	United States	SHCP
Access Route (MX) -Libramiento • 3-way intersection at Reforma and Libramiento breaks down due to truck and passenger vehicle conflicts/congestion, require traffic control officer in afternoon peak • Trucks stop to swap drivers	• Consider a dedicated fiscal route project • Provide area for driver swap off the roadway.	Mexico	Secretariat of Communication and Transportation (SCT), Municipio of Nogales

Source: Barton-Aschman & La Empresa, January 16-17, 1997

During the survey day, three of four booths were operated. Queues formed in front of the U.S. primary inspection booths due to the demand exceeding the inspection capacity. At times, the queue at the U.S. primary booths extended back through the Mexican export facility creating a queue on Libramiento.

Figures 9.5 and 9.6 show the distribution of the total processing time versus when the vehicle entered the queue in Mexico. Total processing time is defined as the time from when the truck entered the queue in Mexico until the time it exits the U.S. Customs compound. Note that the majority (90%) of vehicles are processed in under 90 minutes. Also note that the maximum length of inspections appeared to drop in the afternoon period for the two days surveyed. This is similar to studies performed in 1995 by Cal y Mayor at several POEs along the U.S.-Mexico border.

A contributing factor to the short processing times within the U.S. Customs' compound is the pre-inspection of agricultural cargos. This inspection is carried out at the Confederation of Agricultural Associations of Sinaloa (CAADES) yard located at the intersection of Libramiento and MX 015. Services provided at the CAADES yard include weighing the vehicle, verifying the contents, state (U.S.) agricultural inspection and USDA agricultural inspections. In addition, the collection, verification and distribution of the Mexican pedimentos is completed in the CAADES yard.

Once all inspections are complete, the trailers are sealed and they are released pre-cleared for the border crossing. According to the Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public - SHCP) data, approximately 50 percent of northbound cargo uses the CAADES facility (based on January 1997 data). Of the remaining 50 percent, approximately 25 percent is maquiladora trade and 25 percent is independent exporter trade. Depending on the type of cargo handled by the independent exporters, there may be an opportunity to make additional use of the CAADES facility to speed the border crossing process by the remote processing of agricultural loads.

Figures 9.7 and 9.8 show the cumulative frequency of the length of inspections for loaded and empty vehicles. Ninety percent of the empty vehicles and bobtails are processed in less than 45 minutes. On the other hand, 90 percent of the loaded vehicles are processed in less than 90 minutes.

Within the U.S. compound canine inspections were being conducted in three locations: in front of the U.S. primary booths, on the inspection docks, and in an area near the exit booths out of the flow of traffic. These inspections did not appear to impede the flow of trucks through the facility.

On the survey day, the greatest interruption in flow tended to be trucks stopping just inside the primary inspection booths waiting to park at the dock closest to the ADOT permit booth. These trucks blocked the primary inspection lanes creating delay. The ADOT booth has since been moved and no longer creates this potential for delay.

Southbound

Mariposa Avenue (SR 189), the access route from Interstate 19 (I-19) to the crossing, is very direct and does not contribute to southbound delay. Some congestion occurs adjacent to the crossing when trucks waiting for their pedimentos park along the roadway. Once trucks receive their documents, they merge back onto the roadway. Providing a space for waiting trucks off the roadway or encouraging better coordination between the drivers and brokers would improve this situation.

Figure 9.3 - 15-Minute Arrivals in Nogales, Mexico - January 16, 1997

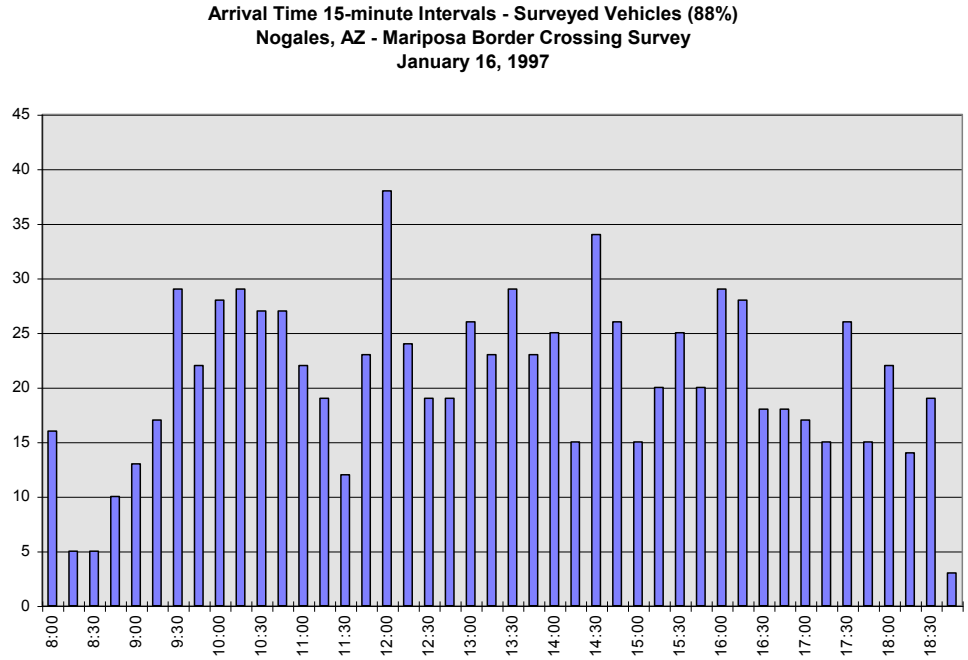


Figure 9.4 - 15-Minute Arrivals in Nogales, Mexico - January 17, 1997

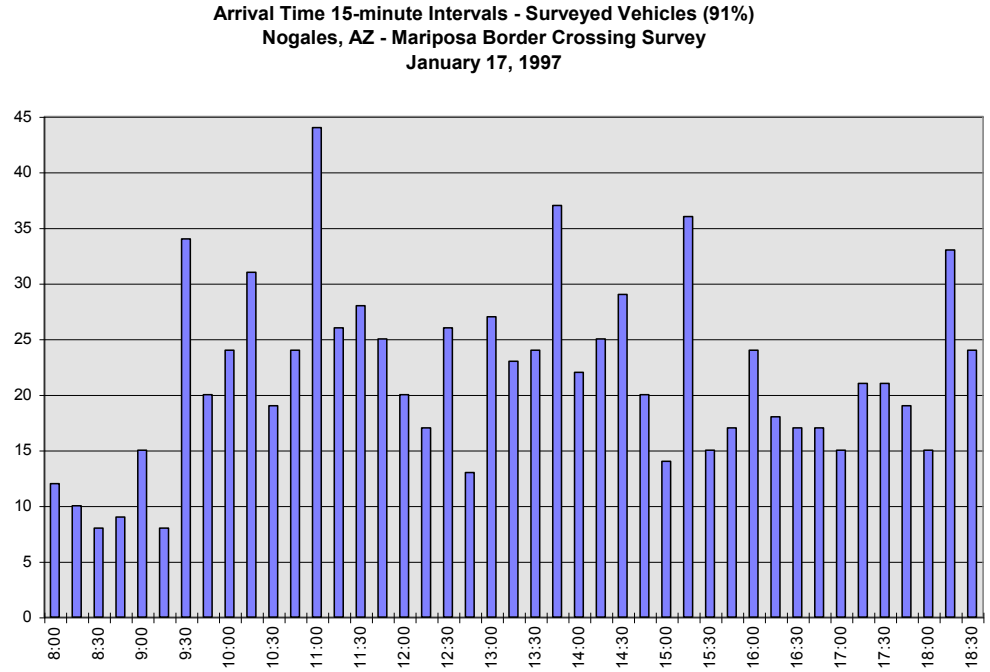


Figure 9.5 - Total Vehicle Crossing Times by Time of Day - January 16, 1997

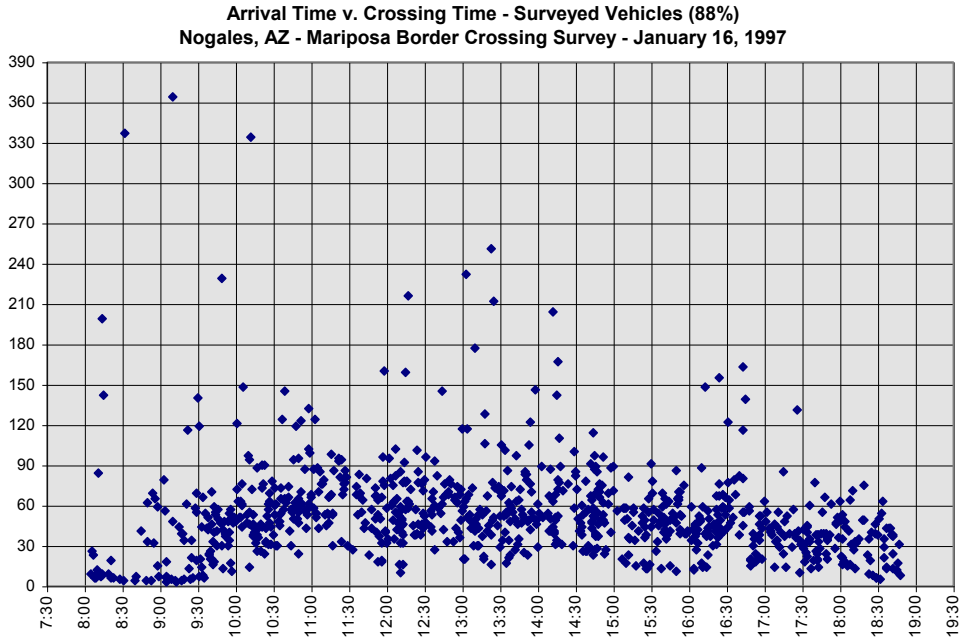


Figure 9.6 - Total Vehicle Crossing Times by Time of Day - January 17, 1997

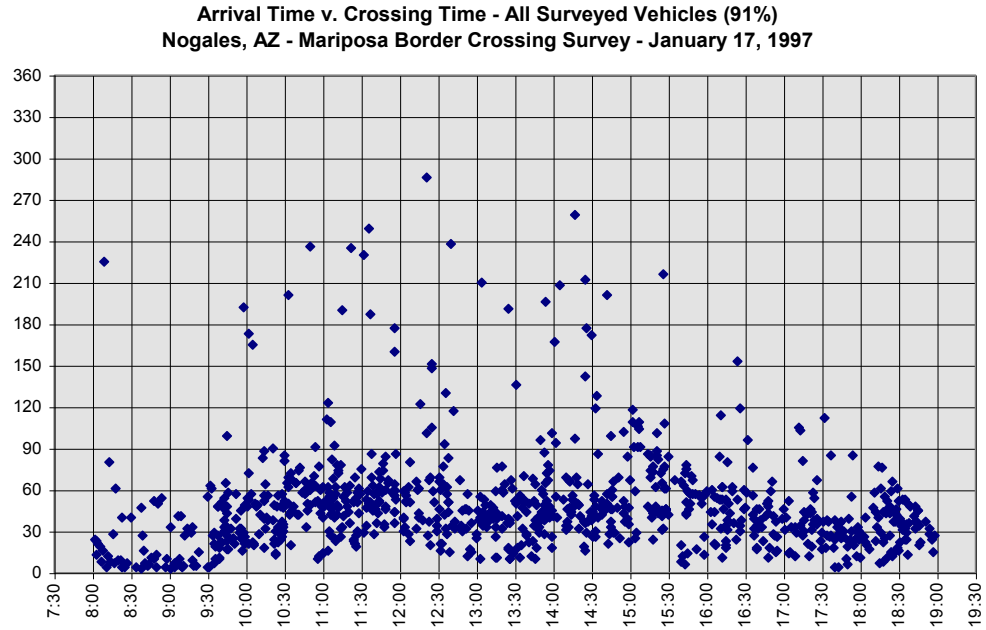


Figure 9.7 - Cumulative Frequency of Crossing Times - January 16, 1997

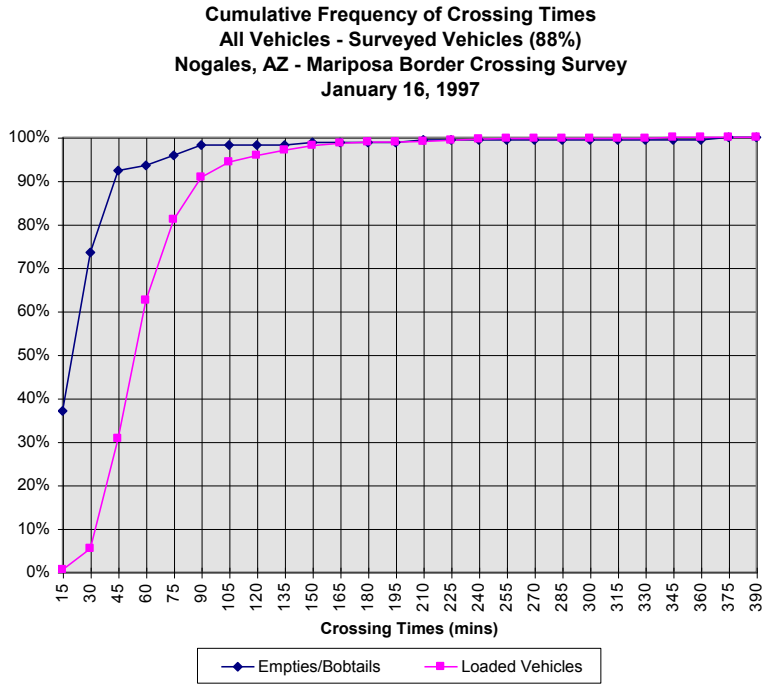
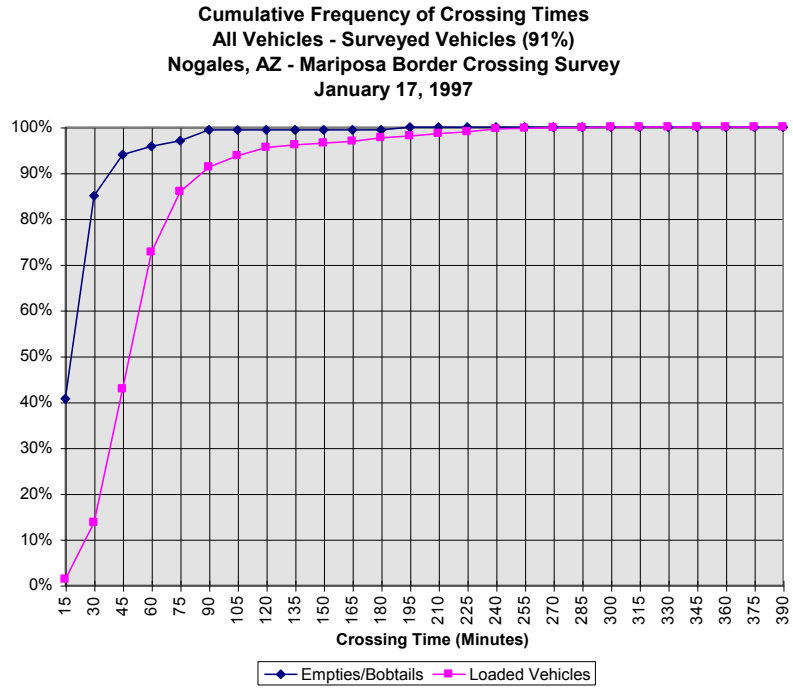


Figure 9.8 - Cumulative Frequency of Crossing Times - January 17, 1997



As drivers proceed across the border, there is a drop box located at an unmanned export booth where export documents are placed. Typically no southbound inspections are conducted, however, random inspections are conducted on an infrequent basis.

The number of document inspection booths (Module 1) where the random selection occurs is sufficient given the low volume of international trade passing through Nogales (400 loaded trucks a day). During the survey days, no significant queues formed in the United States for the following reasons.

For an average flow of 400 trucks per day, the number of trucks sent to Mexican inspection is 40, or an average of 6 trucks per primary inspection space. Primary inspections do not exceed 3 hours and are on average 2 hours in length. The inspectors tend to avoid over loading the inspection area, because they are aware that this would block the flow at the facility entrance.

Demand is relatively constant throughout the day. It increases slightly after 10:00 am and continues until 10:00 pm when the inspection area is closed for the night. During these hours, the random selection system (SAAI) detains on average 4 trucks per hour. With an inspection time of two hours on average, the existing inspection area is sufficient as shown in Figure 9.9.

The potential for congestion is in the afternoon when the demand increases slightly. The capacity of document inspection booths with three booths open is 90 trucks an hour. On average nine trucks sent to the primary inspection area during the peak hour.

On the survey days, no serious congestion was observed in the Mexican primary inspection area. The truck volumes exceeded 300 trucks per day. Mexican Customs worked with two booths all day long and did not have to open the third booth.

A small accumulation of vehicles occurred briefly at 5:00 pm due to the return of the empty trucks when they mixed with the trucks waiting for their pedimentos (documentation). Figure 9.10 shows the southbound hourly arrivals at the POE. Empty trucks are allowed to use one of the automobile lanes (dedicated for this purpose) and do not enter the inspection area. During this peak, a queue of up to 10 vehicles would form at the crossing.

In the future, if the demand increases, the capacity of the primary inspection area will become a constraint to the southbound flow due to insufficient space for primary inspections. It is estimated that the maximum capacity at Mexican customs is 420 (loaded) trucks assuming a relatively constant demand throughout the day and that the average inspection time does not increase above two hours.

In contrast to the potential problem in the primary inspection area, the limted capacity of secondary inspection area is a less significant problem. The maximum capacity of this area is one truck per hour assuming an average inspection time of 2.5 hours. Any significant increase in the demand volume will require an increase of spaces in the secondary inspection area which will require additional space.

Figure 9.9 - Nogales Primary Inspection Area Capacity

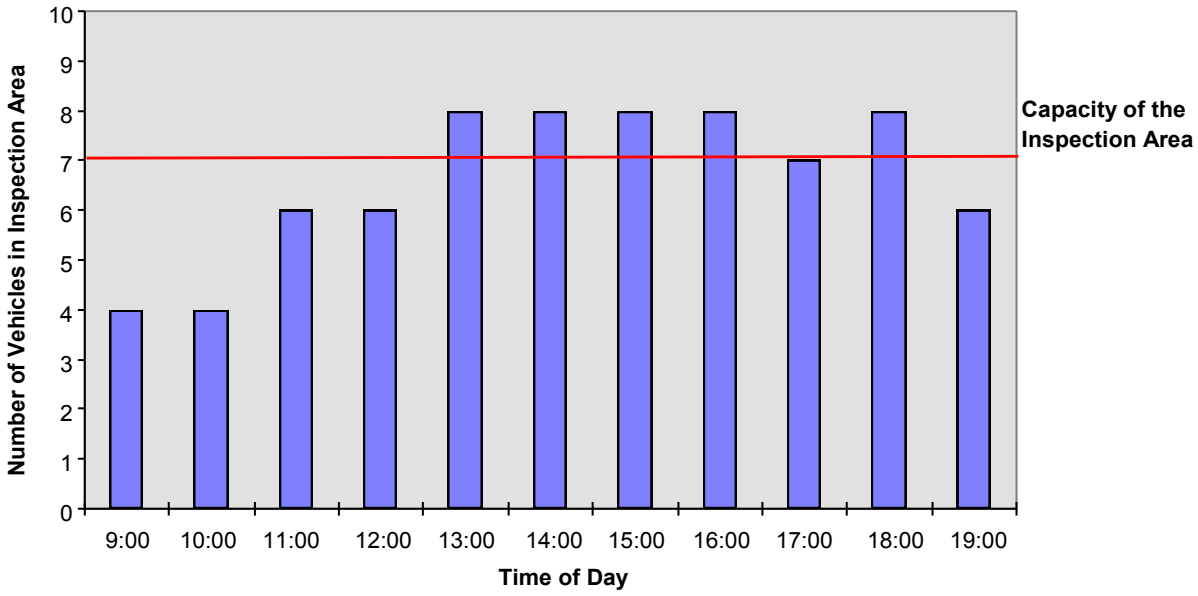
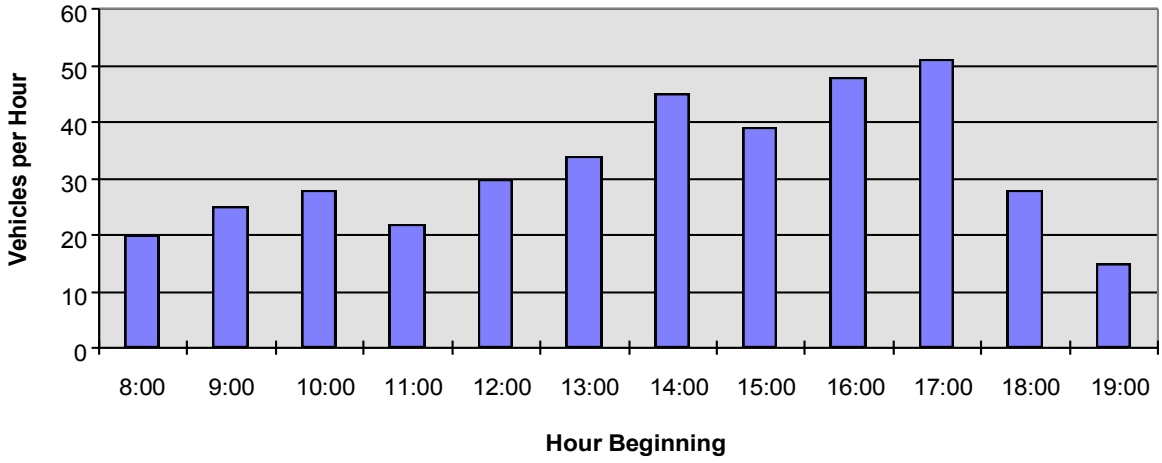


Figure 9.10 - Nogales Southbound Hourly Arrivals



9.3 Eagle Pass-Piedras Negras POE System

9.3.1 Introduction

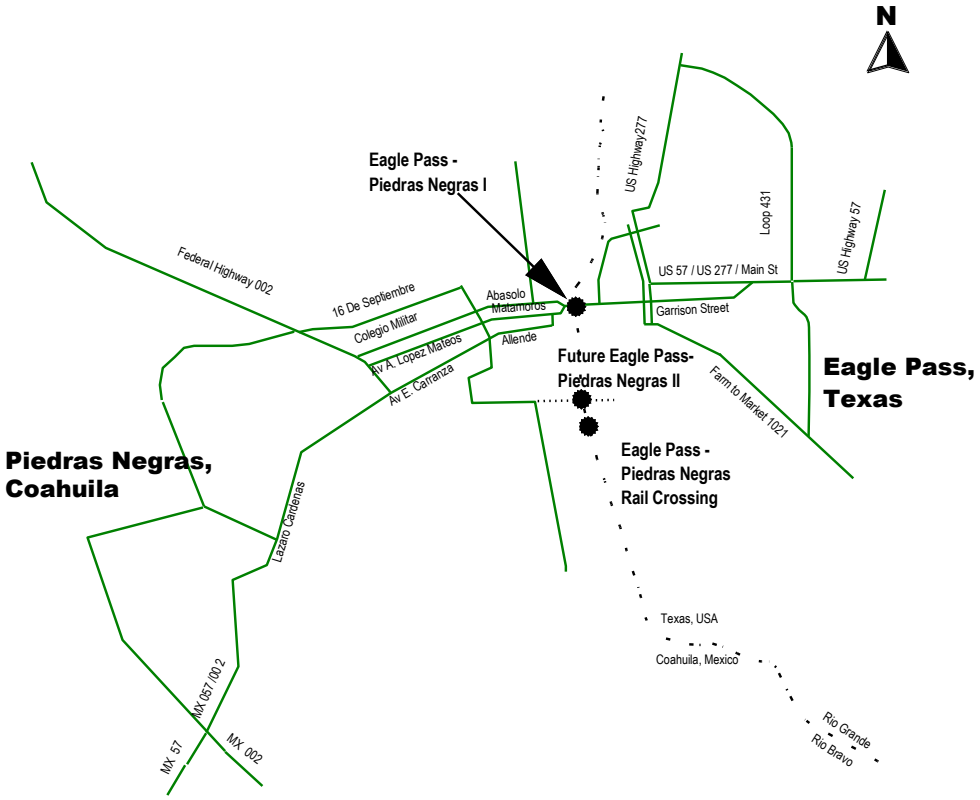
The Port of Entry (POE) at Eagle Pass-Piedras Negras is the principal crossing between the states of Coahuila and Texas. This POE suffers from fierce competition with the crossings located in Laredo-Nuevo Laredo and the Colombia Bridge. However, it serves a well defined area with sufficient industrial potential. Coahuila has been historically strong in the iron and steel industries and has recently become an attractive location for the automobile industry.

The communities of Eagle Pass and Piedras Negras are joined by a single international bridge located in their respective downtowns. The two-lane bridge with sidewalks serves passenger vehicles, commercial vehicles, and pedestrians. The existing bridge was constructed in 1954. A railway bridge is located approximately one kilometer to the south of the vehicle/pedestrian crossing.

Regional access to the Eagle Pass bridge is primarily provided by two U.S. Highways, U.S. 277 and U.S. 57. (See Figure 9.11.) U.S. 57 represents the most direct route for binational trade between the United States and Mexico passing through the Eagle Pass-Piedras Negras port of entry.

In Mexico, regional access is provided by the two-lane Federal Highways 057 and 090 (MX 057 and MX 090 and the two- to four-lane Federal Highway 057(MX057).

Figure 9.11 - Crossings in the Eagle Pass-Piedras Negras POE



Source: Barton-Aschman-La Empresa, 1997

The volume of commercial vehicles at this ~~POE~~ System is much lower than for the other case study locations. Overall the crossing is the eighth busiest crossing of all the POE systems in terms of northbound truck volumes. As such, the same type of survey conducted at the other ports of entry was not merited in this location. Observations of the POE operations were made and interviews with local officials were conducted by the consultants on April 10, 1997.

Interviews were conducted with officials of both U.S. and Mexican Customs. The consultants focused their analysis on the serious operational difficulties on the Mexican side. The consultants also carried out a detailed review of the project for the proposed new bridge in order to evaluate the applicability of the design criteria defined by the Binational Study with an actual project.

9.3.2 Analysis of Flow

Cargo Volumes

Eagle Pass-Piedras Negras is the fourth highest POE in terms of rail volume (tonnage) that cross the U.S.-Mexican border. The railway carries nearly three times as much cargo northbound and nearly two times as much cargo southbound as do trucks. Eagle Pass-Piedras Negras serves as an attractive railway alternative for the importation of grains to Laguna and the exportation of minerals and other heavy products. Tables 9.6 and 9.7 show northbound and southbound trade movements (by ton) crossing through the Eagle Pass-Piedras Negras POE by truck and rail, respectively.[1]

Vehicle Flows

According to CAPUFE,[2] the movement of northbound trucks tripled between the years of 1991 and 1993, for a total of more then 60,000 more trucks each year than the year before. There are approximately 150 average daily northbound loaded commercial trucks.

The commercial vehicular composition consists mainly of tractor-trailers with very few single unit trucks. The volume of trucks at Eagle Pass-Piedras Negras is the smallest observed in the six POE case studies.

Northbound Observations - Mexican Side

- The crossing was designed for passenger vehicles and not for commercial traffic flow.
- The crossing is located in the city center where access routes are narrow, barely sufficient for the movement of truck traffic.
- The movement of truck traffic through the city is felt to be a major cause of congestion on city streets by local officials.

[1] These data will be provided in Task 10 which includes conversion of the value of binational trade into volumes.

[2] CAPUFE: Federal Toll Highways and Bridges (Caminos y Puentes Federales de Ingresos y Servicios Conexos), division of the Secrertariat of Communications and Transportation (SCT) in charge of the operations of some international bridges.

Table 9.6
Northbound Cargo Movement (1995)

Category	Truck Transported (Tons)	Rail Volumes (Tons)	Percent of Total Cross Border Trade by Category
Minerals	108,739	637,873	15.3%
Traditional Industries	109,756	277,600	7.0%
Maquila	159,020	--	3.2%
Pitex[3]	137,664	722,481	10.6%
Total (All Categories of Trade)	515,179	1,637,954	8.0%

Source: La Empresa

Table 9.7
Southbound Cargo Movement (1995)

Category	Truck Transported (Tons)	Rail Volumes (Tons)	Percent of Total Cross Border Trade by Category
Agricultural Products	33,294	332,849	4.9%
Traditional Industries	115,655	494,749	5.9%
Maquila	217,300	--	3.0%
Pitex	229,602	53,739	5.8%
Total (All Categories of Trade)	595,851	881,337	4.9%

Source: La Empresa

- The border crossing system is completely disjointed (See Figure 9.12). The Mexican Customs offices and inspection area are located 700 meters to the east of the bridge, which creates a serious inefficiency in the processing of the import documents (known as pedimentos) and truck inspections. When a loaded truck wants to exit Mexico, it must first go to the Mexican Customs compound to be subjected to the random selection system of SAAI. Upon obtaining authorization to exit, the truck must make its way to the bridge traversing five city blocks.
- Mexican Customs regularly keeps trucks in the yard in order to release them in convoys. This causes a lot of disruption to regular city traffic and contributes to the periodic congestion of the bridge and the U.S. primary inspection booths.
- Upon arriving at the bridge, the trucks pay their tolls at the left hand toll-booth. There is often traffic congestion at the toll booths during the afternoon when trucks are released from the Mexican Customs compound. However, it should be noted that the three existing toll booths are sufficient to meet the demand given that the U.S. passenger vehicle inspection booths and the bridge are the real capacity constraints.
- At the entrance to the bridge, the driver gives the sealed pedimento to the Customs inspector in the customs booth. Prior to the truck's arrival, the customs broker leaves a copy of the pedimento at the Customs booth. This copy is given to the driver in exchange for the sealed pedimento.

Figure 9.12 - Schematic of Eagle Pass - Piedras Negras Crossings

[3] Pitex: Program of Temporary Importation for Exportation (Programa de Importatcion Temporal para la Exportacion) See the Task 10 Report

- The two-lane bridge, one lane in each direction, is insufficient for the peak volumes of mixed passenger and commercial vehicle flow.

Northbound Observations - U.S. Side

- The entrance to the U.S. commercial compound is located at the end of the bridge structure. Commercial vehicles make a right-turn at the end of the bridge approach and then a left-turn behind the U.S. Customs building where they enter U.S. primary inspection. The primary inspection booths are located approximately 100 meters from the bridge.
- The U.S. secondary inspection building is located to the east (right) of the primary inspection booths. Vehicles circulate in a clockwise direction around the building. While both sides of the building have docks, the majority of inspections are conducted on the east side.
- Upon release from U.S. Customs, commercial vehicles exit back onto Garrison Street (U.S. 57) at Adams Street.
- Even though commercial truck volumes are relatively low at this POE, the two-lane bridge cross-section can create a bottleneck for commercial trade since a single stalled vehicle can block northbound or southbound flow.
- Due to the operating characteristics of Mexican Customs, the majority of commercial traffic arrives during a short peak period in early afternoon. Depending on the number of vehicles crossing on a given day, the queue from U.S. primary inspection may extend onto the bridge temporarily blocking the flow of passenger vehicle traffic.
- The release of the commercial vehicles in Mexico often coincides with an increase in passenger vehicular (lunch time/midday) traffic. The combined volume of the commercial and passenger vehicles can cause queues which extend into Piedras Negras.
- The existing U.S. Customs compound has more than adequate capacity for processing the existing volume of commercial vehicles. In addition, since the facility is only processing commercial vehicles for a few hours in the afternoon, there is residual capacity to handle commercial vehicles in the morning hours.

Northbound Opportunities

- Coordinate with Mexican Customs to spread out the arrival of commercial vehicles at the U.S. primary inspection booths. If commercial vehicles were released from the Mexican facility over the entire day, queuing at U.S. primary inspection would be minimal and commercial vehicles would be less likely to block the northbound lane on the bridge.
- Redesign the entrance to the U.S. Customs facility in order to provide additional space for queued trucks.
- In an effort to relieve congestion during peak periods, a second border crossing has been proposed approximately one kilometer south of the existing bridge and immediately north of the existing railroad bridge.

  The addition of a second bridge, relocation of commercial traffic to the new facility, and the provision of a new truck route would improve commercial truck access to and from Mexico. The incorporation of the Mexican Customs inspection area with the bridge and the provision of more sufficient design will assure increased capacity and total separation between the movement of passenger vehicles and commercial vehicles.

Southbound Observations

- Commercial vehicles approach the crossing on Garrison Street.
- Commercial vehicles can use either of the two left toll booths.
- Passenger vehicles typically approach the crossing from either Garrison or Main Streets. Passenger vehicles approaching on Main Street must use Commercial, Washington, Adams, or Jefferson Streets to cross over to Garrison Street before entering the toll booths.
- Peak passenger vehicle flows occur on Friday nights and all day on Saturdays and Sundays. During these peak periods, congestion at the intersections of Commercial, Washington and Adams Streets, hinders flow across the bridge. The Eagle Pass police department often must close these side streets in order to improve southbound traffic flow.
- Upon entry into Mexico, commercial vehicles enter two SAAI booths on the right hand side where their documentation is reviewed and where the trucks are subject to the random selection system for further inspection.
- The lack of space at the exit of the bridge prohibits efficient use of two additional Mexican Customs booths. This produces some congestion on the bridge while trucks are processed at the booths. If more than two trucks are present, passenger vehicles cannot pass, causing vehicular traffic to back up onto the bridge.
- Ten percent of commercial trucks are chosen for primary inspection. These trucks are sent to the Mexican Customs area located 700 meters from the bridge. In the peak hour, the random selection system selects more trucks. Trucks selected for primary inspection wait until a police patrol arrives to accompany them to the Customs inspection area.
- Local officials feel that the separation of the inspection area and the bridge generates unnecessary traffic flow in the streets of Piedras Negras. Furthermore, it creates an inefficient and complex process which would be eliminated by the new bridge.

Southbound Opportunities

- Investigate permanent downtown street closures and/or signalization of intersections along Garrison Street to improve southbound traffic flow.
- In an effort to relieve congestion during peak periods particularly for passenger vehicles, a second border crossing has been proposed approximately one kilometer south of the existing bridge and immediately north of the existing railroad bridge. The addition of a second bridge, relocation of commercial traffic to the new facility, and the provision of a new truck route would improve commercial truck access to and from Mexico. The relocation of trucks to the new bridge would also benefit southbound passenger vehicles using the existing bridge.

9.3.3 Bridge Proposal

The initial study for a new bridge between Eagle Pass and Piedras Negras was conducted in 1988. Numerous studies were conducted related to the application for a Presidential Permit which is required to construct a new international bridge. In May 1996, the Presidential Permit was approved. The United States and Mexico exchanged Diplomatic Notes in this bridge in November 1997.

The proposed bridge will be located just north of the existing railroad bridge. The proposal is to construct a bridge with a five lane cross-section plus pedestrian sidewalks. This cross-section will allow for two lanes in each direction (northbound and southbound) along with a reversible center lane. On the U.S. side of the crossing, a new Customs facility will be constructed to serve the bridge. The existing compound would be closed for commercial traffic.

The land (in the United States) is owned by the City of Eagle Pass, the Union Pacific railroad company, and SESA Fluorspar, Inc. Some right-of-way acquisition has yet to be completed. Several public-use properties including a school, park, and golf course lie in the way of the proposed bridge infrastructure. In addition, there are a few commercial facilities and a closed wastewater treatment plant which lie within the proposed bridge complex area.

As plans for the new U.S. inspection compound are developed, the planning and design principles listed in Chapter 8 should be considered. Sufficient space for maneuvering vehicles and future inspection activities should be reserved. Adherence to these planning and design considerations should aid in correctly sizing the facility.

The Mexican project has been recently modified to include several state of the art elements similar to the designs used at the Colombia bridge. The flow of commercial and passenger vehicles will be clearly separated and sufficient space has been provided for export inspections. The new project has the advantage of being located near the railroad which could foster the future creation of intermodal services.

Regardless of these design changes, there is still insufficient space for import inspections within the Mexican compound. Furthermore, other aspects of the project are also still deficient. The roadway system is proposed to cross through the commercial inspection area reducing the effective space available for inspection of the trucks. This design will require the acquisition of additional land through expropriation or purchase of adjacent occupied parcels.

The minimum space necessary for parking the trucks at the dock in the Customs area, 40 meters in width, is not assured in the final proposal known to the consultant. In the current design, the maneuvering area is still insufficient and will conflict with traffic on the road to the bridge.

It is important to provide sufficient space, in the vicinity of the crossing, for the future development of logistic service areas. In order to meet this need, the availability of land owned by the Ferrocarriles Nacionales de Mexico-Mexican National Railroad (FNM) should be analyzed as an alternative with the new owner of this company. Finally, the proposed project does not provide adequate connections between the portion of the city located to the east of the project and the downtown area. This lack of connectivity could isolate this area of the rest of the city.

Mexican Customs should redesign this project completely. This will require better coordination between the State government of Coahuila, the promoter of the new project, and the Administration of the Mexican Customs. The case study of Eagle Pass-Piedras Negras shows the necessity of having clear and specific design criteria for border crossings.

The involvement of a binational organization could further enhance the design of the project to assure the maximum useful life and efficiency of the new crossing. In addition, the organization

could aid in the communication between participants in Eagle Pass and Piedras Negras and assist in developing a binational consensus about the project.

9.4 Otay Mesa-Mesa de Otay POE System

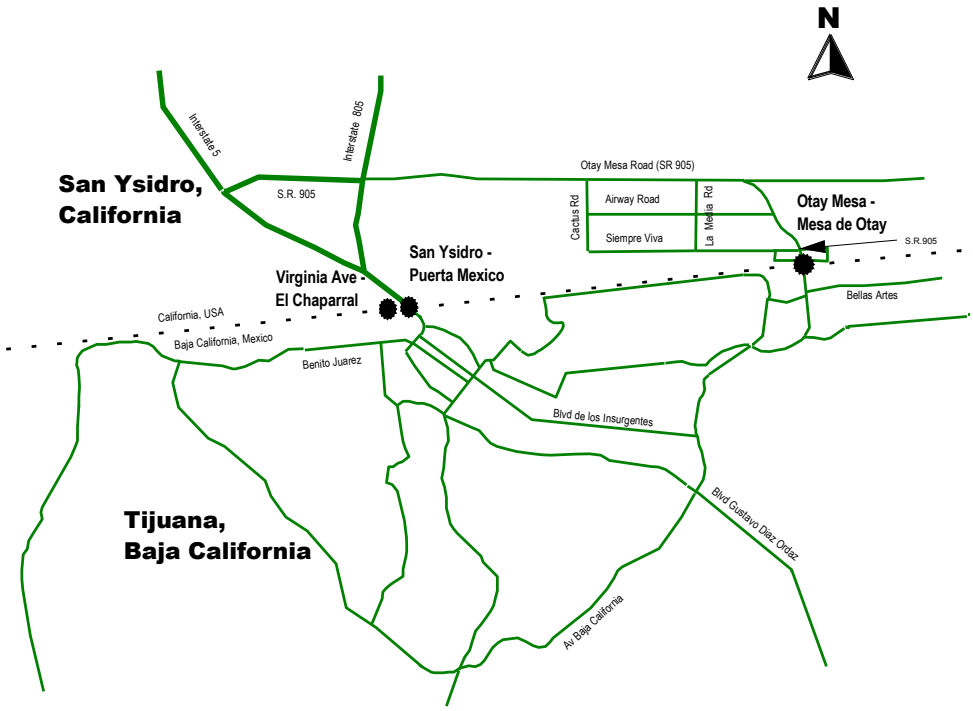
9.4.1 Introduction

The commercial port of entry (POE) located at Otay Mesa-Mesa de Otay is one of three commercial POEs serving the binational state pair of California and Baja California. The Otay Mesa-Mesa de Otay POE is the closest commercial crossing to the urbanized areas of San Diego, California and Tijuana, Baja California. Figure 9.13 shows the location and primary access routes to the Otay Mesa-Mesa de Otay POE.

Due to the number of maquiladora facilities located in Tijuana, the Otay Mesa-Mesa de Otay POE is a significant port for maquiladora goods. Estimates by the Secretariat of Commerce and Industrial Development (*Secretaria de Comercio y Fomento Industrial* - SECOFI) place the level of maquiladora activity at approximately 80 percent of trade by value passing through the port (both northbound and southbound). In addition to maquiladora trade, there is a significant volume of northbound agricultural trade (from Mexico to the United States) passing through this port. The agricultural trade serves the large urban markets located in the area from San Diego to Los Angeles.

The consulting team conducted surveys at the Otay Mesa-Mesa de Otay POE on Friday, June 27, 1997. The northbound survey (trade from Mexico to the United States) was conducted between the hours of 6:00 a.m. to 8:00 p.m. The southbound survey (trade from the United States to Mexico) was conducted between the hours of 8:00 a.m. and 5:00 p.m.

Figure 9.13 - Crossings in the San Diego-Tijuana POE System



Source: Barton-Aschman-La Empresa, 1997

These survey hours reflected the operating hours of the U.S. and Mexican Customs operations, respectively. It should be noted that the U.S. compound remained open until 10:00 p.m. However, the volume was so small it did not warrant the continuation of the survey. Between 8:00 a.m. and 10:00 a.m. empties and bobtails (tractors without trailers) were allowed to pass.

9.4.2 Physical Description of the Border Crossing Area

The Otay Mesa-Mesa de Otay border crossing facilities were originally constructed in 1984. Renovations to the U.S. facilities were completed in 1992, while renovations to the Mexican facilities were completed in 1995. Figure 9.14 shows a schematic layout of the U.S. and Mexican port of entry facilities. The following sections briefly describe the major components of the northbound and southbound border crossing areas.

Northbound

1. **Bellas Artes Boulevard.** A six-lane divided major east-west road connecting directly to Aeropuerto Blvd. on the west and indirectly to MX 002 on the east via Industrial Blvd. The majority of the truck traffic comes from the maquiladora plants located within Tijuana which are located to the south and west of the border crossing.
2. **Mexican Access Roadway.** Two-lane roadway currently striped with one NATAP lane and one general access lane. During the afternoon peak, the single access lane is effectively used as two lanes by the truckers.
3. **Vehicle Queuing Area within Mexican Compound.** In order to maximize the queuing capacity within the Mexican compound, vehicles are directed around the secondary inspection building and into the Mexican export document inspection booths.
4. **Mexican Export (Random Selection) Inspection (Module 1).** Export documentation is collected and any bank payments are made at this location prior to exiting the country. Each vehicle is subjected to the random selection system.
5. **Mexican Primary/Secondary Inspection Building.** If selected by the random selection system or there are problems with the pedimentos (export papers), the vehicle returns to the inspection building. One percent of all Mexican exports undergo either a primary or secondary inspection.
6. **NATAP Lane.** An exclusive lane and booth have been set aside for NATAP. The lane is currently used as a southbound exit lane for trucks not accepted for entry into the United States.
7. **Border Crossing Roadway.** Three-lane roadway between the Mexican booths and U.S. primary inspection booths. Signage specifies right lane for empties, left lane for agricultural products and center lane for non-agricultural loaded vehicles.
8. **U.S. Primary Inspection Booths.** Import papers are collected and need for additional inspection or x-ray is determined.

Figure 9.14 - Schematic of Otay Mesa-Mesa de Otay Crossing

9. **Secondary Inspection Docks.** The most common reasons for a vehicle going to the secondary inspection docks are for a agricultural, compliance or enforcement inspection. A vehicle may go to this area if they do not have a Customs user fee permit. These permits may be purchased on a monthly or per trip basis. On the survey day, approximately 46 percent of all trucks were directed to the secondary inspection docks. There are approximately 100 truck docks at this facility, however, not all docks are currently used
10. **X-Ray Machine.** Virtually all tanker trucks, some loaded vehicles (those which visual inspection is difficult or impossible), and some empty vehicles are subjected to the x-ray machine.
11. **Canine Inspection Block.** The canine inspection block is an area located between the primary inspection booths and the compound exits. At random times, a collection of loaded and empty trucks and bobtails are gathered for canine inspection. At the same time members of the National Guard visually inspect the vehicles. These block inspections can involve up to 30 vehicles and take 15-20 minutes.
12. **Exit #1.** This exit opens at 6:00 a.m. and is used by all exiting vehicles until 9:00 a.m. when Exit #2 opens. After Exit #2 opens, Exit #1 can only be used by vehicles which are **not** subject to secondary, x-ray, or canine inspection. Exit #1 closes at 4:45 p.m. and all vehicles must use Exit #2 until the compound closes.
13. **Exit #2.** Between the hours of 9:00 a.m. and 4:45 p.m. this is the exit used by vehicles which were subject to any type of secondary inspection. After 4:45 p.m., all vehicles must use Exit #2.
14. **Via de la Amistad.** Trucks must turn right on to this street upon exiting the U.S. inspection facility to proceed directly to the California Highway Patrol inspection facility. This street has two wide lanes which permit trucks to park at the curb while other trucks pass. Empty trucks often stop to close their doors or pick up papers from brokers located along this street.
15. **California Highway Patrol (CHP) Inspection Facility.** All commercial vehicles must pass through this facility to be weighed. State safety permits are also checked at this location. If a vehicle is overweight or their inspection sticker is out of date, they are held within the facility until the condition is corrected.
16. **Local Access to Otay Mesa Road.** Vehicles leaving the CHP inspection facility can either turn left on Siempre Viva or proceed north and turn left on Airway Road to access Otay Mesa Road.

Southbound

A. **U.S. Customs Compound Access.** Direct access to the export compound is via a two-lane roadway running adjacent to the U.S.-Mexican border. This road is the last segment of a local street connection from SR 905 (Otay Mesa Road) to the southbound truck inspection facility. From Otay Mesa Road, trucks turn right on La Media and left onto Siempre Viva Road. The border road alignment replaced the original entrance located on Custom Plaza Road which was closed due to the congestion created by the trucks. This section of road, which runs parallel to the border, is one kilometer in length and keeps queuing vehicles from interfering with local traffic. Around 4:30 p.m. U.S. Customs closes the access gate from Customs Plaza Road. The second gate, which controls the entrance to Mexican Customs, closes when the last waiting truck enters the Mexican Customs yard. On the survey day this occurred before 5:00 p.m.

B. **U.S. Export Gates.** As vehicles enter the U.S. export compound, they make a hard right turn to enter the export gates. There are three gates; however, on the survey day only one gate was open. The export declarations are taken by a U.S. Customs inspector.

C. **Mexican Primary Inspection Entrance (Random Selection System Module 1).** The Mexican import booths are located approximately 50 meters south of the U.S. export gates. There are eight booths; however, no more than four were open during the survey day. The easternmost booth was designated as a NATAP booth.

D. **Exit Lane for Vehicles without Inspection.** Ninety percent of the vehicles do not require inspection. These vehicles use the single lane located between the two import buildings to exit the Mexican compound through the gate which controls vehicular passage to the secondary inspection area.

E. **Primary Inspection Area.** If a vehicle is selected for a primary inspection, it moves to the primary inspection area located along the east side of Building 1. There are 60 spaces located there.

F. **NATAP Lane.** An exclusive NATAP lane runs past the primary inspection area along the eastern edge of the Mexican compound.

G. **Primary Inspection Exit Booth.** Of the vehicles that go to primary inspection, 10 percent are selected for a secondary inspection. A random selection system similar to the one at Module 1 is used at this location. This is a quality control inspection to make sure that the first inspection was done properly.

H. **Secondary Inspection Area.** This area contains four loading docks which can be used to conduct secondary inspections.

I. **Exit Booth.** A final control booth collects any remaining documentation before the vehicles exit the compound.

J. **Connection to Bellas Artes Boulevard.** Most of the truck traffic turns right onto Bellas Artes Boulevard to travel west and south into Tijuana. However, some trucks turn left to access maquiladora facilities located along the border to the east of the POE and other facilities located southeast of the POE.

K. **Bellas Artes Boulevard.** See #1 above for roadway description.

9.4.3 General Observations and Conclusions

The Otay Mesa-Mesa de Otay crossing was the second highest volume crossing surveyed as a part of the case studies and it had the highest volume of trucks with trailers (excluding bobtails). Table 9.8 summarizes the results of the survey conducted at the POE on June 27, 1997. On the survey day approximately 2,100 northbound vehicles and 1,300 southbound vehicles were counted. It should be noted that in the southbound direction bobtails, empty single unit and empty tractor-trailers do not pass through the Mexican Customs compound and were therefore not counted.

The average total processing time in the southbound direction was approximately 35 minutes, while in the northbound direction it was 65 minutes. The southbound delay was near the average for all case study locations, while in the northbound direction it was the second highest measured.

Table 9.8
Otay Mesa-Mesa de Otay Survey Results

Vehicle Classification	Northbound Otay Mesa-Mesa de Otay	Southbound Otay Mesa-Mesa de Otay
Total Vehicles	2100	1300
Bobtails	20%	0%
Loaded/Empties Trucks	80%	100%
Truck Inspections		
Primary Inspections		
Percent Inspected	100%	10%
Average Time (min)	1.5	180
Secondary Inspections		
Percent Inspected	46%	1%
Average Time (min)	46	180
Average Processing Time (min)	26	19
Average Waiting Time Outside Compound (min)	39	15
Total Average Time (min)	65	34
Maximum Waiting Time Outside Compound (mins)	60 check this	na

Source: Barton-Aschman & La Empresa, June 27, 1997

In the southbound direction, the primary cause for delay is the limited maneuvering room between the U.S. export compound exit and the document inspection booths located just inside the Mexican import compound. Another contributing factor for southbound delay is that only one of the two inspection buildings is currently being used.

The most significant contributing factor to northbound delay is that the U.S. primary inspection capacity is not staff to meet the demand. The demand at this facility tends to start slow and build to a peak in the afternoon. The current practice is to open additional primary lanes on a schedule rather than based on the demand. To minimize queues and delay it is necessary to anticipate the demand. Once the primary lanes are over capacity, it may take hours to recover from the queue build up which adds unnecessary delay to the operation.

The following sections present the observations (inefficiencies) and potential opportunities for reducing or eliminating these inefficiencies for the northbound and southbound direction.

Northbound

The following sections summarize the results of the survey conducted of northbound vehicles on Friday, June 27, 1997. During the 14-hour survey period 2,100 vehicles were counted as they passed four control points:

- Arrivals at the end of the queue in the Mexican compound
- Release from U.S. primary inspection booths
- Release from U.S. compound exits #1 and #2
- Release from California Highway Patrol inspection facility

In addition, counts were made of vehicles entering and exiting the U.S. secondary inspection area. All counts were collected at five-minute intervals and were classified by vehicle type—bobtail, single unit, or tractor trailer. It should be noted that bobtails accounted for 20 percent of the northbound vehicle flow at the Otay Mesa POE. In comparison, the percentage of bobtails in the northbound direction were 42 percent in Laredo and 6 percent in Nogales.

Table 9.9 lists the observations (inefficiencies) and opportunities for each element of the northbound flow at the Otay Mesa commercial crossing.

For most of the survey day, the northbound queue was contained within the Mexican compound and on the access road leading from Bellas Artes Road. In the afternoon, the northbound queue intermittently extended onto Bellas Artes Road between the hours of 2:00 and 4:00 p.m. Based on earlier observations at this POE and conversations with local officials, there are times when the queuing onto Bellas Artes Road is much more extensive and interferes with local traffic of Tijuana.

An opportunity exists to improve the operation at the entrance to the Mexican export compound from Bellas Artes Blvd. At this intersection, it was suggested that a semi-actuated traffic signal be installed to control trucks entering the compound. The signal should be designed to allow trucks to enter the access road when space is available within the compound or on the access roadway.

As mentioned earlier the primary contributing factor for the northbound queues was related to the capacity of the U.S. primary inspection lanes. The following lane staffing was observed:

- 6:00 a.m. to 8:30 a.m. 1-2 Lanes
- 8:30 a.m. to 9:30 a.m. 3 Lanes
- 9:30 a.m. to 2:00 p.m. 4 Lanes
- 2:00 p.m. to 5:00 p.m. 5 Lanes
- 5:00 p.m. to 8:00 p.m. 2-4 Lanes

As demand exceeds capacity queues begin to form. Figure 9.15 shows the northbound truck arrivals at the end of the queue in Mexico, processing rate at U.S. primary and the queue generated. Figure 9.16 shows the U.S. processing rate over the survey day. Once a queue has formed adding capacity does not immediately eliminate the queue. Short periods of over capacity operation may take many minutes or hours to clear. (This phenomena is similar to congestion caused by freeway incidents.) Therefore, it is important to anticipate demand patterns and to place additional lanes in service prior to when over capacity conditions occur. One opportunity to improve U.S. Customs ability to react to demand would be to use close circuit television cameras to monitor truck queues. The optimum location would be to monitor the queue near the entrance to the Mexican compound or on the access road leading to the Mexican compound.

Even with better management of the U.S. primary lanes, there may be periods of over capacity operation. Another opportunity to manage the queue would be to widen the access road into the Mexican compound. Currently, this is a two-lane roadway with one lane designated for NATAP. This roadway could be widened to three-lanes; two for general use and one for NATAP.

Representatives from the State of California Department of Transportation informed the consultant that there is a project to relocate the entrance and direct traffic through a road located adjacent to the border and enters on the east side of Customs. The truck lanes will have enough room to accommodate the queues created by the U.S. primary inspection. The new connection should consider the design parameters in Chapter 8 in order to anticipate sufficient space to accommodate the queue in an orderly manner and to potentially avoid the queue from forming in the first place.

Table 9.9 (Continued)
Northbound Otay Mesa Crossing Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route (MX) - Bellas Artes Blvd. • Six-lane divided arterial • Most intersections are controlled by stop signs; a few have traffic signals • On the survey day, queues intermittently extended out onto Bellas Artes between 2:00 - 4:00 p.m. sometimes interfering with traffic flow • The entrance to the Mexican export compound was mentioned by several local officials as a problem intersection due to truck queues.	• Install a semi-actuated traffic signal to control trucks entering from Bellas Artes Blvd. Signal should be designed to detect when space is available inside the Mexican compound and on access road.	Mexico	Secretariat of Communication and Transportation (SCT), ~~Municipio~~ Municipality of Tijuana
MX Compound Access Road - Unamed • On the survey day, trucks were queued on this access road between 1:30 - 4:30 p.m. • Currently, striped as two-lanes; one for NATAP and one for general use	• Access road could be widened to three lanes (one NATAP lane and two for general use) to provide additional storage away from Bellas Artes Blvd.	Mexico	Secretariat of Communication and Transportation (SCT), ~~Municipio~~ Municipality of Tijuana
Mexican Export Compound • No inefficiencies were identified in the Mexican export compound • One document inspection booth has been reserved for NATAP • Primary and secondary inspection rates were normal	• No opportunities required.	Mexico	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP)
U.S. Primary Inspection • Primary inspection rate is the main cause for the northbound queue • The primary inspection capacity was not managed to meet the demand, additional lanes opened after queue had already formed • The westernmost booth has poor turning radius limiting its efficiency • The primary lanes are often blocked completely or slowed by canine inspections inside compound	• Staff primary booths based on observed demand to avoid building extensive queues • Install a closed circuit television camera to monitor the truck queue, ideally in Mexican compound, but at least on the roadway between the Mexican and U.S. compounds • Study potential for improving turning radius into westernmost booth • Relocate or change canine inspection practices to avoid blocking primary lanes	United States	U.S. Customs, General Services Administration (GSA)

Secondary Inspection Areas
• Recirculation of trucks around secondary building creates merging and weaving conflicts in area between primary and the exits
• Location of canine inspection block disrupts the flow of trucks through primary and forces drivers not subject to inspections to maneuver around the block
	• Canine Block Inspections
	  • reduce the size (number of vehicles) and increase the frequency of inspections
	  • relocate “block” area to the east to eliminate conflicts with trucks entering the facility from the primary lanes (this would require expanding the site)
	• X-ray Unit
		United States	U.S. Customs, GSA

Table 9.9 (Continued)
Northbound Otay Mesa Crossing Inefficiencies and Opportunities

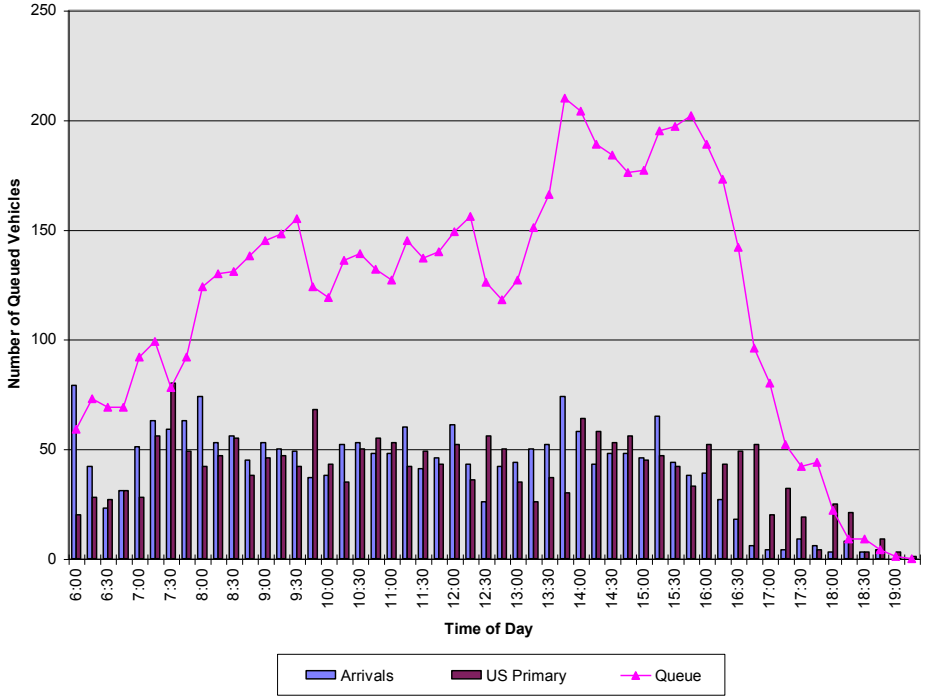
Inefficiencies	Opportunities	Country	Responsible Parties
• X-ray unit queue restricts internal circulation and limits maneuvering space for trucks backing into secondary inspection area on north side of building • Restricted hours for tanker trucks creates evening peak at X-ray unit	• extend the hours for tanker trucks to eliminate evening peak • add second x-ray machine to reduce the length of queue		

U.S. Exit Booth
• Number of booths
  • 8:00-10:00 a.m., one exit booth
  • 10:00 a.m. - 5:00 p.m., two exit booths
  • After 5:00 p.m., one exit booth
• Exit booths generally were not a problem, some minor delay when canine blocks were released
	• Use of smaller and more frequent canine block inspections would reduce exit delay		

Egress Route - Local Streets • On leaving facility all trucks turn right on Via de la Amistad and proceed to State of California Inspection station • Empties often stop to close trailer doors; other trucks stop along the road while waiting for brokers or other drivers	• Proposed dedicated roadway from U.S. Customs compound to State of California weigh station would eliminate these practices or potentially move them beyond the weigh station	United States	CALTRANS
State of California Weigh Station • Minimal delay was observed at the weigh station • Minor queues formed throughout the day; these queues are related to the release of the canine block inspections	• Use of smaller and more frequent canine block inspections would reduce the size of and potential for queues at the weigh station	United States	CALTRANS, U.S. Customs
Egress Route - Otay Mesa Rd. • On the survey day, no significant delays or operational problems were observed • Local officials stated that trucks are delayed due to accidents which block the only egress route from the port of entry.	• Long-term opportunity to upgrade Otay Mesa Road to a limited access facility • Long-term proposed State Route 125 would provide a second egress route from the port of entry	United States	CALTRANS

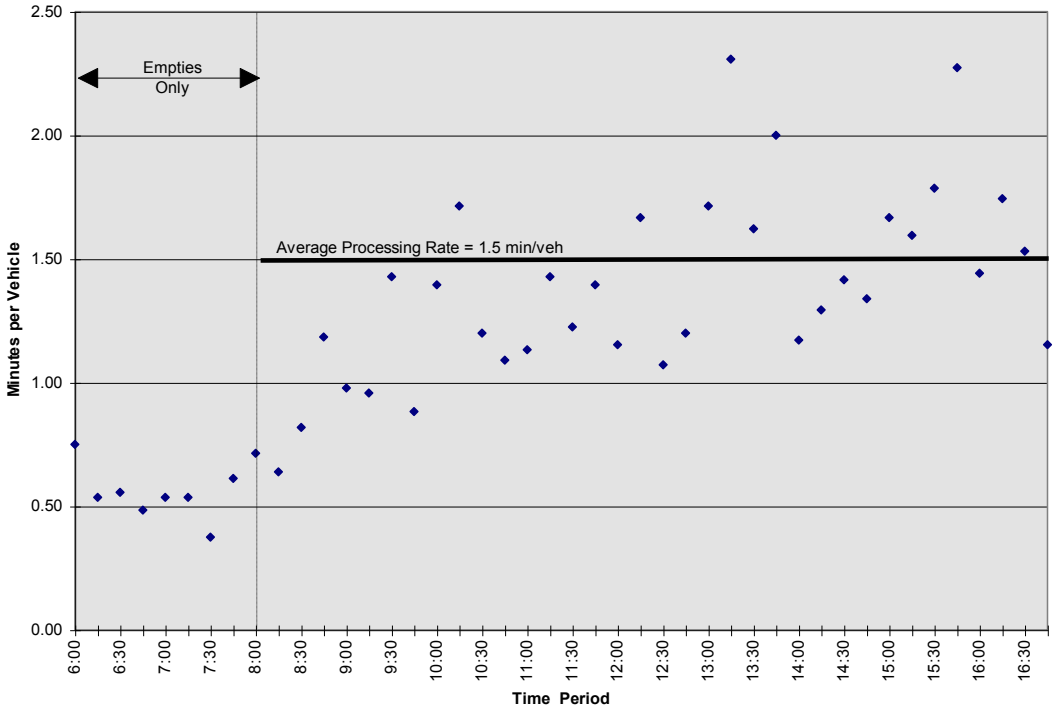
Source: Barton-Aschman & La Empresa, June 25, 1997

Figure 9.15 - Arrivals in Mexico, U.S. Primary Processing Rate and Queued Vehicles



Source: Barton-Aschman - La Empresa, 1997

Figure 9.16 - U.S. Primary Processing Rates Otay Mesa



Source: Barton-Aschman - La Empresa, 1997

Inside the U.S. compound several sources of inefficiency were identified. Generally, the recirculation of vehicles creates an area of merging and weaving in the space between the primary lanes and the two exit gates. Trucks leaving the secondary inspection area must merge back into traffic clearing primary destined for an exit or the secondary inspection area. At several times during the day this congestion effectively stopped traffic flow in the compound.

Another inefficiency was the canine block inspections conducted in an area just in front of the primary inspection lanes. The location of the canine inspection interrupts the operation of the primary lanes. Some primary lanes may be completely blocked, while others are partially blocked which significantly reduces the primary processing rate.

Two opportunities were identified to address the inefficiencies associated with the canine inspections. One would be to include fewer trucks in each block and conduct more frequent inspections. The smaller blocks could still be located in front of primary but should not interfere with the operation of the primary lanes. The other opportunity would be to relocate the block inspection area east of the existing primary booths (which would require adding property to the site).

Observations and counts taken at the State of California safety inspection facility indicated that there was no significant delay caused by that facility. While some small queues developed over the day, they did not typically extend outside of the facility onto the public streets. The queues at the State facility were most likely a result of the release of vehicles from the canine block inspections. A typical canine inspection could involve 15 to 25 vehicles which are all released at once and must proceed directly to the State facility.

Southbound

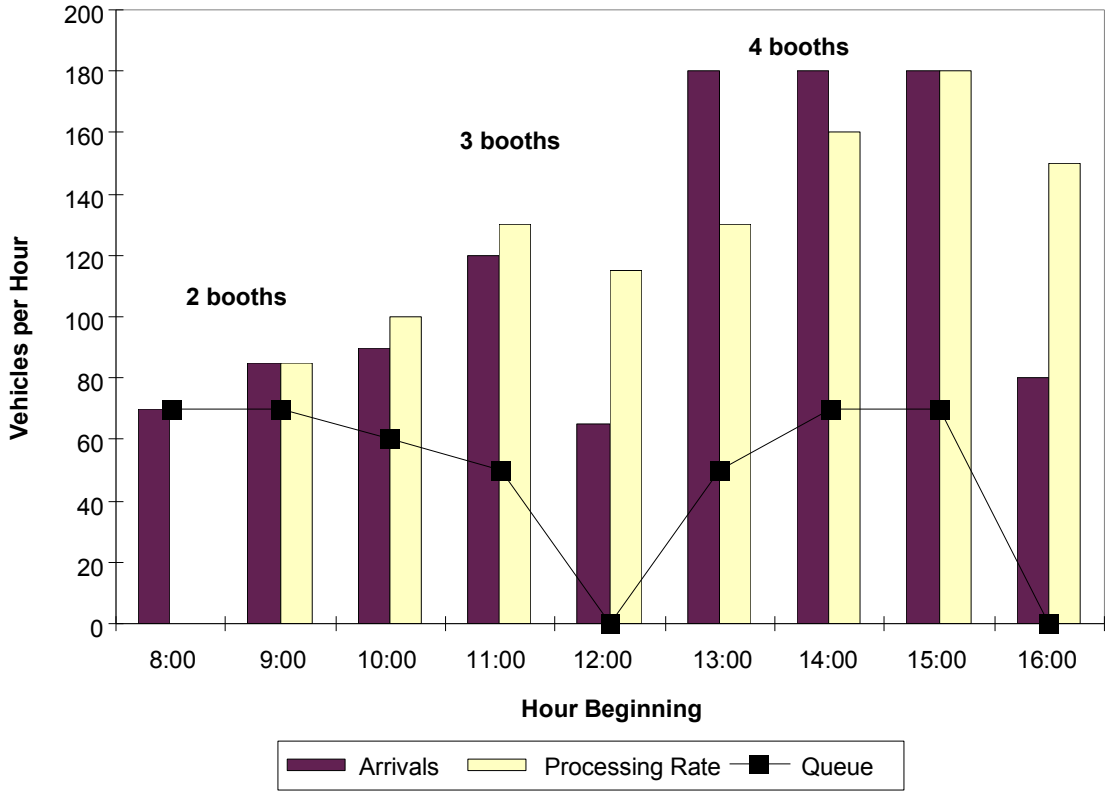
The following sections summarize the results of the survey conducted of southbound vehicles on Friday, June 27, 1997. During the 10-hour survey period approximately 1,050 (loaded) vehicles were counted as they passed two control points:

- Arrivals at the Mexican import gates
- Release from the primary inspection

It is important to note that bobtails and empty vehicles do not use the Mexican import compound. They are allowed to use the passenger vehicle lanes. All counts were collected at 15-minute intervals and were classified by vehicle type—single unit or tractor trailer. Figure 9.17 shows the southbound demand per hour. Based on the counts and observations made by the consultants while in the field, the following observations and opportunities were identified.

Table 9.10 summarizes the observations and opportunities in the southbound direction. In the southbound direction there are four significant areas of congestion contributing to southbound delay. The first area extends from the entrance to the U.S. export compound up to the Mexican document inspection booths. The two yards are side by side (straddling the border), the booths where American exportation documents are collected are only a few yards from the SAAI booths. Several years ago, the truck entrance to the U.S. export compound was moved from Customhouse Road to a new dedicated truck route which parallels the border. While this change took truck traffic off of several congested local streets, it has impacted the movement of trucks through the export compound.

Figure 9.17 - Otay Mesa Southbound Arrivals, Document Processing and Queue



Source: Barton-Aschman - La Empresa, 1997

The relocated entrance requires that drivers make a difficult right-turn through the U.S. exit gates and then maneuver into one of the Mexican document inspection booths. In addition to the limited space, the position of the trucks as they come through the U.S. compound also makes it difficult for drivers to see which document inspection booths are open in the Mexican compound. Finally, U.S. Customs does not operate all of their gates, which generates further delay for vehicles within the U.S. Customs compound.

There are several opportunities for improving the operations in this area. A lowcost opportunity would be to replace the existing swing gates with sliding gates to provide additional maneuvering room for trucks. Longer term opportunities would include the relocation of the Mexican booths farther south and the redesign of the entrance to the Mexican yard. Redesigning the entrance to have two or three gates sufficiently separated and located in front of blocks of two or three inspection booths would avoid the situation that currently causes the southbound truck queue. In this scenario, taking advantage of Building 2 would permit three entrances, one in front of each platform and one in the center. This would provide additional room for truck maneuvers.

Furthermore, the use of a signal system to indicate to drivers which booths are available in the Mexican compound would improve the use of the open booths. Currently 30 percent of these are underutilized. In order to speed up the flow of vehicles through this area requires the cooperation of both Customs. For example, the person gathering the U.S. exportation documents could direct the (vehicle) operator to the appropriate booth in the Mexican compound.

Table 9.10
Southbound Otay Mesa Crossing Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - Otay Mesa Rd. • On the survey day, no significant delays or operational problems were observed • Local officials stated that trucks are delayed due to accidents which block the only egress route from the port of entry.	• Long-term opportunity to upgrade Otay Mesa Road to a limited access facility • Long-term proposed State Route 125 would provide a second egress route from the port of entry	United States	CALTRANS
Access Route - U.S. Compound Road • Two-lane roadway adjacent to border • One lane used for use car exports; one lane use for loaded trucks; no dedicated NATAP lane • Empties and bobtails use passenger vehicle crossing	• Add third lane as needed for growth in demand • Add NATAP lane when system is implemented	United States	U.S. Customs, GSA
U.S. Export Inspection Area/Document Collection • 3 lanes, 2 booths, only one lane open • No designated NATAP lane or booth • Only one person assigned to collect documents • Difficult right hand turn through exit gate	• Replace swing gates with sliding gates to facilitate trucks turning into Mexican compound • Open additional lanes • Relocate U.S. booths to facilitate truck movements • ReconFigure 9.entrance to improve operations	United States	U.S. Customs, GSA
Mexican Document Inspection Booth • 8 lanes, no more than 4 open • Designated NATAP lane, not currently in use • Limited distance (50 m) between U.S. and Mexican booths restricts vehicle flow; this condition may limit future use of Building 2 for inspections • Limited visibility makes it difficult for drivers to identify available booths	• Move booths south 100 meters to improve maneuvering area • Install signals (on U.S. side) to identify available booths • Operate (open) additional lanes	Mexico	SHCP
Mexican Primary Inspection • 60 spaces at Building 1, 60 spaces at Building 2 (not used) • Operates at 33-100% of capacity during the afternoon • Platform is saturated between 3:00-5:00 p.m. • NATAP lane conflicts with trucks maneuvering into primary inspection docks • 14 spaces occupied at the beginning of the day	• Extend operating hours to spread or reduce peak inspection demand • Use all or part of Building 2 for inspections • Relocate NATAP lane between Buildings 1 & 2 to eliminate potential conflicts	Mexico	SHCP
Mexican Secondary Inspection • 4 spaces currently with plans to add more	• No opportunities identified	Mexico	SHCP
Access Route (MX) - Bellas Artes Road • Compound roadway designed for right-turning vehicles makes left-turns difficult • Intersection of exit and Bellas Artes is controlled by a stop sign • Left-turning trucks must force their way across intersection, typical delay 30 seconds	• Install actuated signal to control exit from Mexican Customs compound	Mexico	Secretariat of Communication and Transportation (SCT), Municipio of Tijuana

Source: Barton-Aschman & La Empresa, June 25, 1997

The second location of southbound delay is at the Mexican primary inspection docks. During the afternoon peak period, the primary docks reach capacity. Once the docks are full, trucks must wait for the next available opening. This situation is related to the existing operational practices, since only 60 of a possible 120 docks are being used. Therefore, there is the opportunity to use some or all of the docks at Building 2. The use of the Building 2 docks would also help the congestion problems at the entrance to the compound described above.

The third area of delay is at the exit of the first inspection yard where the seals on the documentation are verified to ensure that no truck escapes Custom's review. To avoid delays, a more efficient method of identification for these trucks needs to be developed.

The fourth area of congestion is at the exit of the Mexican compound onto Bellas Artes Blvd. This intersection is controlled by a stop sign and is designed to facilitate trucks turning to the right. As more maquiladora facilities are being built to the east of the port of entry, more trucks are turning left out of the exit. These left-turn movements are difficult since they conflict with the six traffic lanes carrying high volumes of autos and trucks on Bellas Artes Blvd. The best opportunity at this location would be the installation of a semi-actuated traffic signal to provide gaps for trucks needing to make a left-turn. An in-depth engineering study should be conducted to establish the traffic signal design characteristics.

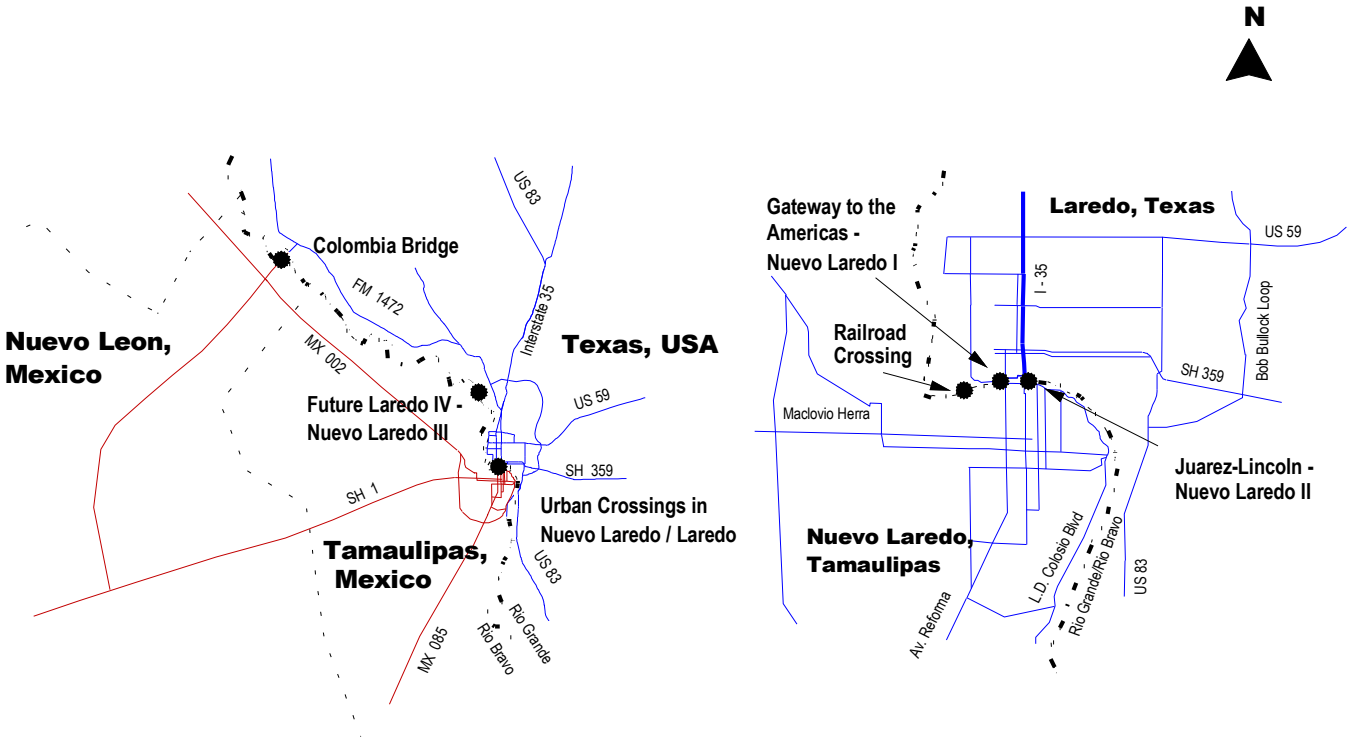
9.5 Laredo-Nuevo Laredo POE System

9.5.1 Introduction

There are three ports of entry in the Laredo-Nuevo Laredo POE system: Juarez-Lincoln, Gateway, and Colombia bridges. Two of these ~~bridges~~ ports of entry carry northbound and southbound commercial truck traffic: Juarez-Lincoln and Colombia. The Gateway Bridge also carries a limited amount of the southbound truck traffic (due to weight restrictions). The majority of commercial truck traffic currently uses the downtown bridge (Juarez-Lincoln) located within the cities of Laredo and Nuevo Laredo. This bridge carries over 70 percent of the loaded commercial trucks. The six-year old Colombia Bridge, located to the west of the urban area, operates far below capacity without any undue delays. Due to study resource limitations, detailed studies were made only at the Juarez-Lincoln Bridge. Figure 9.18 shows the location of the three crossings in the Laredo-Nuevo Laredo POE system.

The Laredo-Nuevo Laredo POE system currently has two primary types of commercial trade activity.

Figure 9.18 - Crossings in the Laredo-Nuevo Laredo POE System



Source: Barton-Aschman-La Empresa, 1997

- **Maquiladora Trade.** Trucks serving local and regional maquiladoras. There are maquiladora manufacturing centers located in Nuevo Laredo, Monterrey, and Saltillo. The warehouses, transportation yards, and most importantly, the Mexican Customs brokers (who prepare the import documents), are located in Laredo. The largest concentrations of facilities are located along the Rio Grande west of the downtown bridges and in areas of northwest Laredo.
- **Traditional Trade.** Traditional trade using the I-35 transportation corridor leading to central Texas and other destinations in the interior of the United States and Federal Highway 85 (MX 085) leading to Mexico City. Traditional trade are goods which originate in one country and have a final destination in the other country.

In addition to these two primary trade types, agricultural products also pass through this port of entry system.

The consulting team conducted surveys at the Laredo-Nuevo Laredo POE on Friday, April 11, 1997. The northbound survey was conducted between the hours of 8:00 a.m. and 11:00 p.m. The southbound survey was conducted between 8:00 a.m. and 9:00 p.m. These times reflected the hours of operation at the U.S. and Mexican Compounds. However, Mexican Customs leaves the gate open in order to move the empties that are trapped on the bridge and the U.S. compound remains open until 12:00 a.m. for unloaded commercial vehicles. The volume during this one-hour period (from 11:00 p.m. to 12:00 a.m.) was so small it did not warrant surveying. Data presented for the Colombia Bridge on the survey day was collected from U.S. and Mexican Customs. This information is part of the normal data collected on a daily basis by these agencies.

9.5.2 Physical Description of the Border Crossing Area

The following is a description of the crossing surveyed by the consulting team. The Juarez-Lincoln Bridge was completed in 1972 and the U.S. Customs compound was completed in 1982. Until 1991, however, in the southbound direction this bridge was used only for empty trucks. When Mexico finished its Customs yard on the bank of the river, the majority of southbound vehicular activity transferred to this bridge. ~~Nuevo Laredo~~ The Gateway Bridge still serves a small amount of southbound activity. Figure 9.19 shows a layout of the Juarez-Lincoln Bridge including both the U.S. and Mexican Customs compounds. The following sections describe the major components of the northbound and southbound movements.

Northbound

1. **Colosio Blvd.** A divided four-lane access roadway which is the eastern extension of a loop road around Nuevo Laredo. Loaded northbound trucks queue in the right-hand lane while waiting to cross the bridge. Frequently, northbound trucks park on the shoulder of the roadway while waiting for export documents from the brokers.
2. **Mexican Customs Export Booth.** Customs officials control northbound commercial vehicles from this location. Any export inspections are conducted in an inspection area located along the side of the road.
3. **Toll Booth.** Four toll booths in the northbound direction. One is used exclusively for commercial trucks, the others are used for passenger vehicles. Small trucks (pickups) and passenger vehicles which are making informal entries into the United States are not required to use the exclusive commercial truck lane.

Figure 9.19 - Schematic of Downtown Crossings in Laredo-Nuevo Laredo

4. **Bridge.** This is a six-lane bridge with three lanes in each direction. The outer lanes in both directions are typically used by truck traffic even though there is no designation as truck-only lanes. Frequently, the lane gets blocked by trucks, typically truck cabs without trailers, which try to break back in line, leaving only one lane for passenger vehicles. In the southbound direction, when the Customs yard is full, trucks form two lines which obstruct the passenger vehicles in the second lane that are trying to enter Mexico. No pedestrian access is allowed on this bridge.
5. **Entrance to U.S. Commercial Compound.** At the north end of the bridge there is a right-hand loop ramp for trucks entering the U.S. commercial compound that goes under the bridge.
6. **U.S. Primary Inspection Booths.** There are four primary inspection booths at the entrance to the U.S. Customs compound. Three of these booths are used to process commercial trucks into the compound. The fourth booth is reserved for U.S. Customs' official vehicles entering and exiting the compound.
7. **Agricultural Inspection and Informal Entry Area.** This section of the dock area is used by the USDA and FDA for conducting inspections. This same space is used by U.S. Customs for processing informal entries into the United States.
8. **Enforcement Inspection Area.** This section of the dock area is used for conducting intensive inspections. Customs inspectors, National Guard, and Canine units are used to conduct these inspections.
9. **Impound Area.** If vehicles, tractors, or trailers are impounded or must wait for additional documentation, they are stored in this area of the compound.
10. **U.S. Customs Compound Exit.** A single exit booth is located at the western end of the U.S. Customs compound. All trucks exiting the compound use this exit. In addition, this gate is used by broker personnel and drivers to enter and exit the compound (as pedestrians).
11. **River Road and Santa Isabel St.** Egress from the U.S. Customs compound is via River Road which connects to Santa Isabel Street. Both of these roadways are wide two-lane urban streets. Trucks are forced to use these and other local roadways to return to I-35 or reach their local transfer point.

Southbound

A. **Interstate 35.** I-35 is a major north-south transportation corridor in the center of the United States. I-35 connects Laredo to San Antonio, Austin and the Dallas-Fort Worth urban centers. In San Antonio, I-35 connects to I-10 which is the major east-west route through the southern United States. Currently, I-35 is a four-lane divided highway in the vicinity of Laredo. There is a project underway to widen it to a six-lane divided facility as it approaches the border with Mexico.

B. **Local Street At-Grade Intersections.** There are three local streets that intersect I-35 just north of the bridge toll booths. These at-grade intersections provide access for local passenger vehicles using the bridge.

C. **Toll Booths.** At the north end of the bridge there are eight southbound toll booths. The two easternmost (leftmost) booths are designated for commercial trucks.

D. **Entrance to Mexican Customs Compound.** At the south end of the bridge there is a right-hand loop ramp that trucks use to enter the Mexican Customs compound. There is limited room for trucks to queue before document inspection.

E. **Document Inspection Area.** Immediately upon entering the Mexican compound, drivers present their documents for review. The random selection system is used to determine if a primary inspection is required.

F. **Primary Inspection Area.** There is a primary inspection dock with 42 spaces located on the southwest corner of the inspection building. However, only seven docks are accessible by full-size trucks due to limited maneuvering space.

G. **Secondary Inspection Area.** The secondary inspection docks located on the west end of the inspection building.

H. **Mexican Compound Exit.** There are two exits, one for the empties on the right-hand side and the other for the trucks that exit from the inspection areas.

I. **Intersection at L.D. Colosio Blvd.** After exiting the compound, trucks traverse a short egress road back to L.D. Colosio Blvd. A signalized intersection is used to control the flow southbound trucks exiting the Mexican Customs compound and northbound trucks headed towards the bridge. Most southbound trucks use L.D. Colosio Blvd. to get to their final destination.

J. **Gateway Bridge Entrance to Mexican Customs Compound.** Some southbound trucks can use the Gateway Bridge. After crossing the bridge, the drivers submit their documents at the document inspection booth and then pass into the same compound as trucks using the Juarez-Lincoln Bridge.

9.5.3 General Observations and Conclusions

The Laredo-Nuevo Laredo downtown crossings carry the highest volume of commercial vehicles of all the locations surveyed, (approximately 5,000 vehicles per day in both directions of which 1,500 are bobtails) (see Table 9.11). This high volume of traffic is being processed in facilities which have been “fit in” to the space available. The U.S. compound was originally designed to process fewer than 1,000 northbound trucks. On the day of the survey, it handled nearly 1,500 trucks with trailers and single units, and 1,075 bobtails (tractors without trailers). Considering these factors, processing within both the U.S. and Mexican compounds operates at a reasonably high efficiency. Other factors external to the inspection operations contribute to the delay experienced at this crossing.

In the northbound direction, while overall truck delay was relatively high when compared to other locations, the primary processing time by U.S. Customs was the lowest on a per-vehicle basis. This is due to the high portion of bobtails using the crossing. Northbound delay at the U.S. primary inspection booths was caused by demand exceeding the available capacity. U.S. Customs opened all three available booths at 8:00 a.m. and kept them fully staffed throughout the day. Without adding primary inspection lanes, it is unlikely that delays can be significantly reduced at this volume of trucks.

Table 9.11
Laredo-Nuevo Laredo Survey Results

Vehicle Classification	Northbound		Southbound	
	Juarez-Lincoln	Colombia	Juarez-Lincoln	Colombia
Total Vehicles	2560	1750	2360	1300
Bobtails (Tractors w/o trailers)	1075 / 42%	315 / 18%	780 / 33%	na
Single Units & Tractor-Trailers	1485 / 58%	1535 / 82%	1580 / 67%	na
Truck Inspections	**Juarez-Lincoln Only**		**Juarez-Lincoln Only**	
Primary Inspections				
Percent Inspected	100%		10%	
Average Time (min)	1.0		180	
Secondary Inspections				
Percent Inspected	13%		1%	
Average Time (min)	28		180	
Average Processing Time (min)	24		30	
Average Waiting Time Outside Compound (min)	31		30	
Total Average Time (min)	55		60	
Maximum Waiting Time Outside Compound (mins)	120-150		180-240	

Source: Barton-Aschman & La Empresa, April 11, 1997

In the southbound direction, on a daily basis, the Laredo-Nuevo Laredo crossings (excluding Colombia) were in the middle range of the case studies in terms of average delay. However, the delay was not uniformly distributed over the day. During the morning and midday periods, southbound delay to trucks is minimal. However, in the late-afternoon and evening, southbound delays are extensive—exceeding three hours of waiting prior to crossing the bridge. The cause of this delay is a combination of toll booth operation and traffic congestion at the three local street intersections north of the bridge toll booths. On the Friday of the study, the trucks that entered from I-35, after five in the afternoon, were stuck in a traffic jam that peaked between 7:00 p.m. and 9:00 p.m.

The following sections describe the northbound and southbound observations made by the study team during the survey. Where possible, opportunities to eliminate inefficiencies and improve traffic flow have been identified.

Northbound

Table 9.12 identifies the inefficiencies and opportunities for northbound traffic using the Juarez-Lincoln Bridge. L.D. Colosio Blvd. was designed as the primary commercial truck approach to the Juarez-Lincoln Bridge. While significant queues form in the right-hand northbound lane of this roadway (near the bridge there are three lanes with the queue in the two right hand lanes), traffic flow in the left-hand northbound lane is rarely blocked. The left-hand northbound lane is used by empty trucks, bobtails (tractors without trailers), and passenger vehicles to access the bridge. The tractors without trailers avoid the queue until they reach the toll booths on the bridge. Many of these cabs, instead of merging into the right lane reserved for trucks without trailers, continue forward in the center lane until they reach the middle of the bridge where they try to get back into the queue, often blocking traffic in the center lane.

Table 9.12
Northbound Juarez-Lincoln Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties

Access Route - L.D. Colosio Blvd.
• Queues present throughout the day, largest queues observed in mid-afternoon and early evening hours
• Trucks waiting for documents park on the shoulder of roadway
• Signalized intersection at exit from Mexican import compound
  • interrupts northbound vehicle flows
  • not the limiting factor since U.S. primary inspection processing is the limiting factor
	• Require trucks to have all documents prior to approaching bridge to eliminate parked vehicles on shoulder of roadway	Mexico	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP), Mexican Customs Brokers

Toll Booths • Currently, toll booths are not a problem since U.S. primary inspection processing is the limiting factor for commercial vehicles	• See next section	Mexico	CAPUFE
U.S. Primary Inspection Area • Insufficient number of primary booths limits the northbound flow of commercial trucks • Bobtails consume primary inspection capacity • Contraband Enforcement Team (CET) Inspections conducted prior to primary booths temporarily block access to compound	• Explore potential for adding primary processing booths. Due to the physical layout of the facility and topography of the compound this would probably require extensive structural work. • Encourage the use of the Colombia Bridge to reduce demand. • Significantly increase bridge tolls rates for bobtails to reduce unnecessary traffic (U.S. and Mexico). • Do CET inspections within the compound rather than at entrance. The area the CET uses near the exit booth does not block the flow of vehicles. There may be a need to provide a covered area for this activity.	United States	U.S. Customs, General Services Administration (GSA)

Secondary Inspection Areas
• Small number of docks available for agricultural, informal entries and enforcement inspections.
  • lowest secondary inspection rate surveyed in the case studies at 13% of all vehicles
  • some vehicles must wait in the lower “impound area” until inspection dock is available
  • returning to dock area requires going against the flow of vehicles passing through the compound
	• No significant opportunities identified considering space constraints	United States	U.S. Customs, GSA

Egress Roads - River Road/Santa Isabel St. • No direct connection to Interstate 35 • Commercial vehicles traverse local streets after exiting compound	• No significant opportunities identified considering existing roadway configuration	United States	City of Laredo, Texas Dept. of Transportation (TxDOT)

Source: Barton-Aschman & La Empresa, April 11, 1997

Some interference is created by trucks parked on the shoulder waiting for documents from the brokers. In addition, there is one signalized intersection at the exit from the Mexican import compound. While this intersection interrupts the flow of northbound traffic, it does not significantly impede the northbound flow which is limited by the capacity of the U.S. primary inspection booths.

The main cause of northbound delay is the number of U.S. primary inspection booths. Currently, there are four primary inspection booths of which three are operated continuously from 8:00 a.m. until 12:00 a.m. The fourth booth is used as an access route for official vehicles entering and exiting the compound area. The average primary processing time per vehicle is one minute at this crossing. This is the lowest average primary processing rate measured at any of the case study locations and is, at least in part, attributed to the high percent of bobtails using this crossing.

While the processing rate is high, the demand exceeds the primary capacity particularly in the early afternoon. Figure 9.20 shows the arrival pattern on L.D. Colosio, U.S. primary processing rate, and queue of loaded northbound trucks. Please note that the high arrival volume of trucks on L.D. Colosio at 3:45 p.m. doubles the length of the queue for the next three to four hours. Figure 9.21 shows the U.S. primary processing rate for all trucks. During the afternoon peak period on the survey day waiting times for loaded vehicles on L.D. Colosio Blvd. exceeded two hours.

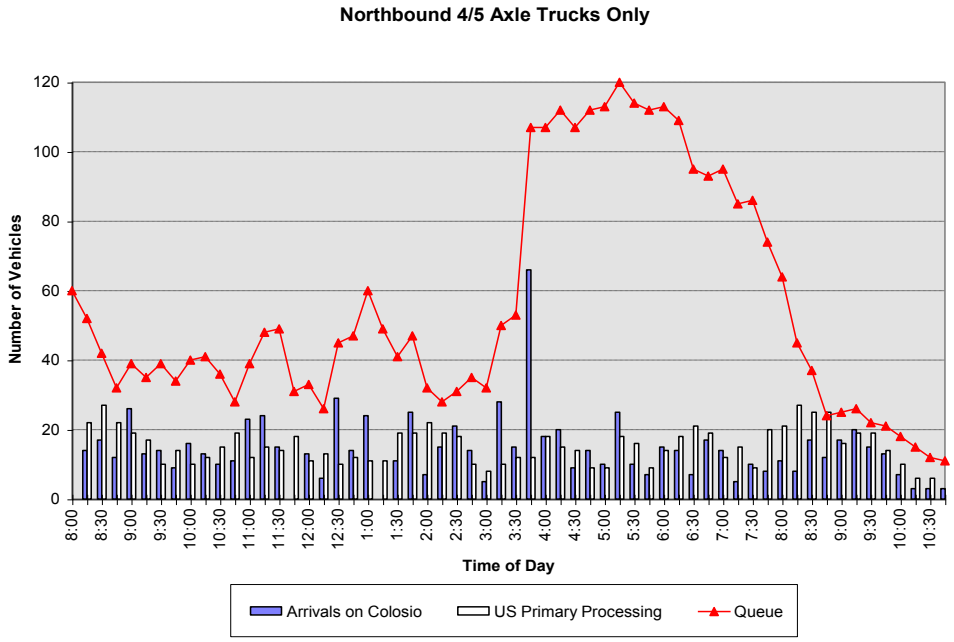
The opportunities to reduce or eliminate this inefficiency would be to add primary lanes or manage (remove) the demand. In order to add primary inspection booths, significant structural construction would be required due to the limited space available. Demand management could involve encouraging shippers and trucking companies:

- to use the Colombia Bridge,
- cross at off-peak times (late evening), and
- eliminate the practice of one way drayage which requires that a bobtail cross in the opposite direction for every trailer that crosses the bridge.

The survey indicated that U.S. Customs at this crossing is conducting some level of secondary inspections on approximately 13 percent of the trucks. This rate is significantly lower than the other case study locations which had secondary inspection rates between 30 and 53 percent. Within the U.S. compound in downtown Laredo, there is limited space for secondary inspections which may account for the lower rate of secondary inspections.

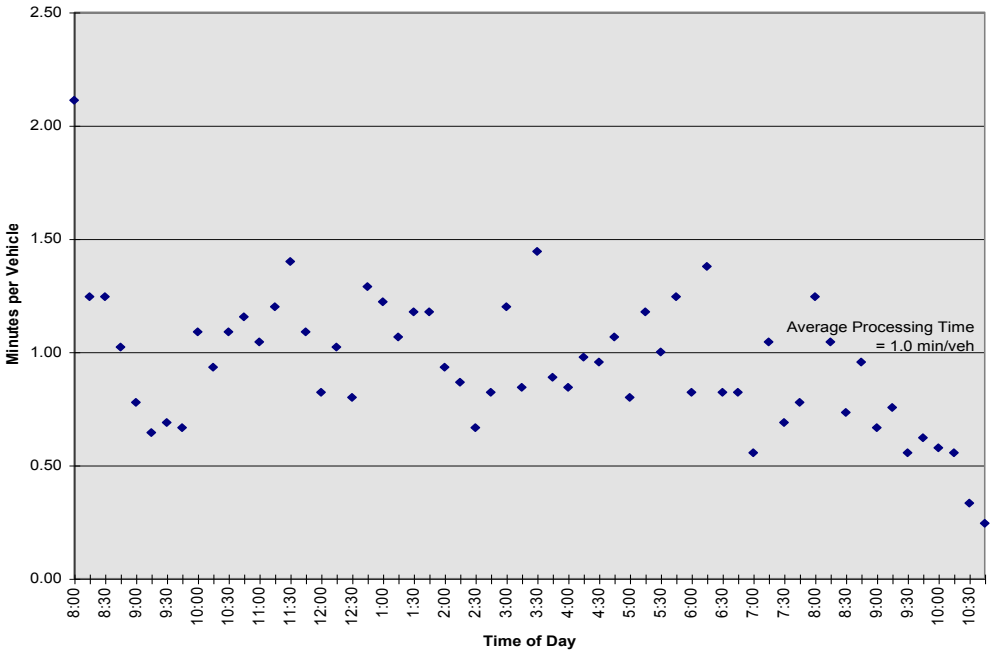
As in most of the U.S. Customs compounds studied, canine inspections were an important part of the compound operations. At the Laredo facility there were four areas where the canine units were used: on the docks, in front of the primary inspection booths, in the impoundment area (approximately halfway through the facility) and an area near the exit to the compound. Of these four locations, only the area immediately in front of the primary inspection booths generated any significant delay for vehicles which were not subject to inspection.

Figure 9.20 - Arrivals, U.S. Primary Processing & Queuing of 4/5 Axle Trucks



Source: Barton-Aschman - La Empresa, 1997

Figure 9.21 - U.S. Primary Processing Rate - Mixed Flow - All Trucks



Source: Barton-Aschman - La Empresa, 1997

The best area for conducting canine inspection was the area next to the exit booths. At this location, several trucks could be taken out of the travel lane and inspected "off-line" out of the path of other trucks. The location halfway through the facility was used to create a large block of trucks which were then inspected and released. During this operation some trucks were allowed to pass through a center lane which was kept open.

Southbound

Table 9.13 identifies the inefficiencies and opportunities for southbound traffic using the Juarez-Lincoln Bridge. A significant queue of commercial trucks was observed in the southbound direction on I-35. This queue developed at 3:00 p.m. and continued to increase until 7:00 p.m., when the arrival of trucks at the end of the queue decreased significantly. On the survey day, the queue exceeded 200 vehicles and extended for over 4.5 kilometers from the bridge toll booths. It was estimated that southbound trucks were experiencing between three to four hours of waiting time prior to crossing the bridge. The cause of this southbound delay is a combination of toll booth operations and traffic congestion at the three signalized local street intersections located immediately north of the toll booths. In addition, the Mexican commercial compound reached capacity around 3:00 p.m., further slowing southbound trucks.

During the afternoon and evening peak, southbound traffic backs up from the bridge toll booths through the three at-grade intersections at the southern terminus of I-35. This backup is caused by southbound traffic demand exceeding the capacity of the bridge toll booths. Figure 9.22 shows the area just north of the bridge which is impacted by southbound bridge traffic during the evening peak and identifies the various factors that contribute to the congestion.

Southbound trucks are required to use one of the two toll booths on the left side of the toll booth battery. In addition, trucks are required to use the left most travel lane as they approach the toll booth area. While this lane is in affect a "truck only" lane, it is not formally signed or channelized as such a lane. One factor which creates delay for the trucks is gridlocked intersections. As the queue of southbound passenger vehicles extends back from the toll booths through the at-grade intersections, trucks are often blocked by passenger vehicles which were not able to clear the intersection.

Another form of delay is caused by passenger vehicles which maneuver into the "truck only" lane in order to clear the intersection while the cross-street signal is green. When the southbound trucks receive a green signal, they often do not have sufficient space to clear the intersection and therefore do not enter the intersection. It was observed that sometimes trucks did not move for several signal cycles. At the northernmost intersection, Houston Street, the operation of the intersection is complicated by the junction of the freeway frontage roads which feed into the intersection parallel to the I-35 southbound lanes. This condition requires that the frontage road have its own signal phase which reduces the time available to the main traffic lanes of I-35 and the cross-street.

Currently, the City of Laredo uses traffic control officers to avoid having these intersections completely blocked by traffic. In addition, these officers enforce the "truck only" lane. Since the flow of vehicles is controlled by the capacity of the bridge toll booths, these traffic control officers cannot improve the flow of vehicles. They can only minimize the potential for gridlock.

Table 9.13
Southbound Juarez-Lincoln Bridge Inefficiencies and Opportunities

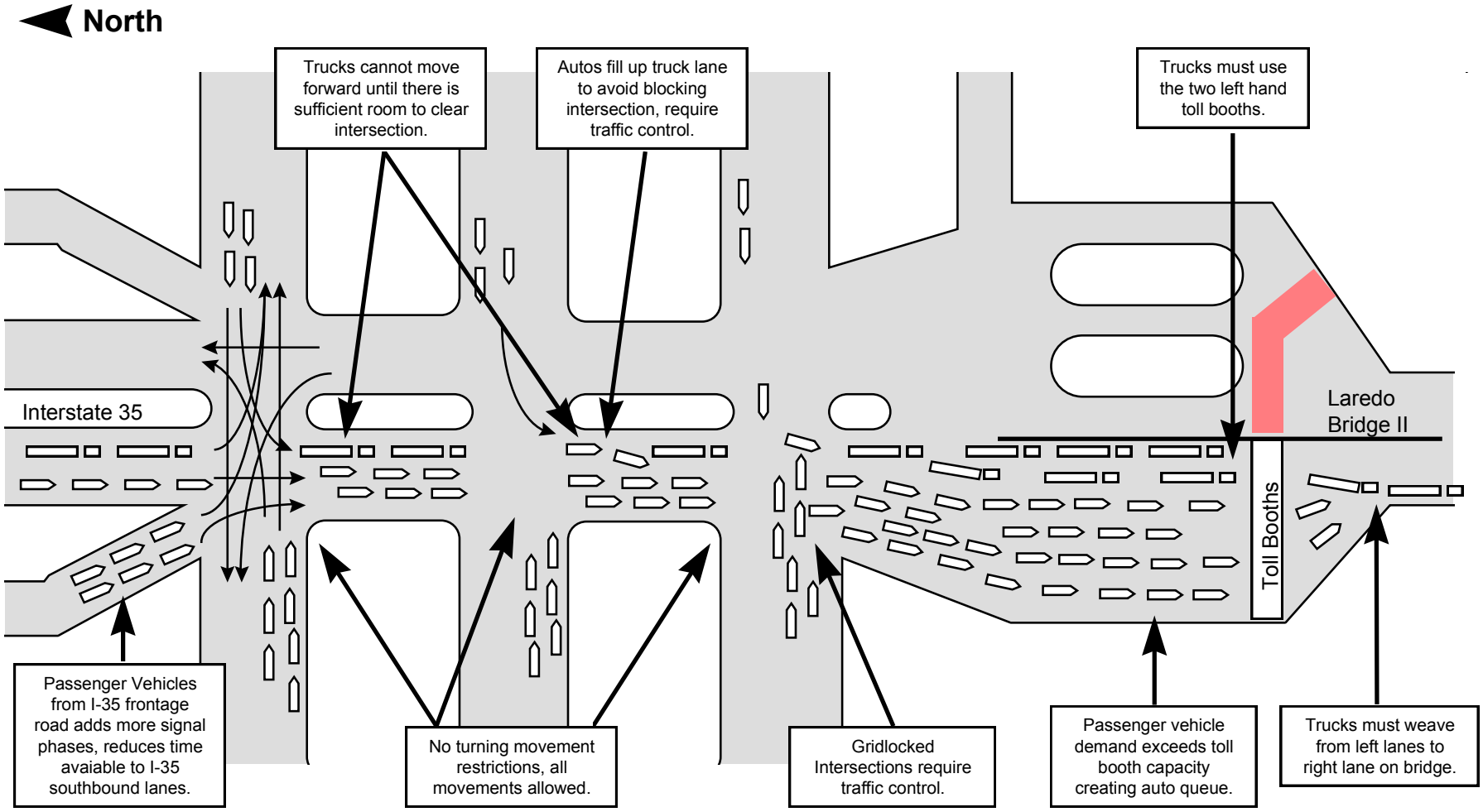
Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - Interstate 35 • Significant queues of southbound trucks during afternoon and evening peaks • Queuing is caused by toll booth operation and at-grade local street intersections	• Facility is currently being widened to six-lanes which will help passenger vehicle flow • Encourage the use of the Colombia Bridge as an alternative crossing	Mexico United States	Texas Department of Transportation (TxDOT)

Bridge Approach
• Frontage Road merger with freeway main line create competition for available signal capacity
  • benefit to passenger vehicles
  • delays commercial trucks
• At-grade intersections with local streets
  • turning vehicles create congestion which blocks truck movement
  • require extensive use of traffic control officers
  • lack of channelized truck lanes allows passenger vehicles to block trucks
	• Short-term investigate traffic management techniques including turning restrictions.
	• Medium-term consider channelizing truck lane to prevent passenger vehicles from using lane
	• Medium-term study the potential benefits for moving trucks into the right-hand lanes.
	• Medium-term study signal coordination options
	• Medium-term study potential strategies for limiting some movements from the local streets giving priority to traffic coming from I-35.
	• Long-term alternatives for grade separating or eliminating one or all of the at-grade intersections
		United States	City of Laredo, TxDOT

Toll Booths (Passenger Vehicles) • Insufficient number of toll booths creates long queues and delays - queues begin here	• Explore the potential for adding more southbound toll booths • Use electronic toll collection (ETC)	United States	City of Laredo (Laredo Bridge System)
Mexican Inspection Areas (Commercial Vehicles) • Congestion begins around 12:00 p.m. in yard • Processing capacity decreases as demand increases	• Extend the hours of operation in the Mexican compound • implement NATAP information system to expedite processing	United States	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP), U.S. and Mexican Customs Brokers

Source: Barton-Aschman & La Empresa, April 11, 1997

Figure 9.22 - Southbound Bridge Approach



Source: Barton-Aschman - La Empresa, 1997

Another observation worth noting, but does not significantly contribute to delay, is that once trucks leave the toll booth, they must change lanes from the two leftmost (toll booth) lanes to the rightmost (bridge) lane. This weaving and merging typically occurs on the bridge approach which causes some interference with passenger vehicle flow. If the toll booth capacity were increased, these weaving and merging maneuvers could become the new constraint to efficient traffic flow.

The primary opportunities improving the southbound flow are related to increasing the capacity of the bridge toll booths and reducing the impact of the three cross street traffic movements. The use of exact fare lanes, improved advanced signage for toll amounts, and the use of electronic toll collections should be considered to improve southbound flow. A long-term opportunity would be to add more southbound toll booths.

Potential opportunities in terms of traffic operations would include:

- channelization of the truck lane to prevent passenger vehicles from entering lane, consider traffic management techniques including turn restrictions,
- study the signal timings to see if improvements can be made, study the potential for moving trucks to the right-hand lanes (this would be important if the toll booth capacity is increased,
- consider/study the impact of preventing I-35 cross-street traffic during peak hours, and
- consider/study the impact of grade separating the local streets.
- study the possibility of prohibiting the entrance of loaded trucks after a certain hour on the peak days (Fridays).

In Mexico, there are six document inspection booths through which commercial vehicles can enter the Customs import compound. Typically, only four of the six booths are used to process loaded vehicles and a fifth booth (on the right-hand side) is used to process empty vehicles and bobtails. The sixth booth is not used. The average processing rate for loaded trucks is 1.2 minutes per vehicle. The four document inspection booths provide sufficient capacity for vehicles entering the compound.

Appoximately ten percent of the loaded vehicles are randomly selected for primary inspection at the document inspection booth. When a vehicle is selected it is sent to the primary inspection area which has 42 inspection docks. There are 20 parking spaces in front of the primary inspection docks which are used by vehicles which have incomplete documents. During the afternoon when the primary inspection area is over capacity, these parking spaces are also used by vehicles waiting for a primary inspection dock.

As vehicles leave the primary inspection area, they are subjected to another random selection booth. Approximately ten percent of the vehicles are selected for re-inspection.

During the period surveyed, 14.5 percent of the vehicles were single-unit trucks and 9.1 percent were empty vehicles. The survey confirmed that approximately 10 percent of the vehicles were being selected for primary inspection.

The operation of the Nuevo Laredo import compound showed many inefficiencies. The average primary inspection exceeded four hours, even though Customs' rules dictate a three-hour maximum. The four-hour inspection time caused the random selection system to overload the inspection area. In addition, the first two hours of operation were used to clear vehicles that were trapped in the compound overnight waiting for primary inspection.

By noon, there were 39 vehicles in primary inspection which is equal to the facility's daily capacity. After the docks were full, vehicles were queued in the parking spaces in front of the docks even

though Customs was trying to reduce the inspection times. These queued vehicles did not block circulation within the facility, but they do cause some friction for vehicles passing through the compound. The maximum amount of congestion occurred at 3:00 p.m. when Customs brokers release groups of loaded southbound vehicles.

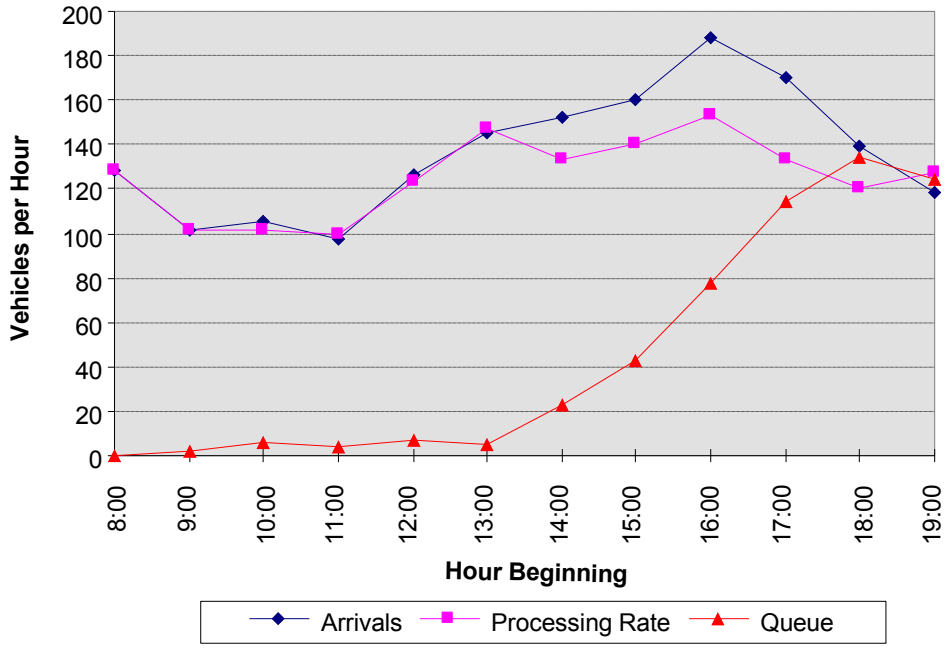
At 8:00 p.m. the composition of the traffic began to change. The number of empty trucks increased and the proportion of trucks sent to primary inspection decreased. Customs stayed open until after 10:00 p.m. to let all the queued vehicles to pass. The last 15 vehicles selected for primary inspection were kept in the compound overnight.

Secondary and exit gate inspections did not impact efficiency. The secondary inspections performed by the private operator were more efficient than in the primary area and there was sufficient inspection space. The final inspections at the exit gate were facilitated by having two gates: one for loaded vehicles which were inspected and another for vehicles that were not inspected.

The most significant opportunity identified in the Mexican compound would be to begin primary inspections when the facility opens at 8:00 a.m. If vehicles are to be held over night, they should be inspected before opening in the morning. The congestion and queuing which occurs in the compound and on I-35 during the afternoon and evening hours could be reduced by this operational change.

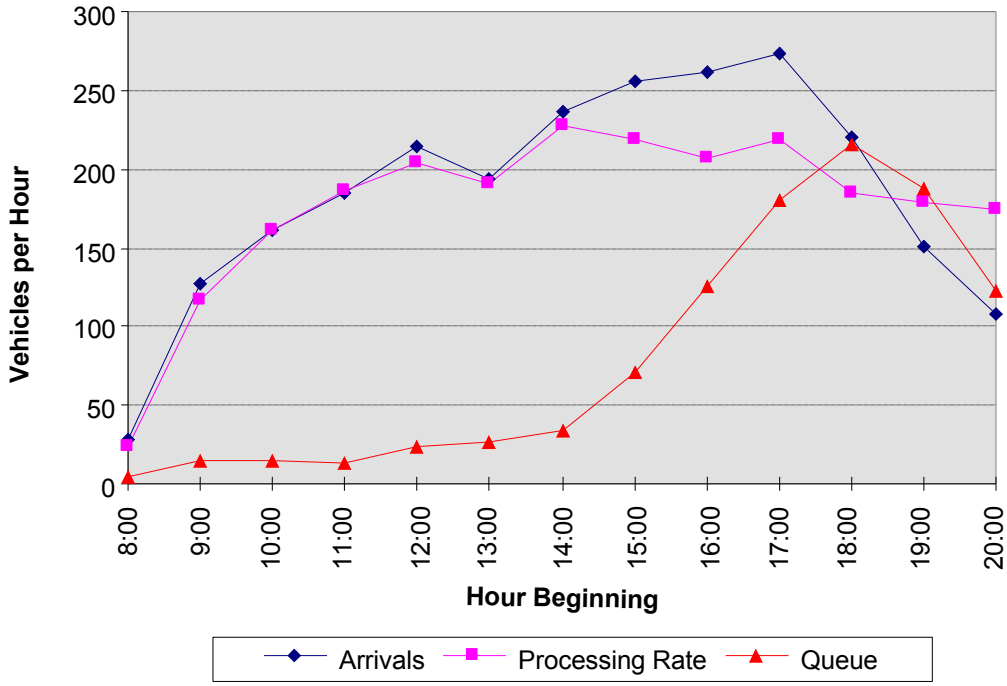
Figures 9.23 and 9.24 show the arrival profiles and processing rates for two survey days. The first survey was conducted in January 1997 and the second was the April 1997 survey described above.

Figure 9.23 - Laredo Bridge II Southbound Arrivals, Document Processing and Queue-January 1997



Source: Barton-Aschman - La Empresa, 1997

Figure 9.24 - Laredo Bridge II Southbound Arrivals, Document Processing and Queue-April 1997



Source: Barton-Aschman - La Empresa, 1997

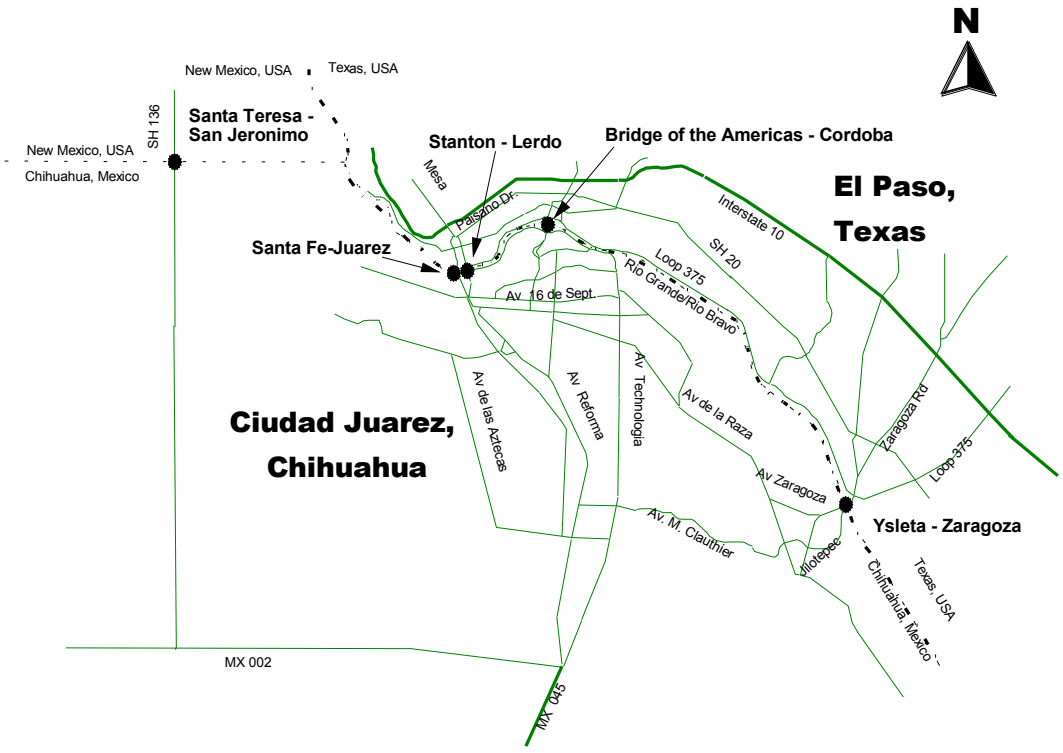
9.6 El Paso-Ciudad Juarez POE System

9.6.1 Introduction

The commercial port of entry (POE) located at Ysleta-Zaragoza is one of three commercial ports of entry serving the El Paso POE system. At the time of the survey, Friday, July 25, 1997, this commercial crossing was serving the majority of loaded cargo trucks in the area. The balance of cargo between this crossing and the other two commercial crossings, Bridge of the Americas-Puente Cordoba (BOTA) and Santa Teresa-San Jeronimo, is expected to shift somewhat in the coming months due to the recent completion of a new, free truck bridge at BOTA. At the time of the survey, the Mexican customs services available at BOTA were still limited, thereby requiring the majority of cargo to cross at Ysleta-Zaragoza. Figure 9.25 shows the relative locations of the three commercial facilities.

The majority of cargo shipped through El Paso-Ciudad Juarez POE system is related to maquiladora activities. Over 85 percent (by value) of the commodities passing through the El Paso-Ciudad Juarez commercial crossings fall into product types related to maquiladora industries. Traditional trade represents only a small portion of the trade at this system. While some agricultural products pass through this POE, very few agricultural loads cross during the summer.

Figure 9.25 - Crossings in the El Paso-Ciudad Juarez POE System



Source: Barton-Aschman-La Empresa, 1997

The consulting team conducted two separate surveys at Ysleta-Zaragoza. The southbound traffic survey was conducted on February 21, 1997, between the hours of 8:00 a.m. and 7:00 p.m. The

hours of operation of the Mexican Customs import facility are 8:00 a.m. until 9:00 p.m. Based on data provided by the bridge operator (Promonfort), the survey captured approximately 80 percent of the total demand for the day or 90 percent of a typical traffic day.

The northbound traffic survey was conducted Friday, July 25, 1997, from the hours of 7:00 a.m. to 9:30 p.m. The Mexican export facility is open from 7:00 a.m. until 8:00 p.m. for loaded trucks. The U.S. import facility is open from 8:00 a.m. to 12:00 midnight. While the U.S. facility accepts empty trucks until midnight, after 8:00 p.m. the amount of truck traffic significantly decreases due to the closure of the Mexican customs facility. No survey was conducted at the Santa Teresa-San Jeronimo crossing because the average daily truck volume is approximately 80 commercial vehicles per day.

9.6.2 Physical Description of the Border Crossing Area

The existing Ysleta-Zaragoza border crossing facilities were last renovated in 1992. Figure 9.26 shows a schematic layout of the U.S. and Mexican port of entry facilities. The following sections briefly describe the major components of the northbound and southbound border crossing areas.

Northbound

1. **Jilotepec Avenue (Mexican Access Roadway).** This is a four-lane roadway which connects to MX 002 approximately 3.5 kilometers from the border crossing. During the afternoon peak hour, trucks waiting to cross the border were queued in the right lane and occasionally the middle lane. In addition, some northbound trucks were parked on the shoulder of the road waiting for documents. While the roadway is designated as a truck route, automobiles often use this road and weave around the trucks—at times crossing into the opposing lanes of traffic. The southbound lanes of this asphalt roadway are badly rutted due to high temperatures and the weight of the vehicles. In some places there are ruts that are 6 to 12 inches deep.
2. **User Fee Booth.** There are two entry lanes at this facility, one for loaded trucks and one for empty trucks. All trucks (empty and loaded) stop here to pay a fee to cover improvements made at the Mexican customs facility.
3. **Document Inspection and Random Selection System Booth (Module 1).** Export documentation is collected and any bank payments are made at this location. Here there are three lanes: one for loaded trucks, one for empty trucks and one for NATAP vehicles. Each vehicle is subjected to the random selection system at this location and are sent to the dock area for a primary inspection or cleared for export.
4. **Secondary Inspection Selection System (Module 2).** Trucks exiting primary inspection are subjected to random selection for re-inspection at this location. Those trucks selected for re-inspection are sent to the dock area and the others are cleared for export.

Figure 9.26 - Schematic of Ysleta-Zaragoza Crossing

5. **Bridge Toll Booths.** Each truck stops to pay their bridge toll. From this location, the toll-takers (representatives of the bridge owners) monitor the queue on the bridge and release trucks based on that queue. To avoid a queue on the uphill approach to the bridge and reduce the standing load on the bridge, the northbound queue is allowed to extend only one-half the length of the bridge.
6. **Ysleta-Zaragoza Bridge.** There are two four-lane bridge structures, one for passenger vehicles and one for commercial vehicles (trucks). There are two lanes in each direction on each bridge.
7. **U.S. Primary Inspection Booths.** There are six primary inspection booths where import papers are collected; however, typically only four are open. Trucks submit their import documentation and may be selected for secondary inspection at this location.

   Canine inspections for drugs are conducted on a portion of the trucks approaching the primary booths. Throughout the day, trucks are held prior to entering the primary inspection booths. Drivers must turn off their engines during the canine inspection. Typically, between 15 to 20 trucks are involved in this type of inspection at any one time. During this inspection process, no trucks are processed at primary inspection.

   Once a truck has been processed at the primary inspection booths, they may be released for exit, or they may be directed to the secondary inspection docks, the scale, or the x-ray machine. Some trucks with incomplete documents park along the fence in the southeast and northeast corners of the yard.
8. **Secondary Inspection Area.** Secondary inspections are conducted at one of two platforms with loading docks. These platforms are separated into distinct inspection areas: empties, hazardous material, pallet x-ray, intensive/interdiction, compliance, and agricultural inspections. On the survey day, approximately 30 percent of the trucks entering the facility were subjected to some form of secondary inspection.
9. **PorTable 9.X-Ray Unit.** This facility is located to the east of the secondary inspection area along the existing eastern fence line of the compound. Trucks drive into the area and wait for the porTable 9.x-ray to pass along the side of the truck. The facility is the width of two truck lanes. Depending on the size of the truck, the vehicle is parked in either the left or right lane. Trucks waiting to enter the x-ray area queue to the south adjacent to the fence and extending past the scale. This leaves a single lane for circulating trucks to pass from the southern to northern portions of the compound.
10. **Scale.** A scale is located immediately adjacent to the dock area and is used to weigh certain trucks, especially those that are difficult to inspect such as tankers and trucks carrying dense products like cement or lumber.
11. **Exit Booths.** Trucks present their exit documents to the customs inspector at the exit booth prior to exiting the commercial compound. There are two booths of which only one is equipped and used. Canine inspections similar to those described in front of the primary inspection booths are also performed at the exit booths. Trucks are queued in a single line. Between five to eight trucks are involved in the canine inspection at any one time.
12. **Loop 375 Frontage Road.** Traffic signals are located at the intersection of the inspection area entrance road and the Loop 375 frontage roads. The frontage roads are three lanes wide and provide access via ramps to Loop 375.
13. **Loop 375 - Primary Egress Route.** Loop 375 West is a four-lane divided limited access highway that provides direct connections to downtown El Paso. Loop 375 East provides access to I-10. The existing roadway is a pair of two-lane frontage roads which will be

incorporated into the future Loop 375 freeway (now funded for construction starting in year 2000).

14. **Zaragoza Road - Alternative Egress Route.** Immediately north of its intersection with Loop 375, Zaragoza Road is a four-lane divided arterial. This roadway narrows to a two-lane, signal-controlled roadway through the El Paso community of Ysleta and on to I-10.

Southbound

A. **Loop 375 - Primary Access Route.** See description above.

B. **Zaragoza Road - Alternative Access Route.** See description above.

C. **Bridge Toll Booth.** There are two toll booths. The west booth is open during the entire operating hours and the east booth operates from 3:00 p.m. to 8:00 p.m. All trucks stop here to pay their toll.

D. **U.S. Export Facility (Mailbox Drop-Off).** Although there is a U.S. export inspection dock located beyond the toll booths, no export inspections are conducted. Drivers stop at a mailbox located in front of the export inspection facility, get out of their vehicle, and place their export papers inside.

E. **Bridge.** See description above.

F. **Primary Inspection Area (Module 1).** Mexican Customs had three booths (of four) open all day beginning at 8:00 a.m. The processing rate of importations stayed relatively constant throughout the day, with an average of one minute per truck. The relatively low average processing rate is due to the large number of trucks from maquiladoras and tankers, which receive special treatment.

G. **Primary Inspection Area.** The Customs yard is wide and allows for the movement of the trucks to and from the platform without conflicting with those which do not require inspection. The platform has the capacity of 65 positions for processing the trucks.

H. **Secondary Inspection Area (Module 2).** This area has only two *positions*. The second inspection, operated by a private firm, is very efficient. However, the new rules of customs inspections as foreseen for September 1997 will create the need for more secondary inspection spaces.

I. **Exit Gate.** There is one lane available for exit.

J. **Jilotepec Avenue** - See description above.

9.6.3 General Observations and Conclusions

In terms of total truck volume, the Ysleta-Zaragoza crossing fell in the middle of the locations surveyed. However, in terms of total processing time, this crossing was the worst location surveyed for the northbound direction. In the southbound direction, processing times were less than the other locations surveyed.

Northbound processing times were directly related to the U.S. Customs inspection practices at this crossing. The duration of both primary and secondary inspections were almost double that of any other location surveyed. The primary inspection rate was over three minutes per vehicle and secondary inspections were 110 minutes on average.

Another unique condition at this crossing was that the U.S. secondary inspection area was operating very near capacity. This occurred even though the rate of vehicles inspected was somewhat lower than in other locations. At this crossing, 30 percent of the total demand was subject to some form of secondary inspection. This is compared o some locations were the

secondary inspection rates were as high as 45 to 55 percent of total demand (San Diego and Brownsville). There were many times during the survey day when only one or two dock spaces were available.

There is ongoing construction to expand the U.S. compound. This project will add a permanent x-ray facility and a significant amount of paved area including bulk storage bins and a hazardous material containment area. The opening of this expansion will provide several opportunities to eliminate existing inefficiencies which are caused by the limited amount of space available. These opportunities are described later in this chapter.

There are also some capacity constraints in the Mexican compound. There is a need for additional lanes at the initial document inspection booths. As trucks enter the compound they present their documents and are subjected to the random selection system. It was observed that at times there were back ups at this booth while there was space in the primary inspection area.

In addition to the constraint at the entry of the facility, there is insufficient room to conduct secondary inspections especially when considering the proposed changes announced for September 1997. Currently, there are two spaces available for secondary inspections. Due to changes in the inspection practices, there will soon be fewer primary inspections, but more secondary inspections. This change will increase the need for secondary inspection spaces to five.

Another observation is that the access/egress route to the Mexican compound needs to be reconstructed. The heavy loads and hot weather have caused the roadway to develop deep ruts in the pavement. While trucks can still use the facility, it is becoming a safety issue for passenger vehicles which use the roadway.

Finally, it is important to note that at the time of the survey only empty trucks were allowed to cross at the Bridge of the Americas. A new free bridge has been constructed and was to be opened to loaded vehicles shortly after the survey. Since the Bridge of the Americas is free and located close to the largest area of maquiladora plants, this crossing will reduce the demand at the Ysleta-Zaragoza Bridge.

Northbound

The following sections summarize the results of the survey of northbound vehicles conducted on Friday, July 25, 1997. During the 12.5-hour survey period, approximately 960 vehicles were counted as they passed three control points:

- Arrivals at the end of the queue at the Mexican export compound
- Release from U.S. primary inspection booths
- Release from the U.S. compound exit

In addition, the number of trucks entering and exiting U.S. secondary inspection were counted as were the number of trucks x-rayed. All counts were collected on five-minute intervals. All counts, with the exception of x-rayed trucks, were classified by vehicle type (bobtails, single-unit, or tractor-trailer).

Table 9.14 summarizes the results of the surveys conducted at the Ysleta-Zaragoza Bridge. Approximately 980 trucks were counted in the northbound direction and 1,150 in the southbound direction. Seven percent of the northbound trucks were tractors only (bobtails). While this percentage is low, it should be noted that bobtails and empty trailers were already allowed to use the new Bridge of the Americas crossing, which is free.

Figure 9.27 shows the arrivals in Mexico, U.S. primary inspection processing rate and the queuing of vehicles. Figure 9.28 shows the U.S. primary processing rate over the entire survey period. It is important to point out the average primary and secondary processing rates of U.S. Customs. The average primary processing rate at this crossing was 3.25 minutes per vehicle which is more that double the average rates of 1.0 to 1.5 minutes per vehicle measured at the other ports of entry. While this crossing processes a relatively low volume of bobtails and empty trucks, this average rates appears high nonetheless.

Similarly, the average secondary processing rate was 110 minutes per vehicle which is double the averages rate of 40 to 50 minutes per vehicle at the other location. Based on conversations with Customs officials no special directives were in place on the day of the survey which would have impacted the inspection time. The fact that both primary and secondary inspection are longer in duration has a direct impact on the ability of the facility to process trucks.

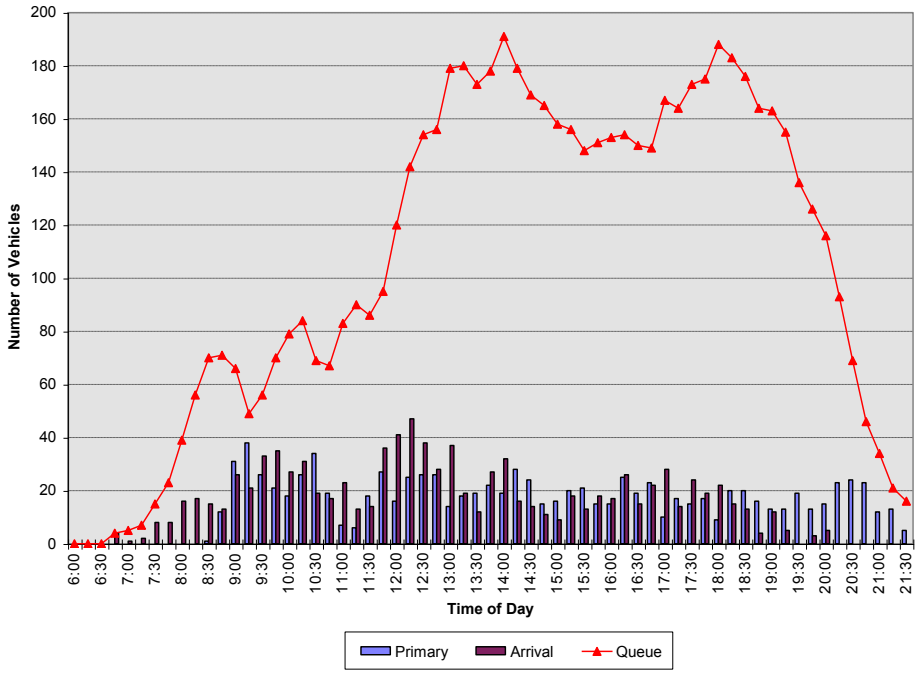
Table 9.15 presents the observations and opportunities that were identified in the northbound direction at the Ysleta-Zaragoza Bridge. Opportunities may be used separately or in combination. Some are redundant, but provide a range of different ways to address existing inefficiencies. Where observations are numbered, the similarly numbered opportunities address those observations.

Table 9.14
El Paso-Ciudad Juarez Survey Results

Vehicle Classification	Northbound Ysleta-Zaragoza	Southbound Ysleta-Zaragoza
Total Vehicles	980	1150
Bobtails (Tractors w/o trailers)	70 / 7%	Not Counted
Single Units & Tractor-trailers	910 / 93%	Loaded Trucks Only
Truck Inspections		
Primary Inspections		
Percent Inspected	100%	10%
Average Time (min)	3.5	180
Secondary Inspections		
Percent Inspected	30%	1%
Average Time (min)	110	180
Average Processing Time (min)	40	13
Average Waiting Time Outside Compound (min)	120	5
Total Average Time (min)	160	18
Maximum Waiting Time Outside Compound (mins)	240	na

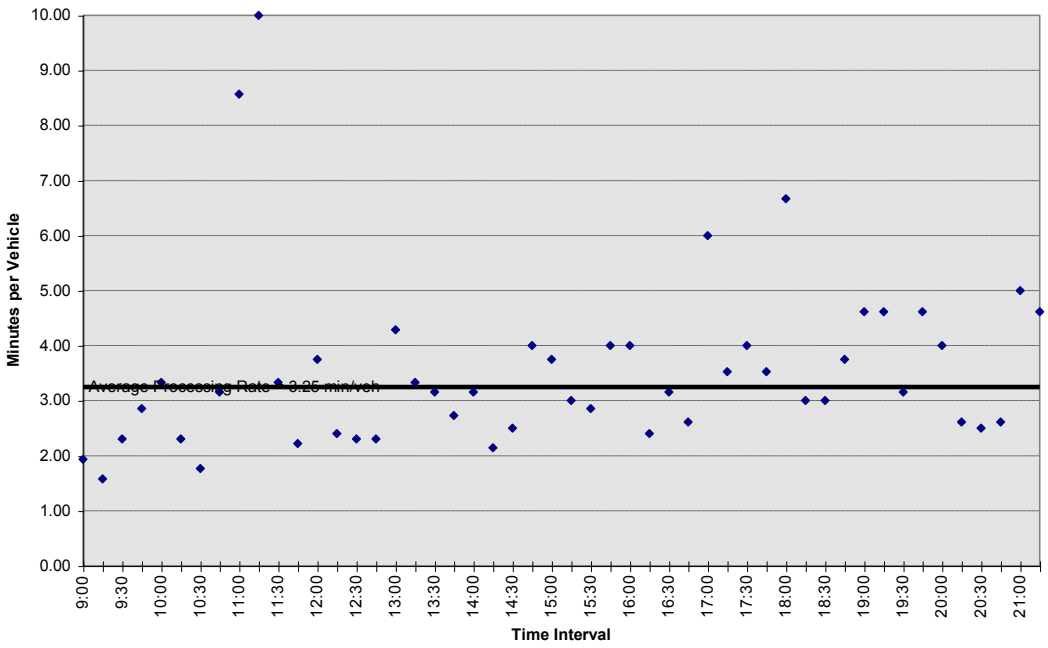
Source: Barton-Aschman & La Empresa, Northbound on July 25, 1997 and southbound on February 21, 1997.

Figure 9.27 - Arrivals in Mexico, U.S. Primary Processing & Queuing of Vehicles



Source: Barton-Aschman - La Empresa, 1997

Figure 9.28 - U.S. Primary Processing Rates



Source: Barton-Aschman - La Empresa, 1997

Table 9.15
Northbound Ysleta-Zaragoza Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties

Access Route (MX) - Jilotepec Avenue
• Approach route does not provide direct (best) connections to maquiladora
• Queue length varies throughout the day
  • loaded trucks queue in right-hand lane, empty trucks use left lane to by pass queue
  • largest queues observed at noon and late afternoon periods
  • at times no queue is present outside Mexican compound
• Pavement in poor condition, particularly the lanes leading away from the port of entry
	• New maquiladora development should be located in areas which are convenient to either the Ysleta or Santa Teresa crossings
	• Queues are due to the operations of the Mexican compound entrance booth and U.S. Primary Inspection rate, opportunities are discussed below
	• Roadway needs to be reconstructed
		Mexico	Secretariat of Communication and Transportation (SCT), Municipio of Ciudad Juarez

Compound Entrance Booth • Booth controls entrance to Mexican compound and requires that each truck pay a fee designed to recover the cost of improvements to the facility • Available lanes (2) are not used efficiently, one for loaded trucks (90% of demand) and one for empties (10%) • Fee collectors control inflow to compound, toll collectors appear to have authority to control/stop flow of trucks • Fee collection is slow	• Expand queuing area at south end of bridge to reduce the number of vehicles on Jilotepec Av. • Allow loaded trucks to use either lane, empties could still be allowed to by-pass loaded truck queue • Utilize prepaid tolls/accounts - automate toll collection • Clarify toll collector authority to regulate flow	Mexico	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP)
Mexican Export Primary Inspection • Inspection rate is 5% (rates of 2% have been observed at other ports of entry)	• Use normal export inspection rate (2%)	Mexico	SHCP
Mexican Export Exit Booth • Available lanes (2) are not used efficiently, one for loaded trucks (90% of demand) and one for empties (10%)	• Allow loaded trucks to use either lane, empties could still be allowed to by-pass loaded truck queue	Mexico	SHCP
Mexican Bridge Toll Booth • Toll collectors control flow onto the bridge, attempt to keep queue length to less than half the bridge	• No opportunities identified.	Mexico	CAPUFE
U.S. Primary Inspection • Primary inspection rate is the main cause for the northbound queue • Idling trucks on bridge may increase the potential for deterioration of structure • 4 of 6 booths are open during afternoon peak • Primary processing rate is half of rate measured at other ports of entry • Canine inspections performed in front of primary booths intermittently close all lanes	• Install a closed circuit television to monitor the queues on the bridge (camera can be located on bridge looking toward the U.S.) • Staff primary booths based on demand/queue, open fifth booth if necessary • Close one or two lanes for canine inspections rather than all four lanes until expansion is completed • When expansion is completed, move canine inspections out of main circulation path	United States	U.S. Customs, General Services Administration (GSA)

Table 9.15
Northbound Ysleta-Zaragoza Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
• Intensive canine inspections just past booths close all lanes			
Secondary Inspection Areas • Temporary location of X-Ray unit blocks circulation and limits maneuvering space for trucks backing into secondary inspection area • Trucks waiting for papers block trucks queuing for X-Ray unit • Secondary inspection docks are operating near capacity, may not be sufficient if primary inspection rate is increased	• Complete new X-Ray facility which is out of the main truck circulation path • Designate an area out of the circulation path for trucks to wait for documents • Construct additional secondary inspection docks	United States	U.S. Customs, GSA
U.S. Exit Booth • Only one of two booths is operated • Canine inspections generates queue all the way back to the primary booths	• Equip and use both exit booths particularly during periods when canine inspections are conducted	United States	U.S. Customs, GSA
Egress Route - Loop 375 • Controlled access facility has not been completed, several at-grade signalized intersections • Traffic signals are not coordinated, all vehicles including trucks are subject to unnecessary delay	• Short-term coordinate and re-time signals • Long-term build grade separations and complete roadway as an access controlled highway	United States	City of El Paso, Texas Dept. of Transportation (TxDOT)

Source: Barton-Aschman & La Empresa, April 11, 1997

In general, the Mexican inspection facilities operate efficiently and have adequate capacity. However, the entrance booths to the compound and the bridge toll booths are not optimally used. Additional capacity can be obtained through more efficient use of these facilities.

Northbound queues in Mexico are primarily due to the processing rate at the U.S. primary inspection booths. There is informal control of the queue at the entrance booth to the compound and the bridge toll booths. While it is unclear who has authority to do so, the toll collectors try to limit the queue to the flat portion or downhill end of the bridge by holding trucks at the toll booths.

At U.S. primary inspection, truck arrivals exceed the capacity of the four booths that are open all day. Primary inspection processing is further limited by having the canine inspections occur in the queues (which causes primary inspections to be stopped).

The recently Ccompletedion of the expansion (scheduled for October, 1997) willl provides the opportunity for canine inspections to be located "off-line" inside the compound. This should allow the primary inspection processing rate to be increased.

It appeared on the survey day that virtually all of the secondary inspection docks were occupied during much of the day. Hence, increasing the primary inspection rate will not necessarily increase facility capacity since current secondary inspection percentages could require more dock space. Secondary inspections took longer on the survey day at this facility than at the other case study location and may be more intensive. If these observations are correct, increasing the facility capacity to reduce overall delay may require the next phase of the secondary platform expansion.

It may be appropriate to resurvey this facility after construction is complete and all inspection operations have been moved to their new locations.

Travel time could be saved on Loop 375 east of the inspection facility if the traffic signals were coordinated to progress traffic along the loop. Stops and waiting were required at almost every signal every time in field observations during the survey day.

Southbound

The following section summarizes the results of the observations and opportunities identified in the southbound direction. Table 9.16 lists the observations and opportunities for each of the southbound crossing elements. The survey of vehicles was conducted on February 21, 1997. During the 11-hour survey period, 929 vehicles out of a total flow of 1,150 vehicles were counted at the following locations:

- Entrance to document inspection booth (random selection system)
- Primary inspection area
- Secondary inspection area

The U.S. export inspection facility is not used, reportedly because its design would cause conflicts between backing maneuvers and trucks entering the bridge. It appears that use of that inspection facility would require redesign and/or modification of current toll collection and entry lanes.

Table 9.16
Southbound Juarez-Lincoln Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - Loop 375 • Controlled access facility has not been completed, several at-grade signalized intersections • Traffic signals are not coordinated, all vehicles including trucks are subject to unnecessary delay	• Short-term coordinate and re-time signals • Long-term build grade separations and complete roadway as an access controlled highway	United States	City of El Paso, Texas Dept. of Transportation (TxDOT)
Bridge Toll Booths • Limited queuing (storage) capacity, room for only 5 trucks south of Loop 375 frontage road • Only 1 of 2 lanes used from 8:00 a.m. to 3:30 p.m. • When toll collector takes a break, all truck flow stops, no replacement toll collector	• Use booth toll booths based on truck demand not staff scheduling, open second booth at 10:00 a.m., monitor traffic patterns to determine optimum time • Provide a relief toll taker during breaks	United States	City of El Paso, TxDOT
U.S. Export Inspection Area/Document Collection • Export inspection area currently not used • Facility is inadequately designed, maneuvering trucks interrupt the flow of trucks onto the bridge • Mail box used for collecting export declarations forces drivers out of their vehicles	• If export inspection area is activated, use east toll booth as the main bridge entrance, redesign the export dock area, and relocate export control booth before toll collection booths • Redesign drop box to allow drivers access without leaving their trucks	United States	City of El Paso, U.S. Customs, GSA
Mexican Document Inspection Booth • Capacity is less than that of the primary inspection facility, limits overall capacity	• Provide additional booths, or relocate and add at least one more lane	Mexico	SHCP
Mexican Primary Inspection • No problems observed		Mexico	SHCP
Mexican Inspection Areas (Commercial Vehicles) • Insufficient number of inspection spaces (2), at least 5 spaces are needed	• Add three more secondary inspection spaces in southwest corner of site near exit booths	Mexico	SHCP
Access Route (MX) - Jilotepec Avenue • Pavement in poor condition, large ruts in lanes leading away from port of entry	• Roadway needs to be reconstructed	Mexico	SCT, Municipio of Ciudad Juarez

Source: Barton-Aschman & La Empresa, April 11, 1997

Toll collection at the bridge entrance is slow for trucks not paying cash. Substitute toll collectors are not provided during break periods so the entrance is effectively closed during those breaks. Relief staffing should be provided during breaks; the toll collector has telephone communication with the office so this should be possible.

Only one lane is open from 8:00 a.m. until 3:30 p.m. In this time period the processing capacity barely keeps up with demand. While the access road has two lanes, only one lane is open for queues. During demand peaks or when the toll taker is on a break, queues can extend to the eastbound Loop 375 frontage road and beyond. From 4:00 p.m. the demand increases significantly and the delay increases even though there are two booths open. The right lane of the entrance road should be opened (currently barricaded) to accommodate the queues or the second booth should be opened more of the day.

The other constraint southbound is the document inspection booth at the entrance to the Mexican inspection facility during the final hours of the day. There are four document inspection lanes where the random selection system selects 10 percent of trucks for primary inspection. Tanker trucks are not inspected. At least one more document inspection lane is needed to meet current volumes.

According to the data provided by Promonfort, the total demand during Customs' normal operating hours on the survey day was 1,150 vehicles. Arrivals increased slowly in the morning, reaching 80 vehicles per hour at 1:00 p.m. The demand was relatively constant until 4:00 p.m. when the demand began to increase to 135 vehicles per hour at 7:00 p.m. Once again the existence of variable (non-uniform) demand was confirmed by the increase in demand during the afternoon. As noted at other POEs, this situation could be created by the release of vehicles by Mexican Customs brokers operating in the United States.

Only 8.2 percent of the loaded trucks where sent to primary inspection. This low proportion is due to the fact that tanker trucks are not inspected. If tankers are not considered in the numbers, the percentage of inspected trucks would be approximately ten percent (the normal rate) of all loaded vehicles.

On the survey day, it did not appear that Mexican Customs document inspection booths were operating at their maximum capacity of 120 vehicles per hour. Demand exceeded capacity at 8:00 p.m. and a queue of 20 vehicles formed outside the compound entrance. This queue was due to two reasons: the processing capacity at the entrance and vehicles waiting on the bridge for documentation.

On the survey day, one additional document inspection booth would have significantly reduced or eliminated the queue. However, there is not sufficient space to add a booth under the current configuration. In addition, on peak days when the daily volume approaches 1,600 vehicles queues would still form even with the addition of a booth. Currently, on peak days the afternoon queue exceeds 50 vehicles.

During most of the survey period, the primary inspection area operated at 25 percent of capacity. At 7:00 p.m., the primary inspection area peaked at 34 percent of capacity. There is a clear imbalance between the primary inspection area and entrance capacities. This situation is unique to the six case study locations, in most locations the primary inspection capacity is the operational constraint.

The secondary inspection area has only two spaces. On the survey day this was sufficient to meet the demand. However, this is primarily due to the efficiency of the company conducting the inspections. This area, however, is too small to meet future demand which will be generated by

changes in the inspection rules. However, since there is reserve capacity in the primary inspection area, this should not be a significant problem.

At times the capacity of the exit booth (compound exit) was exceeded by the release of vehicles from the document inspection booths (compound entrance). When this occurs queues sometimes back up through the secondary inspection area. While this recurred throughout the day, it was a temporary condition with only minor impact on the operation of the compound. Typically the queue during these events was less than ten vehicles. This situation was noted at several of the case study locations which may indicate that a more effective system needs to be developed for the release of vehicles from the compounds.

The egress route along Jilotepec Avenue is badly deteriorated. In the southbound lane ruts six to 12 inches deep make driving dangerous between the exit and Sandoval Street. The pavement should be reconstructed to carry higher wheel loads.

9.6.4 Santa Teresa-San Jeronimo and Bridge of the Americas POEs

At the time of the field observations both of these facilities were in transitional operations.

Santa Teresa-San Jeronimo

~~Both t~~The temporary U.S. ~~and Mexican~~ inspection facilities ~~are being~~ have been replaced by ~~new~~ permanent facilities on a new site~~s~~. ~~Both~~ This facility~~ies~~ ~~will have~~ has substantially more capacity. The U.S. access route has been substantially improved by the construction of New Mexico State Highway 136 (NM 136) which will provide a direct four-lane divided link to I-10 west of El Paso. This should become the preferred route between the area west of El Paso and much of Juarez as well as areas in Mexico south of Juarez and in the western United States. TxDOT El Paso staff indicated that right-of-way is now being acquired for the last section of the highway connecting NM 136 to I-10. The project is still in the planning process, however, some improvements will begin in 1998.

This facility is currently handling over 80 northbound trucks daily, according to the chief inspector on site. This is a significant increase over prior levels. Detailed observations of operations at the inspection facilities were not made because of the short time before the new facilities begin operation. However, it was observed that a significant number of trucks are parked at the first intersection south of the border, apparently waiting for documentation needed to cross the border. There are no broker facilities at this port of entry and truckers use the limited parking near an existing taco stand as a waiting area. Once the off-street parking is full, trucks parked on the shoulder. Since the roadway is relatively narrow, shoulder parking significantly constrains the passing clearance. This condition compromises safety and slows vehicle movement. The northbound shoulder should be widened or other provisions made to accommodate trucks waiting for export documents.

Bridge of the Americas (BOTA)

The northbound lanes have been reconstructed and the southbound lanes are being reconstructed. At the time of the survey (July 25, 1997), northbound truck traffic was restricted to empty trailers and bobtails. The U.S. inspection facility is handling bobtails, empty trucks, informal entries (typically small trucks and passenger vehicles) and some partially loaded trucks. It was reported by El Paso TxDOT and Metropolitan Planning Organization (MPO) staff that some or most of the current Ysleta-Zaragoza Bridge truck traffic will return to BOTA after construction because (1) there is no toll and (2) a significant portion of the cost of the bridge was paid by Mexican “transportistas,” therefore, they feel an obligation to use it.

The attraction to use BOTA could be much greater than reasonably expected. The absence of a toll charge at this bridge creates a basic problem of unequal competition between crossings. The free bridge also benefits from an attractive location in the middle of both cities. However, this may also be a disadvantage due to congestion on downtown streets created by the trucks. Once again, it suggests there be more consideration of the relationship between the location of crossings and urban planning. This problem seems to be particularly under estimated on the Mexican side. In the case of the toll-free Santa Teresa crossing the issue of competition is less significant. On the contrary, this advantage actually makes it more attractive with respect to Zaragoza. However, the opening of the free bridge in the center of town cancels this advantage in the immediate future.

Northbound. Brief observations at this location indicate that U.S. primary inspection rates may be more similar to other crossings than what was surveyed at the Ysleta-Zaragoza Bridge. Only a small portion of the secondary inspection docks were being used. The afternoon truck queue extended to the exit of the Mexican export inspection area with about 75 trucks in the queue. This probably can be traced to having only two U.S. primary inspection booths open until about 3:30 p.m. At that time a third booth was opened and the queue began to rapidly dissipate. With a total of six primary lanes available and plenty of unused secondary inspection capacity, the opportunity to reduce northbound delays looks substantial. However, the location of this bridge in the heart of Cuidad Juarez will limit the development of the logistic services in other locations on the Mexican side, which will have a negative effect on truck operations.

Southbound. The southbound truck lanes are temporary while the new bridge to handle trucks is currently being constructed. The Mexican inspection facility is due for major changes as part of the bridge project, however, that work had not yet started as of the time of the field observations.

The central location of the bridge will impede the relocation of Mexican Custom broker facilities in Mexico and the creation of business zones in central Juarez. This is an example of Mexico not taking advantage of a new project to create service activities connected with foreign commerce.

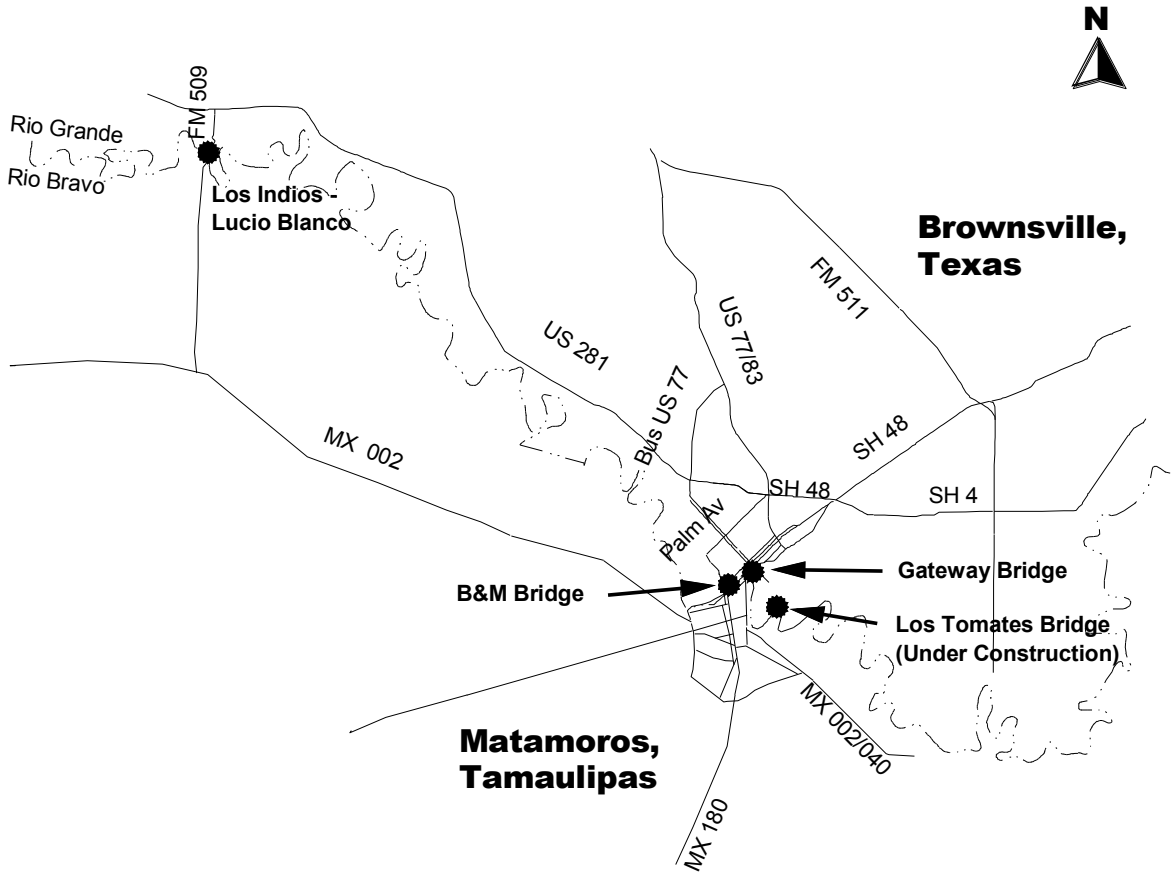
9.7 Brownsville-Matamoros POE System

9.7.1 Introduction

There are three commercial ports of entry in the Brownsville-Matamoros POE system: Gateway, Brownsville & Matamoros (B&M), and the Los Indios-Lucio Blanco bridges. The majority of commercial truck traffic is currently using the two bridges located within the cities of Brownsville and Matamoros: Gateway and B&M. These two bridges carry over 80 percent of the commercial trucks. In addition, the five-year old Los Indios-Lucio Blanco Bridge still operates far below capacity without any undue delays. Due to resource limitations and for these reasons, detail studies were made at Gateway and B&M Bridges only. Figure 9.29 shows the location of the three crossings in the Brownsville-Matamoros POE system.

A fourth crossing within the Brownsville-Matamoros POE system is currently under construction. Construction on the new Los Tomates Bridge began in July 1997 and is expected to be finished in 1998. The Los Tomates Bridge is located approximately eight kilometers east of the Gateway Bridge. The plan is to construct a six-lane bridge with one truck lane and two passenger vehicle lanes in each direction.

Figure 9.29 - Crossings in the Brownsville-Matamoros POE System



Source: Barton-Aschman-La Empresa, 1997

The Brownsville-Matamoros POE system currently has three primary types of commercial trade activity.

- **Port of Brownsville Trade.** Including the shipment of steel to and from mills located in the areas around Monterrey and Saltillo, Mexico.
- **Maquiladora Trade.** Trucks serving local maquiladoras. There are maquiladora manufacturing centers located in several areas of Matamoros. There are warehousing and distribution centers located near the airport in Brownsville.
- **Traditional Trade.** Traditional trade using the transportation corridor formed by State Highway 77 in the United States and Federal Highway 180 (MX 180) in Mexico.

In addition to these three primary trade types, agricultural and seafood products also pass through this port of entry system.

The consulting team conducted surveys at the Brownsville-Matamoros POE on Friday, August 22, 1997. The northbound and southbound surveys were conducted between the hours of 8:00 a.m. and 9:00 p.m. These times reflected the hours of operation at the U.S. and Mexican Compounds. It should be noted that the U.S. compound at the B&M Bridge opened at 7:00 a.m. and the U.S. compound at the Gateway Bridge was open until 10:00 p.m. However, the volumes during these periods were so small they did not warrant surveying.

9.7.2 Physical Description of the Border Crossing Area

The following is a description of the two crossings surveyed by the consulting team. The two structures which comprise the Gateway Bridge were completed in 1970. The B&M railroad and truck bridge was reconstructed in 1941 and the passenger vehicle bridge was completed in 1997. Figure 9.30 shows a schematic layout of the Gateway Bridge, B&M Bridge and the Mexican Customs compound. The following sections describe the major components of the northbound and southbound movements.

Northbound Gateway Crossing

1. **Tamaulipas East.** A two-lane, two-way access roadway which parallels the levee (Rio Grande) and leads to the eastern portion of the plaza at the Gateway Bridge. At times, northbound trucks park along the roadway to wait for export documents.
2. **Mexican Customs Export Booth.** Customs officials control northbound commercial vehicles from this location. Any inspections are conducted by the side of the road.
3. **Toll Booth.** Three toll booths in the northbound direction. One is used exclusively for commercial trucks, the other two are used for passenger vehicles.
4. **Entrance to U.S. Commercial Compound.** At the north end of the bridge there is a sharp right turn into the U.S. commercial compound. There is a pedestrian crossing controlled by a stop sign located at the end of the turn ~~which is~~ into the commercial compound.
5. **U.S. Primary Inspection Booths.** Due to staffing levels only two of the four primary booths are used. During slow periods only one booth is operated.

Figure 9.30 - Schematic of Downtown Crossings in Brownsville-Matamoros

6. **U.S. Secondary Inspection Area.** There are a total of 23 inspection docks. Twelve are used for compliance and enforcement inspections. The nine docks located on the southern end of the building are used as the canine block inspection area.
7. **U.S. Commercial Compound Exit.** Trucks exiting the U.S. import compound turn left onto Elizabeth Street and then right onto International Blvd.
8. **International Blvd.** South of Boca Chica Blvd. this roadway serves as State Highway 4, north of Boca Chica this roadway serves as State Highway 48 which continues on to the Port of Brownsville. Approximately five kilometers north of the border, International Blvd. intersects with U.S. 77 which carries regional traffic to and from cities such as Corpus Christi and Houston.

Northbound B&M Crossing

9. **Tamaulipas Bridge (Road).** This is a two-lane, two-way road that passes in front of the Mexican Customs facility. Northbound trucks using the B&M Bridge use this road to approach the crossing.
10. **Commercial Entrance to B&M Crossing.** Trucks enter the B&M compound at the intersection of Tamaulipas Bridge Road and Sixth Street.
11. **Mexican Export Booth.** Prior to crossing documents are submitted to the booth located inside the B&M export compound. Any export inspections are conducted inside the compound.
12. **B&M Toll Booth.** All bridge tolls, for either commercial or passenger vehicles, are collected on the U.S. side of the B&M Bridge.
13. **Ramp to U.S. Import Compound.** After paying their toll, northbound trucks turn left onto a ramp which loops under the bridge and leads to the U.S. primary inspection booths.
14. **U.S. Primary Inspection Booths.** There are two booths which are both used depending on the demand. Only one booth is equipped with a computer.
15. **U.S. Secondary Inspection Area.** This building has 14 docks of which 13 are used for secondary inspections; one is used for stairs to the platform.
16. **U.S. Compound Exit.** Trucks exiting the B&M Customs compound can turn right onto to Sam Perl Blvd. and proceed through downtown to U.S. 77, or turn left to reach Mexico Street.
17. **Mexico Street.** This is the primary truck route away from the B&M Bridge. From Mexico St. trucks turn right onto Palm Blvd. and proceed north to U.S. 77, bypassing downtown Brownsville.

Southbound Gateway Crossing

A. **International Boulevard.** International Boulevard is the designated truck route for southbound trucks approaching the Gateway Bridge. One block north of the crossing, commercial vehicles make a right turn onto Washington St. and an immediate left-turn onto Fourteenth Street which is used to access the bridge. International Blvd. is designated as State Highway 48 north of Boca Chica Blvd. providing a direct link with the Port of Brownsville. International Boulevard also connects to U.S. 77 approximately five kilometers north of the crossing. Fourteenth Street also connects with U.S. 77 and serves as a major route for passenger vehicles using the bridge.

B. **Toll Booths.** There are three southbound toll booths to serve southbound vehicle traffic.

C. **Mexican Fiscal Route.** At the south end of the bridge structure commercial vehicles make a right-turn onto a single-lane, dedicated fiscal route that leads to the Mexican Customs compound.

D. **B&M Bridge Connection.** After passing under the B&M Bridge, trucks coming from the Gateway Bridge merge with trucks coming from the B&M Bridge.

E. **Entrance to Mexican Customs Compound.** All trucks from both bridges enter the Mexican Customs compound from the single-lane fiscal route.

F. **Document Inspection Booth in Module 1.** Upon exiting the fiscal route. the trucks turn left into the booths of Module 1. There are five booths that open in accordance with assigned personnel. The programming (scheduling) coincides with the demand. From 8:00 a.m. to 12:00 p.m. there is one booth open; from 12:00 p.m. to 3:00 p.m., two booths; from 3:00 p.m. to 5:00 p.m., three booths; and until closing, four booths.

G. **Primary Inspection Area.** There are 20 primary inspection docks located on the southwest corner of the inspection building. However, only seven are usable and only three are accessible by full-size trucks due to limited dimensions.

H. **Secondary Inspection Area.** There are two secondary inspection docks located on the west end of the inspection building.

I. **Mexican Compound Exit.** While there is not a physical building or booth at the exit, one or more Customs officials control the exit of trucks from the compound. All vehicles must present their documents prior to exiting.

J. **Railroad Crossing.** Approximately one kilometer south of the of the Mexican compound, all trucks (northbound and southbound) cross the railroad tracks at an at-grade crossing.

Southbound B&M Crossing

K. **Mexico Street.** This is the primary truck route to the B&M Bridge. Trucks come from U.S. 77 via Palm Boulevard and turn left onto Mexico Street.

L. **Mexico Street and Sam Perl Boulevard.** This intersection connects the two major access routes to the B&M Bridge. Sam Perl Boulevard serves both trucks and passenger vehicles. Much of the truck traffic comes from warehouses located north of Sam Perl Boulevard along East Fronton Street. Most of the southbound passenger vehicle traffic approaches Sam Perl from Twelfth Street

M. **B&M Toll Booth.** (Same as item 12 above.) All bridge tolls, commercial and passenger vehicles, are collected on the U.S. side of the B&M Bridge.

N. **Fiscal Route.** Similar to the Gateway Bridge, trucks use a special fiscal route to traverse from the bridge to the primary fiscal route located on the levee of the Rio Grande. This special route ensures that the trucks go to the Mexican Customs compound.

9.7.3 General Observations and Conclusions

This section summarizes the general results of a survey conducted of both northbound and southbound vehicles on Friday, August 22, 1997. During the survey period 750 northbound

vehicles (traveling from Mexico to the United States) were counted as they passed four control points:

- Gateway Bridge - releases from the Mexican export module
- Gateway Bridge - U.S. primary inspection booths
- Gateway Bridge - exits from U.S. Customs compound
- B&M Bridge - U.S. primary inspection booths

In addition, counts were made of trucks entering and exiting the secondary inspection areas at both U.S. Customs compounds.

In the southbound direction (from the United States to Mexico), a total of 695 vehicles were counted at a location on the fiscal route where the vehicle flows from the Gateway and B&M Bridges join together. Counts were also made within the Mexican Customs compound in terms of the number of primary and secondary inspections.

Table 9.17 summarizes the results of the survey for both bridges and in both directions of flow. Note that since the Mexican Customs compound processes all trucks from both bridges the truck inspection results are presented as a single column. In Mexico, only loaded trucks and vehicles being imported to Mexico are inspected in the truck inspection compound.

Table 9.17
Brownsville-Matamoros Survey Results

	Northbound		Southbound	
Vehicle Classification	**Gateway**	**B&M**	**Gateway**	**B&M**
Total Vehicles	410	340	350	345
Bobtails (Tractors w/o trailers)	25 / 6%	70 / 20%	Not Counted	
Single Units & Tractor-trailers	385 / 65%	240 / 80%	Loaded Trucks Only	
Truck Inspections	**Gateway**	**B&M**	**Combined - Both Bridges**	
Average Processing per Truck	na	na	1.5 min	
Average Time in Booth due to Inspection and Congestion	na	na	3.0 min	
Primary Inspections				
Percent Inspected	100%	100%	7%	
Average Time (min)	2	1.5	90	
Secondary Inspections				
Percent Inspected	48%	60%	<1%	
Average Time (min)	35	10	60	
Exit Document Inspection (min)	<0.5	<0.5	3	
Average Processing Time (min)	15	8	13	
Average Waiting Time Outside Compound (min)	20	15	30	
Total Average Time (min)	35	23	43	
Total Maximum Time, all inspections (min)	58	27	170	

Source: Barton-Aschman & La Empresa, August 22, 1997

In the northbound direction, the Matamoros-Brownsville crossings surveyed were the least time consuming for the case study crossings studied. Some truck delay is caused by the mixed flow on the bridge when autos waiting for inspections at the U.S. primary inspection booths block the movement of trucks into the U.S. Customs compound. Another general observation is that the

rate of secondary inspections in Brownsville is higher than the other locations surveyed, however, the length of these inspections are significantly shorter.

One contributing factor in the length of inspections is that all canine inspections are performed at the secondary inspection docks. This practice benefits the trucks that are not subject to inspection since the inspected vehicles do not block the circulation of vehicles through the compound. In other locations, canine inspections have created delays for all vehicles, even those which are not subject to secondary inspections.

In the southbound direction, the Matamoros-Brownsville crossings surveyed were the most time consuming of the crossings studied. Due to the limited space and operational practices in the Mexican Customs compound, vehicles experienced unnecessary delays. An example of the inefficiency in the Mexican compound is shown in Table 9.17. Note that on average it took 1.5 minutes to process a truck at the document control module. However, it took three minutes for a truck to clear the module due to congestion in the yard. The delay generated by this situation could be reduced or eliminated through operational changes including the use of traffic control officers. Other operational inefficiencies identified within the Mexican compound are described later in this chapter.

The following sections describe the northbound and southbound observations made by the study team during the survey. Where possible, opportunities to eliminate inefficiencies and improve traffic flow have been identified. Due to the current construction of the new Los Tomates Bridge, the opportunities identified in this case study are primarily short-term actions which will benefit traffic over the next one to two years. Once Los Tomates is open, it is anticipated that all truck traffic from the existing bridges will be moved to that facility. One long-term opportunity which benefits passenger vehicles was identified by the consultants and is included in the discussion.

Gateway Bridge Northbound

Table 9.18 identifies the inefficiencies and opportunities for northbound traffic using the Gateway Bridge. Figure 9.31 shows the general layout of the U.S. and Mexican facilities at the Gateway Bridge. Most of the existing northbound inefficiencies cannot be mitigated with low-cost short-term solutions. There are some potential opportunities to improve the access road leading to the crossing in Matamoros and the egress road from the U.S. compound in Brownsville. Currently, the greatest inefficiency to commercial truck traffic is the mixed flow of traffic on the bridge. One potential opportunity would be to have an exclusive truck lane during peak demand periods. This would require the use of traffic control officers to enforce the lane assignments.

B&M Bridge Northbound

Table 9.19 identifies the inefficiencies and opportunities for northbound traffic using the B&M Bridge. Figure 9.32 shows the general layout of the U.S. and Mexican facilities at the B&M Bridge.

Table 9.18
Northbound Gateway Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - East Tamaulipas • Mixed traffic operation - autos, taxis and trucks • Trucks wait for documents along roadway • Insufficient space to conduct export inspections • Conflicts with autos, taxis, buses, pedestrians near toll booth entrance	• Close off bus/taxi loop access to Tamaulipas • Eliminate northbound auto traffic north of Lilas Rd. • Require trucks to have all documents prior to approaching bridge to eliminate parked vehicles on roadway	Mexico	Secretariat of Communication and Transportation (SCT), City of Matamoros, Mexican Customs Brokers
Toll Booths • All traffic stops during shift change (4:00 p.m.) for 10 minutes while money drawers are counted • Toll collection is slower than typical	• Make shift change more efficient (shorter) or stagger changes • Reschedule shift changes outside of peak traffic demand periods • Post toll fee schedule signs in larger type and add sign(s) in advance of Elizabeth Street so drivers can have toll ready • Have toll collectors have change pre-stacked to expedite change making	Mexico	Federal Toll Highways and Bridge, (Caminos y Puentes Federales de Ingreso y Servicios Conexos - CAPUFE), Cameron County International Bridge System

Bridge
• Mixed traffic delays
  • too few U.S. passenger vehicle primary lanes
  • autos delayed (blocked) by truck queue - sometimes
  • trucks delayed (blocked) by auto queue - most of the time
• Tight truck turn into U.S. Customs compound
  • turning truck blocks 2 auto primary lanes
• Pedestrians cross truck lane
  • typical truck delay 15-30 seconds
	• Consider exclusive lane operations during peak commercial traffic periods
	• Staff primary booths in accordance with passenger vehicle and truck arrivals
	• No short-term cost-effective opportunity
	• Install actuated traffic signal to produce gaps in pedestrian flow when space is available in compound
		United States	U.S. General Service Administration (GSA), Cameron County International Bridge System, U.S. Customs Service

U.S. Inspection Areas • Safety inspection location constrains truck circulation	• No short-term cost-effective opportunities	United States	U.S. Customs, GSA

Egress Route
• Delays to turn north on International Blvd. from Elizabeth St.
  • conflicts with turning vehicles and pedestrians
  • vehicle paths not clearly defined in intersection
	• Channelize intersection to permit free right turns	United States	City of Brownsville, Texas Dept. of Transportation (TxDOT), Cameron County International Bridge System, Cameron County

Source: Barton-Aschman & La Empresa, August 22, 1997

Figure 9.31 - U.S. and Mexican Facilities at Gateway Bridge

Table 9.19
Northbound B&M Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - Tamaulipas Bridge (Road) • Trains entering and exiting Mexico block access route while being processed	• Explore proposals to inspect trains at remote facilities outside of the downtown areas • Change or coordinate hours of trains crossing the bridge to outside or the peak hour.	Mexico United States	Union Pacific (UP), Port of Brownsville, B&RG Railroad
Bridge (Commercial Vehicles & Rail) • Joint use of bridge delays both trucks and trains (northbound and southbound)	• No short-term cost-effective opportunities	United States	B&M Bridge Company
Toll Booths (Passenger Vehicles) • Insufficient toll booths create long queues and delays (northbound and southbound)	• Use electronic toll collection (ETC)	United States	B&M Bridge Company
U.S. Inspection Areas (Commercial Vehicles) • Limited primary inspection capacity creates queues and delays	• Equip second booth with computer so inspector can does not have to go to other booth and wait for the single available computer • Relocate primary booths 75-100 feet north of existing booths and add 1-2 new booths (may not be cost-effective short term) • Advise truckers to cross during low activity (off peak) periods, typically after noon	United States	U.S. Customs, GSA

Source: Barton-Aschman & La Empresa, August 22, 1997

Figure 9.32 - U.S. and Mexican Facilities at B&M Bridge

One opportunity for improving northbound truck traffic is related to changing the existing rail operations. Presently, trains crossing the border (northbound and southbound) block access and egress to the Mexican Customs compound due to the inspection process. If the train processing times at the border crossing were minimized, it would reduce the delay to trucks entering and exiting the Mexican Customs' compound. Both the Port of Brownsville and Union Pacific are considering methods that would use remote train inspections outside of the downtown area. This remote processing should reduce the amount of time required for trains to pass through the border crossing area.

The only other short-term, low-cost opportunity would be to work with the transportation companies to increase the northbound use of the B&M Bridge in the afternoon. Demand at this bridge drops sharply after 12:00 p.m. Truckers could be advised of this opportunity to spread out the demand.

Gateway Bridge Southbound

Table 9.20 identifies the inefficiencies and opportunities for southbound traffic using the Gateway Bridge. The greatest inefficiency in the southbound direction is insufficient capacity at the toll booths. Presently, there are three toll booths serving traffic approaching from International Blvd. and Fourteenth Street. During the afternoon and evening peak periods southbound trucks often encounter long queues on International Blvd. and passenger vehicles face similar conditions on Fourteenth Street. While there are plans to realign the approach to the bridge to make International Blvd. the primary access route for all traffic, the proposal does not add toll booth capacity. The approach realignment could actually increase queuing on International Blvd.

Figure 9.33 shows two conceptual plans which would relocate the toll booths north of Elizabeth Street and add a minimum of two toll booths. Both of these proposals would reduce the waiting times and reduce the queue for southbound vehicles. Depending on the planning and construction time frame to implement these changes there may be limited benefit to truck traffic. However, there would be a long-term benefit for passenger vehicles even if all truck traffic moves to the new Los Tomates Bridge. An alternative would be to collect tolls on both bridges only in one direction. This would eliminate the toll booth queue southbound without impacting northbound operations. See Chapter 8 for other toll collection-related opportunities.

In Mexico, southbound trucks using the Gateway Bridge use the same Customs compound as trucks crossing at the B&M Bridge. The operational inefficiencies and opportunities identified by the survey team are described in the following section.

B&M Bridge Southbound

Table 9.21 identifies the inefficiencies and opportunities for southbound traffic using the B&M Bridge. The intersection of Mexico Street and Sam Perl Boulevard represents one of the operational inefficiencies. During the afternoon peak period, southbound trucks queue through the intersection. Rather than having two queues, one on Mexico St. and one on Sam Perl Boulevard, trucks are not allowed to make left-turns onto Mexico Street from Sam Perl Boulevard. This forces trucks to turn right from Sam Perl Boulevard onto Mexico Street and then make a U-turn on Mexico Street to join the queue. The restriction of left-turns minimizes the potential for truck and passenger vehicle conflicts at the intersection.

Table 9.20
Southbound Gateway Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties

Access Routes - International Blvd. & 14th Street
• Mixed traffic operation - except during evening peak when International serves trucks only and 14th Street serves passenger vehicles only
• Long queues and delays on both roadways during evening peak period
• Many traffic control officers (public & private) required to keep intersections clear
Toll Booths
• Insufficient capacity creates access road congestion
  • too few toll booths (3)
  • moderately slow toll collection
	• Relocate toll booths north of Elizabeth Street in vacant block
	• Add at least two more toll lanes
	• Collect tolls in only one direction on both bridges and eliminate tolls southbound; double northbound tolls
	• Sign toll charges in large type both at toll booths and north of Elizabeth Street so drivers can have their tolls in hand
	• Install electronic toll collection (ETC) system
	• Reserve one lane exclusively for ETC
	Note: *These opportunities will benefit passenger vehicle traffic long-term. Other circulation changes are needed. The currently proposed geometric improvements will not increase capacity, only add queuing area. This facility should be re-designed to increase capacity regardless of the construction of Los Tomates.*
		Mexico	City of Brownsville, Texas Department of Transportation (TxDOT), Cameron County International Bridge System, Cameron County

Bridge
• Pedestrian/truck conflicts at entry to fiscal route for commercial vehicles
  • delays to trucks
  • safety hazard
	• No short-term cost-effective opportunities	Mexico	CAPUFE

Mexican Inspection Areas • See discussion of B&M southbound		Mexico	Department of Treasury and Public Credit (Secretariat de Hacienda y Credito Public SHCP)

Source: Barton-Aschman and La Empresa, August 1997.

Figure 9.33 - Alternative Concepts for the Southbound Gateway Bridge Approach

Another form of inefficiency is introduced due to the joint use of the bridge for truck and rail traffic. When a rail crossing occurs all truck traffic must stop. Currently, rail operations are scheduled on an as needed basis. Therefore, the interruption of truck traffic is not predictable. Plans by the Port of Brownsville and the Union Pacific (UP) Railway Company may improve the situation by performing more of the inspection operations away from the border crossing, decreasing the time the trains block the bridge and minimizing the disruption of truck traffic at this location. UP may also divert some of its traffic currently interchanged with Mexico Northeast lines to the Pacific-North lines (through El Paso) which they have an ownership stake in.

Once trucks have crossed either the Gateway or B&M Bridges they are directed onto a fiscal route which runs along the top of the levee next to the Rio Grande. This is a single-lane roadway which leads from the bridges directly to the Mexican Customs compound. While this roadway serves trucks only and keeps queuing off the city streets, delays can occur when a truck breaks down or runs out of gas. In addition, the section of roadway passing under the B&M Bridge has poor drainage and is subject to flooding during rains. While the road could be widened and better drainage created, these solutions might not be cost-effective if truck traffic is to be moved to the new Los Tomates Bridge.

The greatest existing inefficiency for the downtown crossings in the Brownsville-Matamoros POE system lies within the Mexican Customs compound. (Figure 9.34 shows the layout of the Mexican Customs compound.) Generally, the lack of space creates several inefficiencies which are compounded by operational practices. The lack of space (and a second lane) on the fiscal route causes delays when a truck's documents are not ready. Typically, the truck waits on the fiscal route blocking all traffic into the compound until the documents arrive.

The initial point of congestion is created by the lack of maneuvering space between the entrance booths and the exit booths. In this area, trucks cross each others path in order to exit the compound and turn onto the access road.

Operational practices also reduce the efficiency of the compound. Depending on which entrance booths are open, the processing efficiency may go down due to their relationship to the exit. Opening the entrance booths in a different order might improve the efficiency of the operation. For example, Instead of opening the central booth in the morning, the second booth on the right could be opened permitting the use of the two exit gates without blocking the flow of traffic. In the afternoon, a second booth could be opened to the left so that each booth would be in front of an exit, creating two separate lines. Similarly, the use of better traffic control on the fiscal route might improve the operation. Currently, drivers try to guess which booth will give them a "green light" to proceed. These drivers often block the fiscal route when there are open booths. A traffic control officer could direct drivers into the first available booth.

Table 9.21
Southbound B&M Bridge Inefficiencies and Opportunities

Inefficiencies	Opportunities	Country	Responsible Parties
Access Route - Mexico St. & Sam Perl Blvd. • During PM peak periods trucks approaching from Sam Perl Blvd. are not allowed to turn left towards bridge • Turning restriction forces trucks to turn right on Mexico St. and make U-turns near Amigoland Mall	• No short-term cost-effective opportunities	United States	City of Brownsville
Bridge (Commercial Vehicles & Rail) • Joint use of bridge delays both trucks and trains (northbound and southbound)	• No short-term cost-effective opportunities	United States	B&M Bridge Company

Fiscal Route-Access Road
• Single-lane design subjects trucks to delays for incidents
  • stalled vehicles cannot be passed
  • water ponds under B&M Bridge and blocks road
	• No short-term cost-effective opportunities	Mexico	SHCP

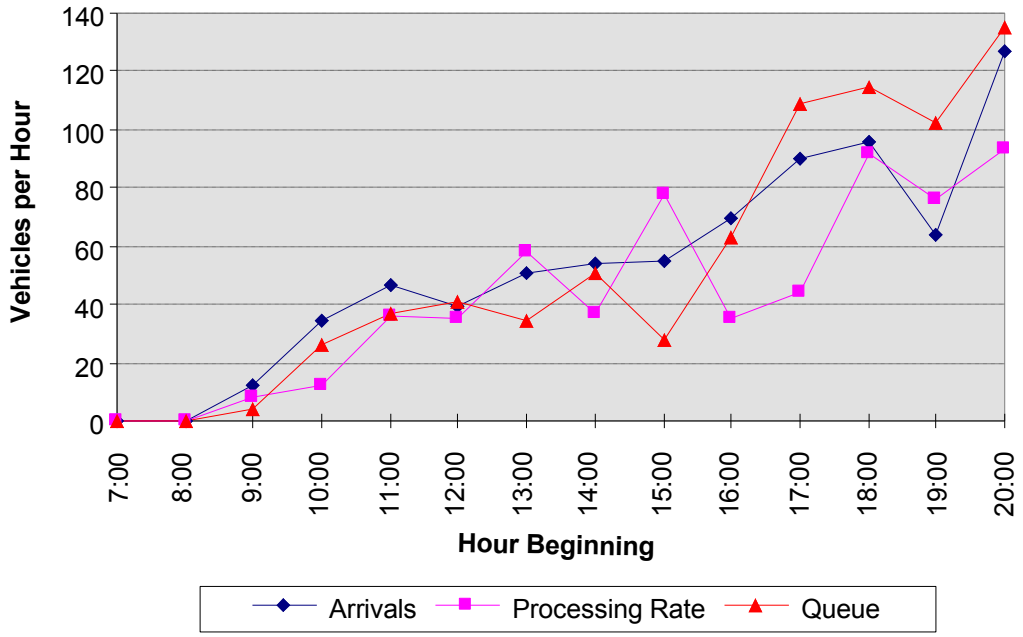
Mexican Inspection Area - Exit & Entry Gates
• Drivers block entrance waiting for documents
• Physical design limits capacity
  • document inspection booths too close to exit gates
  • too little maneuvering space in front of and behind entrance booths
  • conflicting movements (to exit gate and primary inspection area
• As the number of booths increases, efficiency decreases due to congestion/maneuvering
  • 1 lane - 1 minute per truck
  • 5 lanes - 3 minutes per truck
• Drivers block entry trying to avoid red light - want to go to a booth which just had a red light
• Exit document inspection is capacity constraint
  • document inspection - 50 seconds/truck
  • exit inspection - 80 seconds/truck
	• Let drivers wait at inspection booth for documents to avoid blocking all booths
	• Widen fiscal route near compound entrance to two lanes for 100+ meters to accommodate trucks waiting for documents
	• Post traffic control officer at entrance to direct trucks to open lane(s)
	• Use booths which minimize conflicting movements
	• Create third exit lane for import cars to provide two exclusive truck exit lanes
	• Direct trucks to use the exit gate in front of their current position to reduce crossing traffic and conflicts
		Mexico	SHCP

Mexican Inspection Area - Primary/Secondary • Only 30% of facility is available for inspections and circulation due to the storage of impounded autos • Only 7 of 20 primary inspection positions are accessible to trucks • More stevedore capacity is at facility than can be used (Is this really an problem; more like a waste) • Limited space makes it difficult to maneuver into the available inspection docks	• Remove sidewalk to facilitate maneuvers into the primary docks • Relocate stored autos to facilitate maneuvering and circulation	Mexico	~~Hacienda~~ SHCP
Egress Route - Tamaulipas Bridge (Road) • Trains entering and exiting Mexico block access route while being processed	• Explore proposals to inspect trains at remote facilities outside of the downtown areas	Mexico United States	Union Pacific (UP), Port of Brownsville, B&RG Railroad

Source: Barton-Aschman and La Empresa, August 22, 1997

Figure 9.34 - Mexican Customs Compound

Figure 9.35 - Brownsville-Matamoros Arrivals, Document Processing and Queue at Mexican .Compound



Source: Barton-Aschman - La Empresa, 1997

Currently there is also a large number of impounded automobiles that restrict truck movements within the compound. The impounded vehicles cause trucks sent to the primary inspection area to back through the entire compound and into a primary inspection dock. Removing these vehicles from the compound would greatly simplify truck maneuvers. Figure 9.35 shows how the queue on the Fiscal Route accumulates throughout the day.

The secondary inspection area did not present any particular problems in so much as the two available spaces had an inspection capacity which exceeds that of primary inspection.

It should also be noted that this was the first compound where there was excess stevedore capacity. Workers were ready to unload trucks, but often the trucks were unable to access the dock area for unloading.

9.7.4 Conclusions

Northbound the capacity constraint and generator of truck delays is due to U.S. primary inspection and mixed traffic flow on the bridge. More staffing (Gateway) and more lanes (B&M) are needed at the U.S. primary inspection area. Southbound the constraint is toll collection and conflicting truck movements at the Mexican truck inspection compound entrance, document inspection point, and the exit.

The opportunity to implement short-term, low-cost improvements is limited at these crossings. Most of the inefficiencies identified for the downtown crossings in the Brownsville-Matamoros POE system will be eliminated when truck traffic moves to the Los Tomates Bridge within a couple of years. There are some short-term operational changes which could be implemented in the Mexican Customs compound which would significantly improve the efficiency of the commercial

truck operations prior to the completion of the new Los Tomates Bridge. In addition, there is at least one medium to long-term opportunity which would benefit southbound passenger vehicles by increasing the number of toll booths.

Alternatively, tolls could be collected northbound only (doubling the toll going north) and the southbound toll booths removed. This could be done without increasing the number of northbound booths (but would leave space for one more northbound booth). This change, which could be implemented in the short term, would have to be made at both the Gateway and B&M Bridges to prevent drivers from avoiding tolls.

Other minor operational improvements could be made to generate small efficiency increases. They are listed in tables earlier in this chapter.

9.8 Conclusions

This study of commercial border crossings at six ports of entry systems has demonstrated that there are many similarities and several differences among border crossings. This chapter describes the conclusions drawn from all the studies conducted. It includes general observations, identification of common characteristics, and examples of opportunities for improving border crossing systems. Also included is suggested additional research into basic characteristics which may aid future border crossing studies. A suggested work program for prototypical border crossing studies will be included in the final Phase IV report.

The conclusions have been developed by the authors on the basis of study observations and analyses. The JWC asked the consultants to identify the true causes of transportation (movement) inefficiencies and to provide opportunities to reduce or eliminate causes of those inefficiencies and to enhance transportation efficiency. Readers may find the conclusions to be different from common perceptions. However, these are the conclusions of the authors based on an objective, technical study.

9.8.1 Border Crossing Systems

Perhaps the single most important finding is that border crossings need to be considered as binational border crossing systems. By this we mean three things:

1. All crossings in an area function as a "system" serving the same trade or transportation corridors, or economic subregion. In some areas there are separate truck and passenger vehicle crossings. In others, there are multiple crossings serving trucks and/or passenger vehicles in the same corridor.
2. For each crossing, there are many individual components which make up the commercial border crossing "system". Crossings need to be considered separately in each direction because they differ somewhat in the components and how they are operated. Components of commercial crossing systems may include:

   Northbound (Mexico to United States)

   - Ingress route
   - Mexican export inspection
   - Toll collection and queue area
   - Border crossing roadway or bridge
   - Primary inspection queue area and booths
   - Secondary inspection platform(s)
   - Additional inspection areas and facilities (canine, x-ray, etc.)
   - Inspection exit and queue area
   - Egress route

   Southbound (United States to Mexico)

   - Ingress route
   - U.S. export inspection (or document collection) and queue area
   - Toll collection and queue area
   - Border crossing roadway or bridge

- Mexican booth for document inspection/selection for primary inspection (also queue area)
- Primary inspection platform(s)
- Booth for selection for secondary inspection
- Secondary inspection platform
- Inspection exit and queue area
- Egress route

All of these components affect the efficiency and capacity of border crossings. In many respects, they are like links in a chain: the weakest link will eventually cause the chain to break, or in the case of border crossings, the lowest capacity component will limit the capacity of the entire crossing. While there are variations in specific characteristics of individual crossings, they generally operate quite similarly.

3. For each crossing there is a strong relationship between the problems in one country and the impacts on the other. Mostly it is a case of the operational problems on one side of the border resulting in unwanted conditions on the other side. These tend to cause delays and excess costs (economic, environmental, social).

9.8.2 Efficiency Studies

As mentioned in the first chapter, this task was to identify inefficiencies in the movement through the border crossings, excluding the inspections themselves and excluding time expended away from the border with documentation, inspections and other factors discussed in Report 3.1. These studies were not to consider the conduct of inspections. However, access, internal circulation, delays for waiting, and other movement-oriented aspects within an inspection facility were included in these assessments.

All six case studies included examination of the truck mode. Initially some case studies were to include combinations of highway and rail. However, while rail was considered, the detailed studies did not include rail border crossings because of the pending Mexican rail system privatization, the anticipated private sector motivation for more railroad operating efficiency, and joint ownership of rail companies on both sides of the border. These factors should result in greater efficiency for rail crossings and significant change in rail operations. Hence, no detailed rail crossing studies were conducted.

Previous chapters of this report identified opportunities for improvements to each of the six case study crossing systems. This chapter describes general opportunities applicable to all or most existing crossings as well as any new crossings being considered.

9.8.3 Key Findings

The key findings from the six case studies are very important to the understanding of the following discussions. They are stated here to sensitize readers to the systematic nature of the way crossings work.

1. Northbound delays are almost always caused by constraints in the inspection facilities (usually the U.S. Primary inspection booths), not the border crossing roadway or bridge. In only one case was the actual border crossing roadway operating at capacity.
2. Northbound almost no existing crossing (i.e., bridge or crossing road) will ever reach its transportation (vehicular) capacity because the U.S. inspection facilities will run out of capacity first. U.S. inspection facility sites are too small to accommodate enough inspection capacity

(primary booths, secondary spaces, and other inspection areas) for trucks (and/or passenger vehicles) to reach saturation flow on the crossing road or bridge.

3. Southbound several Mexican customs inspection facilities have significant constraints due to site size or lack of exit capacity (document inspection and verification).
4. In Mexico the ingress and egress routes are overloaded or carry high truck volumes for which the streets or adjacent development were not intended. Typical access roads are urban streets with no special provisions for high volume, heavy truck traffic and with many conflicts between passenger and commercial vehicles.
5. Demand management and institutional practice changes could reduce some delays in each direction. Practices such as scheduling shipments during off-peak periods, pre-clearing more loads, and encouraging inspection agencies to reduce avoidable time delays would reduce overall delay.
6. Inspection facilities need to be examined in a systematic way covering all components in order to determine “bottlenecks”. Several existing facilities are “out of balance” (have components with significant capacity constraints which limit the effectiveness of the rest of the components which have excess capacity).
7. High volume, commercial truck traffic should be separated from other traffic because the requirements and characteristics for their efficient operation at border crossings are not compatible with passenger vehicles.
8. Minimizing travel delays does not appear to be a priority for either U.S. inspection agencies or toll collectors.
9. In most cases, there appears to be good coordination and cooperation between the U.S. and Mexican inspection agencies.
10. The only reasons for new border crossings (additional locations) should be (1) to serve new trade or transportation corridors, (2) to eliminate freight movement from urban traffic, and (3) to avoid or eliminate land use incompatibility. Many new locations are now being justified on the basis of perceived bridge congestion which is actually due to queues backing up from undersized or inefficient inspection facilities.

9.8.4 General Characteristics of Border Crossing Systems

This section describes typical characteristics of border crossing systems. Some of the operating characteristics of the case study crossings are shown in Table 9.22 These are used to provide typical criteria for analyzing or planning crossing system components.

Northbound

Ingress routes in Mexico. These are generally major streets or at-grade highways with frequent cross-street and/or driveway access. In urban areas, most are heavily traveled by mixed traffic. In some locations, truck border crossings have been relocated to exclusive crossing points away from other traffic (e.g., Otay Mesa-Mesa de Otay). However, even these

Table 9.22
Characteristics of Border Crossing Systems

	Nogales-Nogales	Laredo-Nuevo Laredo	San Diego - Tijuana	El Paso - Ciudad Juarez	Brownsville - Matamoros
Crossing	**Mariposa**	**Bridge II**	**Otay Mesa**	**Zaragoza**	**Gateway/B&M**
Northbound Direction					
Vehicle Classification					
Total Trucks	1050	2560	2100	980	750
Tractors without Trailers (Bobtails)	60 / 7%	1075 / 42%	420 / 20%	70 / 7%	95 / 12%
Tractor Trailers and Single Units	970 / 93%	1485 / 58%	1680 / 80%	910 / 93%	655 / 88%
Truck Inspections					
Average Primary Inspection Time (min)	1.0	1.0	1.5	3.25	1.5
Primary Lanes (no. used of total)	3 of 4	3 of 4	5 of 6	4 of 6	2 of 4
Estimated Primary Capacity (veh/hr)	180/240[1]	180/240	200/240	70/110	80/160
Secondary Inspection Percentage	na	13%	46%	30%	53%
Average Secondary Inspection (min/veh)	35	28	46	110	24
Average Crossing Times					
Processing within Compound (min)	na	24	26	40	12
Queue/Wait Time (min)	na	31	39	120	18
Total Crossing Process + Queue	51	55	65	160	30
Southbound Direction					
Vehicle Classification					
Total Trucks	400	1590	1300	1150	695
Tractors without Trailers (Bobtails)	na	na	na	na	na
Truck Inspections					
Document Inspection (minutes)	1.0	1.2	1.2	1.0	3.0
Primary Inspection Percentage	10%	10%	10%	10%	7%
Average Primary Inspection (minutes)	180	180	180	180	60
Secondary Inspection Percentage	1%	1%	1%	1%	<1%
Average Secondary Inspection (minutes)	180	180	180	180	30
Average Crossing Times					
Processing within Compound (min)	24	24	24	24	10

Source: Barton-Aschman & La Empresa, January 16-17 1997
[1]# # / # # Capacity based on open lanes/maximum capacity.

crossings are accessed from local major streets. In some cases the heavy traffic on the approach routes results in congestion and delays to trucks, other traffic, or both. For example, the heavy traffic in Juarez often delays trucks approaching the Mexican export inspection facility. In Matamoros, northbound trucks delay some of the passenger vehicle traffic approaching the Gateway Bridge.

Existing border crossing access routes do not always link directly to major maquiladora or other industrial areas in Mexico. Trucks often must travel on narrow city streets through major parts of urban areas to reach border crossings (e.g., Matamoros, Nogales, Piedras Negras, Jauuarez). Often these streets are not designed for high volumes of trucks. Turns are difficult. Streets deteriorate under heavy loads. Travel is slow. Only the separate truck routes in outlying areas seem to operate efficiently.

Access to Crossings. No special provisions have been made for entrance to border crossings at the case study sites to accommodate high volumes of trucks except at Laredo-Nuevo Laredo. Most truck entrances to the crossings are simple driveways without traffic signals or any other provisions. This was a problem at Mesa de Otay and Nogales. Generally the lack of dedicated access routes did not result in significant delays except in Nogales.

Queue to First Control Point. The first control point is normally either the Mexican export inspection booth or a toll booth. However, the queues outside the first control point are usually directly or indirectly caused by insufficient capacity at the U.S. primary inspection booths. Queues developed outside the first control points at all crossings, either because (1) the flow of arriving trucks exceeded the capacity of the booths being operated (2) because the personnel were applying informal flow management to keep subsequent system components from becoming congested, or (3) personnel wanted to keep idling trucks off a bridge (the vibration causes structural deterioration over time). Where such informal management was applied, it was not clear where the authority came from.

In many locations, the available queue space appears to be incidental rather than planned (e.g., Nuevo Laredo and Ysleta Zaragoza). Sometimes it uses the area between a street and the export facility (Mesa de Otay). At other locations the queues are on the streets as was the case in Nogales and Juarez. The needed queue capacity depends on both the truck arrival rate and the processing rate at the most limiting control point.

Mexican Export Inspection. Inspection of northbound loads destined for the United States is made at this point. There are booths where the documents for all trucks are inspected. Generally about two percent of the trucks are sent to a platform to have loads inspected. In some cases no platform or dock space is provided and trucks are inspected on the street. Typically, where there is a platform, it is off-line (out of the flow of traffic), but is not always easy to access when demand is high. Processing times for Mexican export booth document inspection ranged between 0.5 and 1.5 minutes at the border crossings studied. The average was one minute. Export inspections at the platform ranged between 60 and 180 minutes, and averaged about 90 minutes. There were North American Trade Automation Prototype (NATAP) lanes through parts of the Otay Mesa-Mesa de Otay and Ysleta-Zaragoza crossing systems, but they were not in operation at either crossing when the case studies were performed. They are intended to enable pre-cleared trucks to pass through the facility without stopping by using fully electronic processing of the NATAP trucks.

Toll Booth. All toll booths at the case study crossings were manually operated. There were no coin baskets or electronic toll collection. There is prepayment of tolls via corporate accounts at some locations. However, toll collectors must find these accounts and record the transactions on their computers. This takes as long or longer than collecting a cash toll. In Brownsville, the measured average toll collection rate was 16 seconds per vehicle (mixed traffic). In few cases

were enough toll booths supplied to reach the capacity of the bridge crossing the border (assuming the inspection facilities were not the constraint).

Another observed inefficiency at Brownsville was that all northbound toll booths were closed for 10 to 15 minutes for shift changes while the toll collectors tallied their receipts and counted their money. Much of this delay could have been avoided by staggering shift changes or by handling the checkout procedure in the office. Similar closures resulted at Ysleta-Zaragoza when toll collectors at the truck bridge took breaks.

Crossing. The crossings consist of bridges (over the Rio Grande/Rio Bravo) or connecting roadways between Mexican and U.S. inspection facilitates. Some bridges carry mixed traffic (e.g., Laredo II, Eagle Pass, Gateway) while others carry trucks on separate bridges or lanes (e.g., B&M, Ysleta-Zaragoza). The same is true with at-grade roads such as the crossings at Otay Mesa-Mesa de Otay where trucks cross on dedicated truck roads and Nogales-Nogales where trucks cross in mixed traffic. All of the two-way crossings studied were either two or four lanes except Laredo II and Colombia.

Generally, the crossing bridges or roads themselves do not generate any delays unless incidents occur. (The only exception is the two-lane bridge at Eagle Pass-Piedras Negras). However, there is frequently congestion backing up from the U.S. primary truck or passenger vehicle inspection booths onto the crossings, which gives the appearance that the crossing is congested.

Primary Inspection Booths and Queue. All trucks entering the United States must go through the truck inspection facility. This contrasts with the southbound entry to Mexico where empty trucks typically do not go through the truck inspection facility (except Nuevo Laredo).

The first U.S. inspection point is the primary inspection where documents are inspected. No physical inspection is performed at this location at most of the crossings although at some crossings there were occasional canine or vehicle inspections. These additional inspections only occur at primary when no other space was available to conduct the inspections. In all case studies, at some time in the survey period truck arrivals exceeded the primary inspection processing rate. Hence, there was almost always a queue in advance of primary booths during the busy periods of the day. There were two reasons for this:

1. Booths were not opened in sufficient number to meet the truck arrival rates. They appeared to be operated according to pre-defined schedules, in many cases additional booths opened at about 3:00 p.m. when the second shift started.
2. There were not always enough primary inspection booths at some locations (e.g., Brownsville-Matamoros B&M Bridge) even if staffing was available.

The northbound queues approaching the U.S. primary booths ranged from 0 to over 200 trucks at the six case study crossings. At four of these six crossings the queues extended back onto the bridge or crossing road, making the crossing appear to cause congestion.

Primary inspection processing rates at the study locations ranged between 0.5 and 10.0 minutes per truck. However, the sites where only documents were checked (excludes Brownsville and Ysleta) ranged between 0.5 and 2.5 minutes and averaged approximately 1.5 minutes. It appeared that a processing time of about 1.5 minutes per truck should be used for planning purposes.

Secondary Inspection. Some trucks are directed to the secondary inspection area. The secondary inspections may cover the vehicle, the load, or documents and may take a few minutes to several hours. The extent of inspection was not a part of this study. It should be noted that the surveys counted all forms of “secondary” inspection, not just Customs inspections. Therefore, the percentages listed below include: USDA, FDA, Customs Compliance, and Customs Enforcement

inspections. Also, these secondary counts typically include informal entries which are filing their import documents.

Between 13 and 53 percent of the trucks were selected for secondary inspections at the crossings studied. The secondary inspections at Brownsville (both bridges), the highest rate surveyed, included some trucks (for which it appeared) that the primary inspection of papers occurred at the secondary platform. The average percentage of trucks selected for secondary inspection was about 31 percent, or about 28 percent omitting Brownsville. It is suggested that planning be based on 40 percent secondary inspections (based on current practice by inspection agencies).

Supplemental Inspections. Several additional inspections are conducted in the U.S. inspection facility. These include canine (for drugs) in the yard, weight, x-ray, agricultural, hazardous materials, and safety. The safety inspection is a state inspection and may be conducted within the U.S. facilities, as in Texas, or outside the U.S. facility elsewhere. In all cases, supplemental inspections were conducted on only a portion of the total trucks.

Supplemental inspections are performed at various locations within the U.S. compounds. Most of the equipment or structures used by these inspections are located where space has been judged available. In newer facilities, these locations tend to be on the periphery. There did not appear to be a consistent pattern (see prior chapters for facility layouts) to the planning and design. A later section of this chapter addresses supplemental inspection locations.

The only one of these inspections which involved many trucks and created any inefficiencies was the x-ray inspection. Trucks were typically queued waiting to be x-rayed. At the two facilities having 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. X-rays averaged approximately 2.5 minutes per truck at the Ysleta facility. This was a porTable 9.unit which the driver could drive the vehicle into and then the x-ray unit scanned the load. Permanent x-ray units take longer to scan vehicle, because the driver must exit the vehicle and the tractor and trailer are dragged through the unit on a conveyor system. X-ray inspections at the permanent unit at Otay Mesa were taking an average of almost 10 minutes per vehicle. Additional data needs to be collected on the average processing times for x-ray units.

Exit Queue and Inspection. After the inspections, trucks proceed to the exit for a final document inspection. This is merely verification that all required inspections have been completed. This typically took less than 0.5 minute per truck at all locations.

At most facilities there are two exit booths. However, only one booth was used most of the time. Because there were surges of exit traffic, queues developed at some facilities. At Ysleta and Laredo the queues were occasionally created purposely, then used to conduct canine inspections.

At Brownsville, trucks were released from secondary inspection platforms in “waves” of six to eight trucks at a time. This resulted in the trucks all approaching the exit at about the same time. Maximum observed exit queues totaled about eight trucks. At Otay Mesa, canine block inspections of 15 to 20 vehicles were released all at once. These releases created temporary exit queues in excess of 20 vehicles since other vehicles were being released from both the primary and secondary inspection areas.

It should be noted that employee parking is provided inside some of the inspection compounds. Entry to this parking and to the main cargo compound is made by driving the wrong way into one of the exit lanes. At some of the newer facilities, parking is located outside the actual inspection area. This removes most of the need to use an exit lane for inbound traffic.

Egress Routes. Virtually all egress routes to the United States take trucks to a main road by way of a secondary road. Some of these roads are very short and trucks reach the main road within a

few hundred meters. Most provide direct routes to regional highways. However, some of the older crossings require driving through a downtown area or other urban area (e.g., Brownsville-Matamoros B&M Bridge). As mentioned above, several truck crossings have been moved to outlying locations (e.g., Otay Mesa-Mesa de Otay) to facilitate access to major highways and avoid delays.

Southbound

Ingress Routes in United States. See northbound egress routes.

U.S. Export Inspection. Some crossings have been provided with export inspection booths or platform facilities. Otay Mesa and Ysleta are two of these. However, these facilities are not currently being used. Southbound trucks currently bypass these facilities or drop documents into an unstaffed collection box.

Toll Booths. As with the toll booths in Mexico, all tolls are collected manually or through computer-accessed corporate accounts. Toll booths can be a capacity constraint southbound because the Mexican inspection routine is far less time consuming on the average.

For bridges accommodating both trucks and passenger vehicles (with mixed or separated flow), toll collection is done by the same entity. However, sometimes the truck toll booths are separated from those serving passenger vehicles (because the inspection facilities are separated). Staffing at these locations are managed as if it was separate operation. At one bridge no relief collector was available to replace a collector taking a rest or lunch break and the bridge was effectively closed as a result. This was reported to be normal practice. This operational delay could be avoided by providing one of the relief collectors during the break period.

At Brownsville, average toll collection was approximately 16 seconds per vehicle (mixed traffic). Payment by corporate account at other locations took 0.5 to 1 minute to process.

Crossing. See northbound crossings. Only loaded trucks and vehicles being imported into Mexico are subjected to the Mexican truck inspection process. Empty trucks and tractors without trailers pass through inspection with passenger vehicles at all crossings except Laredo-Nuevo Laredo where empty southbound trucks enter the truck inspection facility and immediately exit with a pass.

Document Inspection and Queue Area. The first step in the Mexican inspection process is document inspection by a central computer (SAAI) that recognizes the document bar code and selects about ten percent of the trucks for primary inspection. All loaded trucks and cars being imported to Mexico must pass through this step. Usually there is one booth per lane and there are at least two lanes. Processing time ranged from 0.8 to 2 minutes per truck, although the average for four of the five crossings surveyed was about 1.2 minutes per truck.

A queuing area is usually provided in advance of the document inspection booths. Except at Mesa de Otay and Matamoros, there are only a few spaces provided off the bridge or crossing road. Significant queues did occur at most crossings. These queues appeared during the peak hours of operation and ranged from about 50 to 250 trucks. At only one of the five crossings surveyed did the queue back onto the crossing road or bridge (Laredo).

By policy, ten percent of the entering vehicles are sent for primary inspection. This includes both trucks and import cars (primary inspections are a total of ten percent of trucks and import cars combined). Trucks not selected for primary inspection proceed directly to the exit.

Generally the number of booths is sufficient to accommodate truck arrival rates. However, they are not always open according to demand. Often the queue has already formed before sufficient numbers of booths are opened and it is impossible to process enough trucks to eliminate the

sizable queue. In most cases there is insufficient queue space in advance of the booths. Sometimes the selection of booths being operated causes conflicting truck movements leading to extra delays or processing rate inefficiencies as was the case in Matamoros. These inefficiencies result in decreased processing rates per booth as the number of booths increase.

Primary Inspection. Trucks selected for this inspection proceed to the platform. Inspections are similar for each truck and include inspection of only the freight. Mexican policy is for these inspections to take a maximum of three hours. Inspections were observed to range from one to four hours at the surveyed facilities, averaging approximately 2.5 hours. Based on inspection policy, an inspection time of three hours should be assumed for planning purposes. Once the inspection is complete, trucks approach a second booth where selections for the secondary inspection are made. Only trucks having completed primary inspection are subject to secondary inspection.

Primary inspection capacity is a constraint at Nogales and Nuevo Laredo. The speed of inspection cannot compensate for the lack of room. The inspection yard therefore becomes saturated during busy periods. There does not appear to be a standard number of primary inspection dock positions. Only two of the facilities appeared to have substantial excess capacity.

Secondary Inspection. By policy, ten percent of the vehicles completing primary inspection are selected for secondary inspection. This is one percent of all vehicles passing through the inspection facility. The secondary inspection is a repetition of the primary inspection (for quality control purposes), but is performed by another entity (private contractor; usually more efficient than primary inspection). By policy this inspection is also to be a maximum duration of three hours. These inspections averaged between one and three hours per truck at the surveyed facilities, averaging approximately one hour per truck carrying maquiladora cargo and two hours per truck carrying other cargo.

While the primary inspection platforms had no standard number of positions, the secondary platforms generally had two positions. Secondary inspection is not currently a constraint at any facility.

Exit Inspection and Queue Area. As with the U.S. inspection, the Mexican exit inspection is a review of the documents to make sure the necessary inspections were completed. It normally takes less than one-half minute. There is little queuing at most facilities, but there is also little queue area provided. Maximum queues typically were about seven trucks. Occasionally these queues blocked the secondary inspection area. However, only at the Matamoros inspection facility was the exit inspection the critical constraint.

Egress Routes. See northbound ingress routes.

9.8.5 Opportunities for Improvement

Based on observations and analyses conducted during the case studies, several opportunities have been identified for improving operational efficiency and facility layout. These opportunities fall into several categories:

- general planning considerations,
- facility layout and operational changes, and
- institutional actions.

General Planning Considerations

Crossings should be considered part of the regional transportation system. The border areas have typically one or more major highways on each side of the border. Most U.S. inspection facilities

are on roads with direct connections to highways extending to the major industrial concentrations and/or ports in each country. This is not the case for the Mexican access where some crossings have distant, circuitous, or inefficient access to the regional highways. It is important that regional access highways be considered in locating future border crossings. Crossings located away from the existing or planned major highway system require one of two things:

- state and federal transportation agencies must fund new major highways to connect to the border crossings; if not; then
- crossings will get connected to local roads and trucks will be forced to traverse the local street system to reach the major highways.

Either of these situations should be avoided unless there is close proximity between the U.S. and Mexican primary generators of the binational truck trips.

Where high volumes of large trucks are expected, dedicated corridors serving separate truck crossings would be beneficial. This would enable the trucks to be separated from passenger vehicle traffic and therefore reduce conflicts in operations (for the crossing access routes, the border crossings, and inspection facilities). Otay Mesa-Mesa de Otay and the Colombia Bridge are such examples. This will also enable trucks to be placed away from land uses with which trucks are not compatible. The truck corridors to the border should serve industrial land use concentrations, especially those which will have major maquiladora concentrations. These roads can be designed to handle the high truck volumes.

Land use management (plannning and zoning) should direct binational industry to locations accessible to existing and planned access routes to truck border crossings. Maquiladoras, warehousing, distribution centers, intermodal terminals, and other Binationally oriented industry should be located where convenient to:

- efficient access to existing and planned border crossings
- regional highways (and rail as applicable)
- uncongested roadways

This will keep heavy truck volumes off local streets and minimize truck travel times.

All components of the crossing system should be sized for the ultimate volume of trucks to be served. When new crossings are built, they are often in undeveloped areas with open land around them. It is possible at such times to obtain sites which can accommodate the ultimate size system—access roads, crossing lanes, inspection facility of adequate size, sufficient logistics services etc. Land is more available and less costly when a new facility is being planned. Facilities should be planned and land acquired for their ultimate anticipated volume. They can be implemented incrementally as many inspection facilities now are.

Crossing Configurations

Separate commercial and passenger vehicle flows. These two types of flow should be separated so they do not conflict with or delay each other. The inspection facilities are already separated. Each can generate queues which extend well back from the inspection booths, especially northbound where inspections are more time consuming. By separating the two flows, the delays to one flow will not affect the other. Usually passenger vehicles back up during peak periods and will delay trucks in mixed flow traffic. This is the case in Laredo and on the Brownsville-Matamoros Gateway Bridge.

Separate vehicle and pedestrian flows. At traditional crossings, vehicles use roadway lanes and pedestrians use sidewalks on the edges of the bridges and crossing roadways. This results in

trucks having to cross pedestrian paths in advance of the inspection points. This crossing of pedestrians and trucks is typically accomplished without any special traffic control.

At the Ysleta-Zaragoza bridge, a pedestrian bridge carries pedestrians to the second level of the inspection building out of the path of trucks and other vehicles. Pedestrians then descend to the first level within the building. This is safer and more efficient for all. It can be accomplished more easily where crossings involve bridges but should be pursued in all locations with significant pedestrian traffic.

Toll Collection

Maintain sufficient lanes open to meet demand. Sufficient lanes should be provided to meet peak hour demand. When bridges or other toll facilities are built including toll collection lanes, they should be sized for ultimate volumes. Staffing the lanes to meet demand will avoid queues from accumulating.

Electronic toll collection should be utilized to speed toll collection. This would also enable prepaid corporate tolls to be collected without manually accessing accounts by computer. Manual collection will still be needed in some lanes for those who are infrequent travelers across the border or those who prefer not to have toll transponders in their vehicles. Electronic toll collection capacity is limited only by permissible travel speed and vehicle spacing, but should be able to process ten passenger vehicles per minute if demand exists. The Dallas (Texas) North Tollway Toll Tag lanes currently process over 25 vehicles per minute, based on recent consultant observations.

Collect tolls more efficiently. Observed toll collection rates appear to be less than four vehicles per minute. However, elsewhere tolls are collected much faster. Speeding the process are large signs showing the amount of the tolls, both in advance of the toll booths as well as at the booths, no receipts handed out except on request, and tolls of less than a dollar. The Tri-State Tollway in Chicago collects cash tolls at approximately 10 cars per minute and 3 large trucks per minute (consultant observation).

Use current technology. Self-serve or electronic equipment collection are much higher than collection rates observed at the case study border crossing, but vary depending on equipment used. Self-serve lanes can process up to ten personal vehicles per minute under a steady queue (tolls less than a dollar), although perhaps 6 to 8 per minute would be more realistic with the tolls charged at border crossings ($US1.25 or $US1.45 or 11 pesos).

Collect tolls in one direction only. Delays could be avoided in one direction if round trip tolls were collected in one direction only. Tolls could be doubled in one direction and free in the other. In order for this to work, this change would need to occur on all bridges along a significant section of the border, with tolls being collected in the same direction on all of them. This would eliminate the toll collection cost and time delays in one direction. Toll collection effort and time consumed in the other direction would be the same as existing. One-way toll collection is used on California toll bridges. If tolls are rounded off to even dollar or peso denominations (e.g., 3 dollars or 20 pesos), toll collection could even be faster.

Inspection Facilities

Figure 9.36 and 37 show prototypical layouts for U.S. and Mexican POE facilities based on the guidelines in this chapter. The Task 13 report will provide more specific information on sizing various facility components.

Ingress routes should be major streets or highways. They need to be able to efficiently accommodate large trucks and have direct connections to the regional highway system.

Inspection facility access should efficiently accommodate truck turns into the site. This requires adequate geometric design for truck turning paths from the proper lanes of the adjacent street. It also requires sufficient sight distance to enable drivers to safely and quickly drive to the open booths. This means that booths should be set back from adjacent streets by at least three full truck lengths (about 250 feet or 75 meters including spacing between trucks). In some cases a traffic signal or other appropriate control device may be needed to enable trucks to cross opposing traffic.

Sufficient queue capacity should be provided on site in advance of the initial inspection or toll booth. This should be based on the anticipated normal peak daily truck volume and the processing rate of the booths (or other capacity constraint). It is suggested that in the northbound direction one full truck length (including space to the next truck) should be provided for every two peak hour trucks based on the 10th to 15th highest volume day of the year. In the southbound direction it is suggested that one full truck length be provided for every 30 daily trucks based on the 10th to 15th highest volume day. Trucks should be assumed to be pulling 53 foot trailers and be up to 75 feet (23 meters) long. With ten feet (3 meters) between trucks, 85 feet (26 meters) should be used for each truck length.

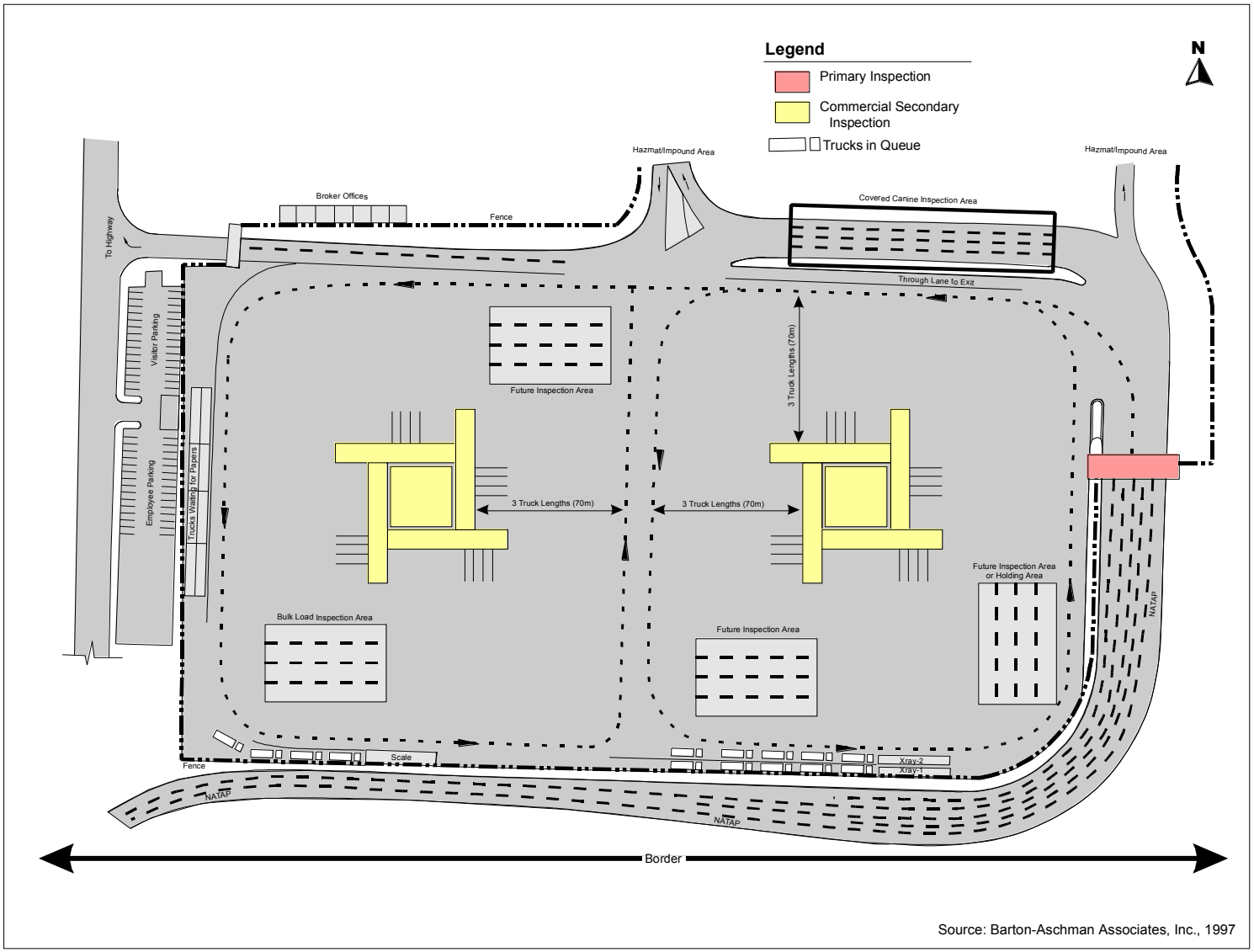
It is suggested that none of the truck queue spaces be provided on the bridge structure. The vibration caused by idling truck engines will accelerate bridge deterioration. In addition, the cost of providing queue space on a bridge is more expensive than providing it at-grade.

The queue road should have at least two lanes throughout its entire length. This will ensure that immobile trucks can be passed. Each inspection lane should extend at least 425 feet (130 meters) (about 5 truck lengths) in advance of the inspection booths.

Figure 9.29 shows a suggested layout which may provide sufficient queue length. Notice that the queue road extends along two sides of the site. In addition, a NATAP lane should also be provided. This will enable pre-cleared trucks to pass through the facility with minimal delay.

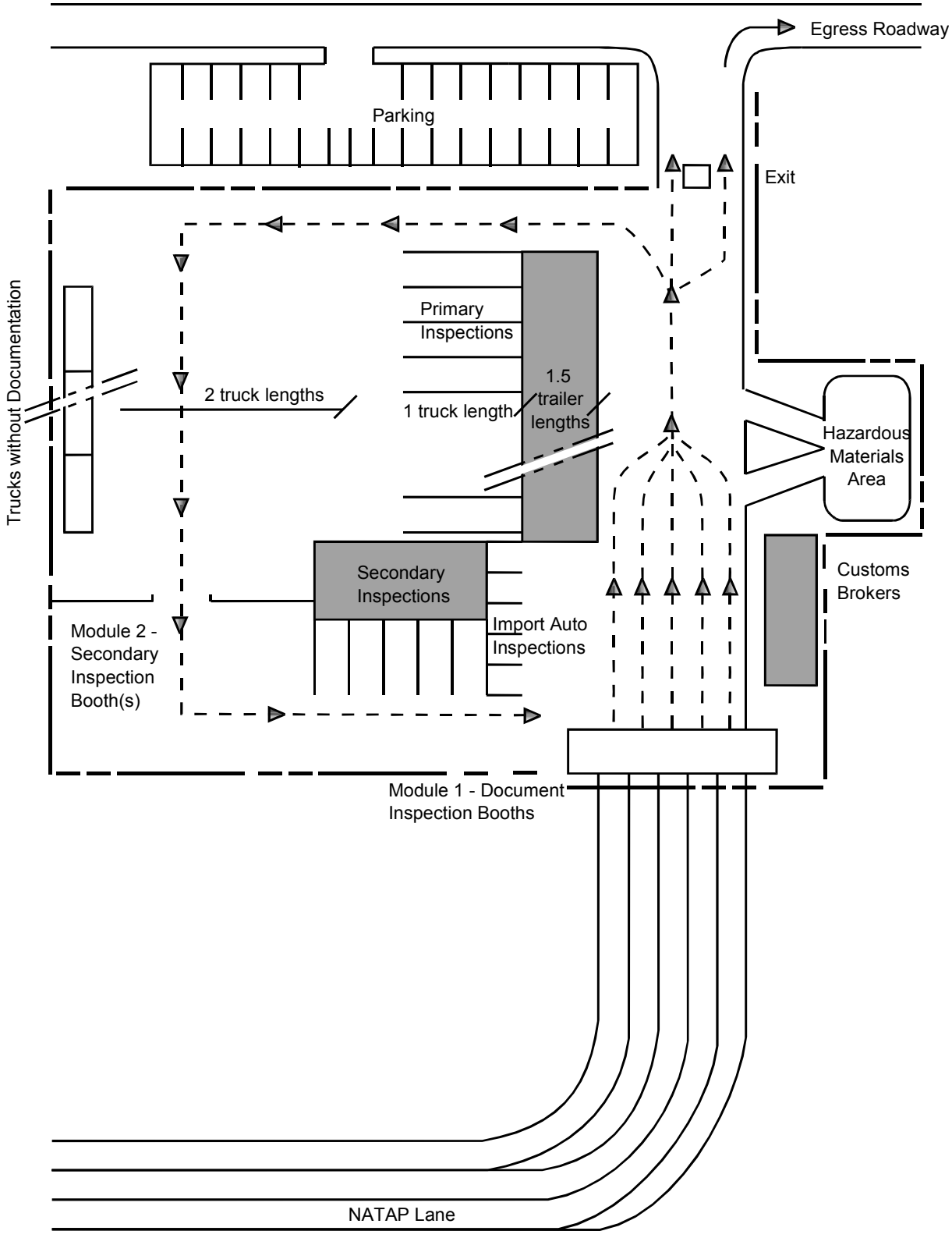
Adequate counts of truck volumes must be recorded in both the northbound and southbound directions for the planning, design and monitoring of inspection facilities. These counts need to differentiate between loaded tractor trailers, loaded single units, empties and bobtails.

Figure 9.36 - Prototypical U.S. Port of Entry Layout



Source: Barton-Aschman Associates, Inc., 1997

Figure 9.37 - Prototypical Mexican POE Layout



Source: La Empresa, 1997

U.S. primary inspection lanes are usually the bottleneck; provide and staff sufficient lanes to meet ultimate demand. Primary lanes should be opened on time and be staffed to meet demand. It was observed that queues were allowed to build early in the day at several facilities and due to short staffing, processing did not catch up to demand until the afternoon. In some cases (e.g., Brownsville B&M Bridge Laredo II) there were not enough booths to meet arrival rates, even when fully staffed. The primary inspection processing rate is typically one truck per 1.5 minutes. A minimum of one lane should be provided for each 250 daily trucks forecasts to be accommodated for design purposes.

Internal circulation should be counter clockwise. This facilitates circulation by having the inside turns on the driver's side of the truck where visibility is best.

All secondary and supplementary inspection sites should be off-line. All of these inspections are optional. Trucks should not need to pass through inspection sites unless they are to be inspected there. Hence, the circulation pattern should be to enter through primary booths and pass through the compound without stopping until reaching the exit where all trucks must be inspected. Supplemental inspection sites may be arranged in different orders, although scales should precede the x-ray (because tankers are often weighed before being x-rayed) and the canine inspection block should be close to the primary booths but out of the circulation path.

Mexican secondary inspection facilities should be reorganized to respond to changes in Mexican regulations.

Beginning in September 1997, secondary inspections will no longer serve as the quality control of primary inspections. Instead, primary inspections will be conducted by both Customs and the private companies which have had the secondary inspection concessions. The distribution of primary inspections between Customs and the private firms will be 60 percent and 40 percent, respectively. Quality control will be accomplished by comparing the results of these two independent inspection groups.

With the consolidation of primary and secondary inspections, the existing inspection areas will need to be restructured in a proportional manner between the Customs and the private companies. The space provided in the existing secondary inspection areas will no longer be sufficient to handle 40 percent of the inspections. In theory, these areas should be separated, however, in practice this may be difficult at the ports of Nogales, Piedras Negras, and Matamoros.

Given the similarity in the primary inspections in the Mexican ports and the proposed regulatory changes, the design of the area of primary inspection should be considered as two separate zones with the capacity to serve the proportional peak demand of the estimated flow. It is also important to consider that the average inspection is three hours in length. Finally, a special area for parking vehicles destined for primary inspection should be considered in new projects. This space would provide reserve capacity in the event that the primary inspection docks reach saturation (capacity).

More exit lanes should be provided from the Mexican inspection facilities. This will eliminate the queues which develop during heavy inspection periods in several Mexican compounds. The number of exit lanes should be estimated based on the projected peak hour truck volume and the inspection rates. It is suggested that a minimum of one exit lane be provided for each 90 peak-hour trucks passing through the compound. The inspection rate could be doubled if a better method of inspection were devised.

Sufficient maneuvering space should be provided in front of all docks. At least three full truck lengths (225 feet or 70 meters) should be provided in front of all docks to ensure efficient maneuvering. It should be understood that many of the drivers using the inspection facilities are not skilled in backing trucks in confined spaces and need extra space to line their trucks up.

NATAP lanes should be extended through the inspection facilities. They should allow NATAP trucks to bypass all inspection areas and queues, thereby deriving maximum benefit from the NATAP process. The NATAP lanes need not be exclusive throughout the inspection compound, but should only share space with active circulation lanes not available for queuing or inspections.

Institutional Changes

Federal and state transportation agencies should provide lead agency guidance in locating new border crossings. Border crossings are major components of the federal and state transportation systems. They should be effective parts of the regional systems. As part of the state (U.S.) and federal (Mexico) plans, these agencies should sponsor proposals for new crossings where they fit into the regional transportation system plans, especially in strategic corridors. The agencies' current reactive role to local sponsorship results in some crossings being located away from the regional highway system. This requires extensive and expensive new road and highway connections.

Encourage shippers to move loads at off-peak times. Present truck arrival patterns indicate that truck volumes during peaks hours are approximately 40 to 120 percent above the daily average. Peaks occur at various times throughout the day. However, the majority of crossings, experienced at least one peak between 12:00 p.m. and 4:00 p.m. Other peaks occur at some crossings, such as an early morning peak at Otay Mesa when empties and bobtails are allowed to cross. Ysleta had one peak at 9:30 a.m. followed by a large peak at 12:00 p.m. Delays can be reduced by shippers if they dispatch trucks to arrive at the border during low demand periods.

As identified in Task 3.1, it is a common practice by brokers to process groups of trucks and then release platoons of vehicles headed for the border crossing. Since customs officials cannot anticipate these releases, this operational practice increases the likelihood of periods of over capacity operation at the inspection facilities. The clearing of these over capacity conditions may take more than an hour and create unnecessary delay. Inspection officials should work with the customs brokers to better distribute the release of vehicles over the hours of operation.

U.S. Customs, trucking associations, trade associations, transportation agencies, and/or the JWC could also publicize periods of low demand to encourage truckers and shippers to more frequently arrive at off-peak periods. Should these users elect to cross the border during times of peak delay, they should bear the cost of time delays rather than public entities building additional facilities.

Pre-clear more loads. Some shipments are now pre-cleared before reaching the border. Sinaloa and Sonora growers. Inspections at remote locations or advance documentation checks could reduce border crossing time. By pre-clearing trucks, time consumed at the border can be reduced to primary/document inspection only. Agricultural loads are currently pre-cleared at Nogales and inspected by both countries' agricultural inspection teams at locations away from the border crossing.

Pre-inspection can be further encouraged by sealing pre-inspected trucks and allowing them to use NATAP lanes which would effectively eliminate time delays at the border.

Encourage truckers to use fastest routes, demonstrating the benefits. It was reported by several sources that truckers tend to use the lowest cost routes rather than the fastest ones. This is particularly true where tolls are charged. Drayage companies are paid by the trip and have no incentive to make the trip faster unless they can make an additional trip. Drivers being paid by the hour have no incentive to use quicker routes. Drivers paid by the trip have no incentive unless they can make an additional trip. They also can keep the cost of the toll. Where toll and free crossings exist in nearby proximity (e.g., El Paso-Juarez tolled Ysleta-Zaragoza Bridge and free Bridge of the Americas), drivers tend to use the free bridge, especially if not pulling a load. This

results in greater use of the free facility when travel time would be less using the toll crossing. Where time can be saved using a crossing, it should be publicized by either the inspection agencies, the DOTs or SCT, or the JWC; or mandated.

Encourage additional inspection agency coordination of inspections. Inspection scheduling should be coordinated better to have one agency's inspectors immediately follow another agency's inspectors once an inspection is complete. Communication and coordination is also important once a process is established.

Use electronic (computer) capabilities more to reduce time and effort to process paperwork manually. Computer technology should be available to identify trucks by a transponder card, bar codes, or other similar technology. This should allow up-to-the-minute processing of both accounts and status. NATAP is a good first step.

Encourage enforcement agencies to consider reduction of unnecessary delays to be part of their mission. Enforcement agencies have a difficult and time consuming challenge to successfully inspect vehicles crossing the border. Many inspections require hours to complete. This should be considered accepTable 9.under the laws, regulations, and policies of the two countries. However, there are unnecessary delays occurring regularly at several of the U.S. inspection facilities at case study sites. Most of these delays consist of long waits approaching primary inspection (not enough booths open). Other delays occur at several Mexican facilities due to poor utilization of or ineffective traffic management at document inspection booths. This inefficiency is due to poor layout and maneuvering space along with the lack of traffic control. In both cases, increased staffing and/or improved traffic management practices could resolve most of these delays. The U.S. Customs could staff the primary inspection booths to meet demand patterns and the Mexican customs could post one or more traffic control officers to direct trucks to open booths which cannot be readily seen by the drivers.

On a typical Friday at the four locations survey using the controlled count methodology (Brownsville, Otay Mesa, Laredo and El Paso), the above measures could save at least 3,500 hours of northbound truck travel time.

Bridge and road border crossings should be viewed as parts of the transportation system rather than an economic enterprise. Toll facilities are looked upon by many local municipalities as a way to make a return on investment, directly or indirectly. Some cities view crossings as a revenue generator (excess toll revenues). Others view them as a way to encourage new business to locate in their area. This has led to the construction of new crossing which are not optimally located and/or require substantial additional investment in roads to make them viable. They should be viewed as functional parts of a transportation system consistent with area transportation objectives.

9.8.6 Additional Research

Three additional research topics are suggested to provide needed information for proper planning to accommodate binational transportation needs. These are described below.

Additional data on processing rates. Sizing of facility components could be improved if primary and secondary processing rates are measured by truck type (bobtails, empty tractor trailer combinations, and loaded trucks); percent of trucks inspected for all secondary inspections (enforcement, compliance, agricultural); percent x-rayed; percent inspected in canine blocks and duration of inspections.

Conversion of trade volumes to truck volumes. Trade data and forecasts are currently provided in terms of either tons or dollar value. Neither is a unit which can be used by transportation planners. They need truck volumes. Research is needed to provide tools that

permit accurate estimates of truck volumes by public agencies, particularly for forecasting purposes.

Estimate mode split for freight among truck and rail, and if practical, air and sea. Part of the above need can be met by providing methods for forecasting the transport mode to be used for binational shipping. Most important for the types of studies made under this contract are truck and rail. However, estimates of air and sea shipping would also be useful for planning airport and seaport facilities.