Executive Summary

"BOTTLENECK STUDY"

TRANSPORTATION INFRASTRUCTURE AND TRAFFIC MANAGEMENT ANALYSIS OF CROSS BORDER BOTTLENECKS

PREPARED BY

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I. Executive Summary

The motivation behind the Transportation Infrastructure and Traffic Management Analysis of Cross Border Bottlenecks study was generated by the U.S.-Mexico Border Partnership Action Plan (Action item #2 of the 22-Point Smart Border Action Plan: Develop a prioritized list of infrastructure projects and take immediate action to relieve bottlenecks). In December 2002, the U.S.-Mexico Joint Working Committee (JWC)[1] approved the scope of work and methodology for the Bottleneck Study developed by the California Department of Transportation (Caltrans), District 11 to identify and address bottlenecks at the U.S.-Mexico ports of entry. For the purpose of this study, a bottleneck is defined as a condition that restricts the free movement of traffic, creating a point of congestion during specific periods of time. Addressing and alleviating this congestion in the highway system would enhance movement of people and goods. The study identifies a number of improvements in the operational efficiency and flow of vehicles traveling to and from the land ports of entry (POEs). Additionally, the JWC requested that Caltrans carry out the Phase I case study of the San Diego-Tijuana Gateway.

As approved by the JWC, the Bottleneck Study has five objectives:

- To develop a methodology capable of identifying low cost/high result recommendations for improvements to the transportation infrastructure and traffic management to and from the U.S./Mexico land POEs;
- To use the San Diego-Tijuana POE gateway as a test-bed for the developed methodology;
- To provide JWC member agencies with documentation of the study's findings and an archive of the obstacles and recommendations;
- To support the U.S. State Department effort to meet the requirements of the U.S.-Mexico Border Partnership Action Plan; and,
- To use this study as a common border-wide framework to substantiate funding requests for relief of bottlenecks at the U.S.-Mexico international boundary.

The methodology developed by Caltrans takes a step-by-step approach to quantify the bottlenecks or congested points within the transportation system that serves the federal ports of entry (POE) and then to identify recommendations for short-term improvements. The ultimate goal of this effort is to achieve a balanced transportation system. A balanced system is obtained when free flow is achieved or at least improved to provide optimal flow through the system. The following are the key steps or tasks of the methodology:

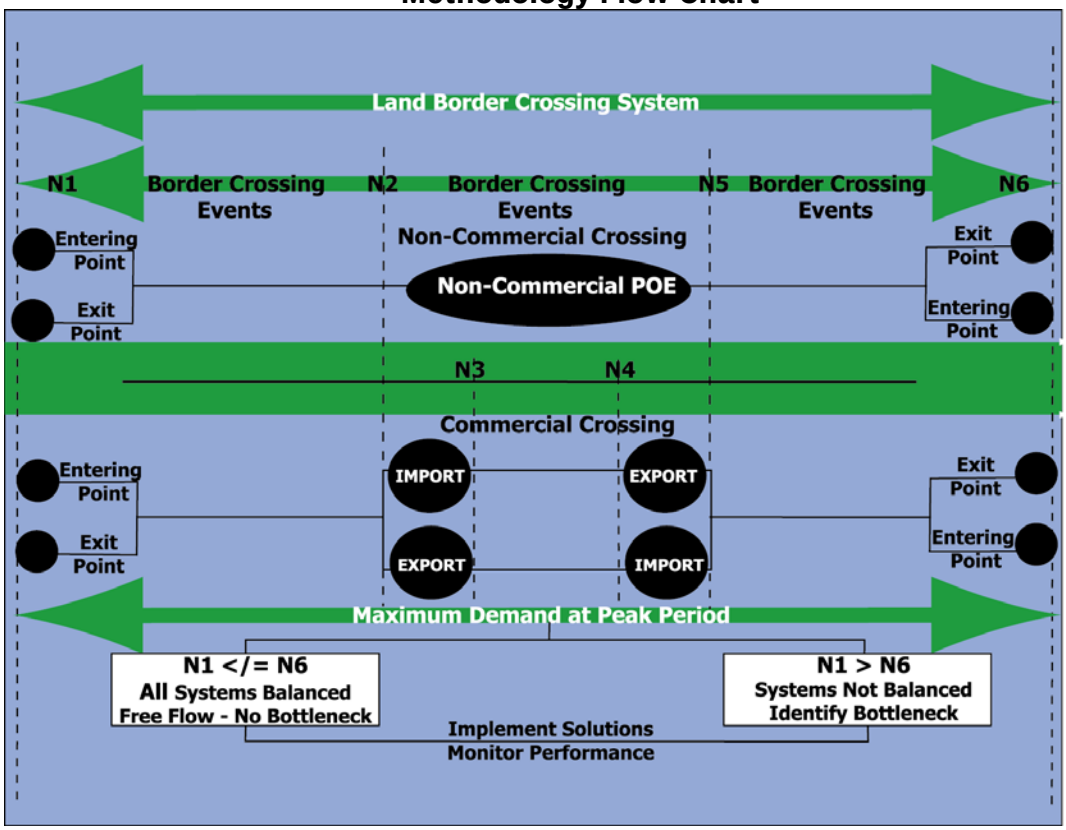
1. System Definition and Data collection;
2. System Capacity Analysis; and
3. Identify Bottlenecks and Propose Improvements

The "System Definition" identifies the different modes of transportation, points of entry and exit within the border crossing system. As illustrated in Figure 1, a binational border crossing land

[1] The JWC was created through a Memorandum of Understanding between the US Department of Transportation and Mexico's Secretariat of Communications and Transportation in 1994. The JWC consists of transportation and planning representatives from the ten border states (four in the US and six in Mexico), the US Federal Highway Administration, US Department of State, Mexican Secretariat of Communications and Transportation, and the Mexican Foreign Ministry. The formal charge of the JWC is "analyzing, developing and coordinating border transportation plans and programs reflecting the needs of both countries."

transportation system is defined as the area between N1 and N6. N1 is usually the point where traffic enters a designated route that directly leads to the POE. N6 is usually the exit point from the POE. For non-commercial (passenger vehicle and pedestrian) and commercial vehicle crossing systems, the intermediate points of N2 through N5 are defined as the federal POEs. For commercial vehicle crossings, the roadway connections between the U.S. and Mexico import/export facilities are specifically identified as N2 to N3, and N4 to N5. Once the system is defined, the conflict points in the transportation system can be identified and specific locations for data collection and analysis are determined. "Data collection" consists of field survey counts of cross-border volumes entering and exiting the system, and vehicle counts at intersections and designated routes leading to and from the international ports of entry. Other data collected include, queue lengths and time of delays.

FIGURE 1
Methodology Flow Chart



Following the system definition and data collection, the "System Capacity Analysis" is performed to determine the maximum demand at peak periods versus the processing capacity. The system capacity analysis can be applied across all modes of cross-border traffic (i.e., passenger or commercial vehicles, pedestrian and public transportation). The analysis determines whether the system is in balance (an equal number of border crossing events that enter and exit the system in a given length of time) or where imbalances or bottlenecks occur.

In the final step, solutions are proposed for those locations in the system where the demand exceeds the capacity. As demonstrated in the Phase I case study, other recommended improvements can be identified based on field observations to improve traffic flow using traffic engineering principles, such as, increasing a turning radius for trucks, adding vehicle storage capacity, and using concrete barriers to separate vehicles and reduce traffic conflicts. The proposed improvements are developed complete with cost estimates and time horizon for implementing the low-cost and short-term recommendations for processing traffic within the cross-border system are available at this point. Although the improvements are short-term and low-cost in nature, time horizon of need is critical to the prioritization process for funding (i.e., 1 month, 6 months, 1 to 2 years, etc.).

As solutions are implemented to the defined system, it is suggested that the methodology is re-applied to calibrate the system's capacity and performance, to determine effectiveness or the need to modify and bring maximum efficiency to the border crossing system.

The Phase I case study follows the developed methodology to analyze the transportation system serving the San Diego-Tijuana Gateway and its land POEs at Otay Mesa/Mesa de Otay and San Ysidro/Puerta Mexico.

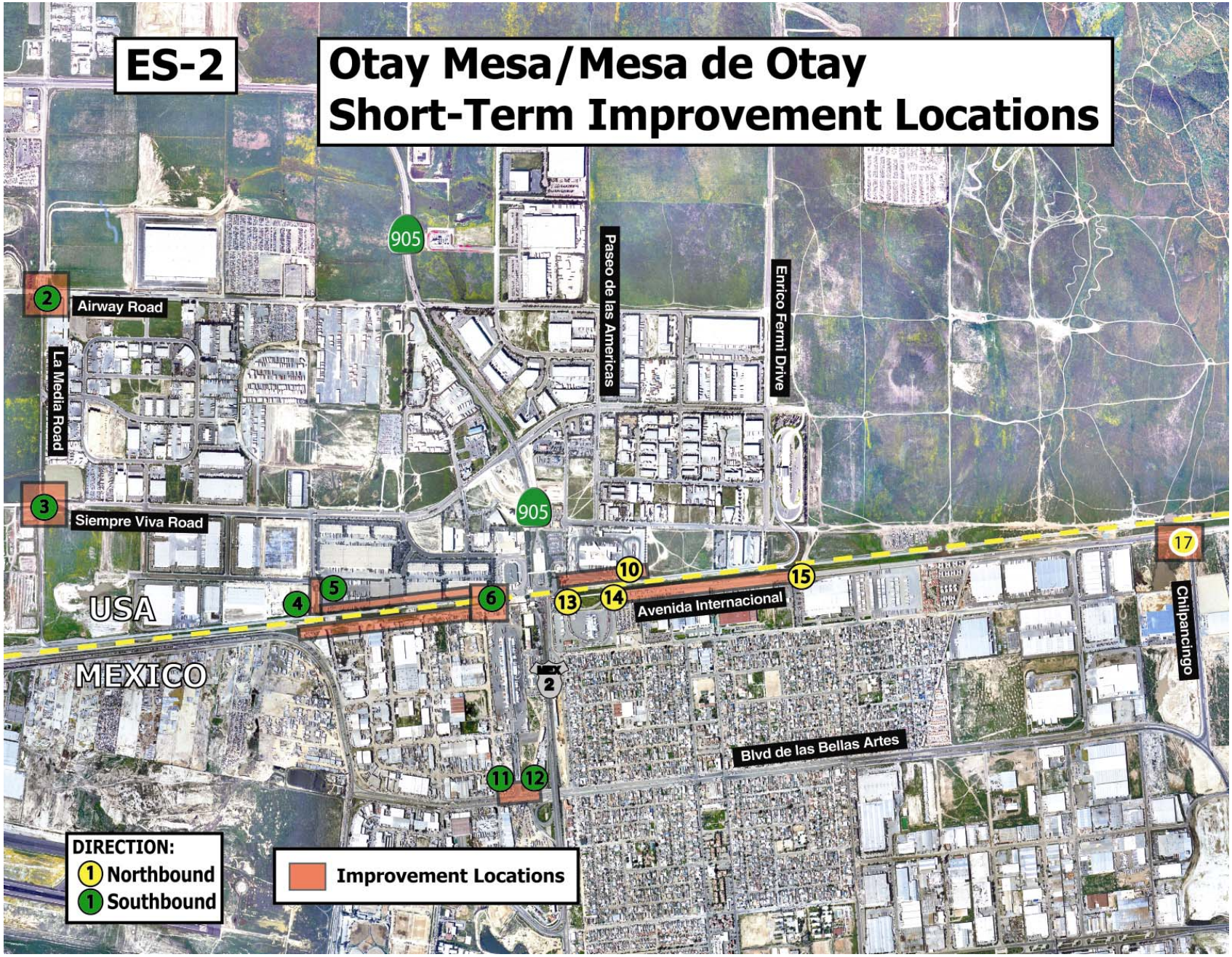
The Otay Mesa/Mesa de Otay POE is the busiest commercial in the California/Baja California border region. At the Otay Mesa/Mesa de Otay POE, the Phase I study focused on the movement of commercial vehicles within the border system.

The San Ysidro/Puerta Mexico POE is known as the busiest land border crossing in the world. In 2003, the San Ysidro/Puerta Mexico POE processed over 46 million[2] people crossing northbound in passenger vehicles and on foot. At San Ysidro/Puerta Mexico, the study focused on passenger vehicles.

Addressed in the following tables and illustrations are the suggested short-term improvements to increase the operational flow of traffic at the Otay Mesa/Mesa de Otay and San Ysidro/Puerta Mexico POEs as determined in the Phase I case study. Tables ES-1 and ES-3 (pages vii and ix) describe location, and cross streets, U.S./Mexico boundaries, and direction of bottleneck for Otay Mesa/Mesa de Otay and San Ysidro/Puerta Mexico respectively. The tables also include a description of the proposed improvements with cost estimates and the time horizon for completion. Figures ES-2 and ES-4 (pages viii and x) provides a map illustration locating the proposed improvements at Otay Mesa/Mesa de Otay and San Ysidro/Puerta Mexico. A majority of the recommendations are operational and minor infrastructure improvements that are low-cost and can be accomplished in the short-term. Most recommendations were proposed because the travel demand has reached or exceeded the capacity, therefore causing a bottleneck. Some improvements were identified regardless of a low demand to capacity ratio and were primarily operational improvements that are considered opportunities to improve the flow and transition of vehicles, thus alleviating existing and potential bottlenecks.

[2] U.S. Customs and Border Protection, 2003

ES-1 OTAY MESA / MESA de OTAY SHORT-TERM IMPROVEMENT PROJECTS						
Location	**Cross Streets**	**U.S. / Mexico**	**NB / SB**	**Description of Improvement**	**Cost Estimates**	**Time Horizon**
1	Otay Mesa Rd & La Media Rd	U.S.	SB	No Improvements Recommended	-	-
2	La Media Rd & Airway Rd	U.S.	SB	1-Improve turning radius at La Media and Airway 2-Restripe intersection	$20,000	6 months
3	La Media Rd & Siempre Viva Rd	U.S.	SB	1-Improve turning radius at La Media and Siempre Viva 2-Pave the western portion of Siempre Viva 3-Restripe intersection	$50,000	6 months
4,5,6	South Drucker Ln & entrance into U.S. export/Mexico import facility	U.S.	SB	1-Increase left turn radius SB to EB to prevent encroachment of loaded truck lane 2-Relocate secondary fence, switch empty & laden lanes, and add emergency lane 3-Improve turning radius from the U.S. export facility to the Mexico import facility	$20,000 $1.0M $20,000	9 months 1.5 years 1 year
7	Siempre Viva Rd & Otay Center Dr	U.S.	SB	No Improvements Recommended	-	-
8	Siempre Viva Rd & Paseo de las Americas	U.S.	NB	No Improvements Recommended	-	-
9	Siempre Viva Rd & Enrico Fermi Dr	U.S.	NB	No Improvements Recommended	-	-
6,11,12	Ave Aduana Garita & Blvd de las Bellas Artes	Mexico	SB	1- Re-route empties to exit on Lazaro Cardenas Norte 2- Add traffic signal to laden truck exit	$400,000 $100,000	2 years 2 years
10,13	Exit of Mexican export facility to U.S. Import facility	U.S.	NB	1-Improve turning radius, number of lanes, and re-route FAST lane/empty lane 2-Ultimate expansion to 8 lanes & improve turn radius NB to WB truck route	$600,000 $5.0 – 8.0M	Completed (Oct. 2004) Pending
14,15	Avenida Internacional	Mexico	NB	Separate lanes with concrete barriers	$20,000	6 months
16	Avenida Internacional	U.S.	NB	No Improvements Recommended	-	-
17	Avenida Internacional & Chilpancingo	Mexico	NB	Improve turn radius NB to WB truck route	$20,000	6 months
18	Blvd de las Bellas Artes & Chilpancingo	U.S.	NB	No Improvements Recommended	-	-


ES-2
Otay Mesa/Mesa de Otay
Short-Term Improvement Locations
905
Paseo de las Americas
Enrico Fermi Drive
2
Airway Road
La Media Road
3
Siempre Viva Road
905
17
10
15
5
6
4
13
14
Avenida Internacional
Chilpancingo
USA
MEXICO
2
Blvd de las Bellas Artes
11
12
DIRECTION:
1 Northbound
1 Southbound
Improvement Locations

ES-3
SAN YSIDRO/PUERTA MEXICO
SHORT-TERM IMPROVEMENT PROJECTS

Location	Cross Streets	U.S./ Mexico	NB/ SB	Description of Improvement	Cost Estimates	Time Horizon
1	I-5 SB @ Via de San Ysidro	U.S.	SB	No Improvements Recommended	-	-
2	I-5 SB @ Via de San Ysidro	U.S.	SB	Add traffic light and optimize signals	$100,000	2-3 years
3-9	Various U.S. SB locations	U.S.	SB	No Improvements Recommended	-	-
10	I-5 NB On-ramp from Transit Center	U.S.	NB	No Improvements Recommended	-	-
11,12	Puerta Mexico mainlanes & secondary lanes	Mexico	SB	1-Utilize existing SB thru lanes at secondary 2-Create turn pocket to enhance secondary inspection, eliminate lane closure to improve traffic flow[1] 3-Enforce no parking zones along the shoulder to improve traffic flow 4-Restriping of lanes	No Cost $3.0M* ($30 M pesos)[1] No Cost Minimal	1 month 1-3 years[1] 1 month 1 month
11,12	Auto entrance to U.S. POE	U.S.	NB	Proposed expansion of SENTRI from 2 to 4 lanes and realign HOV lanes	$150,000	9 months
11,12	Auto access to SENTRI	Mexico	NB	Expand access to new and existing SENTRI, and re-route HOV and SENTRI traffic leading to POE[2]	$200K-300K* ($2M-3M pesos)[2]	1-3 years[2]
11,12	Pedestrian Bridge	Mexico	NB	Extend pedestrian bridge & grade separation from HOV/SENTRI lanes[3]	$1.0M* ($10M pesos) [3]	1-3 years[3]
13	Ave Centenario (SENTRI Lane) – across the street from the Hotel Pueblo Amigo	U.S.	NB	No Improvements Recommended	-	-
14	Paseo de los Heroes at the first "Y" split north of Rio Tijuana bridge	Mexico	SB	Utilize existing SB through lanes and eliminate lane closure by the local Tijuana police department to improve traffic flow	No Cost	1 month
15-22	Various Mexico NB locations	U.S.	NB	No Improvements Recommended	-	-
23-24	Various U.S. SB locations	U.S.	SB	No Improvements Recommended	-	-

1-Source Comision de Avaluos de Bienes Nacionales (CABIN) and Aduana of MEXICO
2-Source Secretaria de Comunicaciones y Transportes (SCT) of MEXICO
3-Source Secretaria de Infraestructura y Desarrollo Urbano Estatal (SIDUE) of MEXICO

* Pesos converted to U.S. Dollars at a 10:1 ratio


ES-4
San Ysidro/Puerta Mexico
Short-Term Improvement Locations
5
USA
MEXICO
12
11
1
14
DIRECTION:
1 Northbound
1 Southbound
Improvement Locations
2 Not Shown

CHALLENGES and CONCLUSIONS

The focus of the methodology and case study was to examine Infrastructure Performance Deficiencies (IPD) and Traffic Jurisdictional Deficiencies (TJD) outside of the POEs. As previously acknowledged by the JWC, bottlenecks can also be due to National Enforcement Laws (NEL) enforced at the international ports of entry. Such laws and the ability to determine optimal crossing time are outside the purview of the transportation community and are not addressed in this study.

The following are some of the challenges encountered while conducting the case study at the Otay Mesa/Mesa de Otay and San Ysidro/Puerta Mexico POEs: Scheduling of data during peak demand periods, and inability to collect data due to major construction that disrupted flow at the POE. Similar issues may be encountered while conducting future cross-border bottleneck studies.

For the case study, the data collection and traffic counts were conducted in early November 2003 with two makeup counts collected in late January 2004. In order to meet the schedule for completing the study, it was not possible to perform the data collection during all of the various peak seasonal times of the year. Although counts were conducted during average seasonal demands, the analysis of determining potential bottlenecks can still be applied using appropriate assumptions regarding peak seasonal demand.

At Otay Mesa/Mesa de Otay, an example of capturing peaks for commercial goods movement, are seasonal changes during the mid to late spring and early fall. Spring traffic increases as agricultural products from the San Quintin/Santo Tomas Valley, which produces large quantities of fruits and vegetables for consumption in the United States. During the late summer and early fall, the commodities tend to shift to consumer goods, such as an increase in electronics for the year-end holiday season.

For San Ysidro/Puerta Mexico, where the focus was on passenger vehicles, the peak is concentrated around annual holidays and daily commutes to and from work or school. Holiday congestion usually occurs during spring break and other three-day weekend holidays in the U.S. For those commuting to work and going to school in California, peak traffic occurs early in the morning northbound commute and again in the evening southbound commute. The daily peaks at San Ysidro/Puerta Mexico were measured, but again not all seasonal peaks were captured.

At the San Ysidro/Puerta Mexico POE all modes of traffic including passenger vehicles, bicycles, pedestrians, and public transportation (bus and light rail transit) trips to and from the border were originally scheduled for data collection and analysis. However, a major construction project was underway at the San Ysidro Intermodal Transit Station, which serves the majority of pedestrian and bicycle crossings. The construction impacts precluded an accurate representation of transit ridership, bicycle, and pedestrian crossing data could not be captured. Thus, the focus at San Ysidro/Puerta Mexico was primarily on autos leading to and from the POE. Using the methodology, future studies could analyze the transit, bicycle and pedestrian data.

In closing, the Phase I case study demonstrates a process and common border-wide framework for carrying out the methodology, from system definition to data collection, and completion of

the capacity analysis to identify low cost and high result solutions to transportation infrastructure and traffic management bottlenecks leading to, from and between the U.S./Mexico land POEs. The case study was a successful endeavor that identified several critical improvements to the transportation infrastructure serving two of California's and Baja California's busiest land crossings. As the case study was nearing completion, one project has been completed and many other improvements have initiated stakeholder coordination and preliminary engineering toward completion.

NEXT STEPS

As previously recognized by the JWC, future bottleneck studies and analysis will be necessary to adequately support to the U.S. Department of State's effort to meet the requirements of the U.S.-Mexico Border Partnership Action Plan. With the completion of the Phase I case study, subsequent phases can now be considered for funding at other gateways along the U.S./Mexico border. Phase II proposes the selection of other border gateways along the U.S./Mexico border to conduct similar case studies using the bottleneck capacity analysis and methodology. For Phase II, it is proposed that the JWC will specifically determine:

a) Funding needs and resources available for future studies;
b) Method for selecting other border gateways; and,
c) Identification of JWC member agencies to conduct Phase II studies.

Pending available resources, Phase III proposes a border-wide U.S.–Mexico Bottleneck Report of findings from each of the subsequent case studies. Such a study may summarize and categorize improvements, leading to a prioritization of improvements on a regional, state or national level. This would provide an important layer of documentation of transportation needs and priorities. The availability of funding to improve the safe and efficient movement of people and goods through our border-wide infrastructure has a direct beneficial relation to the future of our binational economy.