

## Assessment of Truck Border Crossing at Imperial County Port of Entry

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## **Assessment of Truck Border Crossing at Imperial County Port of Entry**

### **ABSTRACT**

Cities and municipalities across the United States are faced with the difficult task of planning adequate transportation infrastructure and freight facilities that enhance goods movement in their region. This is particularly challenging for regions with international borders and limited information on true origin-destination patterns and travel times. Successful planning efforts in these areas generally seek to reduce congestion and delay, improve travel time reliability, and/or enhance safety. However, potential shifts of commodity flows and traffic across modes, routes, and ports of entry present significant challenges. Successful infrastructure planning, therefore, hinges on accurate and reliable multimodal freight data gathered and validated through consensus among various transportation and business stakeholders.

The Southern California Association of Governments (SCAG), the largest metropolitan planning organization in the nation, recently conducted a study to assess the flow of commerce at the California-Baja California border of Imperial County. Data collected would help to develop freight planning strategies to address long term trade and transportation infrastructure needs in the region. This study documents the current commodity flow patterns and associated economic activity in that border region. It also examines the trends and characteristics of international trade that determine the demand for freight activities across the border, focusing on international trade between the U.S. and Mexico. This includes consideration of regional economic integration along the border and an assessment of goods movement activities associated with the maquiladora industry.

This paper summarizes some of the key findings of the study in terms of current supply chain structure in the region, data collection using Origin-Destination (O/D) surveys, measurement of crossing times at the border, economic implications, and policy recommendations.

## INTRODUCTION

With today's global economy and time-based competition, efficient freight transportation networks serve as extremely critical links among manufacturers, distributors, and consumers. Cities and municipalities across the United States are faced with the difficult task of planning adequate transportation infrastructure and freight facilities that enhance goods movement in their region. This is particularly challenging for regions with international borders and limited information on true origin-destination patterns and travel times.

The Southern California Association of Governments (SCAG), the largest metropolitan planning organization in the nation, recently conducted a study to assess the flow of commerce at the California-Baja California border of Imperial County. Data collected would help to develop freight planning strategies to address long term trade and transportation infrastructure needs in the region. This study documents the current commodity flow patterns and associated economic activity in that border region. It also examines the trends and characteristics of international trade that determine the demand for freight activities across the border, focusing on international trade between the U.S. and Mexico. This includes consideration of regional economic integration along the border and an assessment of goods movement activities associated with the maquiladora industry (1).

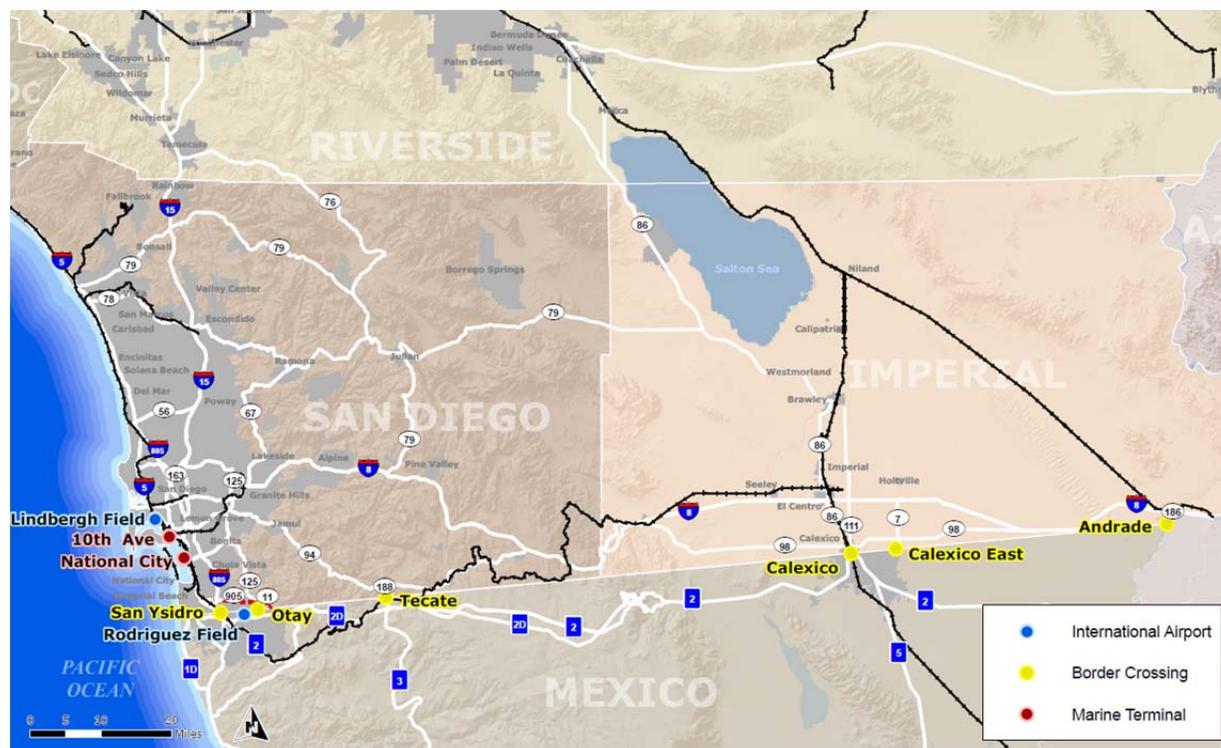
This paper summarizes some of the key findings of the study in terms of current supply-chain structure in the region, data collection using Origin-Destination (O/D) surveys, measurement of crossing times at the border, economic implications, and policy recommendations.

## OVERVIEW OF THE STUDY AREA

The study area is defined as the California-Baja California border region. It encompasses San Diego County and Imperial County on the U.S. side, and the State of Baja California in Mexico. The three major cities in the Imperial County are El Centro, Calexico and Brawley. On the other side of the border, Mexicali is the capital and second largest city in the State of Baja California. The region is home to six land Ports of Entry (POEs). Three of them are located in San Diego County (San Ysidro-Puerta México, Otay Mesa-Mesa de Otay and Tecate-Tecate). The remaining three POEs are located in Imperial County (Calexico West-Mexicali I, Calexico East-Mexicali II and Andrade-Los Algodones). A map of the California-Baja California border region with all major roadways is provided in Figure 1.

Located roughly 130 miles east of San Diego and 60 miles west of Yuma, Arizona, the Calexico East-Mexicali II border crossing is the primary POE in the SCAG region. Imperial County has a well-developed roadway network that meets its current freight transportation needs, but may face challenges in the near future. The highway system currently handles over 95 percent of all commodity flows across the County. In 2007, over 20 million tons of goods (valued at almost \$50 billion) were transported by truck (2). The border crossing serves more than 99 percent of all commercial truck traffic crossing through Imperial County POEs (3). The Andrade-Los Algodones POE in Imperial County is primarily used as a gateway for tourism and visitors moving across the border as pedestrian or privately-owned vehicles. It is sometimes used for relief of congestion at Calexico East-Mexicali II.

Imperial County is served by rail connections from Baja California, Riverside County, and Arizona. Commodity flow volumes by rail account for about 3 percent of total commodity flow volumes in the county. This number is similar to that in San Diego County, where rail volumes represent 2 percent of total commodity flow volumes in the county (2). In 2007, over 0.9 million tons of goods (valued at almost \$987.5 million) were transported by rail (2).



**FIGURE 1 Overview of California-Baja California Border Region**

Though landlocked, Imperial County businesses do export goods through the Ports of Los Angeles and Long Beach, as well as through the nearby Unified Port of San Diego. There are four airports in Imperial County, including three open to the public: the Brawley Municipal Airport, the Cliff Hatfield Memorial Airport and the Imperial County Airport.

Imperial County also hosts a number of warehousing facilities adjacent to the Calexico East – Mexicali II POE and near the junction of the Union Pacific Rail Road (UPRR) tracks north of El Centro at Niland. Trucks originating from, and traveling to, the Calexico area move goods between the maquiladora (3) industries located on both the U.S. and Mexican sides of the border at Calexico and Mexicali, as well as to other destinations within Imperial County, including El Centro.

## **REGIONAL SOCIO-ECONOMIC TRENDS**

Located in the Colorado Desert, Imperial County is a sparsely populated county with relatively little economic activity. Over the last two decades, economic growth in the area has been fueled by international trade, mainly due to its proximity to the Mexican border. As of January 2010, the county's population represented 0.5 percent of the statewide population (or 183,029 individuals) (4). More than 60 percent of the population was concentrated in three cities: El Centro, Calexico and Brawley. More than half of the increase in Imperial County population is attributed to net migration. However, since the onset of the recession in 2007 the rate of demographic growth has been declining. Nevertheless, over the 2008-2035 period, population in Imperial County is expected to increase by 69 percent (from 170 to 288 thousand residents), adding pressure to POE facilities and connecting roads (5).

Overall, employment has been increasing in Imperial County since 1990, though not at a high enough rate to keep pace with the growth in population. Employment in 2011 (estimated at 53,900 jobs) was 20 percent higher than in 1990 (6). On the other hand, the unemployment rate has also remained very high,

averaging 23 percent over the last two decades. In addition, a considerable share of Imperial County residents are not proficient in English and therefore experience difficulties integrating into the educational system and the workplace environment. According to the U.S. Census American Community Survey, about 37 percent of Imperial County's adults age 25 and over have not completed high school.

In 2010, the median household income in Imperial County was \$38,685, significantly lower than that for the state as a whole (\$60,883) (7). About 22 percent of the population was below the federal poverty level, including over 28 percent of those under the age of 18 and nearly 15 percent of those aged 65 or over (7). Imperial County also has the lowest personal income per capita in California (\$27,342 in 2010), in part because more than 30 percent of the population is not of working age. However, this figure did increase by 44 percent from 2000 to 2010, faster than the 27 percent increase at the State level (8).

The economy of Imperial County is dominated by agriculture and retail trade, industries that rely heavily on goods movement activities as well as the government sector. Combined, these job sectors account for more than half of total employment.

## **REGIONAL INTEGRATION AND SUPPLY-CHAIN MANAGEMENT**

The study found that growth in maquiladora activity, fostered by the creation of Foreign Trade Zones (FTZs) and improved logistics, has generated significant increases in economic activity and trade, thus making trade a key driver for this regional economy. This outcome can be mainly attributed to the trade liberalization resulting from the North American Free Trade Agreement (NAFTA), which spurred the mobilization of investment and resources into the border region, creating clusters of industries favored by the trade agreement.

The total value of goods traded within and through Imperial County has grown rapidly since 1994, increasing from nearly \$3 billion dollars to \$12 billion dollars in 2011. Similarly, the importance of the Calexico East-Mexicali II POE has been growing and today handles approximately 98 percent of the total trade in the region. Furthermore, the bi-national region shows a large modal concentration with trucks transporting goods whose value was approximately \$11.5 billion during 2011 (i.e., 96 percent of the total trade for that year) (3).

A summary of the observations during 2011 for the two main modes of transportation in the region (truck and rail freight) is presented below:

Truck transportation (9):

- A total of 312,973 trucks entered the region through Imperial County POEs.
- By value, the largest categories of goods traded were: electrical machinery, equipment and parts and, computer related machinery and parts (combining for more than 46 percent of total trade value by truck).
- Goods with origins or destinations in California accounted for the majority of trade (64 percent by value).

Rail Freight (9):

- A total of 252 freight trains entered the region through Imperial County POEs (with a total of 8,265 loaded and empty rail containers).
- Calexico East-Mexicali II is the busiest rail crossing among the three POEs.
- Goods traded through Imperial County's POEs by rail during 2011 were mainly U.S. exports to Mexico.

- By value, the largest categories of goods traded by rail were: mineral fuels, oils, waxes, and, cereals (combining for more than 53 percent of the goods traded by rail).
- Goods with origins or destinations in California accounted for over 45 percent of the value traded by rail.

Given their importance in the mobilization of goods in the region, the study analyzed the characteristics of regional truck-based supply chains at the Calexico East – Mexicali II POE. Two main factors were found to influence those regional supply chains:

1. country of registration for the truck's license plates, and
2. existence of trusted-traveler programs.

The distinction between U.S.-registered and Mexico-registered license plates is a key determinant in the shape of supply chains along the border since national regulations in both countries establish that vehicles with foreign-issued license plates must obtain special permits to operate in domestic territory. However, it is a well-known fact that a significant number of trucks in the border region have license plates from both countries, allowing supply chain managers to be very flexible in terms of the logistic arrangements used in their supply chains.

Moreover, the existence of programs aimed at facilitating cross-border surface freight flows has a direct impact on truck transportation in the region. They are:

1. **Customs-Trade Partnership Against Terrorism (C-TPAT):** a voluntary government-private sector partnership in which companies involved in commerce destined for the U.S. demonstrate that they have implemented enhanced security measures within their facilities and day-to-day operations to prevent terrorists and weapons of mass effect from infiltrating the supply chain.
2. **Free and Secure Trade (FAST):** a commercial clearance program for known low-risk shipments entering the U.S. from Canada and Mexico. It allows for expedited processing for commercial carriers who have completed background checks and fulfill certain eligibility requirements. FAST processing is available at 55 of 105 northern and southern land POEs that process commercial cargo and the majority of FAST processing occurs at dedicated FAST lanes (FAST lanes are available at the Calexico East-Mexicali II POE). However, participation in FAST requires that every link in the supply chain, from manufacturer to carrier to driver to importer is certified under C-TPAT.

Most of the goods crossing the border are drayage movements, a common component of logistics supply chains in Imperial County POEs. Drayage is defined as the transport of goods over a short distance, often as part of a longer overall move. In the context of this study, the term “drayage” was used to denote the transportation of goods from a location close to a POE on one side of the border to a location close to the POE on the other side of the border.

## DATA COLLECTION

As part of the data collection effort, the following types of data were collected:

1. **Company Shipment Data:** This data included O/D pairs and the shipment information provided by manufacturing companies and custom brokers for goods moved across the border.
2. **Truck Intercept Survey Data:** This data included O/D pairs and truck information obtained via intercept surveys (Northbound and Southbound) at the Calexico East-Mexicali II POE for international trips.
3. **Border-Crossing Time Measurement:** This data included the collection of border crossing time for commercial vehicles at the Calexico East – Mexicali II POE using a time stamp method.

In addition to the O/D pairs, company shipment and truck intercept survey data also included the truck types, tractor types, frequency of border-crossing, use of trusted traveler program (C-TPAT/FAST) and the final destination of the cargo. Also, a stated preference section was included in the survey to understand the interviewee's willingness-to-pay from hypothetical reductions in border-crossing time and improved reliability at the border.

Results of the O/D pairs, willingness-to-pay and border-crossing time measurements are discussed in the subsequent sections of the paper

### *Company Shipments*

Shipment data was gathered as part of a larger effort to interview managers working at companies established in the region and engaged in international trade. A total of 63 companies were interviewed between April and November of 2011. Each company was asked to submit 40-50 shipments that could be analyzed to obtain O/D and supply chain management information.

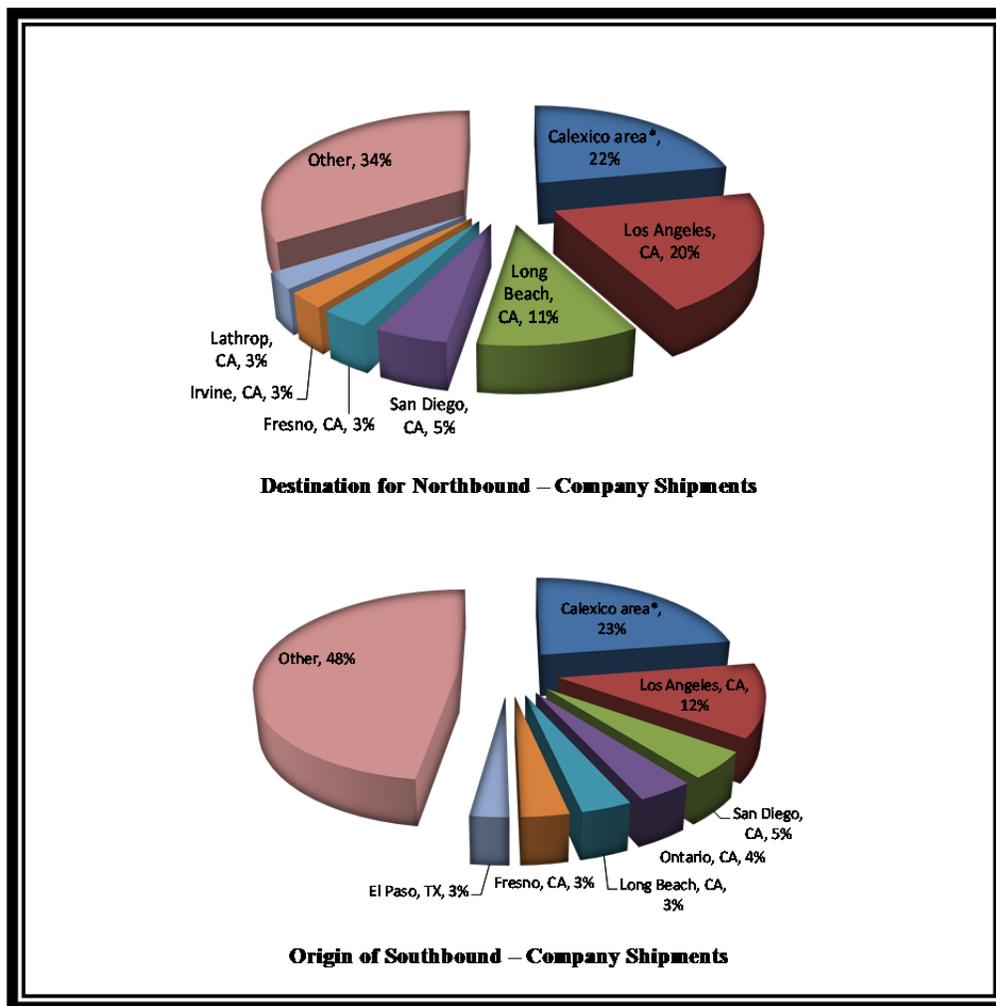
A total of 847 O/D shipment samples were collected. Based on the sample collected, the two types of goods most commonly transported (representing more than a quarter of the total shipments) were electronics and metal products. The sample was divided into northbound movements (59 percent) and southbound movements (41 percent).

For northbound flows moving from Mexico to the U.S., origins are clearly concentrated in the city of Mexicali (99 percent of shipments) while destinations are scattered throughout 98 locations in the U.S. Destinations in the State of California, and particularly, the Calexico area (including Calexico, El Centro and Heber, CA), capture significant share of the flows.

Southbound shipments from the U.S. to Mexico show a slightly less diverse pattern compared to northbound flows. The sample shows only one destination city (Mexicali) and 62 origin cities. The origins of most shipments are concentrated primarily in the Calexico area, Los Angeles, and Long Beach, which represent 52 percent of the total number of origins. The remaining 48 percent is evenly distributed among the other 59 origins. Figure 2 summarizes both the northbound and southbound findings.

Further analysis of shipment data collected shows more than 75 percent of the goods moved by third-parties in the area occur between manufacturing facilities and warehouses. The largest share is from manufacturing facilities to manufacturing facilities. The patterns observed in the data collected using the

company surveys suggests that goods traveling north generally stop at a warehouse in the United States, where they are later dispatched to their final location (possibly a retailer). On the contrary, goods traveling south are more likely to be shipped directly from a manufacturing firm in the United States to another manufacturing firm or maquiladora in Mexico.



**FIGURE 2 Summaries of Company Shipments (Northbound and Southbound)**

Finally, an important characteristic observed in the data is the significance of industrial parks in Mexicali as promoters of international trade. Analysis of originating zip codes for northbound shipments shows 70 percent of them correspond to zip codes where an industrial park is located. Similarly, 85 percent of southbound shipments have their destination in one of the zip codes where an industrial park is located.

Analysis of the information provided as part of the O/D shipment surveys allowed the derivation of additional conclusions on the characteristics of the supply chain in Imperial County:

- Drayage is a common element of the transportation procedures in the region. However, it is more prominent on northbound trips.
- An overwhelming majority of the goods moved across the Mexicali-Calexico border travel using only one mode of transportation: truck (87 percent of analyzed shipments only used truck).

- The number of shipments classified as to/from multinational companies was remarkably low (3 percent of the total shipments).
- Limited use of FAST program for northbound shipments.

### *Truck Intercept Surveys*

Truck intercept Surveys were conducted at the Calexico East – Mexicali II POE on both sides of the border, capturing northbound and southbound flows of goods transported by truck. A total of 427 truck drivers were interviewed during the months of August and September of 2011. Observations on northbound trips totaled 214 while the total number of surveys collected on southbound trips equaled 213. Of the nearly 430 trucks interviewed, only 146 were loaded with cargo. Of those, 46 were traveling in the northbound direction and the remaining 100 were traveling southbound.

For northbound trips, it was found that more than a third of the goods transported can be categorized as food products, automotive goods, and metal products. On southbound trips, metal products, machinery and electronics, and electronic products were found to be the main categories.

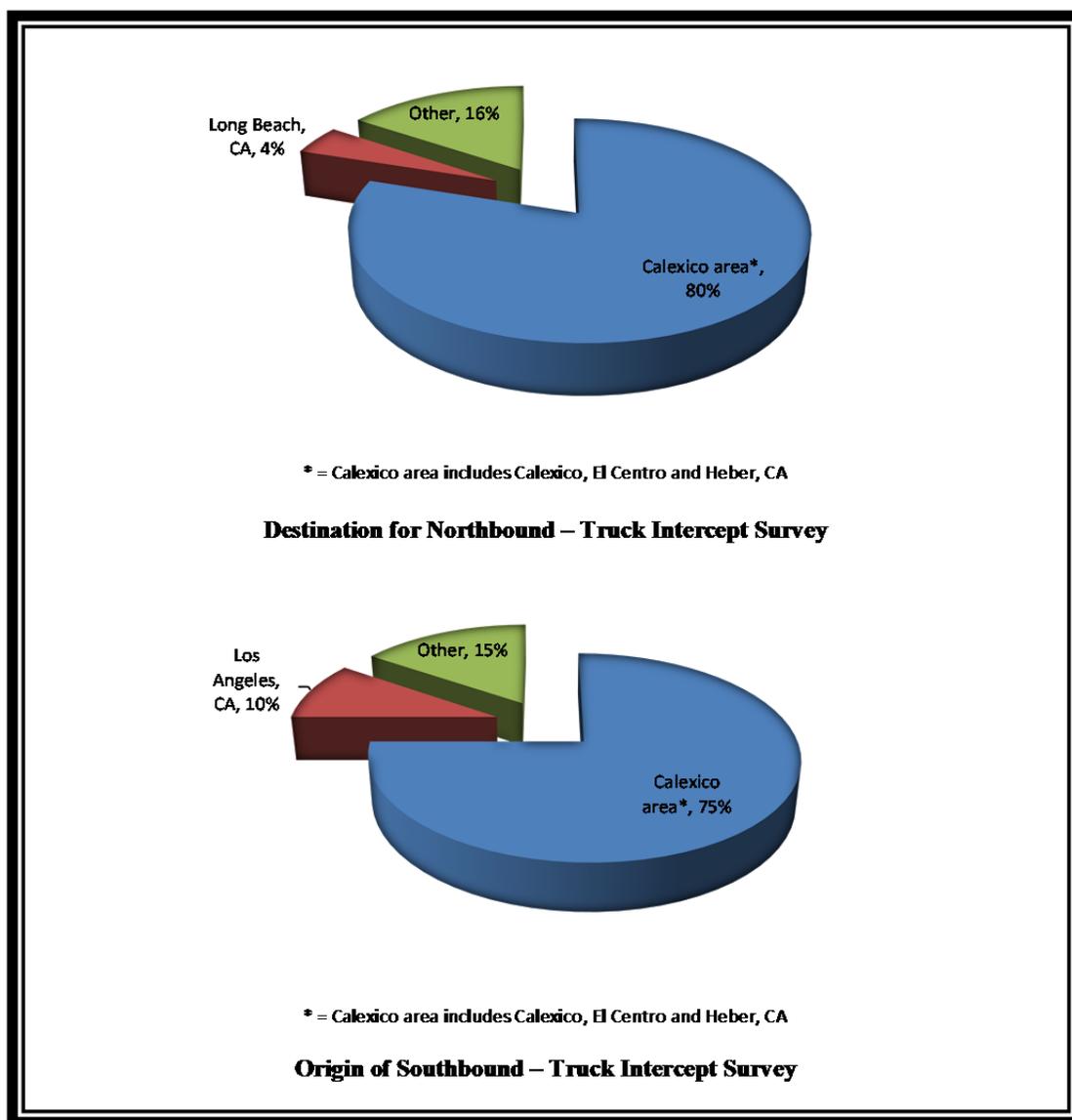
For loaded northbound flows, a large majority of drivers using the Calexico East-Mexicali II POE started their trip in Mexicali (93 percent). These drivers reported 11 different destinations for their cargo. The Calexico area captures approximately 80 percent of the total northbound volume of goods transported across the border, while the different locations in the state of California were listed as the destination for 93 percent of the trips.

Truck intercept surveys for southbound trips show that truckers have 16 different origins (94 percent of them located in California) and two destinations. The main destination is Mexicali (93 percent of the total trips) while the Calexico area is by far the most important origin since it is the starting point for more than three-quarters of all trips going to Mexico.

Figure 3 summarizes both the northbound and southbound findings.

Truck drivers were asked to identify the types of facilities from which the originated cargo had arrived. When the O/D facility types were disaggregated by direction of trip, a clear pattern of goods movement by truck was observed:

- Northbound truck trips originate primarily at warehouses (48 percent of total trips), though those that originate at manufacturing firms are a close second (37 percent). Similarly, the main destination for northbound trips are warehouses (52 percent), with the aggregating category “others” having a relevant share of the destinations (37 percent).
- Southbound trips have more concentrated origin facilities, with almost three out of every four being a warehouse. As in the case of northbound trips their destinations are primarily warehouses (52 percent of total trips). However manufacturing firms, including maquiladoras, represent 30 percent of all destinations for southbound trips.



**FIGURE 3 Summaries of Company Shipments (Northbound and Southbound)**

Similar to the case of company shipment surveys, the truck intercept surveys found that industrial parks play a key role in the generation of cross-border truck trips. Truck intercept survey results show that 54 percent of loaded northbound trucks have their origin in an industrial park while 67 percent of loaded trucks traveling south have an industrial park in Mexicali as their destination.

Analysis of additional information provided as part of the O/D truck intercept surveys allowed the identification of additional characteristics of the supply chain in the region:

- Approximately 75 percent of the drivers reported to cross the border at least once a day. Furthermore, 62 percent of the drivers reported crossing the border two or more times a day. This finding reinforces the importance of drayage in the region and has important implications on the impact of reducing wait times at the border.
- A majority of the drivers using the trusted traveler program to cross the border (57 percent). This result shows a striking contrast to the behavior reported by shipping companies.

- Almost half of the drivers on northbound trips were performing a drayage trip while this type of trip for southbound flows was reported to be only 16 percent.

## **WILLINGNESS-TO-PAY**

The O/D company surveys and truck intercept surveys included a stated preference section intended to capture the interviewee's willingness-to-pay for hypothetical reductions in border-crossing time and improved reliability at the border. Results of the surveys fluctuated between the two different groups of interviewees and by direction of flows but in general show a higher disposition by POE users to pay a fee on northbound movement of goods compared to paying a fee on southbound flows.

The first section of the stated preference survey consisted on recording the general attitude towards paying a fee to reduce border-crossing time. Survey results show that an important share of both companies and truck drivers would be willing to pay to see reduced border crossing times on northbound trips. However, the same level of support does not exist for southbound trips. In particular, for northbound flows, almost half (49 percent) of the shipping companies stated their firm would be willing to pay a fee to reduce crossing time for their shipments. Similarly, more than half of the truck drivers stated their willingness to pay for the reduction of crossing time at the border. On the contrary, for southbound flows, 43 percent of the shipping companies reported no willingness to pay a fee to reduce border crossing times while 46 percent of the truck drivers reported the decision to pay was not theirs to make.

Logistic managers and truck drivers were asked to provide the reduction in border-crossing time required for them to be willing to pay a predetermined fee to cross the border. The collection of data was divided by direction of movement. In general, required reductions were larger on southbound flows, confirming the finding that companies and drivers are less willing to pay for a fee on southbound trips. However, an important finding is that companies require larger time reductions to be willing to pay a toll compared to truck drivers. Figure 4 shows the required reductions in border crossing time (minutes) due to tolling.

Logistic managers and truck drivers were also asked to provide the amount of toll they would be willing to pay for a two-hour reduction in border-crossing times under different traffic at the POE (i.e., night, off-peak, semi-congested and peak hours). The collection of data was divided by direction of movement. Based on the survey results, the standard Willingness-to-Pay curves were created for each type of crossing identified in the surveys, based on the hypothetical 2-hour reduction in wait time at the border. Figure 5 shows the willingness-to-pay during different time periods.

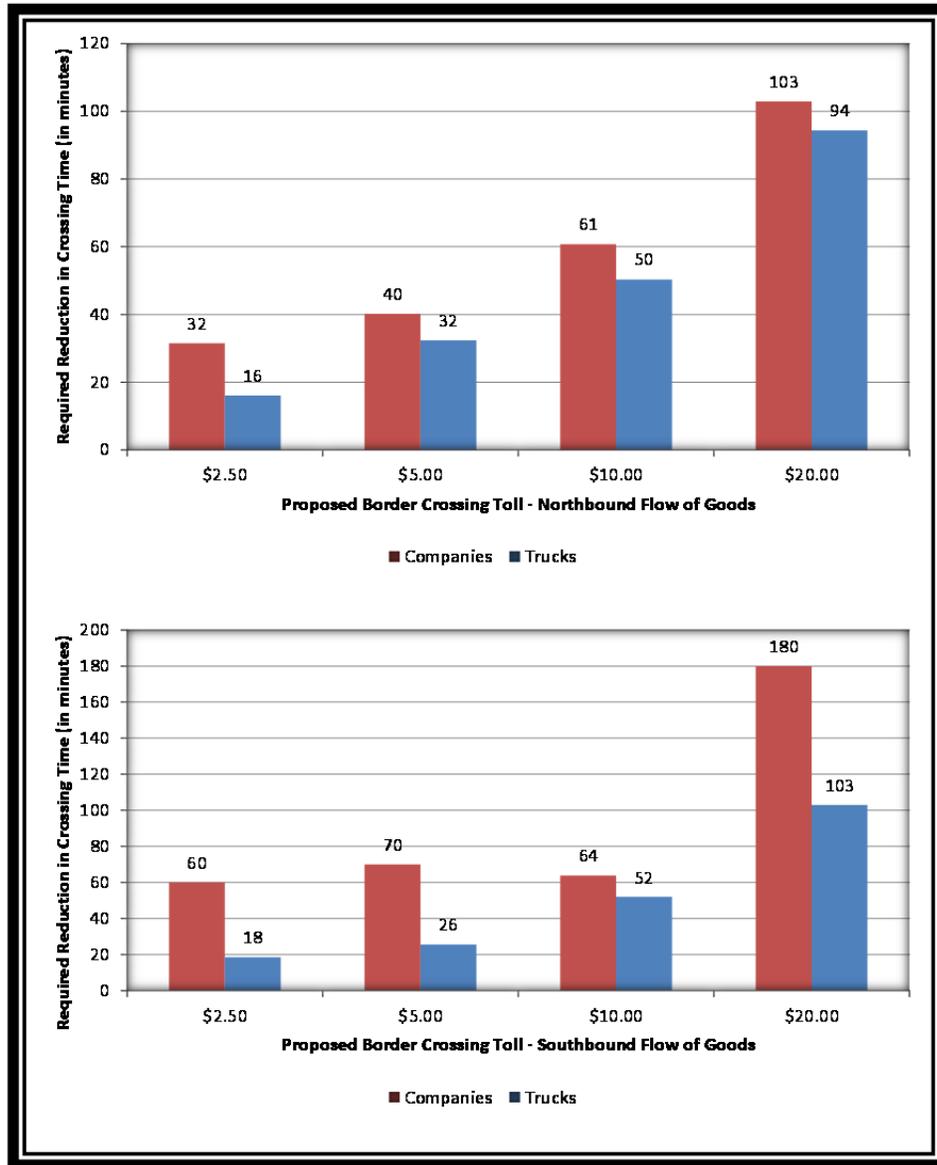


FIGURE 4 Required Reduction in Border Crossing Time (minutes) Due to Tolling

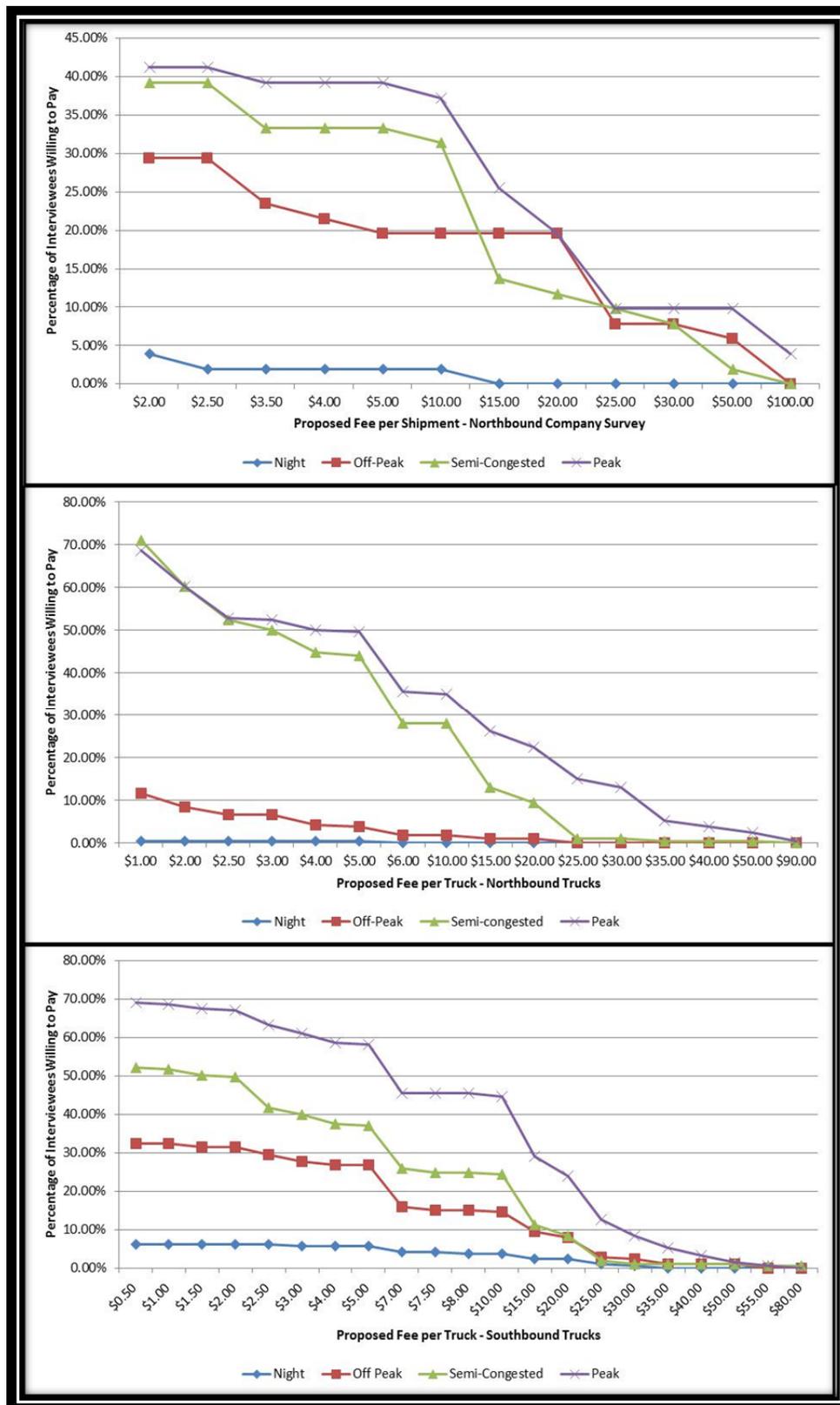


FIGURE 5 Willingness-To-Pay by Time Periods

## BORDER CROSSING TIME MEASUREMENT

Data on border-crossing times was collected for both passenger vehicles and commercial vehicles at the two main POEs in Imperial County, Calexico West-Mexicali I (downtown) and Calexico East-Mexicali II. Of the two POEs where data was collected, only Calexico East-Mexicali II allows commercial vehicles and therefore all information about commercial traffic border-crossing times comes from this POE.

### *Commercial Vehicles*

Collection of border crossing time for commercial vehicles was done exclusively at the Calexico East – Mexicali II POE. In order to actually measure border travel times for commercial vehicles (both northbound and southbound), the project’s team relied on a photographic time stamps. This method involved the use of high-resolution cameras (with synchronized internal clocks) to record a truck’s passage to “time stamp” the event. In order to assess both northbound and southbound commercial crossing times, staff was located at different positions along the truck routes on both sides of the Calexico East - Mexicali II POE to photograph trucks at key points of their crossing.

Sampling was made by randomly choosing every second- or third-truck passing a location. The sample consisted of 2,754 observations of border-crossing times for commercial vehicles collected during the months of May through October of 2011. Data collection for northbound trips was performed uniformly throughout the entire data collection period, while data on southbound trips was concentrated during the months of September and October of 2011. Of the entire sample collected, 1,597 observations correspond to northbound trips (58 percent) and the remaining 1,157 are southbound trips (42 percent). The subsamples also captured the lane used by trucks to cross the border, providing information on the load type and border-crossing procedure used (i.e., FAST, empty FAST, loaded, empty).

The analysis of the data collected for commercial vehicle border-crossing times was performed by partitioning the sample into different sets of subsamples. This grouping was done to ensure that each subsample shared the same border-crossing characteristics. For each subsample analyzed, two sets of statistics were estimated: performance and reliability statistics.

Performance statistics are related to the crossing conditions that would be faced by the average user of the POE. These statistics include average border-crossing time, standard deviation of crossing times, and minimum and maximum crossing times. Reliability statistics, on the other hand, characterize the entire set of possibilities observed in the sample. These statistics include the border-crossing time for the 10th and 90th percentile of the sample as well as the median (50th percentile) crossing time. Table 1 presents the tabulated results (hours: minutes format).

Statistic	Overall Commercial Vehicles		Northbound				Southbound	
	Northbound	Southbound	Empty General Lane	Empty FAST Lane	Loaded FAST Lane	Loaded General Lane	Empty	Loaded
Mean	0:54	1:02	0:37	0:41	0:50	1:02	0:39	1:10
Standard deviation	0:38	0:56	0:29	0:36	0:37	0:39	0:48	0:56
Minimum	0:06	0:02	0:09	0:11	0:06	0:07	0:02	0:02
Maximum	3:24	4:34	2:36	2:37	3:22	3:24	4:14	4:34
10th percentile	0:17	0:11	0:13	0:16	0:17	0:19	0:05	0:16
90th percentile	1:48	2:24	1:14	1:25	1:40	1:56	1:49	2:31
50th percentile	0:42	0:43	0:29	0:29	0:38	0:54	0:18	0:53
Sample size	<b>1,567</b>	<b>1,134</b>	<b>79</b>	<b>21</b>	<b>807</b>	<b>660</b>	<b>300</b>	<b>831</b>

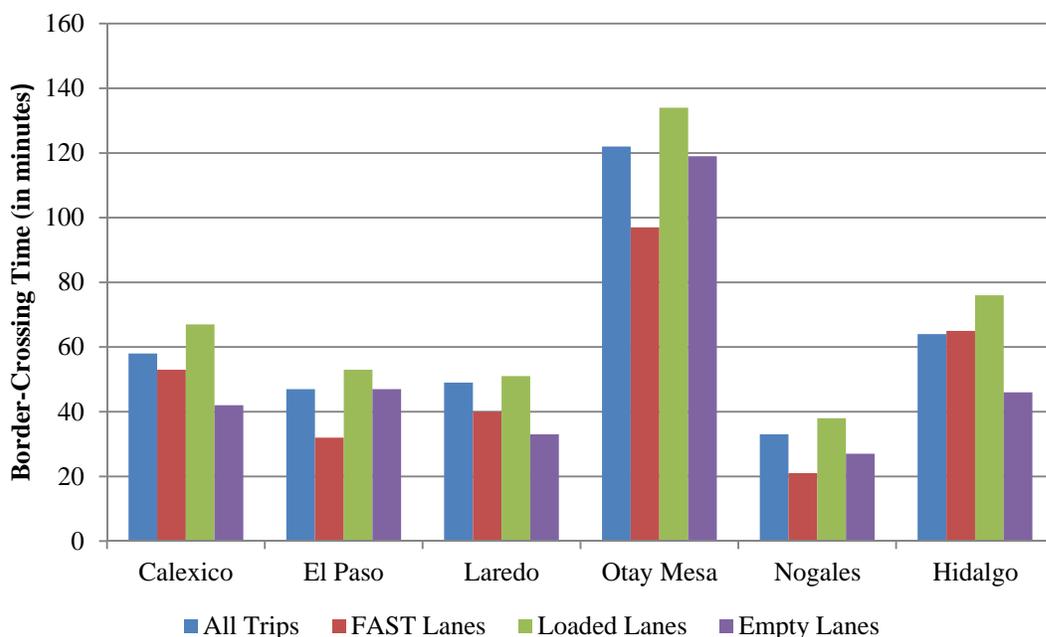
**TABLE 1 Summary Statistics of Commercial Vehicles, by Trip Direction**

***Comparison of Commercial Vehicle Northbound Border-Crossing Times with Other POEs***

The performance of a POE in terms of border-crossing times may be a factor that attracts more trade opportunities to a region. Therefore, it is important to analyze the competitiveness of a specific POE with respect to neighboring crossing points.

A study conducted by the U.S. Department of Commerce (10) reports average border-crossing times for northbound trucks in the five busiest land POEs. The featured POEs in this report are Laredo (including the World Trade Bridge and the Colombia Solidarity International Bridge), El Paso (including the Bridge of the Americas and the Ysleta-Zaragoza), Otay Mesa, Nogales and Hidalgo.

Even though a direct comparison between the results of the present study and those from U.S. Department of Commerce reports is not entirely meaningful (due to the different time periods captured), it can convey a sense of the degree of competitiveness of the Calexico East POE. Figure 6 provides a quick summary of average border crossing times by crossing type of commercial vehicles at the POEs.



**FIGURE 6 Northbound Average Border Crossing Times by Crossing Type and POE (Commercial Vehicles)**

**ECONOMIC DEVELOPMENT OPPORTUNITIES**

By focusing on current economic activities throughout the region, the study identified how economic development opportunities can be better realized through enhancement of goods movement in the region. Several State and federal incentive zones were identified in Imperial County including enterprise zones, Manufacturing Enhancement Areas (MEAs) and Foreign Trade Zones (FTZs) that are coordinated at the local level by the Imperial County Planning and Development Services Department and the Imperial Valley Economic Development Corporation. In addition, the U.S. Department of Commerce’s Economic Development Administration (EDA) was identified as a source of assistance for communities in the

region, providing investment for projects that contribute to the creation or retention of private sector jobs and to alleviate unemployment.

A study prepared by the Imperial County Comprehensive Economic Development (II) identified a number of weaknesses that could constrain economic development in Imperial County in the future. One issue receiving much attention lately is the lack of adequate transportation infrastructure, especially at the border.

As a result, a series of economic sectors were analyzed to provide specific recommendations such as:

- **Transportation/ Warehousing/ Distribution Opportunities:** It is recommended that Imperial County support the maquiladora operations in Mexicali, by investing in trucking-related operations and maintenance, warehousing, professional and financial services.
- **Agricultural and Food Processing Opportunities:** The study area has the opportunity to bring additional food processing facilities to Imperial County, specifically food processing involving crops/products grown and raised in the bi-national region. Therefore, investment is recommended in transportation infrastructure enhancements (e.g., increased number and reliability of roads) that could reduce congestion and delay.
- **Energy Opportunities:** Improvements in the region's transportation network would enable construction of solar and wind energy production plants as they require large-scale equipment (such as solar panels and wind turbines) to be transported.

## CONCLUSIONS

- The study validated that local markets are the main driver for border-crossing goods movement. This is attributable to the high degree of economic integration between California and Baja California. However, the close linkage between industrial parks in Mexicali and demand of truck trips across the border was a critical finding.
- Local experts and logistics companies agree that private sector processes in the area are complex, and in most cases designed to meet the producer's needs. This requires logistics and transportation firms to have significant flexibility in their supply of services, making drayage an important component of the movement of goods across the border.
- Defining the best course of action to reduce delays in the area requires further studies and consultations. However, an initial assessment of the current configuration of the Calexico West-Mexicali I (downtown) and Calexico East-Mexicali II POEs suggests that, on northbound flows, actions can be oriented to reduce queue time before inspections.
- Improvements on inspection logistics on Mexican side could constitute an option to reduce southbound trip times.
- An exploration of implementing tolling schemes on existing POEs in Imperial County that guarantee faster and more reliable crossing times should be considered. Support for southbound tolling is not widespread since companies do not see any value to it. Conversely, the study found a positive attitude towards paying a toll to reduce northbound trip times.

- It is unclear how the transportation market in the region will evolve in the near future. In particular, the implementation of the NAFTA trucking agreement could introduce important changes to the composition of logistic chains in the area.
- Regarding long-term development of logistic activities in the region, manufacturers and transportation experts anticipate sustained increases in production levels. In particular, technification of production processes and a larger number of companies participating in “trusted company” certifications are thought to be the main contributors to that increase.

## **POLICY RECOMMENDATIONS**

To minimize the negative economic effects of delays at the border, a set of policy options as suggested by the study conducted by the U.S. Department of Commerce (10) and specific to Imperial Valley POEs can be explored on both sides of the border to reduce border-crossing times. In most cases, the options require cooperation among federal, State and local agencies to be successfully implemented. The options focus on freight traffic (i.e., trucks) and can be divided into three broad categories:

1. optimize use of existing capacity,
2. improve throughput, and,
3. expand capacity.

### ***Optimize Use of Existing Capacity***

This option is equivalent to the proactive management of demand for commercial use of the POEs in Imperial Valley. The objective is to reduce border-crossing times by providing incentives for decision-makers (e.g., brokers and logistic managers) to use capacity in an efficient way and therefore allocating demand across all available capacity defined not only as physical infrastructure but also as the available hours of operation. A typical barrier to successfully implementing these options is the flexibility of business practices. Specific actions include instituting an appointment system, implementing permits for POE use, implementing variable pricing, and implementing windows of priority.

### ***Improve Throughput***

Throughput increase can be achieved by raising the rate of movement and pace of inspections at the POEs. However, this does not equal faster inspections or compromising the security of the inspection process. The options considered here are related to the logistic and intelligence processes performed before the actual inspection. Specific actions include segmenting the trucking population by commodity transported, expanding trusted traveler programs, and streamlining processing centers.

### ***Expand Capacity***

This category of alternatives represents increasing in the supply of border-crossing capacity by either enlarging physical infrastructure or increasing staff and operating hours. This, in turn, improves the ability to process growing traffic volumes in the region. Specific actions include expanding border-crossing physical infrastructure and increasing staffing and operation hours of the POEs.

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