Measuring Border Delay and Crossing Times at the U.S. / Mexico Border

Task 1 Report
PLAN FOR COLLECTING BASELINE DATA

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Plan for Collecting Baseline Data

Introduction

As part of Task 1 in the “Measuring Border Delay and Crossing Times at the U.S. / Mexico Border” study, the Battelle/TTI project team was responsible for developing a plan for collecting baseline data. This document provides that plan and will be used as a general framework for the Implementation Plan that will be developed during Task 3 of the project. It is also important to note that this document is intended to offer a generic plan for collecting time crossing data at any Port of Entry (POE) along the northern or southern border of the United States, and to be independent of the type of technology selected to implement a border crossing time measurement system. For this pilot program project, border crossing time data will be collected at Bridge of the Americas (BOTA) in El Paso, TX by using RFID technology. Therefore, this document will use principals developed during this task by the project team and apply them at BOTA. This “Plan for Collecting Baseline Data” consists of 6 sections: the definition of total crossing time, the parameters of the northbound border crossing process, the calculation of border crossing times, the calculation of border crossing delay, additional considerations, and a conclusion.

Definition of Total Crossing Time

Before any specific plan for collecting data can be formulated, it is important to clearly define what is to be measured for the project. The main objective of the this project is to implement a system that will automatically calculate total border crossing times for northbound commercial freight traffic at the Bridge of the Americas (BOTA) in El Paso, TX/Ciudad Juarez, Mexico. Towards this end, total crossing time will be defined as the following:

*Total Crossing Time* – the time it takes for a commercial vehicle to travel from a predetermined point on the Mexican side of the border (the beginning of the northbound border crossing process) to a predetermined point on the U.S. side of the border (the end of the northbound border crossing process).

The next section of this document identifies the parameters of the northbound border crossing process at BOTA.
Parameters of Northbound Border Crossing Process for Commercial Freight at BOTA

In order to calculate total crossing times for commercial freight traffic at BOTA, the parameters of the northbound border crossing process must first be identified. A full description of this process can be found in the Current State Analysis (Task 1.2 Report) of this project. The following list summarizes each of the parameters in the northbound border crossing process at BOTA:

*Queue on Mexican Side of the Border* – The line of trucks waiting to enter the Mexican Export Lot. This queue length is variable, and depends on traffic volumes and processing times at each of the inspection facilities throughout the border crossing process.

*Mexican Export Lot* – A facility operated by Mexican Customs (Aduanas) that is responsible for inspecting export materials leaving Mexico. Only a small percentage of freight is physically inspected at this facility for audit purposes.

*International Bridge* – This is the physical bridge between Mexico and the United States, crossing over the Rio Grande River (known as the Rio Bravo in Mexico). The actual international boundary between these two countries is located on this bridge.

*U.S. Federal Compound* – This facility is operated by U.S. Customs and Border Protection (CBP). Its primary function is to make sure no harmful or illegal freight is permitted to enter into the United States. Secondary inspections can occur here if CBP feels it necessary to further examine the driver, freight, or conveyance. These secondary inspections can include intrusive measures (physically unloading the trailer to examine the cargo) or non-intrusive measures (x-ray or gamma ray imaging).

*Border State Inspection Facility (BSIF)* – The BSIF at BOTA is operated by the Texas Department of Public Safety (DPS). Its primary function is to ensure the tractors and trailers entering the United States from Mexico are safe enough to operate on U.S. roadways. Secondary inspections of the vehicles can occur here if deficiencies are revealed through a preliminarily review of the conveyance by DPS.

Figure 1 below illustrates the northbound border crossing process for commercial freight at BOTA.
Calculation of Total Crossing Time

Based on the definition of total crossing time in the first section of this document, only two measurements are necessary in order for the total crossing time to be calculated. These two measurements are the time of day when a truck begins the northbound border crossing process, and when it ends the northbound border crossing process. The proposed system will implement a technology that can be used at these two points in order to collect this information. The definitions listed below will help to outline exactly how total crossing times will be measured.

Measuring Site # 1 (R1) – This is the physical location on the Mexican side of the border where equipment will be set up to identify trucks as they pass it. R1 will be located at a point upstream from the development of the Mexican Queue because the time a truck spends in the queue is a major factor contributing to the amount of time it takes a commercial freight shipment to cross the border. This point needs to be far enough upstream of the Mexican Export Lot entrance that rarely, if ever, will the queue extend beyond it. The exact location for this site will be determined after receiving input from both public and private stakeholders of the border crossing process in the El Paso region.

Measuring Site # 2 (R2) – This is the physical location on the U.S. side of the border where equipment will be set up to identify trucks as they pass it. R2 will be located at a point after the exit of the BSIF, but before a truck enters the U.S. highway system. Like R1, the exact location for R2 will be determined after receiving input from both public and private stakeholders of the border crossing process in the El Paso region.

Time-Stamp – This refers to the exact time of day when a measurement is taken. For this project, time-stamp data will be collected as each truck passes measuring sites R1 and R2.
In order to calculate total crossing times for northbound commercial freight at BOTA, the definitions listed above must be applied to the parameters of the northbound border crossing process. Figure 2 below illustrates how these two concepts can be combined in order to calculate the total crossing time.

As a truck passes R1 before the queue on the Mexican side of the border, a time-stamp will be taken. The truck will then proceed through the northbound border crossing process. At the end of the northbound border crossing process (after the BSIF), another time-stamp will be taken as the same truck passes R2. By comparing these two time-stamps, total crossing time can be calculated for northbound commercial freight shipments at BOTA. Regardless of the technology selected for the proposed system, this plan for collecting baseline data will be applicable as long as the selected technology has the capability to identify individual trucks and capture the time-stamps for those individual trucks at points R1 and R2.

**Calculating Border Crossing Delays**

Once total crossing times are measured, calculating border delays is possible. Figure 3 illustrates a concept for calculating border crossing delays that was developed during Phase I of this project. A full description of this concept can be found in the Measuring Border Delay and Crossing Times at the U.S. / Mexico Border – Tasks 1 & 2 Report (http://tti.tamu.edu/documents/TTI-2007-1.pdf).
Figure 3. Border Crossing Times under Different Scenarios

Figure 3 shows 3 different scenarios for total border crossing time. They are Free Flow Crossing Time, Optimal Crossing Time, and High Volume Crossing Time. Each of these scenarios is defined below.

**Free Flow Crossing Time** – The time it would take a truck to travel across the border if it did not have to stop at any inspection facilities for processing and travel at a constant speed.

**Optimal Crossing Time** – The best case scenario for a border crossing trip, where traffic volumes are low and processing times are low. As figure 3 illustrates, trucks traveling at this “optimal” crossing speed will experience some stoppages as they are processed at each of the inspection facilities on their northbound border crossing trip. It is important to note that this Optimal Crossing Time will be a dynamic figure, which will constantly adjust to current crossing conditions at BOTA. Variables such as the terrorism threat level, seasonal spikes in traffic volume, and the number of booths open at U.S. Customs can all affect total crossing times, and thus the Optimal Crossing Time. Once actual data collection begins, the project team will analyze the data to identify the Optimal Crossing Time at BOTA.

**Observed Total Crossing Time** – The total amount of time it takes a truck to cross the border where delays caused by high traffic volumes that lead to slower traffic speeds and longer queues are accounted for. For illustration purposes in Figure 3, Observed Total Crossing Time is representative of a trip where high volumes at the port lead to a longer total crossing time.
Because trucks do not experience free flow crossing times, this scenario is discarded as a reference point. The optimal crossing time is set as the base time, since it represents the case in which there are no queues at any of the stops during the northbound border crossing process. Taking these factors into consideration, Border Crossing Delay was defined during Phase I of this project as the following:

**Border Delay** – The difference between the observed total crossing time of a truck and the optimal crossing time at a specific POE.

As mentioned earlier, once total crossing times are captured by the proposed system, the data can be analyzed and the optimal crossing time for a specific POE can be calculated.

### Additional Considerations

The three previous sections of this document focused on the necessary components that are required for total border crossing times to be calculated. However, there are additional parameters and points that must also be defined in order to fully understand the northbound border crossing process and total crossing times. These parameters include Origin Point (Shippers) and Destination Point (Receivers), FAST and Non-FAST shipments, and the possibility of collecting segmented northbound border crossing times. The definitions of these additional factors are given below.

**Origin Point (Shippers)** – This is the location from which the freight is shipped on the Mexican side of the border. Most of the shippers sending freight across the border in the El Paso/Ciudad Juarez area consist of the manufacturing plants in Mexico where goods are produced for their consumption or further processing in the United States. Nearly all of the freight crossing at BOTA originates in Ciudad Juarez and its surrounding areas.

**Destination Point (Receivers)** – This is the location where the freight is delivered after it crosses into the United States. The receiver is always a warehouse or freight terminal located within the commercial zone along the U.S. / Mexico border, because Mexican domiciled trucks are not allowed to operate in the U.S. beyond the commercial zone (which extends 25 miles into the U.S. from the international boundary), except for those few carriers which are participating in the Demonstration Program.¹

While it can be argued that both of these points are part of the northbound border crossing process, they cannot be accurately measured due to the variability of their physical locations. Capturing time-stamp data at these points would be nearly

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¹ In 2007, the U.S. Department of Transportation (USDOT) and the Federal Motor Carrier Safety Administration (FMCSA) began a pilot program that would allow up to 100 Mexican carriers to operate in the U.S. beyond the commercial zone for one year. In order to participate in this program, Mexican carriers must meet strict safety standards set by both USDOT and FMCSA, which involve a physical inspection of the carrier’s terminal(s) and equipment. Full details on this initiative can be found at http://www.fmcsa.dot.gov/cross-border/cross-border.htm
impossible, unless substantial efforts were made to identify all of the shippers and receivers in the El Paso region and to set up measuring sites at each of them (if the technology selected requires any installation of equipment). By using \( R1 \) and \( R2 \) as the beginning and end points of the northbound border crossing process, a uniform measurement can be provided.

**FAST Shipments** – In 2003 CBP implemented its Free and Secure Trade (FAST) Program which is aimed at enhancing the overall security of the U.S. borders. This program allows expedited clearance for any shipment whose shipper, receiver, and carrier has Customs – Trade Partnership Against Terrorism (C-TPAT) certification. FAST shipments have a dedicated lane on the international bridge, as well as dedicated inspection booths at the entrance of the U.S. Federal Compound. Because all parties involved in a FAST shipment are C-TPAT certified, CBP considers all FAST shipments as “low risk” cargo, which leads to the high probability that a FAST shipment will not be sent to secondary inspection. These dedicated lanes and booths, along with the “low risk” characteristics of these shipments help significantly decrease the crossing times of all FAST shipments.

**Non-FAST Shipments** – Non-FAST shipments consist of any shipment that does not meet the qualifications of the FAST program. These shipments make up a majority of the northbound border crossings at BOTA because of the high probability that at least one of the parties involved in a shipment (shipper, receiver, or carrier) will not have C-TPAT certification.

Because commercial traffic in the Mexican section of the trip is not segregated by FAST and Non-FAST, the best location to identify FAST and Non-FAST shipments is by installing a measuring site at the international bridge, where FAST traffic is separated from Non-FAST traffic at one of the bridge lanes. This way, a truck using the dedicated FAST lane on the bridge can be recognized and flagged as a FAST shipment. Identifying FAST and Non-FAST shipments would provide greater detail on the variance of crossing times for commercial vehicles at BOTA; however, the project team can achieve its overall goal of calculating total crossing times even if FAST and Non-FAST shipments are not separated.

**Collecting Segmented Data** - During the initial stakeholder meeting for this project in Task 1, both public and private stakeholders expressed an interest in collecting more detailed data on a shipment’s total crossing time. This can be done by installing measuring sites between each inspection facility in the northbound border crossing process. By installing readers between these locations, the exact amount of time a truck spends in each segment of the trip could be calculated. Also, as mentioned earlier, installing a measuring site on the international bridge would allow FAST and Non-FAST shipments to be identified, which would provide even greater detail on total border crossing times. If segmented data was collected, the project team would be able to calculate Optimal Crossing Times by trip type as well, thus enabling border crossing
delays to be accurately disseminated to all stakeholders for FAST, Non-FAST, and empty trips. The concept of collecting segmented data is illustrated in Figure 3 below.

Figure 4. Collecting Segmented Data by Installing Additional Measuring Sites

It is important to note that only two measuring locations have been budgeted for this project, as only two measuring sites would allow total border crossing times to be calculated. Therefore installing additional measuring sites in order to provide segmented trip data would require additional funds.

Conclusion

This document is aimed at providing a “base case” scenario that would allow total crossing times and border delays at BOTA to be measured. This plan for collecting baseline data is meant to be independent of any one technology and to serve as a general guide that would allow total crossing times to be calculated at other Ports of Entry (POEs) along the U.S.’s northern or southern border.