

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

Draft Implementation Plan

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1.0 PURPOSE

The purpose of this implementation plan is to serve as a guideline for installing a system that uses Radio Frequency Identification (RFID) technology to measure the time it takes commercial vehicles to complete the border crossing process at the U.S./Mexico border. This plan presents a general step-by-step process that is not Port of Entry (POE) specific, so that similar systems can be deployed at any POE along the United State's southern border. The Implementation Readiness Review for which this document is prepared will determine whether the required system hardware and communications equipment, software, and database can be installed and configured in the operational environment. The Implementation Readiness Review will also look at interface and external coordination requirements; in-house testing procedures and results; problems with data acquisition, quality, processing and management; and any changes to previously prepared documents.

Figure 1 below is a graphic representation of the implementation plan developed by the project team during this phase of the project.

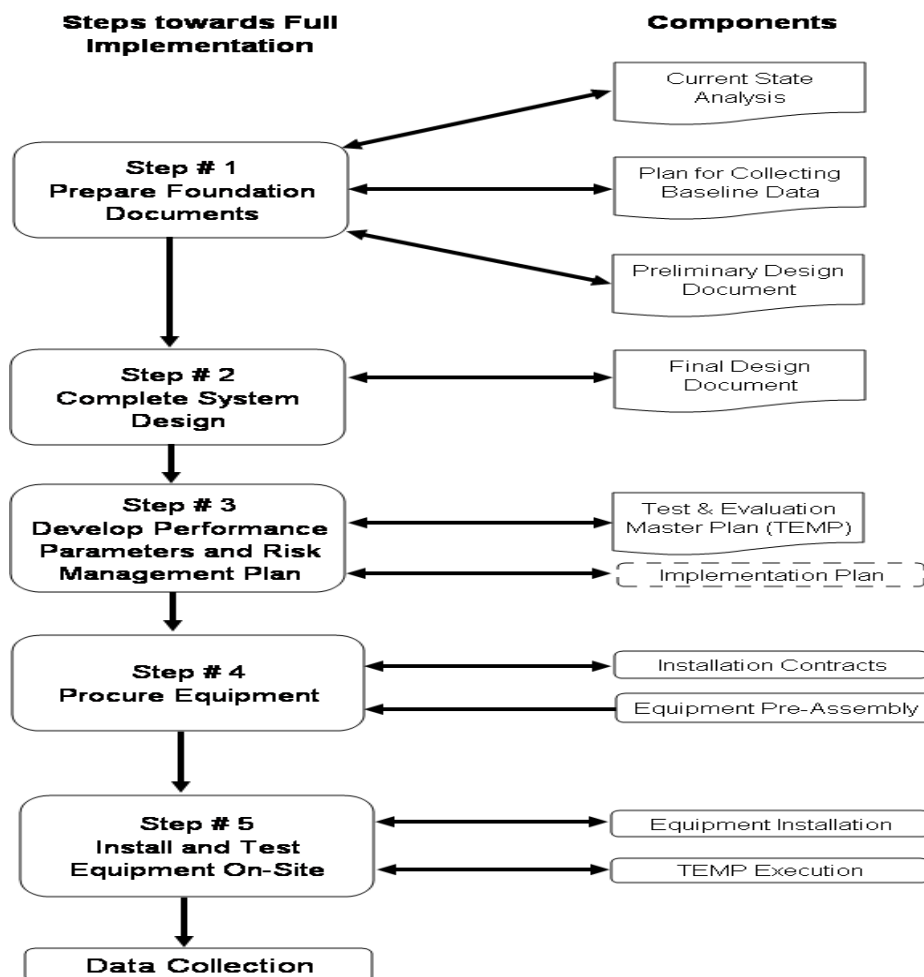


Figure 1: Implementation Plan Flow Diagram

In the flow diagram, the left column represents the key steps that must be taken in order to achieve the ultimate goal of any border crossing time measurement system—data collection. The column on the right illustrates components that are necessary to complete each step. These components are POE-specific, meaning that they will differ from POE to POE. Several components are reports that document in detail particular elements of a specific border crossing environment, and act as building blocks for successful system implementation. It is important to note that the implementation plan outlined in this document draws from but is not meant to replace either the project management process or the systems engineering process. The precepts of those two processes should be considered as part of any border crossing time measurement system implementation.

This report consists of 5 main sections. The first section (Purpose) provides a general overview of this document. Section 2 (Implementation Plan) expands on each of the steps outlined in Figure 1 above. The third section (Lessons Learned) summarizes some of the key findings of the project team regarding implementation to this point. An update to the risk management plan is presented in the fourth section of this report. The fifth and final section (Current Progress and Next Steps) documents the work that has been done by the project team to this point, and the next steps to be taken in order to successfully implement a system that uses RFID technology to accurately and automatically measure border crossing times at land POEs along the U.S./Mexico border.

2.0 IMPLEMENTATION PLAN

2.1 Step 1 – Prepare Foundation Documents

The first step towards implementing a system that accurately measures border crossing times for commercial freight at the U.S./Mexico border is analyzing the specific border crossing at which the measurement will occur. This analysis consists of preparing three separate documents, which are described in greater detail below.

Current State Analysis

The Current State Analysis document highlights the operational details of the Port of Entry where the border crossing time measurement system will be deployed. Operational details include hours of operation, traffic volumes, port schematics/layouts, and specific elements of the border crossing process. Also, a meeting that brings together both public and private stakeholders involved in the border crossing process at the POE should be organized at the beginning of any similar project. Of course, these stakeholders need to be from both sides of the border. Results of this meeting should be included in this document.

Plan for Collecting Baseline Data

This document defines exactly what will be considered as the “total crossing time” for the purposes of the project. It also must define the parameters of the border crossing process at the POE where the system will be implemented. After defining total crossing time and the parameters, the process of calculating total crossing times can be documented for a specific POE.

Preliminary Design Document

Building off of the two previous documents, the Preliminary Design Document begins to identify the specific details of the system that will be deployed at the border crossing site. This document includes maps of the POE along with flow lines, key points, and locations at the crossing where measurement sites could be installed. Drawing from the stakeholder meeting and Current State Analysis document, the needs of the stakeholders who will use the system are also incorporated into this document. Based on these user needs, requirements of the proposed system should be formulated and included in this document. The final element of this document is a conceptual design of the system in which the proposed system is broken down into its core elements and each element is described in detail. Once the Preliminary Design Document is prepared, it should be reviewed by project coordinators to assess the feasibility of successfully implementing a system that uses the initial design.

2.2 Step 2 – Complete System Design

Once approval to proceed is granted by project coordinators, Step 2 of the implementation plan can begin. This step finalizes the system design that was begun in Step 1. The only component for this step is the Final Design Document, which is described in greater detail below.

Final Design Document

The Final Design Document builds on the Preliminary Design Document developed in Step 1 of the implementation plan. While the Preliminary Design Document lays out the conceptual design of the system, the Final Design Document specifies the equipment that will be needed in order to actually build the proposed system in a real-world setting. Equipment specifications for system hardware (i.e. measuring sites) should be provided in this report, along with detailed diagrams of equipment that will be installed on-site. Other considerations such as how to power the equipment should be incorporated into this document as well.

It is important to note that before completing the Final Design Document, it is essential to confirm whether the physical layout of the POE has been modified or there are plans to modify it since the analysis conducted during Step 1 of the implementation plan. Stakeholder intent and commitments should be reaffirmed at this point in the project as well, which is probably best accomplished via another stakeholder meeting. At that meeting, the interfaces between the implementation and the regional architecture (from the Final Design Document) can also be validated. The stakeholder meeting is also an ideal opportunity to discuss plans for short- and long-term security of the installation.

Once the Final Design Document is prepared, it should be reviewed by project coordinators to assess whether all elements required to successfully implement the system have been identified and documented and all risks updated and addressed.

2.3 Step 3 – Develop Performance Parameters and Risk Management Plan

Step 3 is designed as a means to check the functionality of the system once it is installed on-site. This step contains two main components, which are described in greater detail below.

Test and Evaluation Master Plan (TEMP)

The TEMP is a document that outlines specific tests that will be performed on the system to ensure its functionality once it is installed on-site. These system tests should take into account factors such as powering the equipment, checking communications, ensuring accurate readings, etc. Key parameters should also be developed and agreed upon by project coordinators for the operational characteristics of the system and documented in this report.

At this point, the risk management plan section of the Project Plan should be revisited by the project team and updated as necessary. The risk management plan is not necessarily a formal or stand-alone report, however it should document potential problems with installing, running, and/or maintaining the system; and methods for troubleshooting these potential problems.

Implementation Plan

The implementation plan is meant to serve as a checklist for the activities that must take place before data collection can begin. This document, which serves as the implementation plan for installing a border crossing time measurement system at the Bridge of the Americas in El Paso, Texas, is meant to be transferable to other border crossings where similar systems may be implemented. This implementation plan could be amended if the specific characteristics of a POE necessitate it being changed. As noted previously, the implementation plan is not meant to replace the project management process or the systems engineering process.

Risk Management Plan

In following the project management process, risk management would be addressed in the Project Plan, early in the project. Step 3 is a critical point at which to re-evaluate risk prior to the major steps of equipment procurement and installation. Table 1 is the Risk Management Plan for the Bridge of the Americas RFID implementation as it appeared in the Project Plan. Section 4 of this document deals with updates to the Risk Management Plan.

Table 1: Project Risks

	Risk Type	Description of Impact	Mitigation Plans
Technical	Technology system costs increase significantly.	Unplanned procurement expense.	Check on costs and explore alternate sources if needed.
	Integration of data from multiple sources proves to be problematic.	Unplanned labor expense.	Integrate data as realistically as possible during equipment checkout and table-top testing
Programmatic	Reviews by stakeholder organizations take longer than expected.	Deliverables cannot be presented within their planned Period of Performance.	Monitor progress of responses from stakeholders. Implement work-around tactics as needed.
	Managing numerous stakeholders including two different languages and two different countries proves to be more difficult than expected	Unplanned management time, delays in agreements	Work closely with key federal-level and other influential stakeholders to resolve impasses that may arise
	Running the evaluation takes more resources than envisioned	Unplanned labor and/or maintenance expense	Identify and assess any unplanned challenges when discovered
Opera	A real-world event occurs that elevates security at border	Reaction to the event delays installation due to security	Should any such event occur, work closely with FHWA, CBP

	Risk Type	Description of Impact	Mitigation Plans
	crossings in a way that affects the technology implementation.	concerns or causes more limited data to be collected and key findings to be missed, resulting in non-optimal project recommendations.	and other stakeholders to fully understand the impacts any such event will have on the program's technical integrity.
	Vandalism takes installed equipment out of commission.	Interruption in data, delayed deliverables, and repair or replacement cost.	Maintain a security plan for the technology implementation, including stakeholder buy-in.

2.4 Step 4 – Procure Equipment

Upon the completion of Step 3, any equipment that is necessary for the system should be procured. This step may involve getting quotes for system components, which may take a considerable amount of time. If possible, the project team should consider getting quotes on system components earlier in the project, so that time can be saved during this phase of the implementation plan. Step 4 has two major components, which are described below.

Installation Contracts

Installing equipment on-site will most likely have to be done by local contractors. At this phase in the project, it is important to select and establish a contract with a local vendor so installation work on-site can be performed when the time comes. Because the system will operate in both the U.S. and Mexico, two separate contractors will most likely be needed to install equipment, one on each side of the border.

It is also important to note that Memorandums of Understanding (MOUs) may have to be developed at this point in the project. MOUs, if necessary, will establish a plan for operation of they system once the project is concluded. These MOUs will most likely have to be in place with the local municipalities on each side of the border at the POE where equipment is installed.

Equipment Pre-Assembly

Once the equipment is procured and on hand with the project team, all necessary pre-assembly can take place. All wiring between the readers, antennas, power sources, and the cabinets (each of which is described in the Final Design Document) can be performed at this point. In-house tests can also be performed once the equipment is pre-assembled to ensure it is working properly. This process will ensure that less work needs to be done when it is time to install the equipment on-site.

2.5 Step 5 – Install and Test Equipment on-site

Step 5 consists of installing the equipment on-site and testing the system once it is assembled in order to ensure it is working properly. This step has two main components, which are describe in greater detail below.

Equipment Installation

Once the equipment is pre-assembled and local contractor(s) selected by the project team, on-site equipment installation can begin. Acceptance criteria should be defined and agreed upon with the contractor(s) and authority to accept the installation established beforehand. Warranty terms

and conditions should be clear. It is important to note that while local contractors will be performing the actual installation work, members of the project team should be present to supervise the work taking place on-site. Since land border crossings have many large vehicles moving about, safety is a key consideration. The project team and the contractor(s) should meet with the facility operators to discuss on-site safety considerations.

Test and Evaluation Master Plan (TEMP) Execution

After equipment installation, the tests documented in the TEMP (developed in Step 3) should be conducted. Results of the tests and any problems completing the tests set forth in the TEMP should be documented and addressed at this point. If it becomes evident that the key parameters outlined in the TEMP are not being met or exceeded, a process should be put in place to address and correct the problems with the system or re-define the key performance parameters if necessary.

The most important system test that must take place in order to assess the functionality and accuracy of the system is the System Evaluation Plan. This plan, which is documented in full detail in the TEMP, consists of comparing the total crossing time for a sample of trucks recorded by the installed system to GPS recorded total crossing times for the same sample of trucks. If this test is successful, data collection can begin in full.

2.6 Data Collection

After Steps 1 through 5 have been completed, data collection can begin. Depending on the specific POE where data collection will occur, storing the data and disseminating it will occur at this point.

3.0 CURRENT PROGRESS AND NEXT STEPS

For this specific project at the Bridge of the Americas (BOTA) in El Paso, Texas, Steps 1 through 3 in the implementation have been completed in full. Once approval is given by the FHWA, all documentation for this project will be accessible at TTI's website for this project: (http://tti.tamu.edu/about_tti/international/cross_border/mobility.htm).

Currently, quotes for both equipment and installation are being finalized. Equipment will be procured once the quotes are finalized from each vendor. The project team has experience in assembling this type of equipment and will begin the pre-assembly once the equipment is in-house. After pre-assembly, the equipment will be transported from TTI's facilities in College Station, Texas to TTI's facilities in El Paso, Texas so on-site implementation can begin.

Also, as part of the equipment installation process, another meeting that brings together both public and private stakeholders in the El Paso, Texas region will be organized by the project team. This meeting will outline the equipment installation process at BOTA, and any questions or concerns by the stakeholders present will be addressed. Safety procedures for installation and security issues will also be discussed at this meeting.

4.0 UPDATE TO RISK MANAGEMENT PLAN

A Risk Management Plan was prepared by the project team as part of the Project Plan. This section of the report identifies any additions that have been made to the original Risk Management Plan or the realization of any previously identified risk and its effect on the planned installation and operation.

Technical Risks

(Realization of risk) During the course of the project, it was recognized that RFID equipment for the BOTA implementation was going to be more expensive than original estimates. This was due to conditions on the ground such as lack of available power (requiring solar panels), absence of convenient infrastructure for mounting (requiring stand-alone masts), and planned construction on the Ciudad Juarez side just outside the Mexican Customs compound (requiring relocation of planned measurement sites and a greater number of sites). The situation was brought to the attention of the FHWA project coordinator along with progressive installation options and was addressed via a contract modification.

Programmatic Risks

(New entry) The level of detail associated with the installation, such as the complexities of contracting for Mexican installation where currency exchange rates can change significantly, is requiring more time than original estimates. This has induced delays in the installation.

Operational Risks

None of the risks has been realized to date.

5.0 LESSONS LEARNED

Having completed over half of the implementation plan for this specific project at BOTA, the project team has learned some valuable lessons that may help make future implementations more efficient. The list below highlights some of the most important lessons learned to this point. (Note: as the project moves toward full system implementation, this list will be continuously updated).

- A stakeholder meeting at the beginning of any project such as this one is imperative. Without holding a meeting at the site or in the community where a border crossing time measurement system will be installed, it will be difficult to garner support for the project from both public and private stakeholders in the local border crossing environment.
- Obtaining border crossing data is important in the early stages of a project to understand the operational characteristics of the POE where this type of system will be installed. Because of the sensitivity of the information associated with some border crossing data, these data may be difficult to obtain. For this reason, it is essential to open the lines of communication with entities that have border crossing data, such as U.S. and Mexican Customs and bridge operators, as early as possible in any similar project.

- Capitalize on opportunities to use existing infrastructure and equipment. U.S. Customs and Border Protection and the Departments of Public Safety have infrastructure and possibly even compatible RFID systems that may be utilized.
- It is important to continuously monitor any changes that may be taking place at the border crossing where this type of system will be installed. Through actively communicating with local municipalities as well as the owners of border crossing facilities, the project team will be able to identify where the safest places to install equipment exist and can adjust implementation plans accordingly if changes to infrastructure occur or are planned.
- Equipment procurement can require a considerable amount of time. To guard against losing valuable time, it is beneficial to start receiving quotes from equipment vendors as well as local contractors as early as possible in the project. If possible, these quotes should be long term, as the time from quoting to the actual purchasing of products/services could be several months. By having these quotes in writing, the project team can avoid any surprises during Step 4 of the implementation plan.
- With respect to installation, use of a local Mexican contractor has advantages. However, be cognizant that fluctuations in the economy can alter the currency exchange rates between the U.S. and its neighbor over relatively short periods.
- Testing the equipment in-house is a valuable method for identifying potential problems with the equipment before installing it on-site. It is much easier to address any problems with the RFID equipment before it is permanently installed at the border crossing. For this project, an in-house test was conducted during a previous phase of the project. Results of this test, along with other Phase I project documents can be found at: http://tti.tamu.edu/about_tti/international/cross_border/mobility.htm.