

# The Design Process of Physical Security as Applied to a U.S. Border Port Of Entry

George G. Wagner  
Sandia National Laboratories  
MS 0762, Albuquerque, NM 87185

## ABSTRACT

This paper describes the design process of physical security as applied to a U.S. Border Port of Entry (PoE). Included in this paper are descriptions of the elements that compose U.S. border security. The physical security design will describe the various elements that make up the process as well as the considerations that must be taken into account when dealing with system integration of those elements. The distinctions between preventing unlawful entry and exit of illegal contraband will be emphasized.

KEYWORDS: Security, U.S. Border, Design

## Introduction

The United States has several Ports of Entry that facilitate the entry and exit of personnel and vehicles through its land borders with Mexico and Canada. The San Ysidro, California, Port of Entry (PoE) is the world's largest land border crossing for personnel and passenger vehicles. Over 2 million visitors per month enter as pedestrians or in passenger vehicles. This PoE at the U.S./Mexican border has the task of preventing unauthorized contraband or personnel from entering or leaving the U.S. This paper addresses border processing at this facility and how this processing relates to a successful physical protection systems methodology.

The Physical Protection System (PPS) methodology described in this paper had been originally developed by Sandia National Laboratories (SNL) to protect a DOE facility's high-value assets from theft or sabotage. However, the PPS methodology can also be adapted to analyze other protective systems, such as a U.S. PoE. Following is a discussion of the PPS design and evaluation process as applied to the PoE at San Ysidro (Refer to **Figure 1**).



Figure 1. U.S. Border Port of Entry

## PPS Methodology

The primary purpose of the system at the PoE is to prevent unauthorized contraband or personnel from entering or leaving the United States. The methodology (Refer to **Figure 2**) requires designers to:

1. Determine the System's Objectives.
2. Design the System.
3. Analyze the System.

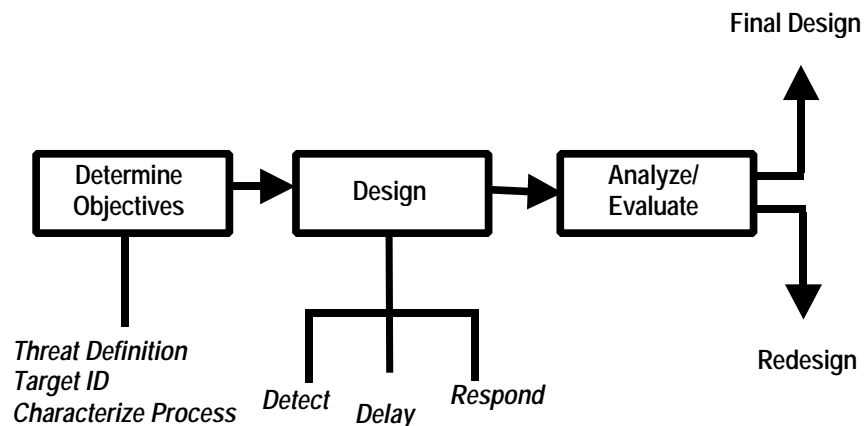


Figure 2. Design & Evaluation Process Outline

### Determining the System Objectives

To determine the system's objectives, one must define the threat and also identify what contraband the facility is seeking to target. Initially, a *Threat Definition* must be made that considers the following:

1. What class of adversary is to be considered? In the case of a PoE, the adversary may be anyone from a sophisticated drug dealer to an undocumented migrant seeking a better way of life.
2. What is the range of the adversary's tactics? The adversary's tactics may extend from coy deceit to the use of advanced technology. The adversary's level of motivation must also be considered.
3. What are the adversary's capabilities? The adversary's capabilities may include being trained and financially supported by a criminal organization or it may be a single dedicated individual using deception.

Secondly, the system must perform a *Target Identification*. The purpose of this task is to completely identify and prioritize what the system is seeking to prevent (which is known as the Target in this case). The target would be contraband, typically entering or leaving the U.S. by vehicle or pedestrian. The typical contraband *entering* the U.S. is illegal drugs but also includes undocumented personnel from Mexico and other foreign countries, agricultural products, etc. The contraband typically *leaving* the U.S. is large illegal amounts of cash (>\$10,000) but also includes stolen vehicles, fugitives from the law, etc.

The system must also *Characterize the Process*. The purpose of this task is to fully understand the PoE facility's objective. A description of the processes, the operational conditions, and the integration of legal policy requirements within the facility must be fully comprehended.

## Designing the System

The system must include three critical design functions: detection, delay, and response. These functions must be integrated and performed within a length of time that is less than the time needed by the adversary to complete his illegal task.

**Detection** is the discovery of an adversary action that includes sensing covert or overt actions. Detection sensing at a PoE is accomplished by the use of x-ray equipment, license plate readers, drug dogs, and enforcement personnel. Entry Control is also a detection function that means allowing entry to authorized personnel and vehicles while detecting entry of unauthorized personnel, vehicles, and material. The measures of effectiveness of entry control are throughput, imposter pass rate, and false rejection rate.

- Throughput is defined as the number of authorized personnel allowed access per unit time, assuming that all personnel who attempt entry are authorized entrance.
- Imposter pass rate is the rate at which contraband or false credentials are allowed entry.
- False reject rate is the frequency at which valid personnel and material are rejected access through the border.

Communication and assessment are also important elements in detection. Mobile radios and video cameras serve as communication and assessment tools at a PoE.

**Delay** is the second function of this system, which is defined as the slowing down of adversary progress. In the case of a PoE, delay is built into the process through the layout of the Pre-Primary, Primary, and Secondary areas. Delay can be accomplished by the use of barriers, activated delays, and protective forces. However, although an adversary may be delayed prior to detection, this delay is of no value to the effectiveness of the system since it does not provide additional time to respond to the adversary. Security personnel, spiked vehicle barrier strips, and concrete rails are examples of delay at a PoE.

**Response** consists of actions taken by the enforcement force—interruption and neutralization—to prevent adversary success. Interruption is defined as a sufficient number of response force personnel arriving at the appropriate location to stop the adversary's progress. It includes the communication to response personnel of accurate information about adversary actions and the deployment of response personnel. The measure of response effectiveness is the time between the response force becoming aware of adversary action and their neutralizing the adversary's action. Neutralization is the act of stopping the adversary before his goal is accomplished. At a PoE, neutralization could possibly be performed throughout the process. Finally, an example of a challenging situation for the response process is the case of a port runner—a person who aggressively drives through the Primary area.

## Description of a Port of Entry

### *Vehicles Entering Port of Entry from Mexico*

The following description details the procedure for vehicles attempting to enter the U.S. from Mexico. As the vehicle crosses over the actual geographic border, the driver must proceed into a queue to approach the U.S. Border Inspection Station (Refer to **Figures 3 and 4**).

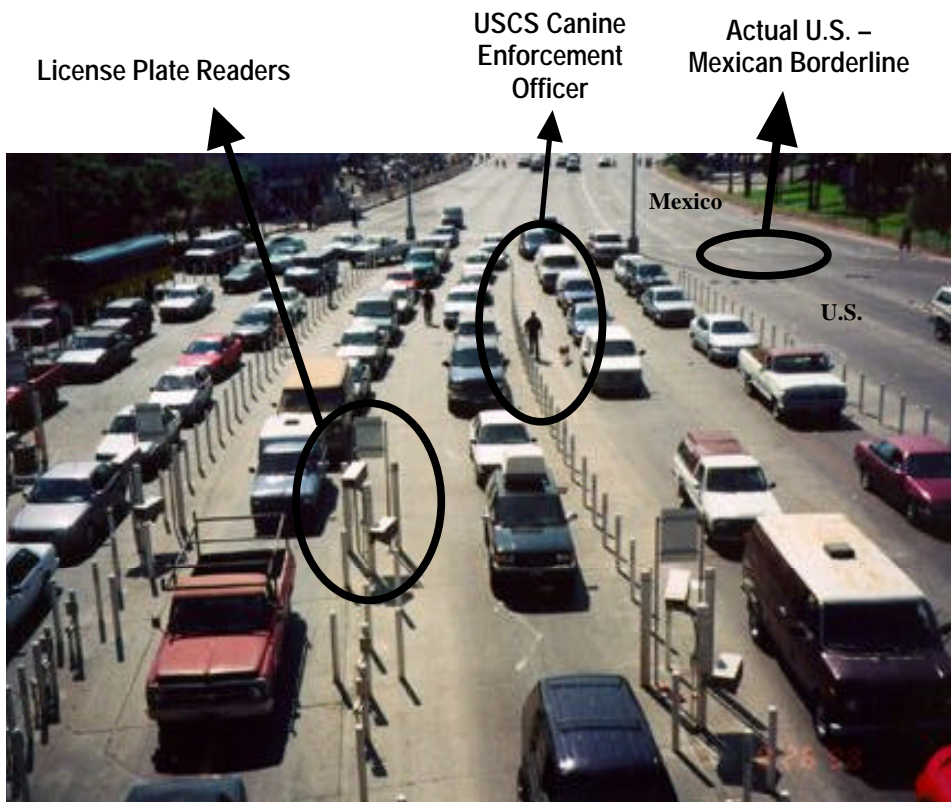


Figure 3. Vehicle Queue to Enter U.S. from Mexico, Pre-Primary

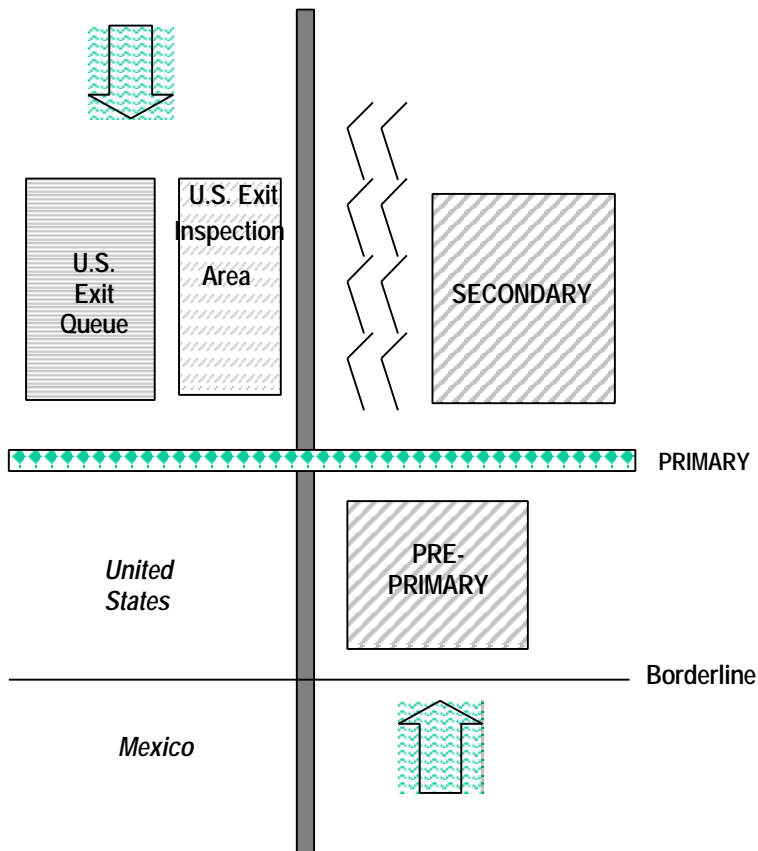


Figure 4. PoE Layout Diagram

The area between the geographic border and the manned inspection booth area is called the “Pre-Primary” area. In this area, there are 24 inbound U.S. vehicle lanes with metal posts separating each of the vehicle lanes that proceed to the manned processing booth. These barriers not only separate lanes, but also prevent vehicles from turning around in the vehicle queue. It is at this location that the vehicle queue provides delay, which thereby allows Customs personnel and drug dogs to inspect vehicles for illegal contraband (periodically maneuvering between vehicle lanes). Through the use of personnel profiling, vehicle profiling, and intelligence information (i.e., threat assessment), Customs inspectors in the Pre-Primary area will observe and question suspicious drivers and passengers to detect for possible illegal activity. In parallel with this activity, Customs Canine Enforcement Officers will use trained drug-sniffing dogs to search for scents emitted from vehicles within the area.

Following the Pre-Primary area, a vehicle will then approach the “Primary” area (Refer to **Figure 5**), which contains a Customs or Immigration and Naturalization Service (INS) inspectors in a booth enclosure with access to a law enforcement database. As the vehicle is queued in Primary, license plate readers are detecting if this vehicle may be stolen or involved in suspicious activities.



**Figure 5. “Primary” Area**

If a vehicle or driver requires further analysis due to a “hit” at Pre-Primary or Primary, the vehicle driver and passenger(s) are either directed or escorted to the “Secondary” area (Refer to **Figure 6**) where more extensive evaluation will take place. Concrete barriers (Refer to **Figure 7**) in a serpentine configuration just beyond Primary provide delay to a vehicle that may attempt to circumvent Customs procedures, such as a port runner. Following the assessment and communication of suspected contraband, Customs inspectors in Secondary provide an extremely thorough response to all vehicles directed to Secondary.



**Figure 6. “Secondary” Area**



**Figure 7. Concrete Delay Barriers**



### *Vehicles Entering Port of Entry Into Mexico*

The following description details the procedure for vehicles attempting to leave the U.S. into Mexico. Vehicles are manually requested to stop by Customs inspectors as they approach the PoE (**Figure 8**). As vehicles stop, they provide a delay barrier to vehicles behind them. Spiked barrier strips located in adjacent vehicle lanes also provide delay for vehicles that attempt to circumvent this procedure. Based on Customs agent profiling, a vehicle and driver may be requested to have his/her possessions inspected by a portable X-ray unit to detect for illegal contraband. The last procedure before entering Mexico is to pass through the six-lane kiosk plaza manned by the Customs Service (**Figure 9**). Following the assessment and communication of a threat condition, Customs agents as well as Mexican enforcement authorities beyond the Secondary area at the PoE, provide response.

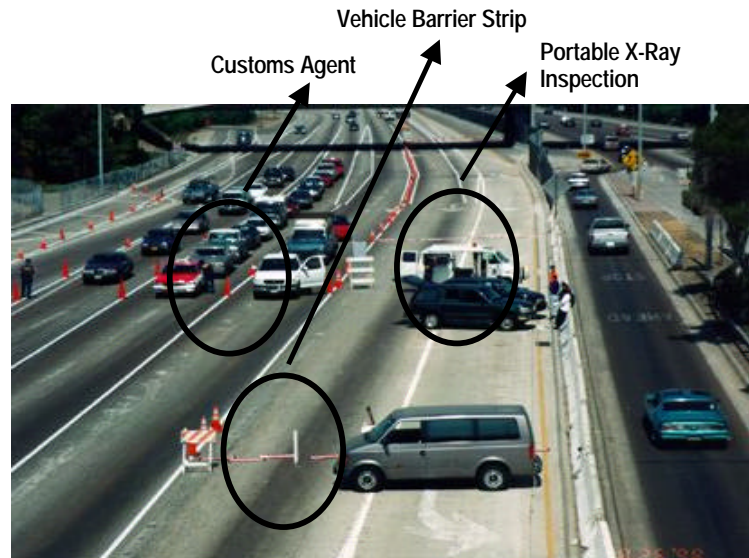


Figure 8. Vehicles Leaving U.S. for Mexico



Figure 9. Vehicles Proceeding from U.S. Into Mexico.

## **Conclusion**

This paper briefly describes the Design Process for Physical Security Systems and how the process applies to a U.S. Port of Entry. It is the author's belief that this process can be adapted to help others understand the effectiveness of their protective systems.

## **Acknowledgments**

The author would like to sincerely thank the U.S. Customs Service for their assistance in providing valuable information and a tour of the San Ysidro U.S. Port of Entry, specifically Mr. Rudy Camacho, Mr. Ernie Mercier, Ms. Renee Fleming, and Ms. Nancy Parlato.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.