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FAA Technical Center
Atlantic City International Airport,
N.J. 08405

FAA Technical Center Enhanced Airport Security System Project

Introduction of Contraband Into the Sterile Area Test Report

Walter Wall
Edward Ocker

October 1994

Final Report

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16. Abstract This report summarizes the effectiveness of different fencing configurations against an adversary intent on tossing various size/weight contraband objects into designated enhanced sterile areas. Test scenarios and methods of tossing contraband are discussed. Results are presented in the classified supplement to this report.					
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PREFACE

This test report is organized into two volumes; this unclassified part and a classified supplement. The two volumes are intended to be read together. Neither volume stands alone.

In the unclassified volume, sections 3, 4, and 5 are not supplied, but only referenced.

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LIST OF ACRONYMS AND ABBREVIATIONS

BWI	Baltimore-Washington International Airport
CDAT	Control Display Advanced Technology
EASSP	Enhanced Airport Security System Project
FAATC	Federal Aviation Administration Technical Center
MDNG	Maryland National Guard
RAIDS	Ramp Area Intrusion Detection System
SOC	Security Operations Center

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EXECUTIVE SUMMARY.

This test report has been prepared in support of the Federal Aviation Administration Technical Center's (FAATC) Enhanced Airport Security System Project (EASSP), established as a research and development project in 1988. The test report summarizes the effectiveness of different fencing configurations against an adversary intent on tossing various size/weight contraband objects into designated enhanced sterile areas. Testing addressed the scenarios where adversaries had been screened, passed through screening points, and later retrieved the contraband from the enhanced sterile areas.

Fourteen test zones within the EASSP comprise the Ramp Area Intrusion Detection System (RAIDS). Six test zones within the RAIDS were categorized as the fenced zones and were designed for detection and assessment of unauthorized entry. The contraband was thrown into these areas. Testing was conducted in the automatic operation mode with the Security Operations Center (SOC) fully operational.

A test team consisting of five (5) Maryland National Guard (MDNG) personnel was utilized to conduct the tests. Test scenarios and methods of tossing contraband are discussed in the report. Data collection/analysis results were recorded on Test Data Sheets and percentages of successful contraband tosses in designated zones were tabulated. Test comments based upon the various toss scenarios enacted by the test team were evaluated.

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1. INTRODUCTION. This EASSP test report presents and describes the results of contraband toss tests conducted within the enhanced sterile area zones of the Baltimore-Washington International (BWI) Airport during the month of November 1993. Testing was accomplished in accordance with section 5.4 of the "Security Effectiveness Test Plan: Enhanced Airport Security System Project at BWI Airport". Specific test objectives, test series conducted and testing dates are discussed as applicable in the report. This test report is presented in two volumes, an unclassified report and a CONFIDENTIAL supplement. Refer to the classified supplement for information relative to sections 3, 4, and 5 of this report.

1.1 OBJECTIVES. The purpose of throwing contraband into enhanced sterile area test zones was to test the effectiveness of several perimeter fencing configurations against tossed objects of various size and weight. Multiple attempts by simulated adversaries were conducted. The detection percentages and interception percentages for contraband tossed into all test zones were evaluated with the results compared across zones with varying clear zone dimensions. Testing addressed the scenarios where adversaries introduced contraband into the sterile area (by tossing) and were then screened, passed through screening points, and later retrieved the contraband from the enhanced test areas.

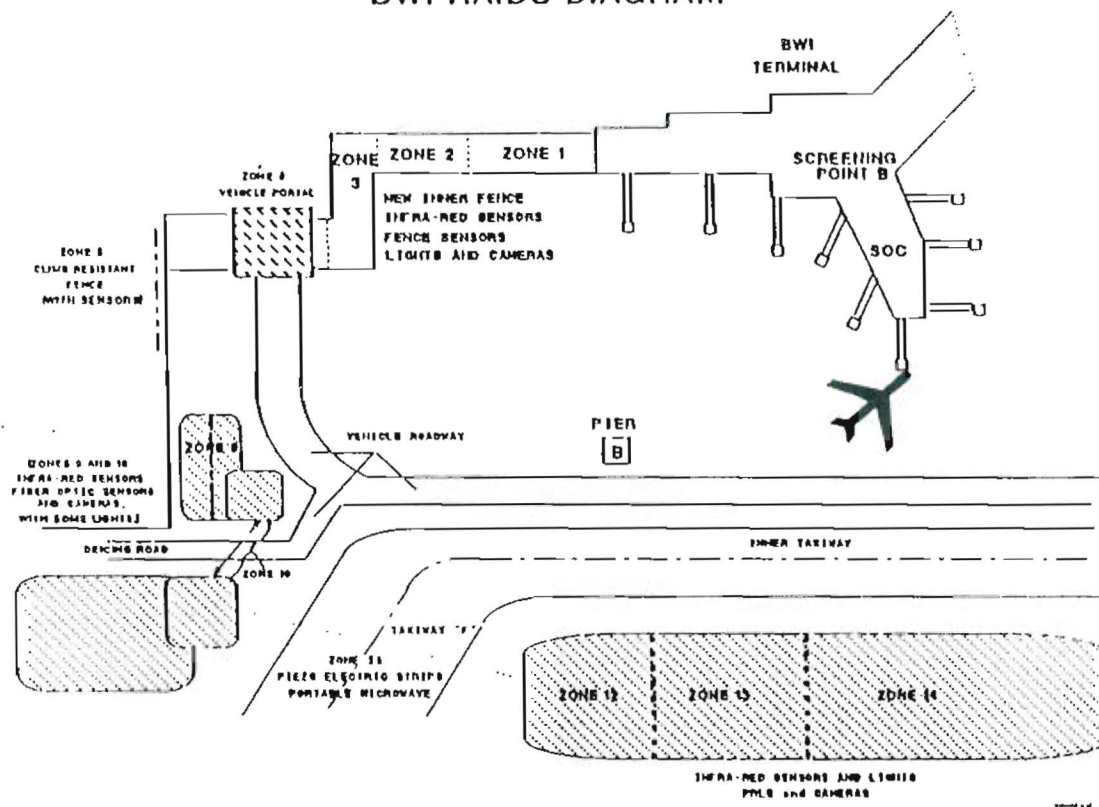
1.2 ORGANIZATION OF TESTS. Test scenarios were conducted in six fenced zones to determine the effectiveness of different fencing configurations against an adversary intent on tossing various size/weight contraband objects into designated enhanced sterile areas. Six enhanced area zones 1, 3, 4, 5, 6, and 9 were selected for contraband toss testing.

1.3 SCOPE. The scope of the toss tests are detailed in the "Security Effectiveness Test Plan: EASSP at BWI". This test series is intended to evaluate six (6) test zones designated for detection and assessment of unauthorized entry. Figure 1, Ramp Area Intrusion Detection System (RAIDS), identifies the test zone locations within the Ramp Area Intrusion Detection System (RAIDS). The tests attempted to demonstrate whether an adversary could introduce contraband into the sterile areas of the selected zones.

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BWI RAIDS DIAGRAM



NOTE: Zones 6, 7, and 8 represent the baseline and have no enhancements. Baseline zones contain only an 8 foot chain link fence and grass.

Figure 1. Ramp Area Intrusion Detection System (RAIDS)

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2. TEST DESCRIPTION.

2.1 METHODOLOGY/APPROACH. The introduction of contraband into the sterile area was conducted by a team of five personnel. The team consisted of one Test Manager (TM), one Lead Test Inspector (LTI) and three test personnel (Maryland National Guard) playing the role of adversaries in all the tests. Total test time required was eight hours. All testing was completed in one day, November 13, 1993.

Testing consisted of tossing contraband in five series of three articles each for a total of forty-five (45) bottles tossed in 270 runs. Fifteen (15) separate runs were conducted for the hammer throw technique. Each adversary threw five (5) test articles of contraband three (3) times. The test series attempted to demonstrate whether an adversary could defeat the EASSP and introduce contraband into the sterile areas of the selected zones. The test also evaluated the sensitivity of different sensors in the six different zones of the EASSP and evaluated the interface between sensors and the SOC. The five contraband test articles used for testing by the adversaries are illustrated in Figure 2, Contraband Test Articles Used for Testing in Enhanced Areas. An eighteen inch long parachute cord was attached to fifteen (15) bottles of different weights and sizes for a "hammer throw" tossing technique used only in zone 9. The hammer throw was used because attempts at contraband tossing, either overhand or underhand, proved unsuccessful due to zone size. Zone 9 is 75 feet wide by 130 feet long, making the test a unique challenge.

2.2 TEST CONFIGURATION. Testing was conducted in the data collection configuration (Automatic Mode Operation) with the SOC fully operational. The tests were conducted from outside the perimeter fencing in zones 1-9 during day/night operational hours, but at selected slow times on Saturday. Temporary public access control was achieved by way of cones/perimeter-tape for safety purposes when test personnel were in parking lot areas or public walk-ways. Communication and scheduling was coordinated with the proper airport authorities before conducting any testing. Warning signs were displayed at specific areas 48 hours in advance before any testing was conducted in order to restrict parking in areas required by personnel conducting the tests.

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A
1 - pound, 16 - ounce bottle contraband



B
2 - pound, 16 - ounce bottle contraband



C
2.5 - pound, 16 - ounce bottle contraband

Figure 2. Contraband Test Articles Used For Testing in Enhanced Areas.
(Sheet 1 of 2)

D
1 - pound, 1 - liter bottle contraband



E
1 - pound, 2 - liter bottle contraband

Figure 2. Contraband Test Articles Used For Testing in Enhanced Areas.
(Sheet 2 of 2)

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2.2.1 Hardware Configuration. The following items were required to support the test procedures being conducted:

- a. EASSP equipment - Full complement of EASSP equipment including the Security Operations Center (SOC) and it's interfaces with all the subsystems;
- b. Software version - The Control Data Advanced Technology (CDAT) was run in automatic data collection configuration to record any alarms that occurred during testing;
- c. The SOC Printer was used for alarm recording and verification;
- d. Radios were used to provide communications between test personnel; and
- e. Test articles used during the test series consisted of fifteen (15) different shapes and weights as indicated in table 1.

The six (6) zones used for the toss testing were configured as follows:

- a. Zone 1 is a double fence zone 20 ft. wide by 90 ft. long by 11 ft. high (an 8 ft. fence plus 3 ft. of barbed wire). The zone contains a taut-wire sensor, fence cable sensor, and an infrared sensor;
- b. Zone 3 is a double fence zone 14 ft. wide by 123 ft. long by 11 ft. high (an 8 ft. fence plus 3 ft. of barbed wire). The zone contains a taut-wire sensor, fence cable sensor, and infrared sensor;
- c. Zone 4 is a double fence zone 36 ft. wide by 102 ft. long by 11 ft. high (an 8 ft. fence plus 3 ft. of barbed wire). The zone contains a taut-wire sensor, fence cable sensor, and infrared sensor;
- d. Zone 5 contains a curved single fence 3 ft. wide by 60 ft. long by 15 ft. high with a fence cable sensor;
- e. Zone 6 is an 8 ft. high single fence. The zone represents the baseline and does not contain any sensors; and
- f. Zone 9 is a double fence zone 75 ft. wide by 130 ft. long by 11 ft. high (an 8 ft. fence plus 3 ft. of barbed wire). The zone contains a infrared sensor and buried fiber-optic sensor.

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2.2.2 Contraband Configuration. Basic contraband configuration information and tactics utilized in the testing are identified in Table 1. Contraband Test Bottles and Table 2. Toss Test Scenarios.

Table 1. Contraband Test Bottles.

WEIGHTS/VOLUME	16 OZ	1 LITER	2 LITER
1 POUND	X	X	X
2 POUND	X		
2-1/2 POUND	X		

2.2.3 Test Scenarios. Zone 9 tests included hand tossing, throws using a bungee cord, and hammer style throws in the attempt to deliver contraband into sterile areas. Table 2. identifies test scenarios that were planned.

Table 2. Toss Test Scenarios.

PATH	TACTIC	RETRIEVAL AREA
Zone 9	Bungee cord assisted throw over the fence	Sterile Area
Zone 9	Test article with 18 inch long cord "hammer throw" over the fence	Sterile Area
Zones 1, 3, 4, 5, 6, and 9	Test article tosses	Sterile Area
NOTE: Zone 6 represents the baseline (no sensors)		

2.2.4 Roles and Responsibilities. Personnel involved in the contraband toss testing program were assigned the following duties:

- a. Test Manager (TM) - Positioned on the outside of the fence, he coordinated and supplied the three (3) adversaries with five different objects of contraband. The TM also

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communicated by radio with the Test Inspector (TI), performed test scheduling, coordinated/conducted testing and monitoring, and recorded the test results. The TM was also responsible for preparing the final test report;

b. Test Inspector (TI) - Positioned on the inside of the fence, in the sterile area, communicating with the Test Manager via radio and recording data using the Data Collection Sheet, figure 3. The inspector monitored and recorded the landing of the contraband objects; and

c. Test Personnel (Maryland National Guard) - Conducted all throws into sterile areas of Zones 1, 3, 4, 5, 6, and 9.

2.3 DATA COLLECTION. The Test Inspector (TI) collected data using data collection sheets illustrated in Figure 3, Test Data Collection Sheet. Data analysis was performed by reviewing the video images/line printer printouts recorded at the SOC. Percentages of tosses detected by the SOC were calculated. Analysis determined the effect that clear zone width had on success rate.

At the end of each test run, for every zone, a camcorder was used to scan all bottles that landed in the sterile areas of each zone and of unsuccessful bottles thrown. Pictures were also taken of the bottles before and after their wrapping with duct tape.

2.4 SUMMARY OF TEST CASES.

2.4.1 Test Methods. The test team completed a total of 285 toss test runs using different shapes and weights of plastic bottles. Each adversary tossed five (5) different bottles of the various weights and shapes indicated three (3) times over all six (6) zones. Contraband used during the testing included the following:

15 x 3 = 45 Bottles Tossed/Zone
x6 Zones

270 Runs(Tosses)
+15 Runs(Hammer Throw)

285 Total Contraband Tosses

The forty-five (45) bottles tossed over the six (6) zones provided test results for 270 runs. Additionally, fifteen (15) tosses using the hammer throw technique were performed.

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TEST DATA SHEET

Test Date: _____ Test Time: _____

Environmental Conditions*

Temp _____ Wind Direction _____ Wind Velocity _____

Test Manager Name: _____

Test Inspector Name: _____

Adversary #1 _____

Adversary #2 _____

Adversary #3 _____

TACTIC		TEST OBJECT/ WEIGHT				
TOSS, BUNGIE, HAMMER	ZONE #		ADVERSARY #	TOSS #	P	F

Figure 3. Test Data Collection Sheet.

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3. RESULTS AND DISCUSSION. The information contained in Section 3 is provided in the classified supplement accompanying this report.

4. CONCLUSIONS. The information contained in Section 4 is provided in the classified supplement accompanying this report.

5. RECOMMENDATIONS. The information contained in Section 5 is provided in the classified supplement accompanying this report.

6. REFERENCES.

a. FAA Technical Center - Aviation Security Research and Development Division, Security Effectiveness Test Plan: Enhanced Airport Security System Project at BWI Airport (Draft), July 14, 1993.

b. FAA Technical Center - Aviation Security Research and Development Division, Master Test Plan (MTP): EASSP at BWI, Final Plan, January 1993.

c. FAA Technical Center - Number DOT/FAA/CT-93/19, Aviation Security Research and Development Division, Training Plan, EASSP at BWI, July 1993

d. FAA Technical Center - Number DOT/FAA/CT-93/73, Aviation Security Research and Development Division, Communications Procedures, December 1993.

e. FAA Technical Center - Number DOT/FAA/CT-93/83, Aviation Security Research and Development Division, Security Operations Center Procedures, December 1993.

f. Maryland Aviation Administration, Airport Security Program (ASP) at BWI.

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