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Transportation Security Administration

Office of Security Technology

Airport Perimeter Security Projects for FY08-09

FINAL REPORT

Buffalo Niagara International Airport (BUF)

CCTV Enhancement/video analytics software and SightLogix, SightSensors Perimeter Detection System

U.S. Department of Homeland Security
Transportation Security Administration
Office of Security Technology
Advanced Surveillance Program
701 South 12th Street
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[redacted]

OVERVIEW

INTRODUCTION

In fiscal year (FY) 2006, the Transportation Security Administration (TSA) announced opportunities for general perimeter security enhancement projects at airports with typical configurations and existing barriers, such as fencing and concrete barricades. The announcement requested information from airport authorities on existing airport perimeter security vulnerabilities and proposals to mitigate those vulnerabilities through the inventive use of available technologies at intended perimeter access points (such as vehicle gates), perimeter boundaries, and terminals.

In FY 2008, TSA reissued the Airport Perimeter Security (APS) announcement to all airports, along with a second announcement addressing small to medium-sized airports with few or no barriers around their perimeters. The second announcement was for the Virtual Perimeter Monitoring System (VPMS) project intended to test a more elaborate solution that would better fit a smaller airport. The VPMS solution was developed by the Navy.

TSA requested airports provide white papers explaining the security deficiencies to be addressed and proposals, including technologies to be deployed and full life-cycle project cost estimates. 65 airports responded to the FY 2006 request and 35 airports responded to the FY 2008 requests. The airports proposed projects of varying complexity, from installation of a single piece of equipment to sophisticated, integrated systems.

Six airports were selected in FY 2006 to participate in the APS projects. In FY 2008 and 2009, TSA selected six additional airports for participation in APS and three airports for VPMS projects.

The attached report covers the test results of only one of the 15 total test sites. TSA plans to release each report singularly as the test results are completed and made available.

IMPLEMENTATION

This project pertained to the evaluation of the intelligent video/neural networking solution at the Bert Mooney Airport (BUF). BUF integrated a CCTV Enhancement/video analytics software and SightLogix, SightSensors Perimeter Detection System program that would both support the continuous monitoring of critical perimeter areas surrounding the airfield to include all runways and taxiways. A number of different CCTV cameras, detection sensors, fiber-optic network infrastructure and video analytics software were used to design and integrate the test system into the existing security operations. All tested components were commercial off-the-shelf (COTS) technologies and were designed to enhance BUF perimeter security detection capabilities. This innovative approach was designed to provide both continuous monitoring of critical field side resources and add additional oversight of the entire runway perimeter area.

National Safe Skies Alliance (Safe Skies) provided independent verification and validation (IV&V) services and operated along with airport authorities to verify that the intelligent video/neural networking solution enhancements met the airport's security expectations. The IV&V was concluded March 11, 2011.

The Safe Skies Lead Test Engineer (LTE) generated a site survey document based on a preliminary survey of the locations prior to the deployment of the security technology improvements. The LTE developed operational testing procedures used as the basis for determining if the system met the security requirements of BUF airport authorities. Representatives of TSA, Safe Skies, and BUF convened to discuss and verify the system requirements prior to the implementation of evaluation procedures. The resulting operational data was analyzed by the Safe Skies statistical team and combined with the site survey information to generate the final report.

SUMMARY

From the data presented in the final report, it is clear that the CCTV Enhancement/video analytics software and SightLogix, SightSensors Perimeter Detection System had a positive effect on the BUF perimeter security monitoring and detection efforts. This equipment was installed to provide continuous monitoring of critical areas along the outer perimeter boundaries of the facility.

The equipment for this installation was selected to increase security at BUF remote perimeter areas, which had mixed topography, inconsistent illumination, and no security detection or surveillance technologies. [redacted]

The SightSensors provided surveillance during both day and night, as well as automated detection capabilities. Because thermal technology detects targets based on thermal signatures, it does not require additional illumination sources.

Fixed cameras were installed to monitor gates and support access control at remote areas; PTZ cameras were used to support surveillance activities and track targets during security or safety events. Installation of the CCTV enhancement was a moderately intensive process, requiring trenching and additional power and communications infrastructure throughout the farthest regions of the facility. Integration of the camera feeds into the existing subsystems proved to be less intensive, and was reported by BUF and dispatch personnel as being a smooth transition.

Lastly, at the time of the evaluation, airport personnel had been trained in the operation of the system, however the new CCTV interface was nearly identical to the original system; as such, the operators did not have to change their routines or go through a difficult training course in order to perform their normal tasks.

[redacted]

DHS/TSA 2600.02.01.11-033	**Airport Perimeter Security (APS) Program – BUF – Operational Test and Evaluation Report** COPYRIGHT © 2011 National Safe Skies Alliance, Inc. ALL RIGHTS RESERVED	
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	Project Performed for: U.S. Dept. of Homeland Security Transportation Security Administration 601 S. 12th Street Mail Stop TSA-16 Arlington, VA 22209	TSA Technical Review Team Charles Kelley John Nestor
	Project Funded by: Federal Aviation Administration 800 Independence Avenue, SW Washington, DC 20591	
	May 2011 Final Report	

[redacted]

[redacted]

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[redacted]

Technical Report Documentation Page

1. Report No. DHS/TSA—11-033	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle Airport Perimeter Security (APS) Program – BUF – Operational Test and Evaluation Report		**5. Report Date** May 2011 **6. Performing Organization Code**
7. Author John Hunsucker, Meg Graham		**8. Performing Organization Report No.** DHS/TSA 2600.02.01.11-033
9. TSA Reviewer(s) Charles Kelley, John Nestor		**10. Work Unit No. (TRAIS)**
11. Performing Organization Name and Address National Safe Skies Alliance 110 McGhee Tyson Blvd., Suite 201 Alcoa, TN 37701		**12. Contract or Grant No.** 09-G-011 **13. Type of Report and Period Covered** Final Report, March 2011
14. Sponsoring Agency Name and Address U.S. Department of Homeland Security Transportation Security Administration 601 S. 12th Street Mail Stop TSA-16 Arlington, VA 22209		**15. Sponsoring Agency Code** TSA-16
16. Supplementary Notes This report was prepared by John Hunsucker of National Safe Skies Alliance.		
17. Abstract Through the Transportation Security Administration Airport Perimeter Security Program, BUF integrated additional CCTV and video analytic subsystems to their existing security network. BUF submitted the system for Operational Test and Evaluation, which National Safe Skies Alliance (Safe Skies) conducted on site, March 7-11, 2011. Safe Skies personnel performed intrusion scenarios and collected performance and user survey data to determine the system's operational effectiveness.		
18. Key Words APS, BUF, CCTV, Perimeter, Perimeter Intrusion Detection Device, SightLogix, Thermal, Video Analytics, Video Surveillance		

19. Security Classif. (of this report) SSI/FOUO	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 30	**22. Price**

Reproduction of completed page authorized

[redacted]

[redacted]

DOCUMENT CHANGE HISTORY

Version	Description/TSA Reviewer	Date(s)	TSA Approval
0.1	Initial Draft/Charles Kelley	April 2011	
1.0	Final Draft/Charles Kelley	May 2011	

[redacted]

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EXECUTIVE SUMMARY

National Safe Skies Alliance (Safe Skies) performed an Operational Test and Evaluation (OT&E) of the CCTV enhancement and associated video analytic software that was installed at Buffalo Niagara International Airport (BUF) under the Transportation Security Administration's (TSA) Airport Perimeter Security (APS) Program. March 7-11, 2011, Safe Skies evaluated various elements of the system to determine whether it resolved Critical Operational Issues (COI) that were identified in the baseline assessment, and the impact, if any, the system had on established security protocols and procedures.

SYSTEM INSTALLATION & INTEGRATION

Though the CCTV enhancement was implemented to monitor the entire outer perimeter region of the BUF facility, Safe Skies' OT&E focused on the areas of concern[1] that were noted in the baseline evaluation.

Around [redacted] SightLogix Thermal sensors were installed and calibrated to provide enhanced monitoring and automated detection of intruders breaching the perimeter fence and approaching the runway. The video analytic component of the SightLogix system was used to create a virtual barrier around this region to detect people or vehicles moving from the public side toward the runway. All video feeds and instrumentation software were accessible through the primary Niagara Frontier Transportation Authority communications center, located on BUF property.

TEST RESULTS

System Performance

Detection effectiveness was defined as the system's ability to alarm on intruders attempting to bypass the detection field and approach the runway. To test this aspect of the system, Safe Skies personnel conducted multiple intrusion scenarios in which a test subject would perform one of four approach methods: [redacted]

Intrusion scenarios were distributed at [redacted] foot intervals throughout each detection zone. The evaluators performed [redacted] randomized scenarios for each sensor.

As shown in Table 1, the SightLogix system's detection rate was at least [redacted] for all four of the approach methods tested.

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[1] Areas of concern were locations designated by BUF personnel as regions that were difficult to reliably monitor and potential susceptibilities.

Table 1. Scenario Test Results Summary

Scenario	Total Tests	Overall Alarm Rate
[redacted]		

[redacted]

Nuisance alarm data could not be collected from the system during the time of the evaluation as the system's database did not provide an option for the user to input alarm cause. The issue has since been rectified, and the system now prompts personnel to provide detail about the cause of the alarm before it can be cleared.

Safe Skies evaluators also observed the operational status of the PTZ and fixed cameras included in the CCTV system. These cameras were not equipped with video analytic components, but as part of the evaluation were observed to ensure system-wide functionality. These cameras did not exhibit any issues during the evaluation period.

Installation & Integration
Installation of the enhancement required moderate construction. Trenching was required throughout the installation sites, and approximately 5 miles of additional communication fiber was needed to interface all subsystems with the primary communications center. The integration of the additional equipment into the existing CCTV subsystem was not intensive and was reported by BUF personnel to be a "smooth transition."

BUF personnel who completed surveys indicated, in general, that the system enhancement offered security improvement and ease of use. Though, as reported by personnel, the technology does generate occasional nuisance alarms [redacted] its benefits were considered to outweigh any issues caused by these events. Surveyors commented that all computer operations were simple and intuitive, and provided greater surveillance capabilities than the previous system.

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3 [redacted]

ACRONYMS

APS	Airport Perimeter Security
BUF	Buffalo Niagara International Airport – FAA designation
CCTV	Closed-Circuit Television
COI	Critical Operational Issue
KPP	Key Performance Parameter
MOE	Measure of Effectiveness
MOP	Measure of Performance
NFTA	Niagara Frontier Transportation Authority
PTZ	Pan-Tilt-Zoom
TSA	Transportation Security Administration

[redacted]

1. INTRODUCTION

National Safe Skies Alliance (Safe Skies), in support of the Transportation Security Administration (TSA) Airport Perimeter Security (APS) Program, performed the Operational Test & Evaluation (OT&E) of the CCTV enhancement and associated video analytic software that were installed at Buffalo Niagara International Airport (BUF). This equipment was installed to provide continuous monitoring of critical areas along the outer perimeter boundaries of the facility.

1.1 Background

The TSA established the APS Program to provide U.S. airports with resources to purchase and implement commercial off-the-shelf security technologies intended to address specific perimeter security concerns or susceptibilities. Airport management personnel from BUF applied for APS Program support for their proposed enhancement in January 2009.

Safe Skies performed the baseline assessment in July 2010 and issued a Baseline Report[3] that detailed the areas in which the APS enhancement would be installed. The enhancement was installed and calibrated throughout 2010. In January 2011, the system was activated and accepted for airport use.

1.2 Purpose of Document

This document details Safe Skies' OT&E effort. The following sections include the evaluation methods used to collect data, calculations of quantitative performance data, analysis, and documentation of observations.

2. SCOPE

The APS enhancement was evaluated in accordance with the Critical Operating Issues (COI) that were defined and approved in the project's Final Test Plan.[4] Safe Skies conducted OT&E intrusion scenarios against the SightLogix SightSensors, performed functionality verification tasks on fixed and PTZ cameras, and documented information pertaining to the installation, integration, and end user acceptance of the entire enhancement.

2.1 Testing Limitations

The new CCTV system included SightLogix Thermal SightSensors, as well as fixed and PTZ cameras. However, only the SightSensors provided unattended intruder detection capabilities,

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[3] *Airport Perimeter Security (APS) Program – BUF – Baseline Report* (DHS-TSA 2600.02.01.10-085, August 2010)

[4] *Airport Perimeter Security (APS) Program – BUF – Operational Test and Evaluation Plan* (DHS/TSA 2600.02.01.11-008, February 2011).

[redacted]

through video analytics. Safe Skies conducted OT&E scenarios within the SightSensor coverage areas to test these capabilities. The fixed and PTZ cameras were only assessed for operability.

The length of the OT&E period was insufficient to either establish rates for nuisance or false alarms or study the conditions that caused them. No alarm information could be gathered with respect to the nuisance and false alarm rates. The cause of the alarm had not been recorded by BUF personnel, and there was no way to verify the alarm type.

User survey data is limited to information obtained from three surveys that were returned to Safe Skies. Should additional information become available, supplemental commentary and results will be issued as an addendum to this report.

There were observable differences within the alarm data that may have resulted from altering weather patterns. This could not be further investigated, however, as the change occurred at the end of the evaluation. Conditions are reported in the Results section of this document.

3. SITE AND SYSTEM DESCRIPTIONS

3.1 APS Enhancement Specifications

The entire APS enhancement comprised the following components:

- Pelco Spectra IV PTZ Cameras
- Pelco Fixed Cameras
- SightLogix Thermal SightSensors
- CCTV Infrastructure (poles, fiber optic cable, conduit)

Specifications for the SightLogix Thermal SightSensor are attached as Appendix B.

3.2 APS Enhancement Installation Objectives

The equipment for this installation was selected to increase security at BUF's remote perimeter areas, which had mixed topography, inconsistent illumination, and no security detection or surveillance technologies. Prior to the APS enhancement installation, BUF relied on periodic patrols to monitor the outer regions of the facility.

The SightSensors provided surveillance during both day and night, as well as automated detection capabilities. Because thermal technology detects targets based on thermal signatures, it does not require additional illumination sources.

Fixed cameras were installed to monitor gates and support access control at remote areas; PTZ cameras were used to support surveillance activities and track targets during security or safety events.

3.3 Site Layout

CCTV infrastructure was installed throughout the facility perimeter. The SightSensors were installed, aligned, and programmed to protect the region shown in Figure 1. [redacted]

Figure 1. Critical Surveillance Region

3.4 Installation

CCTV equipment was deployed throughout the outer perimeter region at sites that were selected by the Niagara Frontier Transportation Authority (NFTA) [redacted] Figure 2 illustrates a typical installation. The fixed cameras provided coverage along the perimeter field, fence line, and nearby gate, and a PTZ camera was used for target tracking and alarm resolution.

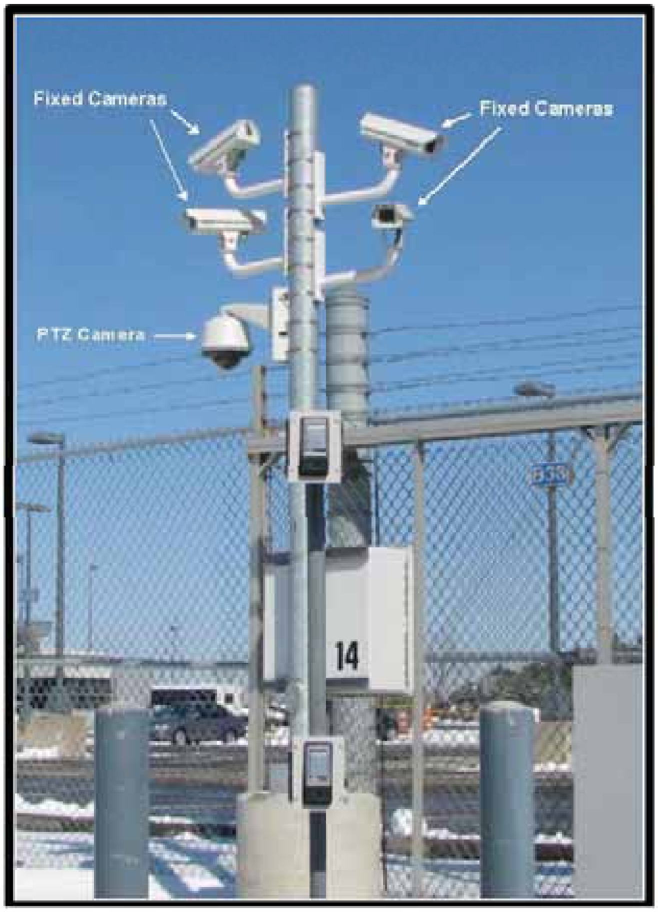

Figure 2. Installation Site 14: Four Fixed Cameras and One PTZ Camera

Approximately 100 cameras, both fixed and PTZ, were installed and networked to a central monitoring station via fiber optic cable. The cameras were positioned to provide additional surveillance capabilities across multiple access gates and portions of the perimeter that were adjacent to public roadways. Alarms were processed at the central monitoring station and then issued through the NFTA communications center, located on BUF property.

The SightSensor cameras were installed, as shown in Figure 3, to protect the critical region shown in Figure 1; several virtual fence zones with automated monitoring capabilities were configured as shown in Figure 4.

[redacted]

Figure 3. SightLogix Sensors 2 & 3 Installation

[redacted]

Figure 4. SightSensor Configuration

[redacted]

3.5 Detection Configuration

The SightSensors were installed to detect, at minimum, a single intruder moving across the boundary from the public side to the Air Operations Area. Figure 5 illustrates a SightLogix camera's alarm zone configuration.

[redacted]

Figure 5. Example SightLogix Detection Zone

Figure 5 is labeled to show the SightLogix devices' dual trip zone configuration, which was designed to maximize true alarms while minimizing nuisance alarms. In its tested configuration, [redacted]

3.6 Interfacing

BUF personnel reported the new cameras were integrated into the existing system without issue, and no changes were made to the existing operator interface.

4. METHODOLOGY

4.1 Site and Schedule

All OT&E activities were conducted on site at BUF, March 7-11, 2011, after allowing for a sufficient burn-in period. All evaluation procedures were conducted between 8:00 a.m. and 6:00 p.m.

4.2 Testing Personnel

Two Safe Skies field personnel conducted all scenario-based. One was 6'1" and approximately 200lbs, the other was 5'7" and 170lbs.

4.3 Critical Operational Issues (COI)

The primary objective of the OT&E was to address the COIs and corresponding Measures of Effectiveness (MOE) and Performance (MOP) that were established in the project test plan.

COI 1: What are the detection capabilities of the CCTV analytic solution?			
MOE		**MOP**	
1	Does the CCTV analytic solution detect intruders attempting to breach the perimeter boundary?	**A**	Does the system detect an unauthorized entrance attempt [redacted]?
		B	Does the system detect an unauthorized entrance attempt [redacted]?
		C	Does the system detect an unauthorized entrance attempt [redacted]?
		D	Does the system detect an unauthorized entrance attempt [redacted]?
2	Does the CCTV analytic solution reject non-intrusion disturbances?	**A**	Determine the number of alarms caused by natural or man-made environmental effects that are reported within the observation period.
		B	Determine the number of alarms caused by internal system processes that are reported within the observation period.

COI 2: Does the CCTV network and analytic solution provide a dependable intrusion detection system?			
MOE		**MOP**	
1	Do the hardware and software components maintain operational functionality?	A	Determine the length and causes of system downtime during the observation period.
		B	Determine whether observed component failures are discrete or compound and/or hardware- or software-related.
2	Do the system components report accurate information?	A	Determine whether the system accurately reports locations of alarms.
3	Does the system integrate with BUF's existing CCTV network?	A	Determine whether the system interfaces with existing hardware and software.
		B	Describe any significant modifications to infrastructure that were required to install the system.

COI 3: Is the CCTV network and analytic solution a usable detection system?			
MOE		**MOP**	
1	Can the operator optimize the system for the specific installation site?	A	Demonstrate that the operator can define customized zones.
		B	Demonstrate that the operator can define sensitivity levels per zone and/or intrusion type.
		C	Demonstrate that the system is scalable for future expansion.
2	Can trained personnel operate and interpret the system?	A	Determine training requirements.
		B	Identify operator-level issues in accessing system information.
		C	Identify operator-level issues in interpreting system information.

5. RESULTS

5.1 COI 1: SightLogix Detection Effectiveness

Detection effectiveness was defined as the system's ability to alarm on intruders. OT&E involved four approach methods: [redacted] Safe Skies field evaluators performed the scenarios consistent with standards that were stipulated in the test plan.

Tests were performed throughout the regions defined in Figure 3. The scenarios were distributed at [redacted] intervals throughout each region that was covered by the SightLogix sensors.

The evaluators performed [redacted] randomized [redacted] scenarios for each sensor.

5.1.1 MOE 1: Intrusion Detection

Table 2 summarizes the number and location of the evaluation scenarios that were conducted. Scenarios were randomized within each sensor.

Table 2. Testing Scenario Summary

Test	Sensor						Total
	2	3	4	5	6	7	
[redacted]							
Total	[redacted]						

[redacted]

5.1.1.1 MOP 1A: [redacted] Through the Detection Field

These tests simulated an intruder attempting to defeat the system by means of [redacted] through the detection field. Safe Skies field evaluators started each scenario outside of the SightSensor's Zone 1 detection range [redacted] Zone 2, [redacted] Table 3 summarizes the collected data.

Table 3. [redacted] Scenario Results

Sensor	Total Tests	% Alarms
Sensor 2	[redacted]	[redacted]
Sensor 3	[redacted]	[redacted]
Sensor 4	[redacted]	[redacted]
Sensor 5	[redacted]	[redacted]
Sensor 6	[redacted]	[redacted]
Sensor 7	[redacted]	[redacted]
Overall	[redacted]	[redacted]

The system failed to detect [redacted] tests conducted. Thus, there was not sufficient variation in the data to conclude significant differences exist in alarm rates by sensor.

5.1.1.2 MOP 1B: [redacted] Through the Detection Field

These tests simulated an intruder attempting to defeat the system [redacted] the detection field. Safe Skies field evaluators started each scenario outside of the SightSensor's Zone 1 detection range [redacted] Zone 2, [redacted] Table 4 summarizes the collected data.

Table 4. [redacted] Scenario Results

Sensor	Total Tests	% Alarms
Sensor 2	[redacted]	[redacted]
Sensor 3	[redacted]	[redacted]
Sensor 4	[redacted]	[redacted]
Sensor 5	[redacted]	[redacted]
Sensor 6	[redacted]	[redacted]
Sensor 7	[redacted]	[redacted]
Overall	[redacted]	[redacted]

The system failed to detect [redacted] tests conducted. Thus, there was not sufficient variation in the data to conclude significant differences exist in alarm rates by sensor.

5.1.1.3 MOP 1C: [redacted] Through the Detection Field

These tests simulated an intruder attempting to defeat the system by means of [redacted] hrough the detection field. Safe Skies field evaluators started each scenario outside of the SightSensor's Zone 1 detection range [redacted] Zone 2, [redacted] Table 5 summarizes the collected data.

Table 5. [redacted] Scenario Results

Sensor	Total Tests	% Alarms
Sensor 2	[redacted]	[redacted]
Sensor 3	[redacted]	[redacted]
Sensor 4	[redacted]	[redacted]
Sensor 5	[redacted]	[redacted]
Sensor 6	[redacted]	[redacted]
Sensor 7	[redacted]	[redacted]
Overall	[redacted]	[redacted]

The system failed to detect [redacted] tests conducted. Based on these results, there is sufficient evidence to conclude that the alarm rates differed by sensor (p-value = .0400).

5.1.1.4 MOP 1D: Attempt to Defeat by [redacted] Through the Detection Field

These tests simulated an intruder attempting to defeat the system [redacted] through the detection field. Safe Skies field evaluators started each scenario outside of the SightSensor's Zone 1 detection range [redacted] Zone 2, [redacted] Table 6 summarizes the collected data.

Table 6. [redacted] Scenario Results

Sensor	Total Tests	% Alarms
Sensor 2	[redacted]	[redacted]
Sensor 3	[redacted]	[redacted]
Sensor 4	[redacted]	[redacted]
Sensor 5	[redacted]	[redacted]
Sensor 6	[redacted]	[redacted]
Sensor 7	[redacted]	[redacted]
Overall	[redacted]	[redacted]

The system failed to detect [redacted] tests conducted. There was not sufficient variation in the data to conclude significant differences exist in alarm rates by sensor.

5.1.2 MOE 2: Nuisance and False Alarm Reporting

The SightSensors should provide continuous intrusion detection capabilities while eliminating erroneous alarms from environmental stimuli. Nuisance alarms were defined as any alarms that were generated by ambient and/or environmental effects such as weather, animals, noise from aircraft, etc. False alarms were alarm instances that did not have an apparent cause, and are typically attributed to mechanical or electrical failure within the equipment.

[redacted]

5.2 COI 2: System Reliability

5.2.1 MOE 1: System Operational Functionality

BUF security personnel and other operations staff were surveyed to determine whether they had observed any hardware or software issues since its inception in February 2011. No issues were reported in that time, and all relevant components remained in continuous operation throughout the evaluation period.

5.2.2 MOE 2: System Accuracy

The Safe Skies evaluation team performed over 900 scenarios of which every alarm instance was accurately reported through the primary management software. Each alarm prompted the system to display the alarm video, location information, nearest camera reference numbers, date and time, and an audible alarm signal.

In the case of the SightSensor cameras, additional target tracking capabilities were available and 100% functional throughout the evaluation period.

5.2.3 MOE 3: System Installation & Integration

There were no significant infrastructure tasks associated with the integration stage of the system installation. Some moderate software modifications were required to integrate the more than 100 new camera feeds, and another screen was installed to provide an additional video display area. BUF personnel reported that the process of integrating the new cameras into the existing system was smooth and without issue.

The Safe Skies team did not witness any fluctuation or delay in alarm processing or drop in video quality during the evaluation period.

5.3 COI 3: System Usability

System usability is the operator's ability to effectively employ the technology and adapt it to their existing protocols and environment.

5.3.1 MOE 1: Custom Optimization

Safe Skies investigated the flexibility and complexity of the SightLogix automated detection software to determine whether the system provided the tools to perform the following tasks, which BUF personnel had indicated during the baseline evaluation to be necessary capabilities:

- Define detection zones
- Define sensitivity levels
- Mask nuisance alarms or malfunctioning zones

The calibration and zone setting functions were accessible via the SightLogix software, which could also be accessed through the dispatch center if needed. From the SightLogix software, it was possible for BUF personnel to customize settings. Zones could be redrawn, areas could be masked, and sensitivity settings could be changed. However, adjusting the system's sensitivity did require some experience with the software. It was recommended that the integrator or SightLogix be contacted before altering settings.

5.3.2 MOE 2: Training Requirements

To be effective, the operation of the system must be reasonably intuitive. To assess this measure, Safe Skies reviewed vendor training materials and interviewed personnel who had been trained to use the system.

The new CCTV interface was nearly identical to the original system; as such, the operators did not have to change their routines or go through a training course in order to perform their normal tasks. Overall, users' opinions of the system's operability were positive.

6. SUMMARY & OBSERVATIONS

Installation and Integration
Installation of the CCTV enhancement was a moderately intensive process, requiring trenching and additional power and communications infrastructure throughout the farthest regions of the facility.

Integration of the camera feeds into the existing subsystems proved to be less intensive, and was reported by BUF and dispatch personnel as being a smooth transition.

Intrusion Detection
Intrusion scenarios were distributed at [redacted] intervals throughout each region that was covered by the SightLogix sensors. The evaluators performed [redacted] randomized [redacted] scenarios for each sensor. Figure 4 shows the overall detection alarm rates for each sensor.

[redacted]

Figure 6. Individual Sensors and Associated Overall Alarm Rates

[redacted]

5 [redacted]

Table 7. Scenario Test Results Summary by Test Day

	[redacted]							
Test Day	**N**	**Alarm Rate**	**N**	**Alarm Rate**	**N**	**Alarm Rate**	**N**	**Alarm Rate**
Day 1	[redacted]							
Day 2								
Day 3								
Day 4								
Day 5								
Day 6								

Interface

The new CCTV interface was nearly identical to the original system; as such, the operators did not have to change their routines or go through a training course in order to perform their normal tasks.

6.1 Key Performance Parameter (KPP) Assessment

Table 7 shows the KPPs that were defined from the baseline assessment, and the disposition as to whether each was met.

Table 8. Key Performance Parameter Dispositions

Requirement Group	Functional Requirements	Technical Requirements (KPPs)	Requirements Met
Video Analytic Performance	Enhanced Detection Capabilities	Maintain a reliable detection rate: - No less than [redacted] for intrusion type scenarios (e.g., [redacted])	[redacted]

[redacted]

Requirement Group	Functional Requirements	Technical Requirements (KPPs)	Requirements Met
	Efficient Nuisance Alarm Rate	Though nuisance alarms should be infrequent, the priority is to maintain high detection capabilities.	[redacted]
Graphical User Interface	Efficient, Flexible, and Reliable	- The system should be simple to learn and use. - [redacted] - Alarm history should be easily accessible for reporting, archiving, and auditing purposes. - Security staff should be able to operate the system with a high level of independence to control sensitivity settings and zone classifications (renaming or regrouping zones). - Security staff should be able to easily and quickly shunt/disable zones if nuisances persist or an unknown error is causing them.	
General Operation	Power	The system should reliably and automatically initiate after complete power failure. The front-end computer systems should have a back-up power supply.	- All systems operate on a backup system that provides power to the entire building.

[redacted]

7. REFERENCES

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[redacted]

APPENDIX A – SIGHTLOGIX THERMAL SIGHTSENSOR

[redacted]

[redacted]

sightlogix
making outdoor video... *smarter*

Thermal SightSensor

Long-Range Thermal Video Detection Camera

The SightLogix® Thermal SightSensor® is an intelligent video detection camera for large outdoor perimeter and buffer zone surveillance, in all weather and geographical conditions. The Thermal SightSensor is designed for high Probability of Detect (PD) and low Nuisance Alarm Rates (NAR) in zero light and widely dynamic lighting situations. The Thermal SightSensor consists of a thermal imager, complete with lens optics, electronic stabilization, on-board image processing, video analytics software, camera control, and geospatial target tracking within a ruggedized, NEMA 4X nitrogen-purged housing.

Feature	Benefit
Multiple digital signal processors (DSP) integrated with the camera imager	Analyzes all detail of every video frame for increased accuracy and extended range
3D Electronic Image Stabilization (translation, rotation and zoom)	Eliminates video shake induced by wind and machinery (trains, airplanes, construction equipment) to eliminate nuisance alarms
Long Wavelength Infrared (LWIR) Uncooled Microbolometer	Detects intrusions in zero light or difficult lighting environments, such as unlit areas near roads and over water in bright sunlight
Detects objects that violate a site's alarm policies. Specifies the GPS position for up to 64 simultaneous targets	Accurate intrusion detection over large outdoor areas
Lens Field of View options: 50°, 36°, 20°, 14°, 7°	Supports various field of view/detection distances
Detects inbound vehicle-sized objects up to 1,600 meters and pedestrian-sized objects at distances up to 660 meters; requires no more than sixteen (16) scene pixels for object detection	Accurate intrusion detection over large outdoor areas
GPS-based analytics determine object location, size, and velocity with real-time display onto geo-positioned topology map	Accurately filters objects based on size and velocity; provides situational awareness
Accurately detects small objects in a background of environmental movement (leaves, reflections, wind-blown objects)	Eliminates nuisance alarms
10/100 Ethernet with support for satellite, cellular, wireless (802.11 a/b/g), and full broadband communications; AES 256 bit encryption and SSL protocol	Flexible and secure communications
Seamless integration with third-party Video Management, Physical Security Information Management (PSIM) and Access Control Systems.	Open-system design supports leading industry systems. Refer to *SightLogix Third Party Compatibility List* for details.
Dry-nitrogen pressurized enclosure (NEMA-4X); rugged, multi-contact sealed Mil-C electrical connector	Built to withstand outdoor elements (rain, snow, humidity, sand, temperature extremes) for extended life

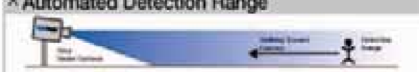
Ordering Information

Part Number	Imager Detection Range	Automated Detection Range *	FOV	Interface	Power
SL-SS-NS100-000	220m (720ft)	90m (300ft)	50°	Ethernet	24V AC/DC
SL-SS-NS200-000	310m (1020ft)	130m (430ft)	36°		
SL-SS-NS300-000	560m (1840ft)	230m (750ft)	20°		
SL-SS-NS400-000	780m (2560ft)	330m (1080ft)	14°		
SL-SS-NS800-000	1.6Km (5250ft)	660m (2170ft)	7°		
SL-SS-NS100-300	220m (720ft)	90m (300ft)	50°	Ethernet	Power Over Ethernet Plus (PoE+)
SL-SS-NS200-300	310m (1020ft)	130m (430ft)	36°		
SL-SS-NS300-300	560m (1840ft)	230m (750ft)	20°		
SL-SS-NS400-300	780m (2560ft)	330m (1080ft)	14°		
SL-SS-NS800-300	1.6Km (5250ft)	660m (2170ft)	7°		
SL-SS-NS100-01x	220m (720ft)	90m (300ft)	50°	Wireless x = 2 for 2.4 GHz x = 4 for 4.9 GHz x = 5 for 5.8 GHz	24V AC/DC
SL-SS-NS200-01x	310m (1020ft)	130m (430ft)	36°		
SL-SS-NS300-01x	560m (1840ft)	230m (750ft)	20°		
SL-SS-NS400-01x	780m (2560ft)	330m (1080ft)	14°		
SL-SS-NS800-01x	1.6Km (5250ft)	660m (2170ft)	7°		

Accessories

- **SightMonitor** – GPS-based target display and coordination software. *Refer to the SightLogix SightMonitor® Datasheet.*
- **SightTracker** – GPS-based PTZ controller. Refer to the *SightLogix SightTracker™ Datasheet.*
- **Heavy-duty Mounts and Cables.** Refer to the *SightLogix Accessories Datasheet.*

* Automated Detection Range



Range measurement method for automated detection range of a man

NS800 Range Performance (Man 1.8m x 0.5m)

Note: 660m Automated Detection Range is unique to SightLogix' Products. Alternate products typically have one-third SightLogix' Automated Detection Range.

PN 6-2000003-001
Made in the USA

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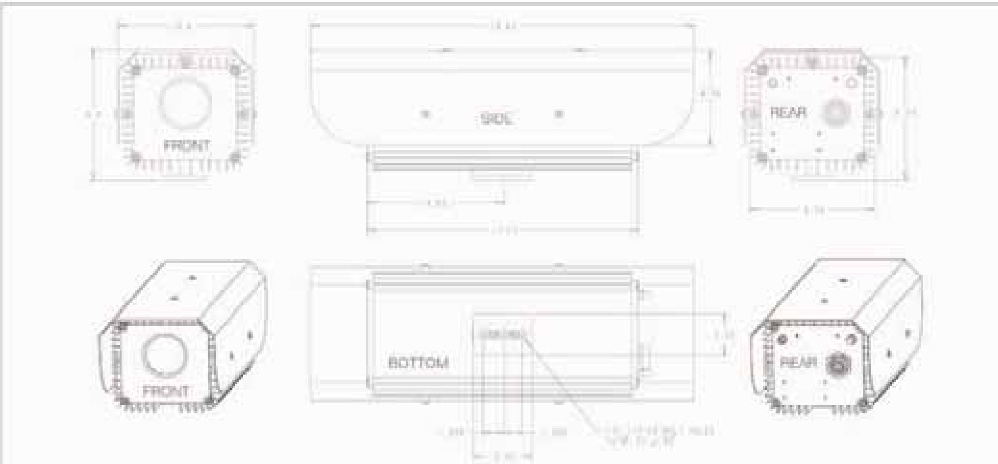
Specifications

Imager	
Detector	Un-cooled VOx Microbolometer
Detector Pitch	38 micron
Spectral Response:	8-14 micron
Picture Elements	320 (H) x 240 (V)Lens (fixed)
Lens / Field of Views	Fixed focus 50°, 36°, 20°, 14°, 7° available
Dynamic Range	16 bit digital sensor interface
NETD	< 85mK
Electrical	
Voltage:	24 VAC/DC +/- 10% or PoE+
Connector	26 pin Mil-C (power & data)
Power:	18 watts nominal (60 watts w/ extended temp option when start-up conditions exceed -40°C)
Network	
Ethernet Wired	10/100 RJ45, IEEE 802.3, 802.3i, 802.3u
Ethernet Wireless	IEEE 802.11 a/b/g (optional)
Data Rate	64 kbps to 8 Mbps

Operating Mode	Full-duplex
Protocols	Supports all leading network protocols including streaming protocols
Video Output	
Compression Type:	MPEG-4 (Simple Profile, Advanced Simple Profile) MJPEG
Bit Rate Profile	Constant (CBR) or variable bit rate (VBR)
Resolution	320x240
Frame Rate	Up to 30 frames per second; user configurable
Target Tracking Output	
Communications	Metadata via industry standard XML over a HTTP/HTTPS interface for third-party integration
Tracked object parameters	Current time, alarm state, creation time, GPS position, size, heading, speed, aspect ratio, and alarm zone
SightTracker (optional)	Provides detected targets' GPS coordinates to automatically position PTZ cameras for continual tracking



Camera Enclosure	
Weight:	6.8 kg (15 lbs.)
Dimensions:	47.3 cm L x 16.2 cm W x 16.8 cm H (18.6" x 6.4" x 6.6")
Enclosure:	NEMA 4X (IP66 compliant)
Nitrogen purge pressure	10 psi
Mounting:	3 x ¼-20 tpi bolts

Environmental	
Operating Temperature	-30° to +60°C (-22° to +140°F) - Optional extended temp range available -50° to +70°C (-58° to +158°F)
Storage Temperature	-30° to +70°C (-22° to 158°F)
Relative Humidity:	0 to 100%
Emissions:	FCC Part 15, Class A ITE Immunity Standard (EN 55024)

Specifications are subject to change without notice

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sightlogix
making outdoor video...*smarter*

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