



Security solutions -Technology to assist or enhance exit lane guard service

EXECUTIVE BULLETIN

AIRPORT EXIT LANE MONITORING CHALLENGES

Exit Lane: A Definition

An exit lane defines a boundary between two areas, through which high volumes of pedestrian traffic are moving in one direction to exit an area. Airports, and similar facilities with high volumes of pedestrian traffic, often employ open exit lanes which allow for quick movement of people out of an area without physical barriers such as doors or gates. Exit lanes can exist in a variety of arenas, and do not necessarily denote a boundary between secured and public areas. In public transportation, such as a light rail system, an exit lane serves to segregate paying passengers who have completed their commute from passengers who have not yet paid their fare and are entering the rail system. In the airport environment, the exit lane connects the secured area to the public area, and the approved direction of traffic flow is from the secured to public area. This paper focuses on exit lanes similar to those in airport environments, or any facility where secured and public areas must be separated.

Security at the Exit Lane

The main challenge in maintaining an exit lane is ensuring that nobody from the public area gains unauthorized access to the secured area by traversing the exit lane in the wrong direction. A secondary challenge is to ensure that no harmful objects (guns, explosive materials, etc.) are tossed from an unsecured person on the public side through the exit lane to a collaborating individual on the secured side. Traditionally, security is provided by one or more security guards positioned at the exit lane to monitor passageway activity. The guard's main purpose is to ensure that no one circumvents the security screening stations by traveling the wrong way through the exit into the secured area, and to detect any items that may be tossed into the secured side from the public side. However, data show that such breaches have occurred at airports, even when more than one guard is present. Humans are not designed to perform vigilance tasks for prolonged periods. Guards become distracted, tired, or are occupied with providing assistance to passersby. Guards have on occasion failed to detect wrong-way travel through the exit passageway in a timely manner. Breaches at airport concourse exit lanes, whether intentional or unintentional, are rare, but the consequences are dire. In recent years, such breaches have resulted in passenger re-screening, flight delays and airport or terminal evacuations. Airport costs associated with even one such incident are estimated at \$800,000¹. Costs to the airlines can be even more significant: a two-hour shutdown of one major terminal at a large airport can cost up to \$15 million².

Controlling wrong-way entry into the secured area by using physical barriers hampers exit flow progress, and slows down hurried passengers. In some cases physical barriers or closed or locked doors violate local fire codes. Therefore, passive, unobtrusive security methods are preferred. A number of systems are available currently that attempt to provide exit lane monitoring. These systems are usually video-based, and are limited in the types of objects that can be detected and the environments in which detection can be achieved. Microwave technologies have been employed in an attempt to provide exit lane security, but they have not proven to be successful as a standalone device. Other vendors are attempting to meet airports' security requirements by repurposing their existing technology into detection or alerting systems. Such nascent technologies do not offer the proven performance that is essential in securing air travel in today's environment.

¹ Department of Homeland Security Office of Inspector General, Review of Allegations Regarding San Francisco International Airport, OIG-07-04. October 2006, 21 May 21 2007 <http://www.dhs.gov/xoig/assets/mgmtrpts/OIG_07-04_Oct06.pdf> .

² Gary Stroller, "Mounting evacuations add to fliers' list of frustrations," USA Today 11 May 2005. 23 May 2007 <http://www.usatoday.com/travel/news/2005-05-10-evacuations-usat_x.htm> .

Physical Characteristics of Exit Lanes

Physically, an exit lane is restricted in minimum width only by fire or building codes designed to ensure rapid and safe egress in case of an emergency. Other than code requirements, an exit lane can take any form. There are no typical physical characteristics. An exit lane can be as narrow as codes allow, or as wide as 28' or more (as at T. F. Green International Airport (PVD), for example).

The ceiling of the exit lane can be low, limited only by building codes, or it can soar to grand heights. Access to ceiling structures which will support the weight of any security devices may be difficult. In addition, some devices must be mounted with specific requirements, which is complicated by very low or very high ceilings.

The flooring material within the exit lane can range from non-reflective carpeting, to chunky terrazzo, to highly reflective marble. Reflections or glare off the floor can vary with ambient light conditions. These light conditions are difficult to control in cases where the exit lane is flanked by windows where direct sunlight can shine into the area. Not only will glare and reflections change with the time of day and angle of the sun, ambient luminance levels can change rapidly as moving cloud cover obscures and exposes the sun.

The floor itself can be level, a sloped wheelchair ramp, stepped, or a combination of any of these. The exit lane from the A and B concourses at Spokane International Airport (GEG), for example, is a combination of wheelchair ramp and level walkway with stairs at the end.

Guards monitoring the exit lane for wrong-way travel may be positioned either on the secured side or the public side. As guards are often called upon to answer questions from the traveling public, positioning of the guard can significantly impact the number of expected security breaches. If the guard is positioned on the public side, any passenger approaching from the public side will not pose a security threat. However, if the guard is posted on the secured side, any passenger approaching them from the public side risks breaching the system. Guards are often assigned additional tasks (checking wheelchairs, strollers or contractor/vendor work carts) while working the exit lane, which can add distractions and reduce vigilance even more. Data have shown that even with multiple guards monitoring a single area breaches have occurred.

An Ideal Solution

An ideal exit lane security solution will monitor a volumetric area that includes depth, width, and height. The system will track items from frame to frame, allowing the identification of events and anomalies that occur in a split second (such as a camera flash), so that false alarms are reduced. Other requirements of an ideal solution include the following:

- The system is designed to augment and assist, not hinder, existing systems, processes and procedures used to regulate the movement of people and threats in and around an exit or remote area.
- The system will continuously monitor exit lane activity for wrong-way movement, without impeding the exit flow, or taxing manpower resources.
- The system will have the ability to detect both large, slow objects (such as people) and small, fast moving objects that might be tossed into a secured area.
- The system will be able to detect objects regardless of the ambient illumination conditions, flooring type, or other physical factors comprising the exit lane.



- The system will generate alarm and warning indicators when wrong-way movement is detected, or if a person or object is detected loitering in a zone for a specified amount of time.
- The system will automatically record warning and alarm events, instantaneously providing video playback of events, and also providing photo printouts for immediate use in intruder identification and forensic analysis.
- The system's tools will preclude drastic security measures, such as airport evacuations. If the system helps resolve even one such event, hundreds of thousands of dollars could be saved.
- The system will not generate false detections resulting from extraneous environmental factors such as glare, shadows or reflections.
- The system will integrate quickly and easily into the existing exit lane configuration and environment without requiring significant changes to the facility infrastructure.
- The user interface will be intuitive, requiring minimal guard staff training.
- The user interface will be driven by a touch screen monitor that allows for the elimination of two components; mouse and keyboard.

Security Costs: Manpower vs. Technology


A number of types of exit lane monitoring technologies are currently available. They range from basic gray scale averaging motion detection, to more advanced video analysis (such as intelligent video), to the most advanced technology available – machine vision.

The national average for a single guard position manned 24 hours per day, 365 days per year is approximately \$100K annually. Exit lane monitoring, detection and alerting systems can range in cost from \$45K to \$125K for a single standalone or integrated system. Costs associated with the different levels of technology vary significantly. The cost variations are due to a combination of the level of detection, size of detection area and complexity of user interface or work station. However, the most advanced technology is not necessarily the most expensive. Older, less advanced video analysis systems typically require larger processors and more processing power, which significantly drives up system costs. Return on investment (ROI) for a typical machine vision exit lane monitoring system can be realized in several months as compared to the cost of a single guard for the same timeframe.

Conclusion

Airport exit lanes pose significant security challenges. They are designed for the rapid, unencumbered movement of people out of a secured area that does not have physical barriers, doors or gates. Exit lanes are a convenience, however, such convenience leaves open the possibility that an intruder can avoid the security screening station by passing through an exit lane the wrong way. Currently, exit lane monitoring is conducted by one or more guards monitoring exit lane traffic for wrong way entry into a secure area. Several documented exit lane breach events have demonstrated that human vigilance alone is not a reliable method for protecting these vulnerable areas in an airport. If intruders are not detected and apprehended in a timely manner, breaches at airport concourse exit lanes result in major disruptions, with associated costs estimated to range from \$800,000¹ to \$15² million for a single breach event. Given these vulnerabilities, automatic security monitoring technology provides a vital solution for monitoring exit lane activity. Such systems ensure that wrong way pedestrian traffic does not occur without immediate and specific alarm notification. An always operational, always vigilant exit lane security system is the preferred method of guarding against wrong way entry. Ideally,





the system will detect and report breaches based on site-specific, customized warning and alarm zones. The system will reliably detect both people and small, fast-moving objects that are tossed or slid through the zones. Visual and aural notification of pre-breach activities can be provided to avert a breach. Should a breach be detected, the system will provide immediate breach notification. The system will also provide forensic tools to increase the likelihood of apprehending an intruder in a timely manner, ensuring that passenger re-screening, flight delays and airport or terminal evacuations as a result of a breach are eliminated. The savings for averting even one such breach will far exceed the investment required to implement the system.

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