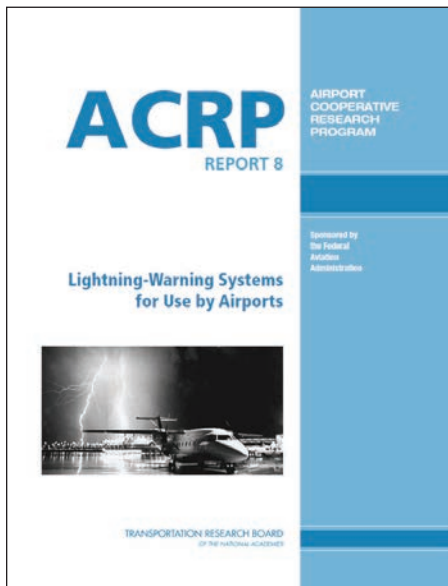# Protecting Airport Personnel from Lightning Strikes

**L**ightning strikes are particularly hazardous to ramp operations at airports, where ramp workers need to cease outdoor activities when lightning presents an imminent danger. All aspects of airport operations—landside, terminal, and airside—are impacted when there is a ramp closure. *ACRP Report 8: Lightning-Warning Systems for Use by Airports* (2008) provides detailed information about lightning detection and warning systems, which includes the ability for airports to measure the operational benefits available from the systems meant to ensure the safety of personnel and minimize disruptions to airport operations.



A variety of detection technologies exist for determining when lightning occurs. Many detectors are based on radio frequency with varying levels of sophistication, accuracy, and cost. Other systems incorporate the measurement of electric or magnetic fields to detect the presence of lightning. The prediction of lightning can also be a component of a comprehensive lightning warning system. While detection simply states the current or past occurrences of lightning, predictive methodologies attempt to determine where lightning is likely to strike next. Two approaches are utilized for lightning prediction through monitoring the buildup of atmospheric electric fields in response to charged clouds and monitoring the growth and movement of systems that develop into thunderstorms.

Lightning strikes pose a risk to aviation activities in the Austin, Texas, area which has led officials at Austin-

Bergstrom International Airport (AUS) to establish procedures for notifying workers and suspending outdoor actions. AUS utilizes an on-site national weather service (NWS) that provides lightning reports with a phone call when lightning strikes within 8 miles of the airport and then again when lightning strikes within 5 miles of the airport, when an auditory warning is signaled and notifications are sent to pagers. At this warning, the apron is closed for refueling operations due to the risk posed by the nearby lightning. However, ramp workers were sometimes unaware of the auditory warning due to aircraft noise or because they were wearing hearing protection. To ensure that staff received the auditory warning, airport personnel drove to each gate, or called airline operations offices to alert those who hadn't heard the warning. Airlines at the airport had requested an improved warning system to eliminate the need for manual warnings and provide a more complete warning.

*Right:*
*Visual warning system installed at Austin-Bergstrom International Airport (AUS).*

*Photo courtesy of AUS Airport.*

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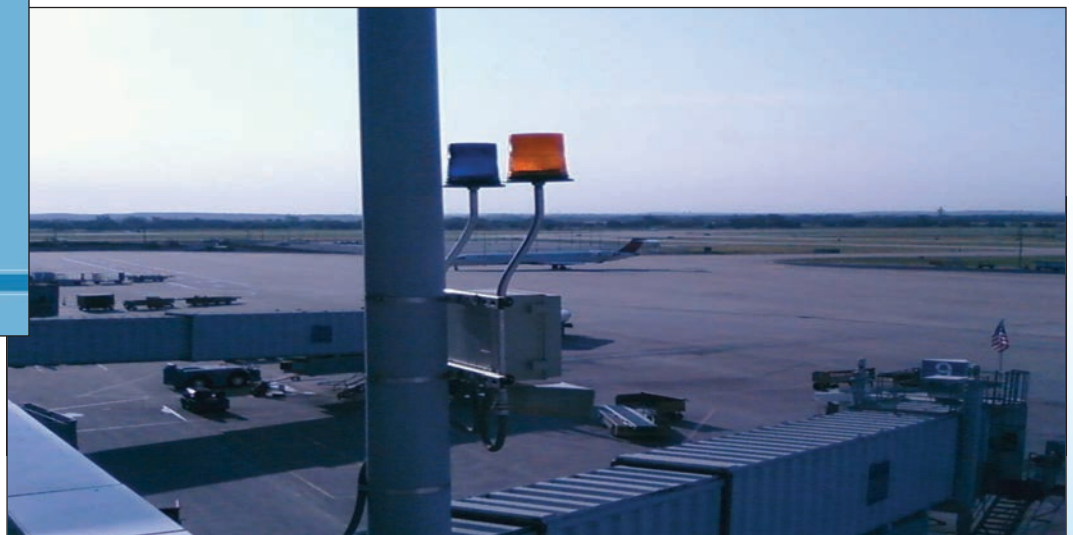
**Protecting from Lightning**—*continued*

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In response to the airline request, AUS officials identified and selected a visual alerting system. Phillip Bays, Information Security Analyst at AUS, states that *ACRP Report 8* was "instrumental in presenting various alternatives for lightning warning systems that ultimately led to the selection and installation of strobe lights." *ACRP Report 8* provided detailed information on a range of warning systems and considerations for selecting a system for AUS.

To complement the audible system, strobe lights were installed on the roof of the terminal building at every third gate where each alert could be seen by operators at several gates. The alert is activated by the airport's communications office through the security system software, which minimized costs through integration with the existing system. The airport is considering expanding the system to buildings outside of the primary terminal area to provide notification to areas that currently require a phone call. The alerts were installed in March 2011 and are tested each week to ensure they are operating as designed. The system is relatively inexpensive and Bays notes that the new warning system offered significant long-term savings as compared to the previous method of sending airport personnel to each gate.
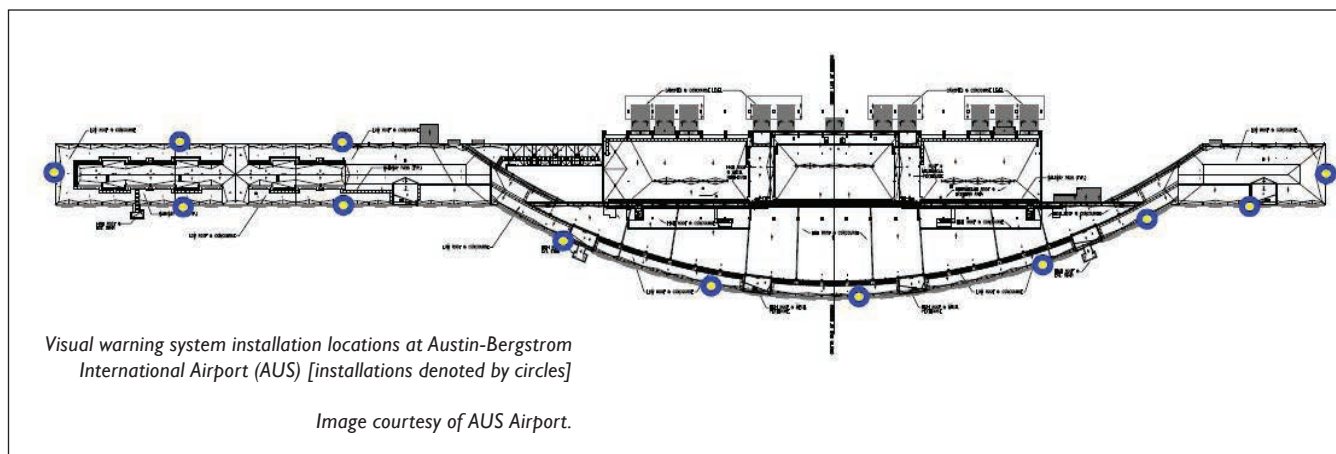
*ACRP Report 8* includes information to enable a benefit-cost analysis to assess which systems are most appropriate for a particular airport or airline. A cost benefit analysis of lightning warning systems will include the effects of ramp closures (which negatively impact operations and introduce costs by suspending passenger enplanements and deplanements), baggage loading and unloading, aircraft servicing (fuel, food, etc.), connecting or disconnecting aircraft to ground power, and gate movements. The duration of lightning-related delays affect these activities to varying degrees. Passengers are affected by any delay, while the direct cost to an airline increases significantly between a short and long delay. The system wide impacts of delay also are most pronounced with longer delays because short delays can be absorbed into the system, while long duration delays can cause en route delays.

*ACRP Report 8* provides a practical guide for airport lightning detection and warning systems that improve ramp worker safety while minimizing the number and duration of ramp closures. *ACRP Report 8* also provides an outlook on future developments and improvements that can assist lighting detection and warning. The potential information available through NextGen system improvements, better meteorological

> "Ramp safety is essential for all airports. All commercial airports with scheduled operations in lightning-prone areas should have lightning detection and warning systems to alert managers and ramp personnel of approaching hazards."
>
> *ACRP Report 8: Lightning-Warning Systems for Use by Airports*

data, and refined warning algorithms and criteria through self-monitoring software all offer enhancements for the future of lighting detection and warning.



*Visual warning system installation locations at Austin-Bergstrom International Airport (AUS) [installations denoted by circles]*

*Image courtesy of AUS Airport.*