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Agenda Item 3: Air Navigation Issues
3.6 Other Air Navigation Issues

STATUS OF ENGINEERED MATERIALS ARRESTING SYSTEM INSTALLATIONS IN THE UNITED STATES

(Presented the United States of America)

SUMMARY

The United States Federal Aviation Administration (FAA) places a high priority on improving runway safety areas (RSA) at commercial service airports to meet current standards. Since many airports are constrained and construction of a full RSA is not possible, FAA, in partnership with industry representatives developed an Engineering Materials Arresting System (EMAS) in the 1990's. EMAS consists of a lightweight concrete material that crushes under the weight of an aircraft's landing gear when it leaves the runway surface. In many situations, EMAS installations meet RSA standards even when standard RSA dimensions are not attainable. Through FAA's leadership, EMAS continues to be deployed at airports throughout the U.S. and it has proven to successfully stop aircraft overruns on several occasions.

1. INTRODUCTION

1.1 The Federal Aviation Administration (FAA) requires that commercial airports, regulated under Title 14 Code of Federal Regulations (CFR), part 139 safety rules, have a standard Runway Safety Area (RSA) where possible. At most commercial airports the standard RSA is 500 feet wide and extends 1,000 feet beyond each end of the runway. The FAA has this requirement in the event that an aircraft overruns, undershoots, or veers off the side of the runway. The most dangerous of these incidents are overruns, but since many airports were built before the 1,000-foot extension was adopted some 20 years ago, the area beyond the end of the runway is where many airports cannot achieve the full standard RSA. This is due to natural obstacles, such as bodies of water and severe drop-off of terrain; local development, such as highways, railroads and populated areas; and/or environmental constraints.

1.2 The FAA has a high-priority program to enhance safety by upgrading the RSAs at commercial airports and provides federal funding to support those upgrades. However, it still may not be practical for some airports to achieve the standard RSA.

1.3 The FAA, knowing that it would be difficult to achieve a standard RSA at every airport, began conducting research in the 1990s to determine how to ensure maximum safety at airports where the full RSA cannot be obtained. Working in concert with the University of Dayton, the Port Authority of New York and New Jersey, and the Engineered Arresting Systems Corporation (ESCO) of Logan Township, New Jersey, a new technology emerged to provide an added measure of safety. This technology, EMAS, uses a lightweight, crushable concrete material with closely controlled strength and density requirements placed beyond the departure end of a runway to stop or greatly slow an aircraft that overruns the runway. The EMAS is designed to stop an overrunning aircraft by exerting predictable deceleration forces on its landing gear as the EMAS material crushes. The EMAS minimizes the potential for structural damage to aircraft that could result in injuries to passengers and/or affect the predictability of deceleration forces.

2. BENEFITS OF THE EMAS TECHNOLOGY

2.1 The EMAS technology provides safety benefits in cases where land is not available or where it would be very expensive for the airport sponsor to buy the land off the end of the runway.

2.2 The EMAS technology also provides an added measure of safety at airports where it is not possible to have the standard 1,000-foot overrun. This technology is now in place at 21 airports with installation under contract at seven additional airports.

2.3 An EMAS that meets all FAA requirements for a standard RSA only needs to extend 600 feet from the end of the runway. However, an EMAS arrestor bed can still be installed to help slow or stop an aircraft that overruns the runway, even if less than 600 feet of land is available.

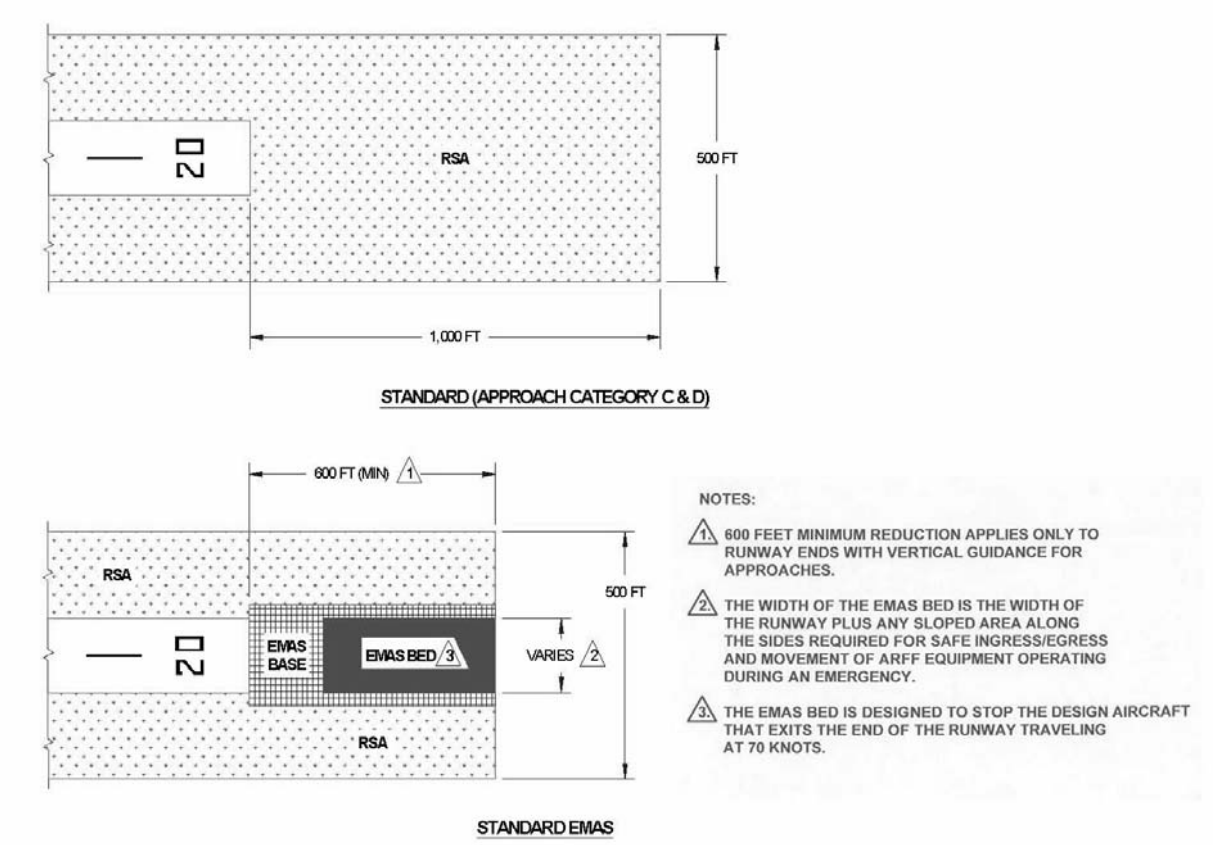

Figure 1A1-1. Standard EMAS Installation Provides a Level of Safety that is generally equivalent to a Standard Runway Safety Area (RSA). (AC 150/5220-22A, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns)

2.4 Presently, the EMAS system using crushable concrete is the only system that meets the FAA standard. The FAA is conducting research through the Airport Cooperative Research Program that will examine alternatives to the existing approved EMAS system. Results of this effort are expected in 2009. More information on the project can be found at the Transportation Research Board web site at http://www.trb.org/CRP/ACRP/ACRP.asp.

3.0 EMAS ARRESTMENT PERFORMANCE

3.1 To date, there have been four incidents where the technology has worked successfully to keep aircraft from overrunning the runway and in several cases has prevented injury to passengers and damage to the aircraft.

May 1999: A Saab 340 commuter aircraft overran the runway at JFK
May 2003: Gemini Cargo MD-11 was safely decelerated at JFK
January 2005: A Boeing 747 overran the runway at JFK
July 2006: Mystere Falcon 900 airplane ran off the runway at the Greenville Downtown Airport, South Carolina

Figure 2. Saab 340 overrun at JFK, May 1999

Figure 3. Falcon 900, Greenville, SC July, 2006

4.0 EMAS INSTALLATIONS

4.1 Currently, EMAS is installed at 30 runway ends at 21airports in the United Stated.

Airport	Location	# of Systems	Installation Date
JFK International	Jamaica, NY	2	1996
Minneapolis St. Paul	Minneapolis, MN	1	1999
Little Rock	Little Rock, AR	2	2000/2003
Rochester International	Rochester, NY	1	2001
Burbank	Burbank, CA	1	2002
Baton Rouge Metropolitan	Baton Rouge, LA	1	2002
Greater Binghamton	Binghamton, NY	2	2002
Greenville Downtown	Greenville, SC	1	2003
Barnstable Municipal	Hyannis, MA	1	2003
Roanoke Regional	Roanoke, VA	1	2004
Fort Lauderdale International	Fort Lauderdale, FL	2	2004
Dutchess County	Poughkeepsie, NY	1	2004
LaGuardia	Flushing, NY	2	2005
Boston Logan	Boston, MA	2	2005/2006
Laredo International	Laredo, TX	1	2006
San Diego	San Diego, CA	1	2006
Teterboro	Teterboro, NJ	1	2006
Chicago Midway	Chicago, IL	4	2006
Merle K. (Mudhole) Smith	Cordova, AK	1	2007
Charleston	Charleston, WV	1	2007
Manchester	Manchester, NH	1	2007

4.2 Additional EMAS systems are currently under contract at eight airports.

Location	Number of Systems	Expected Installation Date
Wilkes-Barre Scranton, PA	1	2008
Chicago O'Hare, IL	2	2008
Newark Liberty, NJ	1	2008
San Luis Obispo, CA	2	2008
Minneapolis-St. Paul, MN	2	2008
Groton-New London, CT	2	TBD
Lafayette, LA	2	TBD
Telluride, CO	2	TBD

4.3 EMAS has also been installed internationally in Jiuzhai-Huanglong (JZH), Sichuan Province, PRC (2) and Madrid-Barajas International Airport, Madrid, Spain (2)

5.0 CONCLUSION

5.1 Airport operators should consider using EMAS to enhance safety at locations where land is not available to meet standard RSA requirements.

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