

# Runway Safety Initiatives

Presented to: ICAO RRSS, Dubai

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Date: June 2014



Federal Aviation  
Administration



# Discussion

- **Surface Operations**
- **Accident data**
- **Runway Safety Areas**
- **EMAS**
- **Problematic Taxiway Geometry**
- **Runway Incursions and RSATs**
- **Aircraft Rescue and Firefighting**
- **Wildlife Strikes and Hazards**
- **Foreign Object Debris Detection**



# Runway Safety: Surface Operations Risk Factors



**Minimal separation and rapid pace**



**High-speed operations with little margin for error**



**Complex environment**



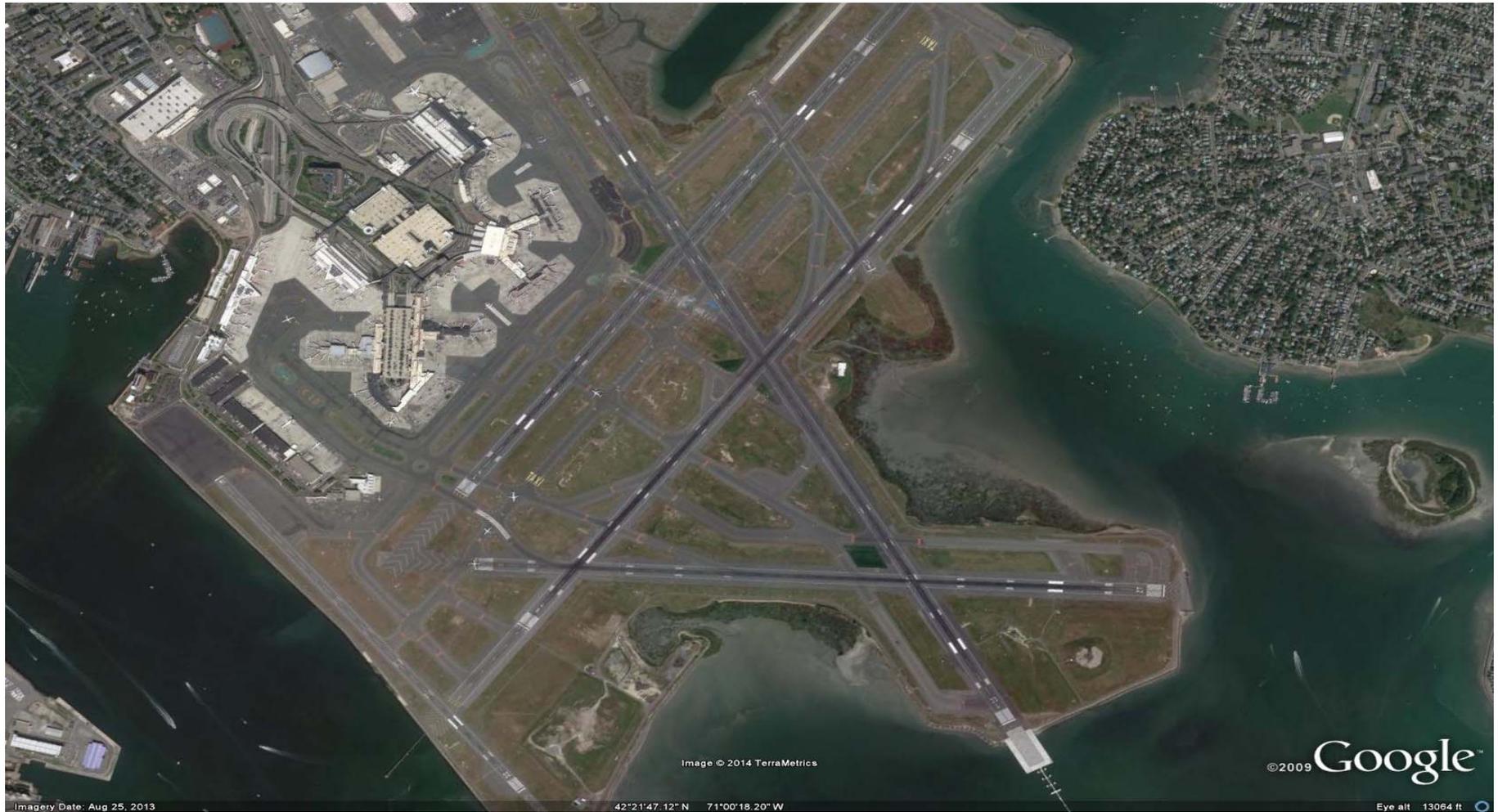
**Low visibility in  
poor weather**

*Combination of Factors Minimizes Safety Margin*

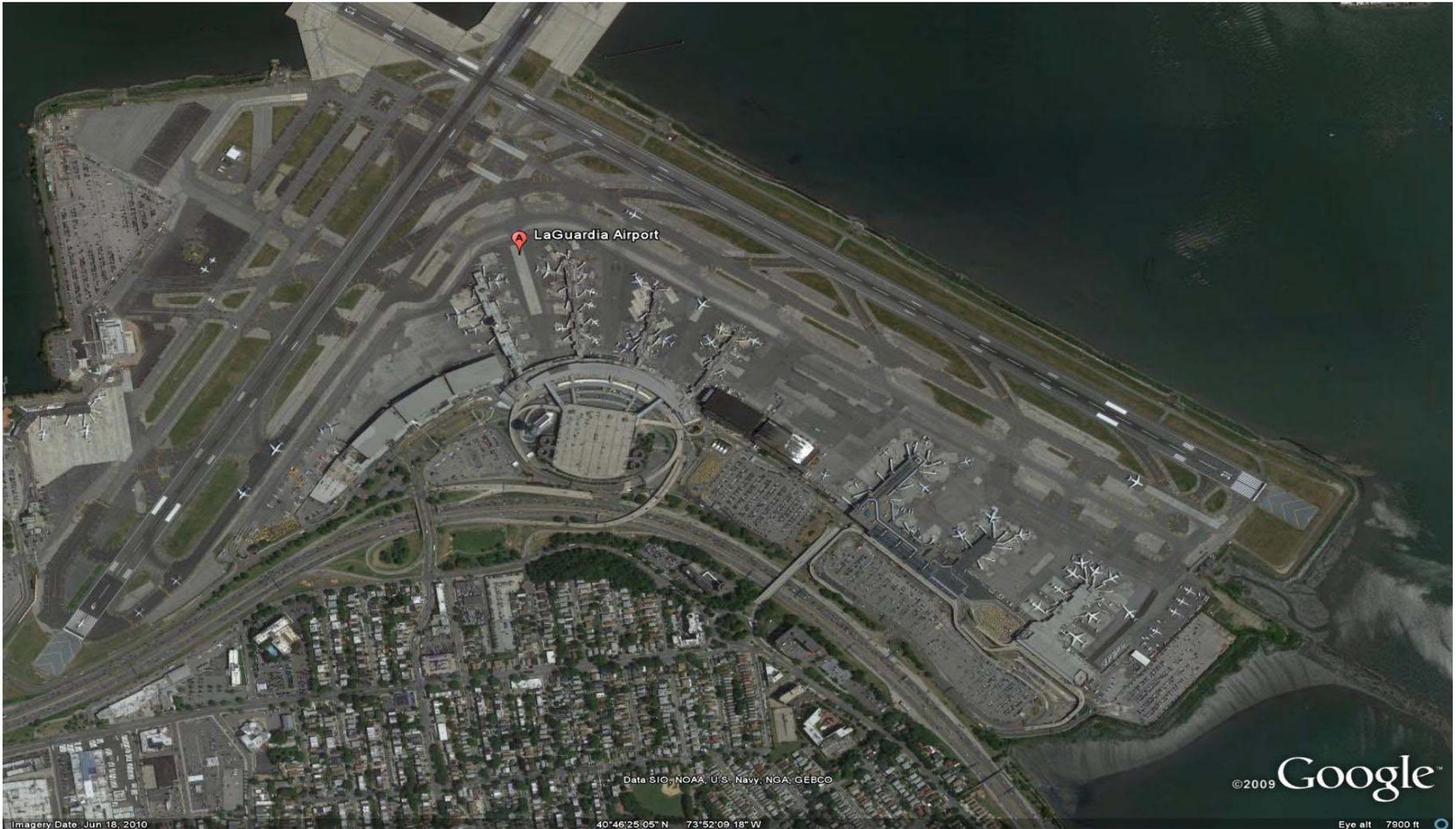


# Airports are complex BOS

## Multiple and crossing runways



# LaGuardia



# Lack of RESA



# **RUNWAY SAFETY AREA (RSA) IMPROVEMENT PROGRAM RSA IMPROVEMENT OPTIONS**

- **Construct or expand the RSA**
- **Modify or Relocate the Runway**
- **Install an EMAS**
- **Remove objects that are not fixed by function**
- **Implement Declared Distances**
- **Any combination of the above**



**EMAS Installation List (January 2013)**

# EMAS	Airport	Location	Departure End of RWY(s)	Installation Date
2	JFK International	Jamaica, NY	4R, 22L	1996(2002)/2007
1	Minneapolis St. Paul	Minneapolis, MN	12R	1999(2008)
2	Little Rock	Little Rock, AR	4R, 22R	2000/2003
1	Rochester International	Rochester, NY	28	2001
1	Burbank	Burbank, CA	8	2002
1	Baton Rouge Metropolitan	Baton Rouge, LA	13	2002
2	Greater Binghamton	Binghamton, NY	16, 34	2002/2002(2011)
1	Greenville Downtown	Greenville, SC	1	2003
1	Barnstable Municipal	Hyannis, MA	24	2003
1	Roanoke Regional	Roanoke, VA	34	2004
2	Fort Lauderdale Intl.	Fort Lauderdale, FL	27R, 9L	2004
1	Dutchess County	Poughkeepsie, NY	6	2004
2	La Guardia	Flushing, NY	22, 13	2005
2	Boston Logan	Boston, MA	4L, 15R	2005/2006(2012)
1	Laredo International	Laredo, TX	17R	2006
2	Jiuzhai-Huanglong (JZH)	Sichuan Province, PRC	2, 20	2006
1	San Diego	San Diego, CA	27	2006
2	Teterboro	Teterboro, NJ	6, 19	2006/2011
4	Chicago-Midway	Chicago, IL	31C, 4R, 22L, 13C	2006/2007
1	Charleston Yeager	Charleston, WV	23	2007
1	Cordova	Cordova, AK	27	2007
2	Madrid-Barajas Intl.	Madrid, Spain	33L, 33R	2007
1	Manchester	Manchester, NH	6	2007
2	Wilkes-Barre/Scranton Intl.	Wilkes-Barre, PA	4, 22	2008
2	San Luis Obispo	San Luis Obispo, CA	11, 29	2008
2	Chicago-O'Hare Intl.	Chicago, IL	4R, 22L	2008
1	Newark International	Newark, NJ	29	2008
1	Charlotte Douglas Intl.	Charlotte, NC	36R	2008
2	St. Paul Downtown	St. Paul, MN	14, 32	2008
2	Worcester Regional	Worcester, MA	11, 29	2008/2009
1	Reading Regional	Reading, PA	13	2009
2	Kansas City Downtown	Kansas City, MO	19, 1	2009/2010
1	Smith Reynolds	Winston-Salem, NC	15	2010
1	New Castle County	Wilmington, DE	19	2010
1	Key West Intl.	Key West, FL	9	2010
1	Arcata-Eureka	Arcata, CA	32	2010
2	Telluride Regional	Telluride, CO	9, 27	2010
1	Taipei Songshan	Taipei, Taiwan	10	2011
1	Palm Beach International	West Palm Beach, FL	14	2011
2	Martin County/Witham Field	Stuart, FL	30, 12	2011
1	Republic Airport	Farmingdale, NY	14	2011
2	Cleveland Hopkins Int'l	Cleveland, OH	10, 28	2011
2	Lafayette Regional	Lafayette, LA	22L, 4R	2011, 2013
2	Groton-New London	Groton, CT	5, 23	2011
2	Augusta State	Augusta, ME	17, 35	2011
1	Elmira-Corning Regional	Horseheads, NY	6	2012
2	Kjevik Airport	Kristiansand, Norway	04, 22	2012
2	Trenton Mercer Airport	West Trenton, NJ	16, 34	2012
1	Coastal Carolina Regional	New Bern, NC	22	2012
75	<b>Systems Installed</b>			

Note: Dates in parentheses are replacement beds.

**ESCO's EMAS product is currently installed at 75 runway ends at 49 airports.**

# Successful EMAS Capture



Courtesy: ESCO

**EMAS capture of a Boeing 747 at JFK International Airport, NY  
January 2005**



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# Successful EMAS Capture



# Successful EMAS Capture



# Boston EMAS Installation



# Problematic Taxiway Geometry

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## Current effort in FY13 and FY14:

- **Creating a Geospatial Database Inventory of Runway Incursion & Hot spot locations**
- **Prioritization based on frequency and severity**
- **Sortable by airport size and activity**

## FY15

- **Evaluate locations to determine options and recommend improvements**
- **FY 16: Start improvements**



## ***Wrong Runway Event Risks***



- 1. Short taxi distance***
- 2. Airport complexity***
- 3. Single taxiway leading to multiple runway thresholds***
- 4. Close proximity of multiple runway thresholds***
- 5. More than two taxiways intersecting in one area***
- 6. Short runways (i.e. < 5000 ft.)***
- 7. Joint use of runway/taxiway***



# Actions to Reduce Risk

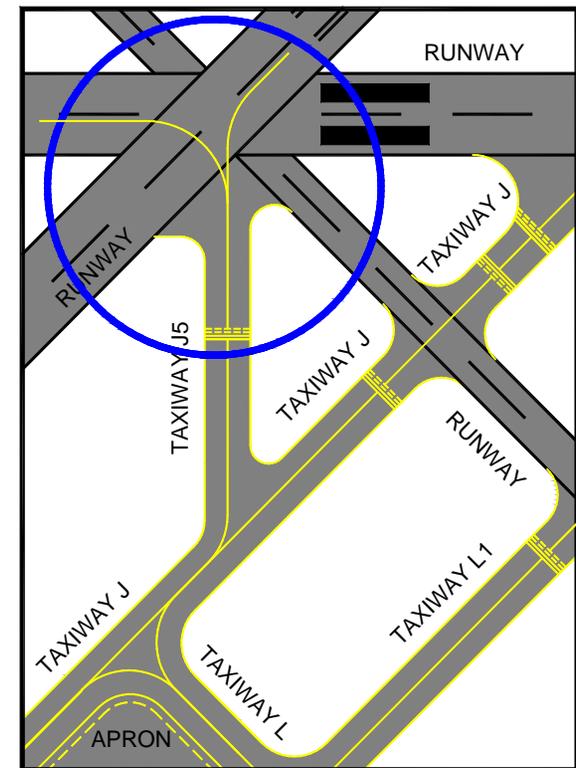
- Enhanced taxiway centerline markings & surface painted signs
- Eliminate RW crossings (pilots & vehicle drivers)
- Green islands/RGLs/Signs
- Pilot education and awareness
- Proper ATC phraseology
- Simple Airport Geometry
- Annual Vehicle Drivers' Training
- Good Communications
- Current Airport Diagrams



# Taxiway / Runway - Interface

- **Optimum design is right-angle**
  - No less than 45 degrees
  - Exception for High Speed Exits
- **Not Recommended:**
  - Y-shaped taxiway crossing
  - Taxiway crossing a High Speed exit
  - Taxiway connecting to V-shaped runways
  - Aligned taxiway (Prohibited)
  - Direct access from a ramp/ terminal to the runway
  - High-speed exits leading directly onto another runway

**Avoid This!**



(d) Taxiway intersecting two or more runways



# Runway Safety Action Teams

RSATs are effective at reducing Runway incursions.

RSAT Team is a non-regulatory assessment of the airport for potential runway incursion problems.

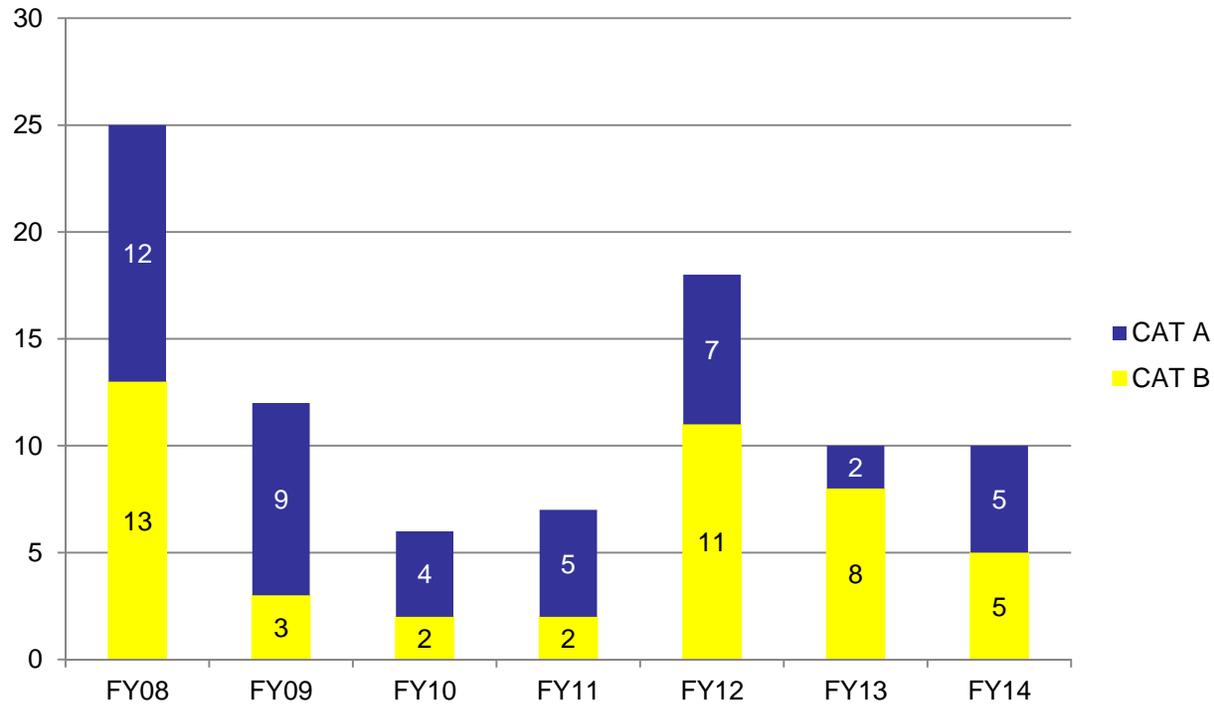
RSAT Team identifies problem areas at the airport and recommends mitigation measures.

FAA requires an RSAT at each towered airport once a year.



# Serious Runway Incursions in U.S.

Data for FY 14 current to 5/1/2014



**Recommendation – Highlight the taxiway centerline from Alpha around the corner towards Runway 3 and install a surface painted destination sign for Runway 3.**



Southwest



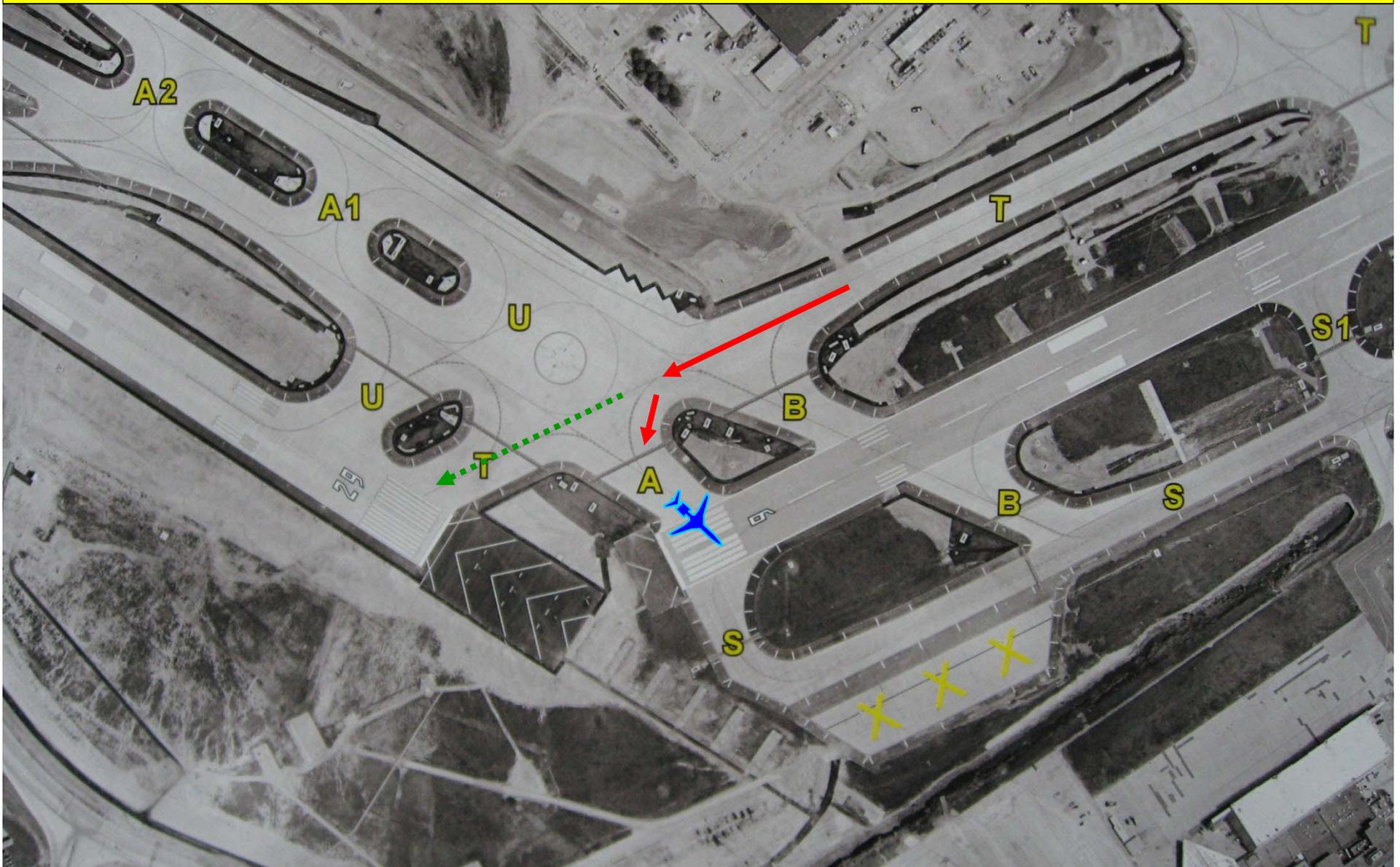
FOE

# Recommendation Implemented



FOE

## STL PD Runway Incursions on Runway 6



On 4/7/08, a CRJ-900 taxiing to Runway 29 on Tango, instead turned left on Taxiway Alfa and entered Runway 6. There was no loss of separation.

## STL RSAT Action Items for the Alfa/Tango Intersection

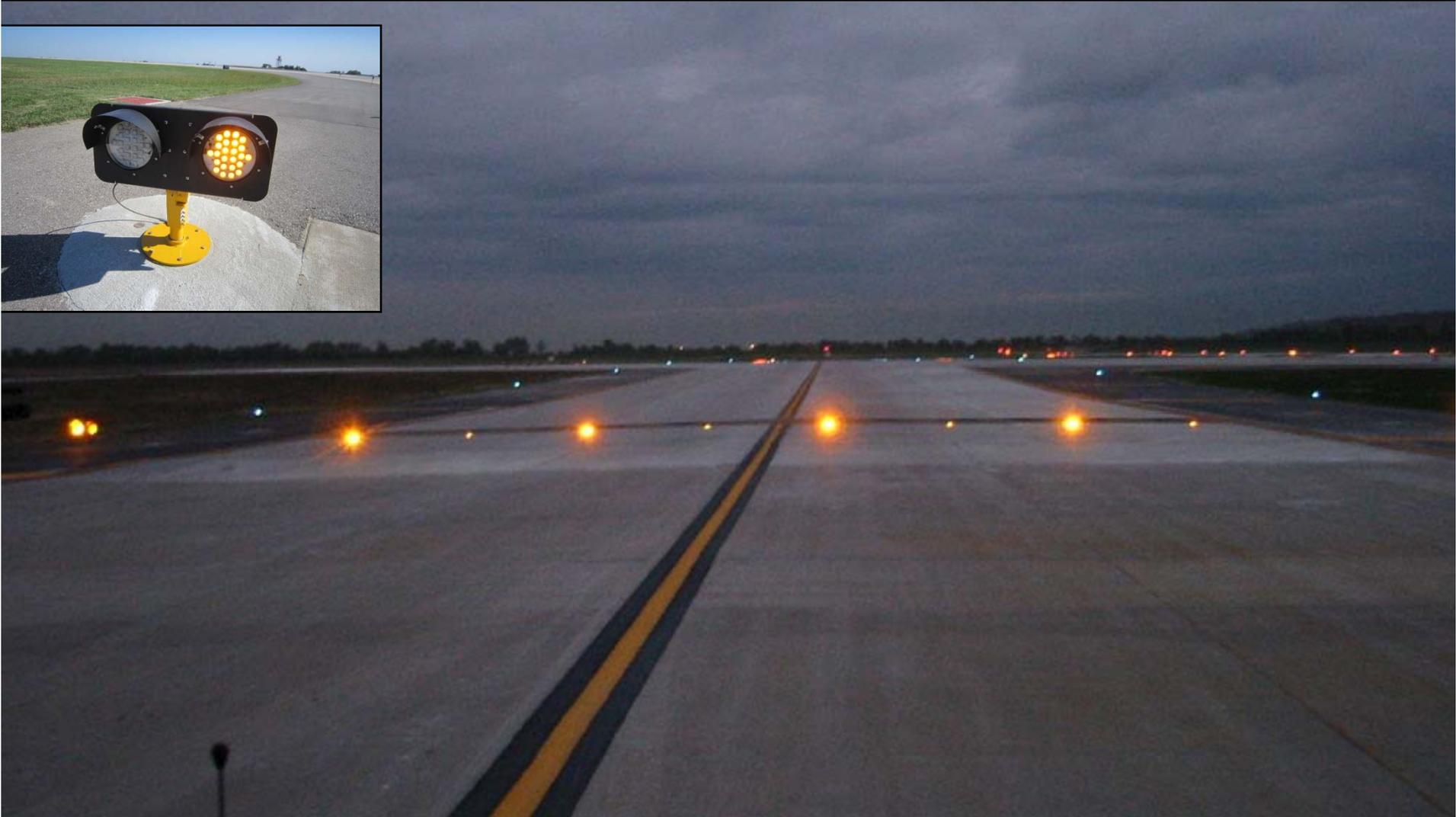


Modified Sign



Action - Modify the Runway 6 holding position sign on the right side of Taxiway Alfa by replacing the 24 designation panel with an arrow panel pointing left.

*Example of an RSAT Recommendation for holding positions when there is a history of pilots failing to hold short.*



Elevated and In-pavement Runway Guard Lights are a common RSAT recommendation to enhance the identification of runway-holding positions at intersections with a history of runway incursions.

# Enhanced Taxiway Markings

Previous Markings



Enhanced Markings

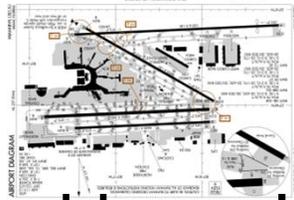


## Vehicle Drivers' Training Just As Important As Pilot Training



# Driver's Training Best Practices

- Airport Layout



4-22

- Airport Signs, Markings, Lighting and NAVAIDs



- Proper Radio Communication



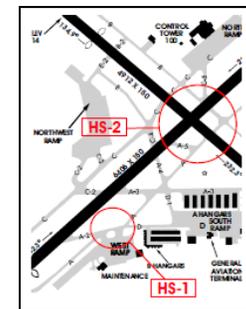
- Safety Areas



- Day, Night and Bad Weather Driving



- Known Congested Areas & Hot Spots



- Driving "Check Rides"



# Vehicle ADS-B Progress Dashboard

Status	Activity	Notes
<b>FY2013</b>		
December 2012	Deployed 37 units at Boston	
June 2013	Deployed 40 units at St. Louis	Units are activated and operating
Summer 2013	Installed 55 units at Denver. Grants awarded to 6 additional airports.	Activation of units will occur after training briefing to ATC and NATCA (currently planned for November 2013)
<b>FY2014</b>		
December 2013	Planned deployment of units at Milwaukee Activation of units at Denver	Milwaukee was awarded grant in FY13
Winter 2014	Planned deployment of units at Atlanta and Philadelphia	Philadelphia and Atlanta were awarded grants in FY13.
Spring 2014	Planned deployment of units at San Francisco and Chicago O'Hare	San Francisco and Chicago O'Hare were awarded grants in FY12.
FY2014	Conduct outreach to ASSC sites to align grant funding to the ASSC waterfall	
<b>FY2015</b>		
FY2015	Establish targeted agreements / grants with ASSC sites	

Complete

On Track

At Risk

Overdue

\*Note: Currently part of NSIP 5.0



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27

# Back to Basics ARFF Training

- **FAA inspections noted increase in airports not meeting ARFF training requirements.**
- **Results in firefighters not fully trained on shifts.**
- **FAA is pursuing enforcement and increasing review of ARFF training records during annual inspections.**



# ARFF – High Reach Extendible Turret (HRET)

## Current Generation

- 2nd level penetration possible, however, vehicle will be too close to burning aircraft and aircraft must be level.
- Penetrating nozzle should be as close to 90 deg. to skin as possible.
- Penetrating nozzle should be in-line with boom arm.



# San Francisco ARFF Response



# Wildlife Hazard Mitigation



# Wildlife Hazard Mitigation R&D



# Wildlife Hazard Assessment

- **Identify species, numbers, locations, local movements**
- **Daily and seasonal occurrences of observed wildlife**
- **Describe existing wildlife hazards to air carrier operations**
- **Review strike records**
- **Identify wildlife attractants on and off airport**
- **Provide recommendations for reducing wildlife hazards**



# Wildlife Hazard Management Plan

- **Provide measures to alleviate or eliminate wildlife hazards.**
- **Identify persons who have authority for implementing the plan.**
- **Priorities for needed habitat modification.**
- **Identification of resources for the plan.**
- **Procedures to be followed during air carrier operations.**
- **Wildlife control measures.**
- **Plan reviewed and approved by FAA**



# Automated FOD Detection

## Why is the FAA Interested?



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"It has become clearer that this was a unique accident caused by a one-off chance of a piece of metal lying on the runway".

-Concorde crash  
preliminary report

# Tarsier Camera in operation



# Tarsier Camera in operation



# Example FOD finds by the QinetiQ system



# FOD Current Status

- **In December 2013, Boston Logan Airport was the first airport in the U.S. to have FOD detection equipment installed on an entire runway.**
- **Runway 9 is the airport's busiest runway and it is using the XSight FODetect system.**
- **The cost to install the system was \$1.71 million with the FAA's share of \$900,000.**
- **Seattle and Miami are in process of acquiring a FOD detection system.**



# XSight System at Boston

