FAA Climate Adaptation Work: Superstorm Sandy Case Study

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By: Andrea S Freeburg

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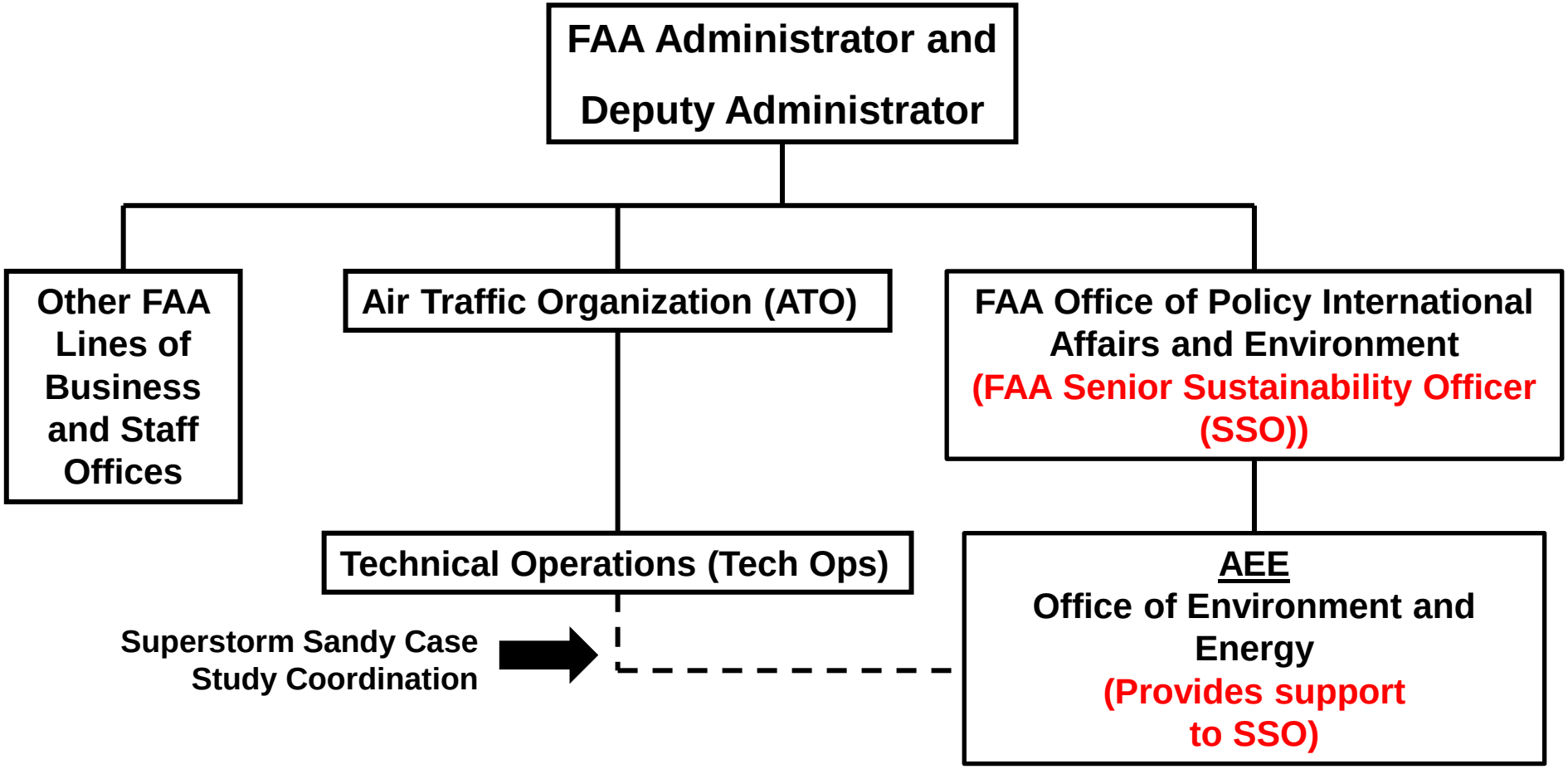
Adaptation Background

- **Executive Order 13514 *Federal Leadership in Environmental, Energy and Economic Performance* (October 2009)**
  - Required federal agencies to designate a Senior Sustainability Officer
  - Included language about considering climate change adaptation in planning
- **Executive Order 13653 *Preparing the United States for the Impacts of Climate Change* (November 2013)**
  - Provided more direction and detail on considering climate adaptation and resilience in federal projects and planning
- **Direction from the White House Council on Environmental Quality and the Department of Transportation (DOT)**

FAA Organization



Purpose of Sandy Case Study

- **To meet requirements from CEQ and DOT, AEE coordinates with other FAA Offices to gather information on opportunities for adaptation project coordination**
- **During coordination, FAA Air Traffic Organization (ATO) Eastern Service Area (ESA) Field Incident Response (FIR) Lead recommendation to consolidate lessons learned and best practices in a report**
- **This Case Study Project was listed as one of FAA's three priority actions in the 2014 DOT Adaptation Plan. Text from the Plan:**

  In FY 2014, FAA began a Superstorm Sandy Case Study project ***to evaluate the impacts of the 2012 storm on FAA navigation infrastructure****. This case study builds off of the information gathered in the Navigation Infrastructure Assessment by contrasting the applicable findings with the actual results of the storm. This Case Study will also include information on the amount of time the select navigation assets were impacted and the cost of repair. It will also highlight some of the* ***lessons learned to inform best practices for future extreme weather events****.*

Superstorm Sandy Background

- The storm made Landfall on October 29, 2012 in New Jersey
- FAA NAS Assets at 25 airports and 2 heliports in 10 states were **impacted**
- FAA NAS Assets incurred an estimated **$28.9 million dollars in damage**
- Estimates do not include damage to airport assets (e.g., taxiway lighting systems, terminal buildings) or air carrier operations impacts (e.g., loss of revenue, canceled flights)

Pier at JFK after the Storm

Case Study Process

- Identified assets impacted by Superstorm Sandy by evaluating cost data compiled by the ATO ESA FIR during the recovery effort
  - These assets were comprised of **navigational aids, communications equipment, and other supporting equipment**
  - Impacts to assets were identified using the **ESA Damage Assessment Reporting and Tracking System (DARTS) and the Remote Maintenance Logging System (RMLS) databases**
- Interviewed employees who participated in the storm recovery at the five facilities where FAA asset costs were extraordinary
  - Interviews obtained qualitative data on ATO ESA FIR actions before, during and after the storm, as well as best practices and lessons learned

Recovery Cost and Time

- **This case study assessed the cost of recovery at each location**
- **While recovery time data was also available, this data could not be compared consistently**

Approach Lighting System (ALS) Data Example:

Cost

	N	Min	Max	Median	Mean
ALS cost ($1000s)	8	1	8567	135	1613
		LGA 13 ALS	JFK 4R ALS	JFK 22L ALS	
				LGA 22 ALS	

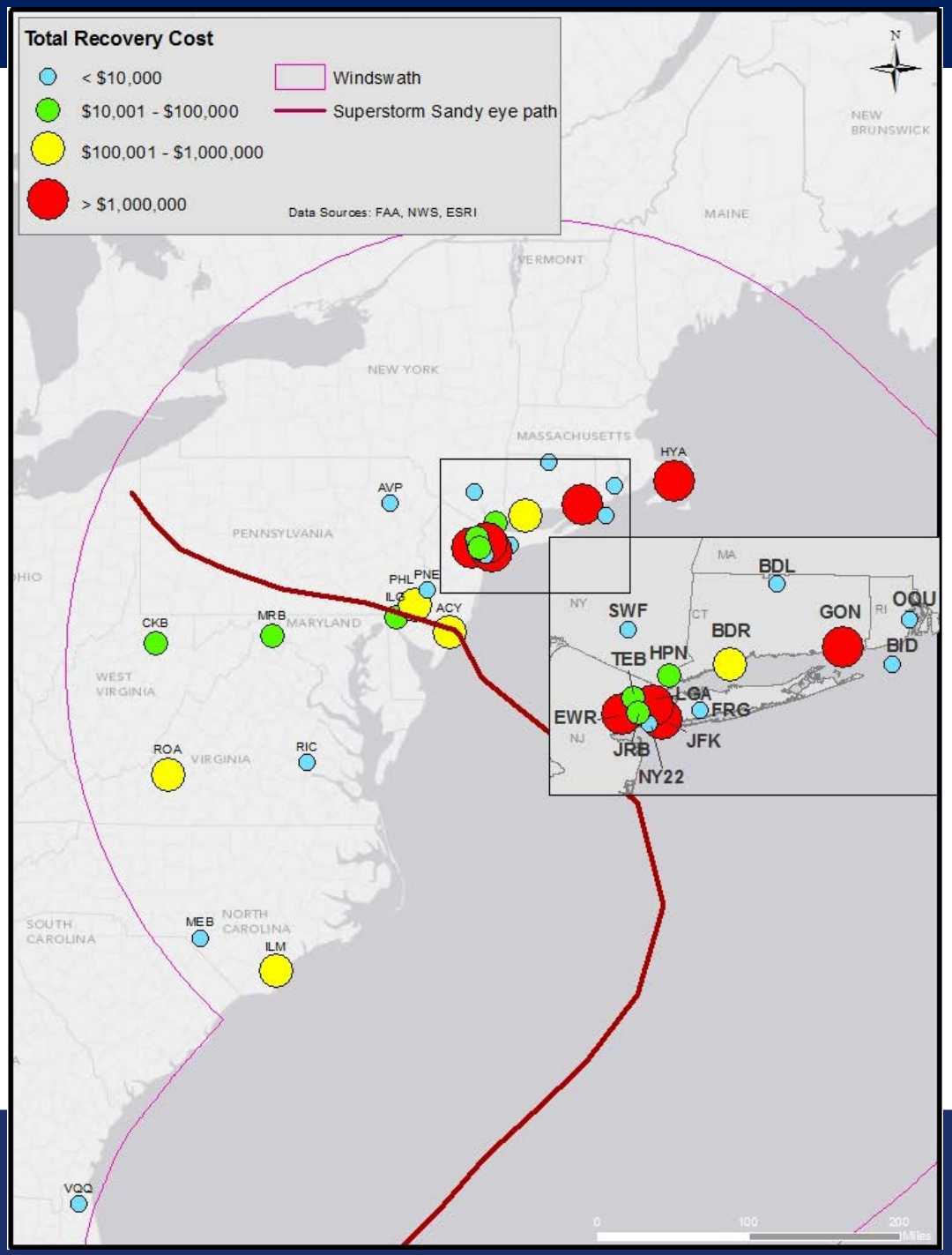
Downtime

	N	Min	Max	Median	Mean
ALS downtime (days)	3	1.11	19.5	1.71	7.44
		TEB ALS	JFK 4R ALS	GON 5 ALS	

Impact for loss of ALS: Aircraft may not be able to land during reduced visibility conditions; lowest weather minimum landing conditions are not available.

Methodology

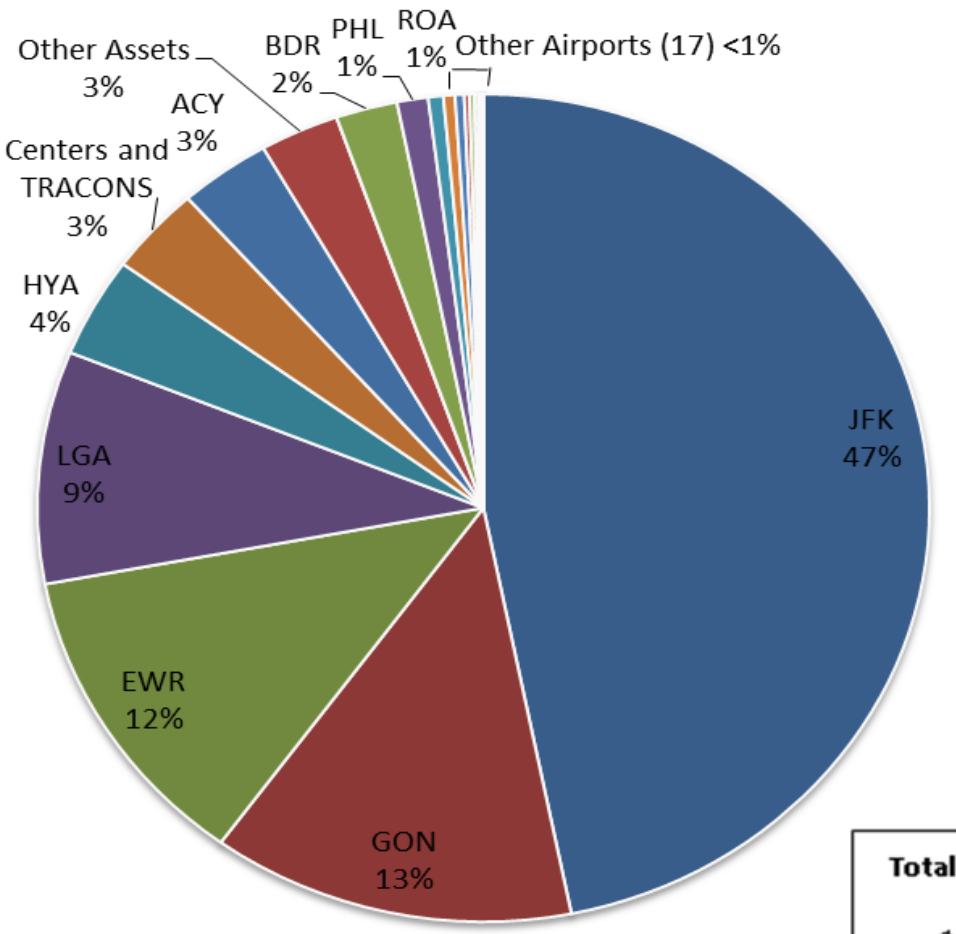
25 Airports and 2 Heliports with FAA NAS Assets damaged during Superstorm Sandy



Recovery Costs

FAA NAS Asset Recovery Costs

- **by Location**
- **as a *percent of total* FAA NAS Asset Recovery Costs**



Total Recovery Cost:

$28.9 Million

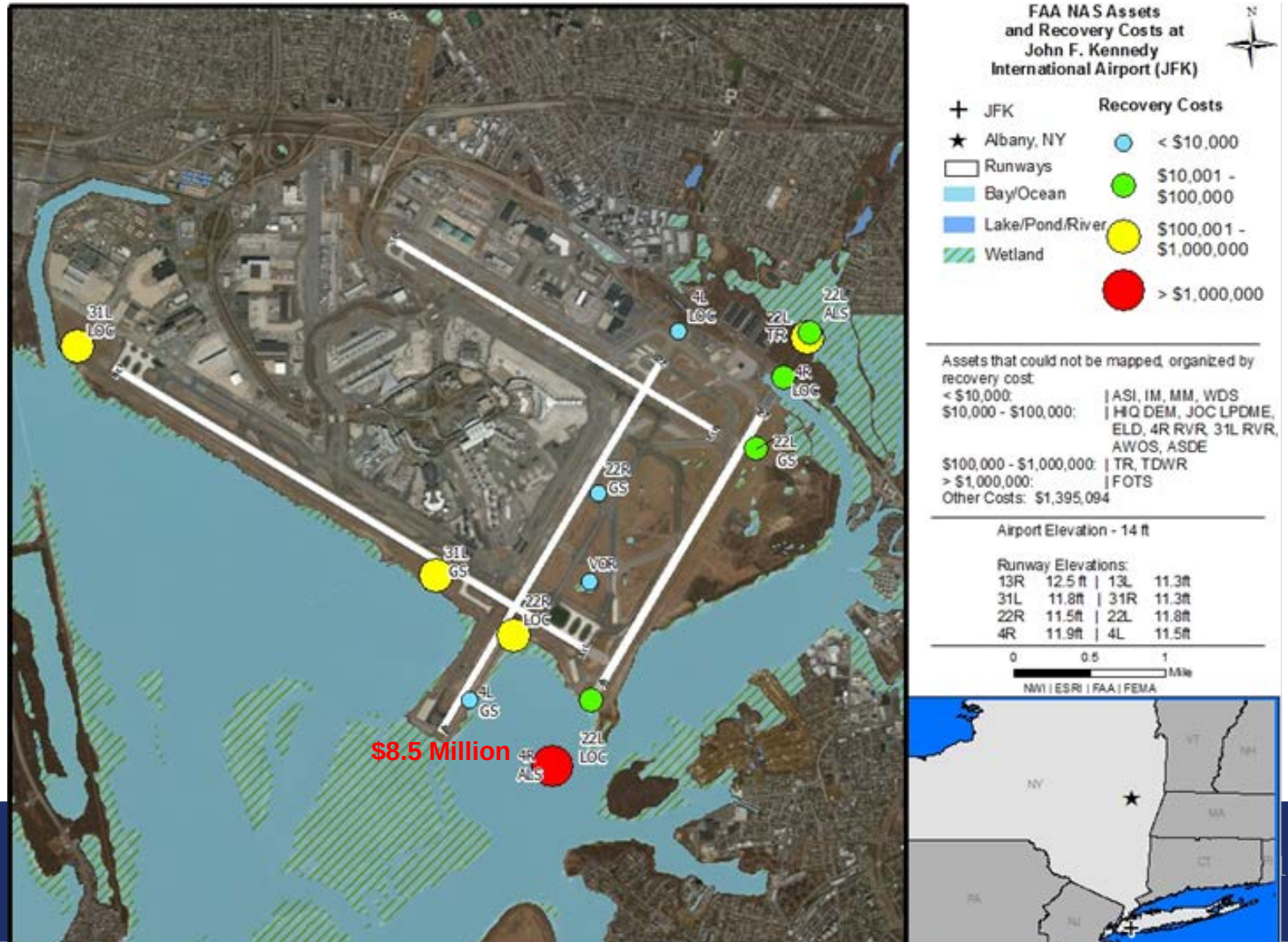
Note: GON is Groton New London Airport

Airports with "extraordinary" NAS Asset Recovery Costs (greater than $1M)

Airport	Location	Total Enplanements (2012)	Total Operations (2012)	Recovery Cost
John F. Kennedy International Airport (JFK)	New York, NY	24,520,981	409,916	$13,578,690
Groton-New London Airport (GON)	Groton, CT	118	35,534	$3,820,300
Newark Liberty International Airport (EWR)	Newark, NJ	17,055,993	421,175	$3,488,980
LaGuardia Airport (LGA)	New York, NY	12,818,717	374,253	$2,631,070
Barnstable Municipal Airport (HYA)	Hyannis, MA	95,717	107,711	$1,131,980

Note: "Greater than $1M" is a level of cost that ATO Tech Ops considers "extraordinary"

FAA NAS Asset Recovery Costs Map: JFK ($13,578,690 recovery cost)



Interviews with FAA ESA FIR Volunteers

Through interviews with ESA FIR Volunteers who were stationed at the airports with extraordinary impact costs, we learned:

- **Pre-storm preparation activities were critical to post-storm recovery**
  - Established communication and coordination processes
  - Site preparation
- **Steps for recovery following the storm at each location:**
  - Assess the impacts
  - Prioritize Recovery (power, communication, navigation)
- **Availability of secondary power sources was critical to efficient recovery**
  - Portable generators and fuel
  - Fuel for employee vehicles
- **ESA FIR Volunteers were enthusiastic about sharing experiences and lessons learned and saw immediate value in the report concept**

Challenges to Recovery

There were multiple challenges to the asset recovery process, including:

- Inaccessibility of sites
- Commercial power outages
- Access to generators and fuel
- Decontamination requirements
- Volume of need

Potential Next Steps for Case Study

- Consideration of infrastructure impacts to airport assets
- Consideration of operational impacts to air traffic, airports, and air carriers
- Consider Climate Change Impacts

Contact Information

Andrea S Freeburg

Office of Environment and Energy

Federal Aviation Administration
Washington, DC

(202) 267-3985

andrea.s.freeburg@faa.gov

Backup Slides

HYA ALS Pictures

Airports with "high" NAS Asset Recovery Costs (greater than $100K and less than $1M)

Airport	Location	Total Enplanements (2012)[3]	Total Operations (2012)[4]	Recovery Cost
Atlantic City International Airport (ACY)	Atlantic City, NJ	663,142	75,018	$962,670
Sikorsky Memorial Airport (BDR)	Bridgeport, CT	235	61,911	$647,930
Philadelphia International Airport (PHL)	Philadelphia, PA	14,589,337	443,236	$326,680
Roanoke-Blacksburg Regional Airport (ROA)	Roanoke, VA	315,877	49,062	$158,460
Wilmington Int'l Airport	Wilmington, NC	392,155	50,811	$110,700

Note: "Greater than $100k and less than $1M" is a level of cost that ATO Tech Ops considers "High"